North Jersey Transportation Planning Authority

# Concept Development Report

## Hackettstown Bridge over Drain Weight Restriction Elimination Project

November 2020

NJTPA

NJTPA Freight Concept Development Program

Jacobs

## Disclaimer

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## About the NJTPA

The North Jersey Transportation Planning Authority (NJTPA) is the federally authorized Metropolitan Planning Organization (MPO) for the 13-county northern New Jersey region, home to 6.7 million people. It evaluates and approves transportation improvement projects, provides a forum for cooperative transportation planning, sponsors and conducts studies, assists county and city planning agencies and monitors compliance with air quality goals. The NJTPA Board includes 15 local elected officials representing 13 counties—Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union and Warren—and the cities of Newark and Jersey City. The Board also includes a Governor's Representative, the Commissioner of the New Jersey Department of Transportation (NJDOT), the Executive Director of NJ TRANSIT, the Chairman of the Port Authority of New York & New Jersey and a Citizen's Representative appointed by the Governor.

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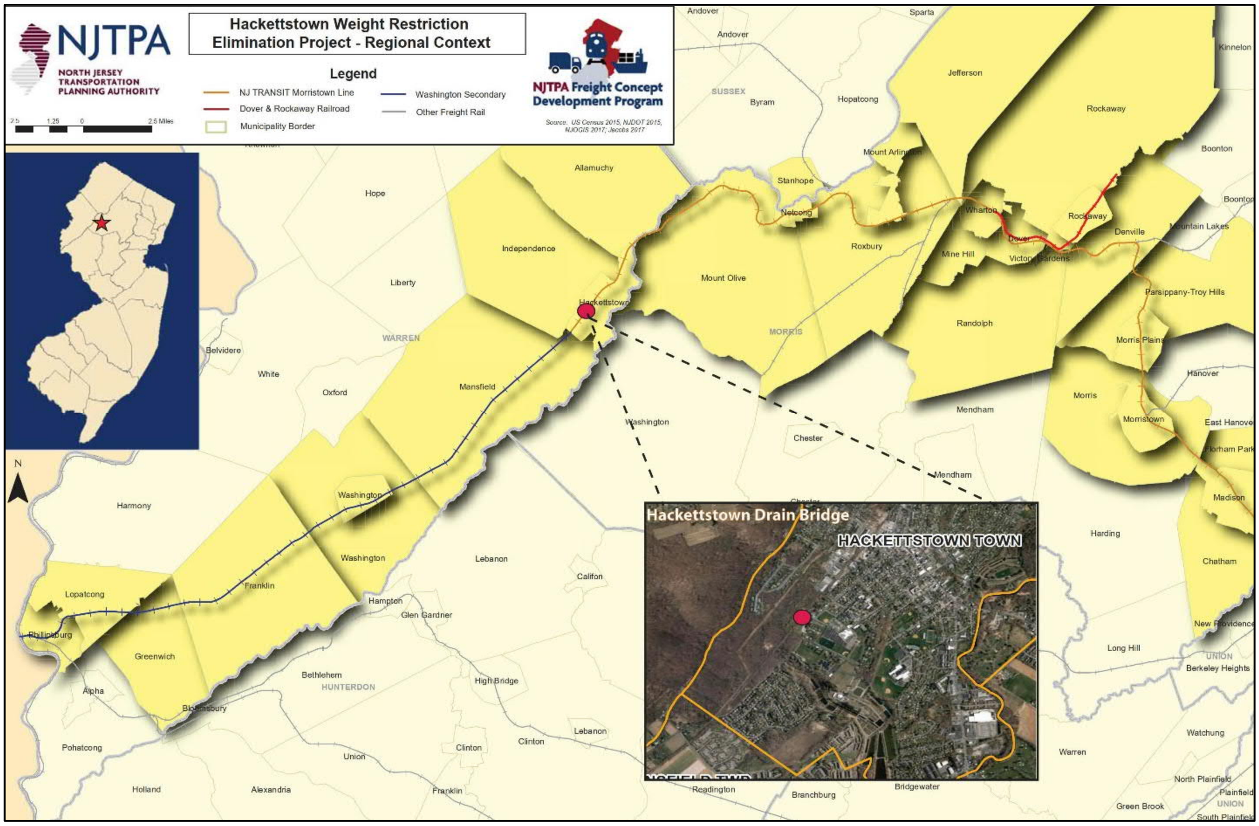
# 1. Introduction

The North Jersey Transportation Planning Authority (NJTPA) in partnership with Morris and Warren counties retained Jacobs Engineering Group Inc. (Jacobs) for the preparation of a Freight Concept Development Study to identify a preferred alternative to eliminate constraints to moving 286,000-pound (286K) railcars across the drain bridge located at milepost 57.25 on the Washington Secondary/Morristown Line Corridor (Washington Secondary). The Washington Secondary includes approximately 52 route-miles extending from Phillipsburg to Morristown and serves as the primary rail corridor for freight service to Warren and Morris counties. Depicted on Figure 1.1, the line provides rail freight access to four branch lines that serve businesses in Morris and Passaic counties.

Figure 1.1: Washington Secondary/Morristown Line – Drain Bridge Regional Context

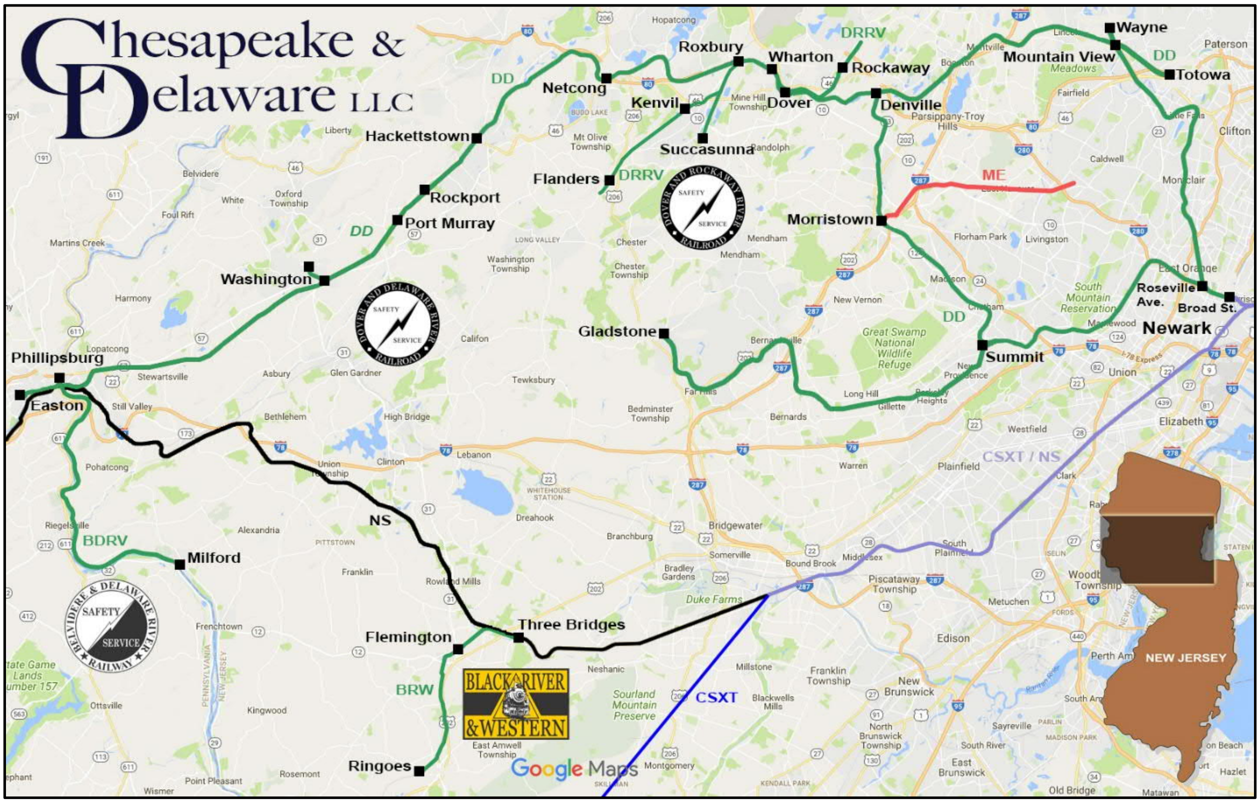


In addition to weight constraints, there are also height constraints along the corridor that limit the rail line's utility and ability to effectively serve the freight rail-served businesses located along the corridor and the connecting branch lines. The industry standard is Plate F or 17 feet in height. This report documents the study process, alternatives considered, public and stakeholder outreach, and coordination and recommendation of a preferred alternative that best meets the project purpose and need for advancement into design and construction at the drain bridge.

## 1.1 Existing Freight Rail Activity on the Washington Secondary

Freight service on the Washington Secondary is operated by the Dover & Delaware River Railroad Company, LLC (DD), a wholly owned subsidiary of the Chesapeake & Delaware, LLC. Another Chesapeake & Delaware subsidiary, the Dover & Rockaway River Railroad (DRRV) was formed in 2017 to operate and service customers along the three rail lines owned by Morris County—the Chester Branch, High Bridge Branch, and Dover & Rockaway Branch. In 2019, the DD leased the Washington Secondary from Phillipsburg to Hackettstown from Norfolk Southern, and replaced Norfolk Southern as the freight operator on NJ TRANSIT's Morristown Line from Hackettstown to Morristown and Montclair Line. Figure 1-2 depicts the DD and DRRV rail lines.

Figure 1.2: Chesapeake & Delaware, LLC - Dover & Rockaway River Railroad



Source: http://www.chesapeakeanddelaware.com/Railroads_DRRV.html

The DD and DRRV serve over 20 active industrial customers along the Washington Secondary and the connecting branch lines, delivering over 2,300 railcars annually. The ability to grow the service, attracting new and expanding existing rail-served businesses is dependent on upgrading the rail network to accommodate 286K, Plate F railcars. While the corridor is cleared to accommodate Plate F railcars from Phillipsburg to Denville, weight is restricted to 263,000-pound (263K) railcars, which puts industrial customers served by the corridor at a competitive disadvantage. While longer term repairs and upgrades to several bridges along the corridor are needed to facilitate unrestricted 286K service, a NJ TRANSIT inspection and rating of the drain bridge in Hackettstown indicates that the bridge is structurally insufficient to accommodate even a limited use by 286K railcars.

## 1.2 Predecessor Projects and Studies

Upgrading key rail corridors to accommodate 286K, Plate F railcars is fully consistent with the goals and priorities set forth in the NJTPA's current Regional Transportation Plan, New Jersey Department of Transportation's (NJDOT's) Statewide Freight Plan, as well as the additional plans listed below, which support investments in the rail infrastructure and eliminating weight and overhead clearance restrictions throughout the NJTPA region as well as New Jersey. Improvements to the rail service within the corridor would create opportunities for growing the existing rail-served businesses and attracting new rail-served developments which would, as a result, increase the number of jobs and economic vitality of the region. The need for and benefits of eliminating the existing weight restrictions were evaluated and documented in the following studies.

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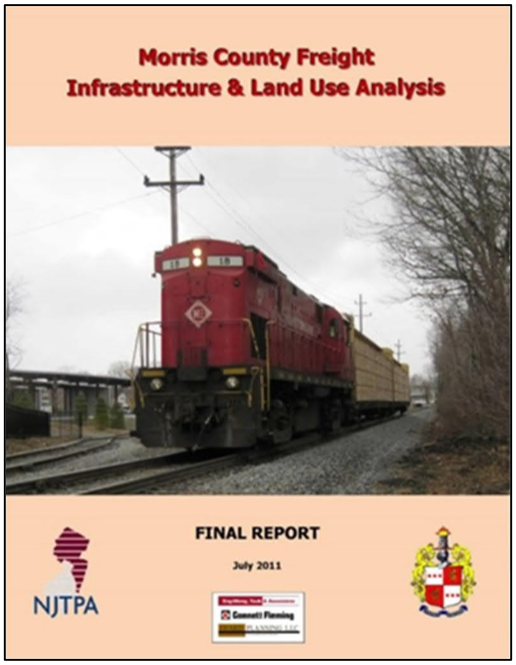
While focusing on infrastructure and land uses within Morris County, the study also identified a series of constraints within Warren County that effect the potential of freight rail to support and foster growth in Morris County industrial businesses, the jobs they create, and the associated economic value they bring to the county and New Jersey as a whole.



Morris County Freight
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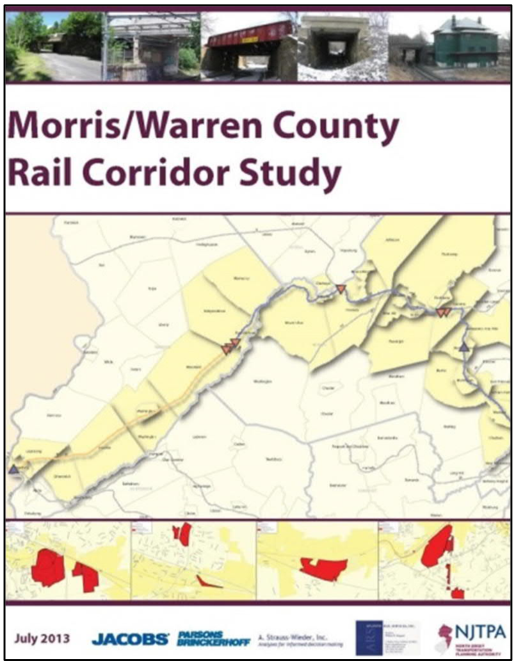

Morris/Warren County Rail Corridor Study

July 2013 JACOBS PARSONS BRINCKERHOFF A. Strauss-Wieder, Inc. NJTPA

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## 1.3 Existing Conditions

This drain bridge, located in the Town of Hackettstown, Warren County approximately 1,800 feet west of NJ TRANSIT's Hackettstown Station, consists of a single span concrete slab reinforced with encased steel rails supported on concrete/stone masonry abutments. The bridge carries two tracks, only one of which is active. The second track is in a deteriorated condition and is not serviceable. This bridge accommodates a mix of drainage pipes and stormwater runoff conveyed from the south side to the north side of the tracks.

The portion of the Washington Secondary between Dover and west of Hackettstown is owned by Norfolk Southern but is controlled and maintained by NJ TRANSIT. No passenger service is currently provided west of Hackettstown, with the only trains operating on this section and crossing the Drain Bridge operated by the DRRV through agreements with Norfolk Southern and NJ TRANSIT.

This bridge was most recently inspected by NJ TRANSIT in 2015. Key findings from the inspection report[1] are as follows:

- The superstructure is in fair condition. The concrete slab exhibits several fine transverse cracks with efflorescence throughout the length of the slab. There are several spalls and delaminations on the underside of the slab, partially exposing the moderately corroded bottom flange of six encased steel rails near the north end and nine steel rail bottom flanges near the south end.

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[1] Bridge Evaluation Survey Report, Morristown Line MP 57.25 Over Drain, December 31, 2015

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- The top concrete portion of the east abutment breast wall exhibits several fine vertical cracks throughout with minor scaling at isolated locations. The north wingwalls exhibit areas of missing mortar/small voids with heavy debris, moderate vegetation, and moss growth.

The inspection analysis concluded that the bridge was not suitable for the movement of 286K railcars.

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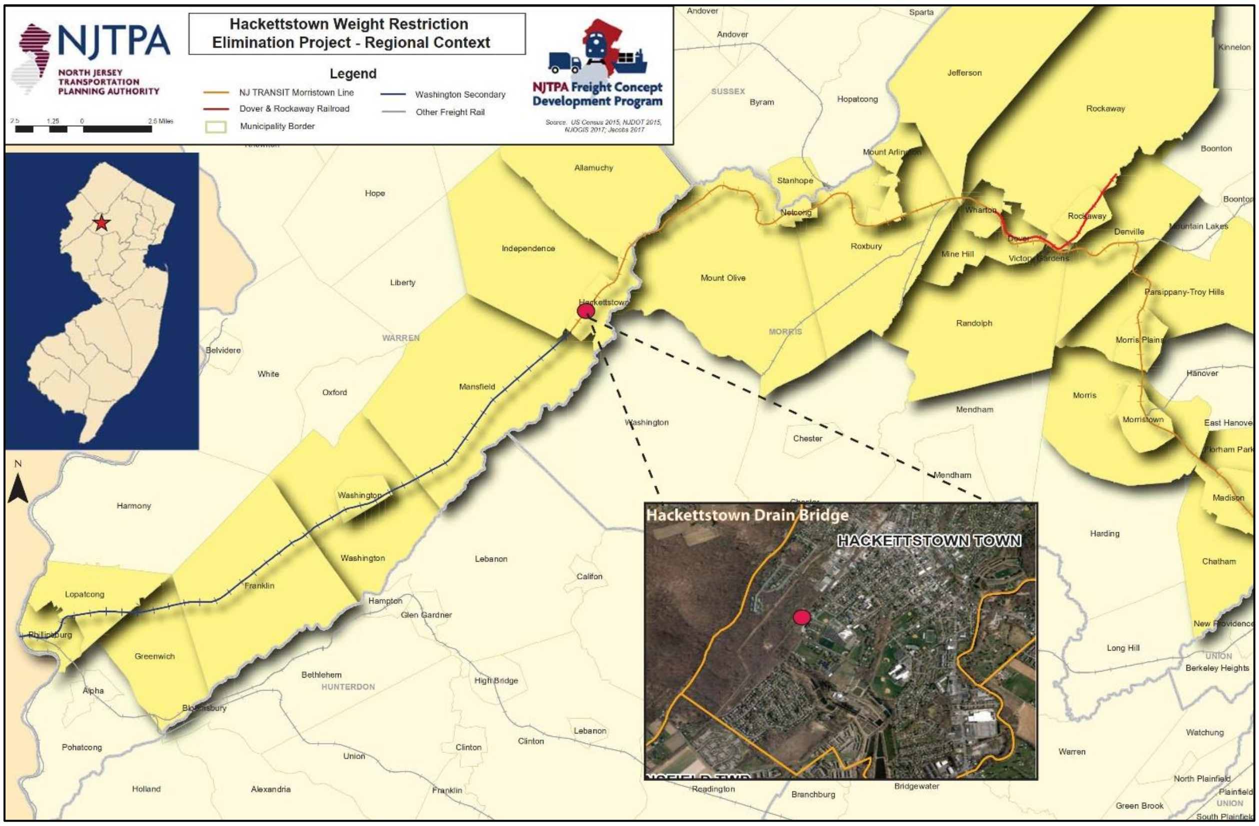

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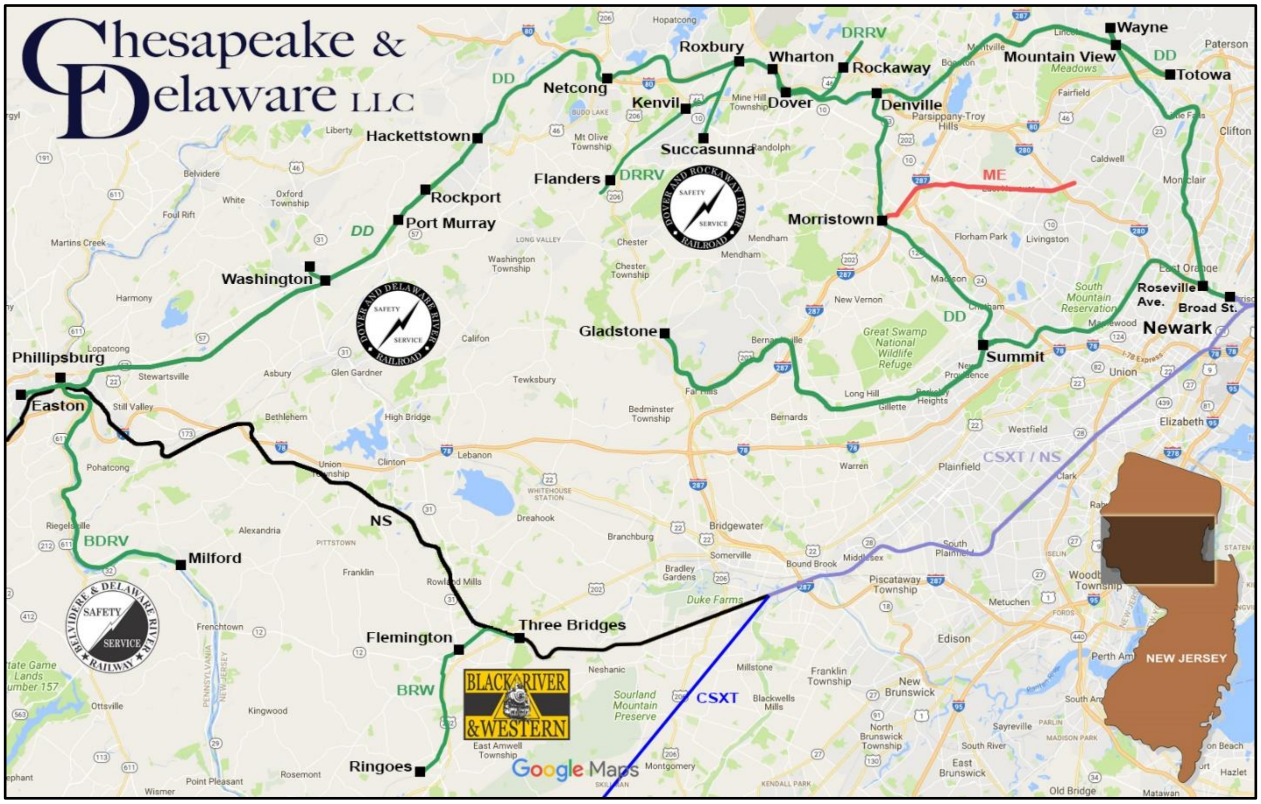

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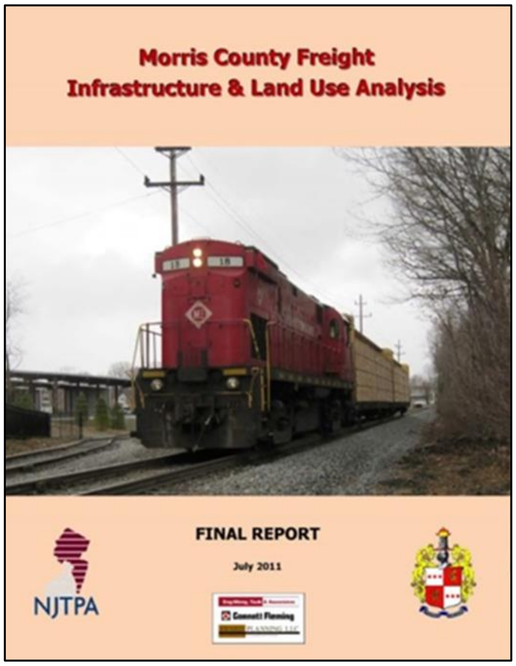

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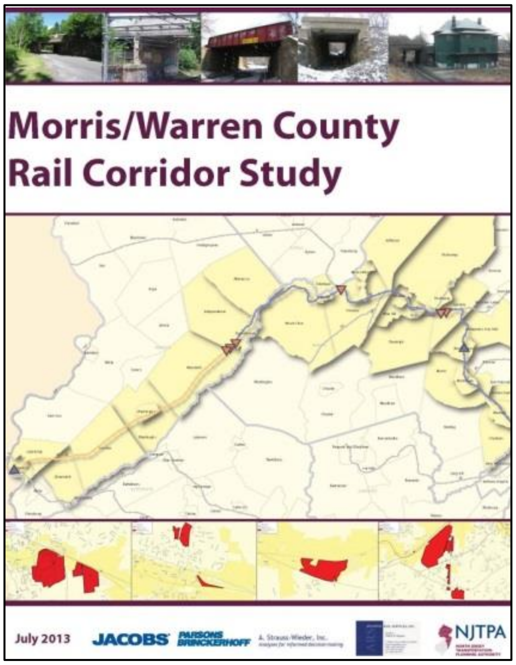

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## 2. Purpose and Need

The purpose of this project is to "provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement particularly the ability to accommodate the movement of 286,000 pound (286K) railcars over the Washington Secondary/Morristown Line in Hackettstown, New Jersey."

The primary goals of this project are to:

1. Enhance operational efficiency along the Washington Secondary/Morristown Line.
2. Support existing and future freight rail-related development.

Within each of these overarching goals, specific objectives are as follows:

1. Enhance operational efficiency along the Washington Secondary/Morristown Line.
    A. **Allow** the movement of industry standard 286K railcars along the Washington Secondary.
    B. **Support** economic competitiveness by allowing increased loading per railcar.

2. Support future freight rail-related development.
    A. **Reduce** the operational cost of rail movement along the Washington Secondary/Morristown Line for rail-served customers along the Washington Secondary and the branch lines to which it connects.
    B. **Promote** retention and expansion of existing rail-served industrial businesses in Warren and Morris counties.
    C. **Attract** investment in rail-served industrial development of vacant and underutilized industrial parcels along the Washington Secondary/Morristown Line and the connecting branch lines.

# 3. Environmental Screening

Concept Development is essentially a fatal flaws analysis performed early in the project delivery process to eliminate impractical and inefficient options and advance those alternatives that are more likely to be constructible. One critical aspect of the fatal flaws analysis is an assessment of potential for environmental impacts. Most impacts exist on a continuum, ranging from no effect to significant impact. While permits may be obtained and mitigation plans developed to address significant impacts, these permissions and ameliorative actions add substantial cost to the project budget, extend the project schedule, and can result in negative public perception and opposition of local governments to the project, which can jeopardize project funding. As a result, an environmental screening to identify environmental obstacles to consider in design is an essential step in the development of viable project alternatives.

The study area defined for the environmental screening is defined as the 0.5-mile radius from the drain bridge. The following sections describe the purpose, data, methodology, and results of each category considered under the environmental screening conducted for the Concept Development phase of project delivery.

# 3.1 Land Use

## 3.1.1 Purpose

Land use analysis considers whether a project alternative is compatible with existing, adjacent uses. Impacts and incompatibilities with certain land use features, such as freshwater wetlands, cultural resources, and environmental justice communities, are each discussed in their own sections later in this screening. The land use discussion in this specific section provides an overview of the land use character of the project area.

## 3.1.2 Methodology and Scope of Screening

### *Data Sources*

This screening uses New Jersey Department of Environmental Protection's (NJDEP's) 2012 Land Use/Land Cover Update (2/17/2015) (LU/LC 2012). Some field verification was conducted as part of study area site visits.

### *Analysis Methodology*

The geographic information system (GIS) data obtained from the NJDEP, and the New Jersey Office of Information Technology's Office of Geographic Information Systems (OGIS), were displayed on a GIS basemap of the project area and clipped to the study area buffer to reduce the total dataset to one that contained only pertinent data.

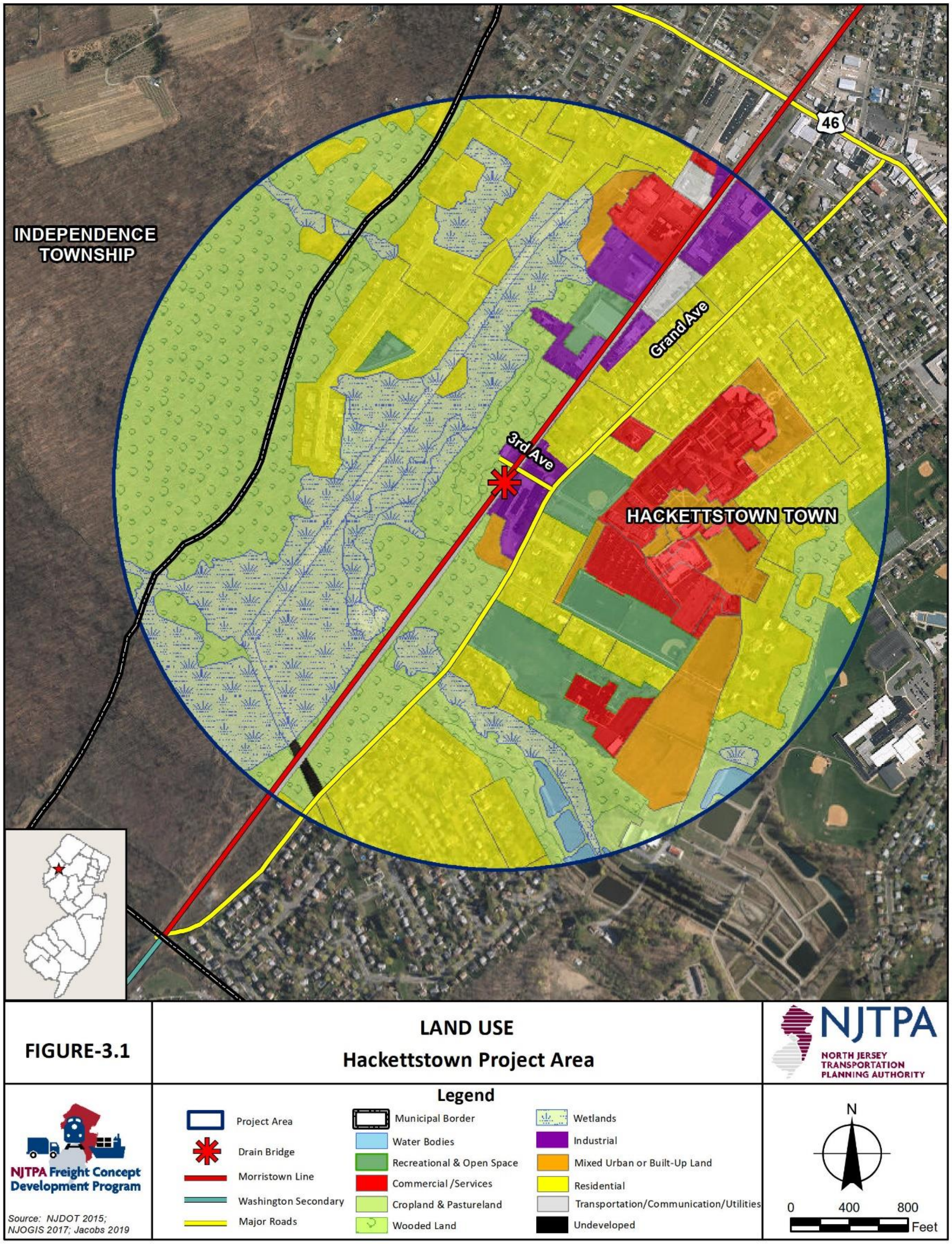
The screening involved desktop analysis with limited field reconnaissance, undertaken during field assessments for alternatives development. Once a Preliminary Preferred Alternative (PPA) is selected and advanced to preliminary engineering, site reconnaissance for a more detailed assessment of land use types may be performed, although all pertinent issues will likely be addressed as part of the field reconnaissance for the discipline areas discussed in the following sections.

## 3.1.3 Results of Screening

The drain bridge is located between wooded land and industrial uses within the Town of Hackettstown away from the commercial district (Figure 3.1). The industrial uses adjacent to the bridge include Hoff's Automotive, Lamb Printing, and Liquid Metalworks to the east and an industrial building to the west. The Morristown Line ends just to the north of the Washington Secondary at NJ TRANSIT's Hackettstown Station. Topography is typically flat within the area adjacent to the drain bridge.

There are no preserved open space areas, but several small public parks and recreational activities exist within the project area (refer to Section 3.4 for additional discussion of Section 4(f) and Green Acres issues). There are freshwater wetlands within the project area; however, it is not anticipated that the project would impact any freshwater wetland resource.

*Figure 3.1: Project Area Land Uses*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

## 3.2 Community Profile and Environmental Justice/Title VI

### 3.2.1 Purpose

The community profile is developed to identify environmental justice and Title VI communities and conduct an assessment to ensure the project does not have disproportionate impacts on these populations. Additionally, an understanding of community demographics is essential in ensuring that the public outreach plan is fair and inclusive.

In addition to looking at the study area’s population, this profile also includes information about community facilities such as schools.

### 3.2.2 Methodology and Scope of Screening

#### *Data Sources*

Community facilities were determined through review of resources provided online by the municipality, county, and state. The location of resources was verified through mapping tools such as Google Maps and Google Earth.

Population data was obtained from the US Census American Community Survey (US Census Bureau 2017) and updated US Census Tracts were provided through OGIS. Datasets obtained from the US Census and used in this analysis included the following:

- S0501: Selected Characteristics of The Native and Foreign-Born Populations
- DP03: Selected Economic Characteristics
- S0501: Populations
- S0103: Population 65 Years and Over in the United States
- S1601: Language Spoken at Home
- S1701: Poverty Status in the Past 12 Months
- B01003: Total Population
- B02001: Race
- B03003: Hispanic or Latino Origin
- B01001H: Sex by Age (White Alone, not Hispanic or Latino)
- S0101: Age and Sex
- B18102: Sex by Age by Hearing Difficulty
- B18103: Sex by Age by Vision Difficulty
- B18104: Sex by Age by Cognitive Difficulty
- B18105: Sex by Age by Ambulatory Difficulty
- B08141: Means of Transportation to Work by Vehicles Available

### *Analysis Methodology*

As noted, community facilities were determined through review of online resources and verified with mapping tools. For this assessment, minority constitutes the population that self-identifies as any of the US Census racial groups or combination of racial groups and/or Hispanic or Latino. In other words, an individual who self-identifies as one race and white but also Latino would be considered a minority. Non-minority is restricted to those who self-identify as being of one race, white, and neither Hispanic nor Latino.

The screen-level review of the community demographics considered the socioeconomic composition of the community in comparison to state, county, and municipality statistics and then examined the project area Census Tracts in more detail. This project considered the Census Tracts located within the 0.5-mile radius of the drain bridge, which includes the Town of Hackettstown and Independence Township. This analysis did not include smaller geographic area data, such as Census Block Groups or Blocks, because the available data did not provide a finer level of detail.

## 3.2.3 Results of Screening

Table 3.1 summarizes the comparative socioeconomic data. The following sections describe the numerical data in more detail and summarize some of the implications of these findings.

*Table 3.1: Project Area Demographic Data*

| **State of New Jersey** | | | | |
|---|---|---|---|---|
| Percentage of Population Self-Identifying as a Minority | 43.9% | | | |
| Percentage of Population Living at or Below the Federal Poverty Line | 10.7% | | | |
| **Project Area** | **Warren County** | **Town of Hackettstown** | **Independence Township** | **Census Tracts** |
| **Total Population** | 107,088 | 9,569 | 5,541 | 10,566 |
| **Racial and Ethnic Composition** | | | | |
| White | 89.4% | 84.7% | 92.5% | 90.7% |
| Black or African-American | 4.4% | 3.2% | 2.5% | 3.2% |
| Native American/Alaskan Native | 0.1% | 0.1% | 0.0% | 0.1% |
| Asian | 2.9% | 3.6% | 2.3% | 1.7% |
| Pacific Islander | 0.0% | 0.1% | 0.2% | 0.2% |
| Other Race Not Specified | 1.7% | 7.5% | 0.4% | 2.4% |
| Two or More Races | 1.5% | 0.8% | 2.2% | 1.7% |
| Hispanic/Latino of Any Race | 8.6% | 20.8% | 6.7% | 13.5% |
| Once Race, White, Not Hispanic/Latino | 82.9% | 71.8% | 86.8% | 80.3% |
| Total Minority Percentage | 17.1% | 28.2% | 13.2% | 19.7% |
| **Percentage of Population Living at or Below the Federal Poverty Line** | 8.2% | 14.2% | 3.5% | 10.4% |

| | | | | |
|---|---|---|---|---|
| **Percentage of Households with No Vehicle** | 6.2% | 10.1% | 3.1% | 4.1% |
| **Percentage of Workers Over 16 with No Vehicle** | 3.0% | 6.0% | 3.0% | 2.2% |
| **Language Proficiency** | | | | |
| Speak only English | 88.5% | 74.2% | 91.3% | 83.3% |
| Speak Spanish | 5.6% | 17.3% | 3.3% | 9.4% |
| Speak other Indo-European languages | 3.7% | 5.3% | 2.6% | 4.7% |
| Speak Asian and Pacific Island languages | 1.5% | 2.0% | 1.7% | 1.5% |
| Speak other languages | 0.7% | 1.3% | 1.1% | 1.1% |
| **Percentage of Population 65 and Older** | 16.5% | 14.6% | 12.1% | 13.1% |

### *Community Facilities & Resources*

Within the 0.5-mile radius of the project area, community facilities and resources are limited to an elementary school and a recreational facility. The Hatchery Hill Elementary School is located to the east of the Washington Secondary Line. Tannery Field, a sports ball facility, is owned by the Town of Hackettstown and located along 3rd Avenue to the east of the drain bridge. There are several houses of worships within the Town of Hackettstown, but they are located more than 0.5 mile from the project area.

The Hackettstown NJ TRANSIT train station is located north of the drain bridge at the intersection of Valentine and Beatty streets. It is the western terminus of the Morristown Line and the Montclair-Boonton Line with service to Hoboken Terminal or New York Pennsylvania Station. There is no NJTRANSIT bus service or other private bus service within the project area.

### *Race and Ethnicity*

As illustrated in Table 3.1, the Town of Hackettstown and the Census Tracts within the project area have a higher percentage of those who identify as a minority than Warren County, but significantly less than that of the State. Independence Township also has a higher percentage of minorities than Warren County, but less than that of the State.

### *Limited English Proficiency*

The percentage of English proficiency is fairly high within the project area. In the portion of the project area located within the Town of Hackettstown, 15.6 percent of the population reports having limited English proficiency, while that number is 3.3 percent in the portion of the project area within Independence Township, according to Census Tract data (Figure 3.2). Those who do not speak English exclusively speak Spanish and to a lesser extent Indo-European languages, Asian languages, and other languages. The portion of the population that speaks Spanish in within the project area located within the Town of Hackettstown is higher than that of Warren County. While limited English proficiency data only could indicate that multi-lingual outreach is necessary, a closer examination of the overall project setting, and context suggests that it is not necessary for this project.

### Poverty

The poverty rate within the project area is comparable to the average poverty rate for the State. The Town of Hackettstown reports a marginally higher poverty rate while Independence Township and Warren County report a lower poverty rate compared to the State (Figure 3.3). Overall, the poverty rate for the project area Census Tracts and adjacent municipalities is comparatively low.

### Mobility

A portion of households as well as working individuals over 16 within the surrounding project area do not have vehicles and may require alternative means of transportation. The percentage of households with no vehicles within the Town of Hackettstown is marginally more than that of Warren County. Similarly, the percentage of working individuals over 16 without vehicles within the Town of Hackettstown is also more than that of Warren County. Within the project area Census Tracts, both the percentage of workers over 16 with no vehicles and households with no vehicles are less than that of Warren County and the Town of Hackettstown. While there are no bus services available within the project area, the Hackettstown NJTRANSIT train station to the north of drain bridge provides an alternative means of transportation.

### Senior Population

The project area as well as the Town of Hackettstown also has a noteworthy portion of the population over the age of 65, 14 percent, which is slightly less than that of Warren County at 16.5 percent (Figure 3.4). Consideration for the senior population was a factor in outreach, public meeting locations, and meeting times. A range of methods employed for providing feedback took this into account, accommodating the capabilities and comfort level of this population. Social media may not be effective for reaching these residents. Legal advertising in local newspapers and posting of flyers in a variety of locations throughout the project area were employed to ensure a high level of dissemination of information to the entire population.

### Disability Status

Disability status was also examined as part of the demographic analysis to be certain that public involvement activities took into consideration of those that had mobility and sensory limitations. This data is summarized in Table 3.2. Overall disability percentages within the study area are comparable with that of Warren County and are low across all Census Tracts and Warren County.

Hearing impaired percentages in the project area Census Tracts are higher than that of Warren County, but only marginally. Visually impaired percentages in the project area Census Tracts are around 2 percent, which is comparable with Warren County.

Cognitively impaired percentages are also low at an average of 3.2 percent for the project area Census Tracts. Mobility impaired percentages follow a similar trend and the percentages reported for the project area Census Tracts are less than that of Warren County.

Public meetings were held in compliance with the Americans With Disabilities Act.

*Table 3.2: Disability Status in the Project Area*

| | | Hearing Impaired | | Visually Impaired | | | Cognitively Impaired | | Mobility Impaired | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Population** | **Total** | **%** | **Total** | **%** | **Population** | **Total** | **%** | **Total** | **%** |
| **Warren County** | 106,181 | 3,993 | 3.76% | 2,154 | 2.03% | 101,122 | 4,567 | 4.52% | 6,953 | 6.88% |
| **Project Area Census Tracts** | | | | | | | | | | |
| 313.01 | 5,531 | 234 | 4.23% | 93 | 1.68% | 5,332 | 89 | 1.67% | 165 | 3.09% |
| 314.02 | 5,018 | 383 | 7.63% | 104 | 2.07% | 4,705 | 222 | 4.72% | 278 | 5.91% |

*Figure 3.2: Percentage of Population with Limited English Proficiency*

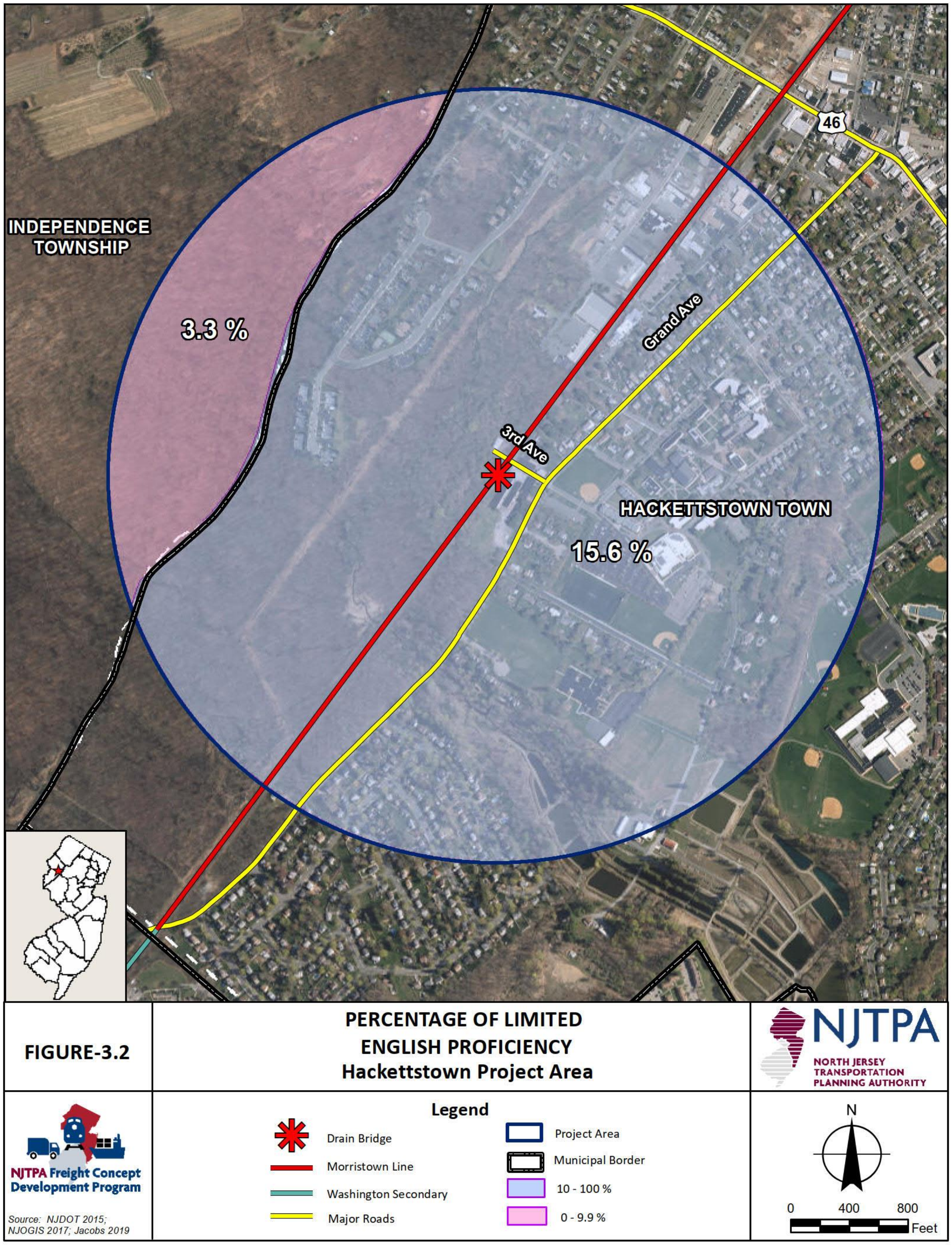
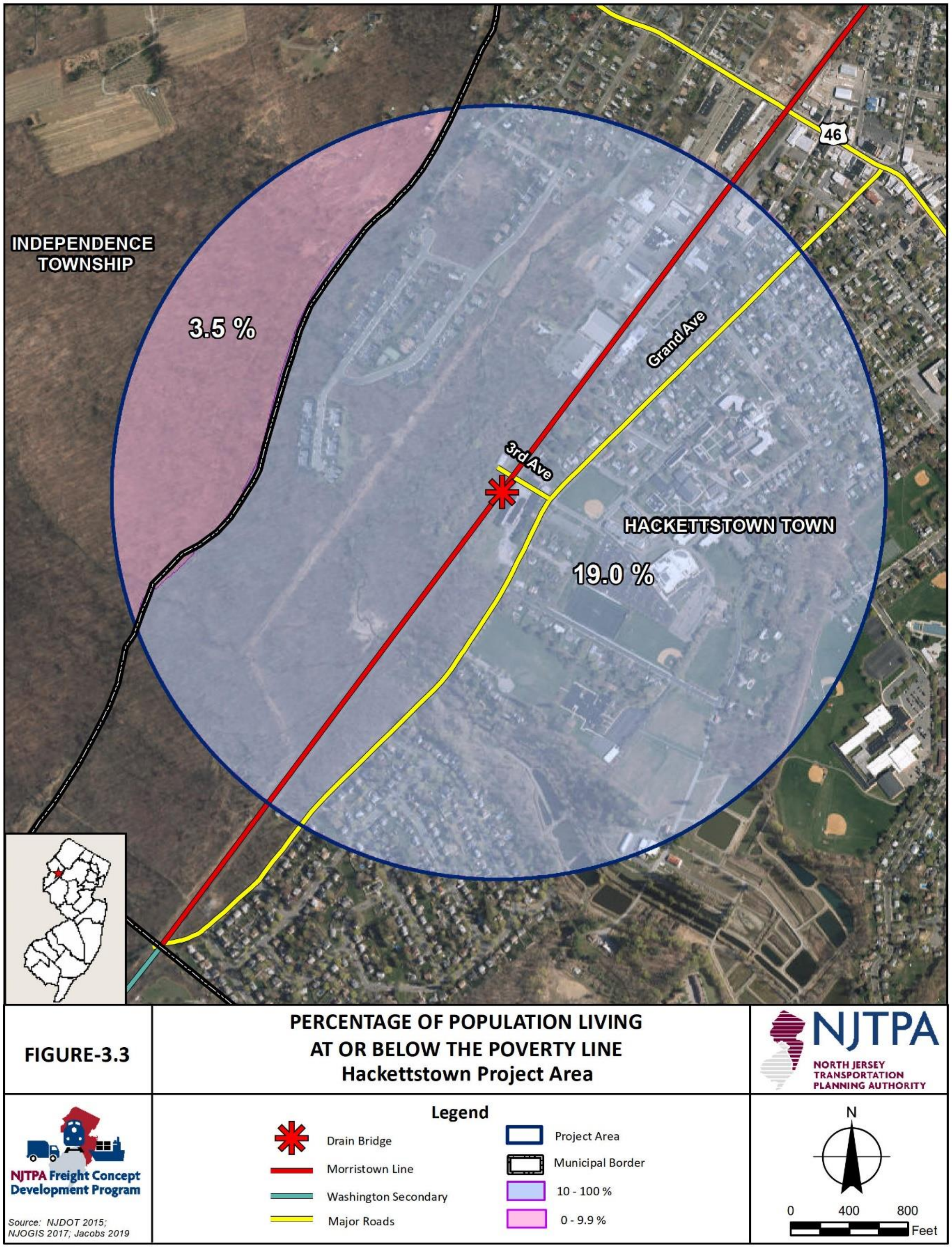
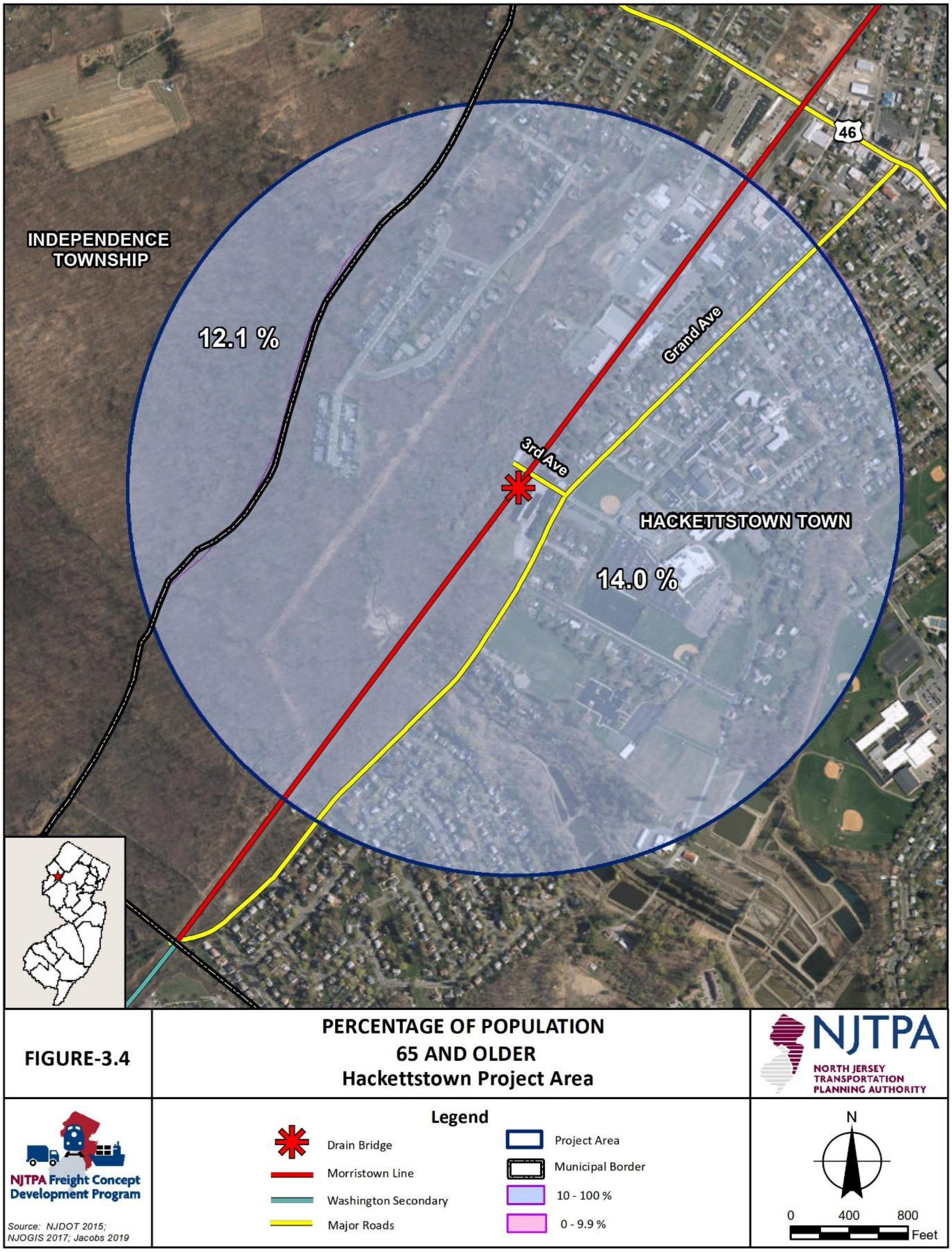


*Figure 3.3: Percentage of Population at or Below the Poverty*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

*Figure 3.4: Senior Population*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

## 3.3 Cultural Resources

### 3.3.1 Purpose

Federal regulations (36 Code of Federal Regulations 800—Protection of Historic Properties and the National Historic Preservation Act, Section 106 ) require federally funded projects to consult with State Historic Preservation Offices (SHPOs), Tribal Historic Preservation Offices (THPOs), Native American Tribes (Tribes), Native Hawaiian Organizations (NHOs) and other interested parties, identify historic properties, determine whether and how such properties may be affected, and resolve adverse effects.

Section 106 requires federal agencies to consider how projects affect historic properties. Historic properties are defined as any prehistoric or historic districts, sites, buildings, structures, or objects that are eligible for or already listed in the National Register of Historic Places (NRHP). Also included are any artifacts, records, and remains (surface or subsurface) that are related to and located within historic properties and any properties of traditional religious and cultural importance to Tribes or NHOs.

In accordance with these applicable regulations, a Cultural Resource Screening analysis was undertaken in the area surrounding the drain bridge. The goal of the screening was to identify known cultural resources in or near the project area. This includes known archaeological resources in the project area and historic architectural resources that are listed in, eligible, or potentially eligible for the New Jersey Register of Historic Places (NJR) and NRHP. The project area delineated for this screening used the maximum possible extent of proposed improvements at this location. The Cultural Resources Screening Report is presented in Appendix A with key findings summarized in Section 3.3.3.

### 3.3.2 Methodology and Scope of Screening

#### *Data Sources*

A range of data sources were reviewed for this screening. This review was supplemented by extensive field observations to validate the information assembled from the data review and identify any additional features that may not have been included in previous investigations.

#### *Analysis Methodology*

Tasks completed for the historic architectural component of the cultural resources screening included background research at the New Jersey Historic Preservation Office (NJHPO) to identify properties within approximately 0.5 mile of the project area that are listed in the NJR and/or listed in or eligible for the NRHP. Previously conducted historic sites inventories and regulatory surveys on file at the NJHPO were reviewed. The archaeological portion of this cultural resources screening consisted of background research at the NJHPO and the New Jersey State Museum to identify any registered archaeological sites as well as prior cultural resources surveys completed in or near the project area. The results of this screening were used in the Environmental Screening document.

### 3.3.3 Results of Screening

**Environmental Setting**

The project area is located within a floodplain topographic setting at elevations ranging from approximately 550 feet to 565 feet above mean sea level. The project area is situated approximately 300 feet east of Hackery Brook. Trout Brook, which passes south of the project area, and Hackery Brook converge approximately 845 feet southwest of the project area. Trout Brook is a tributary of the Musconetcong River, which drains into the Delaware River, the Delaware Bay, and eventually into the Atlantic Ocean. Vegetation within the project area consists of manicured grass east of the train tracks, with secondary-growth deciduous trees, undergrowth, and brambles west of the tracks.

The project area is located within the New Jersey Highlands Physiographic Province, bordered by the Kittatinny Valley to the west and the Piedmont Lowlands to the east (Wolfe 1977). The Musconetcong River Valley, in which Hackettstown is situated, is a rift valley that forms the boundary between the Western and Central Highlands sub-provinces. In general, the Highlands consist of northeast-southwest trending broad, rounded, or flat-topped mountain ranges separated by deep, narrow valleys (Wolfe 1977). Schooley's Mountain and Pohatcong Mountain, the flat-topped ranges surrounding the Musconetcong River Valley to the east and west, respectively, are remnants of the Schooley Peneplain. The project area is underlain by Allentown Dolomite, characterized by dolomite beds containing minor orthoquartzite and shale (Drake et al. 1996). Surficial sediments in the project area are mapped as Flanders till, characterized by middle Pleistocene and Illinoian-age glacial till consisting of non-quartzite gravel clasts deposited directly from glacial ice as a result of the Illinoian glaciation (Stone et al. 2002).

The specific soil type mapped in the project area west of the Washington Secondary is Washington silt loam, 0 to 3 percent slopes (WafA), which consists of well-drained soils situated on ground moraine landforms (NRCS 2018). Soils east of the Washington Secondary are mapped as Udorthents-Urban Land complex, 0 to 8 percent slopes (UdauB). Udorthents soils are characterized by well-drained loam or loamy sand situated on low hill landforms, while Urban Land is characterized by buildings, pavement, and other impervious surfaces overlying fill or disturbed natural sediments (NRCS 2018).

**Known Historic Properties**

Background research conducted at the NJHPO indicated that there is one previously identified historic resource eligible for listing in the NRHP within the project area: the Old Main Delaware Lackawanna & Western Railroad (DL&WRR) Historic District (SHPO Opinion: 6/7/2004 [Boundaries expanded to include Rockaway Loop]; prior SHPO Opinion: 9/24/1996). The Old Main DL&WRR Historic District is eligible for the NRHP under Criteria A and C for its associations with suburbanization, transportation (commuter, passenger, and freight traffic), engineering, and architecture (Guzzo 1996). The period of significance for the historic district dates from the mid-1850s to circa 1930.

Five previously identified historic resources listed in or eligible for listing in the NJR and NRHP fall within approximately 0.5 mile of the project area:

- Morris Canal Historic District (NJR: 11/25/1973; NRHP: 9/30/1974), located approximately 1,500 feet west of the project area.
- Hackettstown Historic District (DOE: 10/25/1979; SHPO Opinion: 2/5/1997), located approximately 525 feet northeast of the project area.
- Centenary Collegiate Institute (NJR: 4/20/1997; NRHP: 6/12/1997), located approximately 1,100 feet northeast of the project area.
- Jacob C. Allen House (NJR: 6/20/2005; NRHP: 8/23/2005), situated approximately 2,200 feet northeast of the project area.
- Hackettstown Iron and Manufacturing Company (SHPO Opinion: 12/21/1994), located approximately 2,000 feet southwest of project area.

**Registered Archaeological Sites**

A review of the New Jersey State Museum site files and standard references (Cross 1941; Skinner and Schrabisch 1913) indicated that there are no archaeological sites located within the project area, although multiple prehistoric sites have been identified within the Musconetcong River drainage basin. The project area does not fall within an archaeological site grid (NJ-LUCY 2019).

Three registered archaeological sites are located within 1 mile of the project area. The closest archaeological site, the Helms Property Site (28-Wa-626), is 0.8 mile east of the subject bridge and represents the location of an early 19th- to 20th-century homestead that contains a prehistoric component. The Helms Property is next to the Lewis J. Youngblood Grist Mill Site (28-Wa-625), the remains of a mid-19th- to early 20th-century gristmill on the west bank of the Musconetcong River. There is also a site (28-Mr-312) with prehistoric lithic scatter situated approximately 1 mile southeast of the drain bridge on the east bank of the Musconetcong River. This Helms Property is eligible for listing in NRHP (SHPO Opinion: 2/6/1997), however, the other two sites were assessed as not eligible. Several other registered prehistoric sites are situated along the banks of the Musconetcong River and its tributaries (Schrabisch 1917).

**New Jersey Historic Bridge Survey**

The MP 57.25 Bridge over Drain was not identified in the 1994 New Jersey Historic Bridge Survey (A.G. Lichtenstein & Associates, Inc. 1994).

**Planning Surveys**

The 1992 Warren County Cultural Resources Survey identified two historic architectural resources within the project area along the railroad right-of-way (ROW) (MAAR Associates, Inc. 1992). To the west of the railroad ROW on Block 41, Lot 20 is a 1.5-story vernacular warehouse built circa 1910. Adjacent to the east of the railroad ROW, the survey identified a factory complex at 700 Grand Avenue (Block 108, Lot 1) formerly associated with the Lackawanna Leather Company Hackettstown Plant. Both properties were recommended as potentially eligible for the NRHP as a larger historic district; however, the survey did not elaborate on the significance of the proposed historic district or whether it had any relationship to the DL&WRR (MAAR Associates, Inc. 1992).

In 1979, Drew University surveyed the Lackawanna Leather Company Hackettstown Plant as part of a Historic American Engineering Record inventory program for historic engineering and industrial sites in Warren and Sussex counties (Lefferts and Peifer 1979). At the time of documentation (1978-1979), the Lackawanna Leather Company Hackettstown Plant property consisted of a large, brick multi-tannery and processing plant with an office building, freight building, and water tower, with a wooden tank and boiler house. Built in 1901 and serviced by the DL&WRR, the Lackawanna Leather Company expanded the Musconetcong Valley tanning tradition to a factory organization (Lefferts and Peifer 1979). The company specialized in a patented enamel leather product. The inventory did not make any recommendations on the NRHP eligibility of the property.

### Cultural Resources Surveys

A review of the NJHPO files indicated that one prior cultural resources survey has been conducted within the project area and two prior surveys were conducted within a 0.5 mile radius of the project area. The RBA Group (Porter 2011) completed a cultural resources survey of the DL&WRR in Western New Jersey to satisfy a Memorandum of Agreement condition for a bridge replacement project. The survey served as a planning document comprised of a historical chronology of the DL&WRR and a comprehensive inventory of surviving resources and features along the former main line segments of the railroad west of Dover. The report identified the drain bridge as H-3 (DLW/Trout Brook Tributary Culvert) and recommended it as an eligible contributing resource to the NRHP-eligible Old Main DL&WRR Historic District. The NJHPO did not provide comments on the survey’s recommended NRHP eligibility of the drain bridge or any other recommendations made by the survey for other potentially contributing resources to the historic district. The NJHPO review letter indicated that the document satisfied the requirements stipulated in the Memorandum of Agreement and that any future determination of eligibility would require additional evaluation by the NJHPO, presumably when a resource was under review due to a more direct impact (Saunders 2001).

Two surveys of the Morris Canal to the north of the subject bridge identified no cultural resources within the project area (Eckhart 1975; Kleinedler 2003).

### Summary

#### *Archaeology*

No registered archaeological sites are located within the project area. There are three registered archaeological sites located within 1 mile of the MP 57.25 Bridge over Drain. The closest site, The Helms Property (28-Wa-626), is an NRHP-eligible (SHPO Opinion: 2/6/1997) prehistoric occupation and an early

19th- to 20th-century homestead site situated approximately 0.8 mile east of the subject bridge. Furthermore, multiple prehistoric sites have been identified within the drainage basin of the Musconetcong River and its tributaries. As a result, the project area for the MP 57.25 Bridge over Drain is generally sensitive for the presence of prehistoric cultural resources due to its proximity to Hackery Brook and its confluence with the Musconetcong River to the southeast.

*Historic Architecture*

There are six previously identified historic architectural resources listed in the NJR and/or NRHP or eligible for listing in the NRHP within 0.5 mile of the MP 57.25 Bridge over Drain; however, only one of these historic properties is within the project area: the Old Main DL&WRR Historic District (SHPO Opinion: 6/7/2004 [Boundaries expansion]; prior SHPO Opinion: 9/24/1996). Project impacts to historic properties should be considered during the preliminary engineering phase. The proposed project involves the possible removal and replacement of MP 57.25 Bridge over Drain (dated to 1910), a resource previously recommended eligible as a contributing element to the Old Main DL&WRR Historic District by The RBA Group in their 2011 cultural resources study of the DL&WRR (Porter 2011). The NJHPO has not made a formal determination of NRHP eligibility for the MP 57.25 Bridge over Drain.

Preliminary research uncovered two additional previously identified historic architectural resources within the project area: a warehouse (Block 41, Lot 20) and the Lackawanna Leather Company Hackettstown Plant (Block 108, Lot 1). The buildings associated with both resources are within the viewshed of the MP 57.25 Bridge over Drain.

A cultural resources survey for the MP 57.25 Bridge over Drain project may be required under Section 106, as amended, during the preliminary engineering phase.

## 3.4 Section 4(f) and Green Acres

### 3.4.1 Purpose

Section 4(f) of the Department of Transportation Act of 1966 prohibits the use of federal transportation funding for a project that impacts public open space, recreational resources, cultural resources, or waterfowl refuges unless it can be proven that no prudent and feasible alternative exists. The complexity of Section 4(f) analyses depends on the degree of impact to the resource. The most complex analyses are associated with physical taking of a protected resource and require an advertised public comment period, even if the project otherwise qualifies for a categorical exclusion under the National Environmental Policy Act.

In New Jersey, all projects, regardless of funding source, are potentially subject to NJDEP's Green Acres rules. Green Acres applies to a parcel of open or recreational space if its jurisdictional agency accepted Green Acres funding for *any* park, open space, or recreational project within its jurisdiction. Consequently, a ball field may be a municipal property and not preserved specifically, but if the township accepted Green Acres funding for the development of a nature center somewhere else within the municipal boundaries, the ball field becomes encumbered by Green Acres, as if it were itself deed-restricted.

The Green Acres process takes approximately 1 year to complete, requires public hearings and State Approval. Additionally, mitigation for parkland takes (known as "diversions" or "disposals" of Green Acres property) requires, at a minimum, acre-for-acre compensation in the form of a suitable parcel to develop as parkland or open space. In some instances, payment can be made to the county, but this approach requires an appraisal and the ratio for payment is always greater than the one-to-one acre replacement value. It can also be the case that Green Acres compensation ratio and requirements were established by the mechanism that funded the preservation of the parkland, which may be more restrictive than the Green Acres regulations, generally. This information is not always readily apparent and requires research and consultation with Green Acres.

Impacts to parks and open space resources can also be considered an environmental justice impact when viewed in the context of the project area's socioeconomic character and the occurrence of similar impacts elsewhere in the project area. It can be the case that operationally and from a design perspective, the use of a 4(f) resource is feasible and prudent, but it fails the environmental justice test. Consequently, it is best to avoid the take of parkland whenever possible.

### 3.4.2 Methodology and Scope of Screening

#### *Data Sources*

NJDEP's Bureau of GIS provided data on the location of open space in Warren County and the State. The NJDEP data did not include parcels that are municipally owned and subject to Green Acres. Consequently, a review of the NJDEP Recreational and Open Space Inventory (ROSI) was undertaken to determine whether the Town of Hackettstown participated in Green Acres. As described above, if Warren County or Hackettstown participated in Green Acres, all public open space owned and maintained by the participating jurisdiction is considered encumbered by Green Acres. The ROSI database provides block and lot numbers only; therefore, Google Earth imagery and NJDEP aerials were used to identify parkland resources within the project area that would be encumbered by Green Acres and likely subject to 4(f).

#### *Analysis Methodology*

The constraints map presents desktop-level reconnaissance using data made available by the resource agencies with jurisdiction over the resource. Field reconnaissance has not been performed to verify the spatial analysis findings. Field reconnaissance is recommended during preliminary engineering.

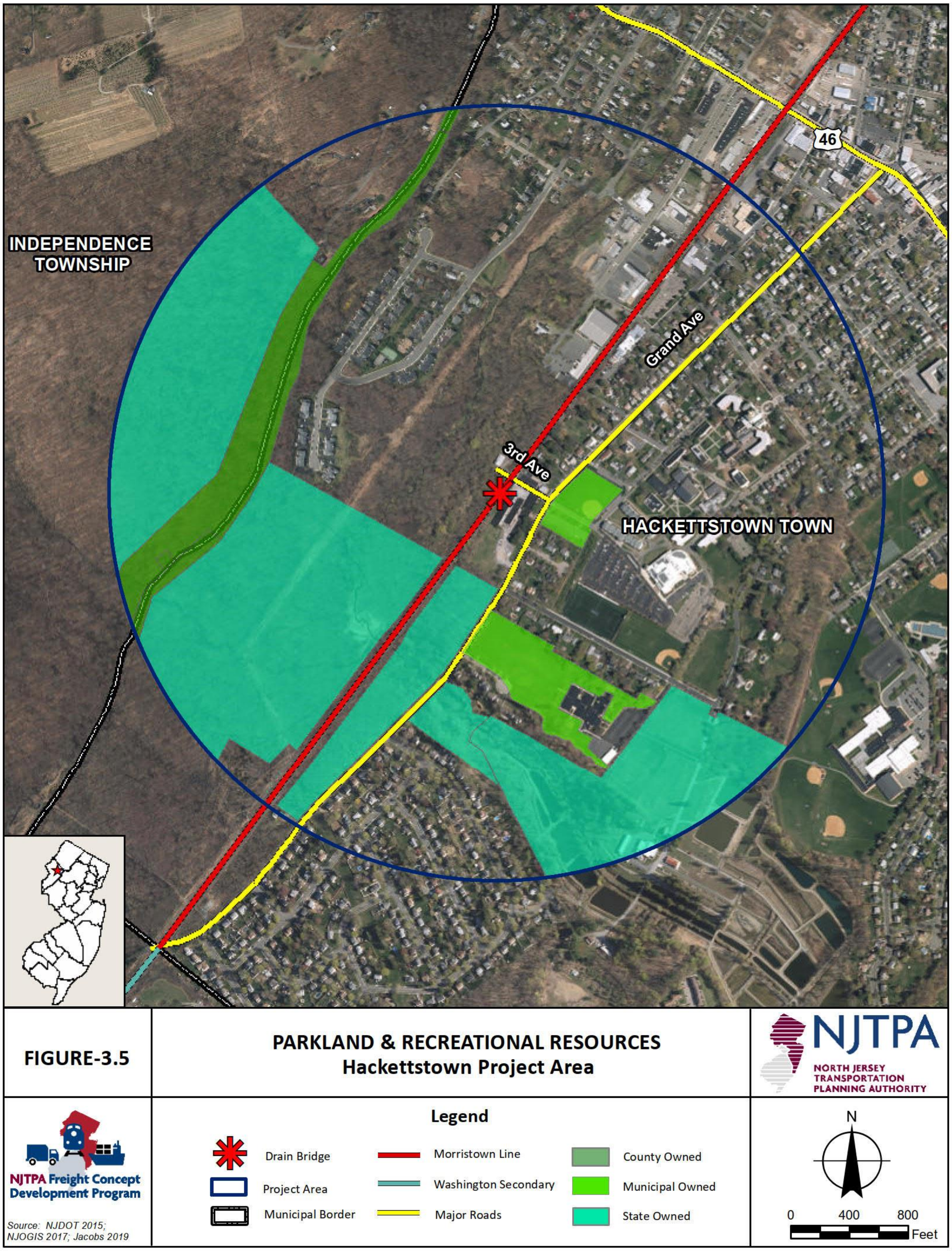
NJDEP data was displayed on an aerial basemap of the project area to determine if deed-restricted open space areas are located within the project area boundary. The ROSI database was used to indicate whether all potential parkland in a community should be considered encumbered by Green Acres and whether natural preserves were found in the project area. Google Earth was then used to identify parkland and recreational resources that were not deed-restricted. These were determined through identification of visual features, such as baseball diamonds, and with the assistance of the "Places" feature on Google Earth, which identified passive-use parks that are lacking obvious recreational amenities. Because Section 4(f) and Green Acres applies only to public resources, ball fields attached to public schools were considered constrained resources, but private resources, such as ball fields associated with private religious schools were not considered in the analysis.

Additionally, while cemeteries provide some amenities similar to passive-use parks, they are typically owned privately and not subject to Section 4(f) or Green Acres, and therefore not included in this screening. Cemeteries are often considered cultural resources and, if applicable, are addressed in the Cultural Resources section of the screening.

### 3.4.3 Results of Screening

The Town of Hackettstown received Green Acres funding for several parks, and specifically for facilities within the project area (Figure 3.5). As a result, any impact to the parkland/open space areas, including Tannery Field (located along Grand Avenue directly opposite from 3rd Avenue) and the Hatchery Hill Elementary School open space areas (further south along Grand Avenue) would be subject to the Green Acres process, and if the project is federally funded, Section 4(f). Note that impacts can include the acquisition of easements and any shared-use agreements where a new transportation use would involve parkland (including parking lots and other hardscape areas).

*Figure 3.5: Parklands and Recreational Resources*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

## 3.5 Air and Noise

### 3.5.1 Purpose

The purpose of an air quality screening is to determine whether the project is likely to contribute criteria pollutants to the project area and affect regional air quality. Air quality impacts are typically a concern for projects that increase the use of non-point sources of pollution, such as engines, through the addition of infrastructure capacity or through secondary impacts that adversely affect the efficiency of existing operations (i.e., causing additional traffic congestion).

Noise impact screening is directly associated with adjacent land uses and the potential for the project to adversely affect the use and enjoyment of certain categories of use. The purpose of the noise screening is therefore to identify sensitive receptors in the project area so that mitigation, whether through avoidance or physical noise abatement measures, can be factored into the design process.

### 3.5.2 Methodology and Scope of Screening

#### *Data Sources*

Air quality matters are under the jurisdiction of the United States Environmental Protection Agency (USEPA). The USEPA Green Book identifies states, counties, and regions within the United States where the levels of criteria air pollutants exceed the National Ambient Air Quality Standards levels. These areas, known as non-attainment areas, are required to implement plans to reduce the levels of criteria pollutants. Projects that could potentially contribute additional criteria pollutants are closely scrutinized and required to adopt control measures to help reduce the generation of these pollutants.

Noise standards are established by the Federal Highway Administration, a unit of the United States Department of Transportation. Projects funded with federal dollars are required to comply with noise abatement measures if a project will increase ambient noise levels above Federal Highway Administration standards, which vary depending on the affected use and the time of day.

Not all projects require noise analysis. Projects that change the elevation of a roadway or railroad (grade separation), move an alignment closer to sensitive noise receptors, add lanes, and result in similar substantial changes require noise studies. Projects that do not result in substantial physical alteration of a railroad do not require study.

#### *Analysis Methodology*

At the Concept Development stage of project delivery, air and noise analysis consists primarily of the awareness of impact triggers and prevailing regulations combined with a review of adjacent land uses and operational goals of the project. The analysis is therefore qualitative, not quantitative.

### 3.5.3 Results of Screening

The purpose of the project is to eliminate the weight constraint on the Washington Secondary corridor. This goal would see an increase in the weight capacity of each train, but not an increase in the number of trains using the Washington Secondary. Conversely, with additional weight capacity, it is conceivable that the trains operated along the Washington Secondary would involve fewer cars. As a result, the project in its final, build scenario is not anticipated to generate more criteria pollutants or noise than in the existing condition.

## 3.6 Freshwater Wetlands

### 3.6.1 Purpose

Freshwater wetland resources are an environmental constraint regulated by the NJDEP, and in some instances, the US Army Corps of Engineers. Wetlands provide a critical role in the maintenance of water quality for both surface and groundwater and provide habitat for multiple plant and animal species, many of which are migratory and may also be threatened or endangered. Consequently, environmental stewardship and ethical design require that impact to freshwater wetland resources be avoided whenever possible. In addition, NJDEP's freshwater wetlands regulations can be onerous and impose substantial mitigation requirements for permanent impacts to wetland areas if more than 0.1 acre (4,356 square feet) is disturbed. Project schedule and budget are therefore also better served by limiting impacts to wetlands. As a result, the identification of known (mapped) freshwater wetlands in the project area is an important component of overall constraints mapping and necessary in the development of project alternatives.

### 3.6.2 Methodology and Scope of Screening

#### *Data Sources*

The environmental screening for freshwater wetland resources relied on the most recent updates of NJDEP's freshwater wetlands data. Data were downloaded directly from NJDEP's Bureau of GIS website. Although NJDEP provides specific wetlands data for each county in the state, the data are based on aerial photography analysis from 1986. To provide a more accurate assessment of wetland resources, wetland data were derived from NJDEP's 2012 Land Use/Land Cover Update (LU/LC 2012, 12-26-19).

#### *Analysis Methodology*

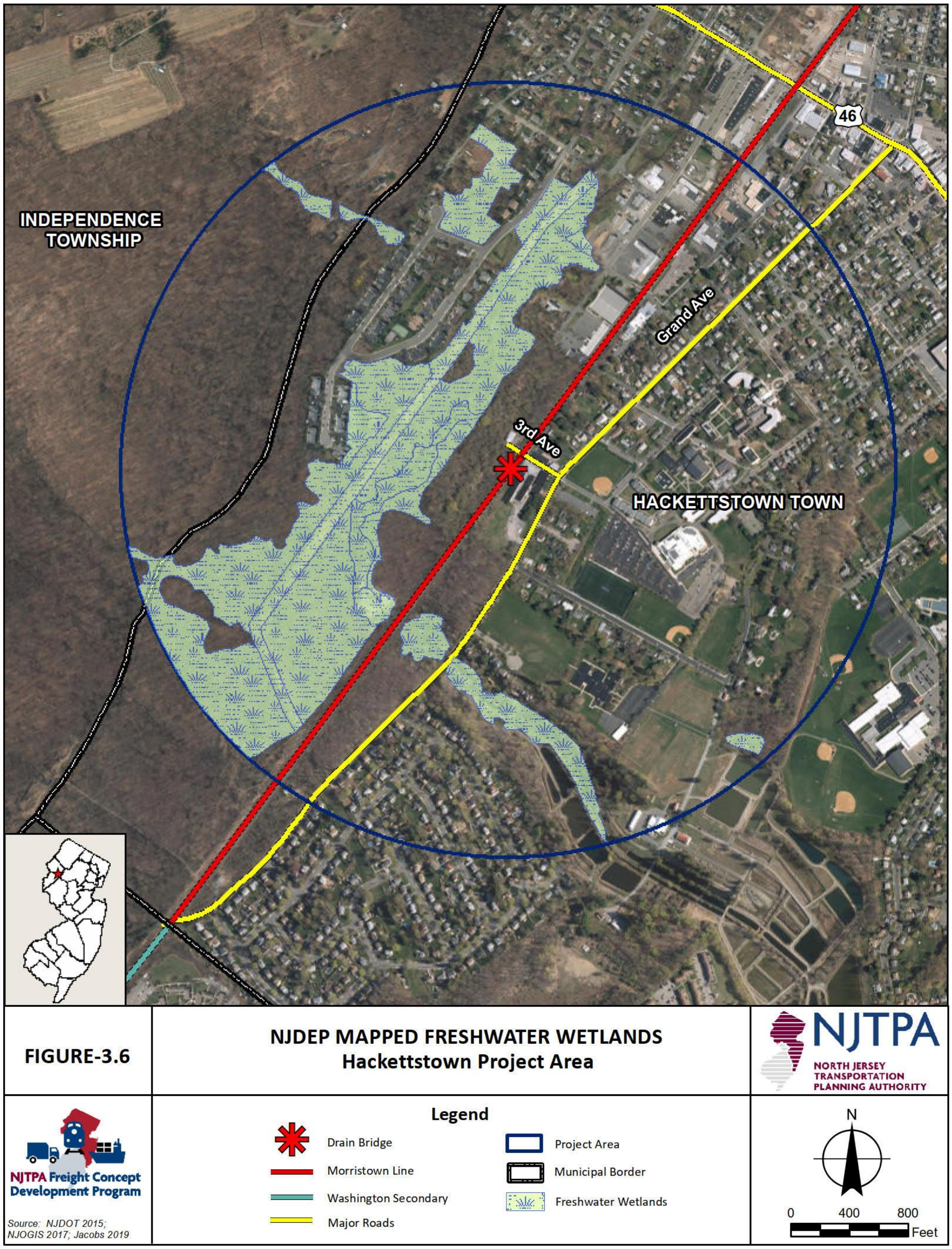
The GIS data obtained from NJDEP was displayed on a GIS basemap of the project area and clipped to the study area buffer to reduce the total freshwater wetland dataset to one that contained only the data pertinent to the study area.

The screening involved only this desktop analysis and is therefore limited to mapped freshwater wetland areas made known to NJDEP as part of their development of the LU/LC 2012 update. Field reconnaissance to identify new or previously undocumented wetland areas was not performed as this level of assessment is not typically required during the Concept Development stage. Once a PPA is selected and advanced to preliminary engineering, site reconnaissance for undocumented resources may be performed and, if necessary, wetland delineations may be performed.

### 3.6.3 Results of Screening

Freshwater Wetland resources have been identified within the project area (Figure 3.6). Deciduous wooded and deciduous scrub shrub freshwater wetland complexes are located to the west and south of the drain bridge. These freshwater wetland resources are not likely to be affected by the project, regardless of alternative selected, as the bridge is more than 300 feet east of the freshwater wetland complexes and the alternatives proposed would not have impacts beyond the existing ROW.

*Figure 3.6: NJDEP Mapped Freshwater Wetlands*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

## 3.7 Floodplains and Aquifers

### 3.7.1 Purpose

The goal of screening for flood hazard areas (FHAs) is to identify those sections of the study area that would be subject to design flood elevations (DFEs) that could consequently affect the overall design and cost of project alternatives.

FHAs are locations that are within the Federal Emergency Management Agency's (FEMA) 100-year flood zone, or Flood Zone A. Improvements constructed in FHAs are subject to NJDEP's FHA rules and design flood standards, which require that all improvements be constructed at the elevation equal to FEMA's DFE plus 1 foot. The DFE elevation varies based on topography, and for a large project area, there may be multiple DFEs.

Sole-source aquifers are critical drinking water resources and supply surface bodies of water. Identification of sole-source aquifers is important if a project is likely to involve excavation that would encounter groundwater.

### 3.7.2 Methodology and Scope of Screening

#### *Data Sources*

Flood hazard data were obtained from FEMA and represents 2012 data, which is post-Superstorm Sandy. NJDEP data made available through the NJ GIS clearinghouse provided the aquifer data.

#### *Analysis Methodology*

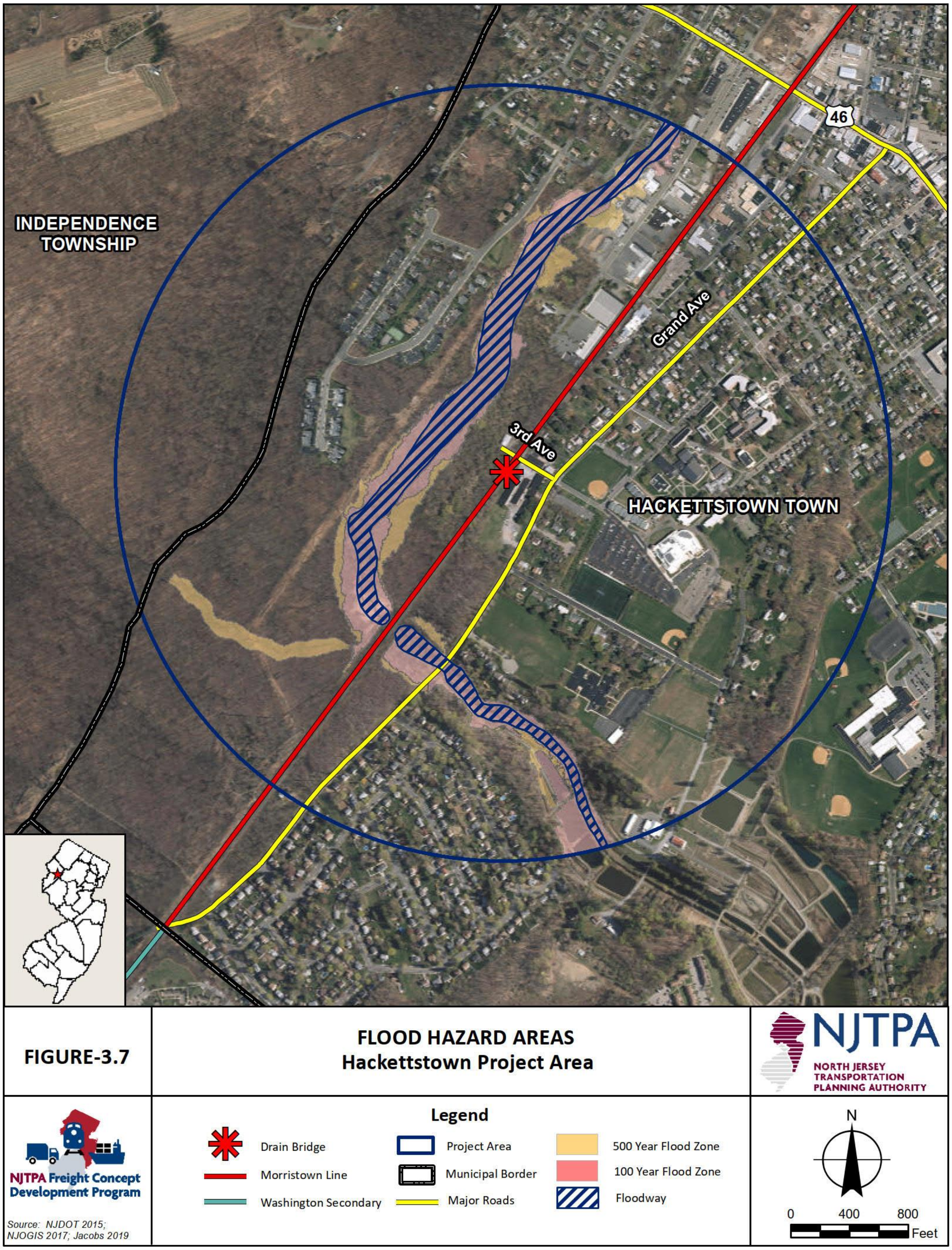
It is important to note that FEMA and NJDEP frequently update FHA data and design standards; consequently, during preliminary engineering, FHA data should be confirmed.

FEMA FHA data were displayed on an aerial basemap of the project area. The FHA dataset was clipped to the project area buffer and then displayed to differentiate between the flood zone types. The 100-year FHA is the area most likely to be inundated in a flooding event or, the 1 percent annual chance of flood. The floodway carries the storm discharge waters from the 100-year flood and includes the channel and often land adjacent to the channel. The 500- year flood zone is the area with a 0.2 percent annual chance of flood.

### 3.7.3 Results of Screening

Flood hazard in the study area overlaps with the identified wetlands within the project area (Figure 3.7). The drain bridge is located within the areas not historically subject to flooding. The 100-year and 500-year FHA of the Hatchery Brook are located to the south and west of the bridge and will not be impacted by the project.

*Figure 3.7: Flood Hazard Areas*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

## 3.8 Threatened and Endangered Species

### 3.8.1 Purpose

The purpose of screening for threatened and endangered species is to identify a constraint that can affect the footprint of the project, both during and after construction, and impact the construction schedule. Threatened and endangered species are regulated by the NJDEP and the United States Fish and Wildlife Service (USFWS). Disturbing, harassing, or taking threatened and endangered species is prohibited without a permit, and in the instance of takings, approval to permanently remove individual specimens requires extensive review and documentation proving there is no alternative to the destructive action. In addition to physical alteration of habitats and harm to individuals, impacts to threatened and endangered species also involve disruptive construction activity during those times of the year coinciding with critical lifecycle activity of the species, such as mating and nesting.

### 3.8.2 Methodology and Scope of Screening

#### *Data Sources*

The environmental screening for threatened and endangered species used NJDEP's latest update to their Landscape Project, Landscape Version 3.3, updated as of December 2019. Landscape Project data is grouped by physiographic province. The project area is in the Skylands province. The Landscape data provides information on the presence of habitat types known to support threatened and endangered species as well as reported sightings of individual specimens of protected species. Additionally, a review of the USFWS IPaC potential resource list was done to review any federally listed species that may be impacted due to the project.

#### *Analysis Methodology*

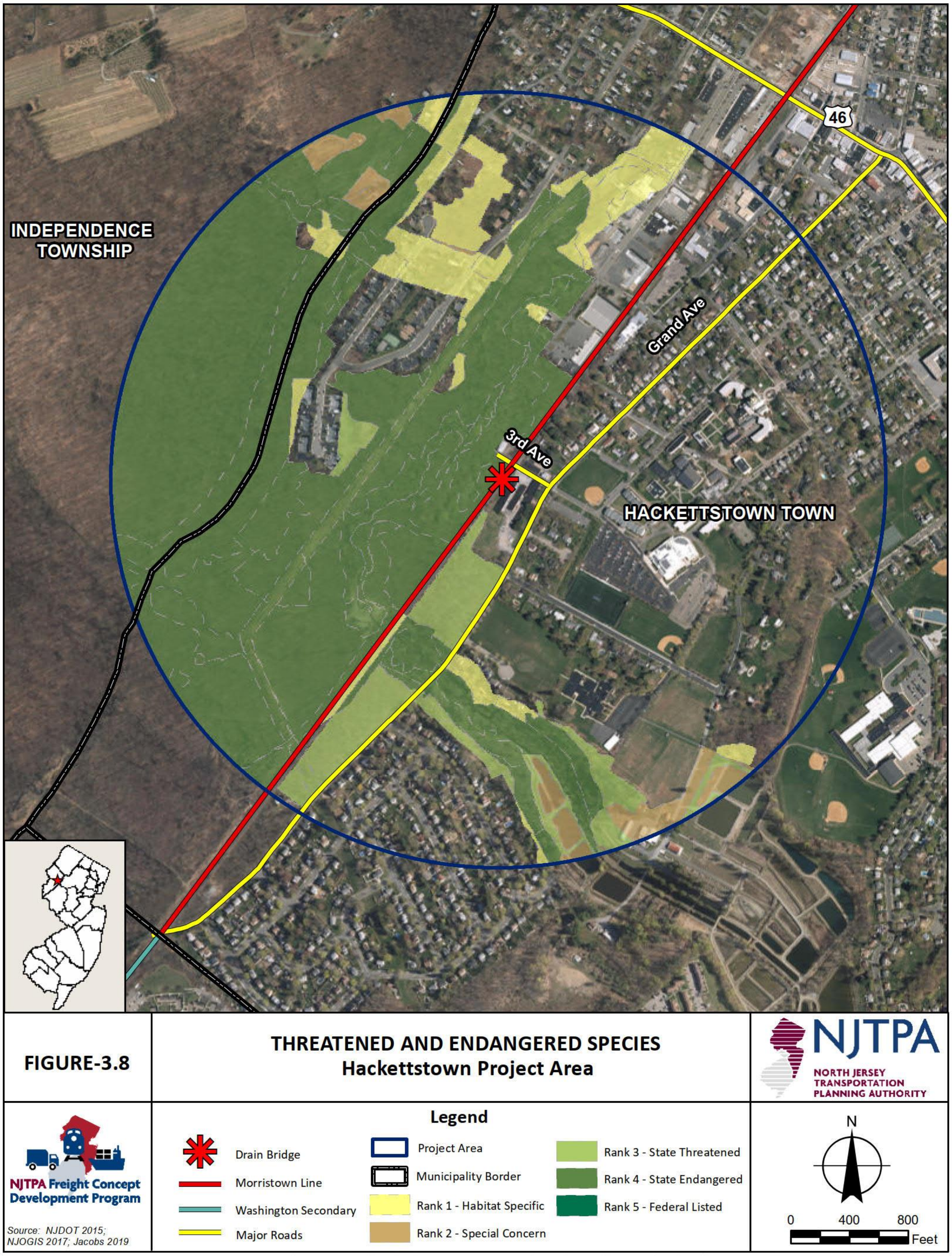
The GIS data obtained from NJDEP were displayed on a GIS basemap of the project area and clipped to the study area buffer to reduce the total dataset to one that contained only the data pertinent to the study area.

The screening involved only this desktop analysis and is therefore limited to habitats and sightings made known to NJDEP as part of the development of Landscape Version 3.3. Field reconnaissance to identify undocumented habitat areas and the presence of listed species was not performed as this level of assessment is not typically required during the concept stage of project development. Once a PPA is selected and advanced to preliminary engineering, site reconnaissance for undocumented resources may be performed.

### 3.8.3 Results of Screening

Landscape 3.3 data indicate that drain bridge is located adjacent to a Rank 3 threatened and endangered species habitats due to the woodland areas to the west of the bridge (Figure 3.8). The wood turtle (state threatened) and bobcat (state endangered) are two species identified to be present adjacent to the bridge. A review of the USFWS IPaC potential resource list identified the federally listed Indiana bat and northern long-eared bat as potential species that may be affected by the project. Removal of trees would need to be coordinated with NJDEP to adhere to species-specific timing restrictions, in order to avoid disturbing migratory bird and bat species that may be roosting in surrounding trees.

*Figure 3.8: Threatened and Endangered Species*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

## 3.9 Stormwater (Surface Water Quality)

### 3.9.1 Purpose

NJDEP regulates surface water bodies and the types of activities permitted within the stream channel and the riparian area (buffer). Surface waters of the highest quality that feed drinking water sources or are of exceptional fishery resources are designated Category 1 (C-1) waters. To protect these resources, NJDEP established a 300-foot riparian buffer, from top of bank, around all C-1 waters. Disturbance within the 300-foot riparian buffer is prohibited without permits issued by NJDEP, and only after proving that an avoidance alternative is not feasible. Consequently, screening for exceptional value surface waters identifies important environmental constraints that can have a substantial effect on alternative design.

### 3.9.2 Methodology and Scope of Screening

#### *Data Sources*

The environmental screening for stormwater/surface water quality used NJDEP's Surface Water Quality Standards (SWQS) data, updated in April 2020.

#### *Analysis Methodology*

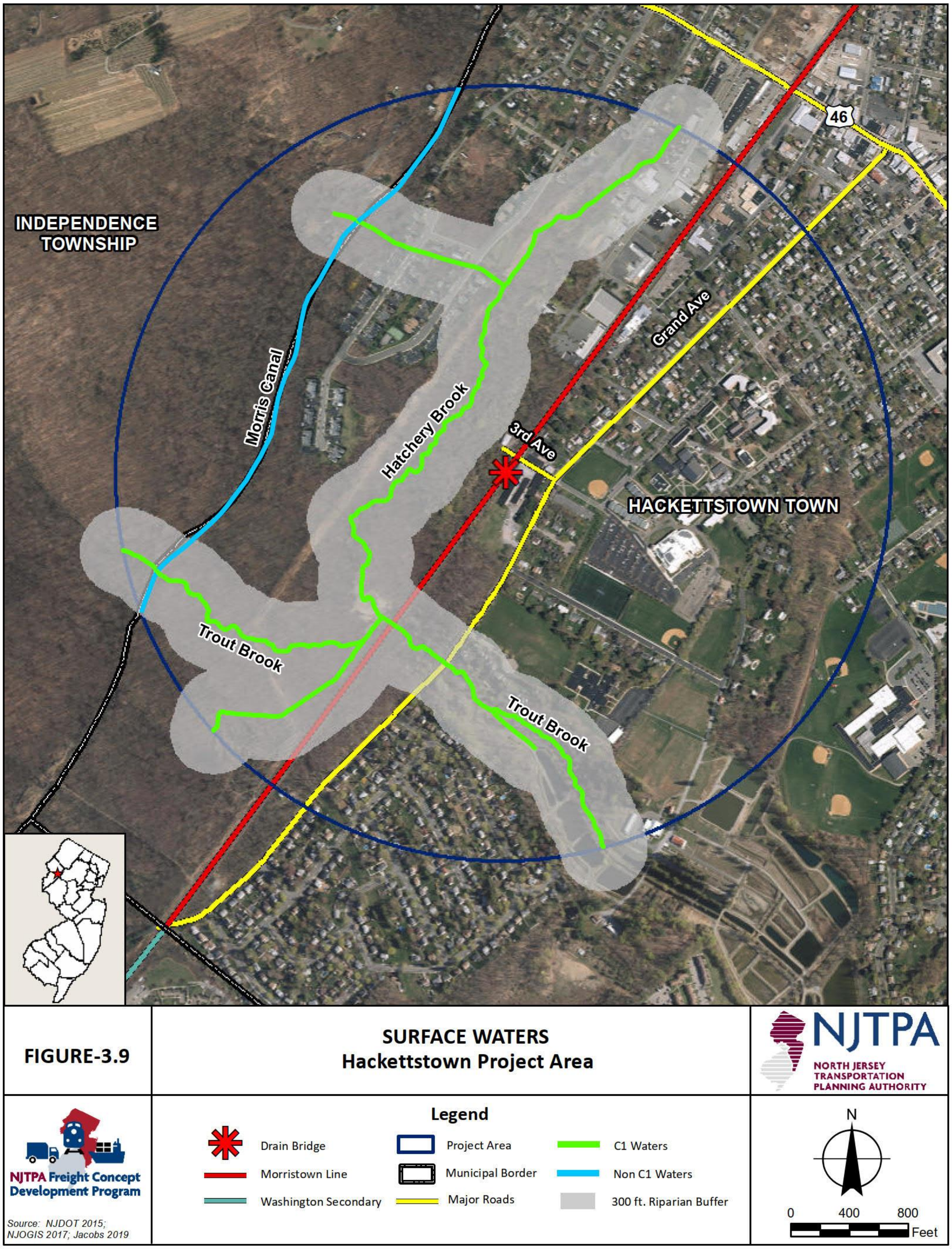
The GIS data obtained from NJDEP were displayed on a GIS basemap of the project area and clipped to the study area buffer to reduce the total dataset to one that contained only the data pertinent to the study area. Jacobs generated approximate 300-foot riparian buffers around all C-1 streams based off the SWQS information.

The screening involved only this desktop analysis. Field reconnaissance to delineate the streambanks is necessary to verify the buffer areas and channel. Once a PPA is selected and advanced to preliminary engineering, site reconnaissance may be performed.

### 3.9.3 Results of Screening

The Hatchery Brook is classified by the SWQS as a Freshwater 2, trout maintenance, category 1 (FW2-TMC1) water body, located west of the drain bridge (Figure 3.9). The brook is located more than 300 feet away from the existing drain bridge, therefore, the 300-foot riparian buffer will not be impacted by the prosed project. Two other surface waters, the Trout Brook (FW2-TMC1) and the Morris Canal (freshwater 2, non-trout [FW2-NT]) are also located within the study area. These resources will not be impacted by the proposed project as they are located more than 0.25 mile away (1,320 feet).

*Figure 3.9: Surface Waters*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

## 3.10 Hazardous Materials

### 3.10.1 Purpose

The intent of the hazardous materials screening is to identify documented areas of hazardous materials contamination within the project area, which are considered during alternatives development constraint analysis. Known hazardous materials locations are those that have been reported to NJDEP and are undergoing classification and study, remediation, or have been remediated but remain in the NJDEP database for real-estate risk analysis and deed-restriction purposes.

The identification of known hazardous materials contamination sites is important when planning construction-phase activities so as to protect worker and community health and safety. In the longer term, this identification is critical to the consideration of infrastructure alignment alternatives when new ROW will be acquired. Environmental regulations assign responsibility for remediation to the owner of a contaminated property, regardless of when the contamination occurred. Consequently, an alternative that would require the acquisition of multiple contaminated parcels would necessitate complex negotiations with the existing owners regarding remediation or would cause the future owner of the infrastructure to bear the cost of remediation.

Remediation activities can take years to complete, as well, particularly when contamination involves groundwater resources. While re-use of brownfield sites for infrastructure ROWs typically requires less complex remediation than required for other civic, institutional, or recreational uses, the time required to mitigate, document, and achieve the Response Action Outcome (RAO) still adversely affects the construction schedule for a project when compared to the development of properties that are not encumbered by existing contamination.

At the same time, it is important to note that some RAO restrictions limit the potential re-use of remediated land, presenting an opportunity for infrastructure development. Use as infrastructure ROWs, where environmental capping would not be disturbed or where access to contaminated groundwater is not a consideration, can be adaptive re-use and is a benefit to the community, returning brownfields to active use. Consequently, the identification of known contaminated sites can present a project benefit, not only an adverse constraint.

### 3.10.2 Methodology and Scope of Screening

#### *Data Sources*

The environmental screening for hazardous materials relied on the most recent updates of NJDEP's Site Remediation Program GIS data. Data was downloaded directly from NJDEP's Bureau of GIS website and included the following datasets:

- **Known Contaminated Sites List (KCSL)**. Updated 2020. This dataset presents all known contaminated sites in New Jersey geographically as point data and provides the Program Interest (PI) number for further investigation using the NJDEP Data Miner.

- **Groundwater Contamination Areas (CEA)**. Updated 2020. This dataset uses polygons to delineate areas where groundwater has been determined to be contaminated and unsafe for use as a source of potable water. Drinking water wells are prohibited within CEAs.

- **Deed Notice Extent Polygons**. Updated 2020. This dataset uses polygons to identify parcels that have received a deed notice to inform prospective owners that contamination exists on the property, the use of the property may be restricted as a result, and mitigation measures put in place on the property must be maintained.

- **Historic Fill.** Updated 2019. This dataset uses polygons to identify areas of historic fill covering more than approximately 5 acres. Historic fill is non-indigenous landform material intentionally deposited in an area at some point in the past. The composition of the fill material is generally unknown, and in many areas, fill contains contaminants from manufacturing processes, urban demolition, and mining.

### *Analysis Methodology*

The study area for the purposes of GIS analysis was determined to be a 0.5-mile buffer area around the concept alternatives explored in the *Morris/Warren County Rail Corridor Study* report. This buffer area was determined to be appropriate because based on existing topography, infrastructure, and development patterns, it is unlikely that a practical alternative would be developed further than 0.5 mile from the alternatives initially explored in the earlier study. The result was a polygon that contained all previously described alternatives and extended 0.5 mile beyond these alternatives in all directions.

The data obtained from NJDEP were displayed on a GIS basemap of the project area and clipped to the study area buffer to reduce the total statewide dataset to one that contained only the data pertinent to the study area. The attribute data included with the GIS dataset were used to identify the PI identifiers for each site within the study area buffer. The PI data were entered into the NJDEP Data Miner (https://www13.state.nj.us/DataMiner) to obtain a report of site remediation status. Site remediation status and case management or licensed site remediation professional (LSRP) contact information was recorded in a data table.

The screening involved only this desktop analysis and is therefore limited to known contamination sites as reported to NJDEP. Field reconnaissance to identify new or previously undocumented contamination was not performed as this level of assessment is not typically required during the concept stage of project development. Once a PPA is selected and advanced to preliminary engineering, site reconnaissance for undocumented sites of contamination may be performed.

Additionally, the data presented were derived directly from the NJDEP Data Miner and presented as retrieved from NJDEP. Follow-up interviews with the listed LSRP or case manager were not performed. Some data were missing from the NJDEP records for some sites. In these instances, a search through multiple site documents was performed to determine whether LSRP names or contact information existed elsewhere in the project record. In some instances, the data were not found in any of the records available on the Data Miner so it is identified with "not provided" in the tables in the following section.

Contaminated locations may appear in more than one dataset. For example, a location undergoing remediation involving contaminated groundwater where a groundwater exception area has been determined may be included in both the KCSL dataset and the CEA dataset. Deed-restricted properties that received a RAO may be included in both the deed restriction dataset and the KCSL dataset. Each site is counted only once in the assessment. The GIS mapping and data table indicate those situations where one location is included in more than one program.

### 3.10.3 Results of Screening

Inclusion in the NJDEP's database indicates that the regulatory agencies are aware of the contamination and a plan is in place or will be in place to remediate the site. Four known contaminated sites were identified within the project area. Additional detail on sites that received No Further Action or RAOs may be obtained through the Open Public Records Act. Table 3.3 lists the sites, their PI number, and status. Figure 3-10 illustrates the location of KCSL.

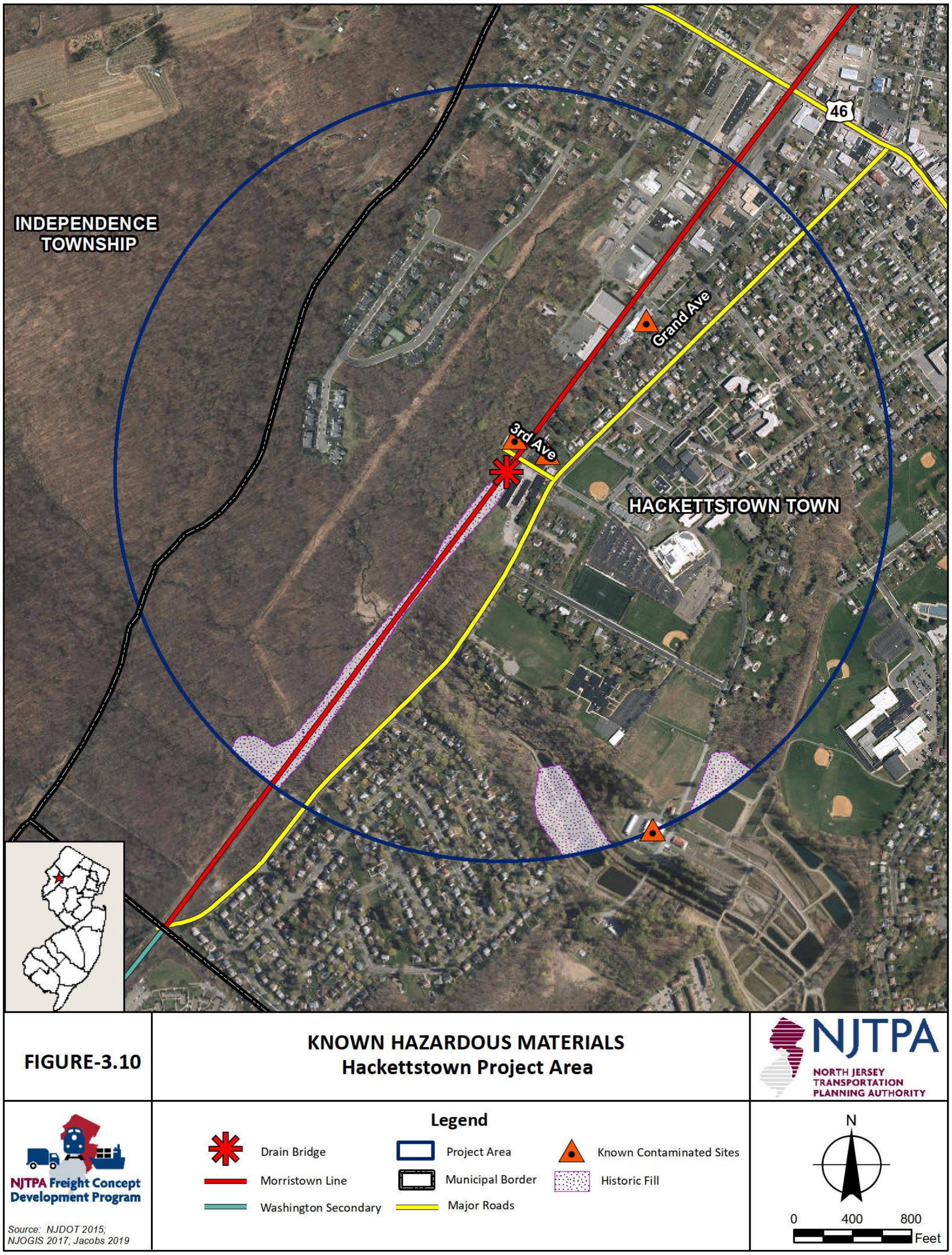
Groundwater contamination was the most common contaminated media, often the result of fuel oil spills or leaking underground storage tanks. Given that railroad ROWs are not uses that typically admit the public, disturb the soil, or draw groundwater, the presence of active remediation or NFA/RAO determinations should not be perceived universally as a fatal flaw in the development of project alternatives. Site-specific details pertaining to the nature of the contamination, remediation plan, and responsible parties will be critical in determining whether a KCSL site presents a significant enough obstacle to warrant avoidance in the development of alternatives. This more detailed level of investigation will occur during preliminary engineering.

The study area contains limited areas of historic fill found along the existing railroad corridors to the south of the drain bridge (Figure 3-10). This use of fill is congruent with the use of fill to even topography for land use development and to create or stabilize embankments for roadways and railroad corridors. Given the history of mining in the study area, it is more likely that the fill may include contaminants associated with mine wastes than from dredge material or urban demolition. The suitability of the fill will be determined during preliminary engineering.

*Table 3.3: Known Contaminated Sites in the Hackettstown Project Area*

| Site Name | Address | PI Number | Status |
|---|---|---|---|
| Hackettstown State Fish Hatchery | 23 Reese Ave | 014757 | Assigned to Program |
| General Graphics Corp. | 700 Grand Ave | G000002578 | LSRP Oversight |
| Gulick Oil Company | 100 102 3rd Ave | 285565 | LSRP Oversight |
| Middletown Leather Company Inc. | 600 Valentine St | 004541 | LSRP Oversight |

*Figure 3.10: Known Hazardous Materials*



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

# 4. Infrastructure Analysis

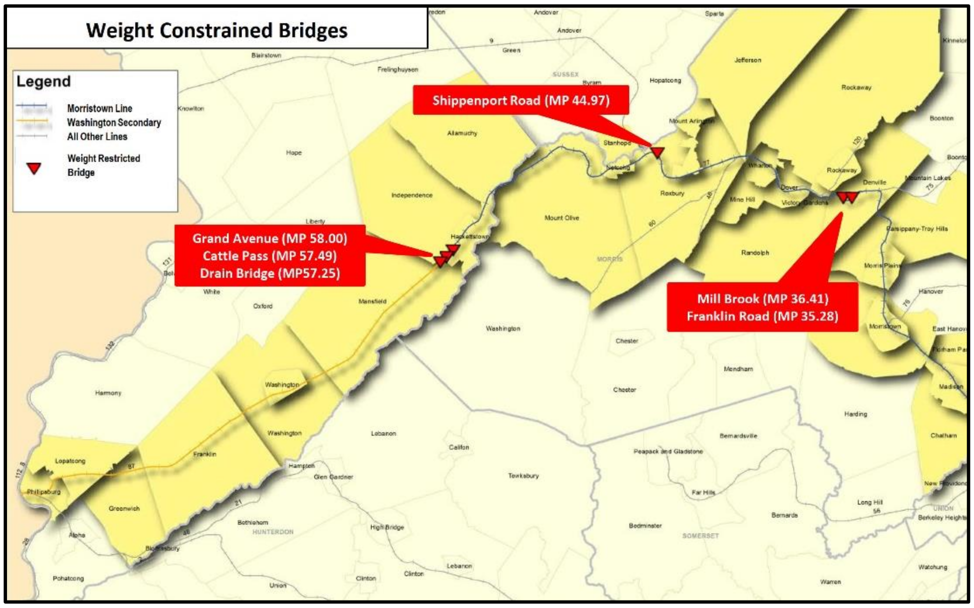
## 4.1 Existing Infrastructure

In previous studies of the Washington Secondary corridor between Phillipsburg, New Jersey and Morristown, New Jersey, a total of six structures were identified as being structurally insufficient to accommodate unrestricted movement of 286K railcars. These structures include:

- MP 58.00 Bridge over Grand Avenue (Hackettstown)
- MP 57.49 Cattle Pass (Hackettstown)
- MP 57.25 Drainage culvert (Hackettstown)
- MP 44.97 Bridge over Shippenport Road (Roxbury)
- MP 36.41 Bridge over Mill Brook (Denville)
- MP 35.28 Bridge over Franklin Road (Denville)

While all these structures require rehabilitation or replacement to accommodate unrestricted movement of 286K railcars, the bridges between MP 58.00 and MP 43.16 are critical for the movement of 286K railcars to service customers located along the three branch lines owned by Morris County. The remaining bridges, while important to the overall operation of the regional freight rail system, are located on the NJ TRANSIT Morristown Line east of the junctions with the Morris County-owned branch lines. These bridges are depicted on Figure 4.1.

*Figure 4.1: Weight Constrained Bridges*



Figures 4.2 through 4.11 depict the existing condition of the bridge surface, abutments, wing walls, and headwall.

*Figure 4.2: Cross Section - Looking West*

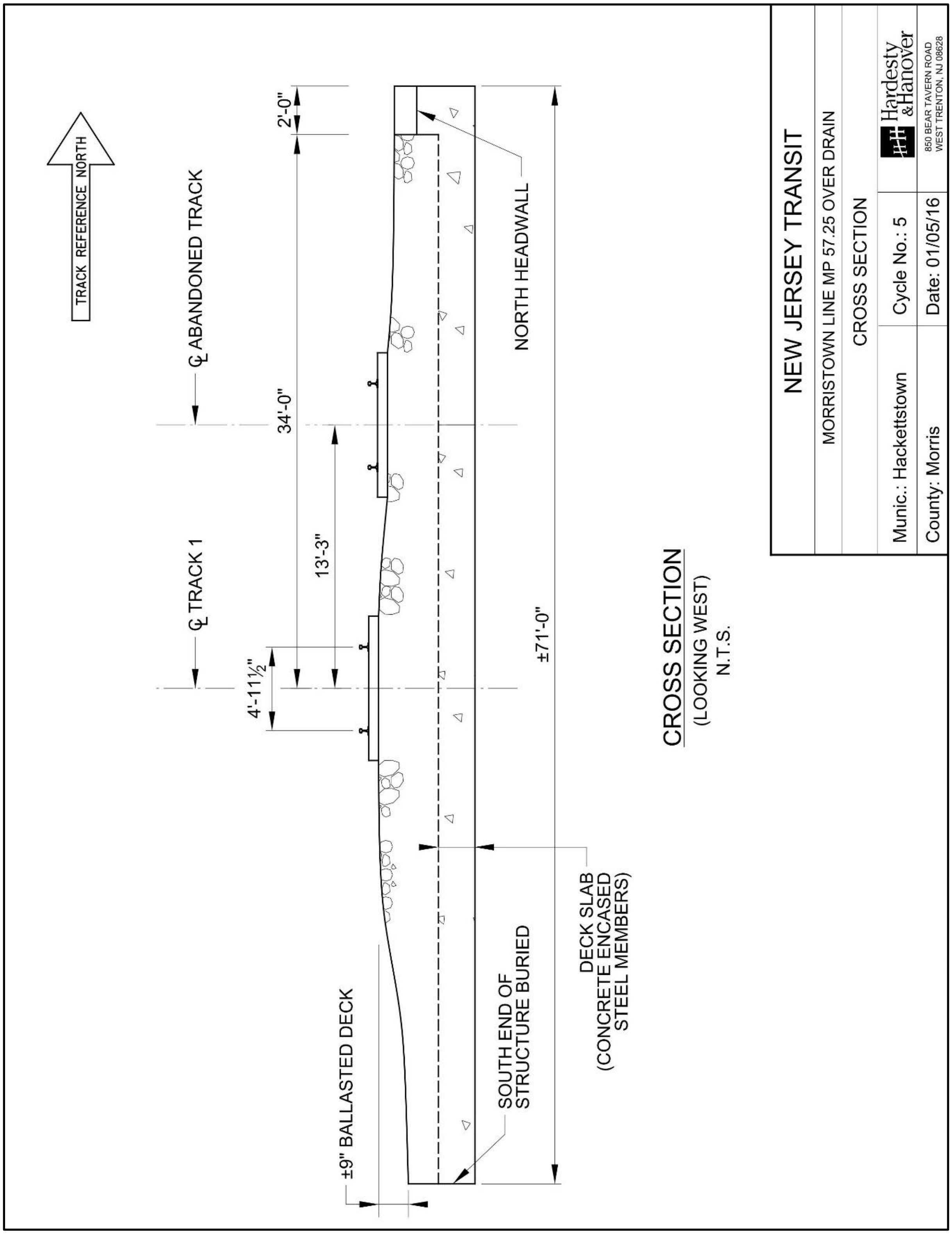


*Figure 4.3: Elevation - Looking South*

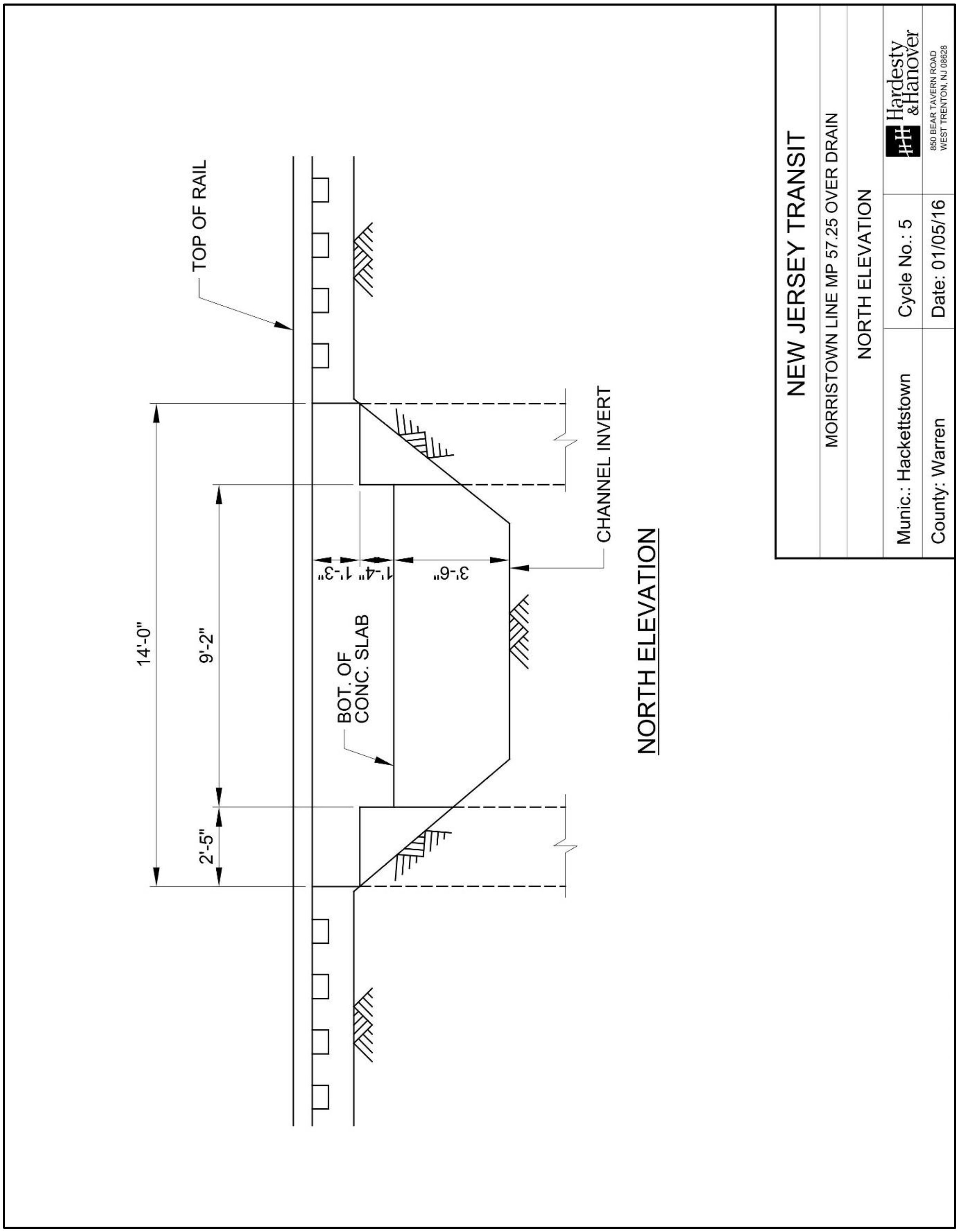


*Figure 4.4: West Approach – Looking East*

*Figure 4.5: East Approach – Looking West*

*Figure 4.6: Grade Crossing at East Approach – Looking West*

*Figure 4.7: Underside of Concrete Slab – Looking Southeast*

*Figure 4.8: East Abutment – Looking Southeast*

*Figure 4.9: Northeast Wingwall – Looking Northeast*

Figure 4.10: Headwall – Northwest End – Looking Southwest

Figure 4.11: Southeast End of Culvert – Looking Southeast

## 4.2 Bridge Evaluation Survey Report – Rating and Substandard Features

The most recent Bridge Evaluation Survey Reports for the six bridges along the Washington Secondary/NJ TRANSIT Morristown Line were obtained from NJ TRANSIT and are presented in Appendix B. While it is recognized that speed restrictions are only a temporary measure, an initial review of the reports appeared to indicate that some of these structures would be acceptable for the movement of a limited volume of 286K railcars operated at reduced speeds. The one exception is the drain bridge at MP 57.25.

On February 5, 2019, a meeting was held with representatives of NJ TRANSIT to review the most recent Bridge Inspection Survey Reports for the four bridges that affect access to the Morris County-owned branch lines. It was generally agreed that the priority section of the Washington Secondary for the purpose of serving existing customers is the section between Hackettstown and Dover. The discussions concluded that as a temporary condition, three of the four subject bridges could accommodate low volumes of 286K railcars traveling at 10 miles per hour. The exception – the drain bridge at MP 57.25 – was not rated as structurally sufficient to accommodate even a low volume of low-speed 286K railcars.

The American Railway Engineering and Maintenance-of-Way Association (AREMA) publishes a recommended practice that includes the design of railroad bridges. The design load for a train moving across a bridge is Cooper E80. This consists of a series of axles with varying weights and different spacing. The heaviest axle is 80,000 pounds. There are also lighter axles in the configuration. For a Cooper E60 train, the heaviest axle would be 60,000 pounds. The lighter axles would each be 0.75 (60/80) times their respective weights in a Cooper E80 train. Bridges built after 1968 usually use this design load.

This project is investigating the feasibility of operating 286K car trains over the Morristown Line. The load used to rate the bridges consists of a line of cars with four axles. Each axle weighs 71,500 pounds (25 percent of the weight of a 286K railcar).

The AREMA Manual has two types of ratings for railroad bridges. Normal ratings are intended to be used for daily traffic. They use the same allowable stresses as those used for designing a new bridge. Typically the As-Built normal rating will usually be about the same as the As-Designed rating. Maximum ratings use higher allowable stresses for infrequent traffic with heavier loads. Railroads are permitted to operate traffic that causes stresses above the normal ratings on a more frequent basis with the understanding that it will shorten the useful life of the bridge.

Railroad bridges are typically rated using Cooper loads. Each of the load-bearing members of the bridge will be given its own Cooper rating for normal allowable and maximum allowable stresses. Because the spacing of the axles on a Cooper train and a train of 286K cars are different, there is no direct correlation between the two. The Cooper load that a 286K car would cause on a structural member varies with its length. Each member must be considered individually.

Following is a summary of the structural rating of the drain bridge.

### 4.2.1 Drain Bridge – MP 57.25 – Structural Rating

The drain bridge is a single span concrete slab bridge built in 1910. The 14-foot long slab is reinforced with repurposed rails and covers an opening of approximately 9 feet, 2 inches between the abutment faces. The bridge currently carries two tracks. The southern track is currently active, while the northern siding track is inactive and badly deteriorated. The concrete slab is approximately 71 feet wide with adequate width to carry a third track.

As demonstrated in the Bridge Evaluation Survey Report, the 286K railcar for this span length is equivalent to a Cooper E59. The concrete slab is the controlling member of the bridge with a normal Cooper E-Load rating of E44 and a maximum Cooper E-Load rating of E55. A normal rating of E59 is required to safely accommodate 286K railcar traffic. A maximum rating of at least E59 would be sufficient to accommodate infrequent, low volumes of 286K railcar traffic. Accordingly, even at a 10-mile per hour operating speed, the Drain Bridge is not rated for any level of use for the movement of 286K railcars. Accordingly, upgrade or replacement of the existing structure would be required to open the Washington Secondary corridor for the movement of 286K railcars from Phillipsburg to the junctions with the three Morris County branch lines. Alternatives for improvement of this bridge are discussed in Section 6.

# 5. Public and Stakeholder Involvement

Public involvement in the transportation planning process is an effort to ensure that citizens have a direct voice in public decision-making. Public involvement is a key component of the transportation planning process and is critical in successfully developing a transportation project that serves a true purpose and need and generates strong stakeholder support. It is important for planners to understand the perspectives of the public, elected officials, stakeholders, advocates, and opponents throughout the project development process. The NJTPA has long recognized the importance of proactively engaging the public. This section details the public involvement process employed in this study.

## 5.1 Technical Advisory Committee and Stakeholder Working Group

At the initiation of the study, a Technical Advisory Committee (TAC) was convened to provide technical support and agency/stakeholder perspective to the study. The TAC members provided a broad range of technical expertise and represented the following organizations:

- NJ TRANSIT
- NJDOT
- Morris County Department of Planning
- Warren County Department of Planning
- Norfolk Southern Corporation
- Morristown & Erie Railway

The TAC met at key points during the study to review findings and offer input. During these meetings, the project team provided progress updates and preliminary study products for TAC review and comment. The TAC members served as a valuable resource in assuring that the analysis and the development of study products were based upon the latest available data, and that all considerations that could potentially affect the study process were considered. Many of these participating agencies provided staff support, with many more technical experts providing assistance beyond those who attended the meetings.

A subset of the TAC formed the Program Compliance Review (PCR) Committee. The PCR was comprised of representatives from NJDOT Division of Local Aid, NJDOT Bureau of Environmental Program Resources, NJDOT Bureau of Multimodal Services, and NJ TRANSIT Rail Operations. The PCR completed interim reviews throughout the Concept Development process to confirm that the project’s development complied with program requirements. The first PCR review was conducted after the initial Local Officials Briefings and the second PCR review conducted after the PPA was identified, but prior to its presentation to the local officials or the public. At the completion of each stage of review, the PCR members provided a formal written signoff attesting to the study’s compliance with the NJTPA program requirements.

The PCR signoffs are presented in Appendix C. It is important to note that their signoff does not constitute approval and acceptance of the study recommendations, nor does it commit their respective agencies to actively participate in the advancement of subsequent project development phases.

## 5.2 Public Involvement Action Plan Summary

A Public Involvement Action Plan (PIAP) was prepared to serve as a blueprint for integrating comprehensive public and stakeholder engagement into the study. The PIAP defined the key elements of the public involvement element of the study and included a targeted schedule for key public involvement activities. The PIAP is presented in Appendix C.

## 5.3 Local Officials Coordination

Key to a successful transportation project is coordination with and the support of the local elected officials representing the municipality where the project is located. This is particularly important if subsequent design and construction funding may be sought from a variety of grant programs like the NJDOT Rail Freight Assistance Program (RFAP), which requires any project receiving RFAP funds to have municipal support. While not a codified requirement in all grant programs, local support enhances the attractiveness and potential success of any grant application, particularly if the program from which funding is sought is competitive.

Coordination with the Hackettstown elected officials centered around two formal Local Officials Briefings. The first briefing was held on June 3, 2019 to introduce the local officials to the project and identify any concerns they may have. In addition, the briefing provided a forum to gather their insights and information to better inform the study process.

The second briefing was held on December 19, 2019 and presented the study findings, alternatives considered and preliminary recommendations for a preferred alternative to be advanced into design and construction. The findings and recommendations of the study were favorably received by the elected officials. Based upon the outcome of the briefing, the project team requested a formal resolution of support from the municipality. The Town Council unanimously passed a resolution at its February 13, 2020 meeting. Copies of both Local Officials Briefing meeting materials and the adopted resolution are presented in Appendix C.

## 5.4 Stakeholder Coordination

A search of local property records was conducted to identify the owners of the properties immediately adjacent to the drain bridge. With three exceptions, the potentially affected properties are owned by either the Town of Hackettstown or the NJDEP. The NJDOT Bureau of Environmental Policy Review was included in the Local Officials Briefings to coordinate with the state on this project. The private property owners were contacted individually to advise them of the project and offer them the opportunity to participate in the study process through the channels identified in the PIAP. A listing of the potentially affected properties and the associated tax maps are presented in Appendix C.

## 5.5 Public Information Centers

As defined in the PIAP, the study hosted two Public Information Centers (PIC). The first PIC was held on September 10, 2019 from 4 to 8 p.m. to introduce the interested members of the public to the project and identify any concerns they may have. The PIC featured a range of printed displays and a formal presentation given twice during the course of the meeting – at 4:30 and 6:30 p.m. The meeting was advertised in The Star-Ledger and the Warren Reporter, and notifications were posted on the Warren County, Town of Hackettstown, and project websites. Flyers advertising the meetings were also posted in the municipal building and in a range of other publicly accessible spaces such as the local library and Centenary College. Despite the extensive advertising, the first PIC attracted no public attendees.

The second briefing was held on February 26, 2020 and presented the study findings, alternatives considered, and preliminary recommendations for a preferred alternative to be advanced into design and construction. As with the first PIC, this meeting was extensively advertised in print media, on websites, and through posting of meeting notices in the municipal building and around the local area. This meeting attracted a single member of the public who viewed the project favorably.

Copies of the PIC presentation materials are presented in Appendix C.

# 6. Concept Development

## 6.1 Previously Developed Alternatives

In 2011, NJTPA published the *Morris County Freight Infrastructure and Land Use Analysis*, which examined "the impact and role of the goods movement industry on the county's transportation network, land use, and economy." A key recommendation of this study was to rehabilitate or replace several bridges on the Washington Secondary to allow the movement of 286K railcars along the corridor. The NJDOT problem statement recommending further study and resolution of the weight limitation imposed by the drain bridge is presented in Appendix D. To address the issue set forth in the problem statement, a series of alternatives were developed. Following is a description of the alternatives and the process undertaken to score them and identify a PPA.

## 6.2 Alternatives Screening / Scoring Process

Based on the study's stated goals and objectives, 14 criteria were identified to evaluate the alternatives. The screening applied a numerical score to each alternative for each criterion. The scores were generally qualitative in nature and considered the relative benefits of each alternative with respect to each criterion in addressing the project purpose and need. An alternative was assigned a score of -100 for any criteria for which the alternative was deemed to be fatally flawed. Scores ranging from +5 to -5 were assigned to the remaining criteria based upon the relative benefit or impact that would accrue to the implementation of the alternative with respect to each evaluation criterion. The range of values assigned is summarized in Table 6.1. The criteria applied to evaluate each alternative are described in this section.

*Table 6.1: Relative Scores Applied in the Evaluation of Alternatives*

| Relative Level of Benefit / Impact | Score |
|---|---|
| Highly Beneficial | 5 |
| Moderately Beneficial | 3 |
| Minorly Beneficial | 1 |
| Neutral | 0 |
| Minorly Detrimental | -1 |
| Moderately Detrimental | -3 |
| Highly Detrimental | -5 |
| Fatally Flawed | -100 |

### 1. *Freight Rail Operations Impacts / Benefits*

Freight rail operational impacts are those impacts which would significantly increase running times/cause delays on the freight route or disrupt existing operations. Benefits may include enhanced operational efficiency through reduced freight travel times due to such factors as trains being able to run at higher speeds or avoid periods of staging. This criterion addresses the alternatives level of support of the project Purpose and Need to "provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement particularly the ability to accommodate the movement of 286,000 pound (286K) railcars over the Washington Secondary/Morristown Line in Hackettstown, New Jersey."

### 2. *Passenger Rail Operations Impacts / Benefits*

Passenger rail operational impacts are those impacts which would affect passenger service of shared lines or otherwise conflict with passenger service operations. Benefits may include avoiding or limiting any potential impacts of freight rail service on existing or planned passenger operations (particularly where tracks are shared).

### 3. *Adjacent and Proximate Land Use Impacts / Benefits*

This criterion addresses any potential effects to adjacent and proximate land uses. Sensitive land uses such as residential, schools, and public open space could be adversely affected by a project-induced increase in rail activity, increases in speeds, or relocation of active rail operations closer to the sensitive land use.

### 4. *Historic and Cultural Resources Impacts / Benefits*

Rail corridors throughout New Jersey are typically identified as historic corridors. Any construction that modifies the existing alignment or the structures that make up the rail corridor has the potential to be considered a significant detrimental effect to the historic resource.

### 5. *Community Profile & Environmental Justice/Title VI Impacts / Benefits*

Many rail corridors run through or adjacent to environmental justice communities. Increased activity or relocation of active rail infrastructure within or closer to a defined environmental justice community has the potential to be defined as a significant impact. Alternatives that eliminate or minimize these adverse effects are considered preferable with respect to selection of a preferred alternative.

### 6. *Wetlands Impacts / Benefits*

Wetlands are protected areas of land that are often saturated or inundated with water. Construction within a wetland is typically discouraged and requires the interested party to obtain a wetland permit. Permit requirements can include wetland mitigation or the purchase of credits to offset the proposed impact. A benefit for this criterion would be to avoid or limit impacts to the existing wetlands both during and after construction.

### 7. *Floodplains & Aquifers Impacts / Benefits*

This criterion examines the potential impacts to floodplains, wetlands, and aquifers resulting from the implementation of an alternative alignment (both during and after construction).

Floodplains are low-lying lands adjacent to rivers and streams. When left in their natural state, floodplain systems store and dissipate floods without adverse impacts to humans, buildings, roads, and other infrastructure. Construction within floodplains decreases the land's natural ability to store and absorb water; this exacerbates storm impacts and increases the risk of flooding.

Aquifers can be a source of water for residents, businesses, and industries; impacts due to construction can include groundwater table decline, subsidence, attenuation/drying of springs, decreased river flow, and increased vulnerability to pollutants.

A benefit for this criterion would be to avoid or limit impacts to the existing floodplains and aquifers both during and after construction.

### *8. Threatened & Endangered Species Impacts / Benefits*

In rural and urbanized areas alike, rail infrastructure may be located in areas identified as home to or suitable habitat for threatened or endangered species of wildlife. A benefit for this criterion would be to avoid or limit impacts to the existing defined habitats that are or could potentially become home to these protected or endangered species.

### *9. Stormwater and Drainage Impacts / Benefits*

Stormwater runoff can include contaminants and pollutants that impact the quality of the receiving waters. In addition, increased stormwater runoff can overwhelm existing drainage systems, resulting in backups and flooding downstream of the project site. A benefit for this criterion would be to avoid or limit any adverse stormwater or drainage impacts (both during and after construction).

### *10. Hazardous Materials Impacts / Benefits*

Due to the nature and materials used in their construction and operations, hazardous materials are often found along active and former rail corridors. While avoidance of railroad infrastructure construction activities that would disturb contaminated soils is challenging at best, every effort should be made to identify alternatives that minimize the disturbance of contaminated soils, or potentially include remediation processes for implementation during construction.

### *11. Air Quality & Noise Impacts / Benefits*

Emissions from diesel locomotive and the noise created by the operation of trains can represent a significant adverse impact to sensitive land uses and receptors such as residential, parks, schools, and hospitals. Every effort should be made to identify alternatives that avoid or at least minimize increases in emissions or noise related to rail operations.

### *12. Community Impacts / Benefits*

In some cases, the mere existence of active rail service through or adjacent to a community can be considered a detriment to public safety and quality of life, particularly when the rail corridor intersects with roadway corridors or high pedestrian activity areas. Constraints to roadway vehicle and pedestrian movements and emissions and noise created by rail operations, particularly during overnight periods, can be considered a negative impact to quality of life.

### 13. Safety Impacts / Benefits

The drain bridge is rated to accommodate 263K railcars. Running 286K railcars without improvement to the bridge would represent a public safety concern. Alternatives that would not improve the bridge to accommodate current industry standard weight limits were deemed a potential safety concern and were therefore considered non-responsive to the project purpose and need.

### 14. Utility Impacts / Relocation Requirements

This criterion examines potential impacts to existing above- and below-ground utilities (e.g., power lines, gas lines, stormwater drainage, and sanitary sewers) and evaluates the need to relocate them to accommodate the new alignment.

## 6.3 Alternatives Considered

The criteria were used to evaluate nine discrete alternatives. A brief summary of each alternative is presented in Table 6.2. The key considerations, benefits, and adverse impacts associated with each alternative are detailed in this section.

*Table 6.2: Summary of Alignment Alternatives Considered*

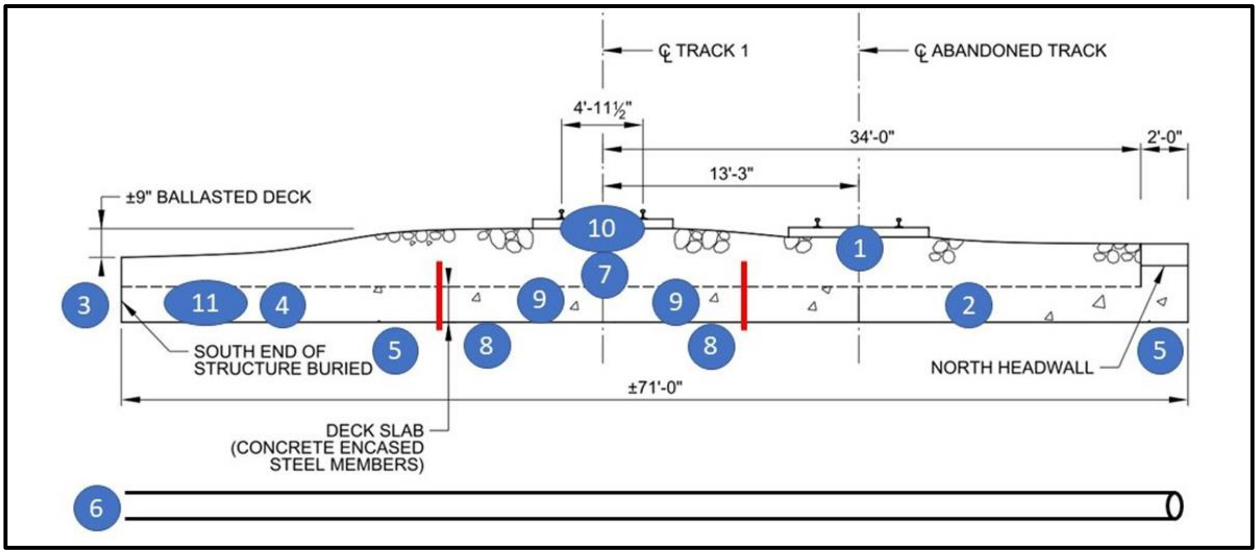
| Alternative | | Description |
|---|---|---|
| 1 | Full Slab Replacement | Repointing of existing abutments and full replacement of the entire existing concrete slab. Construction activities to require temporary stoppage of active rail service on the corridor. |
| 2 | Partial Slab Replacement | Repointing of existing abutments and full replacement of the portion of the existing contrite slab carrying the active track. Construction activities to require temporary stoppage of active rail service on the corridor. |
| 3 | Full Slab Replacement w/ Runaround Track | Repointing of existing abutments and full replacement of the entire existing concrete slab. Initial phase would reconstruct the currently inactive passing siding to all maintenance of rail active during construction. |
| 4 | Fill - Concrete Injection | Core holes in the existing concrete slab and pressure-inject to fill the void with high-strength concrete. Effectively converts the undergrade bridge to at-grade rail. |
| 5 | Replace with Pre-Fab Culvert | Replace existing abutments and concrete slab with precast culvert. Construction activities to require temporary stoppage of active rail service on the corridor. |
| 6 | Extend Culvert - Grout Fill | Extend existing culvert beneath the bridge. Core holes in the existing concrete slab and pressure-inject to fill the void with high-strength concrete. Effectively converts the undergrade bridge to at-grade rail. |
| 7 | Extend Pipe - Soil Fill | Extend existing culvert beneath the bridge. Fill void with compacted soils. Core holes in the existing concrete slab and pressure-inject to fill the void with high-strength concrete. Effectively converts the undergrade bridge to at-grade rail. |
| 8 | Extend Pipe - Grout Fill | Replace existing culvert beneath the bridge with 15-inch pipe extension from inlet on south side of the rail line. Core holes in the existing concrete slab and pressure-inject to fill the void with high-strength concrete. Effectively converts the undergrade bridge to at-grade rail. |
| 9 | Extend Pipe - Soil Fill | Replace existing culvert beneath the bridge with 15-inch pipe extension from inlet on south side of the rail line. Fill void with compacted soils. Core holes in the existing concrete slab and pressure-inject to fill the void with high-strength concrete. Effectively converts the undergrade bridge to at-grade rail. |

### 6.3.1 Alternative 1 – Full Slab Replacement

#### *Overview*

Alternative 1 consists of a full rehabilitation of the existing abutments and headwall and replacement of the existing concrete slab with precast reinforced concrete slab sections designed to accommodate the movement of 286K railcars. The construction phases required are depicted on Figure 6.1, followed by a summary.

*Figure 6.1: Alternative 1 – Construction Phases*



Following are the steps anticipated to replace the existing concrete slab while minimizing the duration of deactivating rail movements along this portion of the Washington Secondary.

1. Remove inactive passing siding and ballast to allow clearing of the concrete slab.
2. Remove northern portion of the existing concrete slab.
3. Excavate southern end of structure to expose culvert and drainage pipe below the slab.
4. Remove southern portion of the existing concrete slab and earth covering the 15-inch drainage pipe.
5. Repoint abutments and repair northern headwall.
6. Extend 15-inch drainage pipe to the opening beneath the northern headwall.
7. Discontinue active rail service over the structure, remove existing active track, ballast, and slab.
8. Repair/level tops of abutments with high-strength concrete.
9. Set two new 8-foot-wide by 14-foot-long precast concrete slabs.
10. Place new ballast and track panels. Reopen line for service.

Once the active rail has been restored, the remaining opening would be completed by setting new 8-foot-wide by 14-foot-long precast concrete slabs with ballast over the northern side and earth fill over the southern side.

### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits -** This alternative would effectively replace the existing structure in its current position using, with the exception of the prefabricated concrete slabs themselves, similar materials used in the original construction. Accordingly, the replacement structure would not represent a significant detrimental effect or otherwise degrade the cultural and historic resource that the existing bridge represents. The extended drainage pipe would continue to convey stormwater from the inlet in the southern side of the track to an open discharge on the northern side of the track. The volume of stormwater discharge or the future flood elevations would not be affected.

This alternative would not affect undisturbed areas when replacing the structure. No impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments** – It is estimated that active rail service would need to be halted for up to 5 days to complete the replacement of the slabs beneath the active track (steps 7 through 10 above). The operators of the DRRV indicated that they would be able to comfortably accommodate this inactive period by stocking customers in advance with adequate materials to continue their operations for the duration of the closure. However, should unforeseen issues arise that delay completion of construction, a lengthened period of inactivity could result in an adverse impact to the existing rail-served customers.

## 6.3.2 Alternative 2 - Partial Slab Replacement

Alternative 2 is a modification of Alternative 1 in that only the portions of the slab and the underlying abutments that support the active track would be replaced. The general construction phases that would be required include:

1. Discontinue active rail service over the structure, remove existing active track, ballast, and slab.
2. Repair/level tops of abutments with high-strength concrete.
3. Set two new 8-foot-wide by 14-foot-long precast concrete slabs.
4. Place new ballast and track panels. Reopen line for service.

### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits -** This alternative would effectively replace the existing structure in its current position using, with the exception of the prefabricated concrete slabs themselves, similar materials used in the original construction. Accordingly, the replacement structure would not represent a significant detrimental effect or otherwise degrade the cultural and historic resource that the existing bridge represents. The extended drainage pipe would continue to convey stormwater from the inlet in the southern side of the track to an open discharge on the northern side of the track. The volume of stormwater discharge or the future flood elevations would not be affected.

This alternative would not affect undisturbed areas when replacing the structure. No impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments –** It is estimated that active rail service would need to be halted for up to 5 days to complete the replacement of the slabs beneath the active track (steps 7 through 10 above). The operators of the DRRV have indicated that they would be able to comfortably accommodate this inactive period by stocking their customers in advance with adequate materials to continue their operations for the duration of the closure. However, should unforeseen issues arise that delay completion of construction, a lengthened period of inactivity could result in an adverse impact to the existing rail-served customers.

While replacement of just the portion of the structure supporting the active rail service would potential reduce construction duration and costs, maintaining the existing portions of the structure to the north and south of the track would not permit extension of the 15-inch drainage pipe beneath the structure. Further, if the need ever arose to rehabilitate the existing inactive passing siding or add a second active running track, the remaining portions of the structure would require replacement.

### 6.3.3 Alternative 3 - Full Slab Replacement with Runaround Track

#### *Overview*

Alternative 3 contemplated the activities that would be required to replace the structure if rail service needed to be maintained during the construction process. The construction activities outlined for Alternative 1 would require additional steps to re-establish the inactive track as an active passing siding. The additional construction activities that would be required include:

1. Completion of Alternative 1 construction steps 1 through 4 and reinstallation of slab and ballast.
2. Replace abandoned tract with approximately 600 feet of new siding track with provisions to cut and throw to connect to the active track both east and west of the bridge. This would require reconstruction of the existing grade crossing of the northern end of 3rd Avenue.
3. Remove northern portion of slab. Level top of abutment with grout.
4. Set two new precast 8-foot by 14-foot slabs designed to accommodate 286K loading.
5. Replace ballast and set siding with new track panels over culvert to connect pre-constructed ends of the new siding. Requires 1-day service shutdown.
6. Cut and throw to connect active track to bypass siding.

7. Run on new bypass siding. Remove active track, ballast, and concrete slab.

8. Level top of abutment beneath active track with grout.

9. Set two new precast slabs for active track.

10. Place new ballast and set track panels for active track. Requires 1-day service shutdown.

11. Throw switches to cease cutting over to the bypass siding.

### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits –** This alternative would allow continued rail service to supply the active customers located east of the bridge to continue uninterrupted. This alternative would effectively replace a majority of the existing structure in its current position using, with the exception of the prefabricated concrete slabs themselves, similar materials used in the original construction. Accordingly, the replacement structure would not represent a significant detrimental effect or otherwise degrade the cultural and historic resource that the existing bridge represents. Stormwater drainage beneath the bridge would continue in its present state. The volume of stormwater discharge or the future flood elevations would not be affected.

This alternative would not affect undisturbed areas when replacing the structure. No impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments –** It is estimated that active rail service would need to be halted for up to five days to complete the replacement of the slabs beneath the active track (steps 7 through 10 above). The operators of the DRRV indicated that they would be able to comfortably accommodate this inactive period by stocking customers in advance with adequate materials to continue their operations for the duration of the closure. However, should unforeseen issues arise that delay completion of construction, a lengthened period of inactivity could result in an adverse impact to the existing rail-served customers.

Replacement of the currently inactive track and installation of two switches would add significant time and cost to the construction phase. Maintaining the existing portions of the structure to the south of the track would not permit extension of the 15-inch drainage pipe beneath the structure.

## 6.3.4 Alternative 4 - Fill - Concrete Injection

### *Overview*

Alternative 4 would not require replacement of any element of the existing bridge. Holes would be cored through the existing deck slabs with the void beneath the structure filled with pressure-injected high-strength concrete. This would effectively eliminate the bridge and render this section an at-grade rail line.

### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits –** This alternative would allow continued rail service to supply the active customers located east of the bridge to continue uninterrupted.

Stormwater drainage beneath the bridge could be maintained through installation of a jacketed drain pipe beneath the structure, allowing stormwater flow to continue in its present state. The volume of stormwater discharge or the future flood elevations would not be affected.

As no currently undisturbed areas would be disturbed by this alternative, no impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments –** While not physically removing or altering it, this alternative would effectively eliminate the bridge and obstruct any future physical or visual access to the historic structure. While not considered a fatal flaw, this alternative represents a significant detrimental effect to the historic resource that the existing bridge represents.

## 6.3.5 Alternative 5 - Replace with Pre-Fab Culvert

### *Overview*

This alternative would require a temporary halting of active rail service while the existing track panels and the bridge substructure is removed. The existing structure would be replaced with sections of prefabricated box culvert designed to accommodate 286K railcars.

### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits –** This alternative would effectively remove the existing bridge and provide a substructure that would accommodate the movement of 286K railcars as well as provide a foundation for any future addition of a second track over the bridge. The extended drainage pipe would continue to convey stormwater from the inlet in the southern side of the track to an open discharge on the northern side of the track. The volume of stormwater discharge or the future flood elevations would not be affected.

This alternative would not affect undisturbed areas when replacing the structure. No impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments –** It is estimated that active rail service would need to be halted for up to five days to complete the demolition of the existing structure and replace it with a precast box culvert. The operators of the DRRV indicated that they would be able to comfortably accommodate this inactive period by stocking customers in advance with adequate materials to continue their operations for the duration of the closure. However, should unforeseen issues arise that delay completion of construction, a lengthened period of inactivity could result in an adverse impact to the existing rail-served customers.

Complete removal of the existing structure would eliminate the bridge, permanently removing this historic resource. While not considered a fatal flaw, this alternative represents a significant detrimental effect to the historic resource that the existing bridge represents.

### 6.3.6 Alternative 6 - Extend Culvert - Grout Fill

#### *Overview*

This alternative is similar to Alternative 4, but would extend the culvert to permit stormwater to continue to flow beneath the bridge. Holes would be cored through the existing deck slabs with the void beneath the structure filled with pressure-injected high-strength concrete. This would effectively seal and jacket the culvert and eliminate the bridge, rendering this section an at-grade rail line.

#### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits –** This alternative would allow continued rail service to supply the active customers located east of the bridge to continue uninterrupted.

Stormwater drainage beneath the bridge could be maintained through extension of the culvert and jacketing with the pressure-injected concrete, allowing stormwater flow to continue in its present state. The volume of stormwater discharge or the future flood elevations would not be affected.

As no currently undisturbed areas would be disturbed by this alternative, no impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments –** While not physically removing or altering it, this alternative would effectively eliminate the bridge and obstruct any future physical or visual access to the historic structure. While not considered a fatal flaw, this alternative represents a significant detrimental effect to the historic resource that the existing bridge represents.

### 6.3.7 Alternative 7 - Extend Culvert - Soil Fill

#### *Overview*

This alternative is similar to Alternative 6, with the exception that instead of pressure-injected concrete fill, the remaining void would be filled with soil. Extension of the culvert would permit stormwater to continue to flow beneath the bridge. The extended culvert would be jacketed with the void filled with laterally compacted soils. This would effectively seal and jacket the culvert and eliminate the bridge, rendering this section an at-grade rail line.

### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits –** This alternative would allow continued rail service to supply the active customers located east of the bridge to continue uninterrupted.

Stormwater drainage beneath the bridge could be maintained through extension of the culvert and jacketing with the pressure-injected concrete, allowing stormwater flow to continue in its present state. The volume of stormwater discharge or the future flood elevations would not be affected.

As no currently undisturbed areas would be disturbed by this alternative, no impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments –** While not physically removing or altering it, this alternative would effectively eliminate the bridge and obstruct any future physical or visual access to the historic structure. Filling with soil instead of concrete would render the historic resource recoverable in the future but at the expense of maintaining active rail service along the Washington Secondary. While not considered a fatal flaw, this alternative represents a significant detrimental effect to the historic resource that the existing bridge represents.

## 6.3.8 Alternative 8 - Extend Pipe - Grout Fill

### *Overview*

This alternative is similar to Alternative 6, with the exception that instead of extending the culvert, the 15-inch stormwater pipe that outlets into the culvert would be extended and jacketed and the remaining void filled with pressure-injected high-strength concrete. Extension of the stormwater pipe would permit stormwater to continue to flow beneath the bridge. The extended culvert would be jacketed with the void filled with laterally compacted soils. This would effectively seal and jacket the culvert and eliminate the bridge, rendering this section an at-grade rail line.

### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits –** This alternative would allow continued rail service to supply the active customers located east of the bridge to continue uninterrupted.

Stormwater drainage beneath the bridge could be maintained through extension and jacketing of the pipe allowing stormwater flow to continue in its present state. The volume of stormwater discharge or the future flood elevations would not be affected.

As no currently undisturbed areas would be disturbed by this alternative, no impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments –** While not physically removing or altering it, this alternative would effectively eliminate the bridge and obstruct any future physical or visual access to the historic structure. Filling with concrete would render the historic resource effectively unrecoverable in the future. While not considered a fatal flaw, this alternative represents a significant detrimental effect to the historic resource that the existing bridge represents.

### 6.3.9 Alternative 9 - Extend Pipe - Soil Fill

#### *Overview*

This alternative is similar to Alternative 8, with the exception that instead of extending the pipe and filling the remaining void with concrete, the remaining void would be filled with compacted soil. Extension of the stormwater pipe would permit stormwater to continue to flow beneath the bridge. The extended culvert would be jacketed with the void filled with laterally compacted soils. This would effectively seal and jacket the culvert and eliminate the bridge, rendering this section an at-grade rail line.

#### *Key Considerations*

**Fatal Flaws –** Through assessment of this alternative with respect to the 14 defined evaluation criteria, this alternative was not considered to have any fatal flaws.

**Benefits –** This alternative would allow continued rail service to supply the active customers located east of the bridge to continue uninterrupted.

Stormwater drainage beneath the bridge could be maintained through extension and jacketing of the pipe, allowing stormwater flow to continue in its present state. The volume of stormwater discharge or the future flood elevations would not be affected.

As no currently undisturbed areas would be disturbed by this alternative, no impacts to the surrounding wetlands or threatened and endangered species habitat are anticipated.

**Potential Impacts/Detriments –** While not physically removing or altering it, this alternative would effectively eliminate the bridge and obstruct any future physical or visual access to the historic structure. Filling with soil instead of concrete would render the historic resource recoverable in the future but at the expense of maintaining active rail service along the Washington Secondary. While not considered a fatal flaw, this alternative represents a significant detrimental effect to the historic resource that the existing bridge represents.

## 6.4 Alternatives Evaluation and Preliminary Preferred Alternative

As described in Section 6.1, a numerical score was applied to each alternative for each of the 14 defined evaluation criteria. The scoring is summarized in Table 6.3.

*Table 6.3: Alternative Scoring*

| Criteria | Full Slab Replacement | Partial Slab Replacement | Full Slab Replacement w/Runaround Track | Fill - Concrete Injection | Replace with Pre-Fab Culvert | Extend Culvert - Grout Fill | Extend Pipe - Soil Fill | Extend Pipe - Grout Fill | Extend Pipe - Soil Fill |
|---|---|---|---|---|---|---|---|---|---|
| Freight Rail Operations Impacts / Benefits | **3** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Passenger Rail Operations Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adjacent and Proximate Land Use Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic and Cultural Resources Impacts / Benefits | **0** | -1 | 0 | -5 | -5 | -3 | -5 | -3 | -5 |
| Community Profile & Environmental Justice/Title VI Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wetlands Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Floodplains & Aquifers Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Threatened & Endangered Species Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stormwater and Drainage Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hazardous Materials Impacts / Benefits | **-1** | -1 | -1 | -1 | -3 | -1 | -1 | -1 | -1 |
| Air Quality & Noise Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Community Impacts / Benefits | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Safety Impacts / Benefits | **1** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Utility Impacts / Relocation Requirements | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **SUMMARY SCORE** | **3** | **2** | **3** | **-2** | **-4** | **0** | **-2** | **0** | **-2** |

As summarized in Table 6.3, two alternatives – Alternatives 1 and 3 – received a composite score of 3. Both alternatives would repair the abutments and replace the entire existing concrete slab. The difference is in the need to temporarily suspend active rail service over the bridge (Alternative 1) versus the additional cost associated with restoring the former siding track to allow maintenance of uninterrupted rail service over the corridor.

Through close coordination with the operators of the freight rail service along this corridor, active rail service could be temporarily suspended to accommodate construction of Alternative 1. The DRRV indicated that it would be able to comfortably accommodate this inactive period by stocking its customers in advance with adequate materials to continue their operations for the duration of the closure. Accordingly, in the interest of cost savings (discussed in detail in Section 6.5), Alternative 1 is recommended for advancement into design, permitting and construction.

## 6.5 Preliminary Construction Cost Estimate

While a detailed construction cost estimate will be developed as part of preliminary and final engineering, an order of magnitude cost estimate for construction of the PPA was developed. As detailed in Table 6.4, construction of the PPA is estimated to be approximately $510,300.

*Table 6.4: Preliminary Construction Cost Estimate*

| Item | Units | Unit Cost | Cost |
|---|---|---|---|
| Mobilization (10% of Base Construction Cost) | 1 | $ 37,750 | $ 37,750 |
| Remove Side Track (100 ft) | 100 | $ 50 | $ 5,000 |
| Remove Side Ballast (100 ft) | 300 | $ 20 | $ 6,000 |
| Remove Northern Slab Sections | 3 | $ 8,000 | $ 24,000 |
| Excavate Southern End to Expose Drainage Pipe and Culvert | 2 | $ 3,500 | $ 7,000 |
| Remove Southern Slab Sections | 4 | $ 8,000 | $ 32,000 |
| Complete Excavation of Southern End | 1 | $ 3,500 | $ 3,500 |
| Repoint and Cap Northern and Southern Ends of Abuttments | 7 | $ 4,000 | $ 28,000 |
| Repair Northern Headwall | 1 | $ 10,000 | $ 10,000 |
| Extend 15-inch Drain Pipe | 80 | $ 50 | $ 4,000 |
| Stop Active Rail Service | | $ - | $ - |
| Remove Active Track | 200 | $ 50 | $ 10,000 |
| Remove Active Ballast (Active Section) | 200 | $ 20 | $ 4,000 |
| Remove Active Slab | 2 | $ 8,000 | $ 16,000 |
| Repoint and Cap Central Section of Abuttments | 2 | $ 4,000 | $ 8,000 |
| Set and Seal 2 New 8-ft x 14-ft Precast Slabs on Central Section | 2 | $ 16,000 | $ 32,000 |
| Install Ballast - Active Section | 200 | $ 30 | $ 6,000 |
| Install Track Panels - Active Section | 4 | $ 6,000 | $ 24,000 |
| Reinitiate Active Rail Service | | $ - | $ - |
| Backfill Previously Excavated Southern End | 1 | $ 3,500 | $ 3,500 |
| Set and Seal New Slabs Over Remaining Northern and Southern Ends | 7 | $ 16,000 | $ 112,000 |
| Install Ballast over Northern and Southern Ends | 500 | $ 30 | $ 15,000 |
| Regrade Excavated Southern End | 1 | $ 3,500 | $ 3,500 |
| Railroad Flaggers | 20 | 1200 | $ 24,000 |
| MPT and Access Maintenance | 20 | 500 | $ 10,000 |
| | | **SUB-TOTAL** | **$ 425,250** |
| | | Contingency (20%) | $ 85,050 |
| | | **TOTAL** | **$ 510,300** |

As shown in Table 6.3, a second alternative also received a final evaluation score of 3. This alternative considered rehabilitation of the second track over the bridge and creating a route that could be utilized during staged reconstruction to avoid the need to halt rail service on the corridor during construction. While tied with the score of the alternative recommended for advancement, this alternative would be significantly more costly, with a cost estimate of approximately $1,537,500, or roughly 3 times higher than the preferred alternative. While a feasible alternative, the need for a passing siding in the future was not deemed to be significant, with the added value that a passing siding would bring not being worth the additional cost of more than $1M. This was further deemed to be an unnecessary additional cost considering that the halting of rail service for a short period of time while the preferred alternative is constructed is easily managed with no undue hardship to the rail operator or the customers who rely on the corridor for service.

## 6.6 Value Engineering Assessment

As part of the alternative development and evaluation process, an independent team of engineers and planners from a firm not involved in the development of the alternatives described above convened and conducted a Value Engineering (VE) Assessment workshop. As an introductory step in the VE process, the VE team was provided with an overview presentation of the Hackettstown Weight Restriction Elimination Project, followed by a site visit to the project site. Data assembled in the alternative development process were provided to the VE team with a summary of the alternatives considered and the initial recommendation of the preferred alternative.

The VE team subsequently met in a workshop forum — the creative ideas phase of the VE assessment — to identify alternatives that the project team may not have initially considered and evaluate possible modifications of the alternatives already developed. The creative ideas phase focused on alternatives that might leave a lesser impact on the project area resources, while meeting the stated purpose and need. These ideas could include:

- An intuitively lower cost alternative
- An alternative with a smaller impact on identified cultural and natural resources
- An alternative that has a smaller real estate impact

The Purpose and Need for this project is stated as:

> "The purpose of this project is to provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement particularly the ability to accommodate the movement of 286,000 pound (286K) railcars over the Washington Secondary/Morristown Line in Hackettstown, New Jersey."

The VE team reviewed the existing alternatives studied including the identified preferred alternative and conducted a facilitated brainstorming session to identify additional new alternatives. The review concluded that while there are several more cost-effective alternatives than Alternative 1 – the recommended preferred alternative — they all conflict with the regulatory finding that the existing structure abutments are a contributing element to the historic rail line and must be preserved as part of the project. Given this constraint, the VE team concurred with the recommendation of Alternative 1 as the preferred option. The full VE report is presented in Appendix F.

# 7. Next Steps

## 7.1 Project Design and Construction Funding Opportunities

The NJTPA Freight Concept Development Program (FCDP) was developed as a pathway to fund the advancement of freight-supporting infrastructure projects that otherwise would not have a viable funding program to advance from an idea or expressed need defined in a local, regional, or statewide planning study into design and construction. Adoption of the PPA developed through this study represents the final stage of the FCDP's ability to advance a project through to construction. As such, alternative funding programs and project advancement pipelines must be identified to move the PPA into design. This is particularly important when addressing issues on non-publicly owned and operated infrastructure, such as much of the freight rail infrastructure serving the needs of New Jersey industries.

To address this next-step need, an inventory of existing publicly supported funding programs were identified as potential pathways for advancing projects from concept through design. Funding programs are managed and funded by a wide variety of federal, state, and other agencies, each having its own unique funding levels and cost-sharing requirements, as well as requirements for eligible project types and project sponsors/applicants. Tables detailing the funding programs applicable to freight infrastructure design and construction projects are presented in Appendix G.

### 7.1.1 New Jersey Rail Freight Assistance Program

The New Jersey Statewide Freight Rail Strategic Plan was developed for the purpose of maintaining and supporting an efficient freight rail system in the State of New Jersey. The Plan assesses the state and efficiency of the existing system; projects future freight rail demands; analyzes infrastructure improvements that are in progress and determines what needs to be done in order to complete those projects; and prioritizes a series of improvements and actions to ensure the efficiency and effectiveness of New Jersey's freight rail system.

The RFAP was developed as a tool for the State of New Jersey to provide financial partnering and support for projects that address the goals and objectives of the Statewide Freight Rail Strategic Plan. Financial assistance under the RFAP is available to Class I, Class II, and Class III railroads. Projects that would improve and support the existing freight rail system and acquisition of property needed for these projects are eligible as well. Funds can be used for final design and construction.

Owners of rail projects, operators of rail freight service, and public agencies or authorities can seek financial assistance through RFAP, if the projects are included in the program's annual list of eligible projects. The RFAP currently distributes $25 million annually to eligible capital improvement projects that result in the continuation or improvement of economically viable rail freight services.

### 7.1.2 Eligibility of the PPA under RFAP

Design and construction of the PPA is eligible for financial support under the RFAP based upon the following:

- Increasing the weight-carrying capacity of the drain bridge, and by extension opening the Washington Secondary and points east to 286K rail service, is fully supportive of the goals and objectives of the Statewide Freight Rail Strategic Plan.
- The Washington Secondary is owned by Norfolk Southern – a Class I railroad.
- Freight rail service on the Washington Secondary is operated by the DRRV, providing service to the three rail lines owned by Morris County, New Jersey – the Dover & Rockaway Branch, the Chester Branch, and the Highbridge Branch.
- Morris County is a public agency with the ability to sponsor projects under the RFAP.

The RFAP provides financial assistance to a Class I railroad (in this case Norfolk Southern, the owner of the infrastructure) at 50 percent of the total eligible cost. However, the operator of the freight rail service on the Washington Secondary is a Class III railroad. Financial assistance to a Class III railroad through the RFAP may be provided at 90 percent of the total eligible cost with the remaining 10 percent to be paid by the sponsor.

It is recommended that the PPA be advanced through an application to the NJDOT for support under the RFAP, with Morris County as the application sponsor. The 10 percent local funding match would be a combination of funding to be provide by Morris County and the freight rail operator, the DRRV.

## 7.2 Risk Assessment – Final Design Issues

Following is an assessment and summary of the impacts to existing infrastructure, systems, and environmental resources potentially associated with the construction of the PPA.

### 7.2.1 Property Access

North of the rail ROW, 3rd Avenue dead ends as a driveway into an underutilized former industrial property that houses only equipment storage activities. While replacement of the bridge would affect an area outside of the 3rd Avenue ROW, construction of the replacement bridge would require staging and material laydown so as not to preclude access to this property.

### 7.2.2 Right-of-Way

The area of disturbance associated with construction of the PPA are within the existing ROW of the Washington Secondary rail corridor. While no ROW acquisition would be required to construct the PPA, the potential exists for temporary access easements to be required for material equipment and staging during construction. The need for temporary construction easements should be determined during the final design of the PPA.

### 7.2.3 Bicycle and Pedestrian Facilities

There are no formal pedestrian or bicycle facilities located on or proximate to the bridge. Any pedestrian or bicycle activity proximate to the bridge would occur within the paved portion of 3rd Avenue which crosses the Washington Secondary at-grade. Construction of the replacement bridge would require staging and material laydown so as not to preclude bicycle or pedestrian movement along the 3rd Avenue ROW.

### 7.2.4 Stormwater Drainage

As described in Section 6, stormwater collected in a swale along the south side of the Washington Secondary east of 3rd Avenue is conveyed beneath the road into an inlet on the west side of 3rd Avenue. From this inlet, stormwater is conveyed via a 15-inch diameter concrete pipe into a culvert beneath the drain bridge, outletting into an open flow channel on the north side of the Washington Secondary. Construction of the PPA will maintain this stormwater infrastructure and would not increase impervious cover or increase stormwater flows or quantities of discharge at the outfall. During construction of the PPA efforts should be undertaken to ensure no damage or disturbance of the existing stormwater conveyance infrastructure occurs.

### 7.2.5 Utilities

No existing subsurface or overhead utilities within or proximate to the area of construction disturbance were identified in the investigation of potential constraints prior to the development and assessment of alternatives. However, all utility records should be reviewed during final design to ensure no conflicts would result from construction of the PPA.

### 7.2.6 Maintenance of Traffic During Construction

The area of disturbance for the construction of the PPA is located outside of the 3rd Avenue ROW. While there is virtually no traffic traveling along the northern end of 3rd Avenue (the roadway north of the Washington Secondary dead ends as a driveway into an underutilized former industrial property used for equipment storage) equipment and material staging areas and work activity areas adjacent to the 3rd Avenue ROW should be developed during final design and managed during construction so as not to impede vehicular movement along the road crossing the Washington Secondary ROW.

### 7.2.7 Potential Environmental Permits / Approvals and Interagency Coordination

Based upon the environmental screening detailed in Section 3, there are no anticipated environmental impacts associated with the construction of the PPA. However, coordination with NJDEP will be required as part of final design to prepare and obtain NJDEP approval of a Categorical Exclusion document. Further, coordination with SHPO will be required to identify any special considerations that will need to be addressed in final design and secure the office's approval for the construction of the PPA.

# Appendix A

## Cultural Resources Screening Report

# Cultural Resources Screening
# Local Concept Development Study
# Norfolk Southern Washington Secondary Line/NJ TRANSIT Morristown Line
# MP 57.25 Bridge over Drain
# Town of Hackettstown, Warren County, New Jersey

**May 8, 2019**

Warren County, using funds provided by the Federal Highway Administration (FHWA), via the New Jersey Department of Transportation (NJDOT) and the North Jersey Transportation Planning Authority (NJTPA), is preparing a Local Concept Development study (LCD) to improve the weight load of the Norfolk Southern Washington Secondary/NJ TRANSIT Morristown Line MP 57.25 Bridge over Drain (MP 57.25 Bridge over Drain) in the Town of Hackettstown, Warren County. The subject bridge is one of a number of structures on the Norfolk Southern Washington Secondary/NJ TRANSIT's Morristown Line corridor incapable of accommodating the 286,000 pounds ("286k") per railcar loading capacity, the national standard maintained by the Association of American Railroads. To accommodate 286k railcars, the potential improvement options at this location are the removal and replacement of the existing concrete slab superstructure and abutments with a precast concrete box structure (New Jersey Department of Transportation Problem Statement Form n.d.), infilling the structure span or substructure, or operational modifications. Such modifications could include the implementation of further speed restrictions along the rail corridor and may necessitate minimal modifications, or no changes to, the bridge.

The subject bridge, MP 57.25 Bridge over Drain, is a single-span, concrete slab reinforced structure with encased steel rails and supported on concrete and masonry abutments. The bridge dates to 1910 and measures approximately 71-feet wide and 14-feet long and is located approximately 0.3 miles west NJ TRANSIT's Hackettstown Station. It carries one active track on a ballasted deck over a mix of drainage pipes and storm water runoff from the south side to the north side of the railroad right-of-way (ROW). The concrete headwall of the structure is visible west of the tracks, adjacent to the south side of 3rd Avenue as it crosses over the railroad line. MP 57.25 Bridge over Drain was constructed in 1910 and has not been rehabilitated (Hardesty & Hanover 2015). A 2015 inspection for NJDOT determined the superstructure to be in fair condition and the substructure to be in good condition (Hardesty & Hanover 2015). The 2015 inspection identified what appears to be a smaller, concrete culvert encased within the subject bridge, as well as drain pipes embedded within the northern wall of the substructure and emptying into the channel passing under the bridge (Hardesty & Hanover 2015). It is unclear if the smaller culvert and embedded pipes are still present. The channel is dry and presents no evidence of recent water flow beneath the bridge or farther west, where water would normally exit the bridge and drain downslope into another drain pipe. Two pipes are visible in the floor of the channel, one which extends farther east under the bridge, and one which appears to be displaced towards the south wall of the substructure. It is possible that the drainage channel and pipes over which the bridge was originally constructed is no longer functioning.

The goal of this screening is to identify known cultural resource constraints at or proximate to the project area. Cultural resource constraints include known archaeological resources in the project area and historic architectural resources that are listed in, eligible, or potentially eligible for the New Jersey Register of Historic Places (NJR) and National Register of Historic Places (NRHP). The project area delineated for this cultural resources screening takes into account the maximum, possible extent of proposed improvements at this location. The project area limits may be refined as the project goes through the LCD phase. Tasks completed for the historic architectural component of the cultural resources screening included background research at the New Jersey Historic Preservation Office (NJHPO) to identify properties within approximately one-half mile of the project area that are listed in the NJR and/or listed in or eligible for the NRHP. Previously conducted historic sites inventories and regulatory surveys on file at the NJHPO were reviewed. The archaeological portion of this cultural resources screening consisted of background research at the NJHPO and the New Jersey State Museum (NJSM) to identify any registered archaeological sites as well as prior cultural resources surveys completed in or near the project area. The results of this screening may be utilized in the Environmental Screening document.

## Environmental Setting

The project area is located within a floodplain topographic setting at elevations ranging from approximately 550 feet to 565 feet above mean sea level. The project area is situated approximately 300 feet east of Hackery Brook. Trout Brook, which passes south of the project area, and Hackery Brook converge approximately 845 feet southwest of the project area. Trout Brook is a tributary of the Musconetcong River, which drains into the Delaware River, the Delaware Bay, and eventually into the Atlantic Ocean. Vegetation within the project area consists of manicured grass east of the train tracks, with secondary growth deciduous trees, undergrowth, and brambles west of the tracks.

The project area is located within the New Jersey Highlands Physiographic Province, bordered by the Kittatinny Valley to the west and the Piedmont Lowlands to the east (Wolfe 1977). The Musconetcong River Valley, in which Hackettstown is situated, is a rift valley that forms the boundary between the Western and Central Highlands sub-provinces. In general, the Highlands consist of northeast-southwest trending broad, rounded, or flat-topped mountain ranges separated by deep, narrow valleys (Wolfe 1977). Schooley's Mountain and Pohatcong Mountain, the flat-topped ranges surrounding the Musconetcong River Valley to the east and west, respectively, are remnants of the Schooley Peneplain. The project area is underlain by Allentown Dolomite, characterized by dolomite beds containing minor orthoquartzite and shale (Drake et al. 1996). Surficial sediments in the project area are mapped as Flanders till, characterized by middle Pleistocene and Illinoian-age glacial till consisting of non-quartzite gravel clasts deposited directly from glacial ice as a result of the Illinoian glaciation (Stone et al. 2002).

The specific soil type mapped in the project area west of the MP 57.25 Bridge over Drain is Washington silt loam, 0 to 3 percent slopes (WafA), which consists of well-drained soils situated on ground moraine landforms (NRCS 2018). Soils east of the railroad tracks are mapped as Udorthents-Urban Land complex, 0 to 8 percent slopes (UdauB). Udorthents soils are characterized by well-drained loam or loamy sand situated on low hill landforms, while Urban Land is characterized by buildings, pavement, and other impervious surfaces overlying fill or disturbed natural sediments (NRCS 2018).

### Known Historic Properties

Background research conducted at the NJHPO indicated that there is one previously identified historic resource eligible for listing in the NRHP within the project area (Figure 1): the Old Main Delaware Lackawanna & Western Railroad (DL&WRR) Historic District (SHPO Opinion: 6/7/2004 [Boundaries expanded to include Rockaway Loop]; prior SHPO Opinion: 09/24/1996). The Old Main DL&WRR Historic District is eligible for the NRHP under Criteria A and C for its associations with suburbanization, transportation (commuter, passenger, and freight traffic), engineering, and architecture (Guzzo 1996). The period of significance for the historic district dates from the mid-1850s to circa 1930.

Five previously identified historic resources listed in or eligible for listing in the NJR and NRHP fall within approximately one-half mile of the project area (Figure 2):

- Morris Canal Historic District (NJR: 11/25/1973; NR: 9/30/1974), located approximately 1,500 feet west of the project area.
- Hackettstown Historic District (DOE: 10/25/1979; SHPO Opinion: 2/5/1997), located approximately 525 feet northeast of the project area.
- Centenary Collegiate Institute (NJR: 4/20/1997; NR: 6/12/1997), located approximately 1,100 feet northeast of the project area.
- Jacob C. Allen House (NJR: 6/20/2005; NR: 8/23/2005), situated approximately 2,200 feet northeast of the project area.
- Hackettstown Iron and Manufacturing Company (SHPO Opinion: 12/21/1994), located approximately 2,000 feet southwest of project area.

### Registered Archaeological Sites

A review of the NJSM site files and standard references (Cross 1941; Skinner and Schrabisch 1913) indicated that there are no archaeological sites located within the project area, although multiple prehistoric sites have been identified within the Musconetcong River drainage basin. The project area does not fall within an archaeological site grid (NJ-LUCY 2019).

Three registered archaeological sites are located within one mile of the project area. The closest archaeological site, the Helms Property Site (28-Wa-626), is situated 0.8 miles east of the subject bridge and represents the location of an early nineteenth- to twentieth-century homestead that contains a prehistoric component. Site 28-Wa-626 is situated adjacent to the Lewis J. Youngblood Grist Mill Site (28-Wa-625), the remains of a mid-nineteenth- to early twentieth-century gristmill on the west bank of the Musconetcong River. Site 28-Mr-312 is a prehistoric lithic scatter situated approximately one mile southeast of the subject bridge on the east bank of the Musconetcong River. Site 28-Wa-626 is eligible for listing in NRHP (SHPO Opinion: 2/6/1997), while sites 28-Wa-625 and 28-Mr-312 were assessed as not eligible. Several other registered prehistoric sites are situated along the banks of the Musconetcong River and its tributaries (see Schrabisch 1917).

### New Jersey Historic Bridge Survey

The MP 57.25 Bridge over Drain was not identified in the 1994 New Jersey Historic Bridge Survey (A.G. Lichtenstein & Associates, Inc. 1994).

## Planning Surveys

The 1992 Warren County Cultural Resources Survey identified two historic architectural resources within the project area along the railroad right-of-way (MAAR Associates, Inc. 1992; see Figure 1). To the west of the railroad right-of-way on Block 41, Lot 20 is a one-and-half story vernacular warehouse built circa 1910. Adjacent to the east of the railroad-right-of-way, the survey identified a factory complex at 700 Grand Avenue (Block 108, Lot 1) formerly associated with the Lackawanna Leather Company Hackettstown Plant. Both properties were recommended as potentially eligible for the NRHP as a larger historic district; however, the survey did not elaborate on the significance of the proposed historic district or whether it had any relationship to the DL&WRR (MAAR Associates, Inc. 1992).

In 1979, Drew University surveyed the Lackawanna Leather Company Hackettstown Plant as part of a Historic American Engineering Record (HAER) inventory program for historic engineering and industrial sites in Warren and Sussex counties (Lefferts and Peifer 1979). At the time of documentation (1978-1979), the Lackawanna Leather Company Hackettstown Plant property consisted of a large, brick multi-tannery and processing plant with an office building, freight building, and water tower, with a wooden tank and boiler house. Built in 1901 and serviced by the DL&WRR, the Lackawanna Leather Company expanded the Musconetcong Valley tanning tradition to a factory organization (Lefferts and Peifer 1979). The company specialized in a patented enamel leather product. The inventory did not make any recommendations on the NRHP eligibility of the property.

## Cultural Resources Surveys

A review of the NJHPO files indicated that one prior cultural resources survey has been conducted within the project area and two prior surveys were conducted within one-half mile of the project area. The RBA Group (Porter 2011) completed a cultural resources survey of the DL&WRR in Western New Jersey to satisfy a Memorandum of Agreement (MOA) condition for a bridge replacement project. The survey served as a planning document comprised of a historical chronology of the DL&WRR and a comprehensive inventory of surviving resources and features along the former main line segments of the railroad west of Dover. The report identified the subject bridge as "H-3 (DLW/Trout Brook Tributary Culvert)" and recommended it eligible as a contributing resource to the NRHP-eligible Old Main DL&WRR Historic District. The NJHPO did not provide comments on the survey's recommended NRHP eligibility of the subject bridge or any other recommendations made by the survey for other potentially contributing resources to the historic district. The NJHPO review letter indicated that the document satisfied the requirements stipulated in the MOA and that any future determination of eligibility would require additional evaluation by the NJHPO, presumably when a resource was under review due to a more direct impact (Saunders 2001).

Two surveys of the Morris Canal to the north of the subject bridge identified no cultural resources within the project area (Eckhart 1975; Kleinedler 2003).

## Summary

### *Archaeology*

No registered archaeological sites are located within the project area. There are three registered archaeological sites located within one mile of the MP 57.25 Bridge over Drain. The closest site, 28-Wa-626, is an NRHP eligible (SHPO Opinion: 2/6/1997) prehistoric occupation and an early nineteenth- to twentieth-century homestead site situated approximately 0.8 miles east of the subject bridge. Furthermore, multiple prehistoric sites have been identified within the drainage basin of the Musconetcong River and its tributaries. As a result, the project area for the MP 57.25 Bridge over Drain is generally sensitive for the presence of prehistoric cultural resources due to its proximity to Hackery Brook and its confluence with the Musconetcong River to the southeast.

*Historic Architecture*

There are six previously identified historic architectural resources listed in the NJR and/or NRHP or eligible for listing in the NRHP within one-half-mile of the MP 57.25 Bridge over Drain; however, only one of these historic properties is within the project area: the Old Main DL&WRR Historic District (SHPO Opinion: 6/7/2004 [Boundaries expansion]; prior SHPO Opinion: 09/24/1996). Project impacts to historic properties should be considered during the Preliminary Engineering Phase of this project. The proposed project involves the possible removal and replacement of MP 57.25 Bridge over Drain (dated to 1910), a resource previously recommended eligible as a contributing element to the Old Main DL&WRR Historic District by The RBA Group in their 2011 cultural resources study of the DL&WRR (Porter 2011). The NJHPO has not made a formal determination of NRHP eligibility for the MP 57.25 Bridge over Drain.

Preliminary research uncovered two additional previously identified historic architectural resources within the project area: a warehouse (Block 41, Lot 20) and the Lackawanna Leather Company Hackettstown Plant (Block 108, Lot 1). The buildings associated with both resources are within the viewshed of the MP 57.25 Bridge over Drain (see Figure 1).

A cultural resources survey for the MP 57.25 Bridge over Drain project may be required under Section 106 of the National Historic Preservation Act (NHPA), as amended, during the Local Preliminary Engineering (LPE) phase.

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# ATTACHMENT

# FIGURES

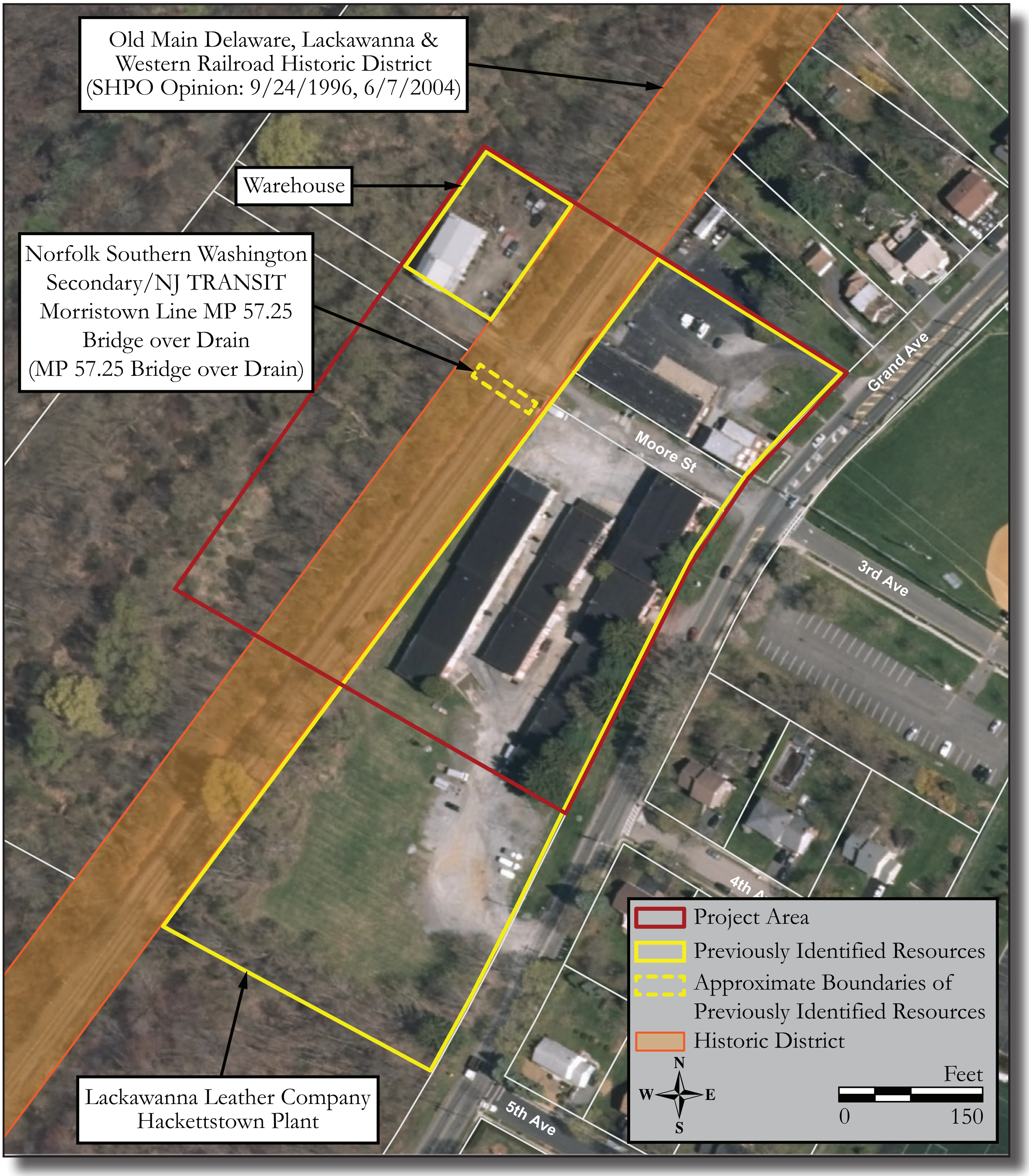
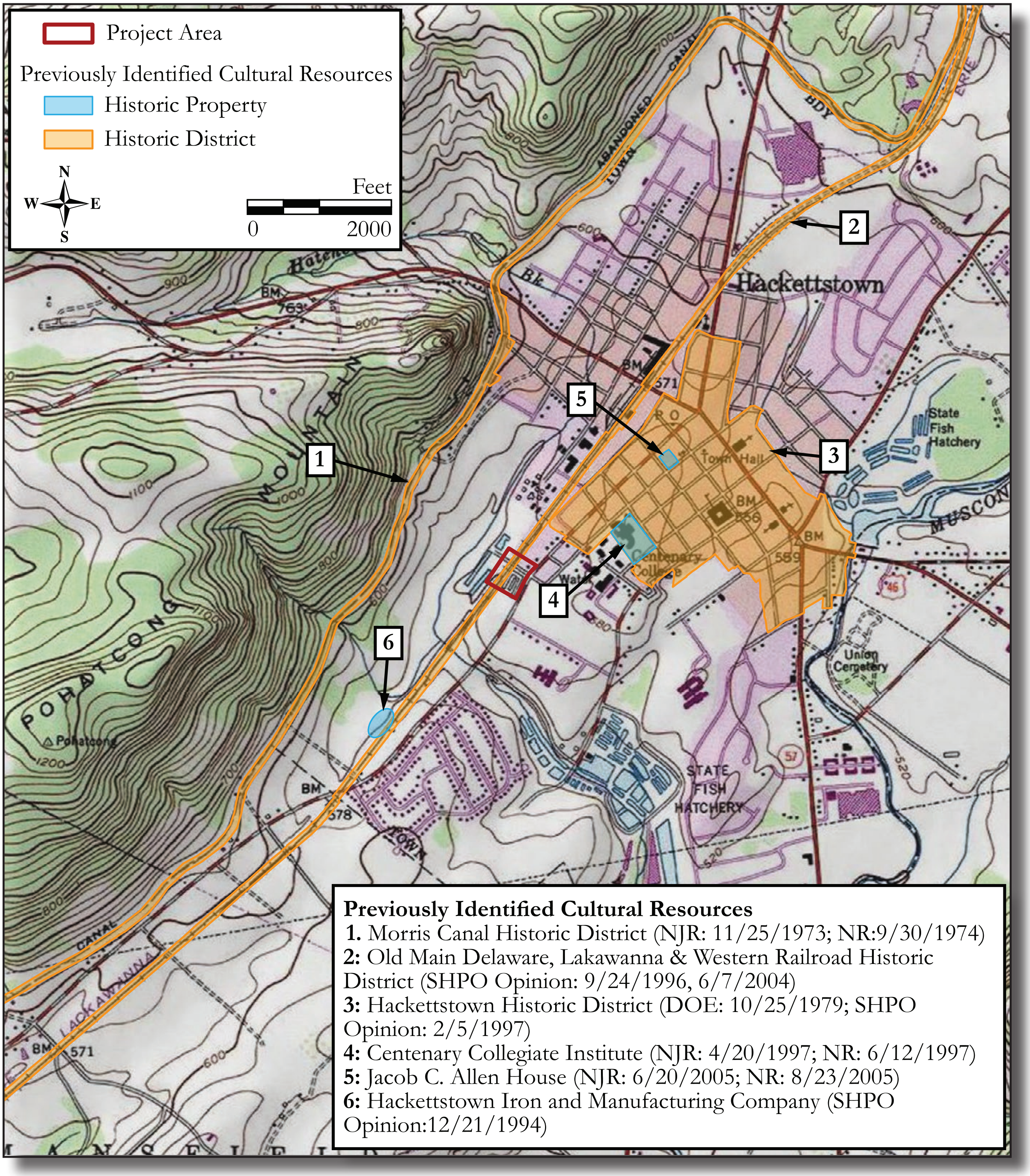


Figure 1: Aerial image showing the proposed project area, historic properties, and previously identified resources within the project area (NJGIS Digital Orthographic Imagery, 2012).



**Previously Identified Cultural Resources**
**1.** Morris Canal Historic District (NJR: 11/25/1973; NR:9/30/1974)
**2:** Old Main Delaware, Lakawanna & Western Railroad Historic District (SHPO Opinion: 9/24/1996, 6/7/2004)
**3:** Hackettstown Historic District (DOE: 10/25/1979; SHPO Opinion: 2/5/1997)
**4:** Centenary Collegiate Institute (NJR: 4/20/1997; NR: 6/12/1997)
**5:** Jacob C. Allen House (NJR: 6/20/2005; NR: 8/23/2005)
**6:** Hackettstown Iron and Manufacturing Company (SHPO Opinion:12/21/1994)

Figure 2: U.S.G.S. Map showing historic properties within a one-half mile radius of the proposed project area (2016 U.S.G.S. 7.5' Quadrangle: Hackettstown, NJ).

# Appendix B

## Structural Assessment of Bridges

# Meeting Minutes

JACOBS

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United States
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www.jacobs.com

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| | | | |
|---|---|---|---|
| **Subject** | **NJ Transit Weight Restricted Bridges Review Meeting** | | |
| **Project** | NJTPA Pilot Freight CD Study | | |
| **Project No.** | E6X90400 | **File** | J:\2017 Projects\E6X90400\500comm\505meetm\NJ Transit Coordination Meetings\NJ Transit 20190205(2)\NJ Transit Weight Restricted Bridges Review Mtg Minutes 20190205.doc |
| **Prepared by** | Scott Parker | **Phone No.** | 862.242.7326 |
| **Location** | NJ Transit, Newark | **Date/Time** | February 5, 2019 / 1:00 pm |
| **Participants** | See Attached | | |
| **Copies to** | Participants / Project Team | | |

---

| Notes | Action |
|---|---|
| **I. Pending Operating Agreements**<br>a. The Chesapeake & Delaware Railroad (CDRR) is in the process of leasing the Washington Secondary line from Norfolk Southern. It is anticipated that the lease agreement will be finalized in the immediate future. | |
| **II. Improvements to be Implemented by Others**<br>a. Upon finalization of the lease agreement, the CDRR has indicated their intent to address the vertical clearance constraint beneath the S. Main Street Bridge in Phillipsburg. This improvement will allow for the movement of Plate F railcars along the Washington Secondary from Phillipsburg to Morris Plains.<br>b. The proposed improvement has been approved by Norfolk Southern who remains the owner of the Washington Secondary.<br>c. As the CDRR's planned improvement will effectively address the project Purpose and Need, continued investigation of alternatives is no longer required.<br>d. Repurposing the remaining funds in the project to address another constraint to the movement of Plate F/286K railcars along the Washington Secondary is under consideration. | |

## III. Remaining Constraints on the Washington Secondary

a. Seven (7) bridges and structures along the Washington Secondary between Hackettstown and Morristown have been identified as potentially being unable to accommodate 286K railcars at track speed.

b. The most recent inspection and rating reports for these structures have been obtained from NJ Transit and are currently under review. An initial reading appears to indicate that some of these structures would be acceptable for 286K railcars operated at reduced speeds. While it is recognized that speed restrictions are only a temporary measure, it was suggested that one of the structures that is rated as being insufficient for 286K railcars at any speed would be a preferred choice for a location for further investigation utilizing the remaining funds in the project.

c. It was generally agreed that the priority section of the Washington Secondary for the purpose of serving existing customers is the section between Hackettstown and Dover. This section contains five (5) of the seven (7) structures identified for review. These structures, from west to east include:

- MP 58.00 Bridge over Grand Avenue (Hackettstown)
- MP 57.49 Cattle Pass (Hackettstown)
- MP 57.25 Drainage culvert (Hackettstown)
- MP 44.97 Bridge over Shippenport Road (Roxbury)
- MP 43.16 Bridge over Howard Blvd (Mt. Arlington)

## IV. Preferred Issue to Advance Through Concept Development

a. Several considerations will affect the selection of which issue to advance. In addition to selection of a bridge that is not rated sufficient for 286K railcars at any speed, ideally the selected location will have alternative solutions that would be readily implementable, would not create any significant environmental issues, would not have an adverse effect on the surrounding residents and would not involve a lengthy coordination process with the State Historic Preservation Office.

b. The above considerations are important in light of the short time remaining in the contract during which all work would need to be completed.

c. Both NJ Transit and Jacobs structures personnel will review the inspection reports and develop recommendations for which location should be advanced. A final selection will be made after these

Finalize review of inspection reports and recommendations

Schedule meeting / conference call with all structures personnel to coordinate recommendations and

| | |
|---|---|
| recommendations are developed and coordinated with NJ Transit and NJTPA. | identify a mutually agreeable recommendation to move forward. |
| **V. Increased Maintenance requirements / Cost for 286K** | |
| a. While it is recognized that the movement of heavier railcars results in more rapid degradation of the supporting infrastructure and increased maintenance requirements and cost, there is no clear quantification of just what the incremental cost increase is. | |
| b. NJ Transit inquired if this was a question that could be addressed as part of this study. | Review the language of the grant to determine if this is even an eligible task under the terms and conditions of the project funding. |

NJTPA Freight Concept
Development Program

# NJTPA Pilot Freight CD Project
# NJ Transit Weight Restricted Bridge Review Meeting

**Jacobs Project No: E6X90400**
**2:00 PM   Tuesday February 5, 2019**
**NJ TRANSIT Headquarters**
**1 Penn Plaza East**
**Newark NJ 07105**

| NAME | ORGANIZATION | PHONE (OFFICE / CELL) | E-MAIL |
|---|---|---|---|
| Jakub Rowinski | NJTPA | (973) 639-8443 | jrowinski@njtpa.org |
| Scott Parker | Jacobs | (862) 242-7326<br>(201) 787-7981 | Scott.parker@jacobs.com |
| Thanh Le | Jacobs | (862) 242-7288 | Thanh.Le@jacobs.com |
| Wilson Ribadeneira | VHB | (212) 857-7343 | WRibadeneira@VHB.com |
| Lisa Fanning | NJ Transit | (973) 491-7227 | lfanning@njtransit.com |
| Steven Friedland | NJ Transit | (973) 491-8761 | sfriedland@njtransit.com |
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# NEW JERSEY TRANSIT CORPORATION

NJ TRANSIT

BRIDGE EVALUATION SURVEY REPORT

OF

MORRISTOWN LINE MP 35.28
OVER FRANKLIN ROAD
DENVILLE, MORRIS COUNTY

ROUTE NUMBER: 4005 USRA LINE CODE: 6101
NJDOT STRUCTURE NO: 1464-151

CYCLE NO. 6

DATE OF INSPECTION: DECEMBER 21, 2015

Prepared By:

LSEA
**LS ENGINEERING ASSOCIATES CORPORATION**
150 River Road, Building E, Suite E2
Montville, New Jersey 07045

For

HARDESTY & HANOVER, LLC
West Trenton, New Jersey

Hardesty & Hanover
engineering that moves you
850 Bear Tavern Road, Suite 206, West Trenton, NJ 08628
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October 28, 2016

Ms. Lisa Fanning, PE
Assistant Chief Engineer - Structures
Infrastructure Engineering – Structures Department
New Jersey Transit Corporation
One Penn Plaza East
Newark, New Jersey 07105-2246

RE: Bridge Inspection Survey and Evaluation
Contract No. 14-051F Group F
Purchase Order No. L-92549
Final Reports Submission

Dear Ms. Fanning,

In accordance with Undergrade Bridge Inspections Contract No. 14-051F Group F, Purchase Order No. L-92549, dated December 23, 2015, we are pleased to submit three copies of the **FINAL REPORT** of the bridge inspection listed below on behalf of our subconsultant firm, LS Engineering Associates Corporation:

Morristown Line MP 35.28 over Franklin Road (NJDOT Structure No. 1464-151)

If you have any questions or comments, please contact me at 609-583-5023.

Very truly yours,

HARDESTY & HANOVER, LLC

Paul Connolly, PE
Principal Associate

Enclosures:
cc: Mr. Paul Falkowski, PE (w/enclosures)

LSEA **LS Engineering Associates Corporation**
150 River Road, Building E, Suite E2 • Montville, New Jersey 07045 • Office: 973.588.3122 • Fax: 973.588.3123

October 18, 2016

Mr. Paul Connolly, P.E.
Principal Associate
Hardesty & Hanover, LLC
850 Bear Tavern Road
Suite 206
West Trenton, New Jersey 08628

**RE: Bridge Inspection Survey and Evaluation**
**Morristown Line MP 35.28 over Franklin Road**
**Denville, Morris County**
**NJDOT Structure No: 1464-151**
**Contract No. 14-051F**

Dear Mr. Connolly:

In accordance with our sub-consultant agreement to Contract No. 14-051F, we are pleased to submit three (3) copies of the **FINAL REPORT** for the above referenced structure.

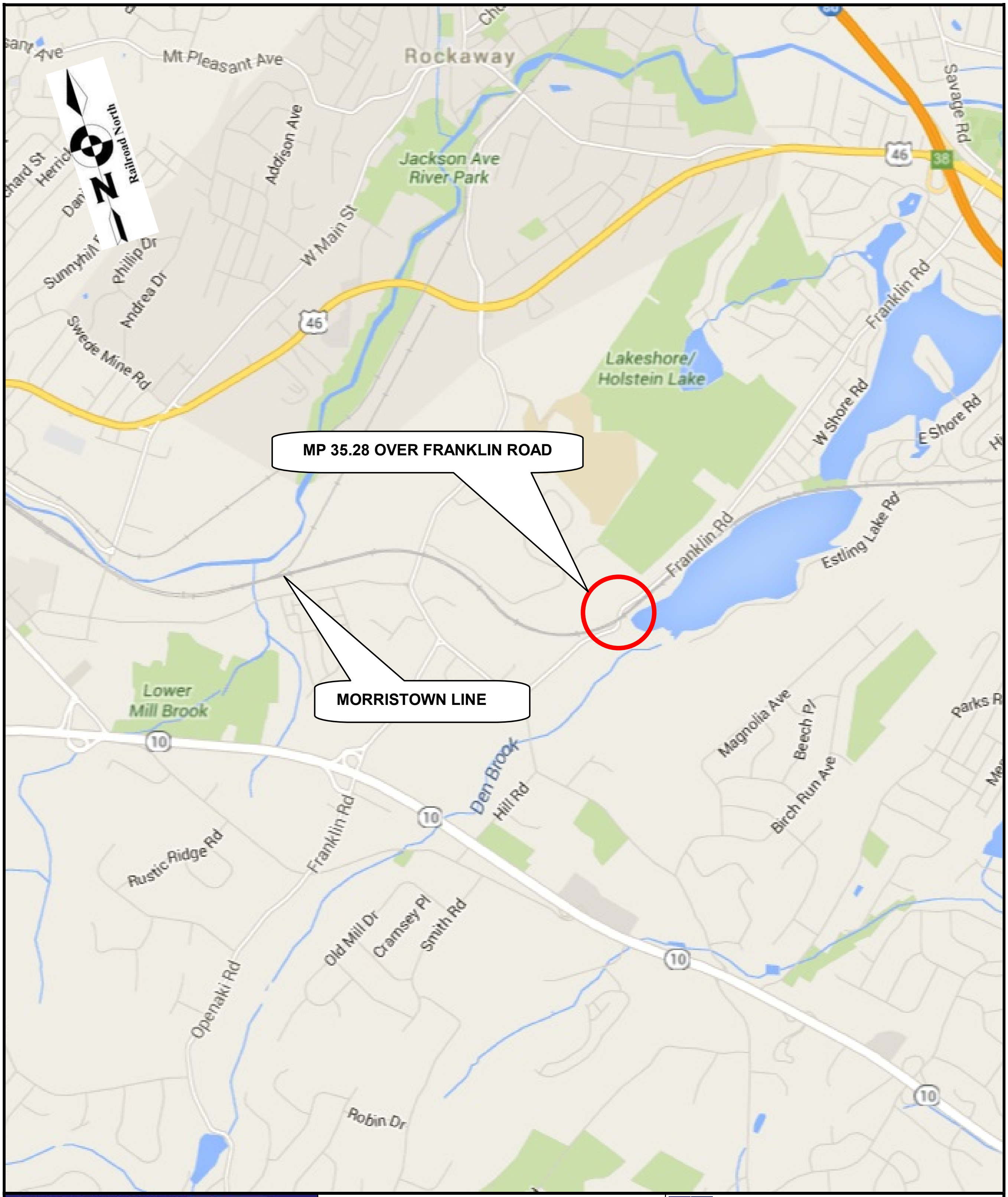
The report presented herein is based upon a thorough inspection of the bridge for the primary purpose of identifying important changes in condition and behavior, which have occurred since the previous inspection. Recommendations for repair of major defects and load rating analyses are included based on inspection findings. The bridge was inspected in accordance with New Jersey Transit guidelines and current AREMA Standards by a NBIS qualified team leader and crew. The report has been reviewed in accordance with the approved quality manual and found to be in accordance with the project agreement and scope of work. Every effort has been made to ensure the accuracy of this report; however, we cannot imply that all latent or other defects were, or could have been, disclosed in the course of inspection.

We will be pleased to respond to any questions that may arise concerning the referenced report.

Very truly yours,
**LS ENGINEERING ASSOCIATES CORPORATION**

Kim P. Law, P.E.
President

# TABLE OF CONTENTS



NJ TRANSIT The Way To Go.

One Penn Plaza East
Newark, New Jersey 07105-2246

# BRIDGE LOCATION MAP

MORRISTOWN LINE MP 35.28
OVER FRANKLIN ROAD
DENVILLE, MORRIS COUNTY

LSEA
LS ENGINEERING ASSOCIATES CORPORATION
150 River Road, Building E, Suite E2
Montville, New Jersey 07045

# NEW JERSEY TRANSIT

## INFRASTRUCTURE ENGINEERING - STRUCTURES
## BRIDGE EVALUATION SURVEY REPORT
## CYCLE NO. 6

**STRUCTURAL DATA:**

**NJDOT Structure No:** 1464-151

**Year Built:** 1928 **Year Rehab:** N/A

**USRA Line Code:** 6101

**Length:** 76'-4" **Width:** 59'-9"

**Route No:** 4005

**Date of This Evaluation:** 12/21/2015
**By:** LS Engineering Associates Corporation

**Line:** Morristown

**MP & Name:** MP 35.28 over Franklin Road

**Date of Previous Evaluation:** 12/07/2010
**By:** HNTB Corporation

**Structure Type:** Two span, continuous, one-way reinforced concrete slab

**Special Equipment Used:** 30' Bucket Truck

**OVERALL CONDITION:** Fair
SUPERSTRUCTURE CONDITION: Fair
SUBSTRUCTURE CONDITION: Fair

**WORK DONE:** New chevron signs were installed in front of the northwest wingwall. Previous guiderail was removed. (Photo 6-1).

**RATINGS:** The following load ratings were updated in the 6th Cycle Bridge Evaluation Survey Report.

| **Controlling Member:** | | As-Built | | As-Inspected | |
|---|---|---|---|---|---|
| | | Normal | Maximum | Normal | Maximum |
| Concrete Slab | Moment | E-31 | E-40 | E-31 | E-40 |
| | Shear | E-29 | E-38 | E-29 | E-38 |

## CONCLUSIONS AND RECOMMENDATIONS

Morristown Line MP 35.28 over Franklin Road consists of a two span, continuous one-way reinforced concrete slab. The bridge carries two active tracks on a ballasted deck supported on a reinforced concrete pier and abutments. The overall condition of the structure is fair.

The approaches are in good condition. The rails exhibit light surface rust and up to 1/2” wear along the inside running edges. The concrete ties are in good condition. The ballast is clean and of adequate depth.

The track components are in good condition. The rails exhibit light surface rust and up to 1/2” wear along the inside running edges. The concrete ties are in good condition. On Span 1, both tracks have missing clips and broken clips at Track 2. The ballast is clean; at Track 2 the ballast is low. The north and south concrete parapet exhibit fine to medium cracks. A large spall and delamination were noted at the east end of the south parapet and near east end of the north parapet.

The superstructure is in fair condition. The underside of the reinforced concrete slab exhibits numerous fine longitudinal cracks with light efflorescence and several medium to large spalls. There is one large spall with areas of moderate honeycombing and exposed steel reinforcement near the centerline of the slab adjacent to the east abutment in Span 1. Active water leakage is evident along the construction joint between the concrete slabs in Span 1. The north fascia exhibits large edge spalls with exposed steel reinforcement and moderate cracks with light efflorescence throughout the entire length of both spans. The south fascia exhibits several small to large spalls, areas of moderate cracks with light efflorescence and a large spall with exposed steel reinforcement at the top of the pier.

The substructure is in fair condition. The reinforced concrete abutments exhibit areas of small to large spalls delaminated concrete, severe scaling, water leakage and numerous fine to medium cracks with heavy efflorescence. The pier exhibits numerous spalls with some exposed steel reinforcement, cracked and delaminated concrete, and numerous fine to medium cracks with efflorescence. No traffic protection was evident in front of the northwest and southeast wingwall and at both ends of the pier column. The wingwalls typically exhibit numerous spalls, delaminated concrete, areas of moderate to severe scaling and fine to medium cracks with light efflorescence.

The minimum vertical underclearance of 12’-6” measured below the northeast corner of the concrete slab over the northbound lane does not meet the minimum vertical underclearance criteria required by MUTCD. The bridge is posted for a minimum vertical underclearance of 12’-3” at both approaches.

The two active tracks are curved and are situated on a 0.74 upgrade to the west. There are no obstructions to the horizontal track clearance on the structure.

**CONCLUSIONS AND RECOMMENDATIONS** (Continued)

The inspection survey indicates no significant deterioration has occurred since the previous inspection affecting the ratings. Updated ratings were performed during this cycle using As-Inspected ratings based on revised impact values, centrifugal effects and wind load effects. Although the rating indicates that the structure has insufficient structural capacity to support the Standard AREMA Cooper E-80 loading, New Jersey Transit operating equipment loads can be carried by the bridge without engine speed restrictions at the Maximum level except for the 286 Kip car which cannot be operated safely at any speed on the bridge. The controlling As-Built and As-Inspected ratings for the reinforced concrete slab based on moment are E-40 at the Maximum level and E-31 at the Normal level and the overstress is 67.9% at the Maximum levels.

## CONCLUSIONS AND RECOMMENDATIONS (Continued)

The following repairs are recommended to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

1. Remove all the deteriorated concrete from the underside of the concrete slab, parapets, fascias, abutments, pier column and wingwalls, clean any exposed rebar and patch the areas with epoxy concrete. (Photos 6-8, 6-11, 6-12, and 6-14 through 6-16).

2. Seal the medium cracks in the fascias, abutment breastwalls, pier and wingwalls with pressure injected epoxy sealer (Photo 6-7).

3. Install a waterproof membrane to prevent water leakage through the concrete slab and provide adequate drains in the slab (Photos 6-8 and 6-13).

4. Replace missing and broken clips on both tracks at span one (Photo 6-9).

5. Remove vegetation and tree growth behind the northeast, northwest and southwest wingwalls (Photos 6-1 and 6-2).

6. Install guide rails along northwest and southeast wingwalls; install an impact attenuator at the north and south end of the pier column (Photos 6-1, 6-2 and 6-7).

7. The structure should be re-inspected during the next regularly scheduled period.

## COST ESTIMATE AND BACK-UP WORK SHEETS

### COST ESTIMATE

The provided cost estimates are for scoping purposes only and shall not be construed as actual construction costs.

| Recommendation | Unit | Quantity | Unit Price | Cost |
|---|---|---|---|---|
| 1. Remove all the deteriorated concrete from the underside of the concrete slab, parapets, fascias, abutments, pier column and wingwalls, clean any exposed rebar and patch the areas with epoxy concrete. | SF | 735 | $155 | $113,925 |
| 2. Seal the medium cracks in the fascias, abutment breastwalls, pier and wingwalls with pressure-injected epoxy sealer. | LF | 170 | $185 | $31,450 |
| 3. Deck waterproofing. | | | | |
| Remove track and ballast | LF/Track | 200 | $1,350 | $270,000 |
| Waterproof membrane | SY | 510 | $60 | $30,600 |
| Drains | Each | 4 | $520 | $2,080 |
| 4. Replace missing and broken clips on both tracks at span one. | Crew Day | 1/4 | $2,080 | $ 520 |
| 5. Remove vegetation and tree growth behind the northeast, northwest and southwest wingwalls. | Crew Day | 1 | $2,080 | $2,080 |
| 6. Install guide rails along northwest and southeast wingwalls. Install an impact attenuator at both end of the pier column. | | | | |
| Guide rail | LF | 60 | $210 | $12,600 |
| Impact attenuator | Each | 2 | $41,580 | $83,160 |
| | | | **Sub-Total:** | **$546,415** |
| | | | **50% Railroad Escalation:** | **$273,208** |
| | | | **Total:** | **$819,623** |
| | | | **Say:** | **$820,000** |

**COST ESTIMATE AND BACK-UP WORK SHEETS** (Continued)

## BACK-UP WORK SHEET

| Recommendation | Total Quantity |
|---|---|
| 1. Remove all the deteriorated concrete from the underside of the concrete slab, parapets, fascias, abutments, pier column and wingwalls, clean any exposed rebar and patch the areas with epoxy concrete.<br>North Parapet 14 SF<br>South Parapet 2.5 SF<br>Underside of deck slab 112 SF<br>North fascia of deck slab 90 SF<br>South fascia of deck slab 27 SF<br>East breastwall 39 SF<br>West breastwall 35 SF<br>Northeast wingwall 223 SF<br>Northwest wingwall 25.5 SF<br>Southwest wingwall 50 SF<br>Pier 113 SF<br>Total = 731 SF Say 735 SF | 735 SF |
| 2. Seal the wide crack in both parapets, at both East and West breastwall, Northeast and Northwest wingwall with pressure injected epoxy sealer.<br>North Parapet 20 LF<br>South Parapet 10 LF<br>East breastwall 18 LF<br>West breastwall 84 LF<br>Northeast wingwall 8 LF<br>Northwest wingwall 10 LF<br>Pier 12 LF<br>Total =162 LF Say 170 LF | 170 LF |

**COST ESTIMATE AND BACK-UP WORK SHEETS** (Continued)

## BACK-UP WORK SHEET

| | |
|---|---|
| 3. Deck Waterproofing.<br>Track and ballast:<br>96 lf/track x 2 tracks = 192 LF/Track      Say 200 LF/Track<br>Membrane:<br>76 ft x 60 ft x 1/9 = 506 SY      Say 510 SY<br>Drains:<br>2 drains/span x 2 spans = 4 Drains | 200 LF/Track<br>510 SY<br>4 Each |
| 4. Replace missing and broken clips on both tracks at span one.<br>1/4 Crew Day | 1/4 Crew Day |
| 5. Remove vegetation and tree growth behind the northeast, northwest and southwest wingwalls.<br>1 Crew Day | 1 Crew Day |
| 6. Install guide rails along northwest and southeast wingwalls. Install an impact attenuator at both end of the pier column.<br>Guide rails:      30 LF x 2 = 60 LF<br>Impact attenuator:      1 at each end x 2 ends = 2 Each | 60 LF<br>2 Each |

# APPENDIX 1

## RATING SUMMARY AND COMPUTATION

# RATING ANALYSIS (Normal Stress)

**BRIDGE (Line, MP, Name):** Morristown Line MP 35.28 over Franklin Road

**CONSULTANT:** LS Engineering Associates Corporation

**DATE:** 12/21/2015 **THIS CYCLE NO.:** 6 **INFO TAKEN FROM CYCLE NO.:** 2, 4, 5 **CONTROLS RATING OF BRIDGE:** E-29

| MEMBER | CAPACITY OF THE BRIDGE Cooper E-Load | | | | | LOADED LENGTH FT. | **Engine restrictions:** note type and moment or shear controls and indicate speed without restriction. |
|---|---|---|---|---|---|---|---|
| | **As-Built** | | **As-Inspected** | | **Fatigue** | | |
| | **E - Moment** | **E - Shear** | **E - Moment** | **E - Shear** | | | |
| **W/O Wind** | | | | | | | |
| **Concrete slab** (Spans 1 & 2, Positive Mom., x = 14.8486’) | 31 | – | 31 | – | – | 37.12 | |
| **Concrete slab** (Spans 1 & 2, Negative Mom., x’ = 2.475’) | 49 | | 49 | | – | 37.12 | |
| **Concrete slab** (Spans 1 & 2, Shear Sect. 3, x’ = 10.25’) | – | 29 | – | 29 | – | 37.12 | Shear Controls |
| **Concrete slab** (Spans 1 & 2 Sect. 4, x’ = 5.267’) | – | 57 | – | 57 | – | 37.12 | . |
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# RATING ANALYSIS (Maximum Stress)

**BRIDGE (Line, MP, Name):** Morristown Line MP 35.28 over Franklin Road

**CONSULTANT:** LS Engineering Associates Corporation

**DATE:** 12/21/2015 **THIS CYCLE NO.:** 6 **INFO TAKEN FROM CYCLE NO.:** 2, 4, 5 **CONTROLS RATING OF BRIDGE:** E-38

| MEMBER | CAPACITY OF THE BRIDGE Cooper E-Load | | | | | LOADED LENGTH FT. | **Engine restrictions:** note type and moment or shear controls and indicate speed without restriction. |
|---|---|---|---|---|---|---|---|
| | As-Built | | As-Inspected | | Fatigue | | |
| | E - Moment | E - Shear | E - Moment | E - Shear | | | |
| **Concrete slab** (Spans 1 & 2, Positive Mom., x = 14.8486’) | 40 | – | 40 | – | -- | 37.12 | |
| **Concrete slab** (Spans 1 & 2, Negative Mom., x’ = 2.475’) | 63 | – | 63 | – | – | 37.12 | |
| **Concrete slab** (Spans 1 & 2, Shear Sect. 3, x’ = 10.25’) | – | 38 | – | 38 | – | 37.12 | Shear controls. Speed restriction is required for NJ Transit Engine 286 KIP CARS S = 0 mph Overstress:67.9% |
| **Concrete slab** (Spans 2 & 3 Negative Mom., x’ = 3.917’) | – | 72 | – | 72 | – | 37.12 | |
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## REFERENCES

1. "Manual for Railway Engineering (2013)" by the American Railway Engineering Association (AREMA).
2. NJ Transit Corporation's "Rating Existing Railroad Bridges" (3/9/2012).
3. Second Cycle ratings prepared by MICHAEL BAKER JR., INC., 1996.
4. Fourth Cycle ratings prepared by EDWARDS AND KELCEY., 2005
5. Fifth Cycle ratings prepared by HNTB CORPORATION, 2010

## UPDATE NOTES

1. Revised centrifugal force due to a misinterpretation of the AREMA provision and to an error of Track 2 curve degree as given by NJ Transit chart (4.0 instead 4.07 as considered).
2. Revised the Dead Load calculation due to a change in the ballast depth since Cycle 2, not considered in Cycle 5 for conservative reason. That updated will also deacrese the Live Load lateral distribution.
3. Revised the the Wind Load calculation due to the change of the lateral distribution.
4. Added an additional section besides those considered in Cycle 5 for shear at 1/2(d-d') of bent up bars.

## Update Calculations

1. Centrifugal Force,

$C_2$= 0.00117$S^2$D= $\boxed{11.7}$ % (Track 2) (S = 50 mph; D = 4.0°) (NJ Transit Chart)
$C_1$= 0.00117$S^2$D= $\boxed{5.79}$ % (Track 1) (S = 35 mph; D = 4.04°) (NJ Transit Chart)

Bring the horizontal force from 8' above the top of rail to the top of rail and add the corresponding moment to account for the force transfer. Then convert that moment into a couple of forces acting on top of rails (+)$P_c$ & (-)$P_c$, where:

$P_{c2}$ = 11.7%(E80) x 8'/5' = 18.72 % of E80 loading
Since there are 2 tracks , Track 1 curvature degree D = 4.04° — Acting simultaneously (not superimposed)
$P_{c1}$ = 5.79%(E80)x8'/5' = 9.26 % of E80 loading

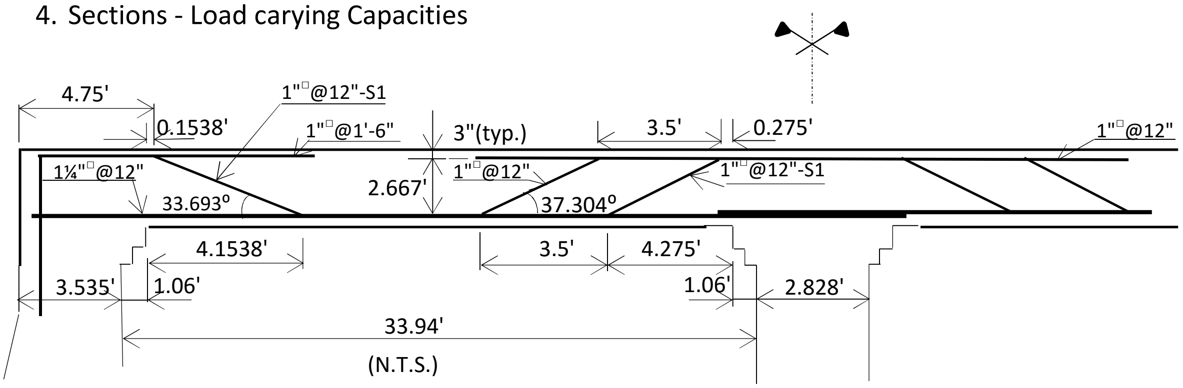
(AREMA Ch. 8 2.2.3e.(4)

2. Dead Load

Weight of ballast: Cycle 4 0.44 k/sf (Ref. 4, sh. 4-12)
Cycle 6: $w_b$ = (22"/12)x 0.12k/cf = 0.22 k/sf
$\Delta_b$ = 0.22 k/sf
Total dead load acting on slab: **$w_{DL}$** =0.95-0.22= **0.73 k/sf**

3. Wind Load **$L_b$** = 8.5'+ (22"-3")/12 = **10.08 ft** (lateral distribution)
**$w_{WL}$** = 0.48k/ft/10.083' = **0.048 k/ft** (Ref. 5, sh. 5-12)

4. Sections - Load carying Capacities



Note: All dimensions are along the main reinforcement direction (45°with substructure axis)

Equivalent bar Ø for 1"□: 4x1" = π D ⟶ D =4"/π =1.273" < 1.375"= 11/8
Development length of tensioned bar: $L_d = 0.04 \times A_b f_y/(f'_c)^{1/2}$ (AREMA Ch. 8, 2.14a.)
$L_d = 0.04 \times 1in^2 \times 33ksi/(3000)^{1/2}$= 2.008 ft
Development length should satisfy eq.: $\boxed{L_d \leq M/V + l_a}$ **EQ 2-8** (AREMA Ch.8, 2.13.2c.)
Where: M = Computed moment capacity with all positive moment tension bars fully stressed
V = Maximum applied design shear at the section
$l_a$ = Embedment length beyond the center of support.

**Moment capacity** (Normal level)

Steel reach the permissible limit: $M_s = A_s f_a jd$

Concrete reach the allowable compression stress $M_c = (1/2)f_c kjb_w d^2$

Where:

$k = [2n\rho + (n\rho)^2]^{1/2} - n\rho$ $\rho = A_s/b_w d$

$j = 1 - k/3$ n= 9

| M. Sect. | Location | $A_s$ (in²) | ρ | k | j | $M_{cap}$Steel(k-ft) | $M_{cap}$Conc.(k-ft) |
|---|---|---|---|---|---|---|---|
| 1(+) x= | 4.75'/2 | 1.25 | 0.002976 | 0.20621 | 0.93126 | **67.90452** | 141.14891 |
| 2(+) x= | 14.8486' | 3.5625 | 0.008482 | 0.32179 | 0.89274 | **180.22127** | 199.25260 |
| 3(-) x'= | 3.5'/2cos45° | 5.00 | 0.012438 | 0.37428 | 0.87524 | 244.33773 | **220.57979** |

**Shear capacity** (Normal level)

Permissible concrete shear stress ($f'_c$ = 3000 psi)

$v_c = 0.95(f'_c)^{0.5} =$ 52.03 psi (AREMA , Ch. 8, 2.26.1)

$V_c = v_c \times b_w \times d$

Where: $b_w$ = 12"

d = distance from centroid of shear reinforcement to extreme compressed fiber

$V_s = A_s \times f_a \times \sin\alpha$

Where: $A_s$ = shear reinforcement (bent bars)

$f_a$ = 20ksi (permissible reinforcement (AREMA , Ch. 8, 2.26.2a.)

α = bent up bars angle with longitudinal reinforcement

| V. Sect. | Location | d (in) | As (in²) | α° | $V_c$ (kips) | $V_s$ (kips) | $V_c + V_s$ |
|---|---|---|---|---|---|---|---|
| 1 x= | 5.292' | 2.917 | 1.00 | 33.693 | 21.8551 | 11.0949 | 32.9500 |
| 2 x= | 6.9825' | 2.917 | 0.00 | 33.693 | 21.8551 | 0 | 21.8551 |
| 3 x'= | 10.25' | 2.917 | 0.00 | 37.304 | 21.8551 | 0 | 21.8551 |
| 4 x'= | 5.267 | 2.792 | 2.00 | 37.304 | 20.9186 | 22.1897 | 43.1083 |

Return to Development length $L_d$:

a) Positive moment reinforcement

Section 1: M(+) 1.25"□x 4 = πD ⟶ D = 5/π = 1.592 in equivalent diam. between #11 & #*14*

Use a mean of the two formulas given by AREMA Table 8-2-8

$L_d = [(0.04A_b + 0.085)/2] \times f_y/(f'_c)^{1/2} =$ 44.434 in (AREMA , Ch. 8, 2.14a.)

From pg.2: **EQ 2-8** 44.434"/12 ≤ 67.90466k-ft/32.95k + 3.535'/2 → $\boxed{\text{3.708 ft < 3.82834 ft}}$ OK

b) Negative moment reinforcement

Section 3: M(-) 1"□ equivalent Ø < #11 (Ref. page 2 of 6)

$L_d$ = 2.008'x 1.4 = 2.811' (Ref. page 2 of 6 + AREMA Ch. 8, 2.14b.)

**EQ 2-8** **2.811' ≤** 220.57979k-ft/43.1083k + 13'-2.75' → $\boxed{\text{2.811 ft < 15.3669 ft}}$ OK

Therefore moment capacity is assured 100% in all three sections.

**Moment capacity** (Maximum level)

| | | | | | |
|---|---|---|---|---|---|
| | $M_{cap\ max}$ = | $M_{cap\ norm}$ x 1.2 | | | (AREMA , Ch. 8, 19.4.1.2a.) |
| Section 1: | $\mathbf{M_{cap\ max}}$ = | 67.90452k-ft x 1.2 = | **81.4854** | **k-ft** | (Ref. page 3 of 6) |
| Section 2: | $\mathbf{M_{cap\ max}}$ = | 180.2213k-ft x 1.2 = | **216.266** | **k-ft** | (Ref. page 3 of 6) |
| Section 3: | $\mathbf{M_{cap\ max}}$ = | 220.5798k-ft x1.2 = | **264.696** | **k-ft** | (Ref. page 3 of 6) |

**Shear capacity** (Maximum level)

| | | | | | |
|---|---|---|---|---|---|
| | $V_{cap\ max}$ = | $V_{cap\ norm}$ x 1.2 | | | |
| Section 1: | $\mathbf{V_{cap\ max}}$ = | 32.9500k x1.2 = | **39.5399** | **kips** | (Ref. page 3 of 6) |
| Section 2: | $\mathbf{V_{cap\ max}}$ = | 21.8551k x 1.2 = | **26.2261** | **kips** | (Ref. page 3 of 6) |
| Section 3: | $\mathbf{V_{cap\ max}}$ = | 21.8551k x 1.2 = | **26.2261** | **kips** | (Ref. page 3 of 6) |
| Section 4: | $\mathbf{V_{cap\ max}}$ = | 43.083k x 1.2 = | **51.7299** | **kips** | (Ref. page 3 of 6) |

Loads

Dead Load

Multiply the moment and shear value calculated in Cycle 4 and replicated in Cycle 5 with the factor $m_D$ = 0.73k/ft/0.95k/ft = 0.76842 (Ref.4, sh.4-12 & pg.2 of6)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Section 1: | $\mathbf{M_{DL}}$ = | 0.76842 x | 33.95 | k-ft = | **26.0879** | **k-ft** | (Ref.4, sh.4-12) |
| Section 2: | $\mathbf{M_{DL}}$ = | 0.76842 x | 92.6 | k-ft = | **71.1558** | **k-ft** | (Ref.4, sh.4-12) |
| Section 3: | $\mathbf{M_{DL}}$ = | 0.76842 x | 113 | k-ft = | **86.8316** | **k-ft** | (Ref.4, sh.4-12) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Section 1: | $\mathbf{V_{DL}}$ = | 0.76842 x | 8.6 | k = | **6.60842** | **kips** | (Ref.4, sh.4-12) |
| Section 2: | $\mathbf{V_{DL}}$ = | 0.76842 x | 6.7 | k = | **5.14842** | **kips** | (Ref.4, sh.4-12) |
| Section 3: | $\mathbf{V_{DL}}$ = | 0.76842 x | 12.4 | k = | **9.52842** | **kips** | (Ref.4, sh.4-12) |
| Section 4: | $\mathbf{V_{DL}}$ = | 0.76842 x | 16.7 | k = | **12.8326** | **kips** | (Ref.4, sh.4-12) |

Wind Load

Multiply the moment and shear value calculated in Cycle 5 with the factor $m_W$

$m_W$ =(0.0476k/SF)/0.041k/SF = 1.16098 (Ref.5, sh.5-12 & pg.2 of6)

| | | | | | | |
|---|---|---|---|---|---|---|
| Section 1: | $\mathbf{M_{WL}}$ = | 1.16098 x | 1.24 | k-ft = | 1.43961 | (Ref.5, sh.4-16) |
| Section 2: | $\mathbf{M_{WL}}$ = | 1.16098 x | 3.955 | k-ft = | 4.59166 | (Ref.5, sh.4-16) |
| Section 3: | $\mathbf{M_{WL}}$ = | 1.16098 x | 4.823 | k-ft = | 5.59939 | (Ref.5, sh.4-16) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Section 1: | $\mathbf{V_{WL}}$ = | 1.16098 x | 0.356 | k = | 0.41331 | (Ref.5, sh.4-16) |
| Section 2: | $\mathbf{V_{WL}}$ = | 1.16098 x | 0.31 | k = | 0.3599 | (Ref.5, sh.4-16) |
| Section 3: | $\mathbf{V_{WL}}$ = | 1.16098 x | 0.531 | k = | 0.61648 | (Ref.5, sh.4-16) |
| Section 4: | $\mathbf{V_{WL}}$ = | 1.16098 x | 0.732 | k = | 0.84983 | (Ref.5, sh.4-16) |

Impact factor I = 36.93% (Ref. 5, sh. 5-11)

**Updated Load Rating Result Tables**

## SUMMARY OF NORMAL RATING W/O WIND

### Reinforced Concrete Slab - As Built = As-Inspected

TOTAL LIVE LOAD CAPACITY = $LL_{CAP}$ = CAPACITY - DL-WL
NET LIVE LOAD CAPACITY = $LL_{NET,CAP}$ = $LL_{CAP}$ / (1 + I + C)
$E_{80}$ RATING (MOMENT & SHEAR) = ($LL_{NET,CAP}$ / LL) x $E_{80}$

**MOMENT (K-FT)**

| MOMENT | MOMENT CAPACITY ($M_{CAP}$) | MOMENT DEAD LOAD ($M_{DL}$) | MOMENT WIND LOAD ($M_{WL}$) | MOMENT LIVE LOAD ($M_{LL}$) | FACTORS | | $LL_{CAP}$ | $LL_{NET,CAP}$ | RATING $E_{80}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | IM (I) | CENT. FORCE (C) | | | |
| Section 1, x = 2.9813' | 67.90 | 26.09 | | 53.91 | 0.37 | 0.187 | 41.82 | 26.87 | 39.9 |
| Section 2, x = 14.8486' | 180.22 | 71.16 | | 178.18 | 0.37 | 0.187 | 109.07 | 70.07 | 31.5 |
| Section 3, x' = 2.475' | 220.58 | 86.83 | | 138.50 | 0.37 | 0.187 | 133.75 | 85.93 | 49.6 |
| | | | | | | | | | |

**SHEAR (KIPS)**

| SHEAR | SHEAR CAPACITY ($V_{CAP}$) | MOMENT DEAD LOAD ($V_{DL}$) | SHEAR WIND LOAD ($V_{WL}$) | SHEAR LIVE LOAD ($V_{LL}$) | FACTORS | | $LL_{CAP}$ | $LL_{NET,CAP}$ | RATING $E_{80}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | IM (I) | CENT. FORCE (C) | | | |
| Section 1, x = 5.292' | 32.95 | 6.61 | | 19.27 | 0.37 | 0.187 | 26.34 | 16.92 | 70.3 |
| Section 2, x = 6.9825' | 21.86 | 5.15 | | 18.09 | 0.37 | 0.187 | 16.71 | 10.73 | 47.5 |
| Section 3, x' = 10.25' | 21.86 | 9.53 | | 21.77 | 0.37 | 0.187 | 12.33 | 7.92 | 29.1 |
| Section 3, x' = 5.267' | 43.11 | 12.83 | | 27.12 | 0.37 | 0.187 | 30.28 | 19.45 | 57.4 |
| | | | | | | | | | |

Note: Moment and shear live load have been taken from Cycle 5 multplied by a factor 11.67'/10.75' due to a reduce lateral distribution as resulted from lower ballast depth.

**Updated Load Rating Result Tables**

## SUMMARY OF MAXIMUM RATING

### Reinforced Concrete Slab - As Built = As-Inspected

TOTAL LIVE LOAD CAPACITY = $LL_{CAP}$ = CAPACITY - DL-WL

NET LIVE LOAD CAPACITY = $LL_{NET,CAP}$ = $LL_{CAP}$ / (1 + I + C)

$E_{80}$ RATING (MOMENT & SHEAR) = ($LL_{NET,CAP}$ / LL) x $E_{80}$

**MOMENT (K-FT)**

| MOMENT | MOMENT CAPACITY ($M_{CAP}$) | MOMENT DEAD LOAD ($M_{DL}$) | MOMENT WIND LOAD ($M_{WL}$) | MOMENT LIVE LOAD ($M_{LL}$) | FACTORS IM (I) | FACTORS CENT. FORCE (C) | $LL_{CAP}$ | $LL_{NET,CAP}$ | RATING $E_{80}$ |
|---|---|---|---|---|---|---|---|---|---|
| Section 1, x = 2.9813' | 81.49 | 26.09 | 1.44 | 53.91 | 0.37 | 0.187 | 53.96 | 34.67 | 51.4 |
| Section 2, x = 14.8486' | 216.27 | 71.16 | 4.59 | 178.18 | 0.37 | 0.187 | 140.52 | 90.28 | 40.5 |
| Section 3, x' = 2.475' | 264.70 | 86.83 | 5.60 | 138.50 | 0.37 | 0.187 | 172.26 | 110.67 | 63.9 |
| | | | | | | | | | |

**SHEAR (KIPS)**

| SHEAR | SHEAR CAPACITY ($V_{CAP}$) | MOMENT DEAD LOAD ($V_{DL}$) | SHEAR WIND LOAD ($V_{WL}$) | SHEAR LIVE LOAD ($V_{LL}$) | FACTORS IM (I) | FACTORS CENT. FORCE (C) | $LL_{CAP}$ | $LL_{NET,CAP}$ | RATING $E_{80}$ |
|---|---|---|---|---|---|---|---|---|---|
| Section 1, x = 5.292' | 39.54 | 6.61 | 0.41 | 19.27 | 0.37 | 0.187 | 32.52 | 20.89 | 86.8 |
| Section 2, x = 6.9825' | 26.23 | 5.15 | 0.36 | 18.09 | 0.37 | 0.187 | 20.72 | 13.31 | 58.9 |
| Section 3, x' = 10.25' | 26.23 | 9.53 | 0.62 | 21.77 | 0.37 | 0.187 | 16.08 | 10.33 | 38.0 |
| Section 3, x' = 5.267' | 51.73 | 12.83 | 0.85 | 27.12 | 0.37 | 0.187 | 38.05 | 24.44 | 72.1 |
| | | | | | | | | | |

Note: Moment and shear live load have been taken from Cycle 5 multplied by a factor 11.83'/10.083' due to a reduce lateral distribution as resulted from lower ballast depth.

## COMPARISON TO NJ TRANSIT EQUIPMENT (MAXIMUM RATING ONLY)

Member = Slab at toe of bent up bar x'=10.25' (Ref. page 2 of 7)
Load Type = Shear
Load Length = 37.12 (ft, slab span)
Effective depth d = 35 (in)
Rating (E) = 38.00

| No. | NJ Transit Equipment | $V_{LL}$ from Cycle 5 | LLcap E80* | Impact Factor | Rating Factor |
|---|---|---|---|---|---|
| 1. | 2 F40PH-2 DIESEL | 110.2 | 16.08 | 0.369 | 1.1 |
| 2. | 2 GP40PH-2 DIESEL | 117.9 | 16.08 | 0.369 | 1.0 |
| 3. | 2 GP40FH-2 DIESEL | 114.1 | 16.08 | 0.369 | 1.0 |
| 4. | SW-1500 SINGLE DIESEL | 99.6 | 16.08 | 0.369 | 1.2 |
| 5. | 2 ALP-44 ELECTRIC | 82.8 | 16.08 | 0.369 | 1.4 |
| 6. | 2 ALP-46 ELECTRIC | 81.2 | 16.08 | 0.369 | 1.5 |
| 7. | 2 PL-42 DIESEL | 113.0 | 16.08 | 0.369 | 1.0 |
| 8. | 2 GP40-2 DIESEL | 114.9 | 16.08 | 0.369 | 1.0 |
| 9. | 2 ALP-45 DUAL MODE | 82.0 | 16.08 | 0.369 | 1.4 |
| 10. | 286 KIP CARS | 175.2 | 16.08 | 0.369 | 0.7 |

* Taken from the table of "Moment and Shear Tables for Heavy Duty Cars
For rating values less than 1.0, speed restrictions are required.

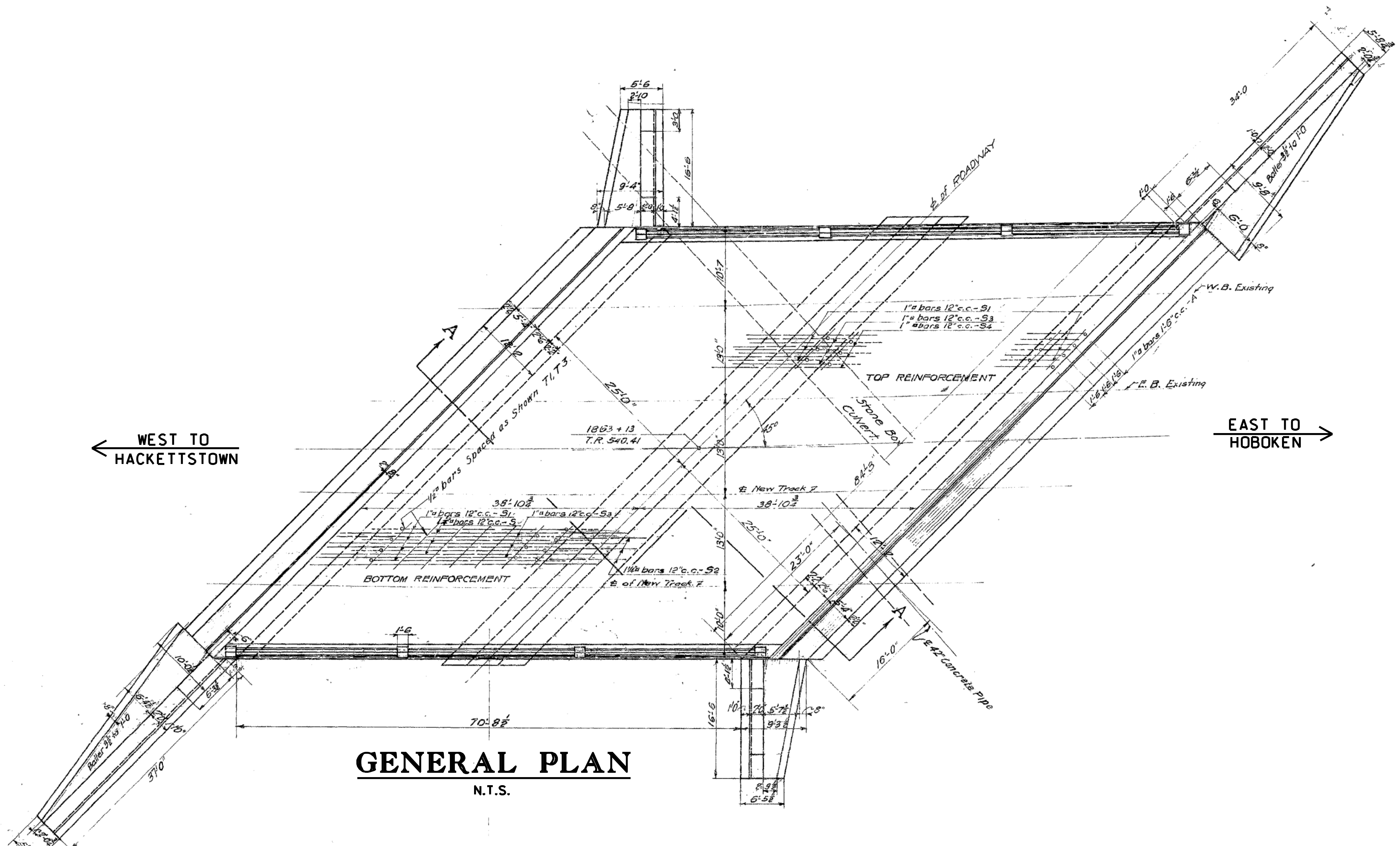
$$\text{Overstress} = \frac{DL+LL(1+I+C)+WL}{CAPACITY}-1$$

$$\text{Overstress} = \frac{230.7\text{ k} + 470.8\text{ k} \times 1.5}{736.6\text{ k}} -1 = 27.19\ \%$$

# APPENDIX 2

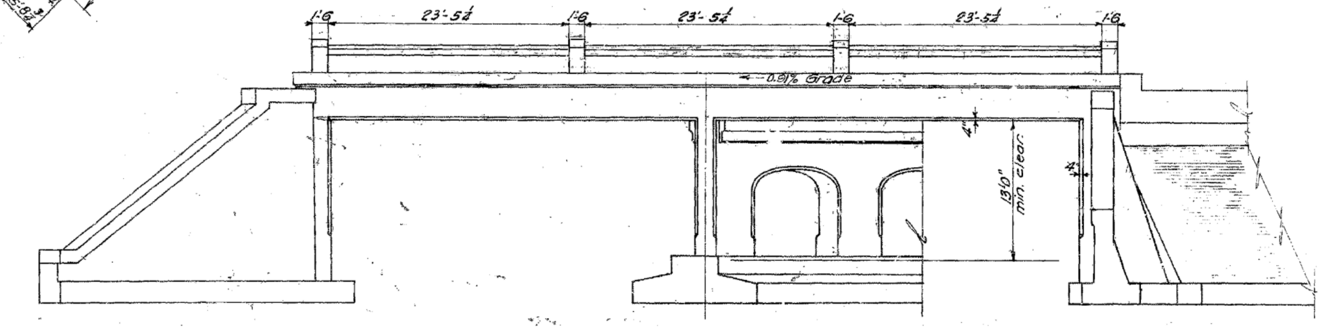
## PHOTOGRAPHS AND DRAWINGS

DESIGNATED
NORTH



## GENERAL PLAN

N.T.S.



## ELEVATION

N.T.S.

NJ TRANSIT
ONE PENN PLAZA EAST
NEWARK, NEW JERSEY 07105

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

DESIGNED BY:
DRAWN BY: HZ
CHECKED BY: DCF
IN CHARGE: KPL
DATE: 9/2016

SEAL

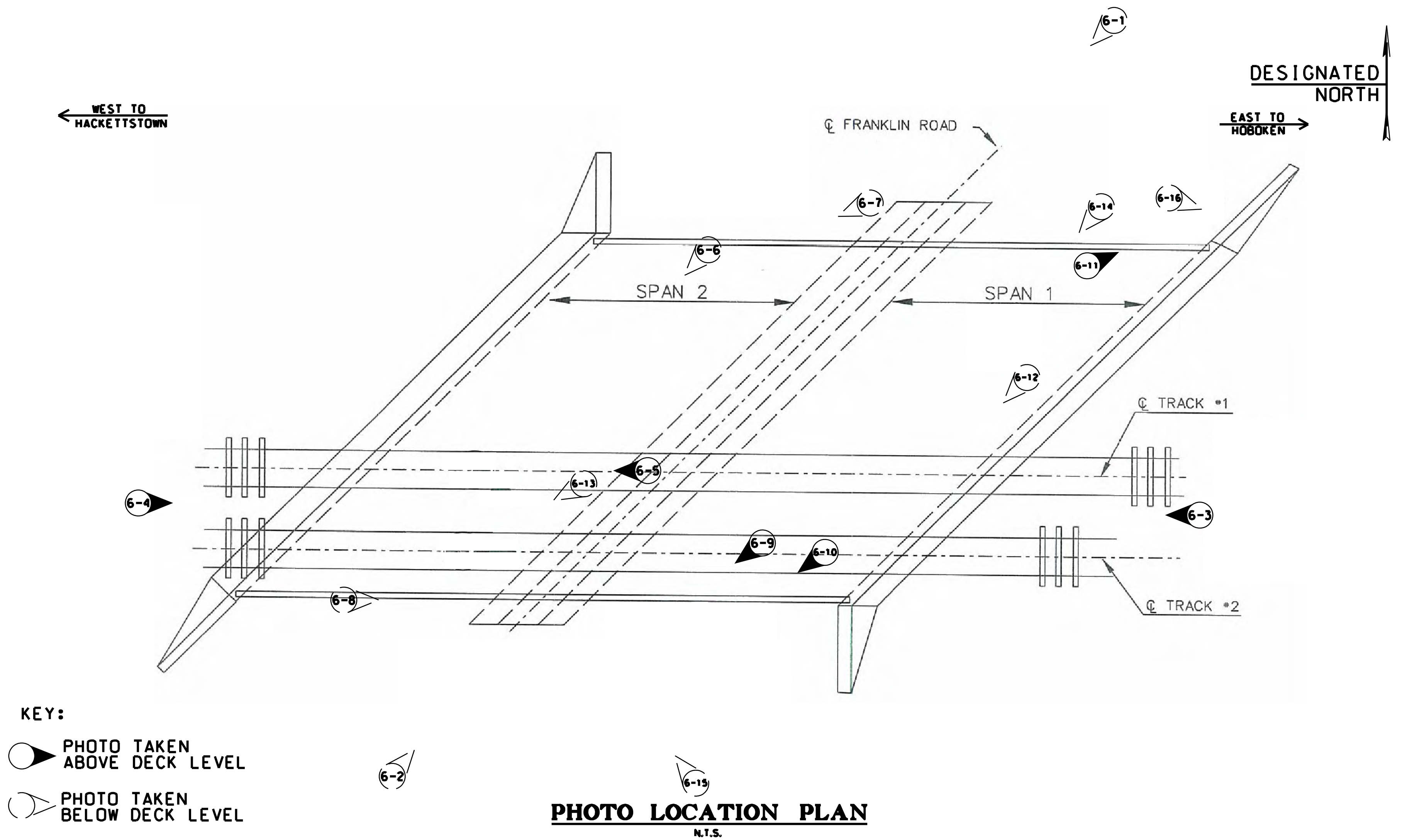
GENERAL PLAN AND ELEVATION

LSEA CORPORATION
150 RIVER ROAD, BUIDLING E, SUITE E2
MONTVILLE, NJ 07045

MORRISTOWN LINE MP 35.28
OVER FRANKLIN ROAD

MUNICIPALITY: DENVILLE
COUNTY: MORRIS

CONTRACT NO. 14-051F
FILE NO.
REV.
DRAWING NO. 1 OF 1



## PHOTO LOCATION PLAN

N.T.S.

NJ TRANSIT
ONE PENN PLAZA EAST
NEWARK, NEW JERSEY 07105

| NO. | DATE | REVISIONS |
|---|---|---|

DESIGNED BY:
DRAWN BY: HZ
CHECKED BY: OCF
IN CHARGE: KPL
DATE: 9/2016

SEAL

PHOTO LOCATION PLAN

LSEA CORPORATION
150 RIVER ROAD, BUIDLING E, SUITE E2
MONTVILLE, NJ 07045

MORRISTOWN LINE MP 35.28
OVER FRANKLIN ROAD

MUNICIPALITY: DENVILLE
COUNTY: MORRIS

CONTRACT NO. 14-051F
FILE NO.
REV.
DRAWING NO. 1 OF 1

**Photo No. 6-1**

| | |
|---|---|
| **Location:** | North elevation, looking southwest. |
| **Description:** | General view. Note lack of substructure protection and vegetation growth behind both wingwalls. Also note the new chevron signs and removal of guide rail in front of the northwest wingwall. |

**Photo No. 6-2**

| | |
|---|---|
| **Location:** | South elevation, looking northeast. |
| **Description:** | General view. Note lack of substructure protection and vegetation growth behind the wingwall. |

**Photo No. 6-3**

| | |
|---|---|
| **Location:** | East approach, looking west. |
| **Description:** | General view. |

**Photo No. 6-4**

| | |
|---|---|
| **Location:** | West approach, looking east. |
| **Description:** | General view. |

**Photo No. 6-5**

| | |
|---|---|
| **Location:** | Bridge ties of Track 1, looking west. |
| **Description:** | General view. |

**Photo No. 6-6**

| | |
|---|---|
| **Location:** | Underside of deck at Span 2, looking southwest. |
| **Description:** | General view. |

**Photo No. 6-7**

| | |
|---|---|
| **Location:** | West abutment, looking southwest. |
| **Description:** | General view. Lack of guiderail along northwest wingwall. Moderate crack along the entire length of the abutment breastwall. |

**Photo No. 6-8**

| | |
|---|---|
| **Location:** | Span 2, west face of pier, looking east. |
| **Description:** | General view. Note spall at bottom of pier at south end. Spall with exposed reinforcement on top of pier. Active water leak mark at first joint. |

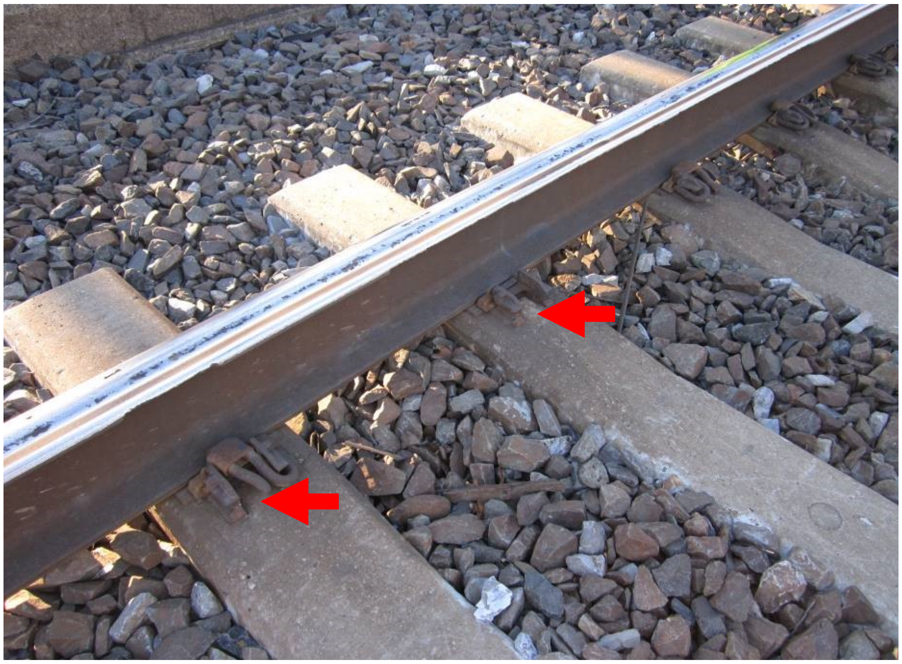


**Photo No. 6-9**

| | |
|---|---|
| **Location:** | South rail of Track 2 at Span 1, looking southwest. |
| **Description:** | Missing and broken pandrol clip. |

**Photo No. 6-10**

| | |
|---|---|
| **Location:** | South rail of Track 2 at Span 1, looking southwest. |
| **Description:** | Low ballast under rail. |

| | |
|---|---|
|  | **Photo No. 6-11** |
| **Location:** | North parapet in Span 1, looking northeast. |
| **Description:** | Spall on top of parapet. |
|  | **Photo No. 6-12** |
| **Location:** | Span 1 adjacent to east abutment, looking southwest. |
| **Description:** | Large spall with exposed reinforcement at the underside of slab at joint. Spall with exposed reinforcement at east face of pier. |

**Photo No. 6-13**

| | |
|---|---|
| **Location:** | Span 2 at first joint from south fascia, looking southwest. |
| **Description:** | Active water leakage at joint. |

**Photo No. 6-14**

| | |
|---|---|
| **Location:** | Span 1 north fascia, looking southwest. |
| **Description:** | Large spall with exposed reinforcement at the underside slab and north fascia. Heavy efflorescence and map cracking adjacent to the spall. |

**Photo No. 6-15**

| | |
|---|---|
| **Location:** | Top of pier at south fascia, looking northwest. |
| **Description:** | Large spall at top of pier at south fascia with exposed reinforcement. |

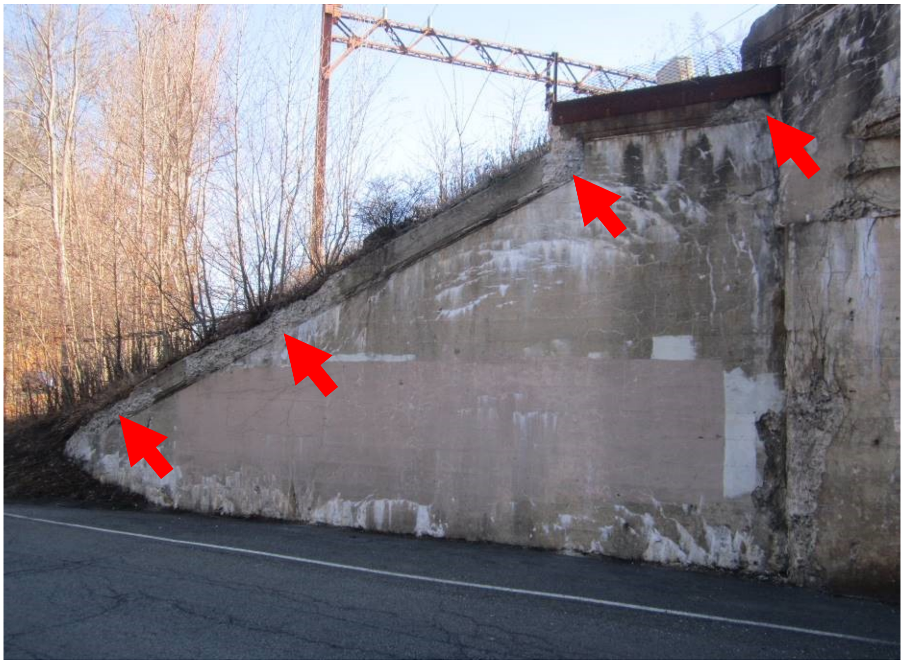


**Photo No. 6-16**

| | |
|---|---|
| **Location:** | Northeast wingwall, looking southeast. |
| **Description:** | Areas of spalls with exposed reinforcement and map cracking with heavy efflorescence throughout the northeast wingwall. |

# APPENDIX 3

## FIELD OBSERVATIONS

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GENERAL

LINE: Morristown

MILEPOST: 35.28

NAME OF BRIDGE: Over Franklin Road

NJDOT STRUCTURE NO.: 1464-151

CONSULTANT BRIDGE NO.: F9

ROUTE NO.: 4005

DATE: TOP OF DECK: 1/04/2016
SUPERSTRUCTURE: 1/15/2016
SUBSTRUCTURE: 12/21/2015

USRA LINE CODE: 6101

MUNICIPALITY: Denville

COUNTY: Morris

CONSULTANT: LSEA Corporation

CREW CHIEF: King F. Lee, P.E.

WEATHER: Sunny (01/04/16), Sunny (01/15/16), Sunny (12/21/15).

CREW MEMBER(S): Kalpesh Patel
Jose Lopez
Hui Zhang

TEMPERATURE: 25°F (01/04/16), 40°F (01/15/16), 55°F (12/21/15).

TYPE OF BRIDGE: Two span continous one way reinforced concrete slab

YEAR BUILT: 1928

YEAR OF MAJOR REPAIRS: N/A

WORK DONE: New chevron signs were installed in front of the northwest wingwall.
Previous guide rail was removed.

OPEN DECK / [✓ BALLASTED DECK]

[✓ ELECTRIFIED] / NON-ELECTRIFIED

INDEPENDENT BRIDGES: YES/[✓ NO]

BRIDGE # 1 = TRACK # N/A = GIRDERS N/A
BRIDGE # 2 = TRACK # ____ = GIRDERS ____
BRIDGE # 3 = TRACK # ____ = GIRDERS ____
BRIDGE # 4 = TRACK # ____ = GIRDERS ____

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GENERAL

### (CONTINUED)

LINE Morristown

MP 35.28

TANGENT / [✓ CURVED] TRACK

NO. OF TRACKS: 2

C/C DISTANCE BETWEEN TRACKS:
TRACK # 1 AND TRACK # 2 : C/C = 13'-9"
TRACK # ____ AND TRACK # ____: C/C = ________
TRACK # ____ AND TRACK # ____: C/C = ________

ECCENTRICITY IN TRACK: N/A
NUMBER 1:__________ SOUTH / NORTH
NUMBER 2:__________ SOUTH / NORTH
NUMBER 3:__________ SOUTH / NORTH
NUMBER 4:__________ SOUTH / NORTH

OVERALL CONDITION RATING OF BRIDGE (G, [✓ F], P, B): Fair

INDIVIDUAL ELEMENT CODES AND GENERAL OBSERVATIONS OF CONDITIONS:

APPROACHES: ([✓ G] F, P, B) The rails exhibit light surface rust and up to 1/2" wear along the inside running edges. The concrete ties are in good condition. The ballast is clean and of adequate depth.

DECK: ([✓ G], F, P, B) The rails exhibit light surface rust and up to 1/2" wear along the inside running edges. The concrete ties are in good condition. On Span 1 both tracks has missing clips and 2 broken clips at Track 2. The ballast is clean; at Track 2 the ballast is low. The north and south parapet exhibit fine to medium cracks. A large spall and delaminations were noted at east end of the south parapet and near east end of the north parapet.

SUPERSTRUCTURE: (G, [✓ F], P, B) The underside of the reinforced concrete slab exhibits numerous fine longitudinal cracks with light efflorescence and several medium to large spalls. There is one large spall with areas of moderate honeycombing and exposed steel reinforcement (20 SF x 6 " deep) near the centerline of the slab adjacent to the east abutment in Span 1. Active water leakage is evident along the construction joint between the concrete slabs in Span 1. The north fascia exhibits large edge spalls with exposed steel reinforcement and moderate cracks with light efflorescence throughout the entire length of both spans. The south fascia exhibits several small to large spalls, areas of moderate cracks with light efflorescence and a large spall with exposed steel reinforcement (12 SF x 6" deep) at top of the pier.

SUBSTRUCTURE: (G, [✓ F] P, B) The reinforced concrete abutments exhibit areas of small to large spalls, delaminated concrete, severe scaling, water leakage and numerous fine to medium cracks with heavy efflorescence. The pier exhibits numerous spalls with some exposed steel reinforcement, cracked and delaminated concrete, and numerous fine to medium cracks with efflorescence. No traffic protection was evident in front of the northwest and southeast wingwall and at both ends of the pier column. The wingwalls typically exhibit numerous spalls, delaminated concrete, areas of moderate to severe scaling and fine to medium cracks with light efflorescence.

WATERWAYS: (G, F, P, B) N/A

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### EAST

LINE Morristown MP 35.28 PHOTOS 6-3

TANGENT / [✓ CURVED] TRACK GRADE: +0.74% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT: N/A LENGTH: N/A

CONDITION: N/A

WEIGHT OF RAIL: 132 Lb/ yd [✓ WELDED] / JOINTED

RAILS:CONDITION: Track 1: 1/2" groove on the north rail, north edge. South rail, inside edge 1/16" lip.
Track 2: South rail exhibits 1/2" groove on both side.

PUMPING: RAILS: YES / [✓ NO]
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____

TIES: YES / [✓ NO]
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____

TIE SIZE: LENGTH: 8'-6" WIDTH: 9" DEPTH: 7"

TIES: C/C OF TIES: 2'-0" NO. NEEDING REPLACEMENT: 0
CONDITION: Concrete ties are in good condition

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### EAST/CONTINUED

LINE Morristown

MP 35.28

TIE PLATES: NO. MISSING: N/A

NO. LOOSE: N/A

CONDITION: N/A

TIE PADS: YES / [✓ NO]

CONDITION: N/A

SPIKES: CONDITION: Pandrol clips - light surface rust typical.

BALLAST: [✓ CLEAN] / UNCLEAN

ADEQUATE DEPTH: [✓ YES] / NO

DESCRIPTION: Well - Graded

SHOULDERS: SOUTH: Steep / Stable

(CONDITIONS)

NORTH: Service road - Flat / Stable

TRACK TO BE RAISED / LOWERED: YES / [✓ NO]

LOW APPROACH / SAG YES / [✓ NO]

NO TRESPASSING SIGNS:

[✓ NONE]

YES

LOCATION: N/A

OTHER OBSERVATIONS: Communications cabinet near north east corner of span, covered with graffiti.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### WEST

LINE Morristown MP 35.28 PHOTOS 6-4

TANGENT / [✓ CURVED] TRACK GRADE: +0.74% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT: N/A LENGTH: N/A

CONDITION: N/A

WEIGHT OF RAIL: 132 Lb/Yd. [✓ WELDED] / JOINTED

RAILS: CONDITION: Track 1: 1/2" groove on the north rail, North edge. South rail inside edge 1/8" lip.
Track 2: South rail exhibits 1/2" groove on the north side.

PUMPING: RAILS: YES / [✓ NO]

TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____

TIES: YES / [✓ NO]

TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____
TRACK: ____ NORTH RAIL: AMOUNT: ____ LENGTH: ____
SOUTH RAIL: AMOUNT: ____ LENGTH: ____

TIE SIZE: LENGTH: 8'-6" WIDTH: 9" DEPTH: 7"

TIES: C/C OF TIES: 2'-0" NO. NEEDING REPLACEMENT: 0

CONDITION: Concrete ties; good condition.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### WEST/CONTINUED

LINE Morristown MP 35.28

TIE PLATES: NO. MISSING: N/A NO. LOOSE: N/A

CONDITION: N/A

TIE PADS: YES / [✓ NO]

CONDITION: N/A

SPIKES: CONDITION: Pandrol clips - Light surface rust typical.

BALLAST: [✓ CLEAN] / UNCLEAN ADEQUATE DEPTH: [✓ YES] / NO

DESCRIPTION: Well graded

SHOULDERS: SOUTH: Steep / Stable

(CONDITIONS)

NORTH: Service road - Flat / Stable

TRACK TO BE RAISED / LOWERED: YES / [✓ NO]

LOW APPROACH / SAG YES / [✓ NO]

NO TRESPASSING SIGNS:

[✓ NONE]

YES LOCATION: N/A

OTHER OBSERVATIONS: Communications cabinet near north west corner of span, covered by graffiti.

Extra rails stored between tracks.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SUPERSTRUCTURE SPAN No. 1 & 2

LINE Morristown MP 35.28 PHOTOS 6-5, 6-9, 6-10, and 6-11

TRACK NUMBER: 1 & 2 OPEN / [✓ BALLASTED] TANGENT / [✓ CURVED] TRACK

SPAN TYPE: Two span continue reinforcement concrete slab SPAN LENGTH: 37'-9" c/c

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT: N/A LENGTH: N/A

CONDITION: N/A

CONDITION OF RAILS: Track 1: North rail has 1/2" lip on outer edge, South rail has 1/2" lip on inner edge.

Track 2: South rail has 1/2" lip on inner edge, North rail is in good condition.

PUMPING: RAILS: YES / [✓ NO]

| | | | |
|---|---|---|---|
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |

TIES: YES / [✓ NO]

| | | | |
|---|---|---|---|
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |

TIE SIZE: LENGTH: 8'-6" WIDTH: 9" DEPTH: 7"

TIES: C/C OF TIES: 2'-0" NO. NEEDING REPLACEMENT: 0

CONDITION: Concrete ties on both tracks are in good condition.

RIBBON GUARD / TIE: YES / [✓ NO] TYPE AND SIZE: N/A

SPACER BLOCKS: YES / [✓ NO]

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SUPERSTRUCTURE SPAN No. 1 & 2

### CONTINUED

LINE Morristown MP 35.28

BACKWALL TIES: SIZE: N/A CONDITION: N/A

TIE PLATES: NO. MISSING: N/A NO. LOOSE: N/A
CONDITION: N/A

TRACKS SHIMMED: YES / [✓ NO]

TIE PADS: YES / [✓ NO] CONDITION: N/A

CONDITION OF SPIKES: Pandrol clips are in good condition with light surface rust. Track 1: South rail (span 1) 1 missing clip at north side. Track 2: South rail (span 1) 2 broken and 1 missing clip (north side).
Track 2: South rail (span 1) area of low ballast.

CONDITION OF ANCHOR / J-HOOK BOLTS: N/A

BALLAST: DEPTH: ±22" [✓ CLEAN] / UNCLEAN

WALKWAYS: STEEL / TIMBER / UNDEFINED
LOCATION: N/A
CONDITION:

HANDRAILS: STEEL / TIMBER / UNDEFINED
CONDITION: N/A

CONDITION OF PARAPET WALLS / CURBS: (See below)

MILEAGE BOARDS: YES: LOCATION:
[✓ NO] / NEEDED: LOCATION: N/A

OBSTRUCTIONS: [✓ NO] / YES: TYPE & DISTANCE: N/A

OTHER OBSERVATIONS: Catenary pole on southeast wingwall, north parapet exhibits fine to 1/8" wide cracks at pylon (20 LF). Northeast end exhibits large spall (4 SF) and areas of delamination (10 SF), Southeast end has large spall (2.5 SF x 2" Deep). South end has several fine to 1/8" wide cracks x 10 LF total.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## CONCRETE DECK SLAB

LINE Morristown MP 35.28 PHOTOS 6-6 through 6-8, 6-12 through 6-14, and 6-15

SPAN: 1 ( E -> W ) SPAN LENGTH: 37'-9" c/c

WATER LEAKAGE: [✓ YES] / NO % DECK AREA: ±10%

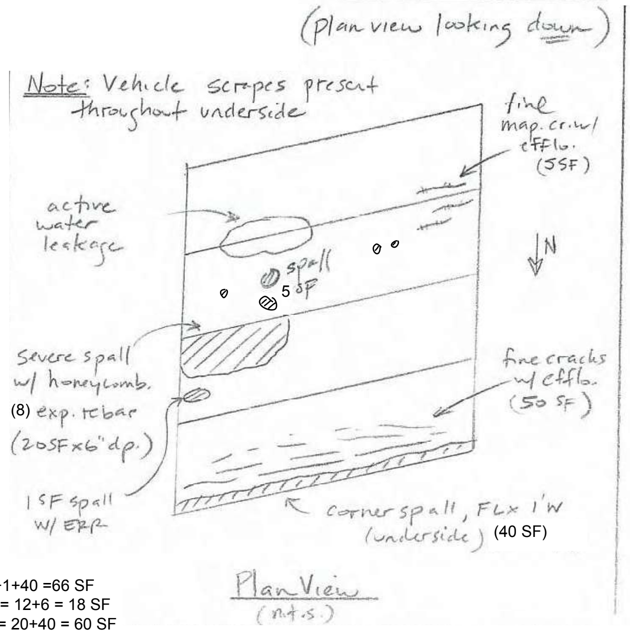
SUFFICIENT CURB HEIGHT: [✓ YES] / NO
(BALLAST OVERFLOW)

CRACKS: Numerous fine longitudinal cracks with efflorescence at both ends of slab underside.

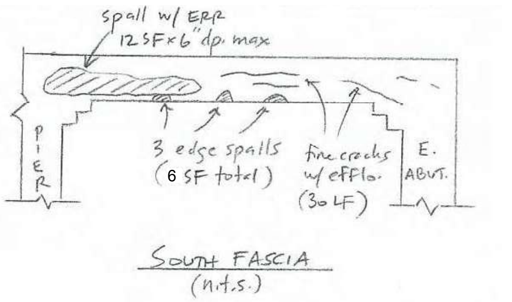
SPALLS: Large spall with honey combing and exposed steel reinforcement (20 SF x 6" deep) near centerline of structure adjacent to east abutment, north fascia exhibit severe edge spalling for full length of span (40 SF) with exposed reinforcement steel.

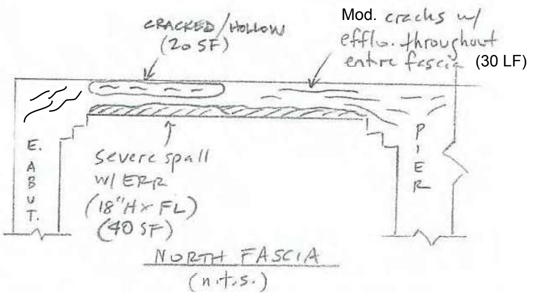
OTHER OBSERVATIONS: Active water leakage noted at all corner joint of slab (See sketch).
South Fascia : exhibit extra large spall with exposed reinforcement steel (12 SF x 6' deep); 3 edge spalls (6 SF total), and moderate cracks with efflorescence (30 LF) (No repair required).
North Fascia : exhibit Severe spall with exposed reinforcement steel (±40 SF) for full span length, area of delamination concrete (20 SF); moderate cracks with efflorescence throughout entered fascia.
Vehicular scrape marks throughout underside of deck.

SKETCH (IF NEEDED):



Total spalls:
Deck = 5+20+1+40 =66 SF
South Fascia = 12+6 = 18 SF
North Fascia = 20+40 = 60 SF





# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## CONCRETE DECK SLAB

LINE Morristown MP 35.28 PHOTOS 6-6 through 6-8, 6-12 through 6-14

SPAN: 2 SPAN LENGTH: 37'-9" c/c

WATER LEAKAGE: [✓ YES] / NO % DECK AREA: ±10%

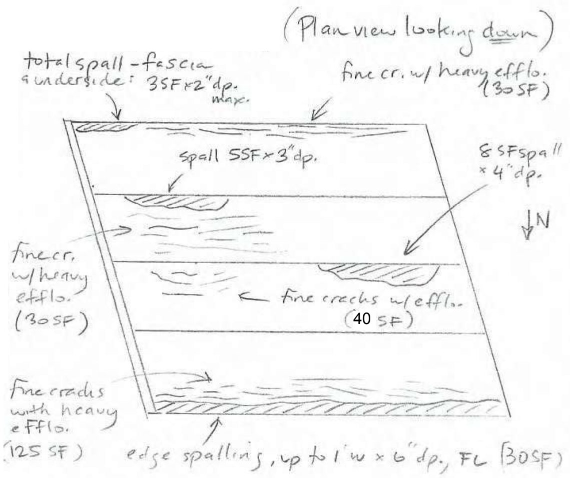
SUFFICIENT CURB HEIGHT: [✓ YES] / NO
(BALLAST OVERFLOW)

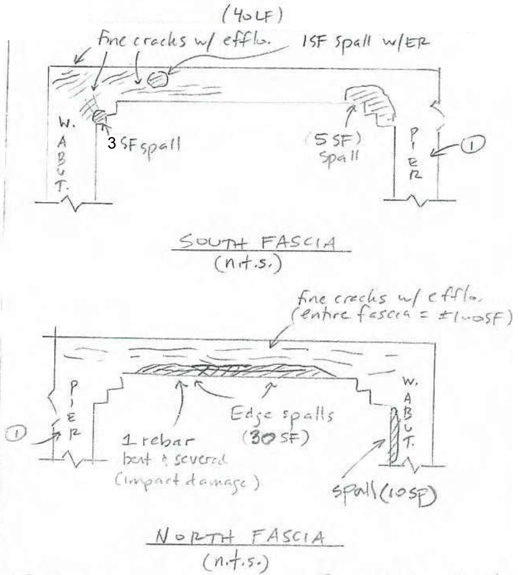
CRACKS: Several fine cracks with efflorescence near center construction joint (±40 SF), and also noted near south fascia (30 SF) and north fascia (125 SF), ( No repair required)

SPALLS: (3 SF x 2" deep) spall noted at southeast slab corner near pier, (5 SF x 3" deep) spall noted at under side near construction joint (see sketch); (8 SF x 4" deep) spall adjacent to center line joint.

OTHER OBSERVATIONS: South facia: exhibit (5 SF) spall near pier, 2 additional spalls (4 SF total), 1 exhibit exposed reinforcement steel ; also ±40 LF of moderate cracks with efflorescence (No repair required).
North fascia : Edge spalls (30 SF total), 1 bent reinforcement steel due to impact damage; entire fascia exhibit fine cracks with efflorescence (±100 SF) (No repair required)

SKETCH (IF NEEDED):





① See pier notes/ sketches for additional notes

Total spalls:
Deck = 3+5+8+30 = 46 SF
South Fascia = 3+1+5 = 9 SF
North Fascia = 30 SF

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ABUTMENT BREASTWALL

### EAST

LINE Morristown MP 35.28 PHOTOS --

TYPE: [✓ REINFORCED CONCRETE] / PLAIN CONCRETE / STONE / BRICK / TIMBER

LENGTH: 84'-6" HEIGHT: 12'-4"

WIDTH: AT BEARING: N/A AT GROUND LEVEL: N/A

STRUCTURAL CRACKS: SIZE: 4' L WIDTH: 1/8" LOCATION: Upper coping near center construction joint

SIZE: 4' L WIDTH: 1/8" LOCATION: Wall near center const. joint

SIZE: 10' L WIDTH: 1/8" LOCATION: Joint near south end

CONDITIONS: (2 SF x 6" deep) spall present at center construction joint in upper coping; (1 SF) pop out, (1 SF) spall with exposed reinforcement steel; area of severe scaling and delaminated concrete (12'H x 2'W) at north corner of wall; south corner exhibit (2 SF x 4" deep) spall at base of wall; various locations with fine cracks, efflorescence, fine vertical cracks, delaminated concrete noted at south end of wall (±8 ' H x 1' W, 8 SF).

CONDITION OF BEARING SEAT: N/A

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION:

GRAFFITI: YES / [✓ NO] [✓ PLUMB] / TILT: Plumb

FOUNDATION CONDITIONS: Not Visible

TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION: N/A

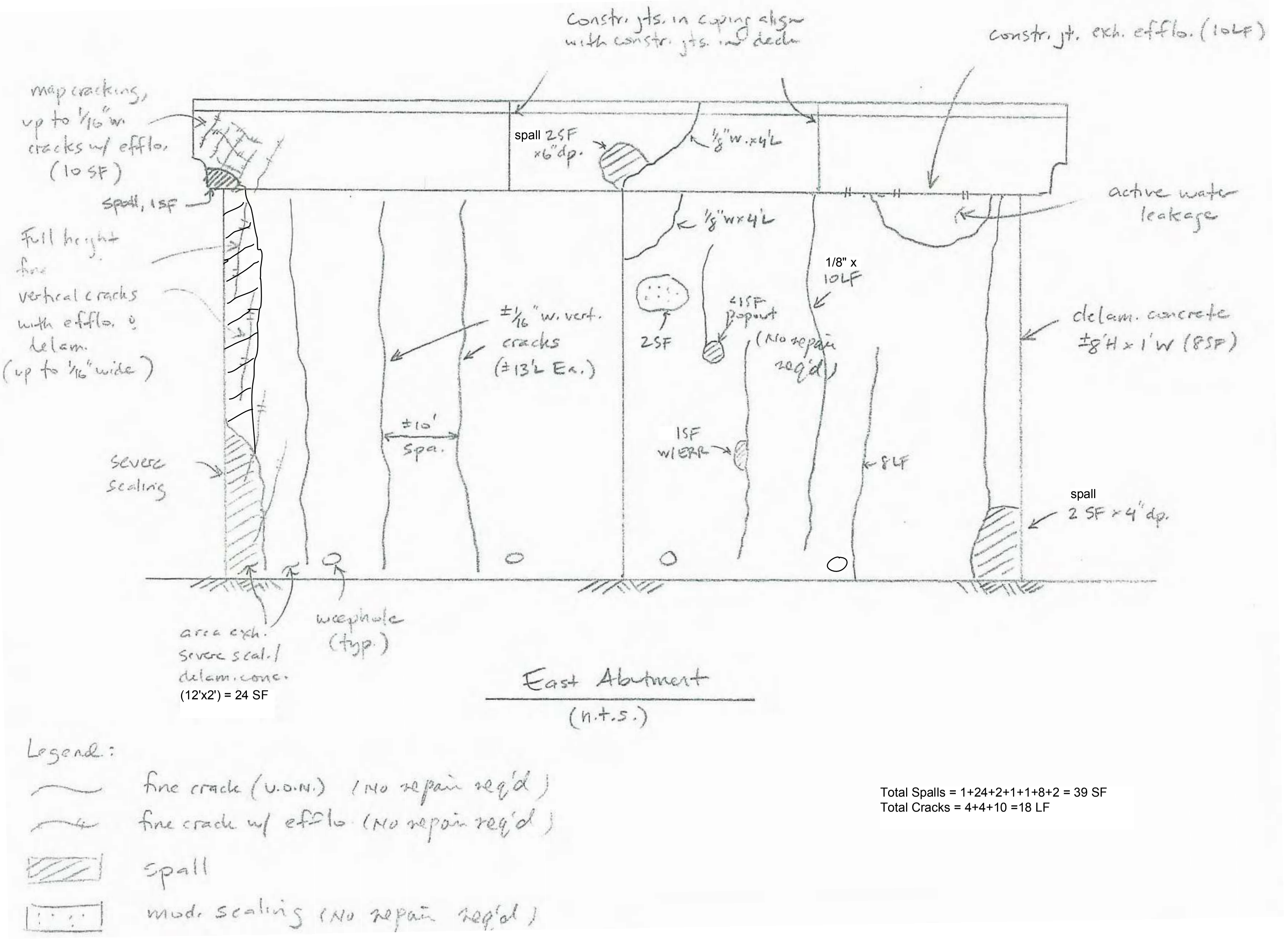
OTHER OBSERVATIONS: There are 4 weep holes at the bottom of the wall.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

LINE Morristown

MP 35.28

PHOTOS --



Total Spalls = 1+24+2+1+1+8+2 = 39 SF
Total Cracks = 4+4+10 =18 LF

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ABUTMENT BREASTWALL

### WEST

LINE Morristown MP 35.28 PHOTOS 6-7

TYPE: [✓ REINFORCED CONCRETE] / PLAIN CONCRETE / STONE / BRICK / TIMBER

LENGTH: 84'-6" HEIGHT: 12'-4"

WIDTH: AT BEARING: N/A AT GROUND LEVEL: N/A

STRUCTURAL CRACKS: SIZE: ±84' L WIDTH: 1/8" LOCATION: At horizontal construction joint between coping and wall

SIZE: WIDTH: LOCATION:

SIZE: WIDTH: LOCATION:

CONDITIONS: (2 SF) spall at top south portion of wall; (2 SF x 2 1/2" deep) spall (See sketch for location); areas with fine vertical cracks, some with efflorescence; north end of wall exhibit 8'H x 3"x 3" (2 SF) corner spall, an area 3'H x ±1'W fractured / delaminated, and additional vertical fine cracks with efflorescence (±50 LF); water leakage, moss growth and fine cracks noted at construction joint in top coping. Delaminated concrete at north end of the wall for full height (±2' wide).

CONDITION OF BEARING SEAT: N/A

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION:

GRAFFITI: YES / [✓ NO] [✓ PLUMB] / TILT: Plumb

FOUNDATION CONDITIONS: Not Visible

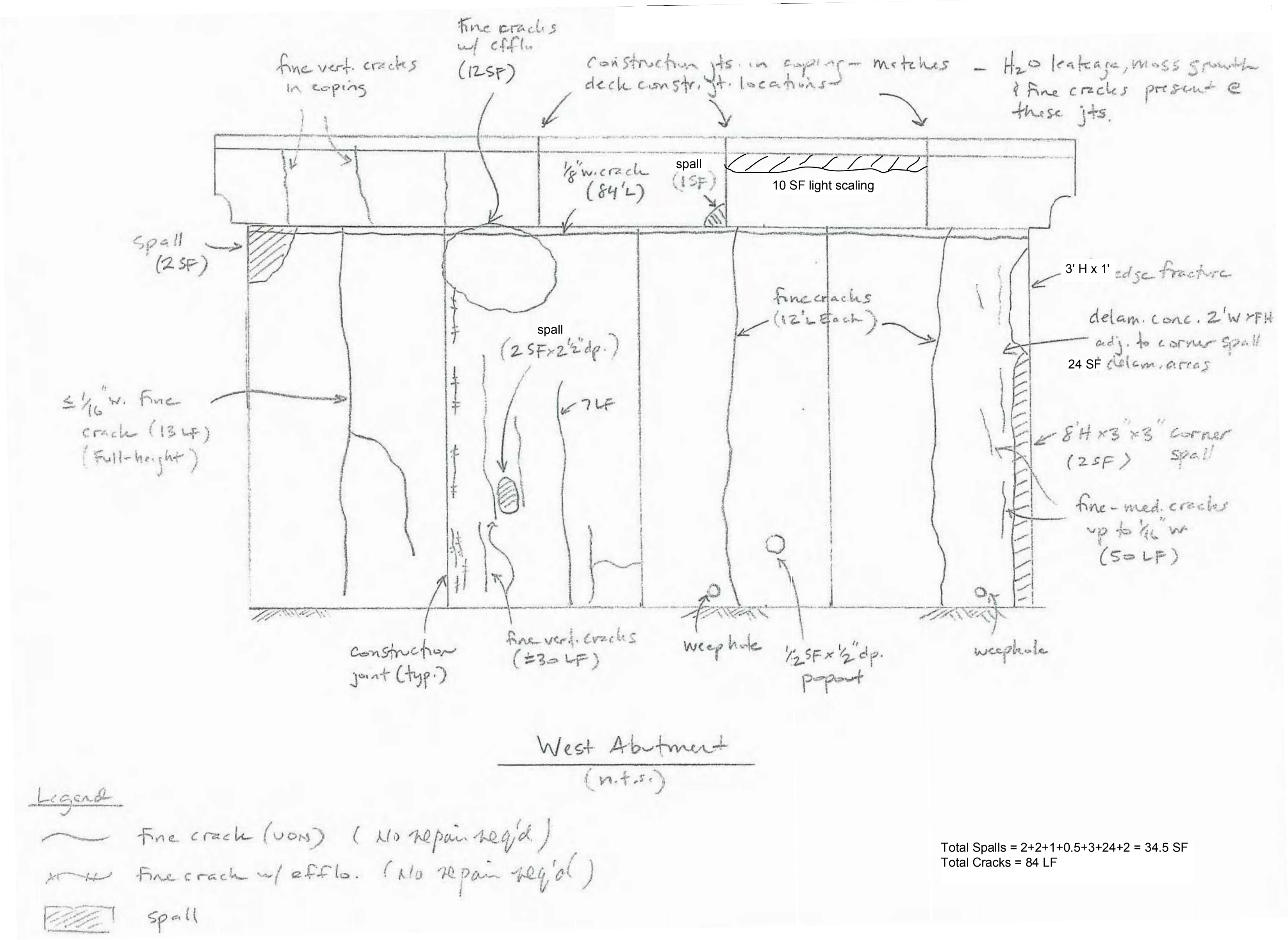
TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: There are 4 weep holes at the bottom of the wall.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

LINE Morristown MP 35.28 PHOTOS --



West Abutment
(n.t.s.)

Total Spalls = 2+2+1+0.5+3+24+2 = 34.5 SF
Total Cracks = 84 LF

OFFICE OF THE CHIEF ENGINEER – STRUCTURES

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## BENT/PIER

LINE Morristown MP 35.28 PHOTOS 6-8

SPAN NO: 1 & 2 TRACK NO: 1 & 2 PIER NO: 1 (FROM EAST)

HEIGHT: 13'-0" SIZE: 6 Columns (5'-3 1/2" L x 2'-0" W)

TYPE: Reinforced concrete with six arched pier columns.

GENERAL CONDITIONS: Pier exhibits several areas of moderate to severe spalling with exposed steel Impact spall / deterioration at south nose of pier. Several locations exhibit medium random cracks with efflorescence. Crack and loose concrete evident along both faces. (See sketch for location)

BEARING SEAT CONDITIONS: N/A

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION: N/A

GRAFFITI: YES / [✓ NO] [✓ PLUMB] / TILT: Plumb

FOUNDATION CONDITIONS: Not visible

TRAFFIC PROTECTION: YES CONDITION:

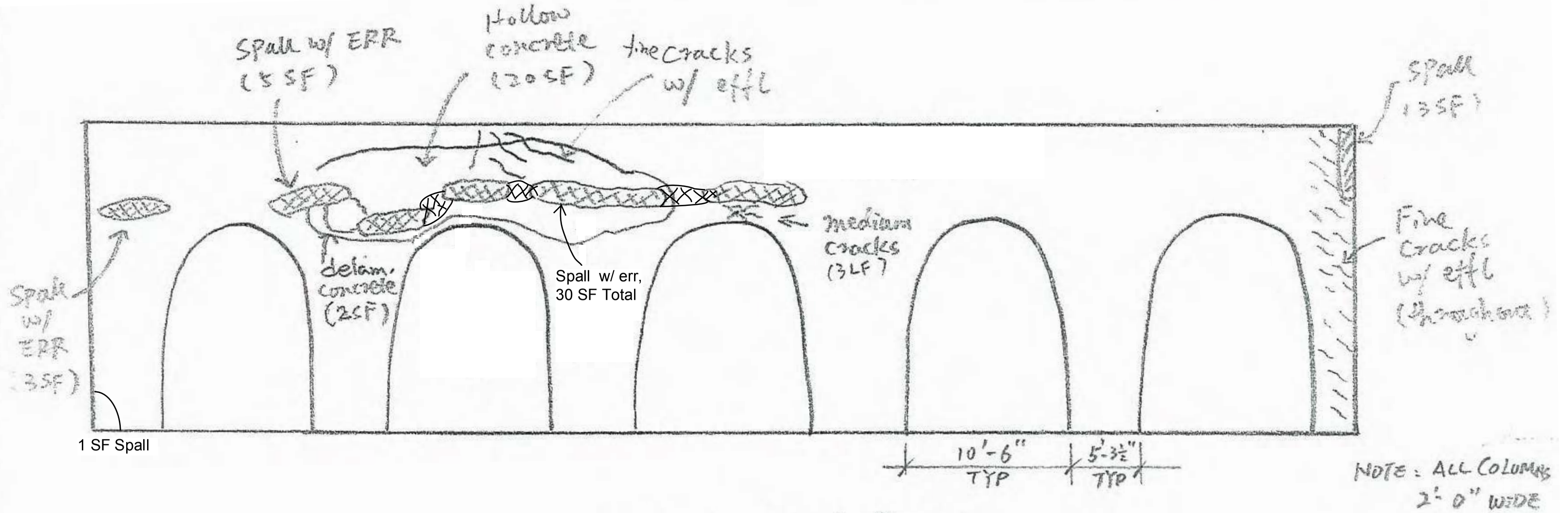
[✓ NO] / [✓ NEEDED] LOCATION: Both ends

OTHER OBSERVATIONS: None

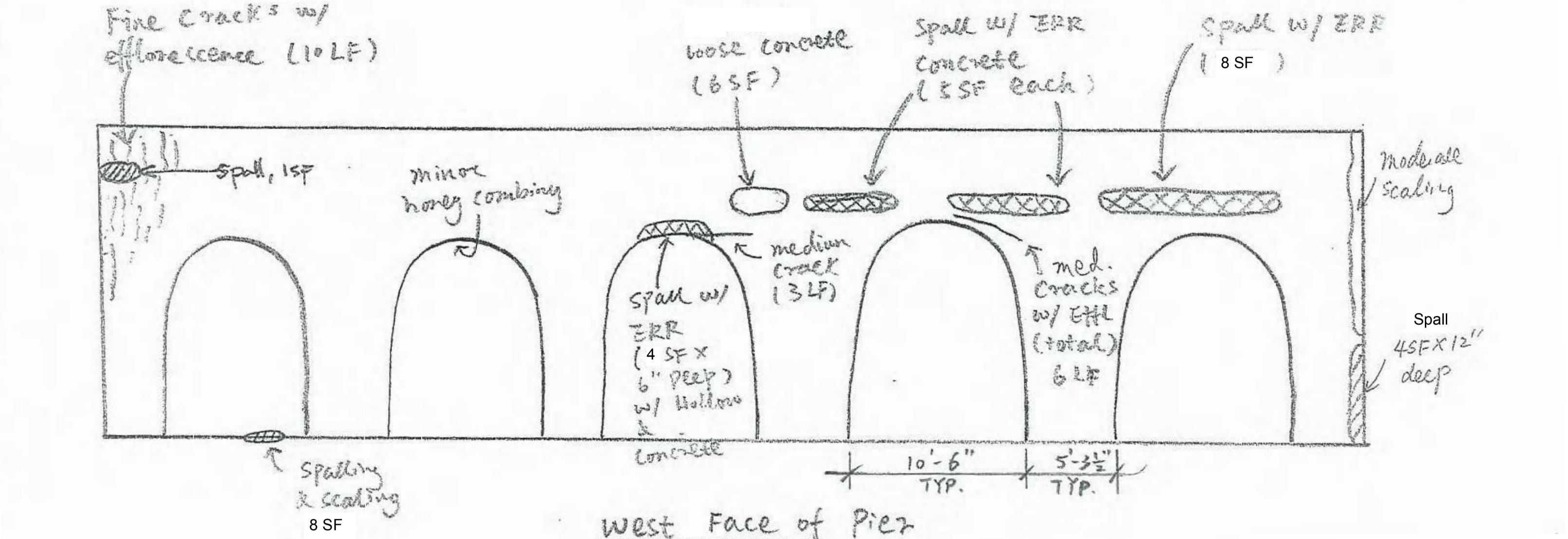
SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

LINE Morristown MP 35.28 PHOTOS --



East Face of Pier



West Face of Pier

Total Spalls = (3+1+5+2+30+30+3)+
(1+6+6+4+5+5+8+4) = 113 SF
Total Cracks = 3+3+6 = 12 LF

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

**EAST / ~~WEST~~**
**NORTH / ~~SOUTH~~**

LINE Morristown MP 35.28 PHOTOS 6-1, 6-16

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: 15'-6" WIDTH: 2'-0" LENGTH: 34'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Trees & Vegetation LOCATION: Behind wall

CONDITIONS: The wing wall exhibits several large area of spalled concrete. Several fine cracks with efflorescence throughout. Severe scaling at several locations. End of wing wall buried under pile of gravel.

FOUNDATIONS: Not Visible

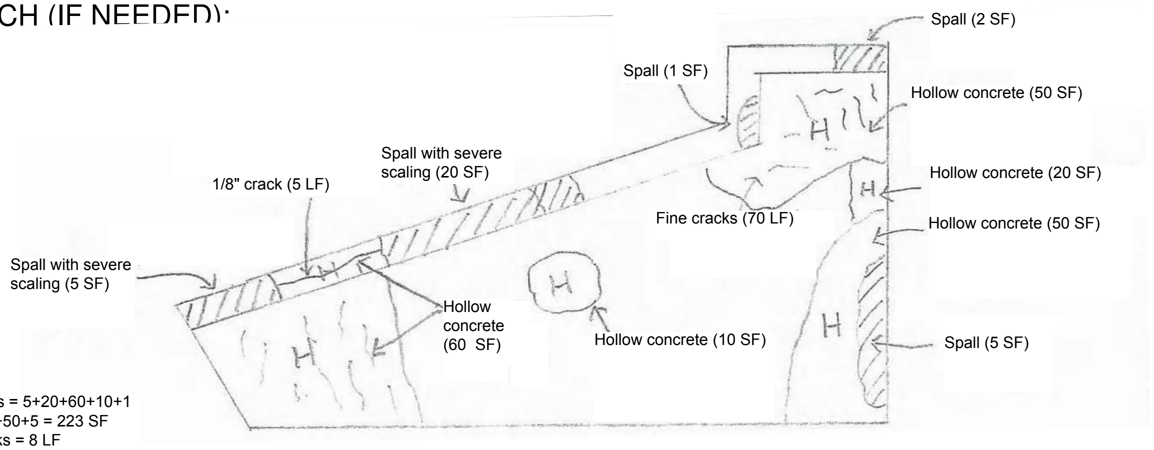
GRAFFITI: YES / [✓ NO] [✓ PLUMB] / TILT: Plumb

TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / [✓ NEEDED] LOCATION: N/A

OTHER OBSERVATIONS: Stone guard on top of wall

SKETCH (IF NEEDED):



Total Spalls = 5+20+60+10+1
+2+50+20+50+5 = 223 SF
Total Cracks = 8 LF

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

~~EAST~~ / WEST
NORTH / ~~SOUTH~~

LINE Morristown MP 35.28 PHOTOS 6-1

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: 8'-6"--> 15'-7" WIDTH: 2'-0" LENGTH: 16'-6"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Trees & vegetation LOCATION: Top of wall

CONDITIONS: Large hollow concrete on wall cap (10 SF). Numerous fine horizontal cracks with efflorescence. Large spalls at end of wall (5 SF each). Debris accumulation along the footing of wall.

FOUNDATIONS: Not Visible

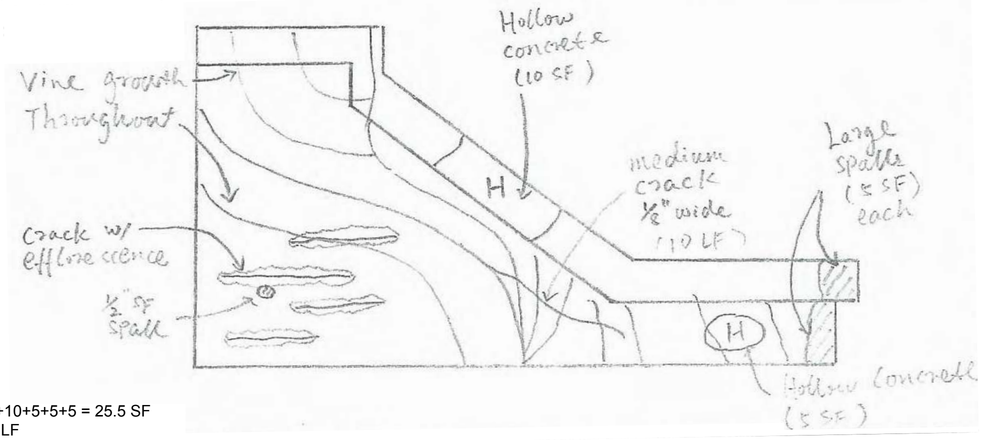
GRAFFITI: YES / [✓ NO] [✓ PLUMB] / TILT: Plumb

TRAFFIC PROTECTION: YES / [✓ NO] / [✓ NEEDED] CONDITION:

LOCATION: In front of the wingwall, along the curb.

OTHER OBSERVATIONS: Chevron sign was installed next to the wall.

SKETCH (IF NEEDED):



Total Spalls = 0.5+10+5+5+5 = 25.5 SF
Total Cracks = 10 LF

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

EAST / ~~WEST~~
~~NORTH~~ / SOUTH

LINE Morristown MP 35.28 PHOTOS 6-2

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: 16'-7" WIDTH: 2'-0" LENGTH: 20'-9"

TREE / VEGETATION GROWTH ON WINGWALL: YES / [✓ NO]

DESCRIPTION: N/A LOCATION: N/A

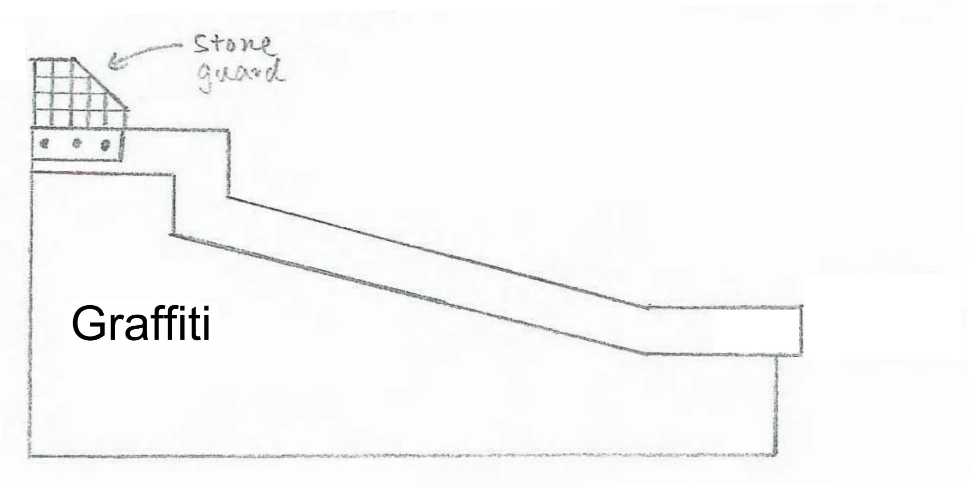
CONDITIONS: Spall adjacent to plate anchor for steel pole at top of wall. Some rust stains from steel plate on top of the wall.

FOUNDATIONS: Not Visible

GRAFFITI: [✓ YES] / NO [✓ PLUMB]/TILT: Plumb
TRAFFIC PROTECTION: YES CONDITION:
[✓ NO] / [✓ NEEDED] LOCATION: Along the curb to meet existing abutment.

OTHER OBSERVATIONS: Ballast slighting over spilling onto wingwall. Chain link fence near wingwall.
Existing guide rail is too far from east abutment.

SKETCH (IF NEEDED):



# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

~~EAST~~ / WEST
~~NORTH~~ / SOUTH

LINE Morristown MP 35.28 PHOTOS 6-2

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: 16'-5" WIDTH: 2'-0" LENGTH: 35'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: 12" ϕ Tree LOCATION: Top of Wall

CONDITIONS: Several areas of delamination concrete and fine cracks with efflorescence. Severe scaling at several locations. Accumulation of debris along bottom of the wall and at the end.

FOUNDATIONS: Not Visible

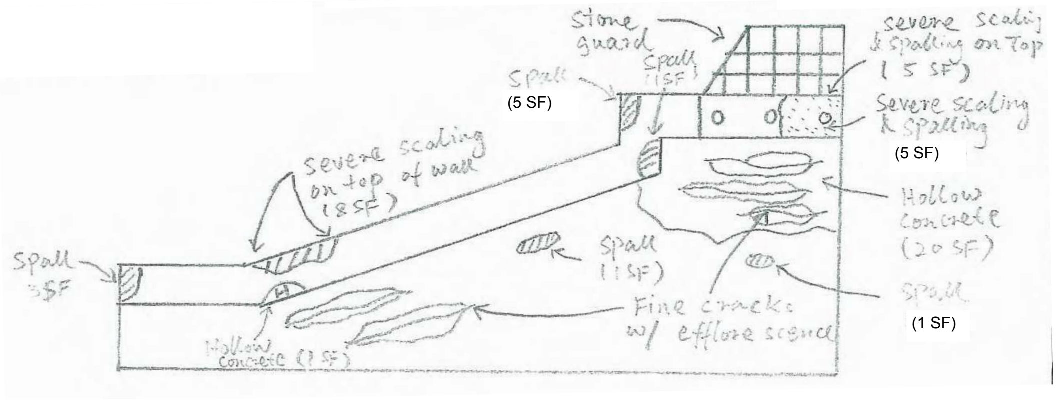
GRAFFITI: YES / [✓ NO] [✓ PLUMB] / TILT: Plumb

TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: Vegetation growth throughout

SKETCH (IF NEEDED):



Total Spalls = 3+8+1+1+5+1+5+5+20+1 = 50 SF

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ROADWAY/RAILROAD BELOW BRIDGE

(REFER TO CLEARANCE DIAGRAM SHEET)

LINE Morristown MP 35.28 PHOTOS 6-1 and 6-2

STRAIGHT / [✓ CURVED]

SIGHT DISTANCE: NORTH: 100'-0"

SOUTH: 100'-0"

ROADWAY WIDTH: 15'-10"(SB)<br>20'-9" (NB) NUMBER OF LANES: 2

SIDEWALKS / SAFETY WALKS: None
WIDTH: N/A (EAST / WEST)
WIDTH: N/A (EAST / WEST)

VERTICAL CLEARANCE POSTED: [✓ YES] / NO
BRIDGE: NORTH / SOUTH
APPROACHES: [✓ NORTH] / [✓ SOUTH]

CONDITION / ADEQUACY OF POSTING: (12'-3") clearance ahead at intersections

OTHER POSTING (TYPE AND LOCATION): N/A

UTILITIES: None

DRAINAGE: Two drainage to the south of bridge in shoulder, 1 drainage adjacent to pier, west span, north end.

LIGHTING: None

OBSERVATIONS: Pothole at north end, span 1.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ROADWAY/RAILROAD UNDERCLEARANCE

LINE Morristown MP 35.28 PHOTOS 6-1 and 6-2

NAME: Over Franklin Road

← WEST TO Hackettstown EAST TO Hoboken →

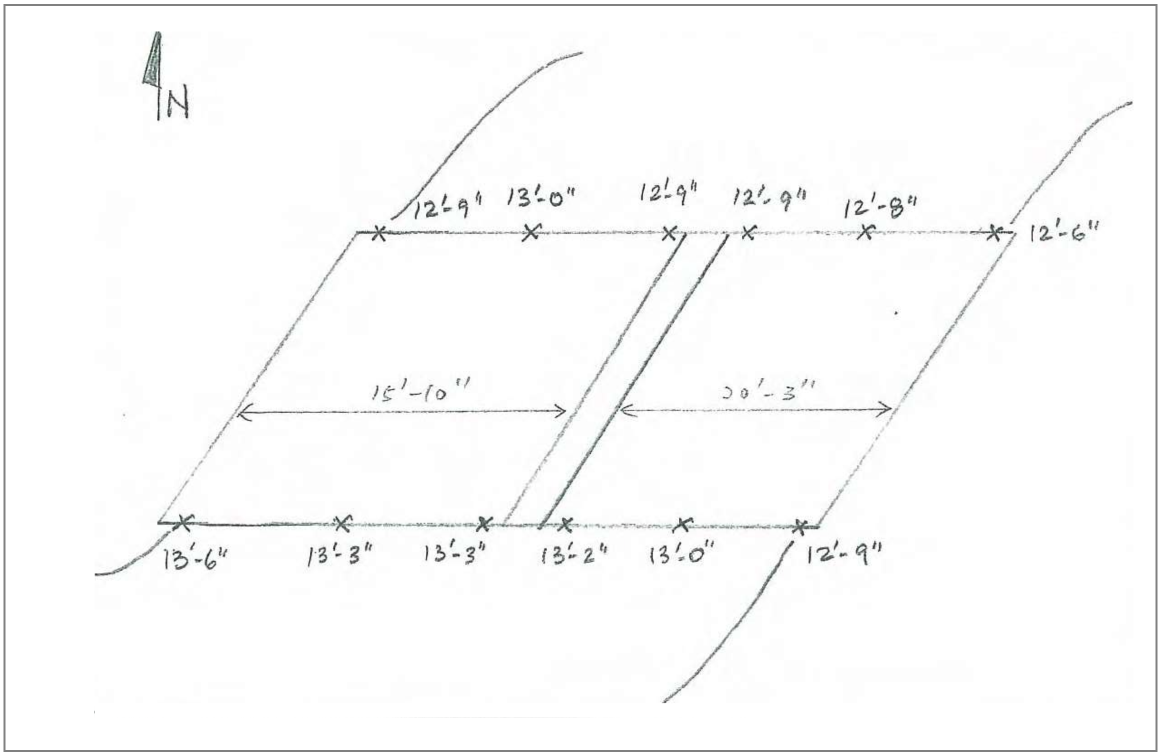


**Table 1 - CLEARANCE DIAGRAM**

(SPAN(S) 1 & 2 )

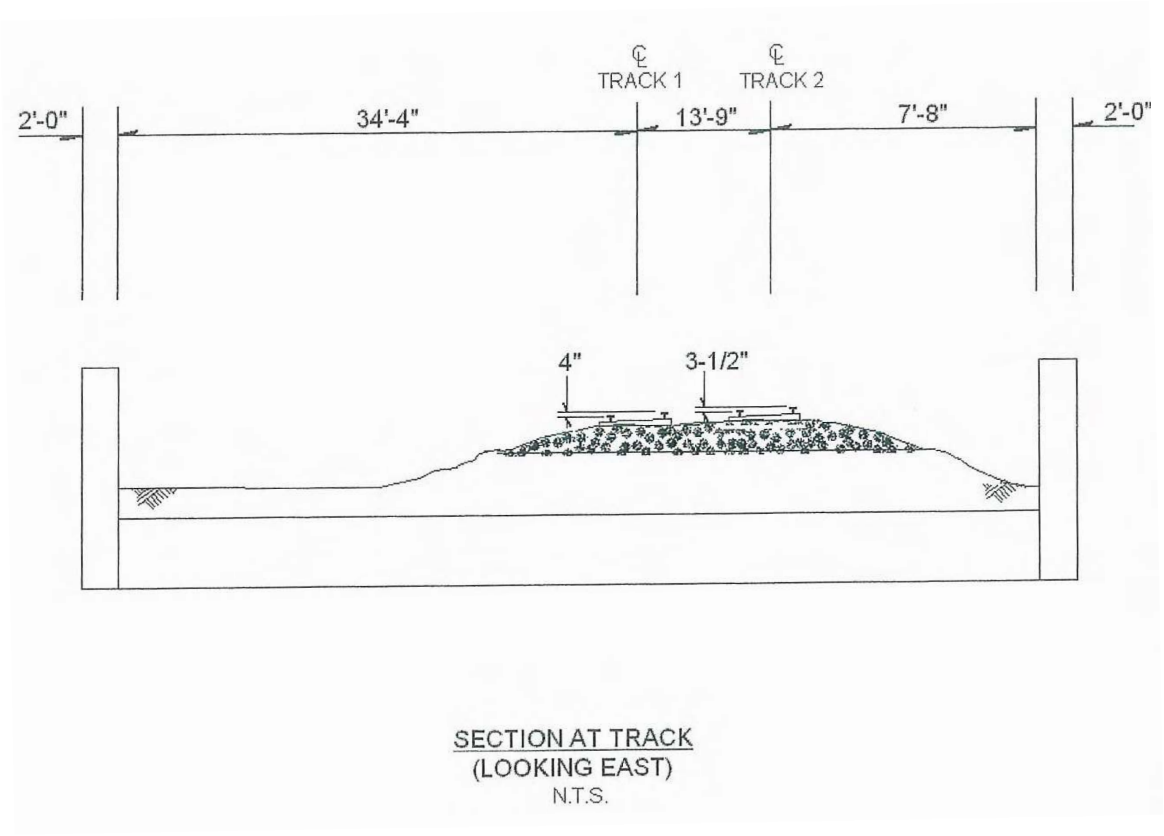
MINIMUM VERTICAL CLEARANCE: 12'-6"

MINIMUM RIGHT LATERAL CLEARANCE: 1'-11"

MINIMUM LEFT LATERAL CLEARANCE: 1'-11"

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

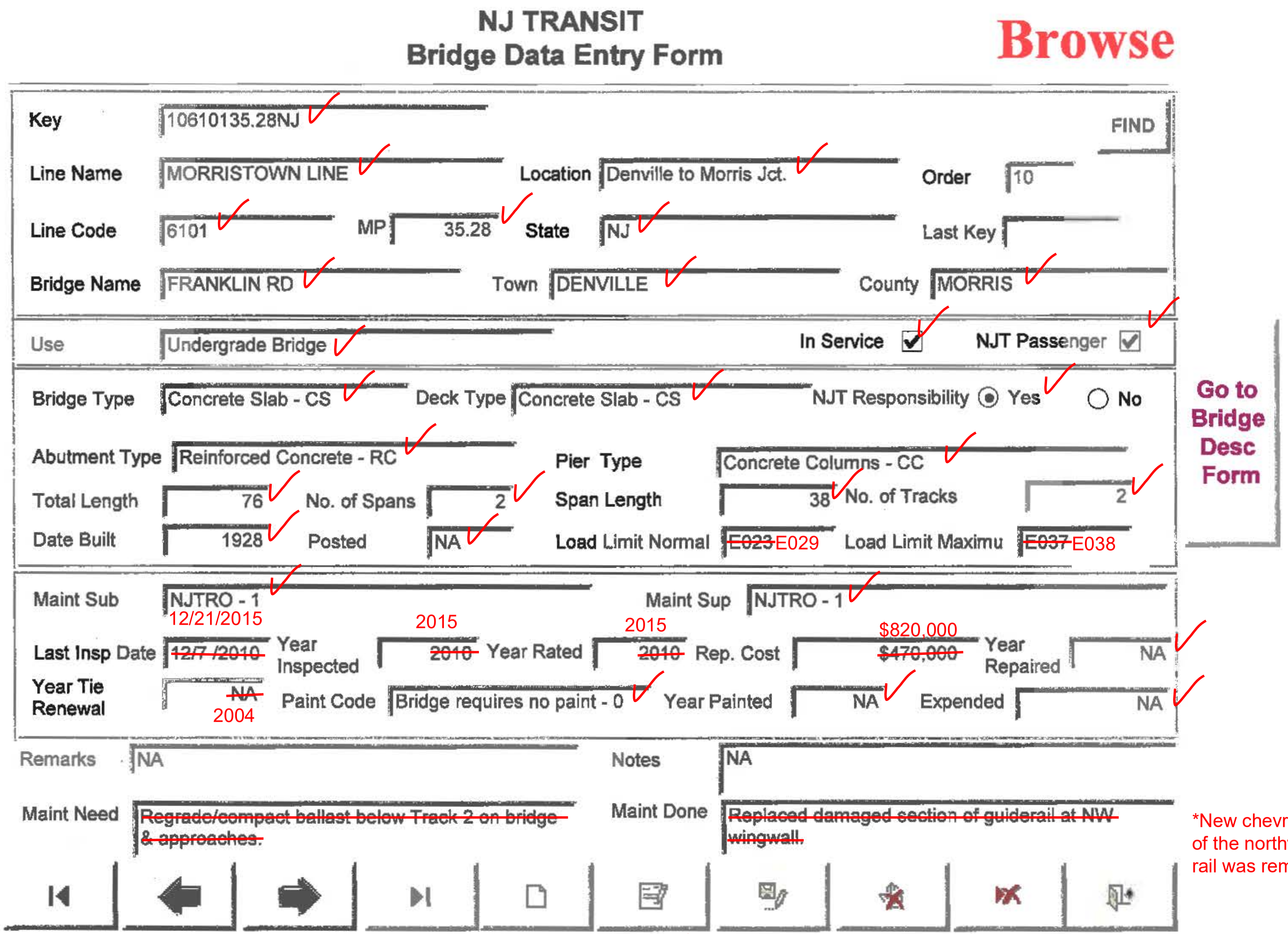
LINE Morristown MP 35.28 PHOTOS --



SECTION AT TRACK
(LOOKING EAST)
N.T.S.

# APPENDIX 4

## BRIDGE INFORMATION SYSTEM INPUT FORMS



NJ TRANSIT
Bridge Data Entry Form

Key: 10610135.28NJ ✓

Line Name: MORRISTOWN LINE ✓ Location: Denville to Morris Jct. ✓ Order: 10

Line Code: 6101 ✓ MP: 35.28 ✓ State: NJ ✓ Last Key:

Bridge Name: FRANKLIN RD ✓ Town: DENVILLE ✓ County: MORRIS ✓

Use: Undergrade Bridge ✓ In Service ☑ ✓ NJT Passenger ☑ ✓

Bridge Type: Concrete Slab - CS ✓ Deck Type: Concrete Slab - CS ✓ NJT Responsibility ● Yes ✓ ○ No

Abutment Type: Reinforced Concrete - RC ✓ Pier Type: Concrete Columns - CC ✓

Total Length: 76 ✓ No. of Spans: 2 ✓ Span Length: 38 ✓ No. of Tracks: 2 ✓

Date Built: 1928 ✓ Posted: NA ✓ Load Limit Normal: ~~E023~~ E029 Load Limit Maximu: ~~E037~~ E038

Maint Sub: NJTRO - 1 ✓ Maint Sup: NJTRO - 1 ✓

Last Insp Date: ~~12/7/2010~~ 12/21/2015 Year Inspected: ~~2010~~ 2015 Year Rated: ~~2010~~ 2015 Rep. Cost: ~~$470,000~~ $820,000 Year Repaired: NA ✓

Year Tie Renewal: ~~NA~~ 2004 Paint Code: Bridge requires no paint - 0 ✓ Year Painted: NA ✓ Expended: NA ✓

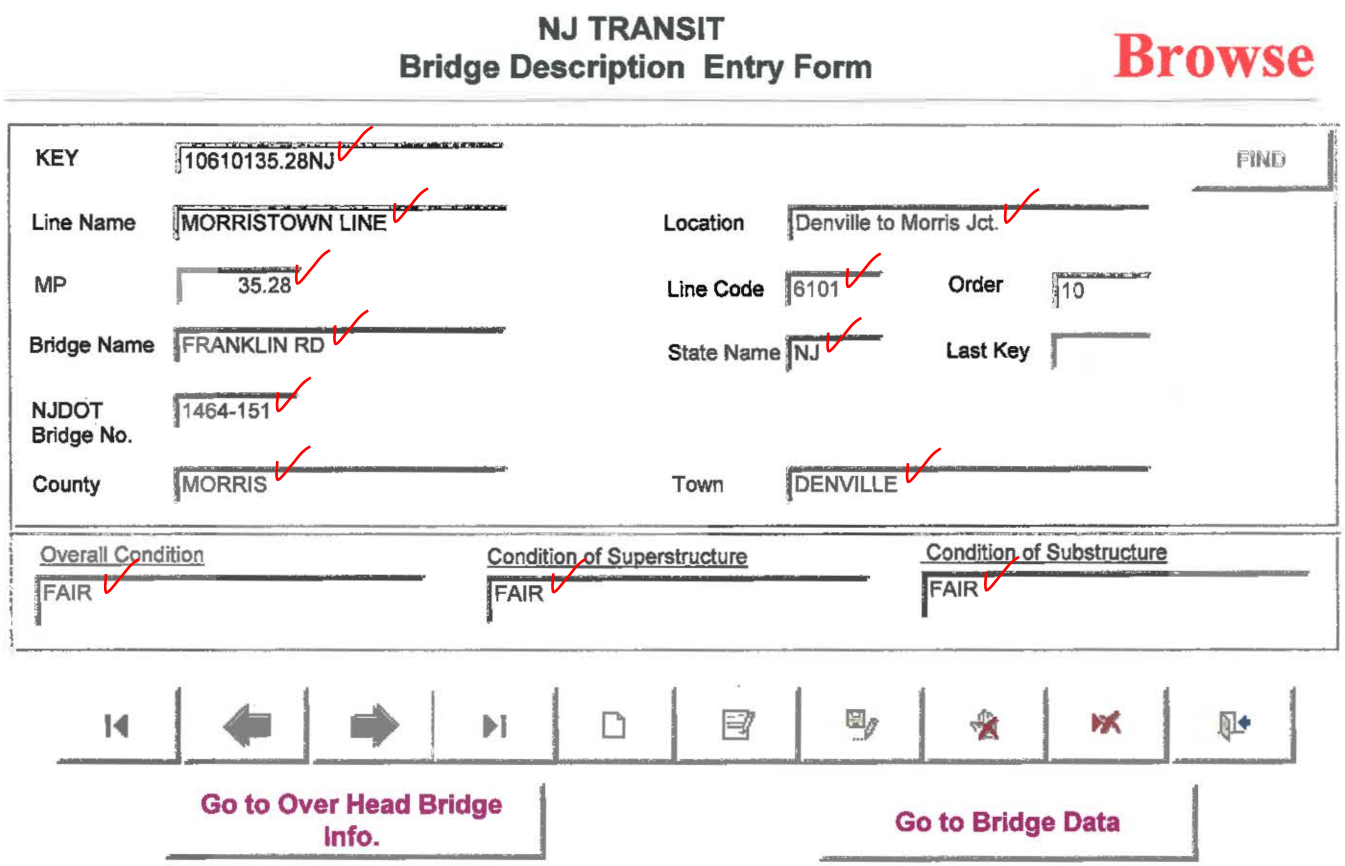
Remarks: NA Notes: NA

Maint Need: ~~Regrade/compact ballast below Track 2 on bridge & approaches.~~ Maint Done: ~~Replaced damaged section of guiderail at NW wingwall.~~

*New chevron signs were installed in front of the northwest wingwall. Previous guide rail was removed.

*Removed all areas of spalled, delaminated and severely scaled concrete from the underside of the concrete slab, parapets, fascias, abutments, pier column and wingwalls to sound concrete, clean and epoxy coat exposed reinforcement steel, and patch with epoxy concrete.
*Seal the medium cracks in the fascias, abutment breastwalls, pier and wingwalls with pressure injected epoxy sealer.
*Install a waterproof membrane to prevent water leakage through the concrete slab and provide adequate drains in the slab.
*Replace missing and broken clips on both tracks at span one.
*Remove vegetation and tree growth behind the northeast, northwest and southwest wingwalls.

*Install guide rails along northwest and southeast wingwalls; install an impact attenuator at the north and south end of the pier column.



**NJ TRANSIT**
**Bridge Description Entry Form**

**Browse**

KEY 10610135.28NJ ✓

Line Name MORRISTOWN LINE ✓

MP 35.28 ✓

Bridge Name FRANKLIN RD ✓

NJDOT Bridge No. 1464-151 ✓

County MORRIS ✓

Location Denville to Morris Jct. ✓

Line Code 6101 ✓

Order 10

State Name NJ ✓

Last Key

Town DENVILLE ✓

Overall Condition FAIR ✓

Condition of Superstructure FAIR ✓

Condition of Substructure FAIR ✓

NJ TRANSIT

# NEW JERSEY TRANSIT RAIL OPERATIONS

# BRIDGE INSPECTION SURVEY REPORT

## MORRISTOWN LINE
## M.P. 36.41
## OVER MILL BROOK

ROUTE No. 4005
U.S.R.A. LINE CODE: 6101
NJDOT STRUCTURE NO.: 1464-153
TOWNSHIP OF DENVILLE
MORRIS COUNTY

FIFTH CYCLE

DATE OF INSPECTION: DECEMBER 11, 2013

KS ENGINEERS, P.C.
Newark, New Jersey

**KSE**
Engineers . Surveyors . Construction Managers
**KS Engineers, P.C.** 494 Broad Street, 4th Floor, Newark, NJ 07102 . P: 973.623.2999 . F: 973.242.2955 . www.kseng.com

March 16, 2016

Ms. Lisa Fanning, P.E.
Assistant Chief Engineer - Structures
New Jersey Transit
Infrastructure Engineering – Structures Department
New Jersey Transit Corporation
One Penn Plaza East
Newark, New Jersey 07105-2246
ATTN: Paul Falkowski, P.E.

**RE: Bridge Inspection Survey and Evaluation**
**Morristown Line M.P. 36.41 over Mill Brook**
**Township of Denville, Morris County**
**NJDOT Structure No.: 1464-153**
**Contract No. 12-053F**

Dear Ms. Fanning,

In accordance with our contract No. 12-053F dated October 28th, 2013 we are submitting three copies of our Bridge Inspection Survey and Evaluation **FINAL REPORT** for the above referenced structure.

The field survey was performed in December 2013 and consisted of an in-depth inspection of the observable structural elements of the bridge and the general features at the site. The inspection was made according to generally recognized standards and procedures, but it is not implied that all defects were or could have been disclosed by this inspection. The field inspection was conducted by a registered Professional Engineer who is qualified with the requirements of NJ Transit criteria.

The report details the conditions observed during a field inspection of the bridge, our recommendations for repairs (along with an estimate of construction costs for the repairs), updated rating calculations for the bridge and completed bridge data. This report was prepared in accordance with our QA/QC program and was reviewed by the Project Manager.

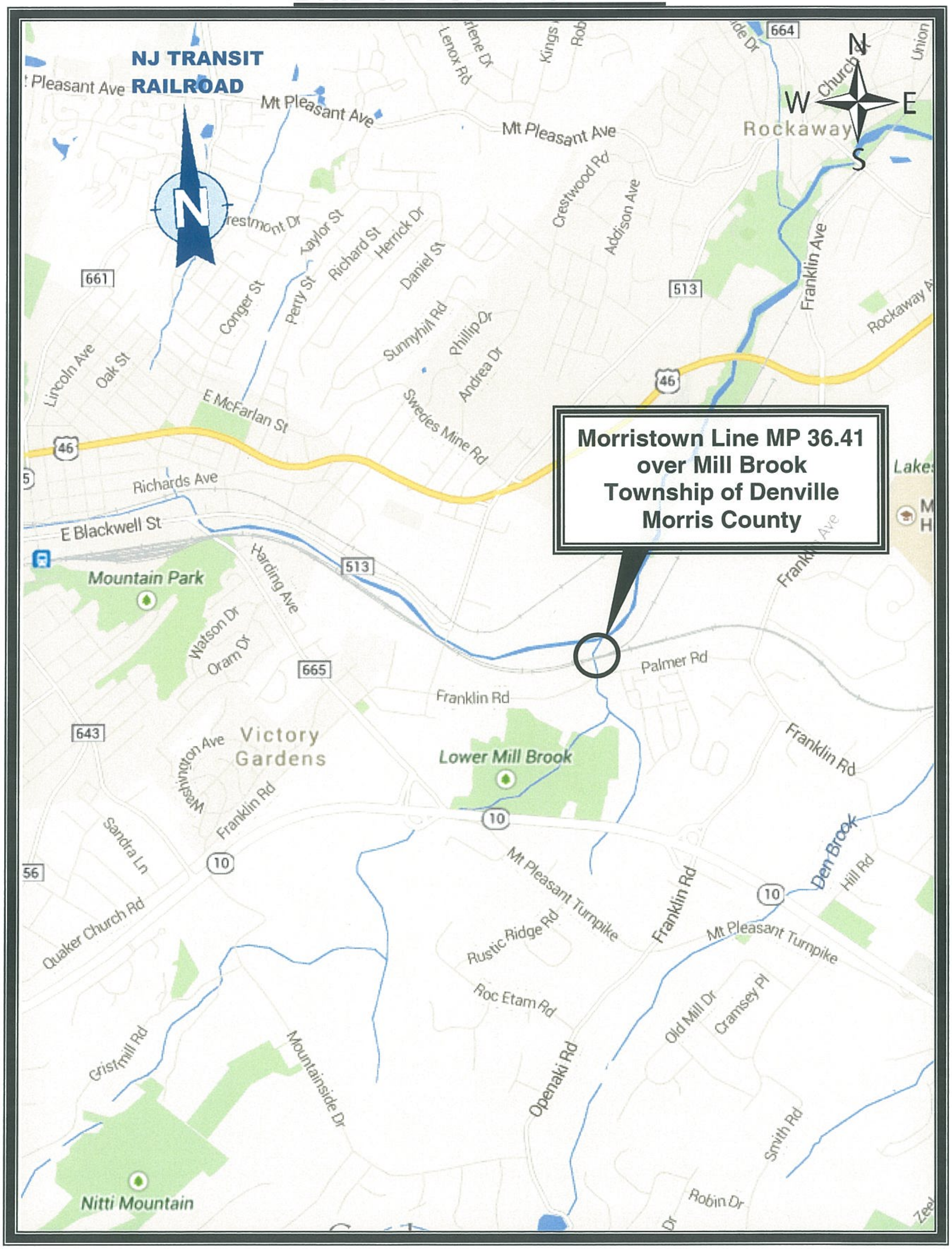
We will be pleased to respond to any questions that may arise concerning the referenced report.

Very Truly Yours,
**KS Engineers, P.C.**

Jack Perlmutter, P.E.
Project Manager

# TABLE OF CONTENTS

# BRIDGE LOCATION MAP



# NEW JERSEY TRANSIT
## INFRASTRUCTURE ENGINEERING – STRUCTURES
## BRIDGE EVALUATION SURVEY REPORT
## CYCLE NO. 5

### STRUCTURE DATA

**NJDOT Structure No.:** 1464-153

**USRA Line Code:** 6101

**Route No.:** 4005

**Line:** Morristown

**MP & Name:** MP 36.41 over
Mill Brook

**Structure Type:** Single span, simply supported, reinforced concrete slab (south portion), brick arch (center portion) and concrete arch (north portion)

**Year Built:** Concrete Arch-1902
Concrete Slab-1927
Brick Arch-Unknown

**Year Rehab:** N/A

**Length:** 25'-0"     **Width:** 71'-3"

**Date of This Evaluation:** 12/11/13
**By:** KS Engineers, P.C.

**Date of Previous Evaluation:** 10/7/08
**By:** HNTB Corporation

**Special Equipment Used:** None

**Underwater Inspection Required:** No

**Scour Critical:** Yes

**OVERALL CONDITION:** Fair
SUPERSTRUCTURE CONDITION: Fair
SUBSTRUCTURE CONDITION: Fair

**WORK DONE:** None.

**RATINGS:** The following load ratings have been computed in Cycle 1, updated in Cycle 4 and verified in this cycle. During this inspection, no significant changes have been observed that affect the structural capacity of the structure; therefore, the previously computed ratings are still valid for the current inspection.

| | | As-Built | | As-Inspected | |
|---|---|---|---|---|---|
| Controlling Member | | Maximum | Normal | Maximum | Normal |
| Reinforced Concrete Slab | Moment | E-54 | E-40 | E-54 | E-40 |
| | Shear | E-48 | E-40 | E-48 | E-40 |

## CONCLUSIONS AND RECOMMENDATIONS:

Morristown Line MP 36.41 Mill Brook is a single span, simply supported concrete slab at the south portion, brick arch at the center portion, and a concrete arch at the north portion. The concrete deck slab carries two active tracks on a tangent horizontal alignment. The overall condition of the structure is fair.

The approaches are in good condition. There is minor wear at the inner edge of the north rail on Track #1 and at inner edge of both rails on Track #2 at both approaches. There is tie pumping up to 1/8" at the west approach on both tracks.

The bridge track components are in good condition. There is minor wear at the inner edge of the north rail on Track #1 and at the inner edge of both rails on Track #2. There is tie pumping up to 1/8" on Track #1.

The superstructure is in fair condition. There are fine cracks with efflorescence, spalled and delaminated concrete at the south end of the concrete deck slab. The south headwall exhibits spalled and delaminated concrete and fine cracks with efflorescence throughout. There is minor scaling approximately at midspan of the underside of deck slab. The brick arch exhibits heavy efflorescence for approximately 50% of the arch intrados. There is missing and deteriorated pointing for approximately 50% of the arch intrados. There are areas of missing and deteriorated bricks along the bottom west side of the brick arch and at the south stone arch ring. There is up to a 1" gap between the south stone arch ring and the brick arch throughout the arch intrados. There are several fine cracks with efflorescence throughout the concrete arch intrados. The south fascia stone spandrel wall is partially visible due to the adjacent concrete slab and exhibits light efflorescence throughout. The north fascia spandrel wall exhibits two wide cracks and several fine cracks with efflorescence. There is graffiti at the northeast corner of the concrete arch intrados.

The substructure is in fair condition. There is moderate scaling along the bottom of the east abutment breastwall for full length. There is severe scaling at the bottom north and south corners of the east abutment breastwall. There is a small area of delaminated concrete with heavy efflorescence at the top south face of the east abutment breastwall. The west abutment breastwall exhibits light scaling along the bottom of the breastwall for full length. The interface between the slab and west abutment breastwall exhibits moderate to heavy efflorescence throughout. The top of footings at both abutment breastwalls is exposed for full length with no undermining observed. There is light to moderate scaling along the bottom of the southeast, northeast and northwest wingwalls. There is a large spall and two small spalls at the southeast wingwall. There is a small spalled concrete area and a medium fractured area along the top face of the northeast wingwall. The top face of the southwest wingwall is spalled throughout the length of the wingwall. There are medium to wide cracks with minor edge spalling at the northeast and northwest wingwalls.

The channel is in poor condition. Moderate scour was observed throughout the channel, exposing stone foundations of abutment breastwalls and at the northeast, southeast and

## CONCLUSIONS AND RECOMMENDATIONS (Cont.):

northwest wingwalls. The east and west stone foundations of the brick arch exhibit undermining up to 3" high and 4" deep for full length of the brick arch. The waterway opening appears to be adequate for normal flow; however, the bridge appears susceptible to scour due to the undermining and spread footing foundation.

The rating results indicate that the structure has insufficient structural capacity to support the standard AREMA "Cooper E80" loading; and the New Jersey Transit 286 Kip Cars is restricted at all speeds at the maximum rating level. The controlling As-Built and As-Inspected ratings for the reinforced concrete slab are E-40 at the normal level and E-48 at the maximum level.

## CONCLUSIONS AND RECOMMENDATIONS (Cont.):

The following repairs are recommended to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

1. Remove the delaminated and moderate to severely scaled concrete from the underside of slab, south headwall, reinforced concrete arch, east abutment breastwall, southeast wingwall, northeast wingwall, southwest wingwall and northwest wingwall. Clean and paint any exposed steel reinforcement and patch the spalls throughout with epoxy concrete (Photos 5-6, 5-8, 5-9, 5-11 and 5-13).
2. Seal the medium to wide cracks at the north spandrel wall, northeast and northwest wingwalls with pressure injected epoxy sealant (Photos 5-10 and 5-14).
3. Replace the missing and or deteriorated bricks throughout the intrados of the brick arch (Photo 5-12).
4. Repoint the areas of missing and or deteriorated mortar joints throughout the intrados of the brick arch (Photo 5-12).
5. Due to water leakage, cracking and or efflorescence at the underside of the concrete deck slab, intrados of the brick arch and intrados of the concrete arch, New Jersey Transit should consider removing the tracks and ballast, and installing a waterproof membrane over extrados of the brick arch, concrete arch and top of the reinforced concrete deck slab. Drains should also be installed along both fasciae at the ends and midspan (Photos 5-6, 5-7 and 5-14).
6. Replace the missing section of stone course along the west side of the brick arch. Place rip-rap along the abutments, arch skewbacks, northeast and northwest wingwalls to prevent further scour (Photos 5-11 and 5-12).
7. Remove the vegetation and or tree growth behind the northeast and northwest wingwalls (Photos 5-1, 5-2 and 5-14).
8. Remove graffiti and apply anti-graffiti coating at the northeast corner of the concrete arch intrados, west abutment breastwall, southeast and southwest wingwalls (Photo 5-1 and 5-6).
9. The bridge should be re-inspected during the next regularly scheduled period.

Railroad Line: Morristown
Railroad Milepost: 36.41
Structure Name: Mill Brook

# COST ESTIMATE

| ITEM | | UNIT | QUANTITY | UNIT PRICE ($) | COST ($) |
|---|---|---|---|---|---|
| 1. | Remove deteriorated concrete and patch the spalls with epoxy concrete. | SF | 154 | 140 | 21,560 |
| 2. | Seal medium to wide cracks with pressure Injected epoxy sealer. | LF | 60 | 170 | 10,200 |
| 3. | Replace the missing and or deteriorated bricks througout the brick arch intrados. | SF | 29 | 95 | 2,755 |
| 4. | Repoint mortar joints at the brick arch. | LF | 160 | 20 | 3,200 |
| 5. | Install waterproof membrane at extrados of arches and over the deck slab: | | | | |
| | a. Remove and reinstall tracks and ballast | LF | 90 | 1,225 | 110,250 |
| | b. Install waterproof membrane | SY | 229 | 55 | 12,595 |
| | c. Install deck drains | Each | 6 | 470 | 2,820 |
| 6. | a. Replace missing stones | SF | 4 | 95 | 380 |
| | b. Place rip-rap | CY | 60 | 115 | 6,900 |
| 7. | Remove vegetation and or tree growth | Crew Day | 1 | 1,885 | 1,885 |
| 8. | Remove graffiti and apply anti-graffiti coating. | Crew Day | 1 | 1,885 | 1,885 |

**Total Estimated Cost = $172,545**

**50% Railroad Escalation = $86,273**

**Total = $258,818**

**Say $259,000**

NOTE: The provided Cost Estimates are for scoping purpose only and shall not be construed as actual construction costs.

# COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 1. Remove deteriorated concrete and patch spalls. **UNIT:** SF

| QUANTITY TAKEOFF | | SUBTOTAL | TOTAL |
|---|---|---|---|
| Remove deteriorated concrete and patch spalls with epoxy concrete at following locations: | | | |
| Location | Quantity | | |
| @ Slab underside | 40 SF | | |
| @ South headwall | 36 SF | | |
| @ Concrete arch | 2 SF | | |
| @ E. abutment | 14 SF | | |
| @ Southeast wingwall | 19 SF | | |
| @ Northeast wingwall | 6 SF | | |
| @ Southwest wingwall | 30 SF | | |
| @ Northwest wingwall | 7 SF | 154 SF | 154 SF |

**SAY:** 154 SF

**ITEM:** 2. Seal medium to wide cracks. **UNIT:** LF

| QUANTITY TAKEOFF | | SUBTOTAL | TOTAL |
|---|---|---|---|
| Seal the medium to wide cracks with pressure injected epoxy sealant at the following Locations: | | | |
| Location | Quantity | | |
| @ North spandrel wall | 8 LF | | |
| @ Northeast wingwall | 28 LF | | |
| @ Northwest wingwall | 24 LF | 60 LF | 60 LF |

**SAY:** 60 LF

## COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 3. Replace the missing and deteriorated bricks. **UNIT:** SF

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Replace the missing and deteriorated bricks throughout the intrados of the brick arch:<br>Total area ≈ 29 SF | 29 SF | 29 SF |

**SAY:** 29 SF

**ITEM:** 4. Repoint missing and deteriorated mortar joints. **UNIT:** LF

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Repoint the areas of deteriorated/ missing mortar throughout the brick arch:<br>Arch intrados – 150 LF<br>North brick arch stone ring – 10 LF | 160 LF | 160 LF |

**SAY:** 160 LF

# COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 5. Install waterproof membrane and provide adequate drains. **UNIT:** Varies

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| a) Remove both tracks and the ballast, and reinstall after installing waterproof membrane:<br>10'+10'+25'= 45'<br>(2 tracks)*(45 LF per track) = 90 LF/Track | 90 LF/Track | 90 LF/Track |
| b) Install waterproof membrane throughout the extrados of concrete and brick arches and over deck slab:<br>Area over extrados of both arches:<br>where 1 SY = 9 FT$^2$<br>$L_{\text{ALONG ARCH EXTRADOS}} = (2*\pi*\frac{20.0'}{2})*({}^{180^\circ}/_{360^\circ}) \approx 31.5'$<br>∴ ({12.75' + 29.5'}W * 31.5' L) (1 SY / 9 FT$^{2)}$<br>≈ 148 SY | 148 SY | |
| Area over deck slab:<br>where 1 SY = 9 FT$^2$<br>(25' L * 29.0' W)(1 SY / 9 FT$^{2)}$ ≈ 81 SY | 81 SY | 229 SY |
| c) Install drains along each fascia at the ends and near midspan. | 6 Each | 6 Each |

**SAY:** Varies

## COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 6. Replace missing stones and place rip-rap. **UNIT:** Varies

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| a) Replace the missing section of stone course along the west side of the brick arch- 4 SF | 4 SF | 4 SF |
| b) Place rip-rap along the abutments, arch skewbacks, northeast and northwest wingwalls to prevent further scour:<br>East abutment/ Skewback ≈ 72 LF<br>West abutment/ Skewback ≈ 72 LF<br>Northeast wingwall ≈ 18 LF<br>Northwest wingwall ≈ 18 LF<br>Total ≈ 180 LF<br>Place rip-rap for 3'W x 3'H at all locations<br>∴ Total rip-rap = {180 LF x 3'W x 3'H}/ 27<br>Say 60 CY | 60 CY | 60 CY |

**SAY:** Varies

**ITEM:** 7. Remove vegetation and tree growth. **UNIT:** Crew Day

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Remove the vegetation and tree growth behind the northeast and northwest wingwalls:<br>Say 1 Crew Day | 1 Crew Day | 1 Crew Day |

**SAY:** 1 Crew Day

## COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 8. Remove graffiti and apply anti-graffiti coating. **UNIT:** Crew Day

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Remove graffiti and apply anti-graffiti coating at the northeast corner of the concrete arch intrados, west abutment breastwall, southeast and southwest wingwalls.<br>Say 1 Crew Day | 1 Crew Day | 1 Crew Day |

**SAY:** 1 Crew Day

# APPENDIX 1

# RATING SUMMARY AND COMPUTATIONS

# RATING SUMMARY
# NORMAL RATING

**BRIDGE:** MORRISTOWN LINE MP 36.41 OVER MILL BROOK
**CONSULTANT:** KS ENGINEERS, P.C.
**DATE:** 12/11/2013 **CYCLE:** 5 **CONTROLS RATING OF BRIDGE:** E-40

| **RATING LEVEL & MEMBER** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | | | **LOADED LENGTH (ft)** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | **AS - BUILT** | | **AS - INSPECTED** | | **FATIGUE** | | |
| | **E-MOMENT** | **E-SHEAR** | **E-MOMENT** | **E-SHEAR** | | | |
| | | | | | | | |
| ALLOWABLE STRESS RATINGS: | | | | | | | |
| CONCRETE SLAB | E-40 | E-40 | E-40 | E-40 | N/A | 22.5 | |
| | | | | | | | |
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NOTE: RATINGS TAKEN FROM CYCLE 4 RATING CALCULATIONS BY HNTB CORPORTATION. PREVIOUS CYCLE RATINGS HAVE BEEN REVIEWED AND DETERMINED TO BE ACCURATE FOR CYCLE 5 RATING ANALYSIS. NO CONDITIONS OBSERVED DURING THE FIELD INSPECTION THAT WOULD IMPACT THE PREVIOUS RATING CALCULATIONS.

# RATING SUMMARY
# MAXIMUM RATING

**BRIDGE:** MORRISTOWN LINE MP 36.41 OVER MILL BROOK
**CONSULTANT:** KS ENGINEERS, P.C.
**DATE:** 12/11/2013 **CYCLE:** 5 **CONTROLS RATING OF BRIDGE:** E-48

| **RATING LEVEL & MEMBER** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | | | **LOADED LENGTH (ft)** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | **AS - BUILT** | | **AS - INSPECTED** | | **FATIGUE** | | |
| | **E-MOMENT** | **E-SHEAR** | **E-MOMENT** | **E-SHEAR** | | | |
| | | | | | | | |
| ALLOWABLE STRESS RATINGS: | | | | | | | |
| CONCRETE SLAB | E-54 | E-48 | E-54 | E-48 | N/A | 22.5 | Speed restrictions: 286 KIP cars restricted at all speeds. |
| | | | | | | | |
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NOTE: RATINGS TAKEN FROM CYCLE 4 RATING CALCULATIONS BY HNTB CORPORTATION. PREVIOUS CYCLE RATINGS HAVE BEEN REVIEWED AND DETERMINED TO BE ACCURATE FOR CYCLE 5 RATING ANALYSIS. NO CONDITIONS OBSERVED DURING THE FIELD INSPECTION THAT WOULD IMPACT THE PREVIOUS RATING CALCULATIONS.

Updated BY KSE in Cycle 5

HS (2/25/16)
HC (2/26/16)

| | | |
|---|---|---|
| For:NJ Transit - MEL MP 36.41 | Job No.: 45361 | Sheet No. |
| Made by: SEC | Checked by: PJM | Backchecked by: |
| Date: 3/26/09 | Date: 4/23/09 | Date: |

HNTB

## Reinforced Concrete Slab Rating (MEL MP 36.41)

The reinforced concrete slab rating is being updated due to modified dead loads acting on the structure, in the form of ballast depth and the addition of concrete ties along both tracks. Also, Normal Ratings have been computed.

## Span Length : (Ref. AREMA, Ch. 8, sec. 2.23.6.a)

Analyze as a simple span (see Cycle 1 ratings, pg. 43):

span length (L) = 25'-0" - 2'-6" = 22.5 ft.

## Lateral Distribution (Ref. AREMA, Ch. 8, 2.2.3.c.3)

Note that ballast depth as measured during this Cycle 3 inspection was found to be greater than the value used in the Cycle 1 calculations. Reference Cycle 1, pg. 44 for details.

Lat. Distribution Width ($L_a$) = tie length +ballast depth below tie

Tie length = 8.50 ft.
Ballast depth below tie = 2.00 ft.

$L_a$ = 10.50 ft.

## Longitudinal Distribution (Ref. AREMA, Ch. 8, 2.2.3.c.2)

Long. Distribution Width ($L_o$) = 3' + ballast depth below tie +2 * effective slab depth

$d_{slab}$ = 32 in.

effective slab depth (deff) = 32 in. - 3 in. - 0.5 in. = 28.50 in.

$L_o$ = 9.75 ft. > 5 ft. axle spacing

Use $L_o$ = 5.00 ft.

Since axle spacing of Cooper E-80 is 5 ft. for max axle load of 80 kips, the axle spacing controls the longitudinal distribution.

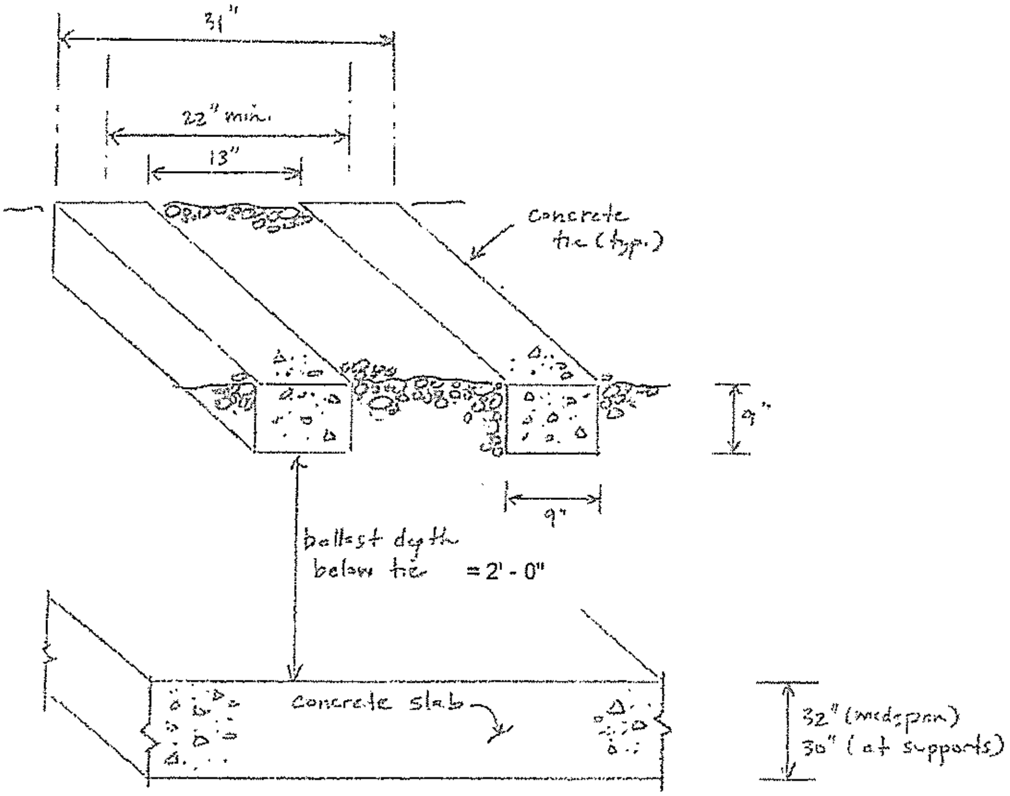
Updated BY KSE in Cycle 5

HS (2/25/16)
HC (2/26/16)

| | | |
|---|---|---|
| For:NJ Transit - MEL MP 36.41 | Job No.: 45361 | Sheet No. |
| Made by: SEC | Checked by: PJM | Backchecked by: |
| Date: 3/26/09 | Date: 4/29/09 | Date: |

**Dead Loads:**

Since concrete ties have been installed along both tracks, compute average weight of tie and ballast for area below rails occupied by both ballast and concrete ties:



Ballast and tie sketch
(not to scale)

Conservatively use minimum tie spacing = 22 in.
ballast weight = 0.12 k/ft.3
tie weight = 0.15 k/ft.3
tie width = 9 in.
tie depth = 9 in.

$$W_{avg.} = \frac{\text{ballast length * ballast weight + tie width * tie weight}}{\text{total width}} =$$

$$W_{avg.} = \frac{(22-9)\text{ in. * } 0.120\text{ k./ft.3} + 9\text{in. * } 0.150\text{ k / ft.3}}{22\text{ in.}} = 0.132\text{ k/ft.3}$$

| For:NJ Transit - MEL MP 36.41 | Job No.: 45361 | Sheet No. |
|---|---|---|
| Made by: SEC | Checked by: PJM | Backchecked by: |
| Date: 3/26/09 | Date: 4/23/09 | Date: |

HNTB

For upper 9" zone occupied by both ballast and concrete ties:

$B_{DL1}$ = $Tie_{depth} * (W_{avg.})$ = 0.099 kips/ft. of track

For remaining portion of ballast, use typical ballast weight:

$B_{depth}$ = ballast depth below tie = 2.00 ft.

$B_{DL2}$ = $B_{depth}$ * (0.120 kips/ $ft^3$) = 0.240 kips/ft. of track

Rails, fasteners (Ref. AREMA, Ch. 8, sec. 2.2.3):
Note that the Cycle 1 ratings did not distribute this loading over the lateral distribution width.
The value calculated below is less than the value used in the Cycle 1 ratings. See page 1-43.

$RF_{DL}$ = $\frac{(200 \text{ lbs./ft. of track}) / (L_a)}{(1000 \text{ lbs./ kip})}$ = 0.019 kips/ft. of track

Slab weight:

Reinforced concrete = 0.15 k/ft.3

$Slab_{DL}$ = (.150 k/ft.3) * 1 ft. width * $d_{slab}$ = 0.40 kips/ft. of track

$w_{total}$ = $RF_{DL} + B_{DL1} + B_{DL2} + Slab_{DL}$

$w_{total}$ = 0.76 kips/ft. of track

**Moment and Shear for 1' wide strip (Location A):**

$$M_{DL} = \frac{w_{total} * L^2}{8} = 47.98 \text{ kip-ft.}$$

$$V_{DL} = \frac{w_{total} * L}{2} = 8.53 \text{ kips}$$

Conservatvely use Moment values at 1/4 point of span for shear rating (Location B):

$M_{DL\ 1/4}$ = (w * x / 2) * (l - x) where x = l/4
= $(3wl^2)/32$

$M_{DL\ 1/4}$ = 35.99 kip - ft.

Updated BY KSE in Cycle 5

HS (2/25/16)
HC (2/26/16)

| | | |
|---|---|---|
| For:NJ Transit - MEL MP 36.41 | Job No.: 45361 | Sheet No. |
| Made by: SEC | Checked by: PJM | Backchecked by: |
| Date: 3/26/09 | Date: 4/23/09 | Date: |

**Live Loads (Ref. NJ Transit Corporation. Exhibit 19 for 286 k cars.)**

Calculate the maximum moment and shear values from 286 kips cars tables.
Based upon interpolation, For Span Length =22.55'

$M_{LL}$ = **804.27** kip-ft. = **804.27** kip-ft./ ft. of track

$V_{LL}$ = **167.08** kips = **167.08** kips / ft of track

$L_a$ = 10.50 ft.
$L_o$ = 5.00 ft.

$M_{LL}$ = $M_{LL} / L_a$ = **76.60** kip-ft./ ft. of track

$M_{LL+I}$ = **112.93** kip-ft./ ft. of track

$V_{LL}$ = $V_{LL} / L_a$ = **15.91** kips / ft of track

$V_{LL+I}$ = 23.46 kips / ft of track

Conservatively use Moment values at 1/4 point of span for shear rating:
Based upon interpolation from Table 15-1-15:

$$M_{LL\ 1/4} = \frac{287.4 * 2 \text{ rails}}{L_a} = \mathbf{54.74286} \text{ kip-ft}$$

$M_{LL\ 1/4+I}$ = **80.71** kip-ft

**Live Load Impact (Ref. AREMA Ch. 8, sec. 2.2.3.d.1)**

For 14' < span length (L) ≤ 127' :

$$I = \frac{225 / \sqrt{(L)}}{100} = 0.47$$

| | | |
|---|---|---|
| For:NJ Transit - MEL MP 36.41 | Job No.: 45361 | Sheet No. |
| Made by: SEC | Checked by: RJM | Backchecked by: |
| Date: 3/26/09 | Date: 4/23/09 | Date: |

**Wind Load (Ref. AREMA Ch. 8, sec. 2.2.3.i)**

Note that this section stipulates the application of a 300 lb./ft. load 8' above the top of rail.
No other criteria for wind loading is cited in Ch. 8, sections 2 or 19 (Rating of Existing Concrete Structures).

Uniform wind load:
Wind load moments and shears are laterally distributed to slab surface. Normal Ratings with wind do not control the overall structure rating. See page 1-43 for the Cycle 1 calculations.

$$w_{WL} = \frac{(0.300\text{ kip / ft.}) * (9\text{ ft.})}{5'\text{ rail spacing } * L_a} = 0.05\text{ kip/ft.}$$

$$M_{WL} = \frac{(w_{WL} * L^2)}{8} = 3.25\text{ kip-ft.}$$

$$V_{WL} = \frac{(w_{WL} * L)}{2} = 0.58\text{ kips}$$

**Centrifugal Force (Ref. AREMA Ch. 8, 2.2.3.e)**

Track is tangent, therefore no centrifigual effects considered.

**Rocking Effect**

Rocking Effect calculations are not required for concrete structures per AREMA, Ch. 8.

Updated BY KSE in Cycle 5

HS (2/25/16)
HC (2/26/16)

**HNTB**

MADE BY: SEC 3/27/09
CHECKED BY: PJM 4/23/09

## ULTIMATE BENDING CAPACITY - LOAD FACTOR DESIGN

(Reference AREMA Manual for Railway Engineering, 2006)

| LOCATION | A - Midspan | B - 1/4 point | UNIT |
|---|---|---|---|
| $\Phi$ (Ref. AREMA Ch. 8, sec. 2.30.2) | 0.9 | 0.9 | |
| d (effective depth) | 28.5 | 27.5 | in |
| b (assumed width) | 12.0 | 12.0 | in |
| fy | 33 | 33 | ksi |
| f'c | 3 | 3 | ksi |
| Rebar | 1" SQUARE PER 4.5" | 1" SQUARE PER 4.5" | |
| As provided | 2.67 | 2.667 | $in^2$ |
| $\rho$ (actual) | 0.0078 | 0.0081 | |
| $\beta_1$ (Ref. AREMA Ch. 8, 2.31.1.f) | 0.85 | 0.85 | |
| $\rho_{balanced}$ | 0.0476 | 0.0476 | |
| $0.75*\rho_{balanced}$ | 0.0357 | 0.0357 | |
| Check $\rho_{actual} \leq 0.75*\rho_{balanced}$ | YES | YES | |
| a | 2.88 | 2.88 | in |
| $M_n$ | 198.5 | 191.1 | k-ft/ft |
| $\Phi M_n$ | 178.6 | 172.0 | k-ft/ft |

$\rho = As / b * d$

$\rho_b = ((0.85*\beta*f'_c)/f_y)*(87000/(87000+f_y)$ (Reference AREMA, Ch. 8, sec. 2.32.2.b)

$a = As * fy / ( 0.85 * f'c * b )$ (Reference AREMA, Ch. 8, sec. 2.32.2 )

$M_n = As * fy ( d - a/2 )$ (Reference AREMA, Ch. 8, sec. 2.32.2 )

**HNTB**

MADE BY: SEC 3/27/09
CHECKED BY: PJM 4/23/09

## SERVICE STRESSES IN STEEL AND CONCRETE - SERVICE LOAD DESIGN

(Reference AREMA Manual for Railway Engineering, 2006)

| LOCATION | A - Midspan | B - 1/4 point | UNIT |
|---|---|---|---|
| DL (D) (See page 4-13) | 47.98 | 35.99 | k-ft |
| L+IM (See page 4-14) | 112.93 | 80.71 | k-ft |
| d (effective depth) | 28.5 | 27.5 | in |
| b (assumed width) | 12.0 | 12.0 | in |
| $(1.9 \text{ sqrt}( f'c) + 2500 * \rho * (V_u / M_u) * d) * b_w * d$ | 33 | 33 | ksi |
| f'c (see plans) | 3 | 3 | ksi |
| Minimum As required | 2.67 | 2.667 | $in^2$ |
| $\rho$ (actual) | 0.0078 | 0.0081 | |
| n | 9.1 | 9.1 | |
| k | 0.31278 | 0.31735 | |
| j | 0.89574 | 0.89422 | |
| Compressive stress due to dead load | 0.42 | 0.34 | ksi |
| Compressive stress due to live load and impact | 0.99 | 0.75 | ksi |
| Allowable concrete stress in compression | 1.44 | 1.44 | ksi |
| Tensile stress in reinforcement due to dead load | 8.5 | 6.6 | ksi |
| Tensile stress in reinforcement due to L+IM | 19.9 | 14.8 | ksi |
| Allowable steel stress in tension | 26.4 | 26.4 | ksi |

n = modular ratio = $E_S / E_C$ (Reference AREMA, Ch. 8, sec. 2.27)

where $E_c = 57*\sqrt{f'_c}$ (Reference AREMA, Ch. 8, sec. 2.23.4)

k = cracked centroid = $\text{sqrt}(2\rho n + (\rho n)^2) - \rho n$

$j = 1 - k/3$

Compressive stress (DL, LL) = $fc = 2M / ( j * k * b * d^2)$

Allowable concrete stress in compression = $0.4 * f'c * 1.2$ (Reference AREMA, Ch. 8, sec. 2.26.1 and sec. 19.4.1.2)

Tensile stress in reinforcement (DL, LL) = $f_s = M / ( As * j * d )$

Allowable steel stress in tension = $0.8 * fy$ (Reference AREMA, Ch. 8, sec. 19.4.2)

4-16

**HNTB**

MADE BY SEC 3/27/09
CHECKED BY PJM 4/23/09

## ULTIMATE SHEAR CAPACITY - LOAD FACTOR DESIGN

(Reference AREMA Manual for Railway Engineering, 2006)

| LOCATION | B | | UNIT |
|---|---|---|---|
| DL SHEAR (D) | 8.53 | | kips |
| LL LOAD SHEAR (L) | 15.91 | | kips |
| IMPACT FACTOR (I) | 0.47 | | |
| FACTORED SHEAR Vu:1.4(D+5/3(L+I)) | 66.7 | | kips |
| 1.8(D+L+I) | 57.6 | | kips |
| $M_u$ | 238.7 | | kips-ft |
| $f'_c$ | 3000 | | psi |
| sqrt(f'c) | 54.8 | | psi |
| d (at face of abutment per plans) | 26.90 | | in |
| $b_w$ | 12 | | in |
| 2*sqrt($f'_c$)*$b_w$*d/1000 | 35 | | kips |
| $V_u/M_u$*d | 0.63 | | |
| $V_c$ | 37.7 | | kips |
| Shear reinforcement $A_v$ (inclined stirrups) | 1.00 | | in^2 |
| spacing (s) of shear reinforcement | 13.50 | | in. |
| Shear reinforcement Av (per 12") | 0.89 | | in^2 |
| $f_y$ | 33.0 | | ksi |
| α | 38.0 | | degrees |
| $V_s$ | 18.1 | | kips |
| $V_n$ | 55.7 | | kips |
| Φ (Ch. 8, sec. 2.30.2) | 0.85 | | |
| Φ$V_n$ | 47.4 | | kips |

I = (100LL / LL + DL) or <= 0.60

Vu = 1.4 (DL + 5/3 (LL+I)) (Reference AREMA, Ch. 8. sec. 2.2 4c, Table 8-2-5)

Vu = 1.8 (DL + LL + I) (Reference AREMA, Ch. 8. sec. 2.2.4c, Table 8-2-5)

$M_u$ = 1.4 ($M_{DL}$ + 5/3 ($M_{LL+I}$)) (See page 4-18, corresponding moment at shear location)
(conservatively taken at 1/4 point)

$V_c$ = take min of :
3.5 sqrt( f'c) * $b_w$ * d, with $V_c$ = kips, f'c = ksi, bw = d = inches (Reference AREMA, Ch. 8, sec. 2.35.2)
or
(1 9 sqrt( f'c) + 2500 * ρ * ($V_u$ / $M_u$) * d) * $b_w$ * d (Reference AREMA, Ch. 8, sec. 2.35.2)

$V_s$ = ($A_v$ * fy *d *(sin α + cos α))/s Shear strength of shear reinforcement for inclined stirrups (Reference ACI 11.5.6.4)
Vs = (1.41*Av*fy*d)/s Shear strength of inclined shear stirrups when inclination angle is 45 degrees
Vs = (Av * fy * d)/s Shear strength of vertical shear reinforcement (Reference ACI 11.5.6 2)
where Av = actual area per bar and s = bar spacing

Vs = Av * fy * sin α Shear strength of single bars bent up (Reference ACI 11.5.6.5)
where Av = area per 12"

$V_n = V_s + V_c$

**HNTB**

MADE BY SEC 3/27/09
CHECKED BY PJM 4/23/09

## STRESS IN BENT UP STEEL DUE TO SHEAR - SERVICE LOAD DESIGN

(Reference AREMA Manual for Railway Engineering, 2006)

| LOCATION | B | | UNIT |
|---|---|---|---|
| DL SHEAR (D) | 8.53 | | kips |
| LL LOAD SHEAR (L) | 15.91 | | kips |
| IMPACT FACTOR (I) | 0.47 | | |
| TOTAL SHEAR V, V = DL + (LL + I) | 32.0 | | kips |
| M, M = $M_{DL}$ + $M_{LL}$ | 116.7 | | kips-ft |
| $f'_c$ | 3000.0 | | psi |
| sqrt($f'_c$) | 54.8 | | psi |
| d | 26.9 | | in |
| $b_w$ | 12 | | in |
| $\rho_w$ | 0.0081 | | |
| $v_c$ | 54.76 | | psi |
| $V_c$ | 17.68 | | kips |
| Is $V_c$ > $V_{DL}$ | YES | | |
| Shear reinforcement Av (per 12") | 0.89 | | in^2 |
| α | 0.66 | | rad |
| s | 13.5 | | in |
| Stress in steel (LL) | 26.158 | | ksi |
| $f_y$ | 33.0 | | ksi |
| Allowable stress in steel | 24.0 | | ksi |

$v_c$ = 0.9 * sqrt( f'c) + 1100 * $p_w$ * V * d / M (Reference AREMA, Ch. 8, 2.29.2.b)

$f_s$ = ($V_T$ - $V_c$)) / ($A_v$ * sin α) Stress in inclined bars when used for shear reinforcement - Reference ACI 11.5.6.2
where (Reference AREMA, Ch 8, 2.29.3b.2)
$V_T$ and $V_c$ are in kips.

HS (2/25/16)

Updated BY KSE in Cycle 5

HC (2/26/16)

HNTB

MADE BY: SEC 3/27/09
CHECKED BY: PJM 4/23/09

## RATING SUMMARY FOR MORRISTOWN LINE MP 36.41 OVER MILL BROOK

### RATINGS BASED ON TENSILE STRESS IN STEEL (BENDING) - ALLOWABLE STRESS RATING

| | ALLOWABLE STRESS | D | L+IM | RATING FACTOR | | E80 RATING | |
|---|---|---|---|---|---|---|---|
| LOCATION | KSI | KSI | KSI | NORMAL (SLN) | MAXIMUM (SLM) | NORMAL (SLN) | MAXIMUM (SLM) |
| A | 26.4 | 8.5 | 19.9 | 0.68 | 0.90 | E54. | E72. |
| B | 26.4 | 6.6 | 14.8 | 1.04 | 1.34 | E83. | E107 |

SLN = $(S_f / 1.2 - DL) / (LL + I)$ (Reference AREMA, Ch. 8, sec. 19.5.3.1.1)

SLM = $(S_f - DL) / (LL + I)$ (Reference AREMA, Ch. 8, sec. 19.5.3.1.2)

### RATINGS BASED ON TENSILE STRESS IN SHEAR REINFORCEMENT - ALLOWABLE STRESS RATING

| | ALLOWABLE STRESS | D | L+IM | RATING FACTOR | | E80 RATING | |
|---|---|---|---|---|---|---|---|
| LOCATION | KSI | KSI | KSI | NORMAL (SLN) | MAXIMUM (SLM) | NORMAL (SLN) | MAXIMUM (SLM) |
| B | 24 | 0 | 26.2 | 0.76 | 0.92 | E61.1 | E73.4 |

SLN = $(S_f / 1.2 - DL) / (LL + I)$ (Reference AREMA, Ch. 8, sec. 19.5.3.1.1)

SLM = $(S_f - DL) / (LL + I)$ (Reference AREMA, Ch. 8, sec. 19.5.3.1.2)

Location description:

A - midspan - controlling location for bending
B - at support - controlling location for shear

JOB 1389 : MORRISTOWN LINE M.P. 36.41
SHEET NO. ____ OF ____
CALCULATED BY HS DATE 3/10/2016
CHECKED BY HC DATE 3/10/16
SCALE ____

SPEED REDUCTION 286$^k$ CARS
(AREMA, CH. 8, ART 19.3.4(b))

SHEAR AT SUPPORT WOULD BE MAXIMUM FOR SINGLE SPAN BRIDGE.

$f_c' = 3{,}000$ psi,

SEE AREMA, CH 8, ART 2.29.6(d)

SHEAR ALLOWABLE STRESS, $f_v = 1.2 \times 0.9 \times \sqrt{f_c'} = 1.2 \times 0.9 \times \sqrt{3000} = 59.2$ psi

SHEAR CAPACITY OF 1 FT WIDE SECTION OF SLAB,

$V_{c\ cap} = f_v \times b \times d / 1000$

$\left(d = \overset{32''}{d_{SLAB}} - \overset{COVER}{3in} - \overset{BAR\ \phi}{0.5in} - \overset{AT\ SUPP}{1.0''}\right)$
$= 27.5$ IN

$= 59.2 \times 12 \times 27.5 / 1000 = 19.54^k$

$LL_{CAP}$ = SHEAR CAPACITY − DEAD LOAD SHEAR − WIND LOAD SHEAR
$19.54 - 8.53 - 0.58 = 10.43^k$ (SEE PAGE 5-18, 5-19)

$LL_{NET\ CAP} = LL_{CAP} / (1+I)$

$R = 1.0 - \frac{40-S}{60} \leq 0.5$ (S = SPEED BETW. 40 MPH & 10 MPH)

REDUCE IMPACT FACTOR $= R \times I = R \times (0.47)$

MAXIMUM RATING :

REVISED RATING $= \frac{LL_{CAP}}{[1+R(0.47)]V_{LL}}$ E80

$= \frac{10.43}{[1+R(0.47)]15.91} \times$ E80 (SEE PAGE 5-18 FOR $V_{LL}$ VALUE)

CONCLUSION : FROM SPEED RESTRICTION TABLE FOR 286$^k$ CARS, AT 10 MPH, REVISED E80 RATING VALUE IS E 42.47 WHICH IS LESS THAN E48 RATING VALUE FOR THE BRIDGE. THEREFORE 286$^k$ CARS ARE RESTRICTED AT ALL SPEEDS.

JOB 1389 NJ Transit
SHEET NO. OF
CALCULATED BY HS DATE 3/10/2016
CHECKED BY HC DATE 3/10/16
SCALE Morristown Line MP 36.41 over Mill Brook

ALLOWABLE STRESS RATING
SPEED RESTRICTION RATING VALUES FOR SHEAR
286 KIPS CAR: MAXIMUM RATING (CONCRETE SLAB)

| SPEED (S) MPH | REDUCTION FACTOR (R ) | REVISED IMPACT FACTOR | REVISED E80 RATING VALUES |
|---|---|---|---|
| 40 | 1 | 0.47 | 35.68 |
| 39 | 0.98 | 0.46 | 35.87 |
| 38 | 0.97 | 0.45 | 36.06 |
| 37 | 0.95 | 0.45 | 36.26 |
| 36 | 0.93 | 0.44 | 36.45 |
| 35 | 0.92 | 0.43 | 36.65 |
| 34 | 0.90 | 0.42 | 36.86 |
| 33 | 0.88 | 0.42 | 37.06 |
| 32 | 0.87 | 0.41 | 37.27 |
| 31 | 0.85 | 0.40 | 37.47 |
| 30 | 0.83 | 0.39 | 37.69 |
| 29 | 0.82 | 0.38 | 37.90 |
| 28 | 0.80 | 0.38 | 38.11 |
| 27 | 0.78 | 0.37 | 38.33 |
| 26 | 0.77 | 0.36 | 38.55 |
| 25 | 0.75 | 0.35 | 38.78 |
| 24 | 0.73 | 0.34 | 39.00 |
| 23 | 0.72 | 0.34 | 39.23 |
| 22 | 0.70 | 0.33 | 39.46 |
| 21 | 0.68 | 0.32 | 39.70 |
| 20 | 0.67 | 0.31 | 39.93 |
| 19 | 0.65 | 0.31 | 40.17 |
| 18 | 0.63 | 0.30 | 40.41 |
| 17 | 0.62 | 0.29 | 40.66 |
| 16 | 0.60 | 0.28 | 40.91 |
| 15 | 0.58 | 0.27 | 41.16 |
| 14 | 0.57 | 0.27 | 41.41 |
| 13 | 0.55 | 0.26 | 41.67 |
| 12 | 0.53 | 0.25 | 41.93 |
| 11 | 0.52 | 0.24 | 42.20 |
| 10 | 0.50 | 0.24 | 42.47 |

HS (2/25/16)
HC (2/26/16)

MADE BY: SEC 3/27/09
CHECKED BY: PJM 4/23/09

**SPEED RESTRICTION CALCULATIONS**:

SPAN LENGTH: 22.5'
STRUCTURE TYPE: SINGLE SPAN REINFORCED CONCRETE SLAB

BASED UPON MOMENT FOR HEAVY DUTY CARS ON BRIDGES (AREMA):

| NJ TRANSIT EQUIPMENT TYPE | EQUIVALENT COOPER LOAD |
|---|---|
| F40PH-2 | E37.0 |
| 2F40PH-2 | E37.0 |
| GP40PH-2 | E41.7 |
| 2GP40PH-2 | E41.7 |
| GP40-FH-2 | E39.9 |
| 2GP40-FH-2 | E40.0 |
| SW-1500 | E36.4 |
| ALP-44 | E28.8 |
| 2ALP-44 | E28.8 |
| ALP-46 | E29.8 |
| 2ALP-46 | E29.8 |
| PL-42 | E39.6 |
| 2PL-42 | E39.6 |
| GP40-2 | E40.2 |
| 2GP40-2 | E40.2 |
| **ALP-45** | **E40.3** |
| **2ALP-45** | **E34.7** |

BASED UPON SHEAR FOR HEAVY DUTY CARS ON BRIDGES (AREMA):

| NJ TRANSIT EQUIPMENT TYPE | EQUIVALENT COOPER LOAD |
|---|---|
| F40PH-2 | E39.1 |
| 2F40PH-2 | E40.0 |
| GP40PH-2 | E44.2 |
| 2GP40PH-2 | E44.2 |
| GP40-FH-2 | E42.3 |
| 2GP40-FH-2 | E42.3 |
| SW-1500 | E39.9 |
| ALP-44 | E30.5 |
| 2ALP-44 | E30.5 |
| ALP-46 | E31.2 |
| 2ALP-46 | E31.2 |
| PL-42 | E42.5 |
| 2PL-42 | E42.5 |
| GP40-2 | E42.7 |
| 2GP40-2 | E42.6 |
| **ALP-45** | **E42.9** |
| **2ALP-45** | **E39.6** |

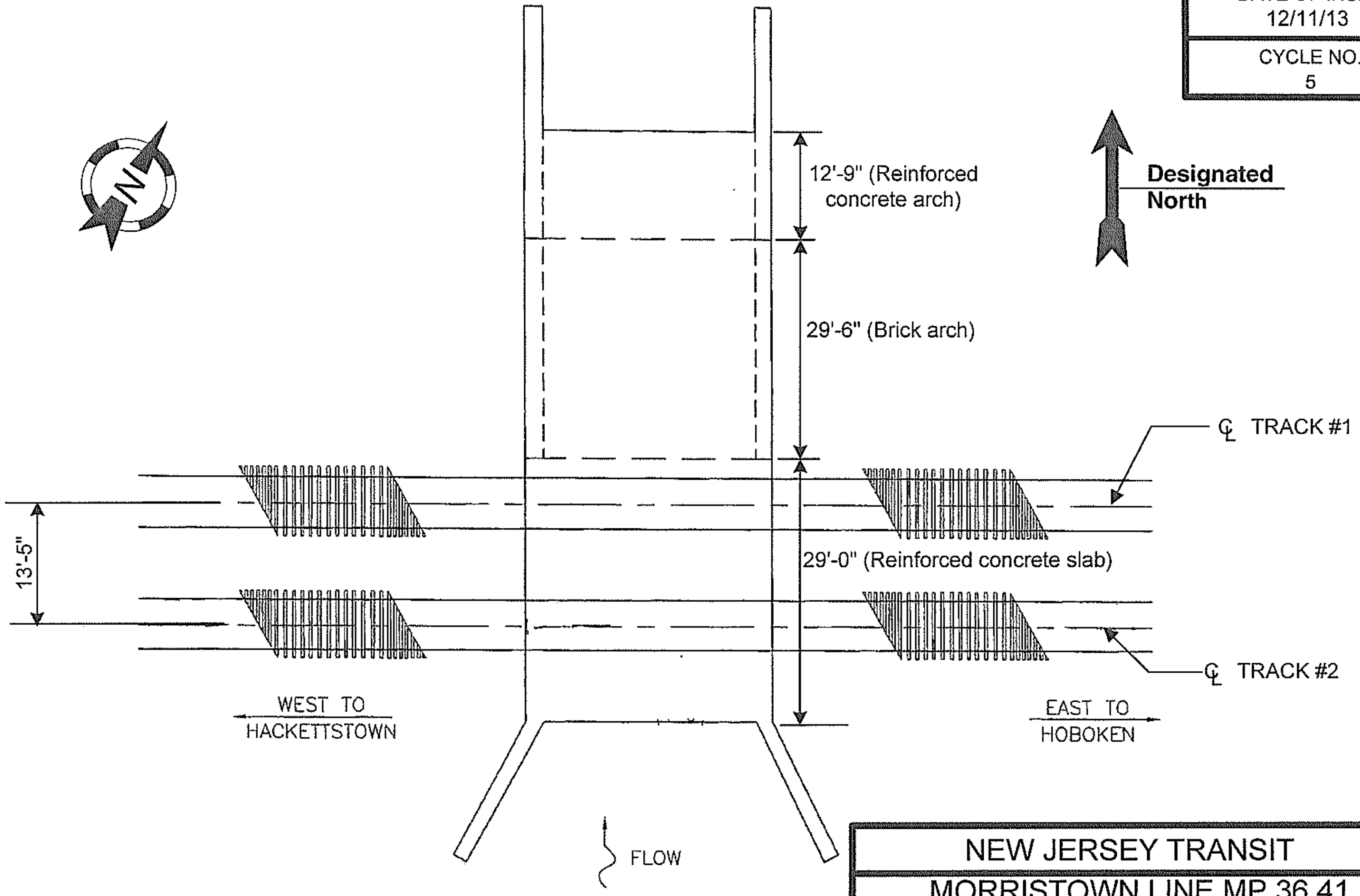
No speed restrictions required for NJ Transit operating equipment at the Maximum Level.

# APPENDIX 2

# PHOTOGRAPHS AND DRAWINGS

DATE OF INSP.
12/11/13

CYCLE NO.
5



## PLAN VIEW

N.T.S.

NEW JERSEY TRANSIT

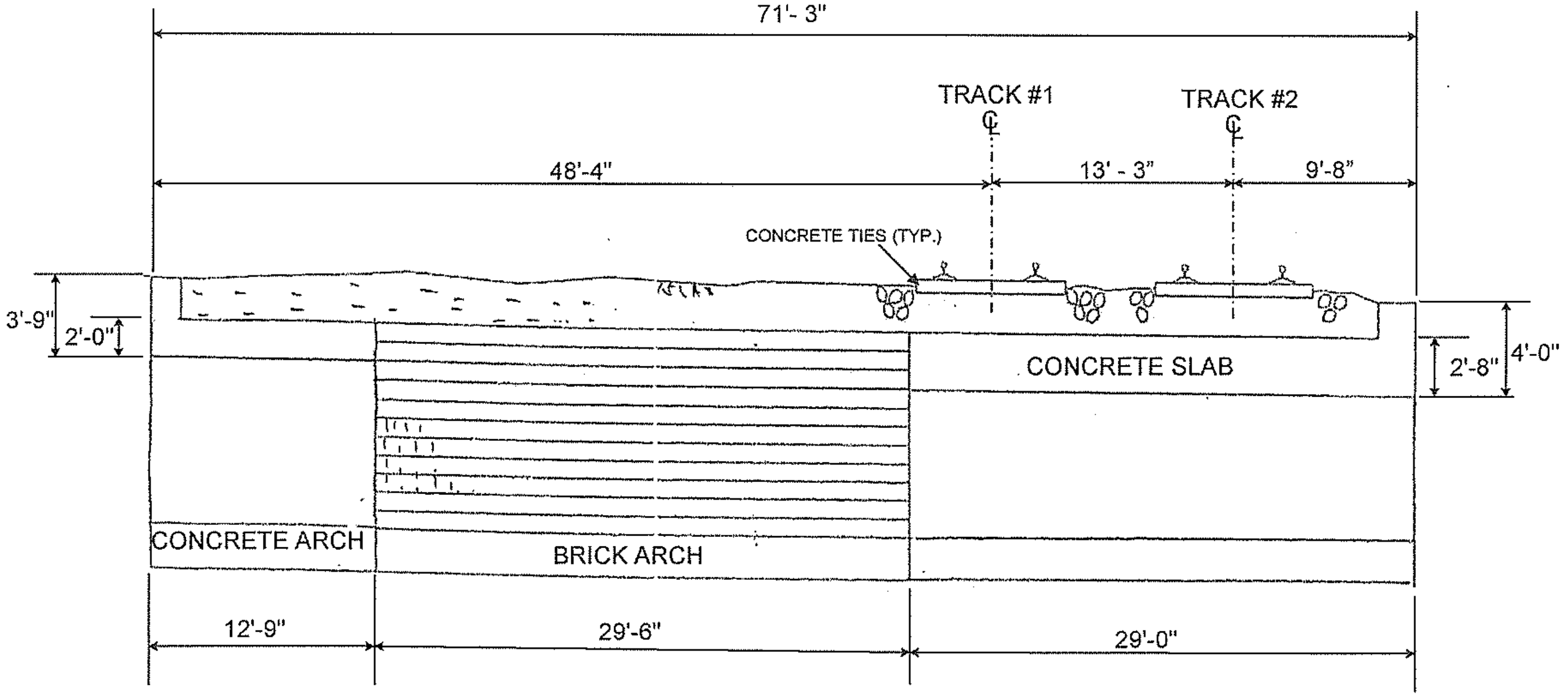
MORRISTOWN LINE MP 36.41
OVER MILL BROOK

**PLAN VIEW**

**KS ENGINEERS, P.C.**
494 BROAD ST. NEWARK, NJ 07102

DATE OF INSP.
12/11/13

CYCLE NO.
5



## CROSS SECTION

(LOOKING EAST)
N.T.S

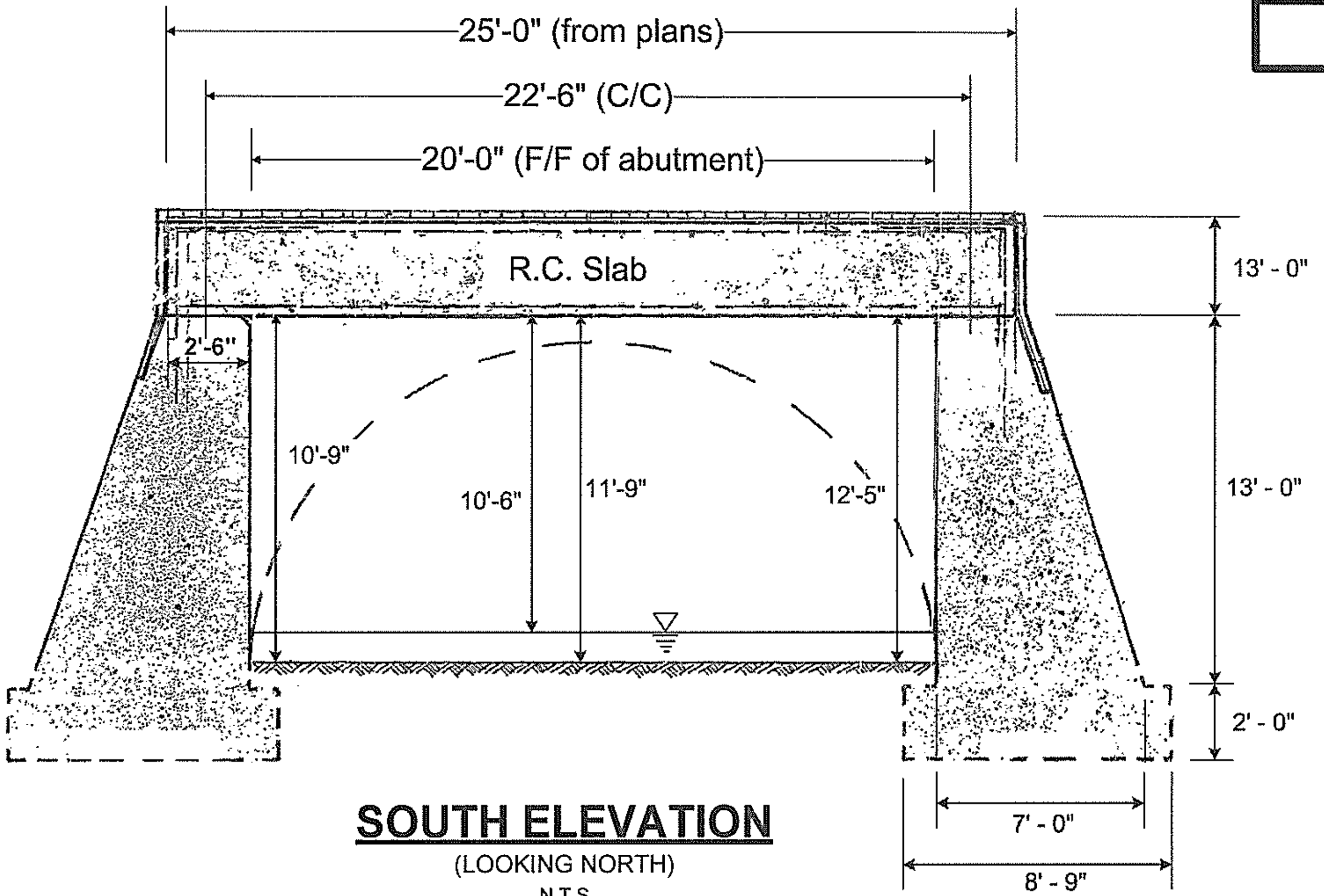
NEW JERSEY TRANSIT

MORRISTOWN LINE MP 36.41
OVER MILL BROOK
**CROSS SECTION**

**KS ENGINEERS, P.C.**
494 BROAD ST. NEWARK, NJ 07102

DATE OF INSP.
12/11/13

CYCLE NO.
5



## SOUTH ELEVATION

(LOOKING NORTH)
N.T.S

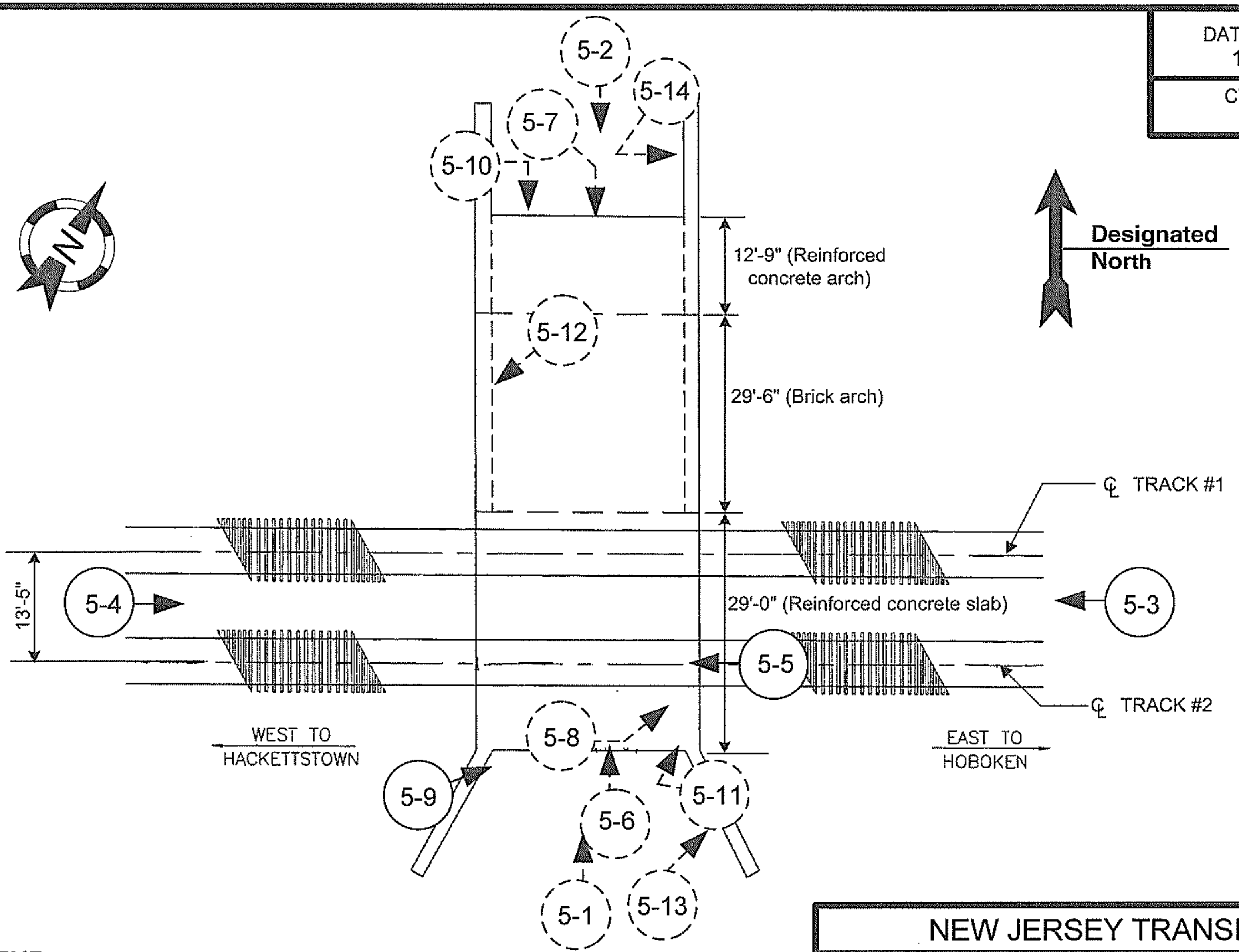
NEW JERSEY TRANSIT

MORRISTOWN LINE MP 36.41
OVER MILL BROOK
**ELEVATION**

**KS ENGINEERS, P.C.**
494 BROAD ST. NEWARK, NJ 07102

DATE OF INSP.
12/11/13

CYCLE NO.
5



**LEGEND:**

○➤ PHOTO TAKEN ABOVE DECK

◌➤ PHOTO TAKEN BELOW DECK

## PHOTO LOCATION PLAN
N.T.S.

NEW JERSEY TRANSIT
MORRISTOWN LINE MP 36.41
OVER MILL BROOK
**PHOTO LOCATION PLAN**
**KS ENGINEERS, P.C.**
494 BROAD ST. NEWARK, NJ 07102

**PHOTO 5-1:** South elevation, looking north. Note tree growth in front of the southwest wingwall and graffiti (arrows) at the southeast and southwest wingwalls.

**PHOTO 5-2:** North elevation, looking south. Note tree and vegetation growth behind the northeast and northwest wingwalls.

Structure Name: Mill Brook
Railroad Line: Morristown
USRA Line Code: 6101

Municipality: Denville
Railroad Milepost: 36.41
Insp. Date: 12/11/2013

**PHOTO 5-3**: East approach, looking west.

**PHOTO 5-4:** West approach, looking east.

**PHOTO 5-5:** General view of bridge ties, Track #2, looking west.

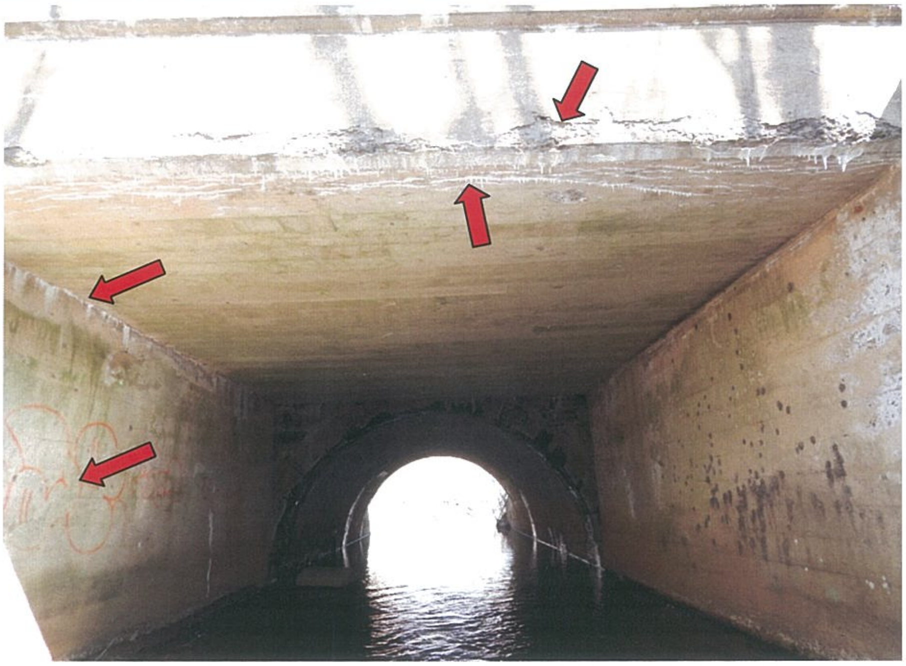


**PHOTO 5-6:** General view of underside of the reinforced concrete deck slab, looking north. Note spalled/ delaminated concrete and fine cracks with efflorescence at the south fascia and underside of the concrete slab. Note also, moderate to heavy efflorescence between slab/ west abutment interface and graffiti at the west abutment breastwall.

**PHOTO 5-7:** General view of intrados of concrete and brick arches, looking south. Note several fine cracks with efflorescence, water staining and active water leakage at the concrete arch intrados. Note also, heavy efflorescence throughout the brick arch.

**PHOTO 5-8:** General view of the east abutment breastwall of concrete slab, looking northeast. Note fine cracks with efflorescence at top of the southeast wingwall. Note also, small spall with heavy efflorescence along the south edge, approximately located at mid height of the breastwall.

**PHOTO 5-9:** Spalled and or delaminated concrete throughout the top of south headwall, looking northeast. Note fine cracks with efflorescence at random locations of the headwall.

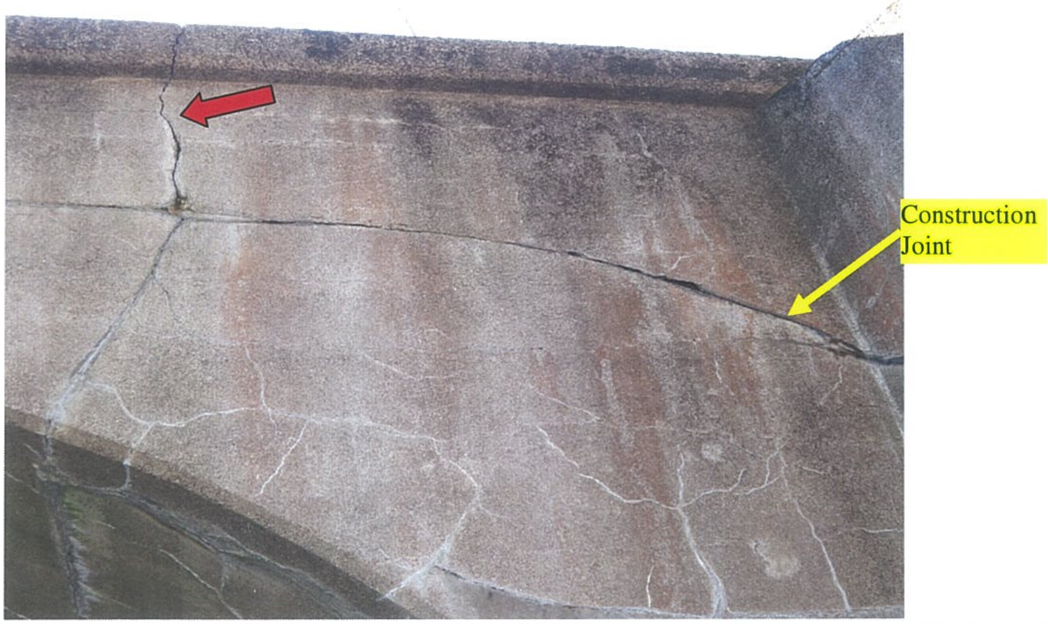


**PHOTO 5-10:** Wide crack at west end of the north spandrel wall, looking south (arrow). Note fine map cracks with efflorescence.

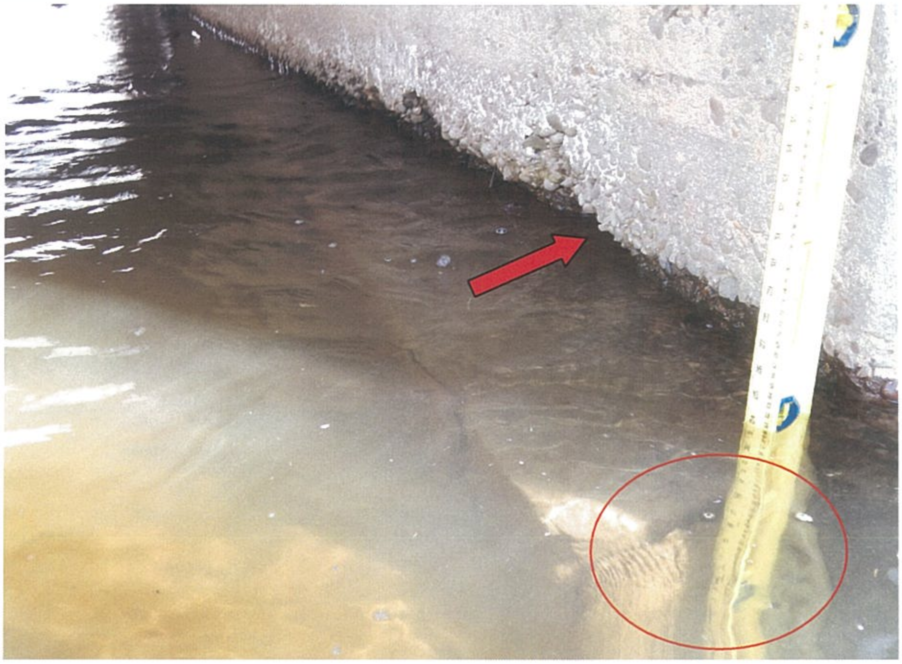


**PHOTO 5-11**: Moderate to severe scaling along the bottom of east abutment breastwall of concrete deck slab, looking northeast. Note exposed footing at south end (typical throughout the length of the breastwall).

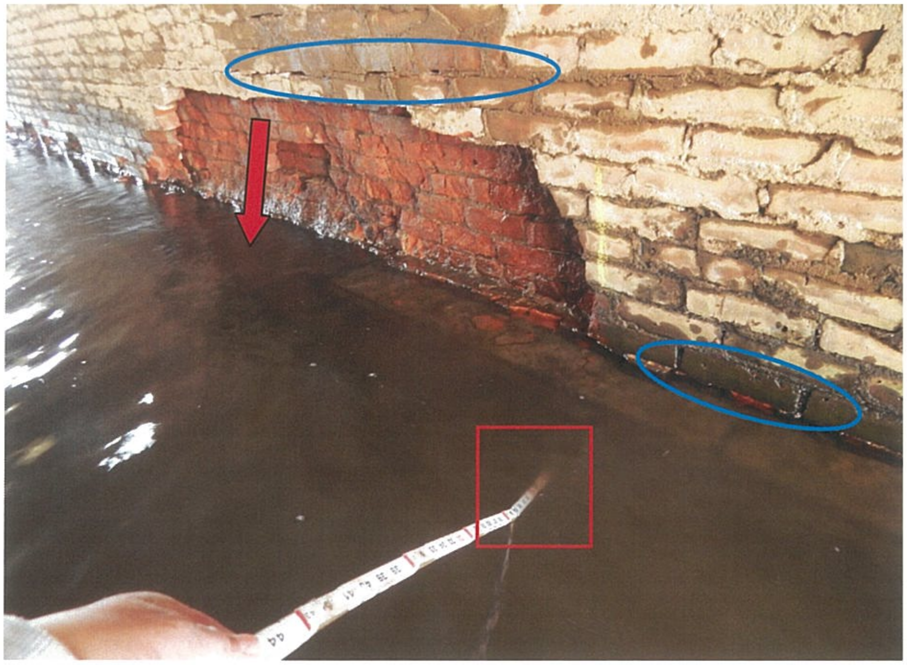


**PHOTO 5-12:** Missing bricks at west side of the brick arch, looking southwest. Note missing section of stone course approximately at center of the brick arch (arrow). Note also, the stone course is undermined throughout the brick arch length (rectangle) and deteriorated pointing at the brick arch intrados (circles).

**PHOTO 5-13:** Large spall (circle) along the top face of the southeast wingwall, looking northeast. Note scattered fine cracks with efflorescence (arrow) at the vertical face of the wingwall.

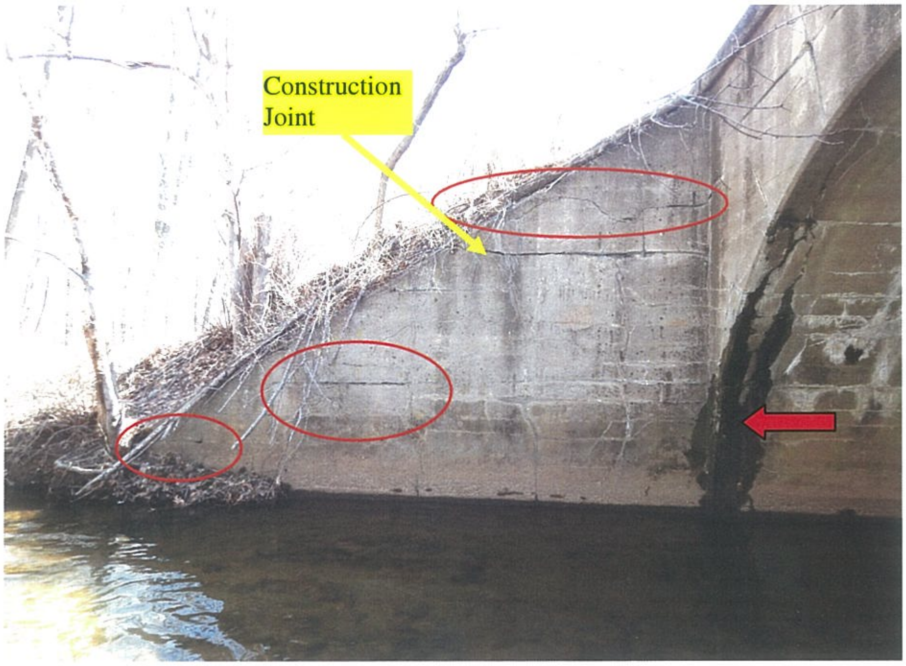


**PHOTO 5-14:** Medium to wide cracks (circles) at isolated locations of the northeast wingwall, looking east. Note tree growth behind the wingwall and active water leakage at northeast corner of the concrete arch (arrow).

# APPENDIX 3

# FIELD OBSERVATIONS

# FIELD OBSERVATIONS

Loss of section was acquired by measurements taken with stick rulers and tape measures where accessible and by visual estimates where not accessible

There were no losses to the structure that affect the rating calculations. The locations and extent of all losses found are recorded in the NJ Transit field notes following this sheet.

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GENERAL

LINE: MORRISTOWN MILEPOST: 36.41

NAME OF BRIDGE: MILL BROOK

NJDOT STRUCTURE NO.: 1464-153 CONSULTANT BRIDGE NO.: F22

ROUTE NO.: 4005 DATE: TOP OF DECK: 5/19/2014

SUPERSTRUCTURE: 12/11/13, 4/10/14

USRA LINE CODE: 6101 SUBSTRUCTURE: 12/11/13, 4/10/14

MUNICIPALITY: TOWNSHIP OF DENVILLE COUNTY: MORRIS

CONSULTANT: KS ENGINEERS, P.C.

CREW CHIEF: H. Shah, P.E. WEATHER: Sunny (12/11/13)
Sunny (4/10/14, 5/19/14)

CREW MEMBER(S): C. Wilder, P.E.
H. Cedeno

TEMPERATURE: 32°F (12/11/13), 45°F (4/10/14)
64°F (5/19/14)

TYPE OF BRIDGE: Single span, simply supported, reinforced concrete slab (south portion), brick arch (center portion) and concrete arch (north portion).

YEAR BUILT: 1902 (Arch) &
1927 (Concrete slab)

YEAR OF MAJOR REPAIRS: N/A

WORK DONE: None

OPEN DECK / [✓ BALLASTED] DECK [✓ ELECTRIFIED] / NON-ELECTRIFIED

INDEPENDENT BRIDGES: [✓ YES] / NO

| | | | |
|---|---|---|---|
| BRIDGE # 1 = TRACK # | 1 & 2 | = ~~GIRDERS~~ | RC. slab |
| BRIDGE # 2 = TRACK # | None | = ~~GIRDERS~~ | Brick arch |
| BRIDGE # 3 = TRACK # | None | = ~~GIRDERS~~ | Concrete arch |
| BRIDGE # 4 = TRACK # | | = GIRDERS | |

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GENERAL
### (CONTINUED)

LINE: MORRISTOWN MP: 36.41

[✓ TANGENT]/ CURVED TRACK NO. OF TRACKS: 2

C/C DISTANCE BETWEEN TRACKS: TRACK # 1 AND TRACK # 2 C/C = 13' - 3"
TRACK # ____ AND TRACK # ____ C/C = ____
TRACK # ____ AND TRACK # ____ C/C = ____

ECCENTRICITY IN TRACKS: N/A
NUMBER 1: ____ SOUTH/NORTH
NUMBER 2: ____ SOUTH/NORTH
NUMBER 3: ____ SOUTH/NORTH
NUMBER 4: ____ SOUTH/NORTH

OVERALL CONDITION RATING OF BRIDGE (G, [✓ F], P, B) Fair

INDIVIDUAL ELEMENT CODES AND GENERAL OBSERVATIONS OF CONDITIONS:

APPROACHES ([✓ G], F, P, B) Good. There is minor wear at the inner edge of the north rail on Track #1 and inner edge of both rails on Track #2 at both approaches. There is tie pumping up to 1/8" at the west approach on Tracks #1 and #2.

DECK: ([✓ G], F, P, B) Good. There is minor wear at the inner edge of the north rail on Track #1 and inner edge of both rails on Track #2. There is tie pumping up to 1/8" on Track #1.

SUPERSTRUCTURE: (G, F, P, B) Fair. There are fine cracks with efflorescence, spalled and delaminated concrete at south end of the concrete deck slab. The south headwall exhibits spalled and delaminated concrete and fine cracks with efflorescence throughout. There is minor scaling approximately at mid span of the underside of deck slab. The brick arch exhibits heavy efflorescence for approximately 50% of the arch intrados. There is missing and deteriorated pointing for approximately 50% of the arch intrados. There are areas of missing and deteriorated bricks along the bottom west side of the brick arch and at south stone arch ring. There is up to 1" gap between the south stone arch ring and the brick arch throughout the arch intrados. There are several fine cracks with efflorescence throughout the concrete arch intrados. The south fascia stone spandrel wall is partially visible due to adjacent concrete slab and exhibits light efflorescence throughout. The north fascia spandrel wall exhibits two wide cracks and several fine cracks with efflorescence. There is graffiti at the northeast corner of concrete arch intrados.

SUBSTRUCTURE: (G, [✓ F], P, B) Fair. There is moderate scaling along the bottom of the east abutment breastwall for full length. There is severe scaling at the bottom north and south corners of the east abutment breastwall. There is small area of delaminated concrete with heavy efflorescence at top south face of the east abutment breastwall. The west abutment breastwall exhibits light scaling along the bottom of the breastwall for full length. The interface between slab and west abutment breastwall exhibits moderate to heavy efflorescence throughout. The top of footings at both abutment breastwalls are exposed for full length with no undermining observed. There is light to moderate scaling along the bottom of southeast, northeast and northwest wingwalls. There is a large spall and two minor spalls at the southeast wingwall. There is a minor spalled area and a medium fractured area along the top face of the northeast wingwall. The top face of the southwest wingwall is spalled throughout the length of the wingwall. There are medium to wide cracks with minor edge spalling at the northeast and northwest wingwalls.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GENERAL
### (CONTINUED)

WATERWAY: (G, F, [✓ P] B) Poor. Moderate scour was observed throughout the channel, exposing stone foundations of abutment breastwalls, northeast wingwall, southeast wingwall and northwest wingwall. The east and west stone foundations of brick arch exhibits undermining up to 3” high and 4” deep for full length of the brick arch. The waterway opening appears to be adequate for normal flow; however, the bridge appears susceptible to scour due to the undermining and spread footing foundation.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### EAST

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-3

[✓ TANGENT] / CURVED TRACK GRADE: - 0.15% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT: ______ LENGTH ______

CONDITION: ______

WEIGHT OF RAIL: 132 LBS/ YD (Track #2) & 132 LBS/YD (Track #1 north rail) & 136 LBS/YD (Track #1 south rail). [✓ WELDED] / JOINTED

RAILS: CONDITION: Track #1: Minor wear at the inner edge of the north rail.
Track # 2: Minor wear at the inner edge of both rails.

PUMPING: RAILS: YES / [✓ NO]

TRACK ______ NORTH RAIL: AMOUNT ______ LENGTH: ______
SOUTH RAIL: AMOUNT ______ LENGTH: ______
TRACK ______ NORTH RAIL: AMOUNT ______ LENGTH: ______
SOUTH RAIL: AMOUNT ______ LENGTH: ______
TRACK ______ NORTH RAIL: AMOUNT ______ LENGTH: ______
SOUTH RAIL: AMOUNT ______ LENGTH: ______
TRACK ______ NORTH RAIL: AMOUNT ______ LENGTH: ______
SOUTH RAIL: AMOUNT ______ LENGTH: ______

TIES: YES / [✓ NO]

TRACK ______ NORTH RAIL: AMOUNT ______ LENGTH: ______
SOUTH RAIL: AMOUNT ______ LENGTH: ______
TRACK ______ NORTH RAIL: AMOUNT ______ LENGTH: ______
SOUTH RAIL: AMOUNT ______ LENGTH: ______
TRACK ______ NORTH RAIL: AMOUNT ______ LENGTH: ______
SOUTH RAIL: AMOUNT ______ LENGTH: ______
TRACK ______ NORTH RAIL: AMOUNT ______ LENGTH: ______
SOUTH RAIL: AMOUNT ______ LENGTH: ______

TIE SIZE: LENGTH 8' - 6" WIDTH 9" DEPTH 8½"

TIES: C/C OF TIES: 24" NO. NEEDING REPLACEMENT: 0
CONDITION: Concrete ties: No significant defects observed.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### EAST/CONTINUED

LINE: MORRISTOWN MP: 36.41 PHOTOS: -

TIE PLATES: NO. MISSING: 0 NO. LOOSE: 0

CONDITION: No significant defects observed.

TIE PADS: [✓ YES] / NO

CONDITION: No significant defects observed.

SPIKES: CONDITION: Pandrol rail clips: No significant defects observed.

BALLAST: [✓ CLEAN] / UNCLEAN ADEQUATE DEPTH: [✓ YES] / NO

DESCRIPTION:

SHOULDERS: SOUTH: Steep, stable slope.
(CONDITIONS)

NORTH: Level ground; NJ Transit access road.

TRACK TO BE RAISED / LOWERED : YES / [✓ NO]

LOW APPROACH / SAG: No

NO TRESPASSING SIGNS:

[✓ NONE]
YES LOCATION:

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH
### WEST

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-4

[✓ TANGENT] / CURVED TRACK GRADE: - 0.15% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT: - LENGTH -

CONDITION: -

WEIGHT OF RAIL: 132 LBS/ YD (Track #2) & 132 LBS/YD (Track #1 north rail) & 136 LBS/YD (Track #1 south rail). [✓ WELDED] / JOINTED

RAILS: CONDITION Track #1: Minor wear at the inner edge of the north rail.
Track # 2: Minor wear at the inner edge of both rails.

PUMPING: RAILS: YES / [✓ NO]

| | | | | | | |
|---|---|---|---|---|---|---|
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |

TIES: [✓ YES] / NO

| | | | | | | |
|---|---|---|---|---|---|---|
| TRACK | 1 | NORTH RAIL: | AMOUNT | 1/8” | LENGTH: | 10.0’ |
| | | SOUTH RAIL: | AMOUNT | 1/8” | LENGTH: | 10.0’ |
| TRACK | 2 | NORTH RAIL: | AMOUNT | 1/8” | LENGTH: | 10.0’ |
| | | SOUTH RAIL: | AMOUNT | 1/8” | LENGTH: | 10.0’ |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |

TIE SIZE: LENGTH 8’ - 6” WIDTH 9” DEPTH 8½”

TIES: C/C OF TIES: 24” NO. NEEDING REPLACEMENT: 0

CONDITION: Concrete ties: No significant defects observed.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### WEST/CONTINUED

LINE: MORRISTOWN MP 36.41 PHOTOS: -

TIE PLATES: NO. MISSING: 0 NO. LOOSE: 0

CONDITION: No significant defects observed.

TIE PADS: [✓ YES] / NO

CONDITION: No significant defects observed.

SPIKES: CONDITION: Pandrol rail clips: No significant defects observed.

BALLAST: [✓ CLEAN] / UNCLEAN ADEQUATE DEPTH: YES / [✓ NO]

DESCRIPTION:

SHOULDERS: SOUTH: Steep, stable slope.

(CONDITIONS)

NORTH: Level ground; NJ Transit access road.

TRACK TO BE RAISED / LOWERED : YES / [✓ NO]

LOW APPROACH / SAG: No

NO TRESPASSING SIGNS:

[✓ NONE]

YES LOCATION:

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SUPERSTRUCTURE SPAN No. 1

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-5

TRACK NUMBER: 1 & 2 OPEN [✓ BALLASTED] [✓ TANGENT] / CURVED TRACK

SPAN TYPE: Reinforced concrete slab SPAN LENGTH: 22.5' C/C

GUARD RAILS: YES / [✓ NO] NEEDED WEIGHT: LENGTH:
CONDITION:

CONDITION OF RAILS: Track #1: Minor wear at the inner edge of the north rail.
Track # 2: Minor wear at the inner edge of both rails.

PUMPING: RAILS: YES [✓ NO]

| | | | | | | |
|---|---|---|---|---|---|---|
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |

TIES: [✓ YES] / NO

| | | | | | | |
|---|---|---|---|---|---|---|
| TRACK | 2 | NORTH RAIL: | AMOUNT | 1/8" | LENGTH: | 10.0' |
| | | SOUTH RAIL: | AMOUNT | 1/8" | LENGTH: | 10.0' |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |
| TRACK | | NORTH RAIL: | AMOUNT | | LENGTH: | |
| | | SOUTH RAIL: | AMOUNT | | LENGTH: | |

TIE SIZE: LENGTH: 8'-6" WIDTH: 9" DEPTH: 8½"

TIES: C/C OF TIES: 24" NO. NEEDING REPLACEMENT: 0
CONDITION: Concrete ties: No significant defects observed.

RIBBON GUARD / TIE: YES [✓ NO] TYPE AND SIZE:
SPACER BLOCKS: YES [✓ NO]

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SUPERSTRUCTURE SPAN No. 1
### (CONTINUED)

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-9

BACKWALL TIES: SIZE: N/A

CONDITION: N/A

TIE PLATES: NO. MISSING: 0 NO. LOOSE: 0

CONDITION: No significant defects observed.

TRACKS SHIMMED: YES / [✓ NO]

TIE PADS: [✓ YES] / NO CONDITION: No significant defects observed.

CONDITION OF SPIKES: Pandrol rail clips: Light surface rust.

CONDITION OF ANCHOR / J-HOOK BOLTS: N/A

BALLAST: DEPTH: 2'± [✓ CLEAN] / UNCLEAN

WALKWAYS: STEEL / TIMBER / UNDEFINED

LOCATION: N/A

CONDITION: N/A

HANDRAILS: STEEL / TIMBER / UNDEFINED

CONDITION: N/A

CONDITION OF PARAPET WALLS / CURBS: Top face of south headwall: Spalled/delaminated concrete along (22 SF x 1" deep). Top face of north headwall: Minor scaling throughout.

MILEAGE BOARDS: YES: LOCATION:

[✓ NO] / NEEDED: LOCATION:

OBSTRUCTIONS: [✓ NO] / YES: TYPE & DISTANCE:

OTHER OBSERVATIONS: None

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## CONCRETE DECK SLAB

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-6 & 5-9

SPAN: 1 SPAN LENGTH: 22'-6" C/C

WATER LEAKAGE: [✓ YES] / NO % DECK AREA: 5%

SUFFICIENT CURB HEIGHT: [✓ YES] / NO
(BALLAST OVERFLOW)

CRACKS: Underside of slab: Fine cracks with efflorescence at south end (20'L± x 2'W±).

SPALLS: Underside of slab: Spalled and or delaminated concrete at south end (40 SF ±). There is small spall (1 SF x 1" deep) adjacent to the area of delaminated concrete at south end (No repair recommendation). There is minor scaling approximately at midspan of underside of slab (2 SF) (No repair recommendation).

OTHER OBSERVATIONS: South headwall: South face- Spalled/ delaminated concrete at the bottom of headwall (14 SF± x 1" ± deep). Scattered fine cracks with efflorescence throughout.

Total spalled area to be repaired at the south headwall = 22 SF (Top face) + 14 SF (south face) = 36 SF.

SKETCH (IF NEEDED): None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SUPERSTRUCTURE - ARCH

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-7, 5-10, 5-12 & 5-14

TYPE: Brick arch with stone fascia rings (29'-6"W @ center), concrete arch (12'-9" W @ north side).

CONDITIONS:

INTRADOS OF ARCH: **Brick arch**: Heavy efflorescence for approximately 50% of the brick arch. Missing and or deteriorated pointing at the intrados (approximately 150 LF) of the arch and at east end (10 LF) of north brick arch ring (stone). See sketch on next sheet for additional conditions.

Total missing and or deteriorated bricks at the intrados of the arch ≈ 29 SF.

**Concrete arch**: Several fine cracks with heavy efflorescence and water staining/ water leakage throughout. Delaminated concrete (2 SF x 1"deep) at the north end of the west arch intrados.

EXTRADOS OF ARCH: Not visible.

SPANDREL WALLS: **South fascia (Stone):** Partially visible, light efflorescence throughout.

**North fascia (concrete):** Two (1/8" to 1/4") wide vertical cracks in spandrel wall (8 LF ± total). A few fine cracks (< 1/8" W) at isolated locations. Delaminated concrete (< 0.5 SF x 1" deep) at the base (east end) of the spandrel wall. Several fine cracks with efflorescence below the crown of the arch.

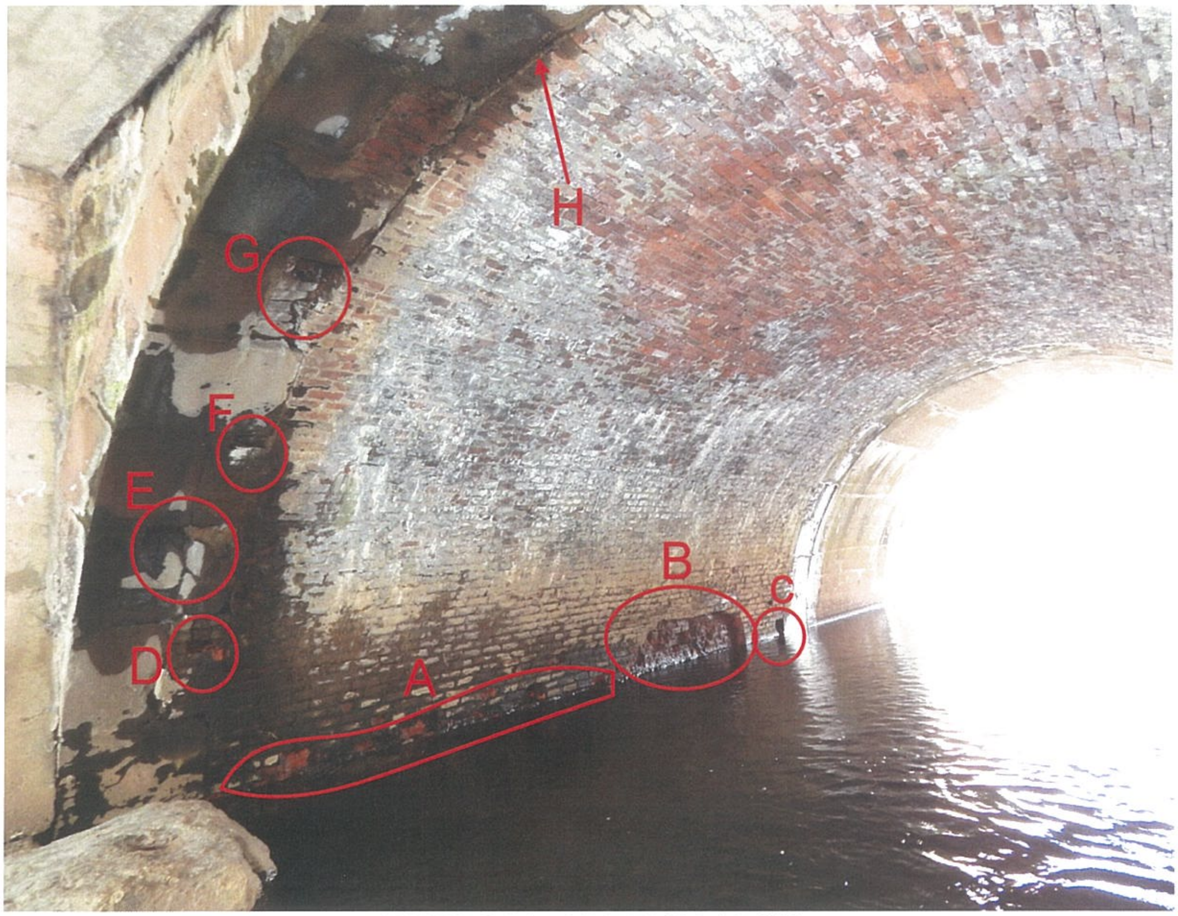
Total cracks to be repaired = 8 LF (North spandrel wall).

OTHER OBSERVATIONS: Graffiti at the northeast corner of concrete arch intrados. Springlines of both arches are supported by stone foundation with east and west foundations exposed up to 1'H throughout. There is a 8" H stone course along the bottom of the brick arch; there is a missing section of stone course for 4 SF (west side), approximately at center of the brick arch.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SUPERSTRUCTURE – ARCH (CONTINUE)

LINE: MORRISTOWN MP 36.41 PHOTOS: 5-12



**WEST SIDE OF BRICK ARCH**

(LOOKING NORTHWEST)

N.T.S

**NOTES:**

Ⓐ One layer of missing and or deteriorated bricks (9 SF +/-).

Ⓑ Up to two layers of missing bricks (12 SF +/-).

Ⓒ One layer of missing bricks (< 1 SF).

Ⓓ Loose and missing bricks (2 SF +/-).

Ⓔ Spalled/ cracked stone (2 SF +/-).

Ⓕ One brick is missing (< 0.5 SF).

Ⓖ Missing bricks (2 SF +/-).

Ⓗ Up to 1" gap between south stone arch ring and brick arch (typical throughout).

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ABUTMENT BREASTWALL (Under concrete slab)
## EAST

LINE: MORRISTOWN MP 36.41 PHOTOS: 5-8 & 5-11

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

LENGTH: 29'-0" HEIGHT: 10'- 11"

WIDTH: AT BEARING: Not visible AT GROUND LEVEL: Not visible

STRUCTURAL CRACKS: SIZE: - WIDTH: - LOCATION: -
None SIZE: WIDTH: LOCATION:
SIZE: WIDTH: LOCATION:

CONDITIONS: A few fine cracks with efflorescence at top of breastwall. There is minor to moderate scaling along the bottom of the breastwall (Full length x up to 17" H x up to ¼" deep). There is moderate to severe scaling at bottom north corner (2 SF± x up to 1" deep) and south corner (12 SF± x up to 5½"deep) of the breastwall. Minor honeycombing at top south end of wingwall (8 SF). Delaminated concrete with heavy efflorescence at top south corner (south face) (1 SF total). Minor spall (1 SF x 1"deep) with heavy efflorescence at south edge, approximately located at mid height of the breastwall.

Total scaled area to be repaired = 14 SF.

CONDITION OF BEARING SEAT: Not visible.

PUMPING DUE TO LOAD: YES [✓ NO] DESCRIPTION:

GRAFFITI: YES [✓ NO] SF [✓ PLUMB] / TILT:

FOUNDATION CONDITIONS: Footing is exposed for full length (28.9'L which includes south face) and up to 13"H (No undermining observed).

TRAFFIC PROTECTION: YES CONDITION:
[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ABUTMENT BREASTWALL (Under concrete slab)
## WEST

LINE: MORRISTOWN MP 36.41 PHOTOS: 5-6

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

LENGTH: 29'-0" HEIGHT: 10'- 4"±

WIDTH: AT BEARING: Not visible AT GROUND LEVEL: Not visible

STRUCTURAL CRACKS: SIZE: - WIDTH: - LOCATION: -
None SIZE: WIDTH: LOCATION:
SIZE: WIDTH: LOCATION:

CONDITIONS: Bottom 10" H of the abutment exhibits light scaling (up to 1/8" deep) for full length. There are two areas with heavy efflorescence (3 SF total) at center of the breastwall. The interface between the roof slab and the west abutment exhibits moderate to heavy efflorescence throughout.

CONDITION OF BEARING SEAT: Not visible.

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION: -

GRAFFITI: [✓ YES] / NO 20 SF [✓ PLUMB] / TILT: -

FOUNDATION CONDITIONS: Footing is exposed for full length (27.9'L) and up to 13" H (No undermining was observed). The north 20' of the footing exhibits spalling/ severe scaling (up to 6" H).

TRAFFIC PROTECTION: YES CONDITION:
[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

[✓ EAST] / WEST
NORTH / [✓ SOUTH]

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-1, 5-8 & 5-13

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: Varies (1.0' to 13.5') WIDTH: 1'-8" LENGTH: 21'-3"

TREE / VEGETATION GROWTH ON WINGWALL: YES / [✓ NO]

DESCRIPTION: - LOCATION: -

CONDITIONS: See sketch below.
Total spalled area to be repaired = 19 SF.

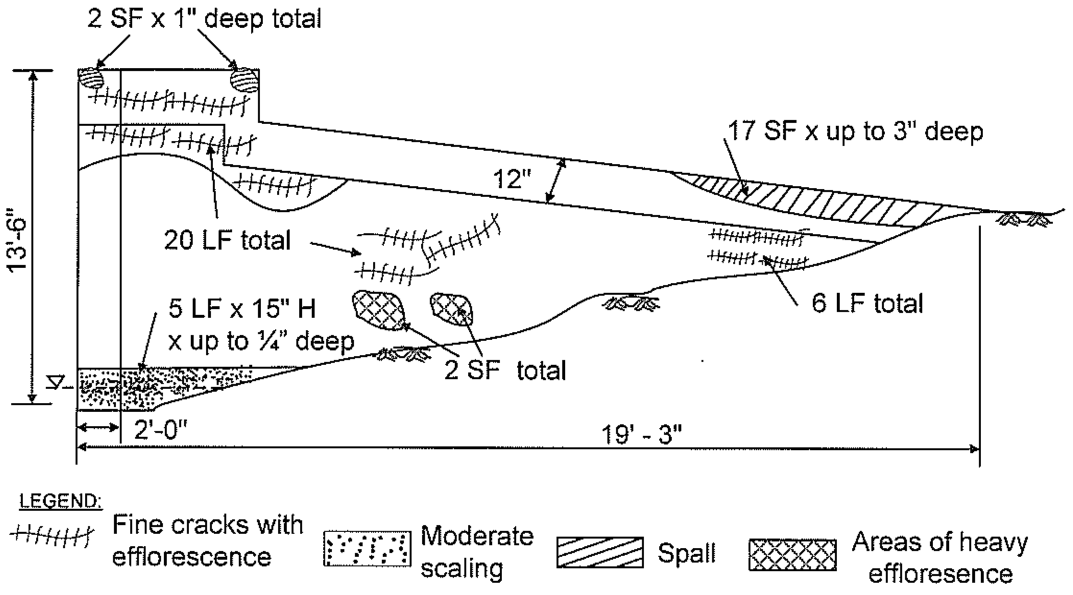
FOUNDATIONS: West end of footing is exposed (3'L x 13"H).

GRAFFITI: [✓ YES] / NO 50 SF [✓ PLUMB] / TILT: -

TRAFFIC PROTECTION: YES CONDITION: -
[✓ NO] / NEEDED LOCATION: -

OTHER OBSERVATIONS: Minor ballast and dirt is spilling from top of the wingwall.

SKETCH (IF NEEDED):



# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

[✓ EAST] / WEST
[✓ NORTH] / SOUTH

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-2 & 5-14

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: 13'-6" WIDTH: 1'-8" LENGTH: 18'-0"

TREE / VEGETATION GROWTH ON WINGWALL [✓ YES] / NO

DESCRIPTION: Small trees/ shrubs LOCATION: Top/ behind the wingwall

CONDITIONS: Several fine cracks with efflorescence at east end of the wingwall.
See sketch below for additional conditions.
Total spalled/ fractured area to be repaired = 6 SF.
Total cracks to be repaired = 15.5 LF + 12 LF = 27.5 LF (Say 28 LF).

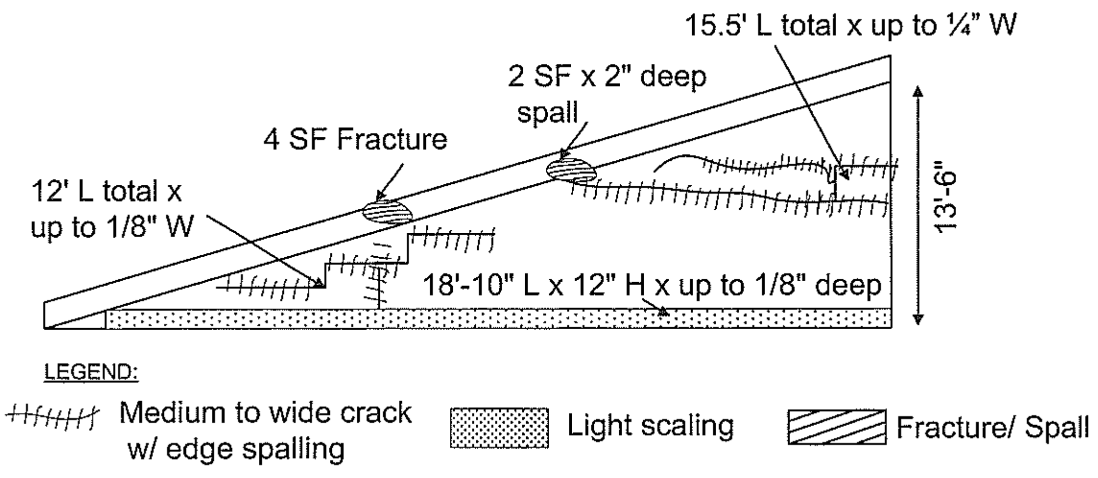
FOUNDATIONS: Footing is exposed for full length and up to 10" H (No undermining was observed).

GRAFFITI: YES [✓ NO] SF [✓ PLUMB] / TILT: -

TRAFFIC PROTECTION: YES CONDITION: -
[✓ NO] NEEDED LOCATION: -

OTHER OBSERVATIONS: Dirt and shrubs cover the top of wingwall.

SKETCH (IF NEEDED):



# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

EAST / [✓ WEST]
NORTH / [✓ SOUTH]

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-1

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: Varies (1.0' to 12.2') WIDTH: 1'-8" LENGTH: 19'-0"

TREE / VEGETATION GROWTH ON WINGWALL: YES / [✓ NO]

DESCRIPTION: - LOCATION: -

CONDITIONS: See sketch below.
Total spalled area to be repaired = 30 SF.

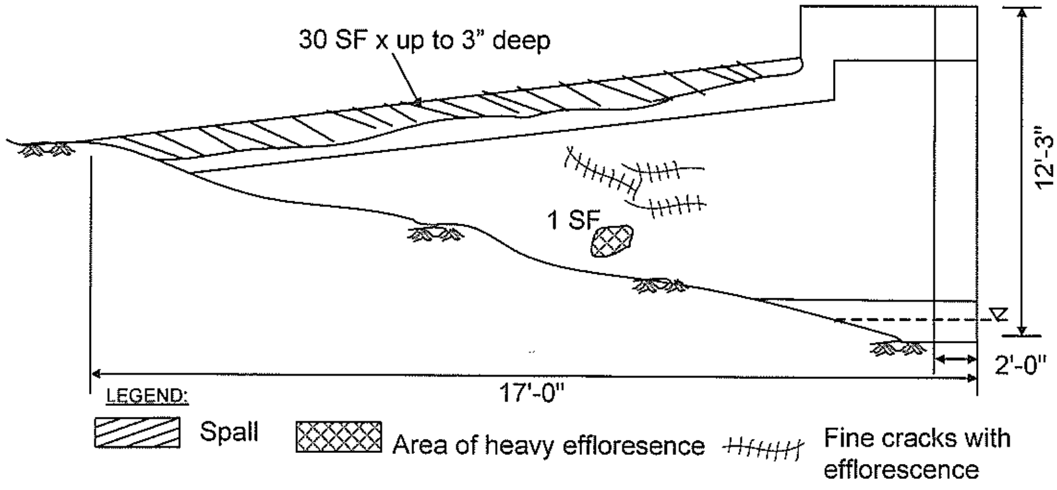
FOUNDATIONS: Not visible.

GRAFFITI: [✓ YES] / NO 30 SF [✓ PLUMB] / TILT: -

TRAFFIC PROTECTION: YES CONDITION: -
[✓ NO] NEEDED LOCATION: -

OTHER OBSERVATIONS: Minor ballast and dirt is spilling from top of the wingwall.

SKETCH (IF NEEDED):



# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS
EAST / [✓ WEST]
[✓ NORTH] / SOUTH

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-2

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: Varies (2.0' to 13.5') WIDTH: 1'-8" LENGTH: 18'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Heavy tree growth LOCATION: Behind the wingwall

CONDITIONS: See sketch below.
Total spalled/ fractured area to be repaired = 7 SF.
Total cracks to be repaired = 11 LF + 7 LF + 1.5 LF + 4 LF = 23.5 LF (Say 24 LF).

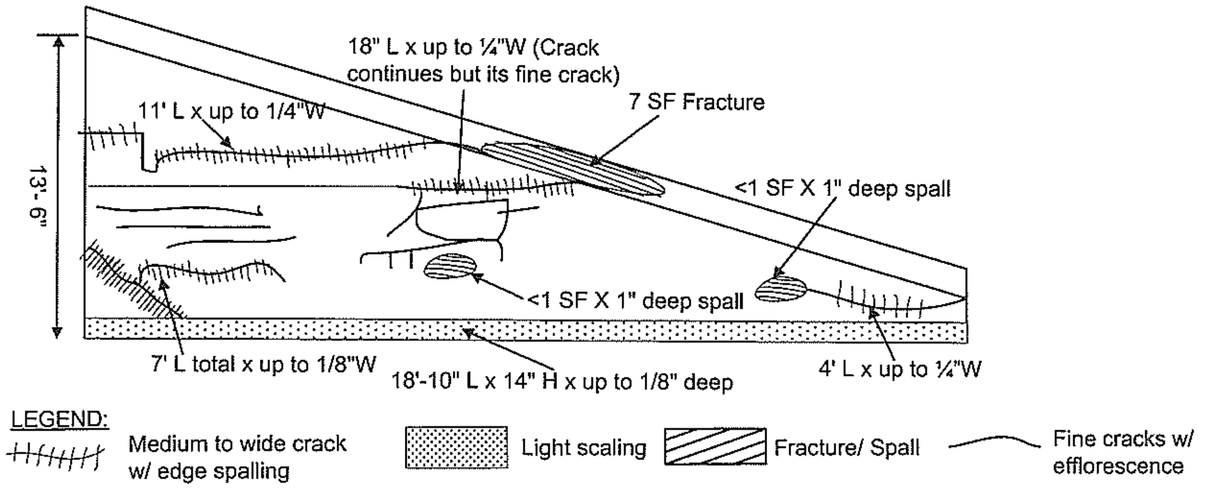
FOUNDATIONS: Footing is exposed for full length and up to 9"H (No undermining was observed).

GRAFFITI: YES [✓ NO] ______ SF [✓ PLUMB] / TILT: -

TRAFFIC PROTECTION: YES CONDITION: -
[✓ NO] NEEDED LOCATION: -

OTHER OBSERVATIONS: Dirt accumulation throughout top of wingwall.

SKETCH (IF NEEDED):



# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WATERWAY BENEATH BRIDGE

LINE: MORRISTOWN MP: 36.41 PHOTOS: 5-12

SOUNDINGS: REFER TO SOUNDINGS PROFILE SHEET

FLOW DIRECTION: South to north. TIDAL: YES [✓ NO]

STREAM CONDITIONS:
EMBANKMENTS:
UPSTREAM: Well vegetated and stable.
DOWNSTREAM: Well vegetated and stable.

SCOUR: General scour throughout, exposing stone foundation of both abutment breastwalls, northeast wingwall, southeast wingwall and northwest wingwall (concrete footings).

UNDERMINING: East and west stone foundations of brick arch exhibits undermining up to 3" H and 4" deep for full length of the brick arch, see sketch below.
No undermining observed along the wingwalls.

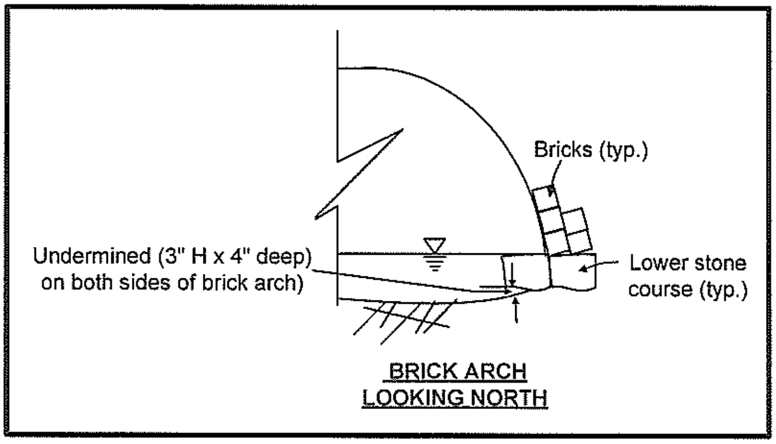
EROSION: None

STREAMBED PROTECTION: YES [✓ NO]

DESCRIPTION: -

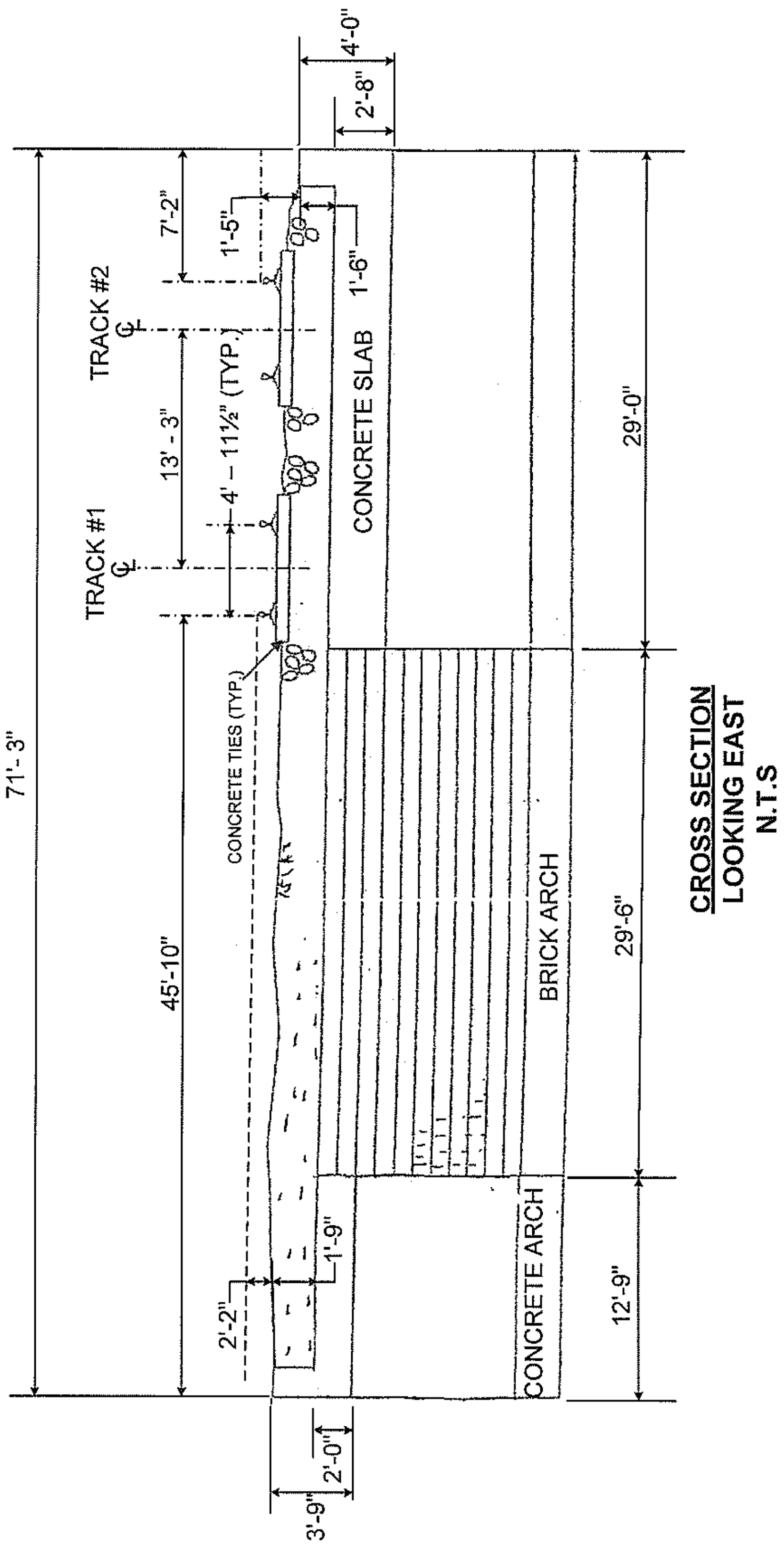
UNDERWATER INSPECTION REQUIRED: YES [✓ NO]

OTHER OBSERVATIONS: Moderate accumulation of debris (wood/ large stone) along the east abutment of concrete slab. Flow centerline is shifted slightly to east through structure.



# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

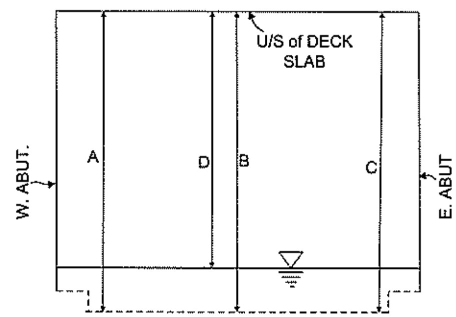
LINE: MORRISTOWN MP: 36.41 NAME: MILL BROOK



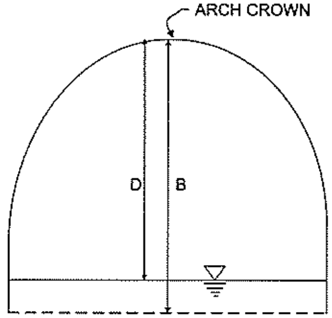
# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SOUNDINGS PROFILES

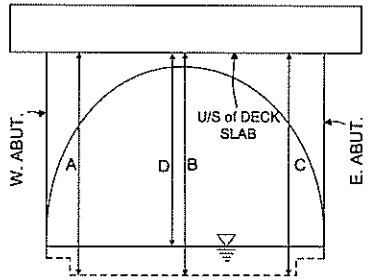
LINE: MORRISTOWN MP: 36.41 NAME: MILL BROOK



SOUTH ELEVATION (CONCRETE SLAB)
LOOKING NORTH
N.T.S.



NORTH ELEVATION (CONCRETE ARCH)
LOOKING SOUTH
N.T.S.



CENTER ELEVATION (NEAR BRICK ARCH)
LOOKING NORTH
N.T.S.

**Legend:**

- - - - - N. Fascia —·—· Centerline

——— S. Fascia ▽ Waterline

NOTES:

① The clear dimensions A, B and C at the south elevation and bridge center are measured from the underside of deck slab to the streambed.

② The clear dimensions A and C at the south elevation and bridge center are measured next to the exposed footings (1.0' +/- from abutments).

③ The clear dimension 'B' at north elevation is measured from arch crown to the streambed.

**SPAN: 1**

| Cycle | BY | DATE | (Concrete slab) ALONG SOUTH FASCIA | | | | (Adj. to brick arch) ALONG CENTERLINE | | | (Concrete arch) ALONG NORTH FASCIA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | A | B | C | A | B | C | D |
| 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2 | LICHTENSTEIN | 6/8/99 | 10'-4" | 11'-4 ½" | 11'-5" | 10'-10 ½" | 11'-3" | 11'-7 ½" | 10'-9" | - | 11'-0" | - | 10'-5 ½" |
| 3 | E & K | 4/20/04 | 10'-2" | 11'-3 ½" | 11'-3 ½" | 10'-9" | 11'-2" | 11'-8 ½" | 10'-11" | - | 11'-3 ½" | - | 10'-2" |
| 4 | HNTB | 1/6/09 | 10'-3 ½" | 11'-4½" | 11'-5" | 10'-9½" | 11'-4" | 11'-8" | 11'-8½" | - | 11'-1 ½" | - | 10'-2" |
| 5 | KS Engineers | 12/11/13 | 10'-9" | 11'-9" | 12'-5" | 10'-6" | 11'-8" | 12'-3" | 11'-7" | - | 11'-5" | - | 9'-10" |

**SPAN:**

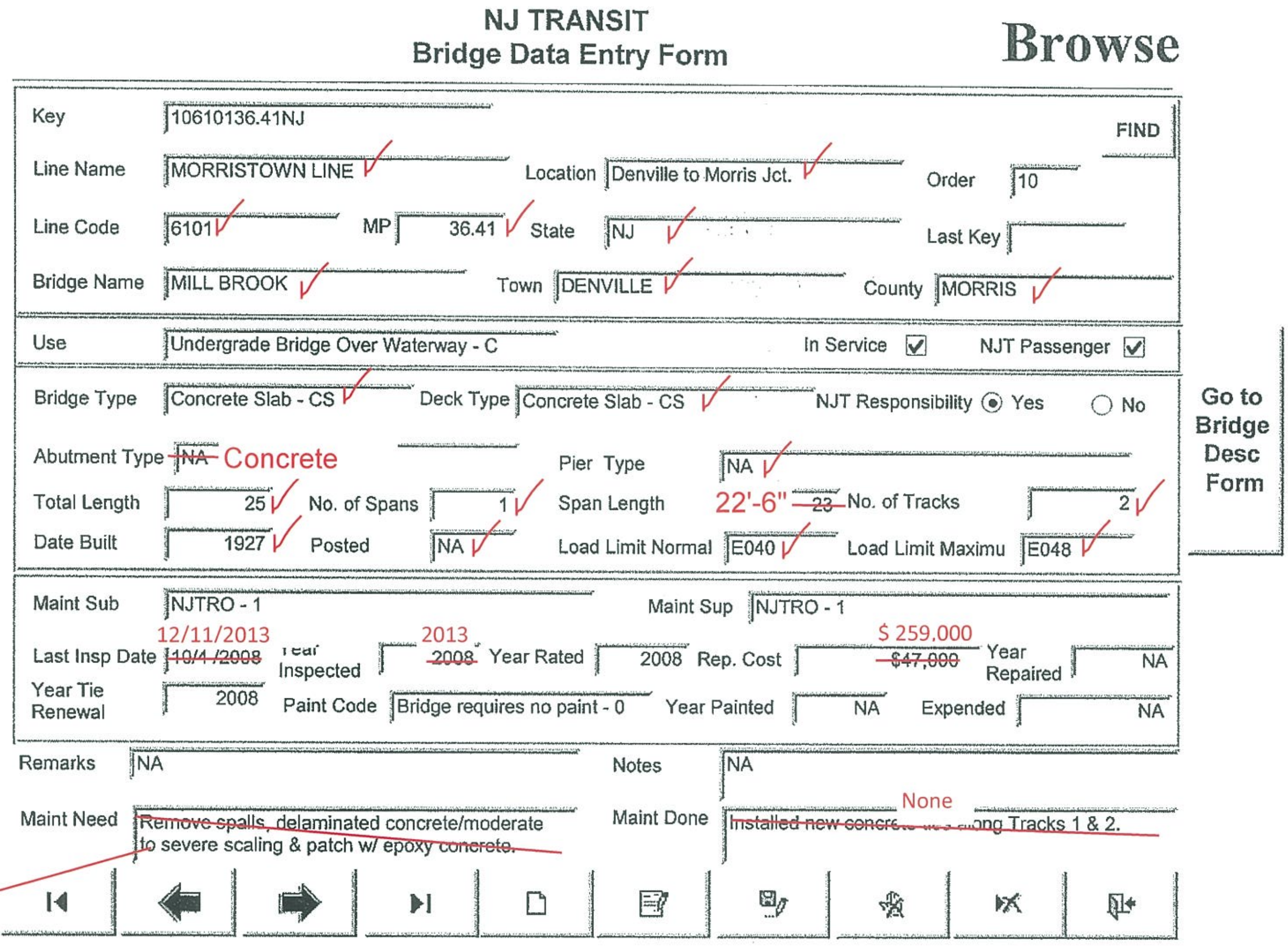
| Cycle | BY | DATE | ALONG SOUTH FASCIA | | | | ALONG CENTERLINE | | | ALONG NORTH FASCIA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | A | B | C | A | B | C | D |
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |

OFFICE OF THE CHIEF ENGINEER – STRUCTURES

Provided By Lichtenstein Consulting Engineers, Inc. 3/99
Modified by NJ TRANSIT 3/99

# APPENDIX 4

# BRIDGE INFORMATION SYSTEM INPUT FORMS



## NJ TRANSIT
## Bridge Data Entry Form

**Browse**

Key: 10610136.41NJ

Line Name: MORRISTOWN LINE ✓
Location: Denville to Morris Jct. ✓
Order: 10

Line Code: 6101 ✓
MP: 36.41 ✓
State: NJ ✓
Last Key:

Bridge Name: MILL BROOK ✓
Town: DENVILLE ✓
County: MORRIS ✓

Use: Undergrade Bridge Over Waterway - C
In Service ☑
NJT Passenger ☑

Bridge Type: Concrete Slab - CS ✓
Deck Type: Concrete Slab - CS ✓
NJT Responsibility ● Yes ○ No

Abutment Type: ~~NA~~ Concrete
Pier Type: NA ✓

Total Length: 25 ✓
No. of Spans: 1 ✓
Span Length: ~~23~~ 22'-6"
No. of Tracks: 2 ✓

Date Built: 1927 ✓
Posted: NA ✓
Load Limit Normal: E040 ✓
Load Limit Maximu: E048 ✓

Maint Sub: NJTRO - 1
Maint Sup: NJTRO - 1

Last Insp Date: ~~10/4 /2008~~ 12/11/2013
Year Inspected: ~~2008~~ 2013
Year Rated: 2008
Rep. Cost: ~~$47,000~~ $ 259,000
Year Repaired: NA

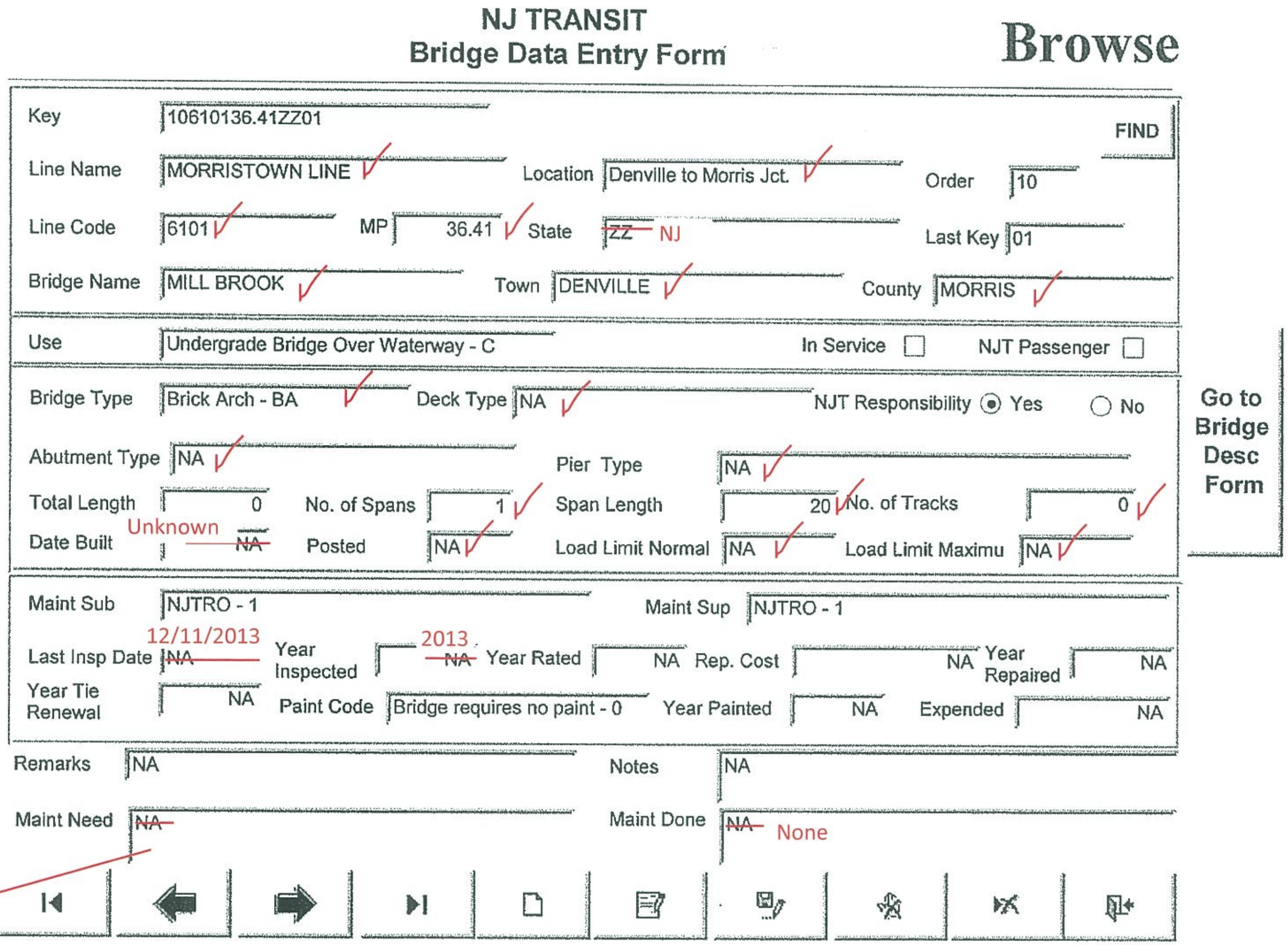
Year Tie Renewal: 2008
Paint Code: Bridge requires no paint - 0
Year Painted: NA
Expended: NA

Remarks: NA
Notes: NA

Maint Need: ~~Remove spalls, delaminated concrete/moderate to severe scaling & patch w/ epoxy concrete.~~

Maint Done: ~~Installed new concre[illegible]ong Tracks 1 & 2.~~ None

(1) Remove the delaminated and or moderate to severely scaled concrete from the underside of slab, south headwall, east abutment breastwall, southeast wingwall, northeast wingwall, northwest wingwall and southwest wingwall. Clean and paint any exposed steel reinforcement and patch the spalls throughout with epoxy concrete. (2) Install a waterproof membrane over top of the reinforced concrete deck slab and install drains along the south fascia. (3) Place rip-rap along the abutments to prevent further scour. (4) Remove the vegetation and or tree growth behind the northeast and northwest wingwalls. (5) Remove graffiti and apply anti-graffiti coating at thewest abutment breastwall, southeast and southwest wingwalls.



**NJ TRANSIT**
**Bridge Data Entry Form**

**Browse**

Key 10610136.41ZZ01

Line Name MORRISTOWN LINE ✓
Location Denville to Morris Jct. ✓
Order 10

Line Code 6101 ✓
MP 36.41 ✓
State ~~ZZ~~ NJ
Last Key 01

Bridge Name MILL BROOK ✓
Town DENVILLE ✓
County MORRIS ✓

Use Undergrade Bridge Over Waterway - C
In Service ☐
NJT Passenger ☐

Bridge Type Brick Arch - BA ✓
Deck Type NA ✓
NJT Responsibility ● Yes ○ No

Abutment Type NA ✓
Pier Type NA ✓

Total Length 0
No. of Spans 1 ✓
Span Length 20 ✓
No. of Tracks 0 ✓

Date Built ~~NA~~ Unknown
Posted NA ✓
Load Limit Normal NA ✓
Load Limit Maximu NA ✓

Maint Sub NJTRO - 1
Maint Sup NJTRO - 1

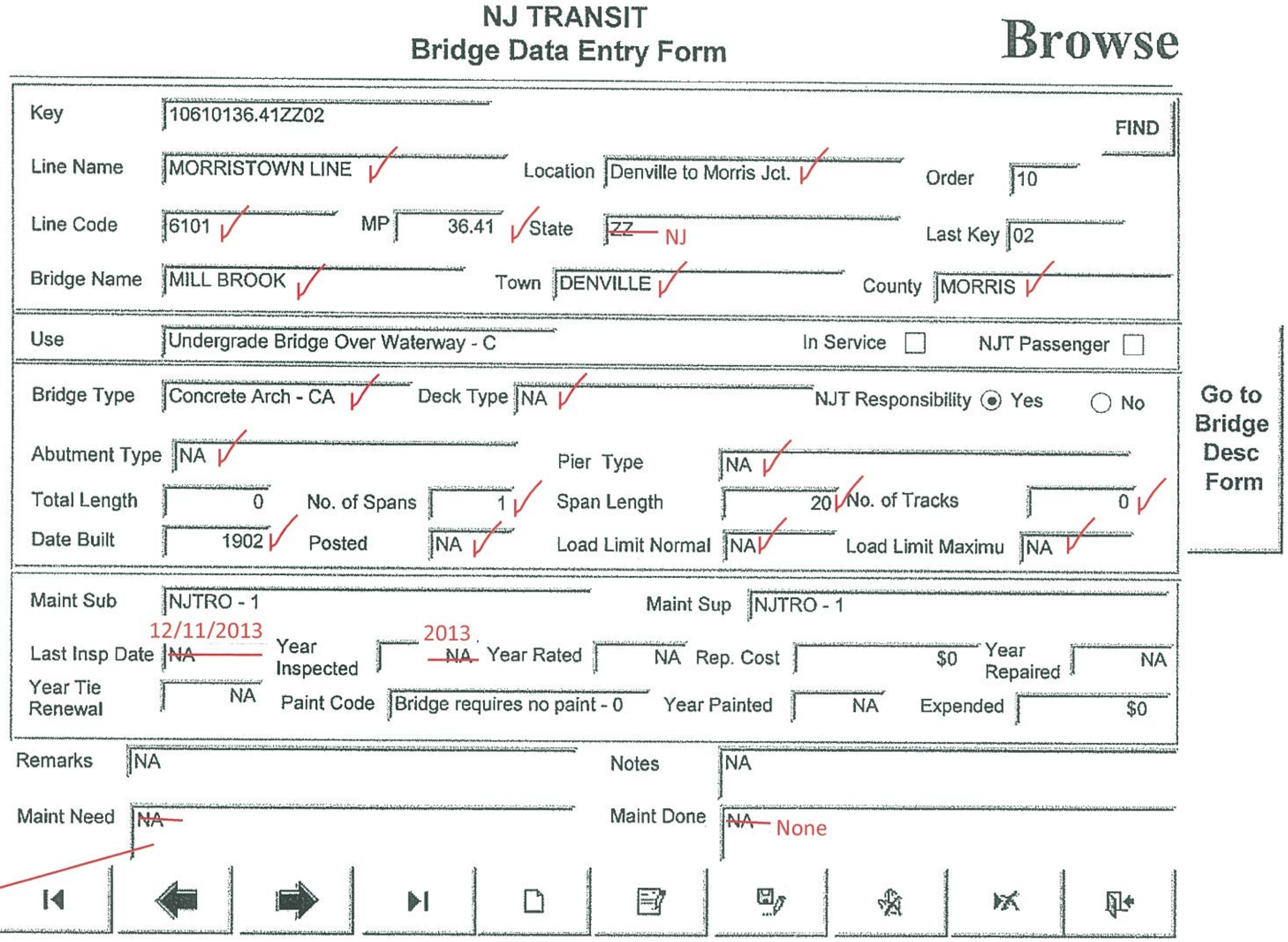
Last Insp Date ~~NA~~ 12/11/2013
Year Inspected ~~NA~~ 2013
Year Rated NA
Rep. Cost NA
Year Repaired NA

Year Tie Renewal NA
Paint Code Bridge requires no paint - 0
Year Painted NA
Expended NA

Remarks NA
Notes NA

Maint Need ~~NA~~
Maint Done ~~NA~~ None

(1) Replace the missing and or deteriorated bricks throughout the intrados of the brick arch. (2) Repoint the areas of missing and or deteriorated mortar joints throughout the intrados of the brick arch. (3) Install a waterproof membrane over extrados of the brick arch. (4) Replace the missing section of stone course along the west side of the brick arch. Place rip-rap along the arch skewbacks to prevent further scour.



**NJ TRANSIT**
**Bridge Data Entry Form**

Key: 10610136.41ZZ02
Line Name: MORRISTOWN LINE ✓
Location: Denville to Morris Jct. ✓
Order: 10
Line Code: 6101 ✓
MP: 36.41 ✓
State: ~~ZZ~~ NJ
Last Key: 02
Bridge Name: MILL BROOK ✓
Town: DENVILLE ✓
County: MORRIS ✓

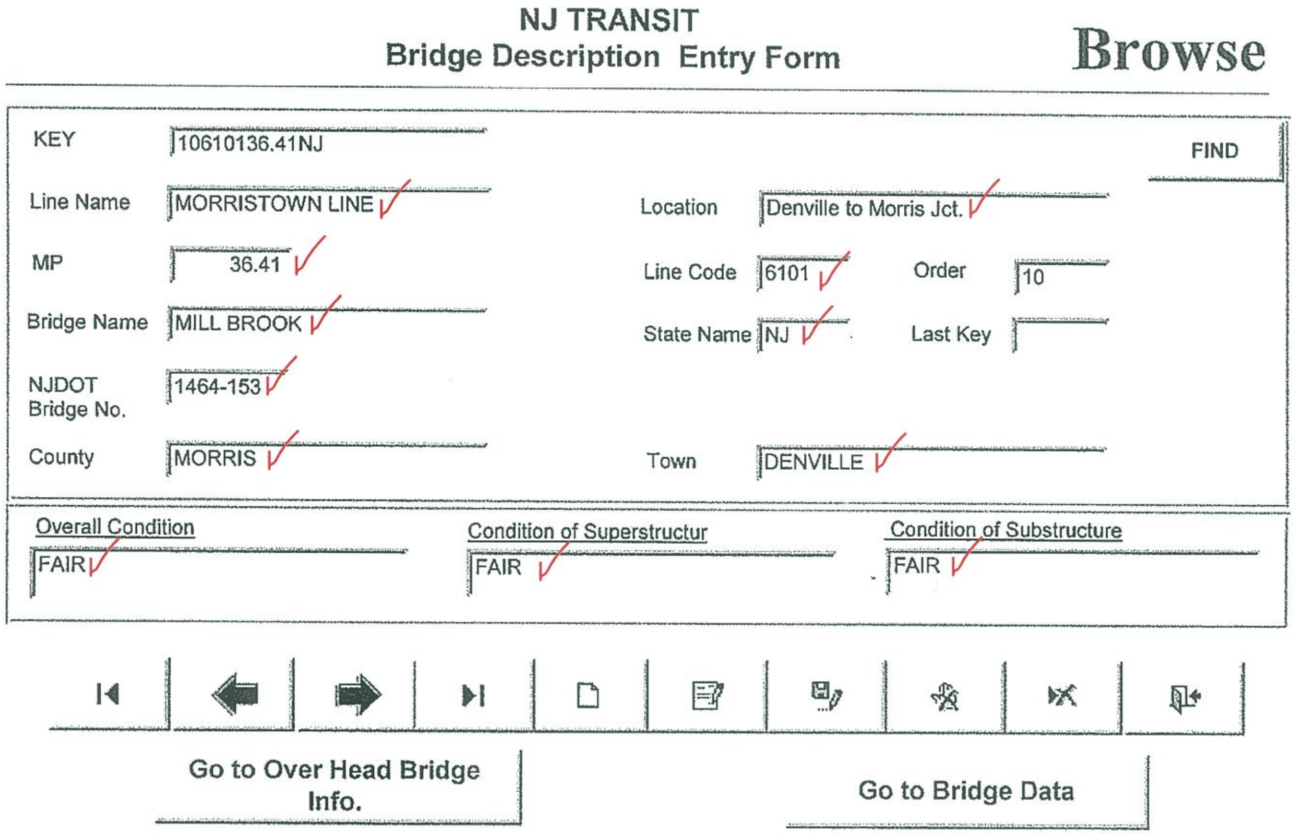
Use: Undergrade Bridge Over Waterway - C
In Service ☐
NJT Passenger ☐

Bridge Type: Concrete Arch - CA ✓
Deck Type: NA ✓
NJT Responsibility ● Yes ○ No
Abutment Type: NA ✓
Pier Type: NA ✓
Total Length: 0
No. of Spans: 1 ✓
Span Length: 20 ✓
No. of Tracks: 0 ✓
Date Built: 1902 ✓
Posted: NA ✓
Load Limit Normal: NA ✓
Load Limit Maximu: NA ✓

Maint Sub: NJTRO - 1
Maint Sup: NJTRO - 1
Last Insp Date: ~~NA~~ 12/11/2013
Year Inspected: ~~NA~~ 2013
Year Rated: NA
Rep. Cost: $0
Year Repaired: NA
Year Tie Renewal: NA
Paint Code: Bridge requires no paint - 0
Year Painted: NA
Expended: $0

Remarks: NA
Notes: NA
Maint Need: ~~NA~~
Maint Done: ~~NA~~ None

(1) Remove the delaminated concrete throughout the arch. Clean and paint any exposed steel reinforcement and patch the spalls throughout with epoxy concrete. (2) Seal the medium to wide cracks at the north spandrel wall, northeast and northwest wingwalls with pressure injected epoxy sealant. (3) Install a waterproof membrane over extrados of the concrete arch and install drains along the north fascia. (4) Place rip-rap along the arch skewbacks, northeast and northwest wingwalls to prevent further scour. (5) Remove graffiti and apply anti-graffiti coating at the northeast corner of the concrete arch intrados.



NJ TRANSIT
Bridge Description Entry Form

**Browse**

KEY: 10610136.41NJ
Line Name: MORRISTOWN LINE ✓
MP: 36.41 ✓
Bridge Name: MILL BROOK ✓
NJDOT Bridge No.: 1464-153 ✓
County: MORRIS ✓
Location: Denville to Morris Jct. ✓
Line Code: 6101 ✓
Order: 10
State Name: NJ ✓
Last Key:
Town: DENVILLE ✓

Overall Condition: FAIR ✓
Condition of Superstructur: FAIR ✓
Condition of Substructure: FAIR ✓

NJ TRANSIT

## NEW JERSEY TRANSIT RAIL OPERATIONS

# BRIDGE EVALUATION SURVEY REPORT

## MORRISTOWN LINE
## M.P. 44.97
## OVER SHIPPENPORT ROAD
## TOWNSHIP OF ROXBURY, NEW JERSEY
## MORRIS COUNTY

**ROUTE No. 4005**
**U.S.R.A. LINE CODE: 6101**
**NJDOT STRUCTURE NO.: 1465-164**

**CYCLE NO.5**

**DATE OF INSPECTION: DECEMBER 11, 2013**

**KS ENGINEERS, P.C.**
**Newark, New Jersey**

**KSE**
Engineers . Surveyors . Construction Managers
**KS Engineers, P.C.** 494 Broad Street, 4th Floor, Newark, NJ 07102 . P: 973.623.2999 . F: 973.242.2955 . www.kseng.com

April 13, 2016

Ms. Lisa Fanning, P.E.
Assistant Chief Engineer - Structures
New Jersey Transit
Infrastructure Engineering – Structures Department
New Jersey Transit Corporation
One Penn Plaza East
Newark, New Jersey 07105-2246
ATTN: Paul Falkowski, P.E.

**RE: Bridge Inspection Survey and Evaluation**
**Morristown Line M.P. 44.97 over Shippenport Road**
**Township of Roxbury, Morris County**
**NJDOT Structure No.: 1465-164**
**Contract No. 12-053F**

Dear Ms. Fanning,

In accordance with our contract No. 12-053F dated October 28th, 2013 we are submitting three copies of our Bridge Inspection Survey and Evaluation **FINAL REPORT** for the above referenced structure.

The field survey was performed in December 2013 and consisted of an in-depth inspection of the observable structural elements of the bridge and the general features at the site. The inspection was made according to generally recognized standards and procedures, but it is not implied that all defects were or could have been disclosed by this inspection. The field inspection was conducted by a registered Professional Engineer who is qualified with the requirements of NJ Transit criteria.

The report details the conditions observed during a field inspection of the bridge, our recommendations for repairs (along with an estimate of construction costs for the repairs), updated rating calculations for the bridge and completed bridge data. This report was prepared in accordance with our QA/QC program and was reviewed by the Project Manager.

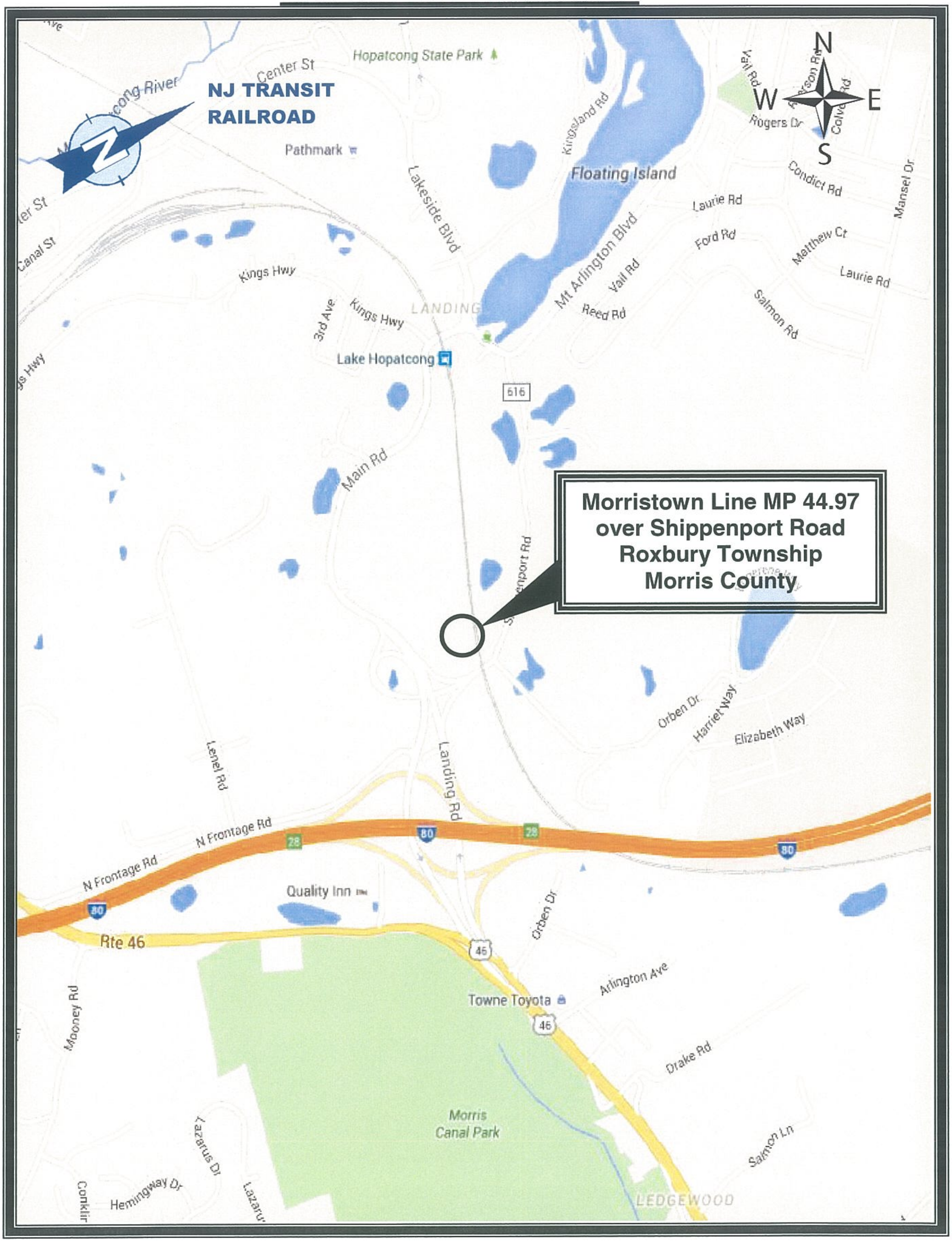
We will be pleased to respond to any questions that may arise concerning the referenced report.

Very Truly Yours,
**KS Engineers, P.C.**

Jack Perlmutter, P.E.
Project Manager

# TABLE OF CONTENTS

# BRIDGE LOCATION MAP



# NEW JERSEY TRANSIT
## INFRASTRUCTURE ENGINEERING – STRUCTURES
## BRIDGE EVALUATION SURVEY REPORT
## CYCLE NO. 5

### STRUCTURE DATA

**NJDOT Structure No.:** 1465-164

**Year Built:** 1910

**Year Rehab:** 1986

**USRA Line Code:** 6101

**Length:** 46'-6"

**Width:** 45'-0"

**Route No.:** 4005

**Date of This Evaluation:** 12/11/13
**By:** KS Engineers, P.C.

**Line:** Morristown

**MP & Name:** MP 44.97 over Shippenport Road

**Date of Previous Evaluation:** 12/02/08
**By:** HNTB Corporation

**Structure Type:** Single span, riveted, built-up, through girders with a floorbeam/ stringer system

**Special Equipment Used:** Police assisted maintenance and protection of traffic.

**OVERALL CONDITION:** Poor

SUPERSTRUCTURE CONDITION: Fair

SUBSTRUCTURE CONDITION: Poor

**WORK DONE:** 14'-2" Vertical clearance signs have been installed at the north and south fasciae and both approaches of Shippenport Road (Photos 5-1, 5-2 and 5-22).

**RATINGS:** The following load ratings have been computed in Cycles 2 and 4. Previous cycle ratings have been reviewed and updated for Cycle 5 rating analysis.

| | | As-Built | | As-Inspected | |
|---|---|---|---|---|---|
| Controlling Member | | Maximum | Normal | Maximum | Normal |
| Stringer/ Floorbeam Connection | Shear | E-82 | E-55 | E-82 | E-55 |

## CONCLUSIONS AND RECOMMENDATIONS:

Morristown Line MP 44.97 over Shippenport Road is comprised of single span, riveted, built-up steel through girders with floorbeams and stringers supported on concrete abutments. The open deck bridge carries two active tracks and one out of service track on a curved horizontal alignment. The overall condition of the structure is poor.

The approaches are in fair condition. A total of 22 ties are decayed at both approaches. There is section loss up to ¼" at the inner and / or outer edges of both rails on Track #1 at both approaches. There is rail pumping up to ½" on Tracks #1 and #2 at the east approach and on Track #1 at the west approach. There is tie pumping up to ½" on Tracks #1 and #2 at both approaches. There are several raised spikes on both tracks at both approaches. The ties at the west approach exhibit low ballast throughout the approach on Track #2.

The bridge deck is in fair condition. A total of 13 ties are decayed on both tracks. There is up to 1/8" section loss to the inner edge of both rails on Track #1. There is tie pumping up to ½" on Tracks #1 and #2. The south side ribbon guard on both tracks is decayed at the west end. The west backwall tie exhibits wide splits and or decayed. There are a few loose J-hook bolts on both tracks and a few missing J-hook bolts on Track #2. The ballast retainer at the west end of Girder G3 on Track #2 has been displaced.

The superstructure is in fair condition. The bottom cover plate of Girders G2, G3 and G4 exhibits up to ¼" loss at the floorbeam connection locations. There is up to ½" edge loss at isolated locations of the bottom cover plates of Girders G2, G3 and G4. There is up to 1" edge loss on both sides of Girder G2 cover plate near the east abutment. In addition, the bottom cover plate of Girder G4 exhibits up to 5/16" pitting at the west end of the second cover plate from top. There is up to 1/8" loss at the south side bottom flange angle of Girder G3 at old floorbeam connections. There is up to 1/4" loss at the south side bottom flange angle of Girder G4 near the east abutment. There are minor impact scrapes at all girder bottom flanges. The web plate of Girders G3 and G4 exhibits up to 1/8" loss at isolated locations. There are several rivets which exhibit greater than 50% head loss throughout the girders. There is a 6" long crack at the tack weld for the Floorbeam FB7 connection to Girder G3 under Track #1. The floorbeams exhibit moderate to severe corrosion at the stringer and girder connections. The Floorbeams FB2 and FB6 exhibit open rivet holes at each end due to previously removed gusset plates. The stringer connection angles exhibit light to moderate corrosion. The lateral bracing angles exhibit up to 1" edge loss and up to ¼" loss to the remaining section of angles between Girders G1 and G2. In addition, there is up to ½" impacted rust between the lateral bracing angles. The gusset plates at the lateral bracing connections exhibit severe corrosion with up to ¼" loss throughout the plates and holed through areas at a few locations. The bolt heads at the lateral bracing connections exhibit severe corrosion with up to 100% loss throughout the bracings. The bearings typically exhibit severe corrosion, impacted rust and minor losses at the sole plates. The expansion bearings at the west abutment appear to be seized. There is severe corrosion at several bearing anchor bolts and nuts. There are several raised anchor bolt nuts throughout the bearings. In addition, there are a few missing anchor bolts and or sole plate bolts over both abutments. The overall condition of the paint is poor.

## CONCLUSIONS AND RECOMMENDATIONS (Cont.):

The substructure is in poor condition. The abutment breastwalls exhibit areas of large spalls and severe scaling. In addition, the abutment breastwalls exhibit areas of light scaling, hollow sounding concrete and fine cracks with efflorescence. The east and west abutment bearing seats exhibit a few medium to large spalls at isolated locations. The west abutment bearing seat exhibits a large spall at the south side of Girder G2 bearing resulting in the partial undermining of the backwall. There are several small to large spalls and fractures at both abutment backwalls. There are several wide vertical cracks at the east abutment backwall and one wide vertical crack at the west abutment backwall. The wingwalls exhibit areas of medium to large spalls, delaminated concrete and hollow sounding concrete. There is moderate to heavy accumulation of ballast and debris throughout both abutment bearing seats. There is vegetation and tree growth behind all wingwalls.

The minimum vertical underclearance is 14'-4" taken at the south fascia over the northbound lane of Shippenport Road adjacent to the east curbline. The structure is posted 14'-2" at both approaches and fasciae.

The rating results indicate that the structure has insufficient structural capacity to support the standard AREMA "Cooper E-80" loading at the normal level. However, New Jersey Transit operating equipment loads can be carried by the bridge without engine speed restrictions at the maximum level. The controlling As-Built and As-Inspected ratings for a stringer to floorbeam connection are E-82 at the maximum level and E-55 at the normal level.

## CONCLUSIONS AND RECOMMENDATIONS (Cont.):

The following repairs are recommended to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

1. Regrade the ballast on Tracks #1 and #2 at both approaches to prevent further tie pumping (Photo 5-9).
2. Replace all decayed and split ties on Tracks #1 and #2 at both approaches. Replace the decayed portion of the south timber ribbon guard at the west end of Track #2 (Photos 5-9 and 5-10).
3. Replace the missing J-hook bolts and secure the loose J-hook bolts on Tracks #1 and #2 (Photo 5-11).
4. Secure all raised spikes and loose tie plates on Tracks #1 and #2 throughout both approaches (Photo 5-12).
5. Reset the displaced ballast retainer at the west end of Girder G3 on Track #2 (Photo 5-13).
6. Backfill the eroded area at the northwest approach embankment (Photo 5-21).
7. Replace all deteriorated, missing rivets and bolts with high strength bolts throughout the superstructure. Secure the loose bolt at the bottom flange of Girder G3 (Photo 5-14).
8. Replace all holed through and severely deteriorated gusset plates (Photo 5-15).
9. Jack the superstructure, replace or reset the seized expansion bearings over the west abutment. Replace the severely deteriorated, missing anchor bolts and nuts throughout the fixed bearings over the east abutment. Secure all raised anchor bolt nuts and sole plate bolts over the east abutment (Photos 5-8, 5-16 and 5-17).
10. Sandblast clean and paint the structural steel and east abutment bearings (Photos 5-6 and 5-9).
11. Remove the deteriorated concrete throughout abutment breastwalls, backwalls and wingwalls and patch the spalled areas with epoxy concrete (Photos 5-7, 5-18 and 5-19).
12. Seal medium to wide cracks at both abutment backwalls with pressure injected epoxy sealant (Photo 5-20).
13. Remove accumulation of debris and ballast from the abutment bearing seats (Photo 5-17).

## CONCLUSIONS AND RECOMMENDATIONS (Cont.):

14. Remove vegetation and tree growth from the wingwalls (Photo 5-18).
15. The bridge should be re-inspected during the next regularly scheduled period.

Railroad Line: Morristown
Railroad Milepost: 44.97
Structure Name: Shippenport Road

## COST ESTIMATE

| ITEM | | UNIT | QUANTITY | UNIT PRICE ($) | COST ($) |
|---|---|---|---|---|---|
| 1. | Regrade the ballast. | LF/ Track | 80 | 375 | 30,000 |
| 2. | Replace all decayed approach ties and replace the decayed south ribbon guard at the west end on Track #2 : | | | | |
| | a.Replace decayed ties | Each | 22 | 375 | 8,250 |
| | b. Replace decayed ribbon guard | Crew Day | 1/4 | 1,885 | 471 |
| 3. | Replace the missing J-hook bolts and secure the loose J-hook bolts. | Crew Day | 1/2 | 1,885 | 943 |
| 4. | Secure all raised spikes, loose tie plates and replace missing spikes. | Crew Day | 1 | 1,885 | 1,885 |
| 5. | Reset displaced ballast retainer. | Crew Day | 1/4 | 1,885 | 471 |
| 6. | Backfill the area of erosion. | CY | 13 | 115 | 1,495 |
| 7. | Replace all deteriorated, missing rivets and bolts. Secure the loose bolt: | | | | |
| | a.Replace rivets and bolts | Each | 304 | 140 | 42,560 |
| | b. Secure loose bolt | Crew Day | 1/4 | 1,885 | 471 |
| 8. | Replace severely deteriorated gusset plates: | | | | |
| | a.Replace gusset plates | LBS | 520 | 10 | 5,200 |
| | b. Install high strength bolts | Each | 260 | 140 | 36,400 |
| 9. | Jack the superstructure and replace seized bearings, replace corroded bearing anchor bolts and or nuts. Secure all raised bolts and nuts: | | | | |
| | a. Jacking of superstructure | Span | 1 | 18,855 | 18,855 |
| | b. Reset or replace bearings | Each | 4 | 5,655 | 22,620 |
| | c. Replace deteriorated and missing anchor bolts. | Each | 10 | 190 | 1,900 |
| | d. Secure all raised bolts and nuts | Crew Day | 1/2 | 1,885 | 943 |
| 10. | Clean and paint the superstructure and bearings: | | | | |
| | a. Structural steel | SF | 5,230 | 55 | 287,650 |
| | b. Bearings | Each | 4 | 660 | 2,640 |
| 11. | Remove delaminated and hollow sounding concrete and patch spalls. | SF | 762 | 140 | 106,680 |
| 12. | Seal medium to wide cracks. | LF | 24 | 170 | 4,080 |

## COST ESTIMATE (Contd.)

| | | | | | |
|---|---|---|---|---|---|
| 13. | Remove accumulation of debris and ballast. | Crew Day | 1/2 | 1,885 | 943 |
| 14. | Remove vegetation and tree growth from the wingwalls. | Crew Day | 1 | 1,885 | 1,885 |
| | | | | **Total Estimated Cost =** | **$576,342** |
| | | | | **30% Railroad Escalation =** | **$172,903** |
| | | | | **Total =** | **$749,245** |
| | | | | **Say** | **$750,000** |

NOTE: The provided Cost Estimates are for scoping purpose only and shall not be construed as actual construction costs.

## COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 1. Regrade the ballast. **UNIT:** LF/ Track

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Regrade the ballast on Tracks #1 and #2 at both approaches and add ballast if necessary to prevent further tie pumping: | | |
| Track #1 / Track #2 | | |
| E. approach 20 LF 20 LF | 40 LF/ Track | |
| W. approach 20 LF 20 LF | 40 LF/ Track | 80 LF/ Track |

**SAY:** 80 LF/ Track

**ITEM:** 2. Replace all decayed ties. Replace the decayed ribbon guard. **UNIT:** Varies

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Replace decayed ties:<br>Decayed ties | | |
| Track #1 / Track #2 | | |
| E. approach 7 2 | 9 Each | |
| W. approach 5 8 | 13 Each | 22 Each |
| Replace decayed south ribbon guard:<br>Track #2 (W. end) = 5 LF<br>Say ¼ Crew Day | ¼ Crew Day | ¼ Crew Day |

**SAY:** Varies

# COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 3. Replace the missing J-hook bolts and secure the loose J-hook bolts. **UNIT:** Crew Day

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Replace the missing J-hook bolts and secure the loose J-hook bolts on Tracks #1 and #2 :<br>Say 1/2 Crew Day | 1/2 Crew Day | 1/2 Crew Day |

**SAY:** 1/2 Crew Day

**ITEM:** 4. Secure all raised spikes, loose tie plates and replace the missing spikes. **UNIT:** Crew Day

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Secure all raised spikes, loose tie plates and replace the missing spikes on Tracks #1 and #2 throughout both approaches:<br>Say 1 Crew Day | 1 Crew Day | 1 Crew Day |

**SAY:** 1 Crew Day

# COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 5. Reset the displaced ballast retainer. **UNIT:** Crew Day

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Reset the displaced ballast retainer at the west end of Girder G3 on Track #2:<br>Say 1/4 Crew Day | 1/4 Crew Day | 1/4 Crew Day |

**SAY:** 1/4 Crew Day

**ITEM:** 6. Backfill the eroded area at the northwest approach embankment. **UNIT:** CY

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Backfill the eroded area at the northwest approach embankment:<br>$(40'L)*(4'W)*(2.2'DP) = 352\ FT^3$<br>$\frac{352\ FT^3}{27\ FT^3 / 1\ CY} \approx 13\ CY$ | 13 CY | 13 CY |

**SAY:** 13 CY

## COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 7. Replace all deteriorated, missing rivets and bolts
Secure the loose bolt at Girder G3. **UNIT:** Varies

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Replace all deteriorated, missing rivets and bolts with high strength bolts throughout the superstructure: | | |
| Rivets with >50% loss: | | |
| Girders G1 to G4 – 200 Each | 200 Each | |
| Laterals/ bracings- 100 Each | 100 Each | |
| Missing rivets/ bolts: | | |
| Girder G3 – 1 Each | 1 Each | |
| Girder G4 – 3 Each | 3 Each | 304 Each |
| Secure the loose bolt at the bottom flange of Girder G3: | | |
| Say ¼ Crew Day | ¼ Crew Day | ¼ Crew Day |

**SAY:** Varies

**ITEM:** 8. Replace severely deteriorated gusset plates. **UNIT:** Varies

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Replace all holed through and severely deteriorated gusset plates: | | |
| 13 Gusset plates (size varies) | | |
| Use 40 LBS average per gusset plate | | |
| 13 x 40 LBS = 520 LBS | 520 LBS | 520 LBS |
| Use 20 high strength bolts per location | | |
| 20 bolts x 13 locations = 260 bolts | 260 Each | 260 Each |

**SAY:** Varies

# COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 9. Jack the superstructure and replace seized expansion bearings, replace corroded bearing anchor bolts and nuts. Secure all raised bolts and nuts. **UNIT:** Varies

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Jack the superstructure, replace or reset the seized expansion bearings under Girders G1 to G4 over the west abutment: | | |
| a) Jacking of superstructure- 1 Span | 1 Span | 1 Span |
| b) Replace or reset bearings- 4 Bearings | 4 Each | 4 Each |
| Replace the severely deteriorated, missing anchor bolts and nuts throughout the fixed bearings over the east abutment:<br>Corroded and missing anchor bolts and sole plate bolts :<br>G1 bearing- 4 Each (4 anchor bolts)<br>G2 bearing- 1 Each (1 anchor bolt )<br>G3 bearing- 4 Each (2 anchor bolts and 2 sole plate bolts)<br>G4 bearing- 1 Each (1 anchor bolt)<br>Total = 4 + 1 + 4 + 1 = 10 Each | | |
| c) Replace bolts- 10 Each | 10 Each | 10 Each |
| d) Secure all raised anchor bolt nuts and sole plate bolts over the east abutment:<br>Say ½ Crew Day | ½ Crew Day | ½ Crew Day |

**SAY:** Varies

# COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 10. Clean and paint the structural steel and bearings. **UNIT:** Varies

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Sandblast clean and paint the structural steel and east abutment bearings: | | |
| Girder G1: | | |
| Web – 2 (78" x 40.75')/12 ≈ 530 SF | | |
| Cover plates (Top & bottom): | | |
| Perimeter of cover plates- | | |
| {4 (14"W) + 4 (0.5"T)}/12 = 4.83' | | |
| Area of Cover plates = 4.83' x 40.75' ≈ 197 SF | | |
| Total area = 1 Girder (530 SF + 197 SF) ≈ 727 SF | 727 SF | |
| Girders G2 to G4: | | |
| Web – 2 (78" x 40.75')/12 ≈ 530 SF | | |
| Cover plates (Top & bottom): | | |
| Perimeter of cover plates- | | |
| {4 (16"W) + 4 (1.625"T)}/12 = 5.875' | | |
| Area of Cover plates = 5.875' x 40.75' ≈ 240 SF | | |
| Total area = 3 Girders (530 SF + 240 SF) ≈ 2310 SF | 2310 SF | |
| Floorbeams (Under Tracks #1, #2 & abandoned): | | |
| Web – 2 (21.24" x 15')/12 ≈ 53 SF | | |
| Flanges –{4 (13" x 15')/12 ≈ 65 SF | | |
| Area = 53 SF + 65 SF = 118 SF | | |
| Area required to be painted: | | |
| Floorbeams (Bays 1 & 2) – | | |
| 12 FB's (20% of 118 SF) ≈ 283 SF | | |
| Floorbeams (Bay 3) – | | |
| 11 FB's (100% of 118 SF) = 1298 SF | | |
| Total area = 283 SF + 1298 SF = 1581 SF | 1581 SF | |
| Stringers (Under abandoned track): | | |
| Perimeter of channels ≈ 45" | | |
| Total area = 2 (45" x 40.75')/12 ≈ 308 SF | 308 SF | |

## COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 10. Clean and paint the structural steel and bearings (Contd.) **UNIT:** Varies

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Use 10% of girder area for connections and laterals:<br>0.10 x 3037 SF ≈ 304 SF | 304 SF | 5230 SF |
| *Note: This item addresses graffiti on superstructure.* | | |
| Girder bearings:<br>East abutment – 4 Each | 4 Each | 4 Each |

**SAY:** Varies

**ITEM:** 11. Remove the deteriorated concrete throughout abutment breastwalls, backwalls and wingwalls. **UNIT:** SF

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Remove the deteriorated concrete throughout abutment breastwalls, backwalls and wingwalls and patch the spalled areas with epoxy concrete: | | |
| East abutment breastwall ≈ 232 SF | 232 SF | |
| East abutment bearing seat ≈ 3 SF | 3 SF | |
| East abutment backwall ≈ 16 SF | 16 SF | |
| West abutment breastwall ≈ Say 177 SF | 177 SF | |
| West abutment bearing seat ≈ 19 SF | 19 SF | |
| West abutment backwall ≈ Say 14 SF | 14 SF | |
| Southeast wingwall ≈ 171 SF | 171 SF | |
| Northeast wingwall ≈ 33 SF | 33 SF | |
| Southwest wingwall ≈ 40 SF | 40 SF | |
| Northwest wingwall ≈ 57 SF | 57 SF | 762 SF |

**SAY:** 762 SF

## COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 12. Seal medium to wide cracks. **UNIT:** LF

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Seal medium to wide cracks at both abutment backwalls with pressure injected epoxy sealant | | |
| East abutment backwall ≈ 22 LF | 22 LF | |
| West abutment backwall ≈ 2 LF | 2 LF | 24 LF |

**SAY:** 24 LF

**ITEM:** 13. Remove accumulation of debris and ballast. **UNIT:** Crew Day

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Remove accumulation of debris and ballast from abutment bearing seats: | | |
| Say 1/2 Crew Day | 1/2 Crew Day | 1/2 Crew Day |

**SAY:** 1/2 Crew Day

## COST ESTIMATE BACK-UP WORK SHEET

**ITEM:** 14. Remove vegetation and tree growth. **UNIT:** Crew Day

| QUANTITY TAKEOFF | SUBTOTAL | TOTAL |
|---|---|---|
| Remove vegetation and tree growth behind southeast, northeast, southwest and northwest wingwalls:<br>Say 1 Crew Day | 1 Crew Day | 1 Crew Day |

**SAY:** 1 Crew Day

## APPENDIX 1

## RATING SUMMARY AND COMPUTATIONS

# RATING SUMMARY
# NORMAL RATING

**BRIDGE:** MORRISTOWN LINE MP 44.97 OVER SHIPPENPORT ROAD
**CONSULTANT:** KS ENGINEERS, P.C.
**DATE:** 12/11/2013 **CYCLE:** 5 **CONTROLS RATING OF BRIDGE:** E - 55

| RATING LEVEL & MEMBER | CAPACITY OF THE BRIDGE COOPER E - LOAD | | | | | LOADED LENGTH (ft) | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | AS - BUILT | | AS - INSPECTED | | FATIGUE | | |
| | E-MOMENT | E-SHEAR | E-MOMENT | E-SHEAR | | | |
| | | | | | | | |
| STRINGER | E-115 | E-74 | E-115 | E-74 | E-192 | 8.2' | |
| FLOORBEAM | E-91 | E-109 | E-91 | E-109 | E-143 | 14.7' | |
| GIRDER | | | | | | | |
| SECTION A @ 4.75' from Support | E-96 | E-86 | E-96 | E-86 | - | 40.75' | |
| SECTION B @ 7.94' from Support | E-88 | - | E-82 | - | - | 40.75' | |
| SECTION C @ 11.48' from Support | E-88 | - | E-82 | - | - | 40.75' | |
| SECTION D @ 20.38' from Support | E-82 | - | E-79 | - | E-46 | 40.75' | |
| CONNECTIONS | | | | | | | |
| STRINGER/ FLOORBEAM | - | E-55 | - | E-55 | - | 8.2' | |
| FLOORBEAM/ GIRDER | - | E-113 | - | E-113 | - | 14.7' | |
| | | | | | | | |
| | | | | | | | |

NOTE: RATINGS TAKEN FROM CYCLES 2 & 4.

PREVIOUS CYCLE RATINGS HAVE BEEN REVIEWED AND UPDATED FOR CYCLE 5 RATING ANALYSIS.

# RATING SUMMARY
# MAXIMUM RATING

**BRIDGE:** MORRISTOWN LINE MP 44.97 OVER SHIPPENPORT ROAD
**CONSULTANT:** KS ENGINEERS, P.C.
**DATE:** 12/11/2013 **CYCLE:** 5 **CONTROLS RATING OF BRIDGE:** E - 82

| RATING LEVEL & MEMBER | CAPACITY OF THE BRIDGE COOPER E - LOAD | | | | | LOADED LENGTH (ft) | ENGINE RESTRICTIONS: NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | AS - BUILT | | AS - INSPECTED | | FATIGUE | | |
| | E-MOMENT | E-SHEAR | E-MOMENT | E-SHEAR | | | |
| | | | | | | | |
| STRINGER | E-168 | E-126 | E-168 | E-126 | | 8.20' | No speed restrictions required for NJ Transit Equipment. |
| FLOORBEAM | E-133 | E-189 | E-133 | E-189 | | 14.70' | |
| GIRDER G3 | | | | | | | |
| SECTION A @ 4.75' from Support | E-143 | E-148 | E-143 | E-148 | | 40.75' | |
| SECTION B @ 7.94' from Support | E-131 | - | E-135 | - | | 40.75' | |
| SECTION C @ 11.48' from Support | E-131 | - | E-135 | - | | 40.75' | |
| SECTION D @ 20.38' from Support | E-123 | - | E-1117 | - | | 40.75' | |
| CONNECTIONS | | | | | | | |
| STRINGER/ FLOORBEAM | - | E-82 | - | E-82 | | 8.2' | |
| FLOORBEAM/ GIRDER | - | E-169 | - | E-169 | | 14.70' | |
| | | | | | | | |

NOTE: RATINGS TAKEN FROM CYCLES 2 & 4.

PREVIOUS CYCLE RATINGS HAVE BEEN REVIEWED AND UPDATED FOR CYCLE 5 RATING ANALYSIS.

**KS ENGINEERS, P.C.**

494 Broad Street 4th Floor
NEWARK, NJ 07102
**(973) 623-2999**

JOB 1389 NJ Transit: Morristown Line MP 44.97
SHEET NO. 1 OF 5
CALCULATED BY HS DATE 4/11/2016
CHECKED BY HC DATE 4/11/16
SCALE Morristown Line MP 44.97 over Shippenport Road

Ref: Cycle 4 rating computation by HNTB dated 6/1/2009

Notes:

1. Centrifugal force 'C' value revised as per AREMA 15.1.3.6 ,
2. Stringer, Floorbeam and Girder G3 rating updated to incorporate revised centrifugal force value.

C=0.00117S^2D=0.00117x55^2x1.5 where S= 55 mph and D = 1.5 degree of curve
=5.309% of live load
=0.053 x live load

## SUMMARY OF RATINGS

### AS-BUILT SPAN 1

TOTAL LIVE LOAD CAPACITY = $LL_{CAP}$ = CAPACITY - DL - WL

NET LIVE LOAD CAPACITY = $LL_{NET,CAP}$ = $LL_{CAP}$ / (1 + I + C)

$E_{80}$ RATING (MOMENT & SHEAR) = ($LL_{NET,CAP}$ / LL) x $E_{80}$

**MOMENT:**

| | | | | | | FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| RATING LEVEL | MEMBER | MOMENT CAPACITY ($M_{CAP}$) | MOMENT DEAD LOAD ($M_{DL}$) | MOMENT WIND LOAD ($M_{WL}$) | MOMENT LIVE LOAD ($M_{LL}$) | IMPACT (I) | CENT. FORCE (C) | **$LL_{CAP}$** | **$LL_{NET,CAP}$** | **RATING $E_{80}$** |
| | | | | | | | | | | |
| MAXIMUM | | | | | | | | | | |
| | STRINGER | 283.20 | 3.30 | 2.05 | 82.32 | 0.55 | 0.05 | 277.85 | 173.37 | 168 |
| | | | | | | | | | | |
| | FLOOR BEAM | 676.82 | 16.67 | 0.00 | 272.67 | 0.40 | 0.05 | 660.15 | 456.54 | 133 |
| | | | | | | | | | | |
| | GIRDER | | | | | | | | | |
| | Sect.A @ 4.5' | 3297.00 | 136.80 | 7.70 | 1184.00 | 0.44 | 0.05 | 3152.50 | 2120.04 | 143 |
| | Sect.B @ 7.94' | 4494.22 | 208.41 | 11.72 | 1747.20 | 0.44 | 0.05 | 4274.09 | 2874.30 | 131 |
| | Sect.C @ 11.48' | 5772.24 | 268.82 | 15.12 | 2240.80 | 0.44 | 0.05 | 5488.30 | 3690.85 | 131 |
| | Sect.D @ 20.38' | 6561.24 | 332.11 | 18.68 | 2708.80 | 0.44 | 0.05 | 6210.45 | 4176.50 | 123 |
| | | | | | | | | | | |
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**SHEAR:**

| | | | | | | FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| RATING LEVEL | MEMBER | SHEAR CAPACITY ($V_{CAP}$) | SHEAR DEAD LOAD ($V_{DL}$) | SHEAR WIND LOAD ($V_{WL}$) | SHEAR LIVE LOAD ($V_{LL}$) | IMPACT (I) | CENT. FORCE (C) | **$LL_{CAP}$** | **$LL_{NET,CAP}$** | **RATING $E_{80}$** |
| | | | | | | | | | | |
| MAXIMUM | | | | | | | | | | |
| | | | | | | | | | | |
| | STRINGER | 143.64 | 1.62 | 1.00 | 55.43 | 0.55 | 0.05 | 141.02 | 87.99 | 126 |
| | FLOORBEAM | 244.73 | 4.17 | 0.89 | 66.67 | 0.46 | 0.05 | 239.67 | 158.29 | 189 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | GIRDER | 877.5 | 32.60 | 1.83 | 305.60 | 0.44 | 0.05 | 843.07 | 566.96 | 148 |
| | | | | | | | | | | |
| | | | | | | | | | | |

NOTE: UNITS ARE IN KIPS AND FEET

# SUMMARY OF RATINGS

## AS-INSPECTED SPAN 1

TOTAL LIVE LOAD CAPACITY = $LL_{CAP}$ = CAPACITY - DL - WL

NET LIVE LOAD CAPACITY = $LL_{NET,CAP}$ = $LL_{CAP}$ / (1 + I + C)

$E_{80}$ RATING (MOMENT & SHEAR) = ($LL_{NET,CAP}$ / LL) x $E_{80}$

**MOMENT:**

| | | | | | | FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| RATING LEVEL | MEMBER | MOMENT CAPACITY ($M_{CAP}$) | MOMENT DEAD LOAD ($M_{DL}$) | MOMENT WIND LOAD ($M_{WL}$) | MOMENT LIVE LOAD ($M_{LL}$) | IMPACT (I) | CENT. FORCE (C) | **$LL_{CAP}$** | **$LL_{NET,CAP}$** | **RATING $E_{80}$** |
| | | | | | | | | | | |
| MAXIMUM | | | | | | | | | | |
| | STRINGER | 283.20 | 3.30 | 2.05 | 82.32 | 0.55 | 0.05 | 277.85 | 173.37 | 168 |
| | | | | | | | | | | |
| | FLOOR BEAM | 676.82 | 16.67 | 0.00 | 272.67 | 0.40 | 0.05 | 660.15 | 456.54 | 133 |
| | | | | | | | | | | |
| | GIRDER | | | | | | | | | |
| | Sect.A @ 4.5' | 3297.00 | 136.80 | 7.70 | 1184.00 | 0.44 | 0.05 | 3152.50 | 2120.04 | 143 |
| | Sect.B @ 7.94' | 4494.22 | 208.41 | 11.72 | 1747.20 | 0.44 | 0.05 | 4274.09 | 2874.30 | 131 |
| | Sect.C @ 11.48' | 5772.24 | 268.82 | 15.12 | 2240.80 | 0.44 | 0.05 | 5488.30 | 3690.85 | 131 |
| | Sect.D @ 20.38' | 6281.30 | 332.11 | 18.68 | 2708.80 | 0.44 | 0.05 | 5930.51 | 3988.24 | 117 |

**SHEAR:**

| | | | | | | FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| RATING LEVEL | MEMBER | SHEAR CAPACITY ($V_{CAP}$) | SHEAR DEAD LOAD ($V_{DL}$) | SHEAR WIND LOAD ($V_{WL}$) | SHEAR LIVE LOAD ($V_{LL}$) | IMPACT (I) | CENT. FORCE (C) | **$LL_{CAP}$** | **$LL_{NET,CAP}$** | **RATING $E_{80}$** |
| | | | | | | | | | | |
| MAXIMUM | | | | | | | | | | |
| | | | | | | | | | | |
| | STRINGER | 143.64 | 1.62 | 1.00 | 55.43 | 0.55 | 0.05 | 141.02 | 87.99 | 126 |
| | FLOORBEAM | 244.73 | 4.17 | 0.89 | 66.67 | 0.46 | 0.05 | 239.67 | 158.29 | 189 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | GIRDER | 877.5 | 32.60 | 1.83 | 305.60 | 0.44 | 0.05 | 843.07 | 566.96 | 148 |
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NOTE: UNITS ARE IN KIPS AND FEET

## SUMMARY OF NORMAL RATINGS W/ WIND

### AS-BUILT SPAN 1

TOTAL LIVE LOAD CAPACITY = $LL_{CAP}$ = CAPACITY - DL - WL

NET LIVE LOAD CAPACITY = $LL_{NET,CAP}$ = $LL_{CAP}$ / (1 + I + C)

$E_{80}$ RATING (MOMENT & SHEAR) = ($LL_{NET,CAP}$ / LL) x $E_{80}$

**MOMENT:**

| | | | | | FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MEMBER | MOMENT CAPACITY ($M_{CAP}$) | MOMENT DEAD LOAD ($M_{DL}$) | MOMENT WIND LOAD ($M_{WL}$) | MOMENT LIVE LOAD ($M_{LL}$) | IMPACT (I) | CENT. FORCE (C) | $LL_{CAP}$ | $LL_{NET,CAP}$ | RATING $E_{80}$ |
| | | | | | | | | | |
| Stringer | 194.70 | 3.30 | 0.00 | 82.38 | 0.55 | 0.05 | 191.40 | 119.43 | 115 |
| | | | | | | | | | |
| Floorbeam | 465.29 | 16.67 | 0.00 | 272.67 | 0.40 | 0.05 | 448.62 | 310.25 | 91 |
| | | | | | | | | | |
| GIRDER | | | | | | | | | |
| Sect.A @ 4.5' | 2266.69 | 136.80 | 0.00 | 1184.00 | 0.44 | 0.05 | 2129.89 | 1432.34 | 96 |
| Sect.B @ 7.94' | 3089.78 | 208.41 | 0.00 | 1747.20 | 0.44 | 0.05 | 2881.37 | 1937.71 | 88 |
| Sect.C @ 11.48' | 3968.42 | 268.82 | 0.00 | 2240.80 | 0.44 | 0.05 | 3699.60 | 2487.96 | 88 |
| Sect.D @ 20.38' | 4510.85 | 332.11 | 0.00 | 2708.80 | 0.44 | 0.05 | 4178.74 | 2810.18 | 82 |
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**SHEAR:**

| | | | | | FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MEMBER | SHEAR CAPACITY ($V_{CAP}$) | SHEAR DEAD LOAD ($V_{DL}$) | SHEAR WIND LOAD ($V_{WL}$) | SHEAR LIVE LOAD ($V_{LL}$) | IMPACT (I) | CENT. FORCE (C) | $LL_{CAP}$ | $LL_{NET,CAP}$ | RATING $E_{80}$ |
| | | | | | | | | | |
| Stringer | 83.79 | 1.62 | 0.00 | 55.43 | 0.55 | 0.05 | 82.17 | 51.27 | 74 |
| Floorbeam | 142.76 | 4.17 | 0.00 | 66.67 | 0.46 | 0.05 | 138.59 | 91.53 | 109 |
| Girder | 511.88 | 32.60 | 0.00 | 305.60 | 0.44 | 0.05 | 479.28 | 322.31 | 84 |
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NOTE: UNITS ARE IN KIPS AND FEET

## SUMMARY OF NORMAL RATINGS W/ WIND

### AS-INSPECTED SPAN 1

TOTAL LIVE LOAD CAPACITY = $LL_{CAP}$ = CAPACITY - DL - WL

NET LIVE LOAD CAPACITY = $LL_{NET,CAP}$ = $LL_{CAP}$ / (1 + I + C)

$E_{80}$ RATING (MOMENT & SHEAR) = ($LL_{NET,CAP}$ / LL) x $E_{80}$

**MOMENT:**

| | | | | | FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MEMBER | MOMENT CAPACITY ($M_{CAP}$) | MOMENT DEAD LOAD ($M_{DL}$) | MOMENT WIND LOAD ($M_{WL}$) | MOMENT LIVE LOAD ($M_{LL}$) | IMPACT (I) | CENT. FORCE (C) | **$LL_{CAP}$** | **$LL_{NET,CAP}$** | **RATING $E_{80}$** |
| | | | | | | | | | |
| Stringer | 194.70 | 3.30 | 0.00 | 82.38 | 0.55 | 0.05 | 191.40 | 119.43 | 115 |
| | | | | | | | | | |
| Floorbeam | 465.29 | 16.67 | 0.00 | 272.67 | 0.40 | 0.05 | 448.62 | 310.25 | 91 |
| | | | | | | | | | |
| GIRDER | | | | | | | | | |
| Sect.A @ 4.5' | 2266.69 | 136.80 | 0.00 | 1184.00 | 0.44 | 0.05 | 2129.89 | 1432.34 | 96 |
| Sect.B @ 7.94' | 3089.78 | 208.41 | 0.00 | 1747.20 | 0.44 | 0.05 | 2881.37 | 1937.71 | 88 |
| Sect.C @ 11.48' | 3968.42 | 268.82 | 0.00 | 2240.80 | 0.44 | 0.05 | 3699.60 | 2487.96 | 88 |
| Sect.D @ 20.38' | 4318.39 | 332.11 | 0.00 | 2708.80 | 0.44 | 0.05 | 3986.28 | 2675.36 | 79 |

**SHEAR:**

| | | | | | FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MEMBER | SHEAR CAPACITY ($V_{CAP}$) | SHEAR DEAD LOAD ($V_{DL}$) | SHEAR WIND LOAD ($V_{WL}$) | SHEAR LIVE LOAD ($V_{LL}$) | IMPACT (I) | CENT. FORCE (C) | **$LL_{CAP}$** | **$LL_{NET,CAP}$** | **RATING $E_{80}$** |
| | | | | | | | | | |
| Stringer | 83.79 | 1.62 | 0.00 | 55.43 | 0.55 | 0.05 | 82.17 | 51.27 | 74 |
| Floorbeam | 142.76 | 4.17 | 0.00 | 66.67 | 0.46 | 0.05 | 138.59 | 91.53 | 109 |
| Girder | 511.88 | 32.60 | 0.00 | 305.60 | 0.44 | 0.05 | 479.28 | 322.31 | 84 |

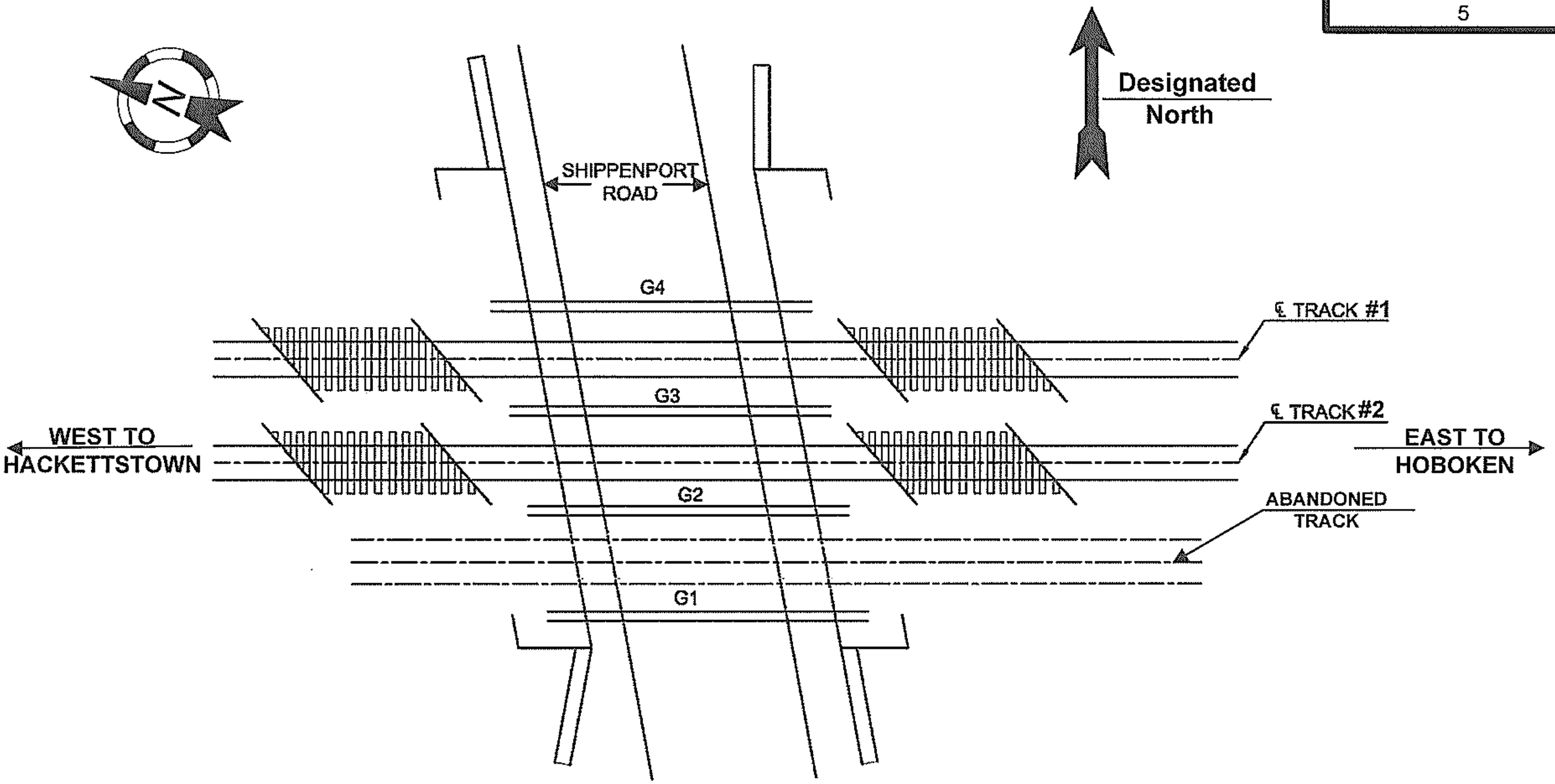
NOTE: UNITS ARE IN KIPS AND FEET

# APPENDIX 2

# PHOTOGRAPHS AND DRAWINGS

DATE OF INSP.
12/11/13

CYCLE NO.
5



## PLAN VIEW

N.T.S.

NEW JERSEY TRANSIT

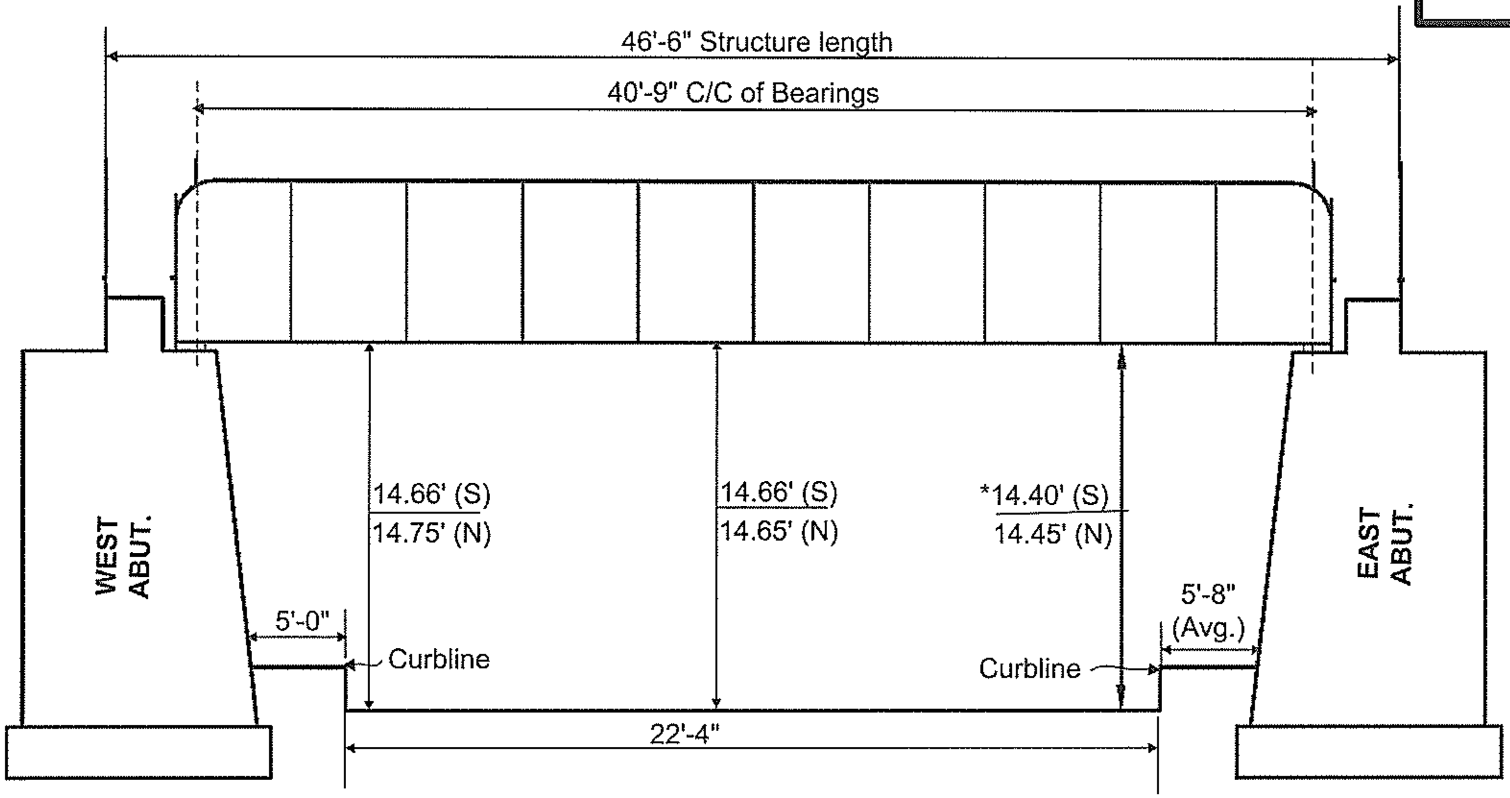
MORRISTOWN LINE MP 44.97
OVER SHIPPENPORT ROAD

**PLAN VIEW**

**KS ENGINEERS, P.C.**
494 BROAD ST. NEWARK, NJ 07102

DATE OF INSP.
12/11/13

CYCLE NO.
5



* Minimum vertical clearance

## SOUTH ELEVATION

LOOKING NORTH
N.T.S.

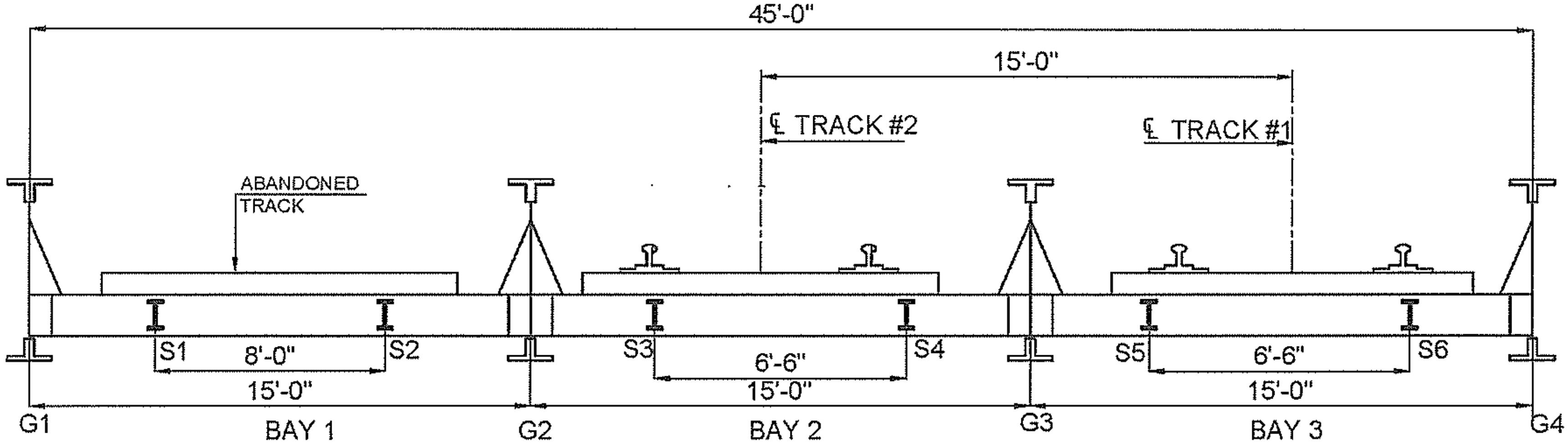
NEW JERSEY TRANSIT

MORRISTOWN LINE MP 44.97
OVER SHIPPENPORT ROAD
**ELEVATION**

**KS ENGINEERS, P.C.**
494 BROAD ST. NEWARK, NJ 07102

DATE OF INSP.
12/11/13

CYCLE NO.
5



## CROSS SECTION

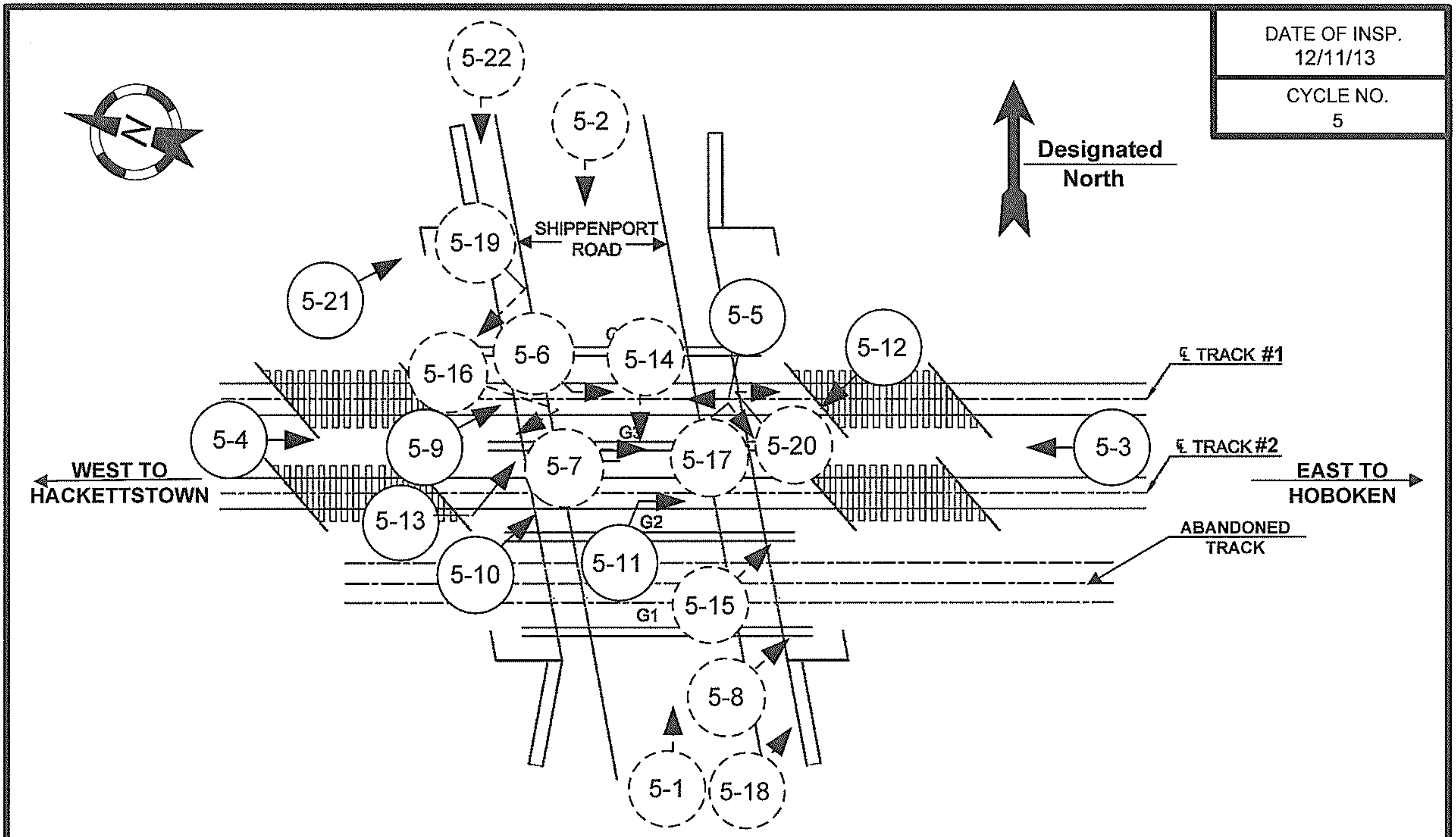
(LOOKING WEST)
N.T.S

NEW JERSEY TRANSIT
MORRISTOWN LINE MP 44.97
OVER SHIPPENPORT ROAD

**CROSS SECTION**

**KS ENGINEERS, P.C.**
494 BROAD ST. NEWARK, NJ 07102

| | |
|---|---|
| DATE OF INSP.<br>12/11/13 | CYCLE NO.<br>5 |



## PHOTO LOCATION PLAN

N.T.S.

**LEGEND:**

○ PHOTO TAKEN ABOVE DECK

◌ PHOTO TAKEN BELOW DECK

NEW JERSEY TRANSIT

MORRISTOWN LINE MP 44.97
OVER SHIPPENPORT ROAD

**PHOTO LOCATION PLAN**

**KS ENGINEERS, P.C.**
494 BROAD ST. NEWARK, NJ 07102

**PHOTO 5-1:** South elevation, looking north. Work Done: 14'-2" Vertical clearance sign has been installed at the south fascia.

**PHOTO 5-2:** North elevation, looking south. Work Done: 14'-2" Vertical clearance sign has been installed at the north fascia.

Structure Name: Shippenport Road
Railroad Line Morristown
USRA Line Code: 6101

Municipality: Roxbury Township
Railroad Milepost: 44.97
Insp. Date: 12/11/2013

**PHOTO 5-3:** East approach, looking west.

**PHOTO 5-4:** West approach, looking east.

**PHOTO 5-5:** General view of bridge ties, Track #1, looking west.

**PHOTO 5-6:** General view of the superstructure, looking east. Note paint peeling with corrosion throughout the superstructure steel.

**PHOTO 5-7:** General view of the east abutment, looking east. Note the large spalls and delaminated concrete throughout the abutment (Circles).

**PHOTO 5-8:** General view of bearing G1 over the east abutment, looking northeast. Note raised anchor bolt nuts (Circles) and broken masonry plate at the southwest corner of the bearing (Arrow).

**PHOTO 5-9:** Decayed ties at the west approach on Track #1, looking northeast. Note low ballast adjacent to the bridge (Arrow) and graffiti at the web plate of Girder G4.

**PHOTO 5-10:** Decayed south ribbon guard at the west end of Track #2, looking northeast.

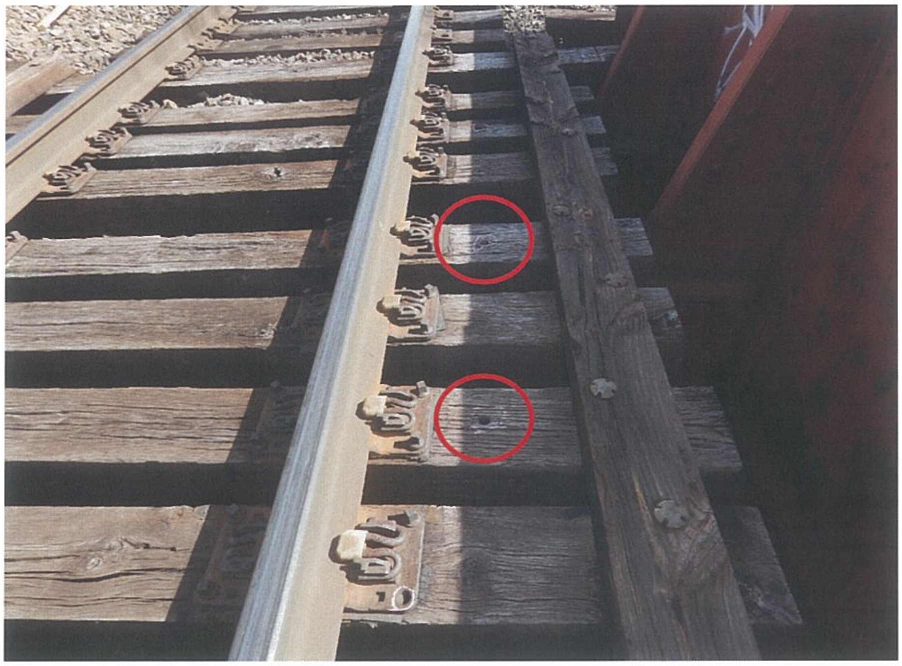


**PHOTO 5-11** Missing J-hook bolts at the south side of Track #2, looking east.

**PHOTO 5-12:** Raised spike at the south rail on Track #1 at the east approach, looking southwest.

**PHOTO 5-13:** Displaced ballast retainer at the west end of Girder G3 on Track #2, looking northeast.

**PHOTO 5-14:** Missing bolt and loose bolt at the bottom flange of Girder G3 at Floorbeam FB6, looking south. Note the rivets at the bottom flange of Girder G3 exhibit greater than 50% head loss (Rectangle).

**PHOTO 5-15:** Severe section loss and holed through gusset plate at the south side of Girder G2 bearing over the east abutment, looking northeast.

**PHOTO 5-16:** Missing and raised anchor bolt nuts (Circles) at the north side of Girder G3 bearing over the west abutment, looking southwest. Note up to 100% section loss to the sole plate bolt (Insert). Note also, the bearing is seized.

**PHOTO 5-17:** Missing sole plate bolt at the north side of Girder G3 bearing over the east abutment, looking southeast. Note the accumulation of ballast on the bearing seat.

**PHOTO 5-18:** Large spalls and delaminated concrete throughout the southeast wingwall, looking northeast. Note tree growth behind the wingwall.

**PHOTO 5-19:** Large spall and delaminated concrete at the north face of the west abutment backwall adjacent to the Girder G4, looking southwest.

**PHOTO 5-20**: 1/4" wide crack and small spall at the east abutment backwall between Girders G3 and G4, looking east.

**PHOTO 5-21:** Erosion hole at the northwest approach embankment, looking northeast.

**PHOTO 5-22:** Work Done: 14'-2" Vertical clearance sign has been installed at the north approach of the Shippenport Road, looking south. Typical at south approach.

# APPENDIX 3

# FIELD OBSERVATIONS

# FIELD OBSERVATIONS

Loss of section was acquired by measurements taken with calipers, stick rulers and tape measures where accessible and by visual estimates where not accessible.

The critical losses for the rated members are listed in the table below. The locations and extent of all losses found are recorded in the NJ Transit field notes following this sheet.

**CONTROLLING LOSSES FOR RATED MEMBERS**

| MEMBER | LOCATION (S) | MEASURED LOSS |
|---|---|---|
| | | |
| G1 | Bottom angles | Up to 1/16" loss (typical) at the floorbeam connections at both legs of north angle. |
| G2 | Bottom cover plates | ¼" loss x 1.5"W (typical) to top of the plate at floorbeam connection locations (north and south sides). |
| | | ½" edge loss to the cover plates at isolated locations (north and south sides). |
| | Bottom angles | Up to 1/16" loss (typical) at the floorbeam connections at both legs of (north and south angles). |
| G3 | Bottom cover plates | ¼" loss x 1.5"W (typical) to top of the plate at floorbeam connection locations (north and south sides). |
| | | ½" edge loss to the cover plates at isolated locations (north and south sides). |
| | Bottom angles | Up to 1/16" loss (typical) at the floorbeam connections at both legs of north angle. |
| | | 1/8" loss to both angle legs of south angle at old floorbeam connections. |

# FIELD OBSERVATIONS (CONTD.)

| CONTROLLING LOSSES FOR RATED MEMBERS (CONTD.) | | |
|---|---|---|
| **MEMBER** | **LOCATION (S)** | **MEASURED LOSS** |
| | | |
| G4 | Bottom cover plates | ½" edge loss to the cover plates at isolated locations (south side). |
| | | Up to 5/16" loss for 4"W at the west end of 2nd cover plate (from top), 10' from west bearing. |
| | Bottom angles | Up to 1/16" loss (typical) at the floorbeam connections at both legs of south angle. |
| | | ¼" loss at both angle legs of the south angle, 10' from the east abutment bearing. |

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GENERAL

LINE: MORRISTOWN

MILEPOST: 44.97

NAME OF BRIDGE: SHIPPENPORT ROAD

NJDOT STRUCTURE NO.: 1465-164

CONSULTANT BRIDGE NO.: F25

ROUTE NO.: 4005

DATE: TOP OF DECK: 5/5/14

SUPERSTRUCTURE: 12/11/13, 6/19/14

USRA LINE CODE: 6101

SUBSTRUCTURE: 12/11/13, 6/19/14

MUNICIPALITY: ROXBURY TOWNSHIP

COUNTY: MORRIS

CONSULTANT: KS ENGINEERS, P.C.

CREW CHIEF: H. Shah, P.E.

WEATHER: Sunny (12/11/13, 5/5/14 & 6/19/14)

CREW MEMBER(S): C. Wilder, P.E.
H. Cedeno

TEMPERATURE: 35°F (12/11/13), 68°F (6/19/14)
65°F (5/5/14)

TYPE OF BRIDGE: Single span, riveted, built-up through girders with a floorbeam/ stringer system.

YEAR BUILT: 1910

YEAR OF MAJOR REPAIRS: 1986*
*Stringer/ Floorbeam replacement-Tracks #1 & #2

WORK DONE: 14'-2" Vertical clearance signs have been installed at the north and south fasciae and both approaches of Shippenport Road (Photos 5-1, 5-2 and 5-22).

[✓ OPEN DECK]/ BALLASTED DECK

ELECTRIFIED [✓ NON-ELECTRIFIED]

INDEPENDENT BRIDGES: YES [✓ NO]

BRIDGE # 1 = TRACK # - = GIRDERS -
BRIDGE # 2 = TRACK # = GIRDERS
BRIDGE # 3 = TRACK # = GIRDERS
BRIDGE # 4 = TRACK # = GIRDERS

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GENERAL
(CONTINUED)

LINE: MORRISTOWN MP: 44.97

TANGENT / [✓ CURVED TRACK] NO. OF TRACKS: 2

C/C DISTANCE BETWEEN TRACKS: TRACK # 1 AND TRACK # 2 : C/C = 15'-0"
(See cross section on Page 5-77) TRACK # ____ AND TRACK # ____ : C/C = ____
TRACK # ____ AND TRACK # ____ : C/C = ____

ECCENTRICITY IN TRACK:
*(Eccentricity with respect to the stringers)
NUMBER 1: *1/8" SOUTH / [✓ NORTH]
NUMBER 2: *1-1/8" SOUTH / [✓ NORTH]
NUMBER 3: ____ SOUTH / NORTH
NUMBER 4: ____ SOUTH / NORTH

OVERALL CONDITION RATING OF BRIDGE (G, F, [✓ P], B): Poor.

INDIVIDUAL ELEMENT CODES AND GENERAL OBSERVATIONS OF CONDITIONS:

APPROACHES: (G, [✓ F], P, B) Fair. A total of 22 ties are decayed at both approaches. There is section loss up to ¼" at the inner and or outer edges of both rails at both approaches. There is rail pumping up to ½" on Tracks #1 & #2 at the east approach and on Track #1 at the west approach. There is tie pumping up to ½" on Tracks #1 and #2 at both approaches. There are several raised spikes on both tracks at both approaches. There are a few loose tie plates and several raised spikes at both approaches. The ties at the west approach exhibit low ballast throughout the approach on Track #2.

DECK: (G, [✓ F], P, B) Fair. A total of 13 ties are decayed on both tracks. There is up to 1/8" section loss to the inner edge of both rails on Track #1. There is tie pumping up to ½" on Tracks #1 and #2. The south side ribbon guards on both tracks are decayed at the west end. The west backwall tie exhibits wide splits and or decayed. A few screw spikes are missing on both tracks. There are a few loose J-hook bolts on both tracks and a few missing J-hook bolts on Track #2. The ballast retainer at the west end of Girder G3 has been displaced.

SUPERSTRUCTURE: (G, [✓ F], P, B) Fair. The bottom cover plate of Girders G2, G3 and G4 exhibits up to ¼" loss at the floorbeam connection locations. There is up to ½" edge loss at isolated locations of the bottom cover plates of Girders G2, G3 and G4. There is up to 1" edge loss on both sides of Girder G2 cover plate near the east abutment. In addition, the bottom cover plate of Girder G4 exhibits up to 5/16'' pitting at the west end of the second cover plate from top. There is up to 1/8" loss at the south side bottom flange angle of Girder G3 at old floorbeam connections. There is up to 1/4" loss at the south side bottom flange angle of Girder G4 near the east abutment. There are minor impact scrapes at all girder bottom flanges. The base web plate of Girders G3 and G4 exhibits up to 1/8" loss at isolated locations. There are several rivets which exhibit greater than 50% head loss throughout the girders. There is a 6" long crack at the tack weld for the Floorbeam FB7 connection to Girder G3 under Track #1. The floorbeams exhibit moderate to severe corrosion at the stringer and girder connections. Floorbeams FB2 and FB6 exhibit open rivet holes at each end due to previously removed gusset plates. The stringer connection angles exhibit light to moderate corrosion. The lateral bracing angles exhibit up to 1" edge loss and up to ¼" loss to the remaining section of angles between Girders G1 and G2. In addition, there is up to ½" impacted rust between the lateral bracing angles. The gusset plates at the lateral bracing connections exhibit severe corrosion with up to ¼" loss throughout the plates and holed through areas at a few locations. The bolt heads at the lateral bracing connections exhibit severe corrosion with up to 100% loss throughout the bracings.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GENERAL
### (CONTINUED)

INDIVIDUAL ELEMENT CODES AND GENERAL OBSERVATIONS OF CONDITIONS:

SUBSTRUCTURE: (G, F, [✓ P] B) Poor. The abutment breastwalls exhibit areas of large spalls and severe scaling. In addition, the abutment breastwalls exhibit areas of light scaling, hollow sounding concrete and fine cracks with efflorescence. The east and west abutment bearing seats exhibit a few medium to large spalls at isolated locations. The west abutment bearing seat exhibits a large spall at the south side of Girder G2 bearing resulting in the partial undermining of the backwall. There are several small to large spalls and or fractures at both abutment backwalls. There are several wide

several small to large spalls and or fractures at both abutment backwalls. There are several wide

cracks at the east abutment backwall and one wide vertical crack at the west abutment backwall.

WATERWAY: (G, F, P, B) N/A

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### EAST

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-3

TANGENT / [✓ CURVED TRACK] GRADE: +1.10% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT: - LENGTH: -

CONDITION: N/A

WEIGHT OF RAIL: 132 LBS/YD [✓ WELDED] / JOINTED

RAILS: CONDITION: Track #1: There is up to 1/8" section loss to the inner edge of the north rail and up to 1/16" section loss to the inner edge of the south rail and outer edge of the north rail.

PUMPING: RAILS: [✓ YES] / NO

| | | | |
|---|---|---|---|
| TRACK: 1 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 25' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 25' |
| TRACK: 2 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 10' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 10' |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |

TIES: [✓ YES] / NO

| | | | |
|---|---|---|---|
| TRACK: 1 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 20' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 20' |
| TRACK: 2 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 20' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 20' |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |

TIE SIZE: LENGTH: 8'- 6" WIDTH: 9" DEPTH: 7"

TIES: C/C OF TIES: 23" NO. NEEDING REPLACEMENT: 9

CONDITION: Decayed and or wide splits in ties:
Track #1 = 7, Track #2 =2

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### EAST/CONTINUED

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-12

TIE PLATES: NO. MISSING: 0 NO. LOOSE: 11 (Track #1) & 6 (Track #2)
CONDITION: Track #1: Light rust throughout. 4 tie plates are overhanging on tie (up to 1/8"). Track #2: Light rust throughout. 3 tie plates are overhanging on tie (up to 1/4").

TIE PADS: YES [✓ NO]
CONDITION: N/A

SPIKES: CONDITION: Track #1: One sheared off spike (2nd from the bridge) at the inner side of the south rail. Several raised spikes up to 1/2".
Track #2: Several raised spikes up to 1/2".

BALLAST: [✓ CLEAN] UNCLEAN ADEQUATE DEPTH: YES [✓ NO]
DESCRIPTION: Track #1: Two ties adjacent to the bridge exhibit low ballast at the north end of ties.

SHOULDERS: SOUTH: Level (NJ Transit access road).
(CONDITIONS)

NORTH: Level (NJ Transit access road).

TRACK TO BE RAISED / LOWERED: YES [✓ NO]

LOW APPROACH / SAG: No

NO TRESPASSING SIGNS:
NONE
[✓ YES] LOCATION: NE corner (Sign completely faded) & SE corner (Sign knocked down).

OTHER OBSERVATIONS: High ballast covers several tie ends between Tracks #1 and #2.
Ballast is slightly low at a few locations of Track #2 adjacent to the south rail.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### WEST

LINE: MORRISTOWN  MP: 44.97  PHOTOS: 5-4 & 5-9

TANGENT / [✓ CURVED TRACK]  GRADE: +1.10%  TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED  WEIGHT: -  LENGTH: -

CONDITION: N/A

WEIGHT OF RAIL: 132 LBS/YD  [✓ WELDED] / JOINTED

RAILS: CONDITION: Track #1: There is up to 1/8" section loss to the inner edge of the north rail and up to 1/4" section loss to the inner edge of the south rail.
Track #2: Light rust throughout.

PUMPING: RAILS: [✓ YES] / NO

| | | | | |
|---|---|---|---|---|
| TRACK: 1 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 15' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 15' |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |

TIES: [✓ YES] / NO

| | | | |
|---|---|---|---|
| TRACK: 1 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 20' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 20' |
| TRACK: 2 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 20' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 20' |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |

TIE SIZE: LENGTH: 8'-6"  WIDTH: 9"  DEPTH: 7"

TIES: C/C OF TIES: 20"  NO. NEEDING REPLACEMENT: 13

CONDITION: Decayed and or wide splits in ties:
Track #1 = 5, Track #2 =8

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## APPROACH

### WEST/CONTINUED

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-9 & 5-21

TIE PLATES: NO. MISSING: 0 NO. LOOSE: 10 (Track #1) & 6 (Track #2)

CONDITION: Track #1: Light rust throughout.

Track #2: Light rust throughout. 2 tie plates are overhanging on tie (up to 1/4").

TIE PADS: YES [✓ NO]

CONDITION: N/A

SPIKES: CONDITION: Track #1: Missing spikes at the first tie adjacent to the bridge. Several raised spikes up to 1/2". Track #2: Several raised spikes up to 1/2".

BALLAST: [✓ CLEAN] / UNCLEAN ADEQUATE DEPTH: YES [✓ NO]

DESCRIPTION: Track #1: The first tie adjacent to the bridge exhibits low ballast.

Track #2: Several ties exhibit low ballast throughout the approach.

SHOULDERS: SOUTH: Level (NJ Transit Access Road).

(CONDITIONS)

NORTH: NJ Transit access road.

Erosion hole at the northwest approach embankment (40'L x 4'W x 2.2' DP).

TRACK TO BE RAISED / LOWERED: YES [✓ NO]

LOW APPROACH / SAG: No

NO TRESPASSING SIGNS:

NONE

[✓ YES] LOCATION: NW corner (Sign completely faded) & SW corner (Sign knocked down).

OTHER OBSERVATIONS: Track #1: Several ties (between the rails) near the bridge are partially covered with ballast.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SUPERSTRUCTURE SPAN NOS. 1

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-5 & 5-10

TRACK NUMBER: 1 & 2 [✓ OPEN] / BALLASTED TANGENT / [✓ CURVED] TRACK

SPAN TYPE: Riveted, Built-up Through Girders.

SPAN LENGTH: 40'-9" c/c

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT: - LENGTH: -
CONDITION: N/A

CONDITION OF RAILS: Track #1: There is up to 1/8" section loss (for 20 LF) to the inner edge of both rails.

PUMPING: RAILS: YES / [✓ NO]

| | | | |
|---|---|---|---|
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |

TIES: [✓ YES] / NO

| | | | |
|---|---|---|---|
| TRACK: 1 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 15' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 15' |
| TRACK: 2 | NORTH RAIL: | AMOUNT: 1/2" | LENGTH: 15' |
| | SOUTH RAIL: | AMOUNT: 1/2" | LENGTH: 15' |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |
| TRACK: | NORTH RAIL: | AMOUNT: | LENGTH: |
| | SOUTH RAIL: | AMOUNT: | LENGTH: |

TIE SIZE: LENGTH: 11'-0" WIDTH: 9" (Average) DEPTH: Track #1 -11" Track #2- 14"

TIES: C/C OF TIES: Trk. #1 -15", Trk. #2- 16" NO.NEEDING REPLACEMENT: 13

CONDITION: Decayed and or wide splits in ties:
**Track #1 = 10, **Track #2 = 3
**Since the decayed ties on both tracks are less than 50% of the total bridge ties, there is no repair recommended.

RIBBON GUARD / TIE: [✓ YES] / NO TYPE AND SIZE: *Timber 8"x4" (12' L sections)
SPACER BLOCKS: YES / [✓ NO]

*Ribbon Guard Conditions: Track #1 - The south side ribbon guard exhibits 2' L wide split at the west end. One bolt is raised up to 2" adjacent to the south rail. Track #2- The south side ribbon guard is decayed for 5' L at the west end.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SUPERSTRUCTURE SPAN NOS. 1

### CONTINUED

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-11 & 5-13

BACKWALL TIES: SIZE: Track #1-12'-5"L x 10"W x 9"DP (W) & 12'-1"L x 10"W x 9"DP (E).

CONDITION: Track #1: Minor checks and or splits.
Track #2: West backwall tie exhibits wide splits and or decayed.
**See below Other Observations for additional backwall sizes.

TIE PLATES: NO. MISSING: 0 NO. LOOSE: 0

CONDITION: Light rust throughout the tie plates.

TRACKS SHIMMED: YES [✓ NO]

TIE PADS: [✓ YES] NO CONDITION: Several tie pads are shifted along both tracks (No repair recommendation).

CONDITION OF SPIKES: Pandrol rail clips/ screw spikes: Missing (2 of 4) spikes at the tie plate under the south rail of Track #1. Missing (1 of 4) spikes at the tie plate under the south rail of Track #2.

CONDITION OF ANCHOR / J-HOOK BOLTS: Track #1: There are 5 loose J-hook bolts at isolated locations of the track.
Track #2: There are 4 missing and 4 loose J-hook bolts at south side of the track and 9 loose J-hook bolts at north side of the track.

BALLAST: DEPTH: N/A CLEAN / UNCLEAN

WALKWAYS: STEEL / TIMBER / [✓ UNDEFINED]

LOCATION: N/A

CONDITION: N/A

HANDRAILS: STEEL / TIMBER / UNDEFINED

CONDITION: None

CONDITION OF PARAPET WALLS / CURBS: N/A

MILEAGE BOARDS: [✓ YES] LOCATION: West end of Girders G2 and G3 & east end of Girders G3* and G4* (*See below Other Observations).

NO / NEEDED: LOCATION:

OBSTRUCTIONS: NO / [✓ YES] TYPE & DISTANCE: See sketch on Page 5-77.

OTHER OBSERVATIONS: *Mileage boards: Graffiti is obscuring the mileage board at the west end of G2. The ballast retainer at the west end of Girder G3 on Track #2 has been displaced.
**Backwall ties size: Track #2 - Double backwall tie: 11'-3"L x 12"W x 8" DP (East top) & 11'-9"L x 12"W x 10"DP (East bottom). 12'-2"L x 12"W x 8"DP (West top) & 12'-2"L x 12"W x 10"DP (West bottom).

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## GIRDERS (G1 to G4)

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-6, 5-9 & 5-14

SPAN NUMBER: 1 TRACK NUMBER: 1 & 2 C/C GIRDERS: 15'-0"

[✓ NORTH]/[✓ SOUTH] GIRDER SPAN LENGTH: 40'-9" c/c of brgs. SIZE: See sketch on Page 5-55

G4 ←—— G1

OBSERVATION OF LOSSES:

TOP COVER PLATES: No significant defects observed.

TOP ANGLES: No significant defects observed.

BOTTOM COVER PLATES: 1/4" loss x 1.5"W (typical) to top of the plate at floorbeam connection locations at Girders G2 & G3 (N. & S. sides) and Girder G4 (S. side). 1/2" edge loss to all cover plates at a few locations of Girders G2 & G3 (N. & S. sides) and Girder G4 (S. side). 1" edge loss at both sides of Girder G2 cover plate near the east abutment. Up to 5/16" pitting/ loss for 4"W at the west end of Girder G4 2nd cover plate (from top), 10'± from the west bearing.

BOTTOM ANGLES: Up to 1/16" loss (typical) at the floorbeam connections at both legs: G1 & G3 (N. angle), G2 (Both angles) & G4 (S. angle). See below "Other Observations".

WEB PLATE: There are areas with 1/8" loss x up to 3"H at the base of the web above bottom flange angles at isolated locations of Girders G3 and G4 (South side).

RIVET HEADS: Rivet head loss (>50%) at bottom flanges at current or former floorbeam connections: Girders G1 to G4 (200± Total). There are 3 missing rivets at the bottom flange of Gider G4. There is 1 missing bolt and 1 loose bolt at the bottom flange of Girder G3.

INTERIOR STIFFENERS: Minor corrosion to full depth stiffeners at lower 6". Up to 1/8" loss at the south side of Girder G1 and north side of Girder G4.

All other stiffeners consists of knee braces above floorbeams: No significant defects observed.

BEARING STIFFENERS: 1/8" loss for 3"H at the base of bearing stiffener at south side of Girder G3 bearing at the east abutment.

DEFLECTION / PUMPING: Minor deflection.

FATIGUE DETAILS: D LOCATION: Riveted tension flanges

FATIGUE DETAILS: LOCATION:

FATIGUE DETAILS: LOCATION:

FATIGUE CRACKS: YES /[✓ NO] LOCATION:

See *Note below "Other Observations".

PAINT CONDITION: Poor.

% STEEL REQUIRING PAINTING: 100% GRAFFITI: [✓ YES] / NO 200 SF

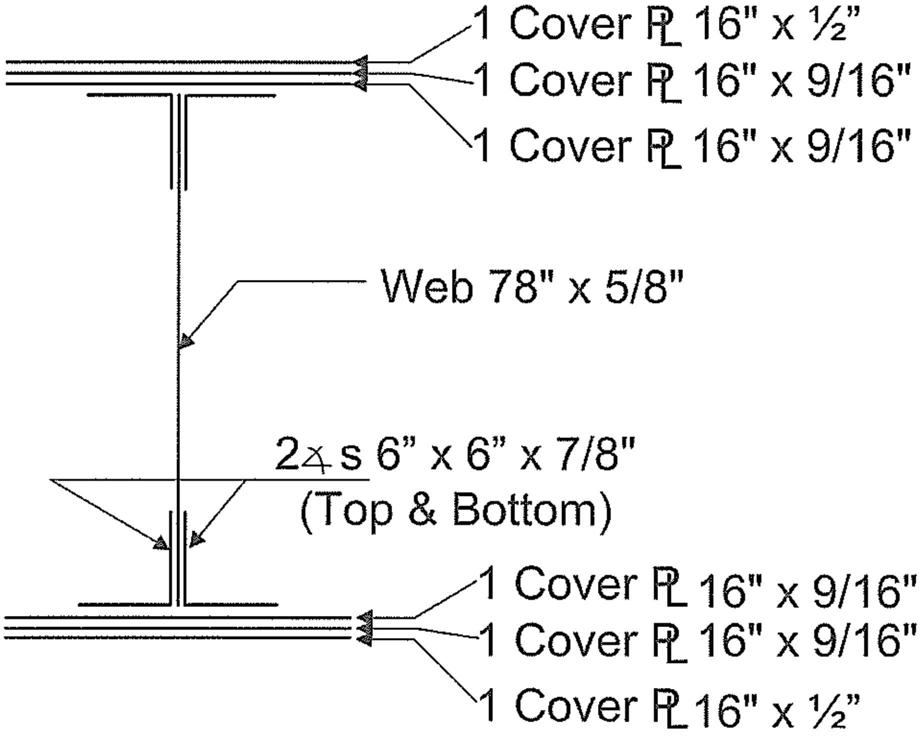
OTHER OBSERVATIONS: Bottom angles (Contd.): 1/8" loss to both angle legs of south angle at old floorbeam connections of G3. 1/4" loss to both angle legs at south side of G4, 10'± from the east bearing.

*Note: Tack welds present at FB connection weld between filler plate and web (Girders G2, G3, G4)- 6" L crack to tack weld at Floorbeam FB7 to Girder G3 (Track #1).

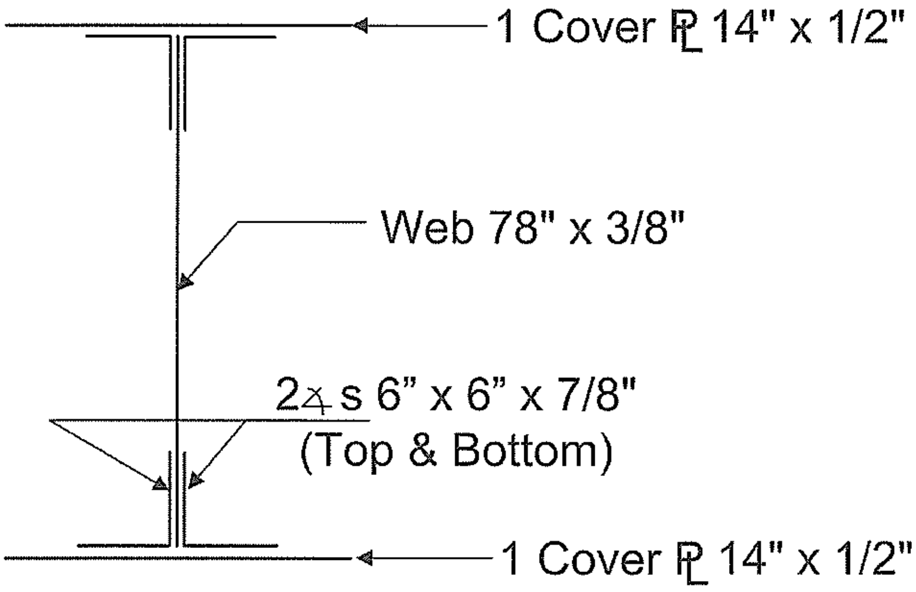
Minor impact scrapes at all girder bottom flanges. 6 open holes at Girder G3 and 9 open holes at Girder G3 bottom flange at floorbeam connection locations.

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

LINE: MORRISTOWN MP: 44.97 PHOTOS: -



**Girder Details (G2, G3 & G4)**



**Girder Details (G1)**

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## FLOORBEAMS

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-6

SPAN NUMBER: 1 TRACK NUMBER: 1

C/C FLOORBEAMS: *Varies FLOORBEAM LENGTH: 14.7' SIZE: 21WF x 127
*7'-5" to 8'-2"

OBSERVATION OF LOSSES:

TOP FLANGE: No significant losses observed.

BOTTOM FLANGE: No significant losses observed.

WEB: Moderate to severe corrosion at stringer and girder connections. No significant losses observed.

CONNECTIONS: See "WEB" notes above.

RIVET HEADS: No significant losses observed.

DEFLECTION / PUMPING: None observed.

FATIGUE DETAILS: None LOCATION:
FATIGUE DETAILS: LOCATION:
FATIGUE DETAILS: LOCATION:

FATIGUE CRACKS: YES [✓ NO] LOCATION:

PAINT CONDITION: Fair

% STEEL REQUIRING PAINTING: 20% GRAFFITI: YES [✓ NO] SF

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## FLOORBEAMS

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-6

SPAN NUMBER: 1 TRACK NUMBER: 2

C/C FLOORBEAMS: *Varies FLOORBEAM LENGTH: 14.7' SIZE: 21WF x 127

*7'-5" to 8'-2"

OBSERVATION OF LOSSES:

TOP FLANGE: No significant losses observed.

BOTTOM FLANGE: Gusset plate has been removed at Floorbeams FB2 & FB6; open holes at each end (16 @ each location) {No repair required}.

WEB: No significant losses observed.

CONNECTIONS: See "BOTTOM FLANGE" notes above.

RIVET HEADS: No significant losses observed.

DEFLECTION / PUMPING: None observed.

FATIGUE DETAILS: - LOCATION: -

FATIGUE DETAILS: LOCATION:

FATIGUE DETAILS: LOCATION:

FATIGUE CRACKS: YES [✓ NO] LOCATION:

PAINT CONDITION: Fair

% STEEL REQUIRING PAINTING: 20% GRAFFITI: YES / [✓ NO] SF

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## FLOORBEAMS

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-6

SPAN NUMBER: 1 TRACK NUMBER: Abandoned

C/C FLOORBEAMS: 3'-9" FLOORBEAM LENGTH: 14.7' SIZE: I 20" x 100#

OBSERVATION OF LOSSES:

TOP FLANGE: Moderate to severe corrosion with up to 1/16" loss.

BOTTOM FLANGE: Floorbeams FB2 to FB5, FB7, FB8 & FB10- 1/2" edge loss at midspan, stringer connections and girder connections, 3/8" loss at midspan and 1/4" loss to remaining section. Floorbeams FB1 & FB6- 1/8" loss and 1/2" edge loss at Stringer S2 connection.

WEB: Floorbeams FB2, FB3, FB5, FB7, FB9 & FB11-1/8" loss for full height between Stringer S2 and Girder G2. Up to 1/8" losses observed (typ.) at the bottom of the web at stringer and girder connections.

CONNECTIONS: Floorbeams FB2, FB3, FB5, FB7, FB9 and FB11: One missing bolt at connection angles at Girder G2 (No repair required).

RIVET HEADS: N/A (Rolled beams).

DEFLECTION / PUMPING: N/A (Abandoned track).

FATIGUE DETAILS: - LOCATION: -

FATIGUE DETAILS: LOCATION:

FATIGUE DETAILS: LOCATION:

FATIGUE CRACKS: YES [✓ NO] LOCATION:

PAINT CONDITION: Poor. Peeling paint with corrosion throughout.

% STEEL REQUIRING PAINTING: 100 % GRAFFITI: YES [✓ NO] SF

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## STRINGERS

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-6

SPAN NUMBER: 1 STRINGER LENGTH: *Varies (See table below) TRACK NUMBER: 1

C/C DISTANCE OF STRINGERS: 6'- 6" SIZE: *See table below

| * |
|---|
| STRINGER |
| 18WFx64x8'-2 |
| ∠6x4x½x1'-0 |
| STRINGER |
| 18WF x 64x 7'-5 |
| |
| STRINGER |
| 18WF x64x7'-9½ |

OBSERVATION OF LOSSES:

TOP FLANGE: No significant losses observed.

BOTTOM FLANGE: No significant losses observed.

WEB: No significant losses observed.

CONNECTIONS: Stringer connection angles exhibit light corrosion (East half of the bay is not painted).

RIVET HEADS : No significant losses observed.

ECCENTRICITY OF RAILS WITH RESPECT TO STRINGERS: 1/8" TOWARD [✓ NO] / SO.

DEFLECTION / PUMPING: None observed.

FATIGUE DETAILS: - LOCATION: -

FATIGUE DETAILS: LOCATION:

FATIGUE DETAILS: LOCATION:

FATIGUE CRACKS: YES / [✓ NO] LOCATION:

PAINT CONDITION: Good.

% STEEL REQUIRING PAINTING: - GRAFFITI: YES / [✓ NO] SF

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## STRINGERS

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-6

SPAN NUMBER: 1 STRINGER LENGTH: *Varies (See table below) TRACK NUMBER: 2

C/C DISTANCE OF STRINGERS: 6'- 6" SIZE: *See table below

*

| |
|---|
| STRINGER |
| 18WFx64x8'-2 |
| ∠6x4x½x1'-0 |
| STRINGER |
| 18 WF x 64x 7'-5 |
| |
| STRINGER |
| 18WF x 64 x 7'-9 ½ |

OBSERVATION OF LOSSES:

TOP FLANGE: No significant losses observed.

BOTTOM FLANGE: No significant losses observed.

WEB: No significant losses observed.

CONNECTIONS: Moderate corrosion at stringer and floorbeam connections.

RIVET HEADS : No significant losses observed.

ECCENTRICITY OF RAILS WITH RESPECT TO STRINGERS: 1-1/8" TOWARD [✓ NO.] / SO.

DEFLECTION / PUMPING: None observed .

FATIGUE DETAILS: - LOCATION: -

FATIGUE DETAILS: LOCATION:

FATIGUE DETAILS: LOCATION:

FATIGUE CRACKS: YES / [✓ NO] LOCATION:

PAINT CONDITION: Good.

% STEEL REQUIRING PAINTING: - GRAFFITI: YES / [✓ NO] SF

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## STRINGERS

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-6

SPAN NUMBER: 1 STRINGER LENGTH: 3'-9" TRACK NUMBER: Abandoned

C/C DISTANCE OF STRINGERS: 8'- 0" SIZE: 2 Channel's 10" x 25#'s & 10.5" x 3/8" plate

OBSERVATION OF LOSSES:

TOP FLANGE: Up to 1½" edge loss and up to 1/4" loss on remainder of both channels (Typical).

BOTTOM FLANGE: Up to 1/4" edge loss and up to 3/8" loss at floorbeam connection locations.

WEB: Moderate to severe corrosion with up to 1/8" loss.

CONNECTIONS: Moderate to severe corrosion with up to 1/16" loss.

RIVET HEADS : A few rivets exhibit up to 50% head loss at stringer ends and floorbeam connections.

ECCENTRICITY OF RAILS WITH RESPECT TO STRINGERS: N/A TOWARD NO. / SO.

DEFLECTION / PUMPING: N/A (Abandoned track)

FATIGUE DETAILS: LOCATION:
FATIGUE DETAILS: LOCATION:
FATIGUE DETAILS: LOCATION:

FATIGUE CRACKS: YES / [✓ NO] LOCATION:

PAINT CONDITION: Poor. Paint peeling with severe corrosion throughout.

% STEEL REQUIRING PAINTING: 100% GRAFFITI: YES / [✓ NO] SF

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## LATERALS / BRACING

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-6 & 5-15

SPAN NUMBER: 1 TRACK NUMBER: 1, 2 & Abandoned SIZE: Double angle 4" x 3" x 3/8"

OBSERVATION OF LOSSES:

ANGLES: Bay 1: Severe losses on upper legs with up to 1" edge loss and up to 1/4" loss to the remaining section. Impact damage to three angles over NB lane. Up to 1/2" Impacted rust (typical) between angles.

Bay 2: 1/4" Impacted rust between north angle and Floorbeam FB2 lower flange.

GUSSET PLATES: Bay 1:Severe corrosion with up to 1/4" loss throughout plates and holed through at four plates. There is severe deterioration at the connection of Girder G2 and Floorbeam FB1 connection including 100% section loss at 3/4 area of the plate.

Bay 2: Severe corrosion at the connections connecting Floorbeams FB1, FB3, FB5 & FB7 to Girders G2/ G3.

Total number of deteriorated gusset plates = 5 (Bay 1) + 8 (Bay 2) = 13 Total.

CONNECTIONS: See "Gusset Plates" notes above.

BOLT ~~RIVET~~ HEADS: Bay 1: Severe corrosion with up to 100% loss throughout (100± Total).

Bay 2: One bolt is not fully tightened at the south side of Girder G3 and Floorbeam FB3 connection (No repair required).

PAINT CONDITION: Poor (Bay 2). Paint peeling and minor rust throughout.

% STEEL REQUIRING PAINTING: 50%

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## BEARINGS

### FIXED

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-8 & 5-17

SPAN NO: 1 TRACK NO: 1 & 2 [✓ EAST]/WEST NO OF BEARINGS: 4

SOLE PLATE CONDITION: Girder G2 bearing: Up to 1" impacted rust at west edge of the plate. Girder G3: Bottom surface exhibits up to 1/4" loss. G4: 1/2" edge loss at the south side and 1/4" loss at the north side and up to 1/4" loss throughout the bottom face.

MASONRY PLATE CONDITION: Girder G1 bearing: The southwest corner of the plate is broken at anchor bolt location (6" x 6"){No repair required}.
Girders G2 to G4 bearings: Minor corrosion throughout (typical).

PIN CONDITIONS: N/A

ANCHOR BOLT/NUT CONDITIONS: Girder G1 bearing: Corroded anchor bolts with >50% loss. All anchor bolt nuts are raised (SW-3", SE-1.5", NW & NE- 1/4"). The south side sole plate bolt is raised 1/4". N. side sole plate bolt is missing. Girder G2 bearing: The south side sole plate bolt is sheared off. *See below "Other Observations".

[✓ SETTLEMENT]/TILT: Girders G1 and G3 bearings: 1/4" over 9" towards east.

DEBRIS AT BEARING SEAT: Moderate to heavy accumulation of ballast and debris throughout the bearing seat.

PAINTING REQUIRED: [✓ YES] / NO
OUT OF POSITION: YES / [✓ NO]
BEARING SEIZED: N/A YES / NO
PUMPING: YES / [✓ NO] AMOUNT: ______

OTHER OBSERVATIONS: *Anchor bolt/ nut conditions (Contd.): Girder G2 bearing (Contd.)- Southwest anchor bolt nut is raised (1/4"). NE anchor bolt exhibits severe corrosion with up to 75% loss. Girder G3 bearing- 2 of 4 anchor bolt nuts exhibit severe corrosion with >50% loss. Both sole plate bolts are missing. Raised anchor bolt nuts (SW-1/2" & NW-3/4"). Girder G4 bearing: Raised anchor bolt nuts (SW & SE-1", NW-3/8"). The northeast anchor bolt nut is missing and the anchor bolt exhibits 75% section loss.
The anchor bolts are buried with ballast at the following locations: Girders G2 and G3 bearings (NE & SE).

SKETCH:

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## BEARINGS

### EXPANSION

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-16

SPAN NO: 1 TRACK NO: 1 & 2 EAST/[✓ WEST] NO OF BEARINGS: 4

SOLE PLATE CONDITION: Girder G2 bearing: Up to 1/2" edge loss at north & south sides and up to 1/4" loss to remaining exposed bottom face. Girder G3 bearing: Up to 1/4" edge loss at north & south sides. Girder G4: Up to 1/8" edge loss at north and south edges.

MASONRY PLATE CONDITION: Minor rust (Typical).

PIN CONDITIONS: N/A

ANCHOR BOLT/NUT CONDITIONS: Girder G1 bearing: The northwest anchor bolt is missing. Girder G2 bearing: Both sole plate connection bolts are raised (1/4") and exhibits up to 25% loss. 2 of 4 anchor bolts exhibit severe corrosion with >50% loss (NE & NW). Girder G3 bearing: Both sole plate bolts exhibit up to 100% loss. *See below "Other Observations".

SETTLEMENT/TILT: None

DEBRIS AT BEARING SEAT: Moderate to heavy accumulation of ballast and debris throughout the bearing seat.

PAINTING REQUIRED: [✓ YES] / NO
OUT OF POSITION: YES / [✓ NO]
BEARING SEIZED: [✓ YES] / NO
PUMPING: YES / [✓ NO] AMOUNT:

OTHER OBSERVATIONS: *Anchor bolt/ nut conditions (Contd.): Girder G3 bearing (Contd.)- Northeast and southeast anchor bolt nuts are missing. Raised anchor bolt nut (NW-1"). Girder G4 bearing- Northwest and northeast anchor bolt nuts are missing. The south sole plate bolt is raised (1/4").

The anchor bolts are buried with ballast at the following locations: Girder G1 bearing (NW), Girder G3 bearing (SW) & Girder G4 bearing (SW and SE).

SKETCH:

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ABUTMENT BREASTWALL

### EAST

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-7

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

LENGTH: 72'-8" HEIGHT: 12'-4"

WIDTH: AT BEARING: 4'-5" AT GROUND LEVEL: Not visible

STRUCTURAL CRACKS: None

| | | | |
|---|---|---|---|
| | SIZE: - | WIDTH: - | LOCATION: - |
| | SIZE: | WIDTH: | LOCATION: |
| None | SIZE: | WIDTH: | LOCATION: |
| | SIZE: | WIDTH: | LOCATION: |
| | SIZE: | WIDTH: | LOCATION: |

CONDITIONS: Spalled concrete (up to 6" DP) = 207 SF total.
Hollow sounding concrete = 25 SF total.
Large areas with light scaling.
Fine cracks with efflorescence at several locations.
See sketch on Page 5-66.

CONDITION OF BEARING SEAT: Spall (3 SF x 4" DP) between Girders G2 & G3 at the west corner of the bearing seat.

PUMPING DUE TO LOAD: YES [✓ NO] DESCRIPTION:

GRAFFITI: YES [✓ NO] ________ SF PLUMB [✓ TILT] 2.5" over 4.0' level (Battered back).

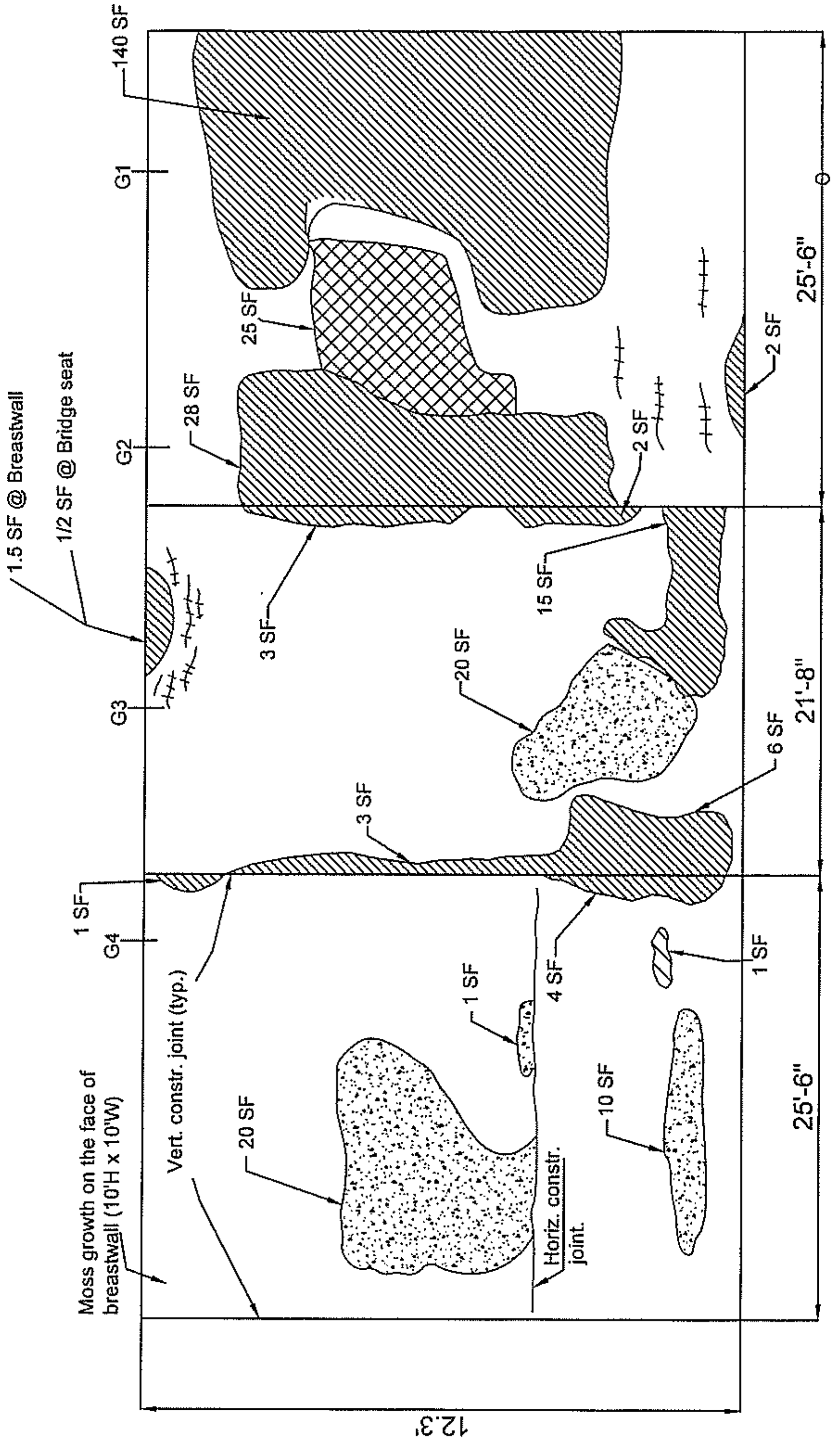
FOUNDATION CONDITIONS: Not visible.

TRAFFIC PROTECTION: YES CONDITION: N/A
[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-7



**East Abutment Breaswall**
(Looking East)
N.T.S.

Legend:
- ▩ - Hollow sounding concrete
- ░ -Light scaling (Up to 1" Max.)
- ▨ - Spalling / Severe scaling (Up to 6" DP. Max.)
- ⧺ - Fine cracks w/ efflorescence

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ABUTMENT BACKWALL

### EAST

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-20

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

TILT: YES / [✓ NO] DESCRIPTION:

CLEARANCE BETWEEN BACKWALL AND SUPERSTRUCTURE: G1- 6.25", G2- 5.5", G3-4.5" and G4-5.5".

CONDITIONS: Spall/ fractures at the south end of the backwall (4 SF x 6" DP). Spall at the top south face, located north of Girder G2 (4.5 SF x 12" DP). Shallow spall at the top north face adjacent to Girder G3 (2 SF). Small spall (1 SF) at the bottom west face with fine diagonal crack, located north of Girder G3. Spall (2 SF x 8" DP) with adjacent wide vertical crack (2 LF x 1/4" W) at the top near Girder G4. Two small spalls (2 SF Total x 1" DP) and horizontal/ vertical cracks (20 LF x up to 1/4" W), located north of Girder G4.

Total spalls = 16 SF .

Total wide cracks = 22 LF.

WATER LEAKAGE: YES / [✓ NO] DESCRIPTION:

OTHER OBSERVATIONS: Backwall is partially concealed due to end floorbeams.

SKETCH (IF NEEDED): -

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ABUTMENT BREASTWALL

### WEST

LINE: MORRISTOWN MP: 44.97 PHOTOS: -

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

LENGTH: 68'-0" HEIGHT: 12'-0"

WIDTH: AT BEARING: 4'-4" AT GROUND LEVEL: Not visible

STRUCTURAL CRACKS: SIZE: - WIDTH: - LOCATION: -

None

SIZE: WIDTH: LOCATION:

SIZE: WIDTH: LOCATION:

SIZE: WIDTH: LOCATION:

SIZE: WIDTH: LOCATION:

CONDITIONS: Spalled concrete (up to 13" DP) = 156.5 SF total.
Hollow sounding concrete = 20 SF total.
Large areas with light scaling.
Fine cracks with efflorescence at several locations.
See sketch on Page 5-69.

CONDITION OF BEARING SEAT: Spalls (10 SF x 6" DP) at the south side of Girder G2 bearing resulting in partial undermining of the backwall (See backwall sheet for quantity of undermining).
Spall (9 SF x 2" DP) at the south side of Girder G1 bearing.

PUMPING DUE TO LOAD: YES [✓ NO] DESCRIPTION:

GRAFFITI: YES [✓ NO] SF PLUMB / [✓ TILT:] 3" over 4.0' level (Battered back).

FOUNDATION CONDITIONS: Not visible.

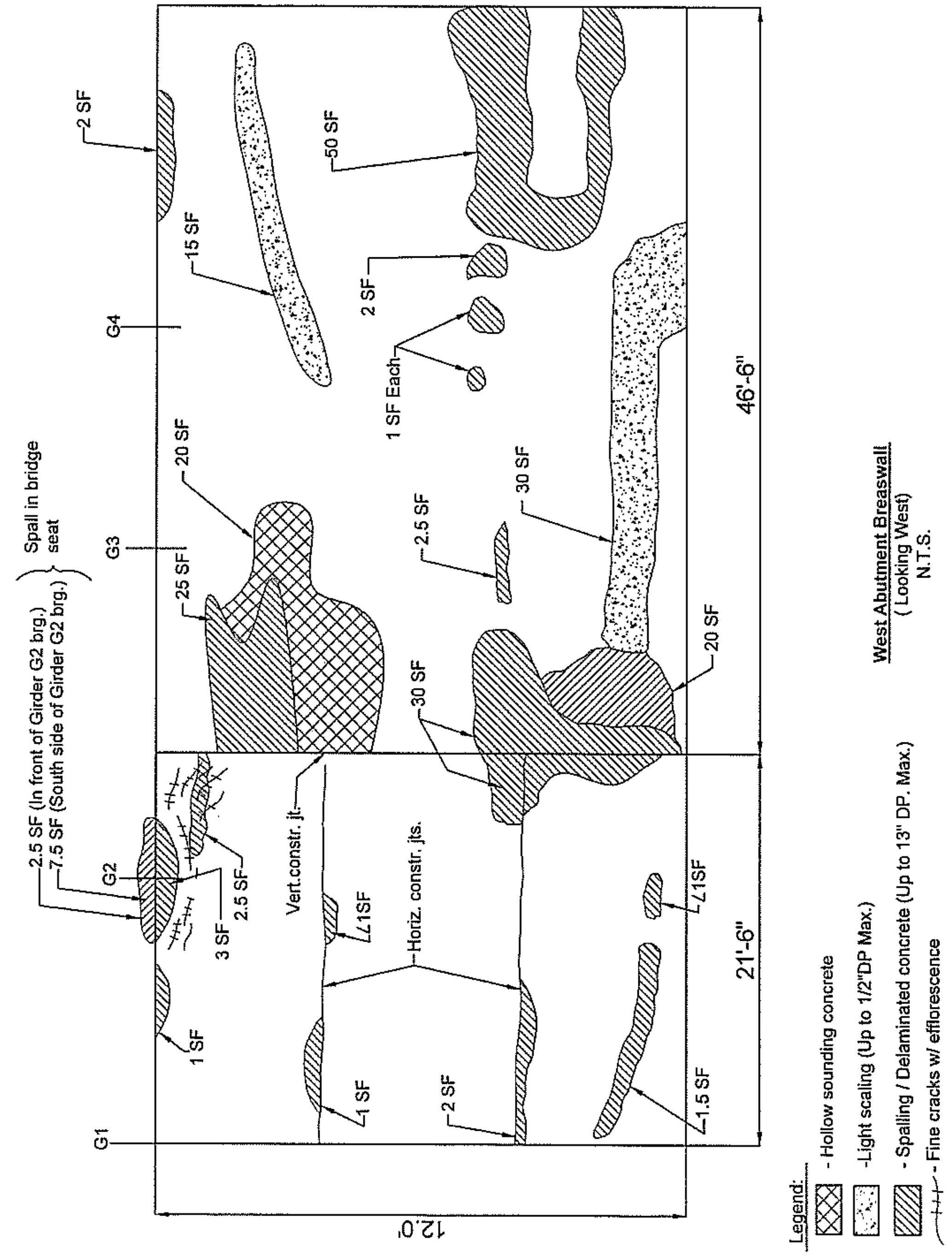
TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

LINE: MORRISTOWN MP: 44.97 PHOTOS: -



# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ABUTMENT BACKWALL

### WEST

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-19

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

TILT: YES / [✓ NO] DESCRIPTION:

CLEARANCE BETWEEN BACKWALL AND SUPERSTRUCTURE: G1- 3.75", G2- 4", G3-4.5" and G4-4.5".

CONDITIONS: Spall in Bay 1 at the top of Girder G2 (3 SF x 4" DP). Fracture (2 SF), located north of Girder G3. Spall at the top of backwall adjacent to Girder G3 (2 SF x 2" DP). Spall at the south side of Girder G4 (4 SF x 12" DP). Spall at the north face near Girder G2 (2 SF x 6" DP). Deteriorated concrete in Bay 2 (<0.5 SF) and wide crack in Bay 3 (1/4" W x 2 LF) at north end of the backwall Spalls at the north end and north face of the backwall (4 SF x 3" DP). The spall on south side of Girder G2 brg. on the bridge seat is partially undermining the backwall at the base (0.6 SF x 20" DP).

Total area of spalls/ fractures = 13.5 SF.

Total cracks = 2 LF.

WATER LEAKAGE: YES / [✓ NO] DESCRIPTION:

OTHER OBSERVATIONS: None

SKETCH (IF NEEDED): -

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

[✓ EAST] / WEST
NORTH / [✓ SOUTH]

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-18

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: Varies (1' to 12') WIDTH: 2'-0" LENGTH: 17'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Brush and tree growth LOCATION: Behind the wingwall

CONDITIONS: The top portion (cap) of the wingwall is fractured (23 SF x 12" DP). The remaining top portion (cap) of the wingwall is completely spalled/ missing (18 SF x 12" DP). There is extensive spalling throughout the east face of the wingwall (130 SF x up to 18" DP).
Total spalled areas = 171 SF.

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO] ______ SF PLUMB / [✓ TILT]: 2¼” on 4' level.

TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: None

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

[✓ EAST] / WEST
[✓ NORTH] / SOUTH

LINE: MORRISTOWN MP: 44.97 PHOTOS: -

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: Varies (6' to 12'-3") WIDTH: 2'-6" LENGTH: 12'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Brush and tree growth LOCATION: Behind the wingwall

CONDITIONS: The top portion (cap) of the wingwall is spalled/ delaminated at north end (9 SF x 6" DP). The north face of the wingwall exhibits spalled/ or delaminated concrete (9 SF x 3" DP). The east face of the wingwall exhibits spalls at the north end (15 SF total x up to 6" DP). There is area of medium scaling along the bottom of the wingwall at south end (5 SF x up to 1" DP). Total spalled areas = 33 SF. Total area of scaling = 5 SF (No repair recommendation).

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO] ______ SF PLUMB / [✓ TILT] 2½" over 4.0' level.

TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: None

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

EAST / [✓ WEST]
NORTH / [✓ SOUTH]

LINE: MORRISTOWN MP: 44.97 PHOTOS: -

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: Varies (2' to 12') WIDTH: 2'-0" LENGTH: 17'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Tree growth LOCATION: Behind the wingwall

CONDITIONS: The top portion of the wingwall exhibits spalling/ delaminated concrete for full length of the wingwall (32 SF x up to 24" DP). There are a few spalls at the north end of the wignwall, adjacent to the west abutment breastwall (3 SF x up to 1.5" deep total). Hollow sounding concrete areas at north end of the wingwall, adjacent to the west abutment breastwall (5 SF total). *See below.

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO] ______ SF PLUMB / [✓ TILT]: 3½” over 4.0' level.

TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: *Wingwall conditions: There are areas of fine cracks with efflorescence at top northwest corner of the wingwall.
Total spalled/ delaminated areas = 35 SF. Total hollow sounding areas = 5 SF.

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## WINGWALLS

EAST / [✓ WEST]
[✓ NORTH] / SOUTH

LINE: MORRISTOWN MP: 44.97 PHOTOS: -

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / STONE / BRICK / TIMBER

HEIGHT: Varies (1' to 12') WIDTH: 2'-0" LENGTH: 17'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Trees, brush and wine growth LOCATION: Behind and in front of the wingwall

CONDITIONS: The top portion of the wingwall is completely spalled/ fractured (35 SF x up to 14" DP). There is spalling along the horizontal construction joint at the base (14 SF x 2" DP). Two spalls at the south end of the wingwall, adjacent to the breastwall (8 SF total x up to 3" DP). Total spalled/ fractured concrete areas = 57 SF.

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO] ______ SF PLUMB / [✓ TILT:] 2½" over 4.0' level.

TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: None

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ROADWAY/RAILROAD BELOW BRIDGE

(REFER TO CLEARANCE DIAGRAM SHEET)

LINE: MORRISTOWN MP: 44.97 PHOTOS: 5-1, 5-2 & 5-22

STRAIGHT / [✓ CURVED]

SIGHT DISTANCE: NORTH: 100' ± Then road curves west at 'Y-Intersection'

SOUTH : 200' ± With ramps (on and off) at 100' ± from the bridge.

ROADWAY WIDTH: 22'-4" NUMBER OF LANES: 2

SIDEWALKS / SAFETY WALKS: WIDTH: 5'-8" (Avg.) ([✓ EAST] / WEST)
WIDTH: 5'-0" (EAST / [✓ WEST])

VERTICAL CLEARANCE POSTED: [✓ YES] / NO BRIDGE: [✓ NORTH] / [✓ SOUTH]
APPROACHES: [✓ NORTH] / [✓ SOUTH]

CONDITION / ADEQUACY OF POSTING: 14'-2" clearance signs, adequate.

OTHER POSTING (TYPE AND LOCATION): None

UTILITIES: None

DRAINAGE: Two grates at the center of the roadway under the bridge: No significant defects observed.

LIGHTING: None.

OBSERVATIONS: Handrail under the bridge along the east curbline exhibits severe corrosion at rail joint couplings. (No repair recommendation). The roadway below the bridge is not striped and exhibits wide longitudinal cracks at north and south sides of the structure(50 LF total) {No repair recommendation}.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## ROADWAY/RAILROAD UNDERCLEARANCE

LINE: MORRISTOWN MP: 44.97 PHOTOS: -

NAME: SHIPPENPORT ROAD

← WEST TO HACKETSTOWN EAST TO HOBOKEN →

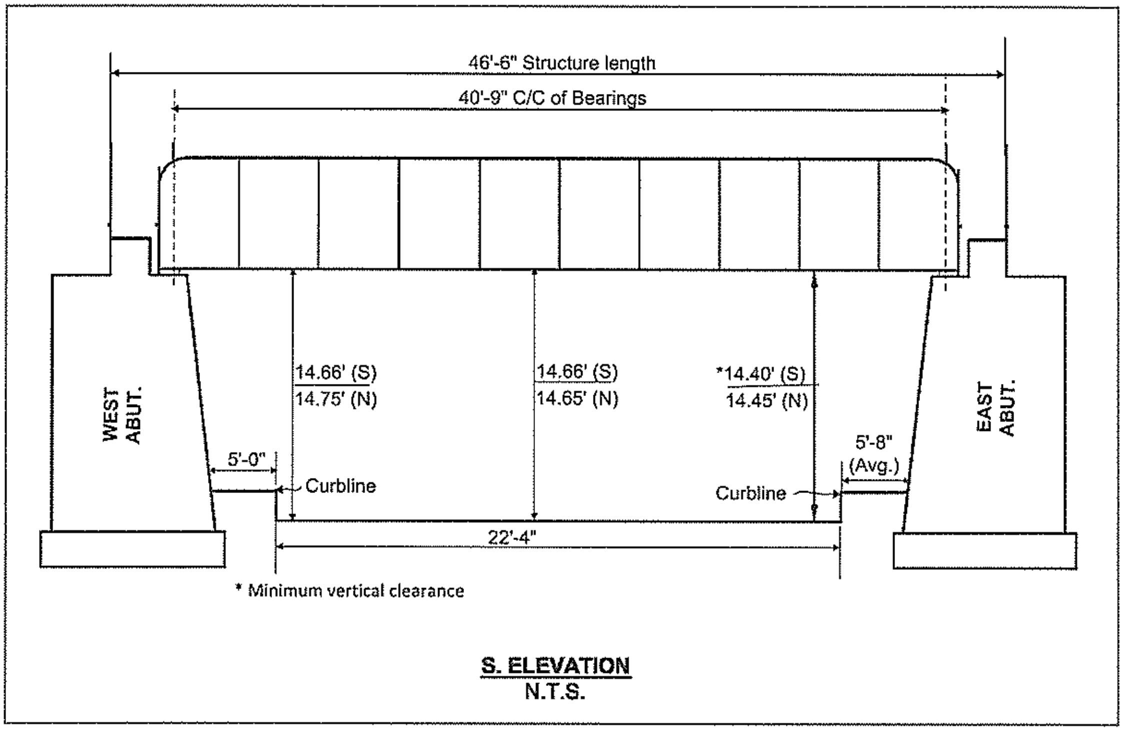


**Table 1 - CLEARANCE DIAGRAM**

(SPAN(~~S~~) 1 )

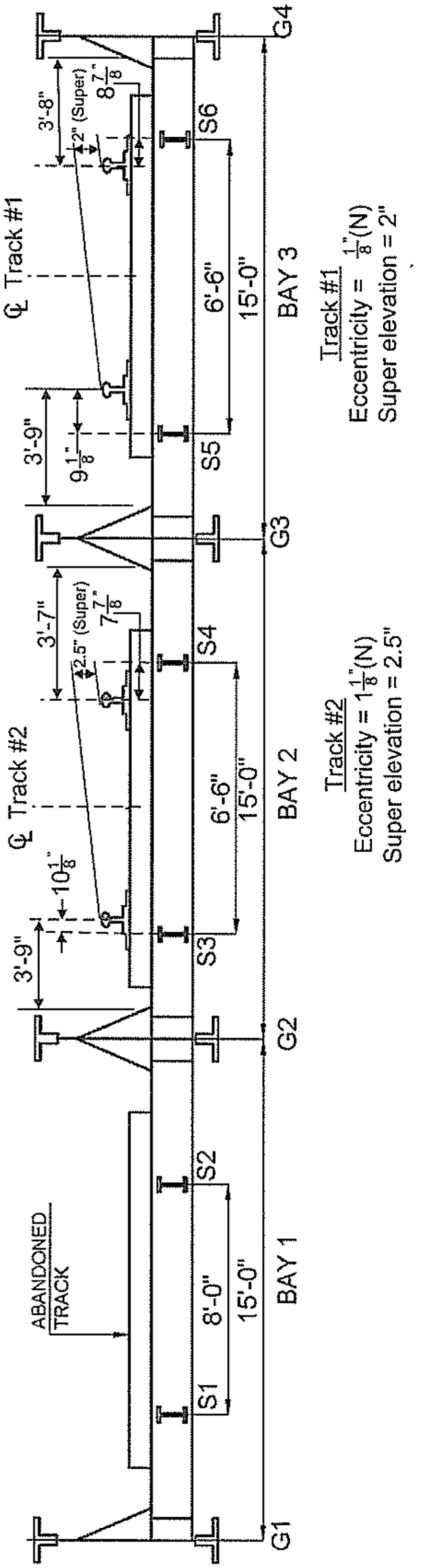
MINIMUM VERTICAL CLEARANCE: 14' - 4"

MINIMUM RIGHT LATERAL CLEARANCE: 5'-0"

MINIMUM LEFT LATERAL CLEARANCE: N/A

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

LINE: MORRISTOWN MP: 44.97 PHOTOS: -



Track #1
Eccentricity = $\frac{1}{8}$"(N)
Super elevation = 2"

Track #2
Eccentricity = $1\frac{1}{8}$"(N)
Super elevation = 2.5"

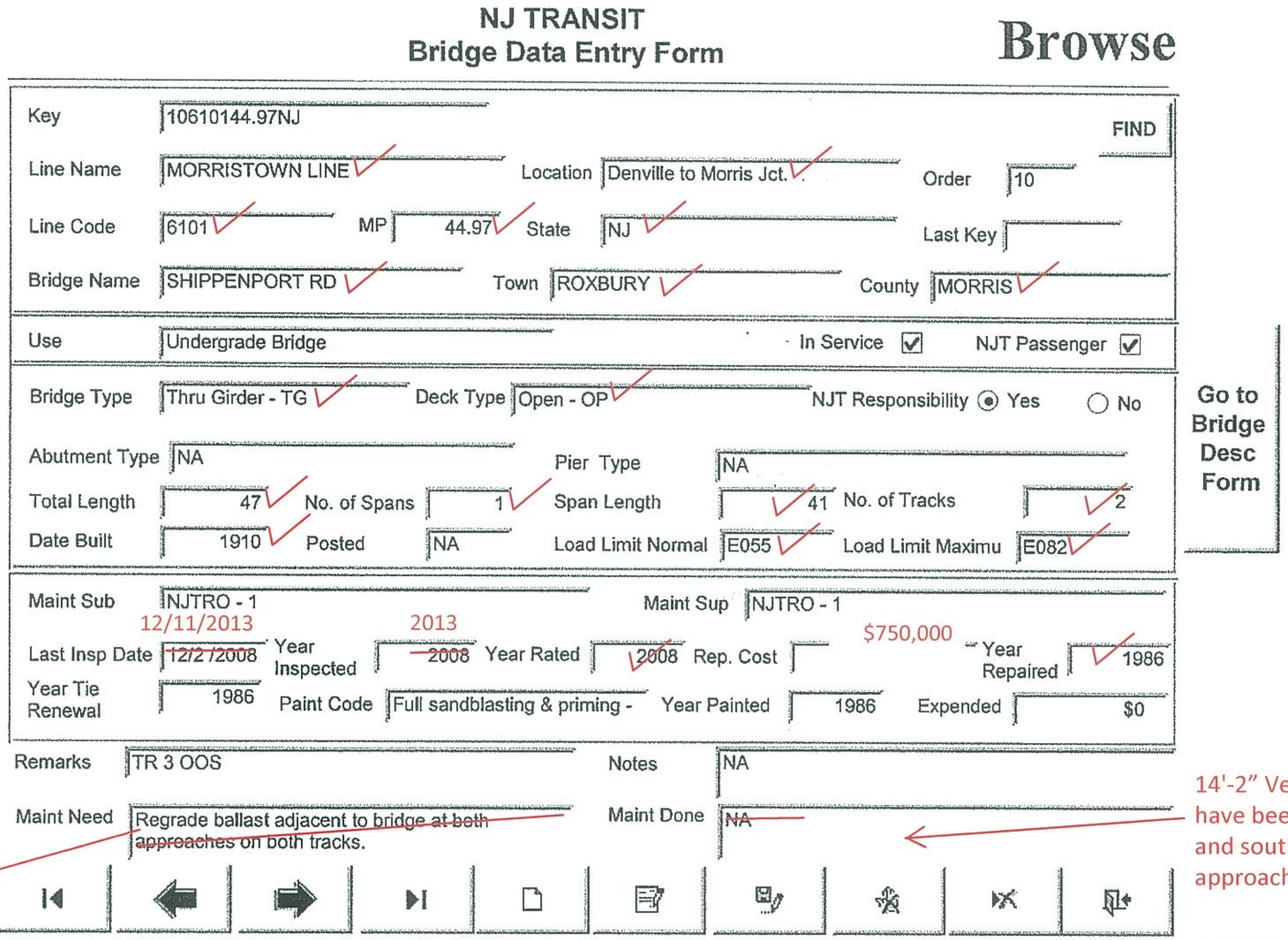
**Cross Section**

Looking west

Provided By Lichtenstein Consulting Engineers, Inc. 3/99
Modified by NJ TRANSIT 3/99

# APPENDIX 4

# BRIDGE INFORMATION SYSTEM INPUT FORMS



## NJ TRANSIT
## Bridge Data Entry Form

Key: 10610144.97NJ

Line Name: MORRISTOWN LINE ✓ Location: Denville to Morris Jct. ✓ Order: 10

Line Code: 6101 ✓ MP: 44.97 ✓ State: NJ ✓ Last Key:

Bridge Name: SHIPPENPORT RD ✓ Town: ROXBURY ✓ County: MORRIS ✓

Use: Undergrade Bridge In Service ☑ NJT Passenger ☑

Bridge Type: Thru Girder - TG ✓ Deck Type: Open - OP ✓ NJT Responsibility ● Yes ○ No

Abutment Type: NA Pier Type: NA

Total Length: 47 ✓ No. of Spans: 1 ✓ Span Length: 41 ✓ No. of Tracks: 2 ✓

Date Built: 1910 ✓ Posted: NA Load Limit Normal: E055 ✓ Load Limit Maximu: E082 ✓

Maint Sub: NJTRO - 1 Maint Sup: NJTRO - 1

Last Insp Date: ~~12/2/2008~~ 12/11/2013 Year Inspected: ~~2008~~ 2013 Year Rated: 2008 ✓ Rep. Cost: $750,000 Year Repaired: 1986 ✓

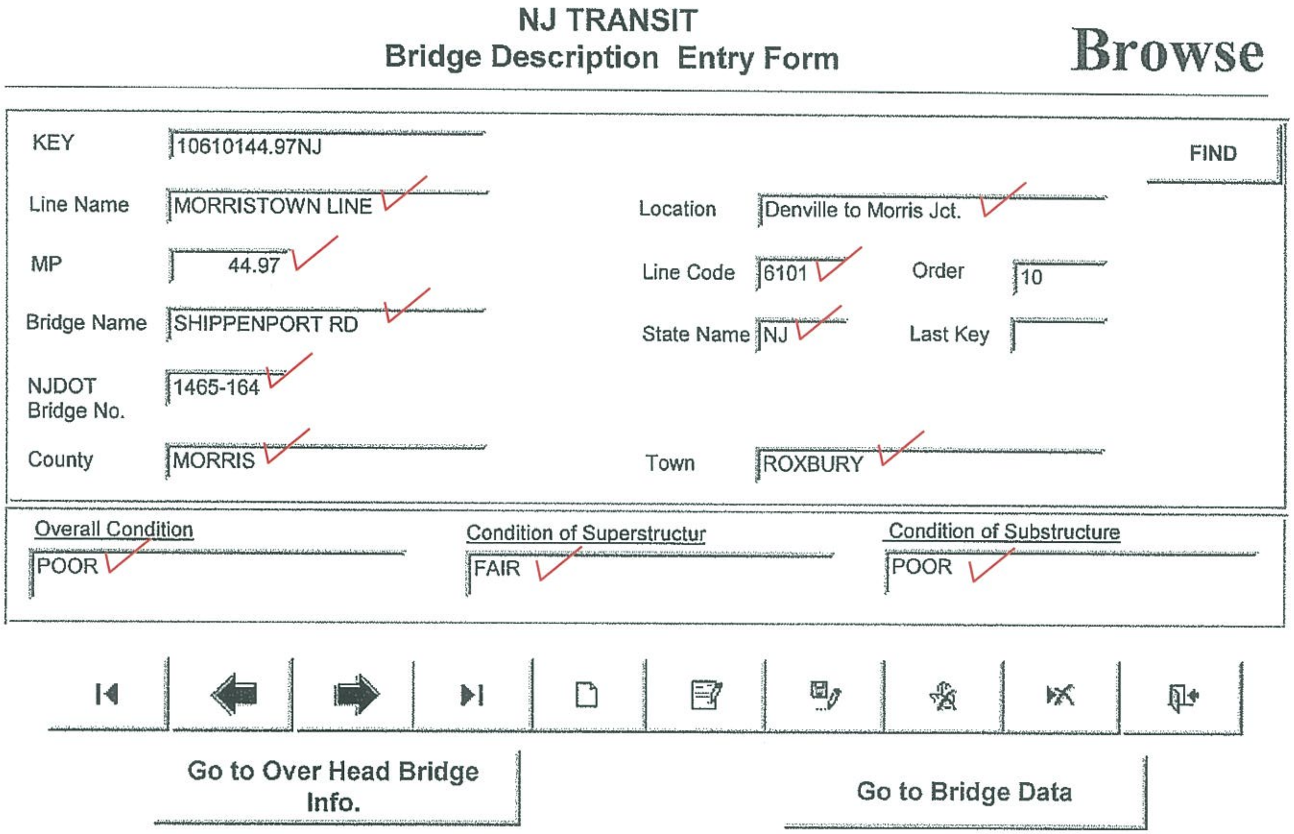
Year Tie Renewal: 1986 Paint Code: Full sandblasting & priming - Year Painted: 1986 Expended: $0

Remarks: TR 3 OOS Notes: NA

Maint Need: ~~Regrade ballast adjacent to bridge at both approaches on both tracks.~~ Maint Done: ~~NA~~

14'-2" Vertical clearance signs have been installed at the north and south fasciae and both approaches of Shippenport Road.

(1) Regrade the ballast on Tracks #1 and #2 at both approaches and add ballast if necessary (2) Replace all decayed and split ties on Tracks #1 and #2 at both approaches . Replace the decayed portion of the south timber ribbon guard at the west end of Track #2 (3) Replace the missing J-hook bolts and secure the loose J-hook bolts on Tracks #1 and #2 (4) Secure all raised spikes, loose tie plates (5) Reset the displaced ballast retainer near the west abutment backwall (6) Backfill the eroded hole at the northwest approach embankment (7) Replace all deteriorated, missing rivets and bolts. Secure the loose bolt at the bottom flange of Girder G3 (8) Replace all holed through and severely deteriorated gusset plates (9) Jack the superstructure, replace or reset the seized expansion bearings. Replace the severely deteriorated, missing anchor bolts and nuts. Secure all raised anchor bolt nuts and sole plate bolts (10) Sandblast clean and paint the structural steel and east abutment bearings (11) Remove the deteriorated concrete and patch the spalls throughout the substructure (12) Seal medium to wide cracks at both abutment backwalls with pressure injected epoxy sealant (13) Remove accumulation of debris and ballast from abutment bearing seats (14) Remove vegetation and tree growth from the wingwalls.



**NJ TRANSIT**
**Bridge Description Entry Form**

**Browse**

KEY: 10610144.97NJ

Line Name: MORRISTOWN LINE ✓

MP: 44.97 ✓

Bridge Name: SHIPPENPORT RD ✓

NJDOT Bridge No.: 1465-164 ✓

County: MORRIS ✓

Location: Denville to Morris Jct. ✓

Line Code: 6101 ✓

Order: 10

State Name: NJ ✓

Last Key:

Town: ROXBURY ✓

Overall Condition: POOR ✓

Condition of Superstructur: FAIR ✓

Condition of Substructure: POOR ✓

# NEW JERSEY TRANSIT CORPORATION

# BRIDGE EVALUATION SURVEY REPORT

## MORRISTOWN LINE MP 57.25
## OVER DRAIN
## HACKETTSTOWN, WARREN COUNTY

**ROUTE NUMBER: 4004**
**USRA LINE CODE: 6192**

**NJDOT STRUCTURE NO.: UNKNOWN**

**FIFTH CYCLE**

**DATE OF INSPECTION**

**DECEMBER 31, 2015**

**Prepared by:**

**Hardesty & Hanover, LLC**
**850 Bear Tavern Road, Suite 206**
**West Trenton, NJ 08628**

Hardesty &Hanover
engineering that moves you
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July 20, 2016

Ms. Lisa Fanning, PE
Assistant Chief Engineer – Structures
Infrastructure Engineering – Structures Department
New Jersey Transit Corporation
One Penn Plaza East
Newark, New Jersey 07105-2246

Re: Bridge Inspection Survey and Evaluation
Morristown Line MP 57.25 over Drain
Hackettstown, Warren County
NJDOT Structure No. Unknown
Contract No. 14-051F Group F

Dear Ms. Fanning,

In accordance with Undergrade Bridge Inspections Contract No. 14-051F Group F, Purchase Order No. L-92549, dated December 23, 2015, we are pleased to submit three (3) copies of the **FINAL REPORT** of the bridge inspection for the above-referenced structure.

The in-depth inspection of the above referenced structure was done in accordance with established accepted practices, however there is no representation made that all defects have been disclosed or discovered. The report presented herein is based upon a thorough inspection of the bridge for the primary purpose of identifying important changes in condition and behavior, which have occurred since the previous inspection. Recommendations for the repair of major defects and load rating analyses are included based on inspection findings. The bridge was inspected in accordance with New Jersey Transit guidelines and current AREMA standards by an NBIS qualified team leader and crew. The report has been reviewed in accordance with the approved quality management system, per the project agreement and our scope of work.

If you have any questions or comments, please contact me at 609-583-5023.

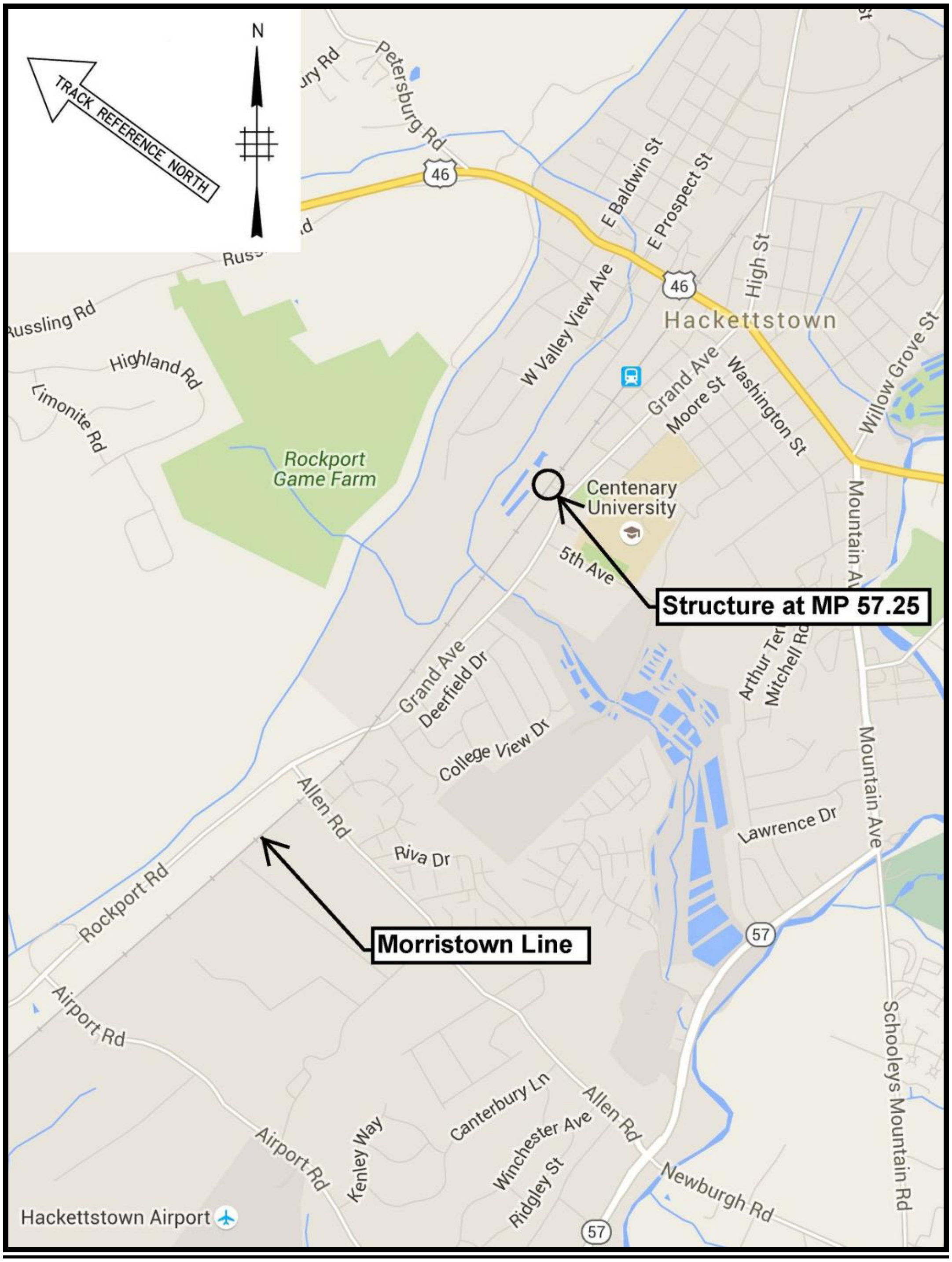
Very truly yours,
HARDESTY & HANOVER, LLC

Paul J. Connolly, PE
Principal Associate

Enclosures:
cc: Mr. Paul Falkowski, PE (w/enclosures)

# TABLE OF CONTENTS

# BRIDGE LOCATION MAP



| | | |
|---|---|---|
| NJ TRANSIT<br>The Way To Go. | LOCATION MAP<br>MORRISTOWN LINE MP 57.25<br>Over DRAIN<br>HACKETTSTOWN, WARREN COUNTY<br>NEW JERSEY | **Hardesty & Hanover, LLC**<br>DATE: 01/04/2016 |

# STRUCTURAL DATA SHEET

# NEW JERSEY TRANSIT
## INFRASTRUCTURE ENGINEERING – STRUCTURES
## BRIDGE EVALUATION SURVEY REPORT
## CYCLE NO. 5

## STRUCTURAL DATA

**NJDOT Structure No.:** Unknown

**Year Built:** 1910 **Year Rehab:** N/A

**USRA Line Code:** 6192

**Length:** 14'-0" **Width:** 71'-0"

**Route No.:** 4004

**Date of this Evaluation:** 01/05/2016
**By:** Hardesty & Hanover, LLC

**Line:** Morristown

**MP & Name:** MP 57.25 over Drain

**Date of Previous Evaluation:** 12/14/2010
**By**: HNTB Corporation

**Structure Type:** Single span concrete slab with encased steel rails

**Special Equipment Used:** None

**OVERALL CONDITION:** Fair
SUPERSTRUCTURE CONDITION: Fair
SUBSTRUCTURE CONDITION: Good

**WORK DONE:** Several ties have been replaced on the approaches (Photos 5-03 and 5-04).

**RATINGS:** The following load ratings were computed in the 3rd and 4th Cycle Bridge Evaluation Survey Reports and were revised during this 5th Cycle Inspection based on revised span length, revised moment capacity, and revised shear capacity.

| | Controlling Member | As-Built | As-Inspected |
|---|---|---|---|
| **Normal:** | Reinforced Concrete Slab (Moment) | E-44 | E-44 |
| **Maximum:** | Reinforced Concrete Slab (Moment) | E-55 | E-55 |

# CONCLUSIONS AND RECOMMENDATIONS

## CONCLUSIONS AND RECOMMENDATIONS

Morristown Line MP 57.25 over Drain consists of single span concrete slab reinforced with encased steel rails supported on concrete/stone masonry abutments. The bridge carries one active track on a ballasted deck. The overall condition of the structure is fair.

The approaches are in fair condition. The timber ties typically exhibit moderate checks and splits. A total of six ties are severely rotted and deteriorated and one is missing on the east approach. Pumping was not observed since passenger train service ceases west of the Hackettstown station and only occasional freight trains cross the bridge. The rails typically exhibit up to a 1/8" lip with a 1/4" lip on the outer edge of the north rail. The tie plates exhibit moderate rust with three tie plates not securing spikes on the east approach. The spikes have minor surface rust and are raised up to 1/2" on both approaches with one raised 1 1/4" and two missing on the west approach. The ballast is clean and of adequate depth.

The deck components are in fair condition. The timber ties typically exhibit minor checks and splits. A total of five ties exhibit wide splits and checks. There is moderate rust on the tie plates and spikes. Several spikes are raised up to 1/2". The north track has been abandoned and was previously cut off over the structure. The rails exhibit up to a 1/8" lip on the outer edges.

The superstructure is in fair condition. The concrete slab exhibits several fine transverse cracks with efflorescence throughout the length of the slab. There are several spalls and delaminations on the underside of the slab, partially exposing the moderately corroded bottom flange of six encased steel rails near the north end and nine steel rail bottom flanges near the south end. There is active leakage for half of the slab area. There are fine to medium cracks, light moss growth, and edge spalling on the north headwall extending 1 LF into the slab.

The substructure is in good condition. The stone masonry abutments exhibit several areas of missing and deteriorated mortar with a small void at the north end of the east abutment and the south end of the west abutment near the base of the walls. There is a displaced stone 15' from the south end of the east abutment. The top concrete portion of the east abutment breastwall exhibits several fine vertical cracks throughout with minor scaling at isolated locations. The north wingwalls exhibit areas of missing mortar/small voids with heavy debris, moderate vegetation and moss growth.

The channel is in good condition. The waterway beneath the structure was dry at the time of inspection. The streambed is silted and there is no erosion or scour evident.

The track is tangent and is on a 0.37% downgrade toward the west. There are no obstructions to the horizontal track clearance on the structure.

The inspection survey indicates that no significant deterioration affecting the ratings has occurred since the previous inspection. Although the ratings have slightly increased, the rating results based on assumed steel reinforcement indicate that the structure has insufficient capacity to support the standard AREMA Cooper E-80 loading at the Maximum and Normal levels, however, NJ Transit operating equipment loads can be carried by the bridge without engine speed restrictions (based on revised speed restriction tables) with exception of the 286 Kip Car, (2) GP40PH-2, (2) GP40FH-2, (2) PL-42, (2) GP40-2, and (2) ALP-45 which have speed restrictions of 19 mph, 31 MPH, 38 MPH, 35 MPH, 36 MPH, and 36 MPH, respectively, at the Maximum level. The controlling as-built and as-inspected ratings for the reinforced concrete slab based on moment are E-55 at the Maximum level and E-44 at the Normal level.

## CONCLUSIONS AND RECOMMENDATIONS (continued):

We recommend that the following repairs be made to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

1. Install a waterproofing membrane throughout the slab and provide adequate drains in the slab (Photo 5-11).

2. Remove all unsound concrete, clean and paint any exposed steel rails and repair the spalls in the slab and north headwall with epoxy concrete (Photos 5-06 and 5-12).

3. Seal the medium crack in the north headwall with a pressure injected epoxy sealer (Photo 5-02).

4. Fill the voids with epoxy concrete at the north wingwalls and both abutments (Photos 5-13 through 5-15).

5. Repoint the deteriorated and missing mortar throughout the abutments and the north wingwalls (Photos 5-07 and 5-15).

6. Replace the severely split and missing ties on the bridge and along both approaches (Photos 5-05 and 5-10).

7. Secure the loose tie plates and raised spikes and replace the missing spikes on the bridge and along both approaches (Photo 5-08 through 5-10).

8. Remove vegetation growth at the north elevation (Photo 5-02).

9. The structure should be re-inspected during the next regularly scheduled period.

# COST ESTIMATE SUMMARY AND WORK SHEETS

## COST ESTIMATE AND BACK-UP WORKSHEETS

DISCLAIMER: The provided cost estimates are for scoping purposes only and shall not be construed as actual construction costs.

### ESTIMATED REPAIR COSTS

| ITEM NO. | REPAIR RECOMMENDATION | UNIT | QUANTITY | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|
| 1 | WATERPROOF THE DECK SLAB: | | | | |
| | A. REMOVE & REINSTALL TRACK & BALLAST | LF/TRACK | 30 | $1,350 | $40,500 |
| | B. INSTALL WATERPROOFING MEMBRANE | SY | 112 | $60 | $6,720 |
| | C. INSTALL DECK DRAINS | EACH | 4 | $520 | $2,080 |
| | | | | | |
| 2 | REMOVE ALL UNSOUND CONCRETE, CLEAN | SF | 200 | $155 | $31,000 |
| | AND PAINT ANY EXPOSED STEEL RAILS | SF | 175 | $60 | $10,500 |
| | AND REPAIR SPALLS IN THE SLAB & NORTH | | | | |
| | HEADWALL & SLAB FASCIA WITH EPOXY | | | | |
| | CONCRETE | | | | |
| | | | | | |
| 3 | SEAL THE MEDIUM CRACK IN THE | LF | 10 | $185 | $1,850 |
| | NORTH HEADWALL WITH A PRESSURE | | | | |
| | INJECTED EPOXY SEALER | | | | |
| | | | | | |
| 4 | FILL THE VOIDS WITH EPOXY CONCRETE | SF | 5 | $155 | $775 |
| | AT BOTH ABUTMENTS & AT THE NORTH | | | | |
| | WINGWALLS | | | | |
| | | | | | |
| 5 | REPOINT THE DETERIORATED & MISSING | LF | 60 | $20 | $1,200 |
| | MORTAR THROUGHOUT THE ABUTMENTS | | | | |
| | AND NORTH WINGWALLS | | | | |
| | | | | | |
| 6 | REPLACE THE SEVERELY SPLIT & MISSING | EACH | 12 | $415 | $4,980 |
| | TIES ON THE BRIDGE AND ALONG BOTH | | | | |
| | APPROACHES | | | | |
| | | | | | |
| 7 | SECURE THE LOOSE TIE PLATES AND | CREW DAY | 1 | $2,080 | $2,080 |
| | RAISED SPIKES & REPLACE THE MISSING | | | | |
| | SPIKES ON THE BRIDGE & ALONG BOTH | | | | |
| | APPROACHES | | | | |
| | | | | | |
| 8 | REMOVE VEGETATION GROWTH AT THE | CREW DAY | 1 | $2,080 | $2,080 |
| | NORTH ELEVATION | | | | |

| | |
|---|---|
| Sub-Total: | $103,765 |
| 30% Railroad Escalation: | $31,130 |
| Total: | $134,895 |
| Say | **$135,000** |

## COST ESTIMATE AND BACK-UP WORKSHEETS

### ESTIMATED REPAIR QUANTITIES

| ITEM NO. | REPAIR RECOMMENDATION | QUANTITY | TOTAL QUANTITY |
|---|---|---|---|
| 1 | WATERPROOF THE DECK SLAB: | | |
| | A. REMOVE & REINSTALL TRACK & BALLAST | 2 TRACKS X 14' = 28 LF/TRACK SAY 30 LF/TRACK | 30 LF/TRACK |
| | B. INSTALL WATERPROOFING MEMBRANE | 14' X 71' / 9 = 110.4 SY SAY 112 SY | 112 SY |
| | C. INSTALL DECK DRAINS | 4 EACH | 4 EACH |
| | | | |
| 2 | REMOVE ALL UNSOUND CONCRETE, CLEAN | SLAB = 173 SF; | 200 SF |
| | AND PAINT ANY EXPOSED STEEL RAILS | HEADWALL: N = 5 SF; | |
| | AND REPAIR SPALLS IN THE SLAB & NORTH | TOTAL = 178 SF; SAY 200 SF | |
| | HEADWALL & SLAB FASCIA WITH EPOXY | PAINT EXPOSED STEEL RAILS | 175 SF |
| | CONCRETE | 20 SF + 130 SF = 150 SF SAY 175 SF | |
| | | | |
| 3 | SEAL THE MEDIUM TO WIDE CRACK IN THE | N. HEADWALL = 8 LF; | 10 LF |
| | NORTH HEADWALL WITH A PRESSURE | TOTAL = 8 LF SAY 10 LF | |
| | INJECTED EPOXY SEALER | | |
| | | | |
| 4 | FILL THE VOIDS AT THE NORTH WINGWALLS | EAST ABUTMENT = 1 SF; WEST ABUTMENT = 1 SF | 5 SF |
| | & BOTH ABUTMENTS WITH EPOXY CONCRETE | NW WINGWALL = 2 SF; NE WINGWALL: 1 SF | |
| | | | |
| 5 | REPOINT THE DETERIORATED & MISSING | ABUTMENTS: E = 25 LF; W = 30 LF; | 60 LF |
| | MORTAR THROUGHOUT THE ABUTMENTS | WINGWALLS: NE = 4 LF; | |
| | AND THE NORTH WINGWALLS | TOTAL = 59 LF SAY 60 LF | |
| | | | |
| 6 | REPLACE THE SEVERELY SPLIT & MISSING | APPROACHES: E = 1; W = 6; | 12 EACH |
| | TIES ON THE BRIDGE AND ALONG BOTH | BRIDGE = 5; | |
| | APPROACHES | TOTAL = 12 EACH | |
| | | | |
| 7 | SECURE THE LOOSE TIE PLATES AND | SAY 1 CREW DAY | 1 CREW DAY |
| | RAISED SPIKES & REPLACE THE MISSING | | |
| | SPIKES ON THE BRIDGE & ALONG BOTH | | |
| | APPROACHES | | |
| | | | |
| 8 | REMOVE VEGETATION GROWTH AT THE NORTH | SAY 1 CREW DAY | 1 CREW DAY |
| | ELEVATION | | |

# APPENDIX 1

# RATING SUMMARY AND COMPUTATIONS

# RATING SUMMARY - NORMAL

**BRIDGE:** Morristown Valley Line MP 57.25 over Drain
**CONSULTANT:** Hardesty & Hanover, LLC
**DATE:** 5/5/16 **CYCLE: 5 INFO TAKEN FROM CYCLES NO. 2, 3, & 4**

**CONTROLLING RATING OF BRIDGE: E-44**

| **MEMBER** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | | | **LOADED LENGTH FT.** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | **AS - BUILT** | | **AS - INSPECTED** | | **FATIGUE** | | |
| | **E-MOMENT** | **E-SHEAR** | **E-MOMENT** | **E-SHEAR** | | | |
| Slab | **E44** | E961 | **E44** | E961 | -- | 11.63 ft | |
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| **COLUMNS** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | **LOADED LENGTH FT.** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|
| | **AS - BUILT** | **AS - INSPECTED** | **FATIGUE** | | |
| | **E-AXIAL** | **E-AXIAL** | | | |
| N/A | | | | | |
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| | | | | | |

Notes:
Reference Cycles 2, 3, and 4 for previous rating calcs.

## RATING SUMMARY - MAXIMUM

**BRIDGE:** Morristown Valley Line MP 57.25 over Drain
**CONSULTANT:** Hardesty & Hanover, LLC
**DATE:** 5/5/16 **CYCLE: 5 INFO TAKEN FROM CYCLES NO. 2, 3, & 4**

**CONTROLLING RATING OF BRIDGE: E-55**

| MEMBER | CAPACITY OF THE BRIDGE COOPER E - LOAD | | | | | LOADED LENGTH FT. | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | AS - BUILT | | AS - INSPECTED | | FATIGUE | | |
| | E-MOMENT | E-SHEAR | E-MOMENT | E-SHEAR | | | |
| Slab | **E55** | E1155 | **E55** | E1155 | -- | 11.63 ft | GP40PH-2, 2 GP40PH-2: 31 mph |
| | | | | | | | GP40FH-2, 2 GP40FH-2: 38 mph |
| | | | | | | | PL-42, 2 PL-42: 35 mph |
| | | | | | | | GP40-2, 2 GP40-2, ALP-45, 2 ALP-45: 36 mph |
| | | | | | | | 286K Car: 19 mph |
| | | | | | | | |
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| COLUMNS | CAPACITY OF THE BRIDGE COOPER E - LOAD | | | LOADED LENGTH FT. | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|
| | AS - BUILT | AS - INSPECTED | FATIGUE | | |
| | E-AXIAL | E-AXIAL | | | |
| N/A | | | | | |
| | | | | | |
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| | | | | | |

Notes:
Reference Cycles 2, 3, and 4 for previous rating calcs.

**1. GEOMERTY & FRAMING**

*a. Field Observations*

- Per the Cycle 5 inspection report, no changes to the geometry or framing system have been observed.

*b. Errors/Omissions in Previous Cycles*

- For load ratings of concrete elements, the span length shall be taken as the center-to-center length between points of bearing, not the out-to-out dimension of the deck.
- Previous load rating calculations shall be modified based on the c/c span length.

- The following information is taken directly from the Cycle 5 inspection report; these inputs will be used throughout the calculations below.

**Member Length =** 11.63 ft

**2. CUTOFF SECTIONS**

- There are no cutoff sections to be evaluated for this concrete deck element.

**3. SECTION PROPERTIES**

*a. Field Observations*

- Per the Cycle 5 inspection report, no significant section losses have occurred since the last report.

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

**4. ALLOWABLE STRESSES & CAPACITIES**

*b. Errors/Omissions in Previous Cycles*

- In previous rating cycles, the moment capacity of the member is incorrectly taken as the concrete compression force; this force shall be multiplied by the moment arm, jd, to obtain the moment at which the compressive extreme fiber reaches its allowable stress.
- In previous rating cycles, the equation used for steel shear contribution is applicable for reinforcement acting in tension across a diagonal crack plane. This methodology is invalid for the encased rail.
- Similar to a concrete-encased steel shape, the shear capacity of the rail shall be considered in accordance with Chapter 15 allowable shear stresses, not the axial capacity of a reinforcement bar; Table 15-7-1 is used to determine the allowable shear stress of the encased rail.
- The spacing of the rails shall be revised to reflect Cycle 4 inspection findings.

**Yield Strength, $F_y$ =** 33 ksi *(from Cycle 2 rating)*
**Rail Spacing, s =** 12.00 in *(from Cycle 4 inspection)*
**Rail Area, $A_r$ =** 10.84 sq. in *(from Cycle 2 rating)*
**Allowable Stress, $F_v = 0.75*0.80*F_y$ =** 19.8 ksi
**Steel Shear Capacity, $V_s = F_vA_r(s/12)$ =** 214.63 k
**Shear Capacity, $V = V_c + V_s$ =** 222.40 k

**Moment Arm, jd =** 8.39 in
**Compression Force, C =** 51.66 k *(from Cycle 2 rating)*
**Moment Capacity, $M_c = C(jd)$ =** 36.11 k-ft

**5. DEAD LOAD (1.3.2, 7.3.2.1)**

*a. Field Observations*

- Per the Cycle 5 inspection report, no changes to the dead load of the structure have been observed.

*b. Errors/Omissions in Previous Cycles*

- As mentioned in the "Geometry & Framing" calculation above, previous rating cycles analyzed the deck for the incorrect span length.
- The dead load magnitude from previous ratings is acceptable; the forces will be computed for the correct span length.

**Uniform Dead Load, w =** 0.35 klf

**Max Shear, $V = wL/2$ =** 2.0 k
**Max Mom., $M = wL^2/8$ =** 5.8 k-ft

**6. LIVE LOAD (1.3.3, 1.3.4, 7.3.2.2)**

*b. Errors/Omissions in Previous Cycles*

- As demonstrated in Cycle 3, the distribution length is limited by the axle spacing of the Cooper E80 train (per AREMA Ch. 8 2.2.3.c(2)).
- Therefore, since the total length of the 80-kip axles exceeds the span length of the rated member, a uniform load can be applied equal to 80 kips, divided by 5 ft axle spacing and divided by the effective beam width.
- The calculation herein also accounts for the updated c/c of bearing span length.

**Uniform Live Load, w = 16 / 9.75 =** 1.64 klf

**Max Shear, $V = wL/2$ =** 9.5 k
**Max Mom., $M = wL^2/8$ =** 27.7 k-ft

**7. IMPACT EFFECTS (1.3.5, 7.3.2.3)**

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

**8. CENTRIFUGAL EFFECTS (1.3.6, 7.3.2.4)**

- The track on this bridge is straight; therefore, there are no centrifugal effects to consider for this rating.

**9. TRACK ECCENTRICITY EFFECTS**

- For the given effective beam width analyzed here, track eccentricity effects have negligible effect on the overall rating; as such, no consideration for track offset is made here.

## 10. WIND LOADS (1.3.7, 1.3.8, 7.3.2.5)

*b. Errors/Omissions in Previous Cycles*

- As mentioned in the "Geometry & Framing" calculation above, previous rating cycles analyzed the deck for the incorrect span length.
- The wind load magnitude from previous ratings is acceptable; the forces will be computed for the correct span length.

**Uniform Wind Load, w =** 0.05 klf

**Max Shear, V = wL/2 =** **0.3 k**
**Max Mom., M = $wL^2/8$ =** **0.8 k-ft**

## 11. OTHER LATERAL LOADS

*b. Errors/Omissions in Previous Cycles*

- AREMA 19.5.1 states that the following loads must be considered in a load rating: dead, live, impact, centrifugal, wind on train, wind on structure, longitudinal from live load, longitudinal from friction among others. NJ Transit Exhibit 19 requires that only wind be the only lateral force included in the rating equation.

## 12. FATIGUE

- AREMA makes no reference to rating concrete elements for fatigue; consequently, no fatigue rating will be provided herein.

## 13. CONNECTIONS

- There are no connections to be checked for the rating of this member.

## 14. RATINGS

- Rating for this member can be found in the rating summary sheet on page 5-15.

**Notes**: - The following table summarizes all forces and factors to be used in the rating procedure of all sections. See the individual calculations for more information.
- Values highlighted in **blue** have been revised from the Cycle 4 ratings.
- Section locations are measured from the centerline of end bearing.

| | | | | **FORCE SUMMARY** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MEMBER** | **LENGTH (ft)** | **SECT.** | **LOC. (ft)** | **BENDING (k-ft)** | | | **SHEAR (kips)** | | | **AXIAL (kips)** | | | **FAT. (k-ft)** | **FACTORS** | | |
| | | | | $M_{DL}$ | $M_{LL}$ | $M_{WL}$ | $V_{DL}$ | $V_{LL}$ | $V_{WL}$ | $P_{DL}$ | $P_{LL}$ | $P_{WL}$ | $M_{LL}$ | **I** | **C** | **ECC** |
| | | | | | | | **AS-BUILT** | | | | | | | | | |
| **Slab** | 11.63 | -- | -- | 6 | 28 | 1 | 2 | 10 | 0 | -- | -- | -- | -- | 0.600 | 0.000 | 0.000 |
| | | | | | | | **AS-INSPECTED** | | | | | | | | | |
| **Slab** | 11.63 | -- | -- | 6 | 28 | 1 | 2 | 10 | 0 | -- | -- | -- | -- | 0.600 | 0.000 | 0.000 |

**Notes**: - The following table summarizes all member capacities to be used in the rating procedure. See individual calculations for more information.
- Values highlighted in **blue** have been revised from the Cycle 4 ratings.
- Section locations are measured from the centerline of end bearing.

| | | | | CAPACITY SUMMARY | | | |
|---|---|---|---|---|---|---|---|
| MEMBER | LENGTH (ft) | SECT. | LOC. (ft) | BENDING (k-ft) | SHEAR (kips) | AXIAL (kips) | FAT. (k-ft) |
| | | | | M | V | P | $M_{fat}$ |
| AS-BUILT | | | | | | | |
| **Slab** | 11.63 | -- | -- | 36 | 222 | -- | -- |
| AS-INSPECTED | | | | | | | |
| **Slab** | 11.63 | -- | -- | 36 | 222 | -- | -- |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Calculation** | NJ Transit | **Made By** | MCR | **Date** | 4/29/2016 | **Job No.** | 3147 |
| | ML MP 57.25 | **Checked By** | DMM | **Date** | | **Sec. No.** | 00 |
| | Rating Summary | **B.Checked By** | MCR | **Date** | | **Page No.** | 5 of 7 |

**Notes**: - The following table summarizes normal and maximum ratings for every section of every rated member, under as-built and as-inspected criteria.

- Values highlighted in **red** do not rate for E80 loading; note that this is only critical when a member does not rate for E80 loading in the maximum level.
- Live load capacity, $CAP_{i.LL}$ = n * CAP - DL - WL *where:* *i* = rating level, WL only applied overstress cases (Eq. 19-2, 19-5)
- Net live load capacity, $CAP_{i.n}$ = $CAP_{i.LL}$ / [1 + I + C] *n* = overstress factor, table below presents governing case
- Rating = [$CAP_{i.n}$ / ($LL_{E80}$ * ECC)] * 80
- No reductions in the impact factor due to speed restrictions are considered in this table in accordance with NJ Transit Exhibit 19.

| MEMBER | SECT. | LOC. (ft) | MAXIMUM RATING | | | | | | | | | NORMAL RATING | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | BENDING (k-ft) | | | SHEAR (kips) | | | AXIAL (kips) | | | BENDING (k-ft) | | | SHEAR (kips) | | | AXIAL (kips) | | | FATIGUE (k-ft) | |
| | | | $M_{m.LL}$ | $M_{m.n}$ | E | $V_{m.LL}$ | $V_{m.n}$ | E | $P_{m.LL}$ | $P_{m.n}$ | E | $M_{n.LL}$ | $M_{n.n}$ | E | $V_{n.LL}$ | $V_{n.n}$ | E | $P_{n.LL}$ | $P_{n.n}$ | E | $M_{sr.n}$ | E |
| AS-BUILT | | | | | | | | | | | | | | | | | | | | | | |
| **Slab** | -- | -- | 30 | 19 | **E55** | 220 | 138 | **E1155** | -- | -- | -- | 24 | 15 | **E44** | 183 | 115 | **E961** | -- | -- | -- | -- | -- |
| AS-INSPECTED | | | | | | | | | | | | | | | | | | | | | | |
| **Slab** | -- | -- | 30 | 19 | **E55** | 220 | 138 | **E1155** | -- | -- | -- | 24 | 15 | **E44** | 183 | 115 | **E961** | -- | -- | -- | -- | -- |

**Notes**: - The following table compares the as-inspected capacity of the member under maximum loading with the equivalent E loading for the special equipment trains presented in NJ Transit Exhibit 19.
- If the capacity of the member exceeds the equivalent E-load of all equipment loads, then no speed restrictions are required.
- Equivalent E ratings herein assume no longitudinal distribution of live load; this approach yields acceptable results.
- Speed restrictions, if any, are computed based on the speed reduction required to achieve an acceptable maximum rating in accordance with AREMA Ch. 8, 19.3.4.3.b.

| MEMBER | | E-CAP | F40PH-2 | 2 F40PH-2 | GP40PH-2 | 2 GP40PH-2 | GP40FH-2 | 2 GP40FH-2 | SW-1500 | ALP-44 | 2 ALP-44 | ALP-46 | 2 ALP-46 | PL-42 | 2 PL-42 | GP40-2 | 2 GP40-2 | ALP-45 | 2 ALP-45 | 286K Car | Restrict Speed? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | **BENDING** | | | | | | | | | | |
| **Slab** | **E55** | E51 | E51 | **E58** | **E58** | **E55** | **E55** | E50 | E40 | E40 | E41 | E41 | **E56** | **E56** | **E56** | **E56** | **E56** | **E56** | **E63** | **YES** |
| | | | | | | | | | | | | | | | | | | | | |
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| **Restriction (mph)** | | -- | -- | **31.4** | **31.4** | **38.1** | **38.1** | -- | -- | -- | -- | -- | **35.0** | **35.0** | **36.9** | **36.9** | **36.9** | **36.9** | **19.3** | |
| | | | | | | | | | | **SHEAR** | | | | | | | | | | |
| **Slab** | **E1155** | E47 | E47 | E53 | E53 | E51 | E51 | E46 | E37 | E37 | E38 | E38 | E50 | E50 | E51 | E51 | E50 | E50 | E62 | **NO** |
| | | | | | | | | | | | | | | | | | | | | |
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| **Restriction (mph)** | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | | | | | | | | | **AXIAL** | | | | | | | | | | |
| **Girder G3** | **--** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | **NO** |
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**BRIDGE:** Morristown Valley Line MP 57.25 over Drain
**CONSULTANT:** Hardesty & Hanover
**DATE:** 4/29/2016 **CYCLE NO.:** 5 **INFO TAKEN FROM CYCLE NO.:** 1-4 **CONTROLLING RATING OF BRIDGE:** E44

***NORMAL***

| MEMBER [Gov. Section] | CAPACITY OF THE BRIDGE Cooper E-Load | | | | | | | LOADED LENGTH | Engine Restrictions: note type, moment or shear control, and indicate speed without restriction. |
|---|---|---|---|---|---|---|---|---|---|
| | As-Built | | | As-Inspected | | | Fatigue | | |
| | E-Moment | E-Shear | E-Axial | E-Moment | E-Shear | E-Axial | | | |
| **Slab** | E44 | E961 | -- | E44 | E961 | -- | -- | 11.63 ft | |
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**CONTROLLING RATING OF BRIDGE:** E55

***MAXIMUM***

| MEMBER [Gov. Section] | CAPACITY OF THE BRIDGE Cooper E-Load | | | | | | | LOADED LENGTH | Engine Restrictions: note type, moment or shear control, and indicate speed without restriction. |
|---|---|---|---|---|---|---|---|---|---|
| | As-Built | | | As-Inspected | | | Fatigue | | |
| | E-Moment | E-Shear | E-Axial | E-Moment | E-Shear | E-Axial | | | |
| **Slab** | E55 | E1155 | -- | E55 | E1155 | -- | -- | 11.63 ft | GP40PH-2, 2 GP40PH-2: 31 mph |
| | | | | | | | | | GP40FH-2, 2 GP40FH-2: 38 mph |
| | | | | | | | | | PL-42, 2 PL-42: 35 mph |
| | | | | | | | | | GP40-2, 2 GP40-2, ALP-45, 2 ALP-45: |
| | | | | | | | | | 36 mph |
| | | | | | | | | | 286K Car: 19 mph |
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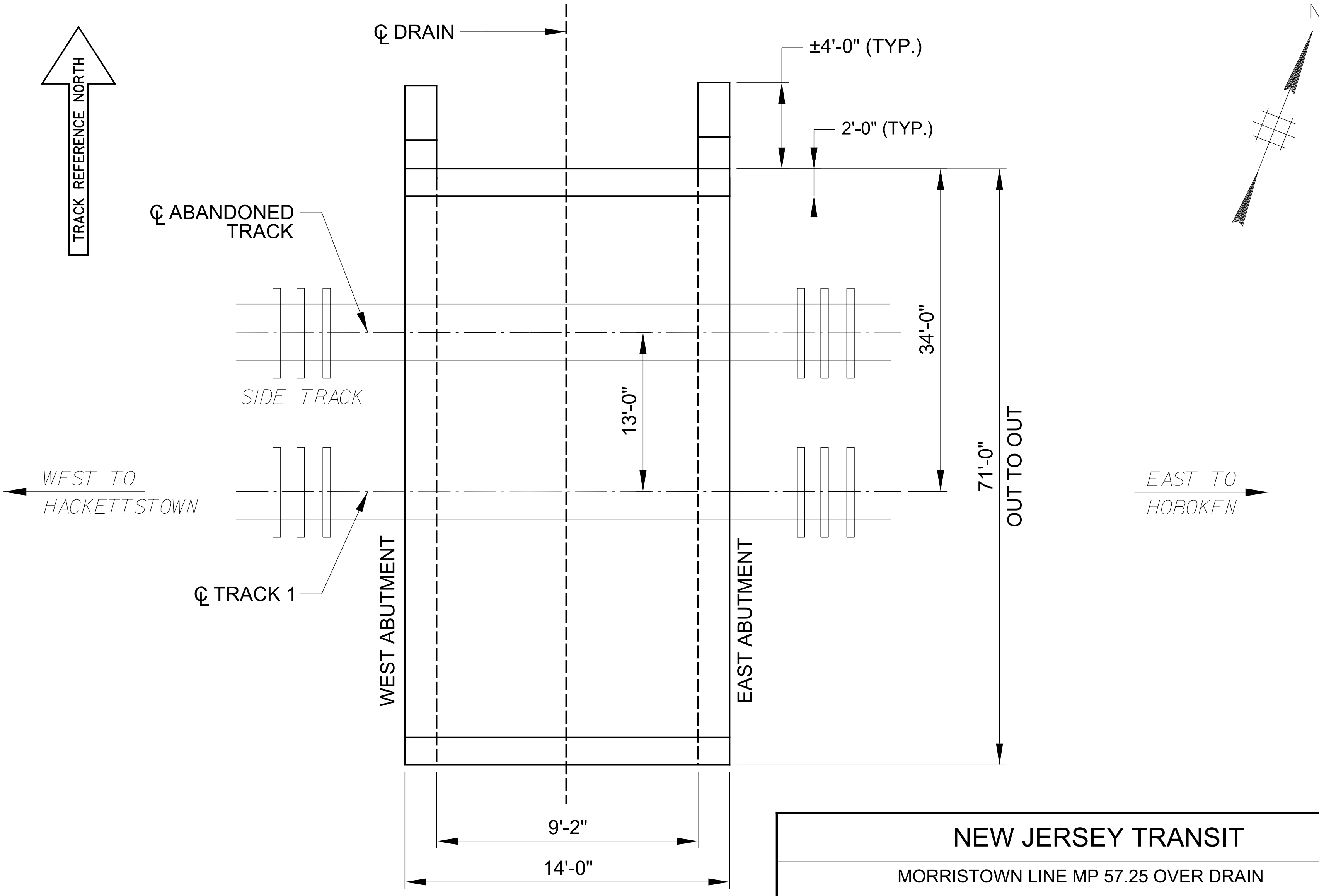
# APPENDIX 2

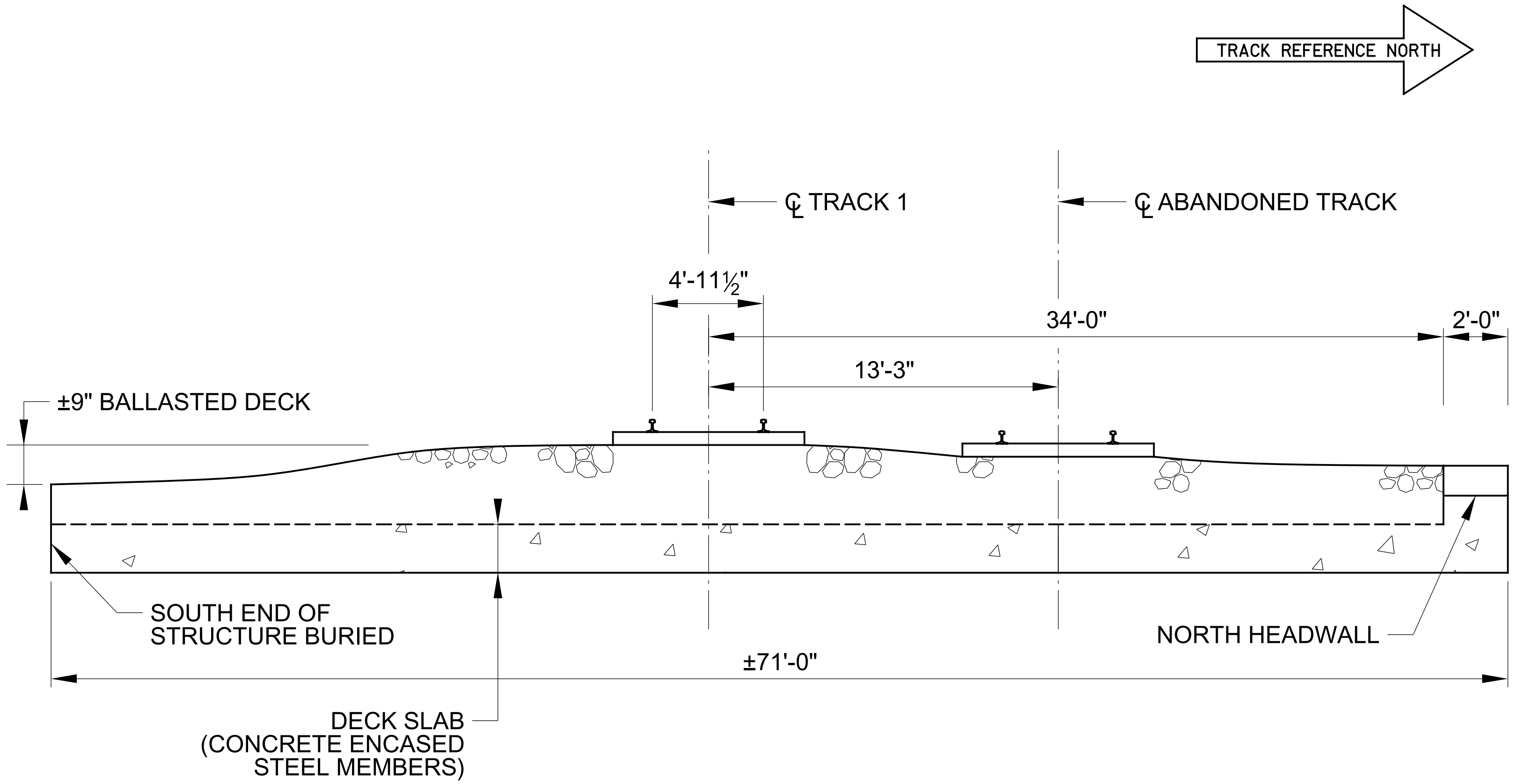
# DRAWINGS AND PHOTOGRAPHS



## GENERAL PLAN

NEW JERSEY TRANSIT
MORRISTOWN LINE MP 57.25 OVER DRAIN
GENERAL PLAN
Munic.: Hackettstown
Cycle No.: 5
County: Warren
Date: 01/05/16

Hardesty & Hanover
850 BEAR TAVERN ROAD
WEST TRENTON, NJ 08628



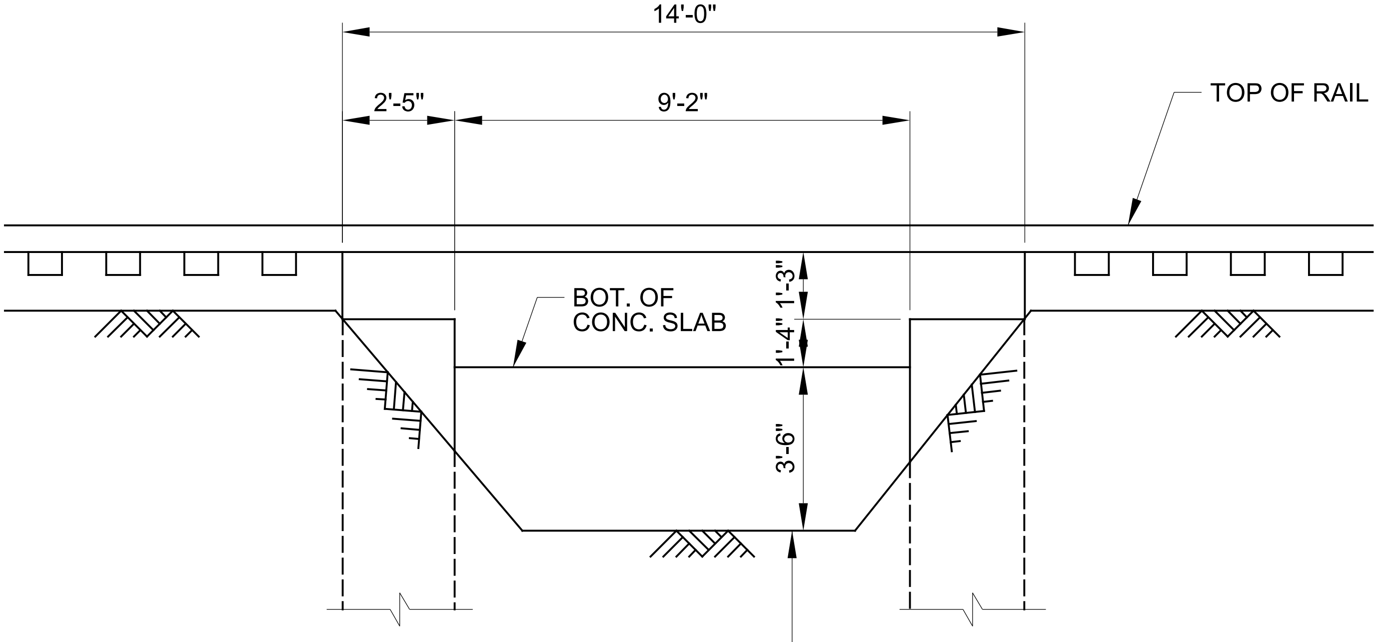
## CROSS SECTION

(LOOKING WEST)
N.T.S.

NEW JERSEY TRANSIT
MORRISTOWN LINE MP 57.25 OVER DRAIN
CROSS SECTION

Munic.: Hackettstown
Cycle No.: 5
County: Morris
Date: 01/05/16

Hardesty & Hanover
850 BEAR TAVERN ROAD
WEST TRENTON, NJ 08628



NORTH ELEVATION

NEW JERSEY TRANSIT

MORRISTOWN LINE MP 57.25 OVER DRAIN

NORTH ELEVATION

Munic.: Hackettstown

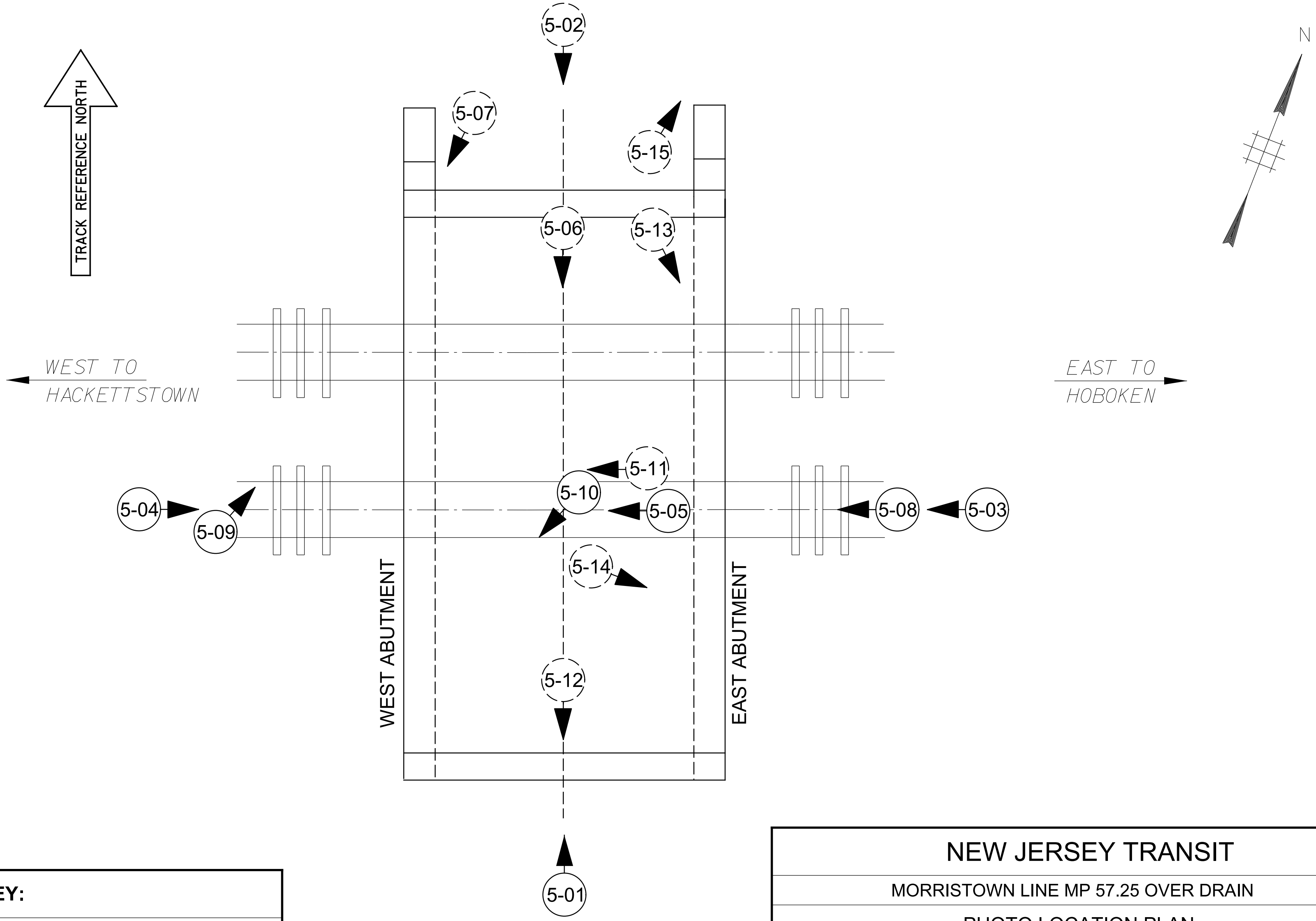
County: Warren

Cycle No.: 5

Date: 01/05/16

Hardesty & Hanover

850 BEAR TAVERN ROAD
WEST TRENTON, NJ 08628



## PHOTO LOCATION PLAN

N.T.S.

**KEY:**

| | |
|---|---|
| ○ ➤ | **PHOTO TAKEN ABOVE DECK LEVEL** |
| ◌ ➤ | **PHOTO TAKEN BELOW DECK LEVEL** |

NEW JERSEY TRANSIT

MORRISTOWN LINE MP 57.25 OVER DRAIN

PHOTO LOCATION PLAN

| | | |
|---|---|---|
| Munic.: Hackettstown | Cycle No.: 5 | Hardesty & Hanover |
| County: Warren | Date: 01/05/16 | 850 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |

**Photo No: 5-01**

| | |
|---|---|
| **Location:** | South elevation, looking north. |
| **Description:** | General view (backfilled inlet opening). |

**Photo No: 5-02**

| | |
|---|---|
| **Location:** | North elevation, looking south. |
| **Description:** | General view. Note: Heavy vegetation growth obstructing view. Medium crack in north headwall. |

**Photo No: 5-03**

| | |
|---|---|
| **Location:** | East approach, looking west. |
| **Description:** | General view. Note: Grade crossing covers some ties along the east approach. Work Done: Several ties have been replaced since previous cycle. |

**Photo No: 5-04**

| | |
|---|---|
| **Location:** | West approach, looking east. |
| **Description:** | General view. Note: Work Done: Several ties have been replaced since previous cycle. |

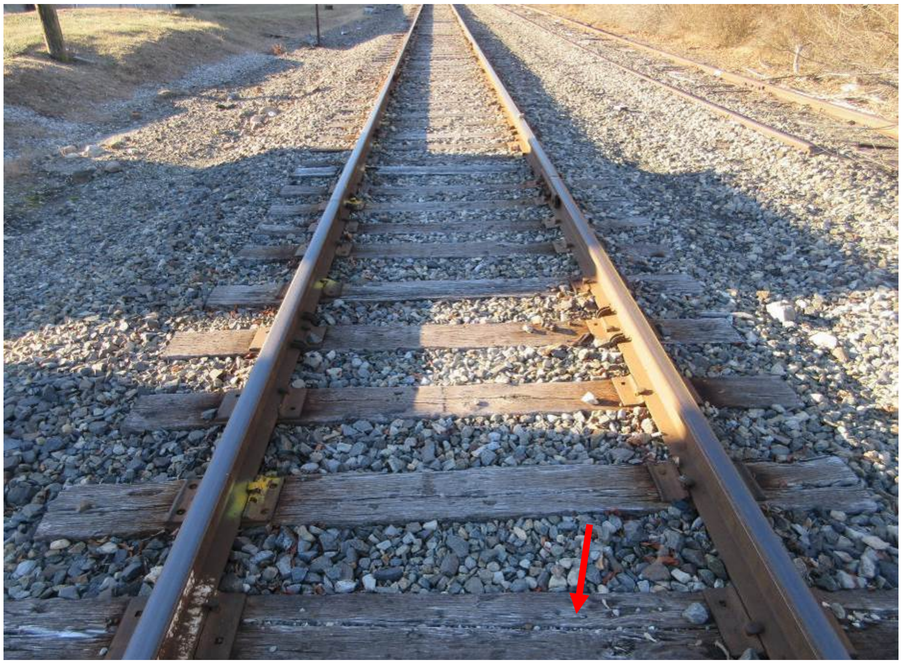


**Photo No: 5-05**

| | |
|---|---|
| **Location:** | Deck ties on bridge, looking west. |
| **Description:** | General view. Note: Severely split and deteriorated ties on bridge (typical on both approaches). |

**Photo No: 5-06**

| | |
|---|---|
| **Location:** | Underside of superstructure, looking south. |
| **Description:** | General view. Note: Spalled concrete and exposed steel rails on underside of concrete deck slab. |

**Photo No: 5-07**

| | |
|---|---|
| **Location:** | West abutment, looking southwest. |
| **Description:** | General view. Note: Missing/deteriorated mortar at various locations throughout wall (typical at east abutment). |

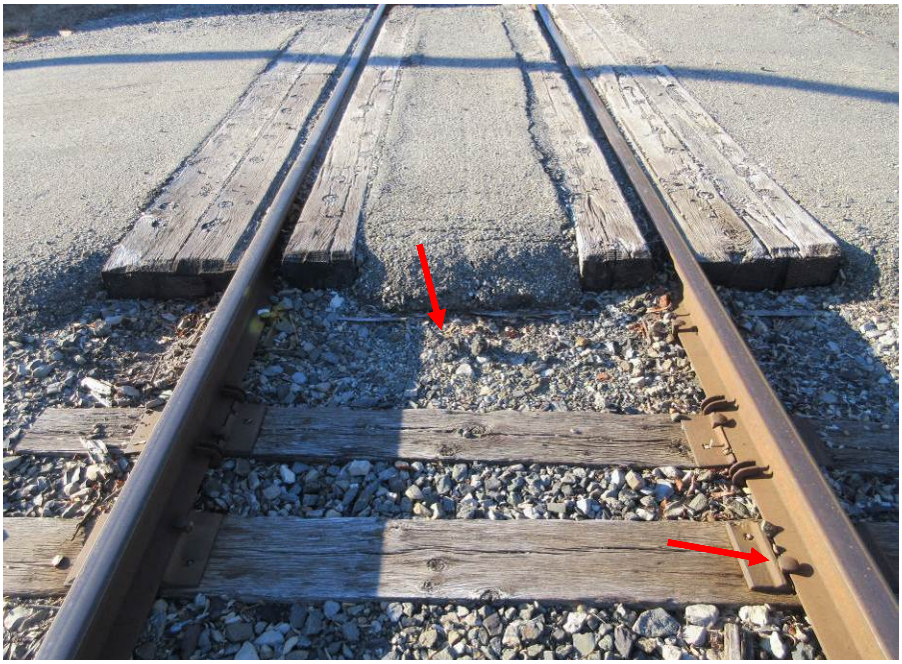


**Photo No: 5-08**

| | |
|---|---|
| **Location:** | Grade crossing at east approach, looking west. |
| **Description:** | One missing timber tie at the east end of the grade crossing. Spike not properly securing tie plate on north rail. |

**Photo No: 5-09**

| | |
|---|---|
| **Location:** | West approach, north rail, looking northeast. |
| **Description:** | Missing spike on inside of rail. |

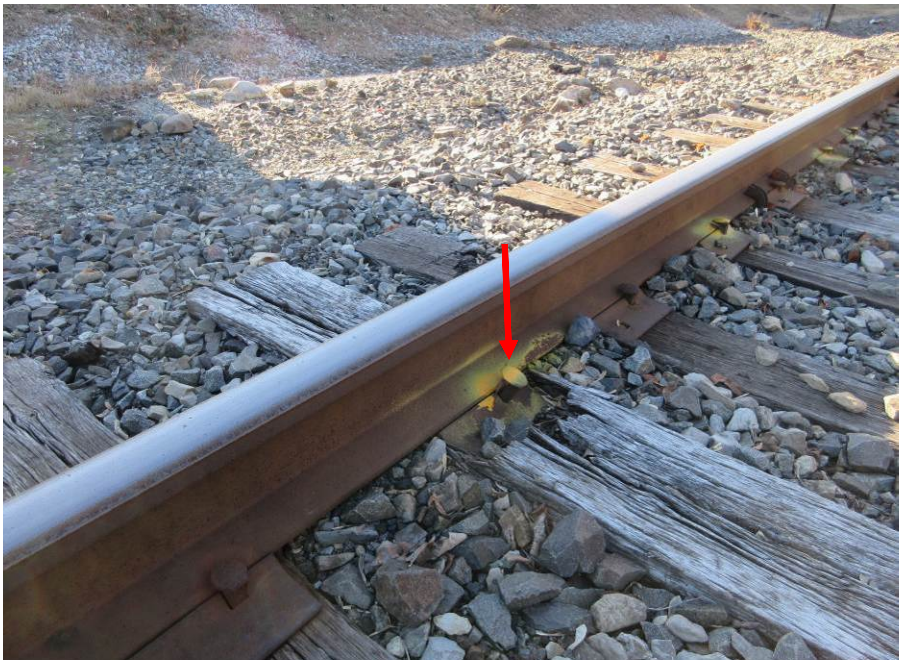


**Photo No: 5-10**

| | |
|---|---|
| **Location:** | South rail on bridge, looking southwest. |
| **Description:** | Raised/bent spike (typical at both approaches) and deteriorated timber tie. |

<table>
<tr><td colspan="2"></td><td><b>Photo No: 5-11</b></td></tr>
<tr><td><b>Location:</b></td><td colspan="2">Underside of concrete deck slab, looking west.</td></tr>
<tr><td><b>Description:</b></td><td colspan="2">Several full width, fine transverse cracks with efflorescence near midspan.</td></tr>
<tr><td colspan="2"></td><td><b>Photo No: 5-12</b></td></tr>
<tr><td><b>Location:</b></td><td colspan="2">Drain at south end of structure, looking south.</td></tr>
<tr><td><b>Description:</b></td><td colspan="2">Exposed bottom flanges of nine steel rails at south end due to concrete spalls on underside of deck slab (typical at north end of structure).</td></tr>
</table>

**Photo No: 5-13**

| | |
|---|---|
| **Location:** | East abutment, north end, looking southeast. |
| **Description:** | Small void near base of wall (typical at west abutment). |

**Photo No: 5-14**

| | |
|---|---|
| **Location:** | East abutment, looking southeast. |
| **Description:** | Displaced stone over drain pipe approximately 15’ from south end of structure. |

**Photo No: 5-15**

| | |
|---|---|
| **Location:** | Northeast wingwall, looking northeast. |
| **Description:** | Void near base of wall and areas of missing mortar (typical at northwest wingwall). |

# APPENDIX 3

# FIELD OBSERVATIONS

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## GENERAL

LINE: Morristown

MILEPOST: 57.25

NAME OF BRIDGE: Drain

NJDOT STRUCTURE NO.: Unknown

CONSULTANT BRIDGE NO.: F19

ROUTE NO.: 4004

DATE: TOP OF DECK: 01/05/16
SUPERSTRUCTURE: 03/04/16
SUBSTRUCTURE: 03/04/16

USRA LINE CODE: 6192

MUNICIPALITY: Hackettstown

COUNTY: Warren

CONSULTANT: Hardesty & Hanover, LLC

CREW CHIEF: R. Zahalan, P.E.

WEATHER: Sunny 01/05/16
Cloudy 03/04/16

CREW MEMBER(S): S. Trelles

TEMPERATURE: 20°F 01/05/16
30°F 03/04/16

TYPE OF BRIDGE: Single span concrete slab with encased steel rails on masonry abutments

YEAR BUILT: 1910

YEAR OF MAJOR REPAIRS: Unknown

WORK DONE: Several ties have been replaced on the east and west approaches (Photos 5-03 and 5-04).

OPEN DECK/[✓ BALLASTED DECK]

ELECTRIFIED/[✓ NON-ELECTRIFIED]

INDEPENDENT BRIDGES: YES/[✓ NO]

BRIDGE # 1 = TRACK # N/A = GIRDERS = N/A
BRIDGE # 2 = TRACK # = GIRDERS =
BRIDGE # 3 = TRACK # = GIRDERS =
BRIDGE # 4 = TRACK # = GIRDERS =

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## GENERAL

### (CONTINUED)

LINE: Morristown

MP: 57.25

[✓ TANGENT]/CURVED TRACK

NO. OF TRACKS: 1 active, 1 abandoned

C/C DISTANCE BETWEEN TRACKS:

TRACK # 1 AND TRACK # 2 : C/C= 13'-3"
TRACK #____ AND TRACK #____ : C/C=____
TRACK #____ AND TRACK #____ : C/C=____

ECCENTRICITY IN TRACK:

N/A

NUMBER 1:____ SOUTH/NORTH
NUMBER 2:____ SOUTH/NORTH
NUMBER 3:____ SOUTH/NORTH
NUMBER 4:____ SOUTH/NORTH

OVERALL RATING OF BRIDGE (G, [✓ F,] P, B): Fair

INDIVIDUAL ELEMENT CODES AND GENERAL OBSERVATIONS OF CONDITIONS:

APPROACHES (G, [✓ F,] P, B) The timber ties typically exhibit moderate checks and splits. A total of six ties are severely rotted and deteriorated and one is missing and require replacement. Few ties have been replaced on the east approach. The rails typically exhibit up to 1/8" lip with a 1/4" lip on the outer edge of the north rail. The tie plates exhibit moderate rust with three tie plates not securing spikes on the east approach. The spikes have minor surface rust and are raised up to 1/2" on both approaches with one raised 1 1/4" and two missing on the west approach. The ballast is clean and of adequate depth.

DECK (G, [✓ F,] P, B): The timber ties typically exhibit minor checks and splits. A total of five ties exhibit wide splits and checks and require replacement. Several ties have been replaced since the previous inspection. There is moderate rust on the tie plates and spikes. Several spikes are raised up to 1/2". The north track has been abandoned and was previously cut off over the structure for approximately 20 LF. The rails exhibit up to 1/8" lip on the outer edges.

SUPERSTRUCTURE (G, [✓ F,] P, B): The concrete slab exhibits several fine transverse cracks with efflorescence throughout the length of the slab. There are several spalls and delamination on the underside of the slab, partially exposing the bottom flange of six encased steel rails near the north end and nine steel rail bottom flanges near the south end. The exposed steel exhibits minor to moderate corrosion. There is active leakage for half of the slab area. There are fine to medium cracks, light moss growth, and edge spalling on the north headwall extending 1 LF into the slab.

SUBSTRUCTURE ([✓ G,] F, P, B): The stone masonry abutments exhibit few areas of missing and deteriorated mortar with a small void at the north end of the east abutment and the south end of the west abutment near the base of the walls. There is a displaced stone 15' from the south end of the east abutment. The top concrete portion of the east wall exhibits several fine vertical cracks throughout with minor scaling at isolated locations (5 SF at north half). The north wingwalls exhibit some areas of missing mortar/small voids with heavy debris, moderate vegetation and moss growth.

WATERWAY ([✓ G,] F, P, B): The waterway beneath the structure was dry at the time of inspection. The streambed is silted and there was no erosion or scour evident. The streambed has a low susceptibility to scour.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### EAST

LINE: Morristown MP: 57.25 PHOTOS: 5-03, 5-08

[✓ TANGENT] / CURVED TRACK GRADE: -0.37% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT:______ LENGTH:______

CONDITION: N/A

WEIGHT OF RAIL: 105 LB/YD WELDED / [✓ JOINTED]

RAILS: CONDITION: North Rail: 1/4" lip on outer edge, 1/16" lip on inner edge.
South Rail: 1/8" lip on outer edge.

*No passenger train service west of Hackettstown station

PUMPING: RAILS: YES / NO*

TRACK:____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______

TIES: YES / NO*

TRACK:____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______

TIE SIZE: LENGTH: 8'-6" WIDTH: Varies 8"-9" DEPTH: 7"

TIES: C/C OF TIES: Varies 18"-28" NO. NEEDING REPLACEMENT: 1 of 30

CONDITION Ties typically exhibit minor to moderate spits and checks throughout. Most ties on the east approach are covered by a grade crossing (Photo 5-03). One (1) tie is missing adjacent to the grade crossing (Photo 5-08). Work Done: Few (3) ties have been replaced since previous inspection cycle (Photo 5-03).

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### EAST/CONTINUED

LINE: Morristown

MP: 57.25

PHOTOS: 5-08

TIE PLATES: NO. MISSING: 0

NO. LOOSE: 2

CONDITION: Tie plates exhibit moderate rust throughout. Two (2) spikes are not securing tie plates, 15' from the grade crossing. One (1) spike is not securing tie plate, 2' from grade crossing (Photo 5-08).

TIE PADS: YES / [✓ NO]

CONDITION: N/A

SPIKES: CONDITION: Spikes exhibit minor surface rust throughout. 20% of spikes are raised 1/4"-1/2".

BALLAST: [✓ CLEAN] / UNCLEAN

ADEQUATE DEPTH: [✓ YES] / NO

DESCRIPTION: Stable/flat

SHOULDERS: (CONDITIONS): SOUTH: Stable/flat

NORTH: Stable/flat

TRACK TO BE RAISED / LOWERED: YES / [✓ NO]

LOW APPROACH / SAG: YES / [✓ NO]

NO TRESPASSING SIGNS:

[✓ NONE]

YES LOCATION: N/A

OTHER OBSERVATIONS: There is a grade crossing adjacent to the bridge on the east approach. The north track is no longer in service.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### WEST

LINE: Morristown
MP: 57.25
PHOTOS: 5-04

[✓ TANGENT] / CURVED TRACK
GRADE: -0.37%
TOWARD EAST/[✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED
WEIGHT: ____
LENGTH: ____

CONDITION: N/A

WEIGHT OF RAIL: 105 LB/YD
WELDED / [✓ JOINTED]

RAILS: CONDITION: North Rail: 1/8" lip on outer edge; 1/16" lip on inner edge.
South Rail: 1/8" lip on outer edge; 1/16" lip on inner edge.

*No passenger train service west of Hackettstown station.

PUMPING: RAILS: YES / NO *

| | | | |
|---|---|---|---|
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |

TIES: YES / NO *

| | | | |
|---|---|---|---|
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| TRACK: ____ | NORTH RAIL: | AMOUNT: ____ | LENGTH: ____ |
| | SOUTH RAIL: | AMOUNT: ____ | LENGTH: ____ |

TIE SIZE: LENGTH: 8'-6" WIDTH: Varies 8"-9" DEPTH: 7"

TIES: C/C OF TIES: Varies 16"-26"
NO. NEEDING REPLACEMENT: 6 of 30

CONDITION Ties typically exhibit minor to moderate checks and splits throughout. Six (6) ties exhibit wide splits and checks and require replacement. Work Done: Several (9) ties have been replaced since previous cycle (Photo 5-04).

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### WEST/CONTINUED

LINE: Morristown MP: 57.25 PHOTOS: 5-09

TIE PLATES: NO. MISSING: 0 NO. LOOSE: 3
CONDITION: Tie plates exhibit moderate rust throughout.

TIE PADS: YES / [✓ NO]
CONDITION: N/A

SPIKES: CONDITION: One (1) spike raised 1 1/4". 15% raised ±1/4". Two (2) spikes are missing on the north rail one on outside of rail, one on inside of rail) (Photo 5-09). Spikes exhibit moderate surface rust.

BALLAST: [✓ CLEAN] / UNCLEAN ADEQUATE DEPTH: [✓ YES] / NO
DESCRIPTION:

SHOULDERS: (CONDITIONS): SOUTH: Stable/flat

NORTH: Stable/flat

TRACK TO BE RAISED / LOWERED: YES / [✓ NO]

LOW APPROACH / SAG: YES / [✓ NO]

NO TRESPASSING SIGNS:
[✓ NONE]
YES LOCATION: N/A

OTHER OBSERVATIONS: Ballast is overspilling ties on outside of rails.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## SUPERSTRUCTURE SPAN NO. Single

LINE: Morristown MP: 57.25 PHOTOS: 5-10

TRACK NUMBER: 1 (active) OPEN / [✓ BALLASTED] [✓ TANGENT] / CURVED TRACK

SPAN TYPE: Single span concrete slab with encased steel rails SPAN LENGTH: 11.63' c/c

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT:________ LENGTH:________

CONDITION: N/A

CONDITION OF RAILS: North Rail: 1/16" lip on outer edge.
South Rail: 1/8" lip on outer edge.

*No passenger train service west of Hackettstown station

PUMPING: RAILS: YES / NO *

TRACK:____ NORTH RAIL: AMOUNT:________ LENGTH:________
SOUTH RAIL: AMOUNT:________ LENGTH:________
TRACK:____ NORTH RAIL: AMOUNT:________ LENGTH:________
SOUTH RAIL: AMOUNT:________ LENGTH:________
TRACK:____ NORTH RAIL: AMOUNT:________ LENGTH:________
SOUTH RAIL: AMOUNT:________ LENGTH:________
TRACK:____ NORTH RAIL: AMOUNT:________ LENGTH:________
SOUTH RAIL: AMOUNT:________ LENGTH:________

TIES: YES / NO *

TRACK:____ NORTH RAIL: AMOUNT:________ LENGTH:________
SOUTH RAIL: AMOUNT:________ LENGTH:________
TRACK:____ NORTH RAIL: AMOUNT:________ LENGTH:________
SOUTH RAIL: AMOUNT:________ LENGTH:________
TRACK:____ NORTH RAIL: AMOUNT:________ LENGTH:________
SOUTH RAIL: AMOUNT:________ LENGTH:________
TRACK:____ NORTH RAIL: AMOUNT:________ LENGTH:________
SOUTH RAIL: AMOUNT:________ LENGTH:________

TIE SIZE: LENGTH: 8-6" WIDTH: Varies 8"-9" DEPTH: 7"

TIES: C/C OF TIES: Varies 17"-22" NO. NEEDING REPLACEMENT: 5 of 9

CONDITION Ties typically exhibit minor to moderate splits and checks. Five (5) ties exhibit wide splits with rot and deterioration and require replacement (Photo 5-10).

RIBBON GUARD / TIE YES / [✓ NO] TYPE AND SIZE: N/A
SPACER BLOCKS: YES / [✓ NO]

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## SUPERSTRUCTURE SPAN NO. Single

## (CONTINUED)

LINE: Morristown MP: 57.25 PHOTOS: 5-10

BACKWALL TIES: SIZE: N/A CONDITION:

TIE PLATES: NO.MISSING: 0 NO.LOOSE: 0
CONDITION: Tie plates exhibit moderate rust throughout.

TRACKS SHIMMED: YES / [✓ NO]

TIE PADS: YES / [✓ NO] CONDITION: N/A

CONDITION OF SPIKES: Spikes typically exhibit moderate rust. ±8 spikes are raised up to 1/2" (Photo 5-10).

CONDITION OF ANCHOR / J-HOOK BOLTS: None

BALLAST: DEPTH: ±9" [✓ CLEAN] / UNCLEAN

WALKWAYS: STEEL / TIMBER / UNDEFINED
LOCATION: N/A
CONDITION:

HANDRAILS: STEEL / TIMBER / UNDEFINED
CONDITION: N/A

CONDITION OF PARAPET WALLS / CURBS: N/A

MILEAGE BOARDS: YES: LOCATION: N/A
[✓ NO] / NEEDED: LOCATION:
OBSTRUCTIONS: [✓ NO] / YES: TYPE AND DISTANCE: N/A

OTHER OBSERVATIONS: North track has been abandoned and was previously cut off over the structure for approximately 20 LF.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## CONCRETE DECK SLAB

LINE: Morristown

MP: 57.25

PHOTOS: 5-02, 5-06, 5-11, 5-12

SPAN: 1

SPAN LENGTH: 11.63' c/c

WATER LEAKAGE [✓ YES] / NO

%DECK AREA 50%

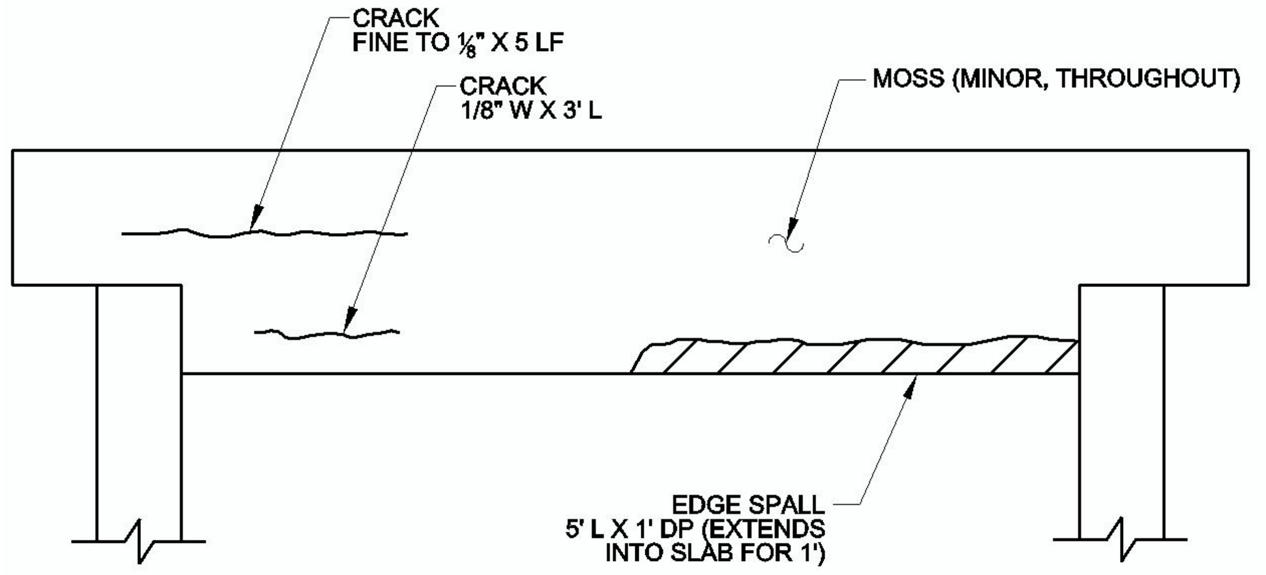
SUFFICIENT CURB HEIGHT: [✓ YES] / NO
(BALLAST OVERFLOW)

CRACKS: Several fine transverse cracks with efflorescence throughout for the full width of the deck (Photo 5-11).

SPALLS: North End: Several spalls on the underside of the slab, exposing the bottom flanges of 6 encased steel rails (20 SF total). Delaminated areas beneath two (2) steel rails (4 SF)(Photo 5-06).
South End: Spalls on underside of slab expose the bottom flanges of nine (9) steel rails for full width (Photo 5-12).
See concrete deck slab defects sketch on the following page for more details.

OTHER OBSERVATIONS: There is active leakage for ±50% of deck underside. Minor to moderate corrosion on exposed portions of rails. The bottom flanges of the rails are 4" wide and are spaced 12" c/c.
The north headwall has minor moss growth throughout with minor edge spalling at the west end extending 1' into the slab. There are two (2) fine to 1/8" wide horizontal cracks at the east end of the wall (Photo 5-02).
See sketch below for details.
Note: Previously noted that first interior rail is 2'-0" from north fascia (not exposed).

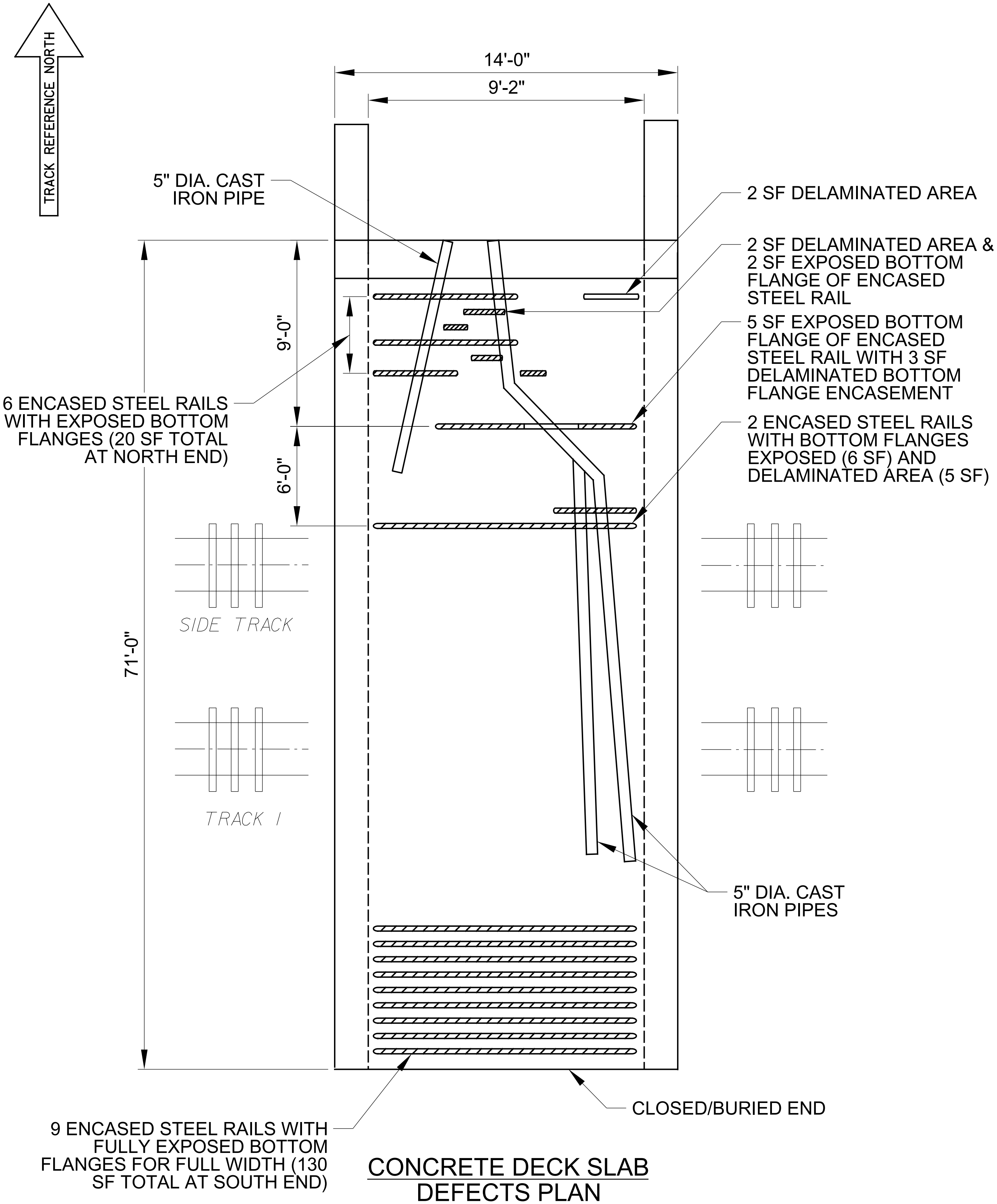
SKETCH (IF NEEDED):



NORTH ELEVATION

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

LINE MORRISTOWN MP 57.25 PHOTOS 5-06, 5-11, 5-12



### CONCRETE DECK SLAB DEFECTS PLAN

N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ABUTMENT BREASTWALL

### EAST

LINE: Morristown MP: 57.25 PHOTOS: 5-13, 5-14

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / [✓ STONE] / BRICK / TIMBER

LENGTH: 71'-0" HEIGHT: 3'-6"

WIDTH: AT BEARING: Not visible AT GROUND LEVEL: Unknown

STRUCTURAL CRACKS: SIZE:___ WIDTH:___ LOCATION:___
Minor, see below. SIZE:___ WIDTH:___ LOCATION:___
SIZE:___ WIDTH:___ LOCATION:___

CONDITIONS: Top of wall (±12" H) is plain concrete. Concrete exhibits several fine vertical cracks throughout with minor scaling at isolated locations (±5 SF throughout north half). The bottom portion of the abutment is stone masonry and exhibits missing/deteriorated mortar at few locations throughout (25 LF total). There is a small void at the north end of the abutment near the base of the wall (4" Ø x 5" DP) and there is a displaced stone (4 SF) above the drain pipe approximately 15' from the south end (Photos 5-13 and 5-14).

CONDITION OF BEARING SEAT: Not visible

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION: None

GRAFFITI: YES / [✓ NO] [✓ PLUMB] / TILT:

FOUNDATION CONDITIONS: Not visible.

TRAFFIC PROTECTION: YES CONDITION:
[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: None

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ABUTMENT BREASTWALL

### WEST

LINE: Morristown

MP: 57.25

PHOTOS: 5-07

TYPE: REINFORCED CONCRETE / [✓ PLAIN CONCRETE] / [✓ STONE] / BRICK / TIMBER

LENGTH: 71'-0"

HEIGHT: 3'-6"

WIDTH: AT BEARING: Not visible

AT GROUND LEVEL: Unknown

STRUCTURAL CRACKS: SIZE: WIDTH: LOCATION:

Minor, see below. SIZE: WIDTH: LOCATION:

SIZE: WIDTH: LOCATION:

CONDITIONS: Top of wall (±12" H) is plain concrete. Concrete exhibits several fine vertical cracks and isolated areas of scaling throughout. Bottom portion of abutment is stone masonry and exhibits missing/deteriorated mortar for 30 LF throughout Photo 5-07. There is a 5" Ø x 1' deep void approximately 35' from the south end of the structure near the base of the wall.

CONDITION OF BEARING SEAT: Not visible.

PUMPING DUE TO LOAD: YES / [✓ NO]

DESCRIPTION: None

GRAFFITI: YES / [✓ NO]

[✓ PLUMB] / TILT:

FOUNDATION CONDITIONS: Not visible.

TRAFFIC PROTECTION: YES

CONDITION:

[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: N/A

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

**[✓ EAST] / WEST**
**[✓ NORTH] / SOUTH**

LINE: Morristown
MP: 57.25
PHOTOS: 5-15

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: 2'-4" to 4'-0"
WIDTH: 2'-5"
LENGTH: 4'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: 1-3" ∅ trees, heavy debris, and brush
LOCATION: On top, behind, and in front of wall

CONDITIONS: Moderate tree and vegetation growth with heavy debris. Missing mortar for 2 LF at top of wall near the north end and 2 LF at base of wall near center (creating 8" deep void) (Photo 5-15). There is minor moss growth covering 25% of the face of the wall, and the base of the wall is partially buried.

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO]
[✓ PLUMB] / TILT:
TRAFFIC PROTECTION: YES
CONDITION:
[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: Large rocks on top of wall.

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

**EAST / [✓ WEST]**
**[✓ NORTH] / SOUTH**

LINE: Morristown MP: 57.25 PHOTOS: ---

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: 4'-0" WIDTH: Not visible - buried LENGTH: Not visible - buried

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: 1-3" ∅ trees and brush LOCATION: On top, behind, and in front of wall

CONDITIONS: Moderate tree and vegetation growth with heavy debris. Void (1 SF x 4" deep) near base of wall (total area of voids = 2 SF). Minor moss growth on wall, covering ±50% of the visible portion of the wall. Base of wall is partially buried.

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO] [✓ PLUMB] / TILT:

TRAFFIC PROTECTION: YES CONDITION:

[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: None

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WATERWAY BENEATH BRIDGE

LINE: Morristown MP: 57.25 PHOTOS: ---

SOUNDINGS: REFER TO SOUNDINGS PROFILE SHEET

FLOW DIRECTION: South to north TIDAL: YES / [✓ NO]

STREAM CONDITIONS:

EMBANKMENTS:

UPSTREAM: Completely buried. Primary inlet opening has been backfilled. There is a small inlet at the south end.

DOWNSTREAM: Heavily vegetated throughout. Banks are stable, and there is a wide/flat floodplain.

SCOUR: None observed.

UNDERMINING: None observed.

EROSION: None observed.

STREAM BED PROTECTION: YES / [✓ NO]

DESCRIPTION: N/A

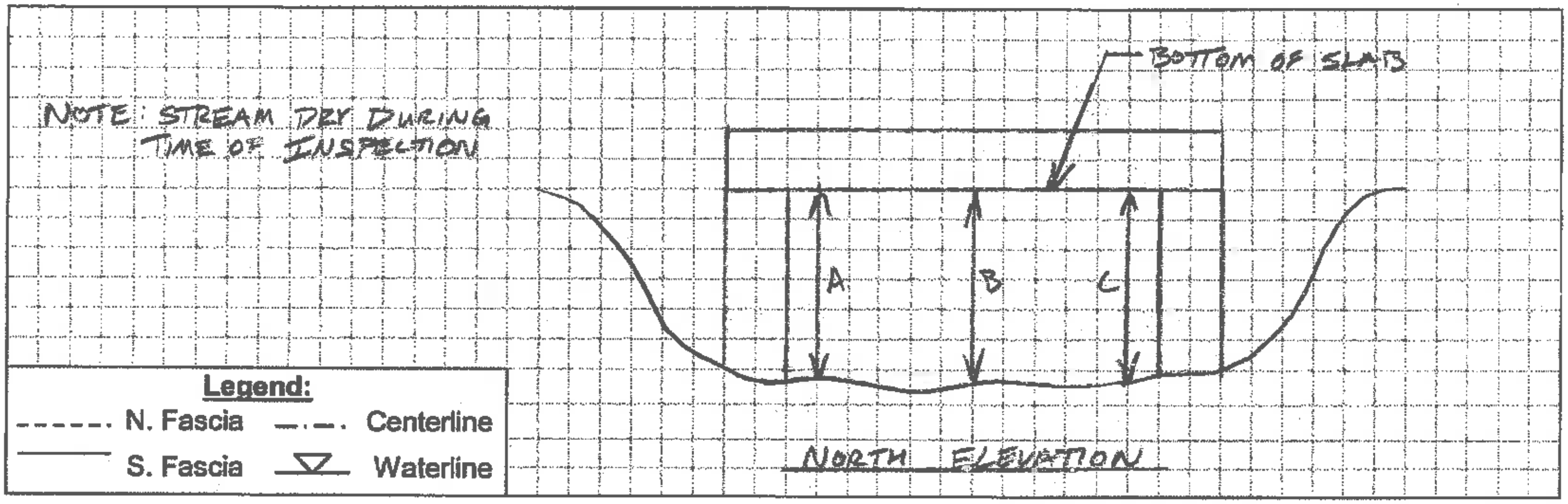
UNDERWATER INSPECTION REQUIRED: YES / [✓ NO]

OTHER OBSERVATIONS: Stream was completely dry at the time of inspection. Streambed is silted with large rocks/ boulders near the east side at the north end. There are two (2) 5" Ø pipes lying in the streambed.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS – FIELD NOTES

## SOUNDINGS PROFILES

LINE MORRISTOWN MP 57.25 NAME: OVER DRAIN


NOTE: STREAM DRY DURING TIME OF INSPECTION

SPAN:

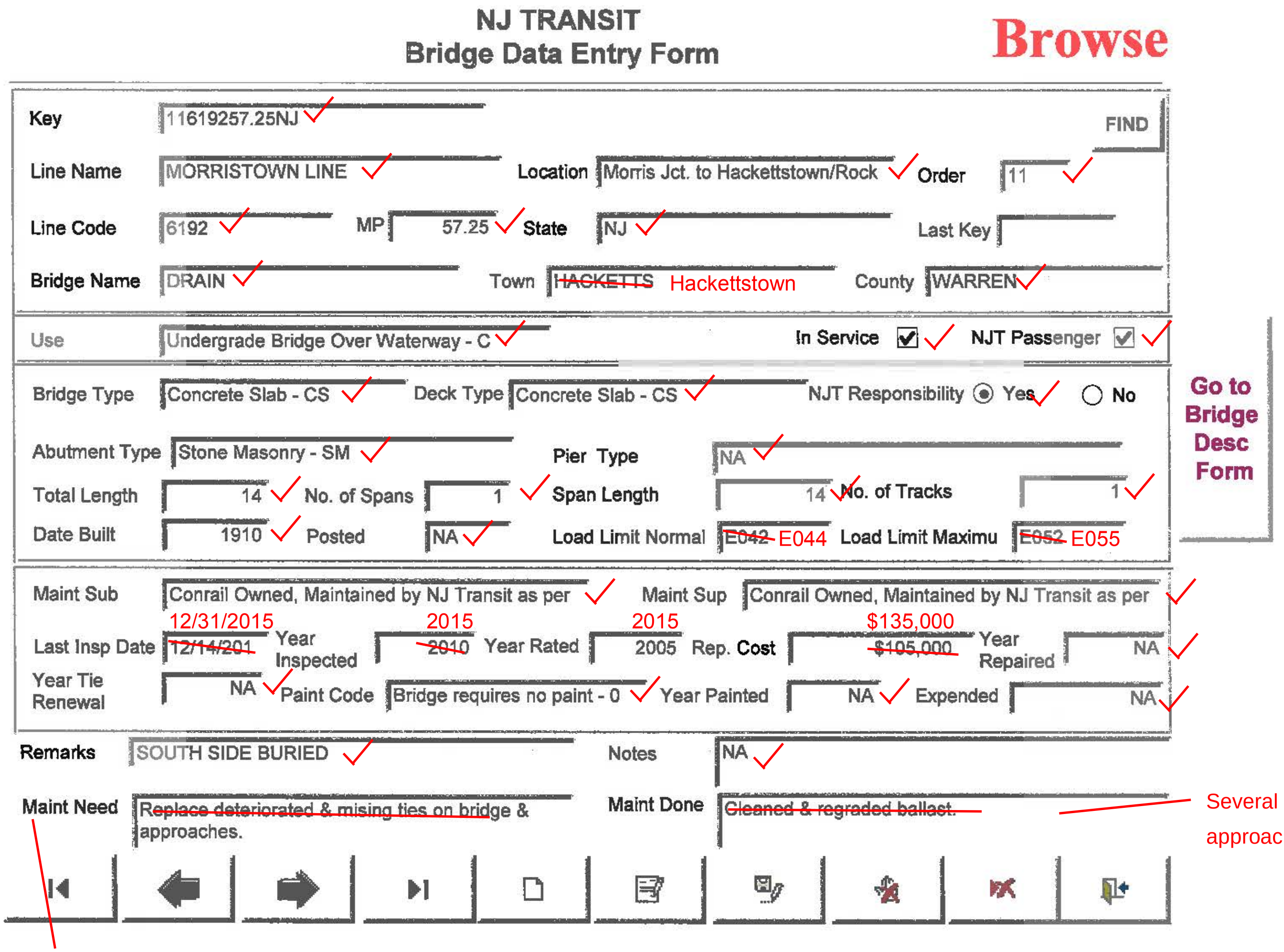
| Cycle | BY | DATE | ALONG SOUTH FASCIA | | | | ALONG CENTERLINE | | | ALONG NORTH FASCIA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | A | B | C | A | B | C | D |
| 1 | | | | | | | | | | | | | |
| 2 | HATCH MOTT MACDONALD | 2/22/01 | | | | | | | | 2'-4" | 4'-0" | 2'-4" | |
| 3 | EDWARDS & KELLEY | 8/8/06 | | | | | | | | 2'-5" | 3'-9" | 2'-4" | |
| 4 | HNTB | 2/14/11 | | | | | | | | 2'-7" | 3'-7" | 3'-0" | |
| 5 | HARDESTY & HANOVER | 3/4/16 | — | — | — | | 3'-3" | 3'-2" | 3'-2" | 2'-7" | 3'-6" | 2'-9" | |

SPAN:

| Cycle | BY | DATE | ALONG SOUTH FASCIA | | | | ALONG CENTERLINE | | | ALONG NORTH FASCIA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | A | B | C | A | B | C | D |
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |

# APPENDIX 4

# BRIDGE MANAGEMENT SYSTEM INPUT FORMS



## NJ TRANSIT
## Bridge Data Entry Form

**Browse**

Key: 11619257.25NJ ✓

Line Name: MORRISTOWN LINE ✓

Location: Morris Jct. to Hackettstown/Rock ✓

Order: 11 ✓

Line Code: 6192 ✓

MP: 57.25 ✓

State: NJ ✓

Last Key:

Bridge Name: DRAIN ✓

Town: ~~HACKETTS~~ Hackettstown

County: WARREN ✓

Use: Undergrade Bridge Over Waterway - C ✓

In Service ☑ ✓

NJT Passenger ☑ ✓

Bridge Type: Concrete Slab - CS ✓

Deck Type: Concrete Slab - CS ✓

NJT Responsibility ● Yes ✓ ○ No

Abutment Type: Stone Masonry - SM ✓

Pier Type: NA ✓

Total Length: 14 ✓

No. of Spans: 1 ✓

Span Length: 14 ✓

No. of Tracks: 1 ✓

Date Built: 1910 ✓

Posted: NA ✓

Load Limit Normal: ~~E042~~ E044

Load Limit Maximu: ~~E052~~ E055

Maint Sub: Conrail Owned, Maintained by NJ Transit as per ✓

Maint Sup: Conrail Owned, Maintained by NJ Transit as per ✓

Last Insp Date: ~~12/14/201~~ 12/31/2015

Year Inspected: ~~2010~~ 2015

Year Rated: 2005 2015

Rep. Cost: ~~$105,000~~ $135,000

Year Repaired: NA ✓

Year Tie Renewal: NA ✓

Paint Code: Bridge requires no paint - 0 ✓

Year Painted: NA ✓

Expended: NA ✓

Remarks: SOUTH SIDE BURIED ✓

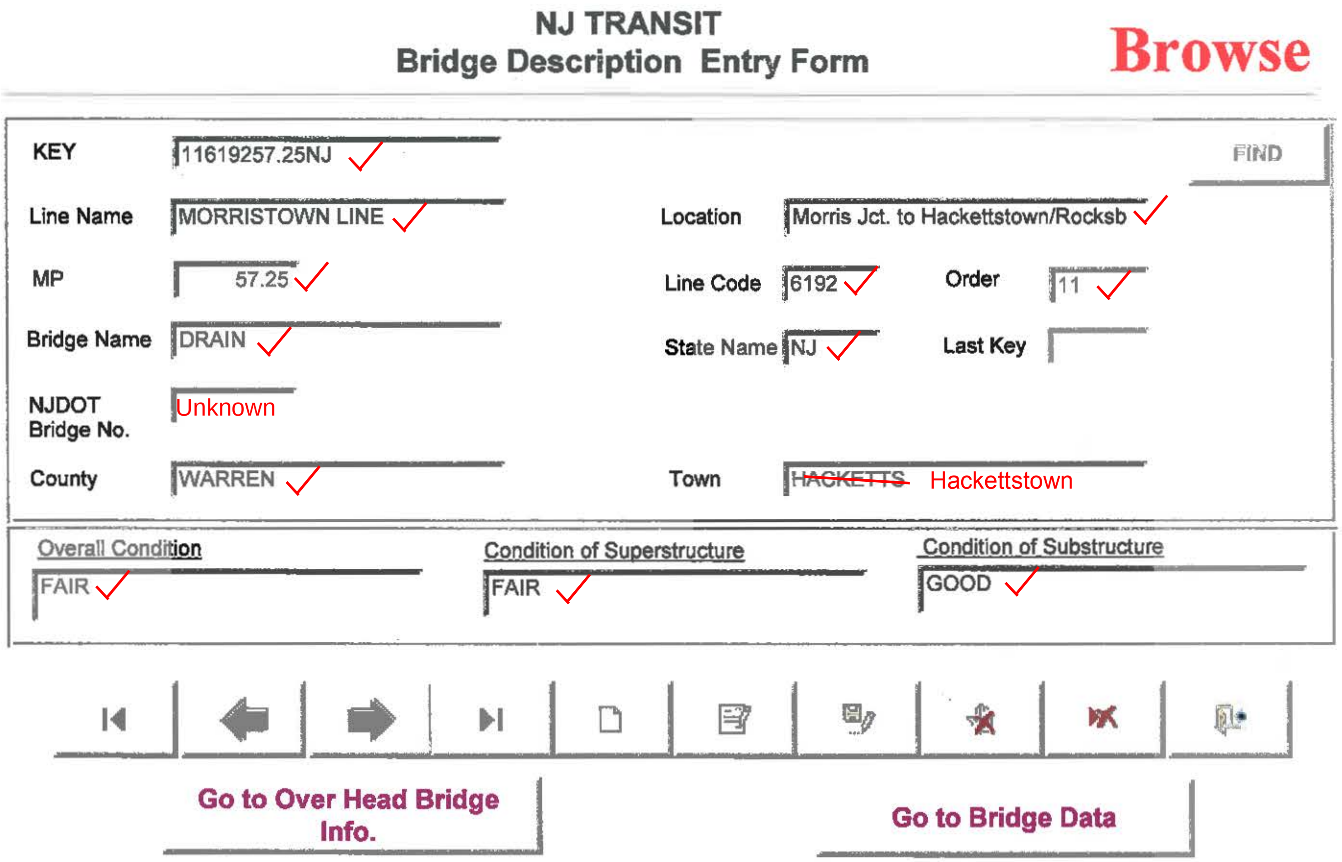
Notes: NA ✓

Maint Need: ~~Replace deteriorated & mising ties on bridge &~~ approaches.

Maint Done: ~~Cleaned & regraded ballast.~~

Several ties have been replaced on the approaches.

1. Install a waterproofing membrane throughout the slab and provide adequate drains in the slab.
2. Remove all unsound concrete, clean and paint any exposed steel rails and repair the spalls in the slab and north headwall with epoxy concrete.
3. Seal the medium crack in the north headwall with a pressure injected epoxy sealer.
4. Fill the voids with epoxy concrete at the north wingwalls and both abutments.
5. Repoint the deteriorated and missing mortar throughout the abutments and the north wingwalls.
6. Replace the severely split and missing ties on the bridge and along both approaches.
7. Secure the loose tie plates and raised spikes and replace the missing spikes on the bridge and along both approaches.
8. Remove vegetation growth at the north elevation.



NJ TRANSIT
Bridge Description Entry Form

Browse

KEY: 11619257.25NJ ✓

Line Name: MORRISTOWN LINE ✓

Location: Morris Jct. to Hackettstown/Rocksb ✓

MP: 57.25 ✓

Line Code: 6192 ✓

Order: 11 ✓

Bridge Name: DRAIN ✓

State Name: NJ ✓

Last Key:

NJDOT Bridge No.: Unknown

County: WARREN ✓

Town: ~~HACKETTS~~ Hackettstown

Overall Condition: FAIR ✓

Condition of Superstructure: FAIR ✓

Condition of Substructure: GOOD ✓

# NEW JERSEY TRANSIT CORPORATION

# BRIDGE EVALUATION SURVEY REPORT

## MORRISTOWN LINE MP 57.49
## OVER CATTLE PASS BRIDGE
## HACKETTSTOWN, WARREN COUNTY

**ROUTE NUMBER: 4004**
**USRA LINE CODE: 6192**

**NJDOT STRUCTURE NO.: UNKNOWN**

**FIFTH CYCLE**

**DATE OF INSPECTION:**

**DECEMBER 31, 2015**

**Prepared by:**

**Hardesty & Hanover, LLC**
**850 Bear Tavern Road, Suite 206**
**West Trenton, NJ 08628**

Hardesty
&Hanover
*engineering that moves you*

850 Bear Tavern Road, Suite 206, West Trenton, NJ 08628
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www.hardesty-hanover.com

July 20, 2016

Ms. Lisa Fanning, PE
Assistant Chief Engineer – Structures
Infrastructure Engineering – Structures Department
New Jersey Transit Corporation
One Penn Plaza East
Newark, New Jersey 07105-2246

Re: Bridge Inspection Survey and Evaluation
Morristown Line MP 57.49 over Cattle Pass
Hackettstown, Warren County
NJDOT Structure No. Unknown
Contract No. 14-051F - Group F

Dear Ms. Fanning,

In accordance with Undergrade Bridge Inspections Contract No. 14-051F, Group F, Purchase Order No. L-92549, dated December 23, 2015, we are pleased to submit a total of three (3) **FINAL REPORTS** of the bridge inspection for the above-referenced structure.

The in-depth inspection of the above referenced structure was done in accordance with established accepted practices, however there is no representation made that all defects have been disclosed or discovered. The report presented herein is based upon a thorough inspection of the bridge for the primary purpose of identifying important changes in condition and behavior, which have occurred since the previous inspection. Recommendations for the repair of major defects and load rating analyses are included based on inspection findings. The bridge was inspected in accordance with New Jersey Transit guidelines and current AREMA standards by an NBIS qualified team leader and crew. The report has been reviewed in accordance with the approved quality management system, per the project agreement and our scope of work.

If you have any questions or comments, please contact me at 609-583-5023.

Very truly yours,
HARDESTY & HANOVER, LLC

Paul J. Connolly, PE
Principal Associate

Enclosures:
cc: Mr. Paul Falkowski, PE (w/enclosures)

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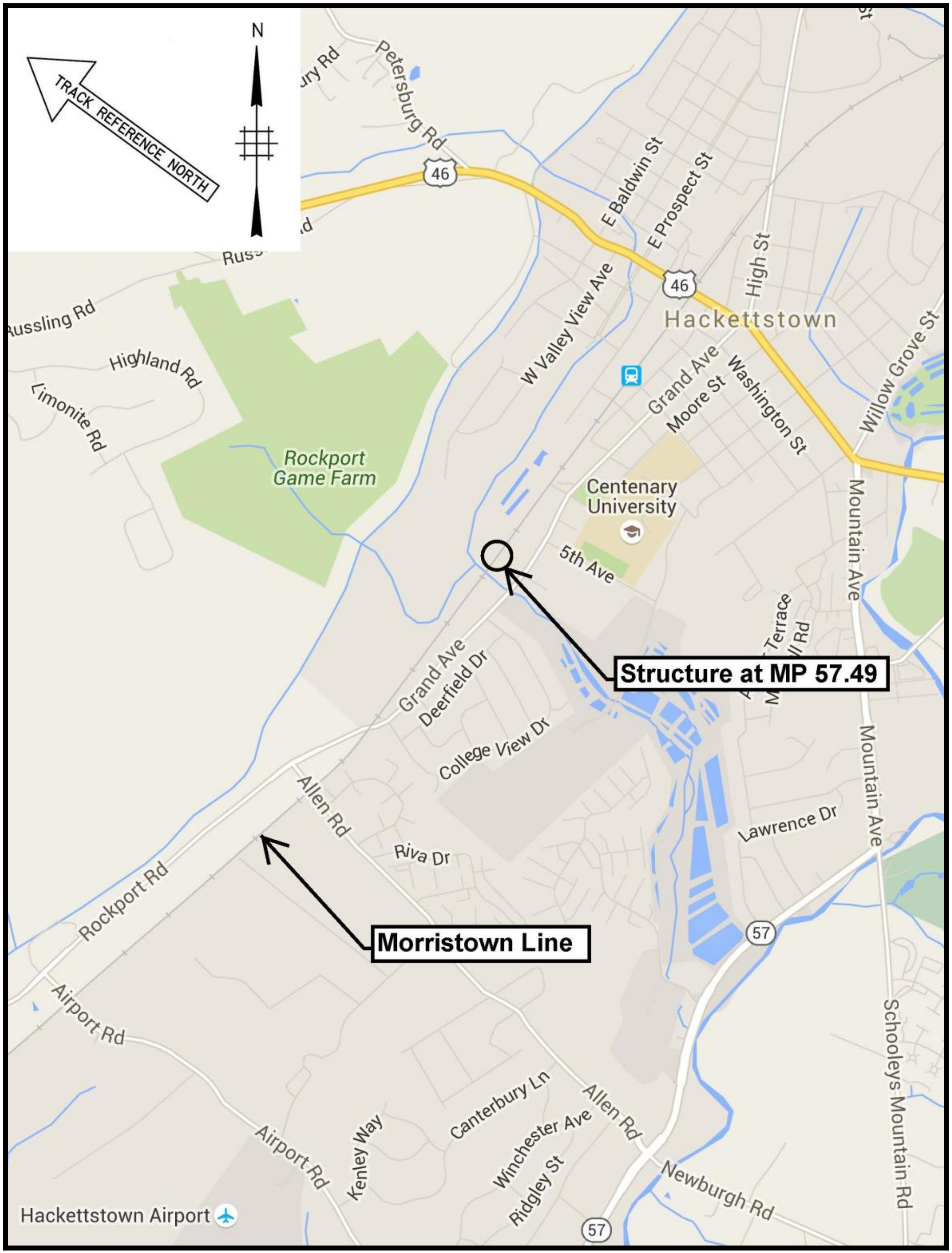
**Page No.**

# BRIDGE LOCATION MAP



NJ TRANSIT
The Way To Go.

LOCATION MAP
MORRISTOWN LINE MP 57.49
Over CATTLE PASS
HACKETTSTOWN, WARREN COUNTY
NEW JERSEY

**Hardesty & Hanover, LLC**

DATE: 01/05/2016

# STRUCTURAL DATA SHEET

# NEW JERSEY TRANSIT
## INFRASTRUCTURE ENGINEERING – STRUCTURES
## BRIDGE EVALUATION SURVEY REPORT
## CYCLE NO. 5

## STRUCTURAL DATA

**NJDOT Structure No.:** Unknown

**USRA Line Code:** 6192

**Route No.:** 4004

**Line:** Morristown

**MP & Name:** MP 57.49 over Cattle Pass

**Year Built:** 1927 **Year Rehab:** N/A

**Length:** 16'-5" **Width:** 71'-0"

**Date of this Evaluation:** 01/05/2016
**By:** Hardesty & Hanover, LLC

**Date of Previous Evaluation:** 12/14/2010
**By**: HNTB Corporation

**Structure Type:** Single span reinforced concrete slab

**Special Equipment Used:** None

**OVERALL CONDITION:** Fair
SUPERSTRUCTURE (ARCH) CONDITION: Fair
SUBSTRUCTURE CONDITION: Fair

**WORK DONE:** None.

**RATINGS:** The following load ratings were computed in the 3rd Cycle Bridge Evaluation Survey Report and have not been affected by the as-inspected conditions found during this 5th Cycle Inspection. The ratings have been recalculated during this 5th Cycle inspection due to the revised impact value:

| | **Controlling Member** | **As-Built** | **As-Inspected** |
|---|---|---|---|
| **Normal:** | Concrete Slab (Shear) | E-50 | E-50 |
| **Maximum:** | Concrete Slab (Shear) | E-63 | E-63 |

# CONCLUSIONS AND RECOMMENDATIONS

## CONCLUSIONS AND RECOMMENDATIONS

Morristown Line MP 57.49 over Cattle Pass consists of a single span reinforced concrete slab supported on stone masonry/concrete abutments. The bridge carries one active track on a ballasted deck. The overall condition of the structure is fair.

The approaches are in fair condition. The timber ties typically exhibit moderate checks and splits. A total of eight ties exhibit severe splits and rot on both approaches and one tie is missing at the east approach. The rails exhibit moderate rust and up to a 1/8" lip. There are two loose tie plates at each approach and several spikes raised up to 1 1/2". The tie plates and spikes exhibit moderate rust. The south embankments exhibit moderate erosion near the bridge. The ballast is clean and of adequate depth.

The deck components are in fair condition. The timber ties exhibit minor checks and splits. The rails exhibit up to a 1/8" lip. The tie plates and spikes exhibit moderate rust throughout. There are two loose tie plates and several spikes are raised up to 1 1/2". The parapets exhibit spalls up to 4" deep and cracks up to 1/8" wide with missing bricks and waterproofing liner along the north parapet. The ballast is clean and of adequate depth.

The superstructure is in fair condition. The concrete slab exhibits deteriorated asphaltic waterproofing that is peeling off throughout the underside of the slab. There is fine map cracking throughout the underside with minor efflorescence. There are several small popouts with exposed rebar and water staining throughout the underside. The south panel exhibits spalls and fine to medium cracks with efflorescence on the fascia. The north fascia is in good condition with minor scaling.

The substructure is in fair condition. The stone masonry abutments exhibit areas of missing and deteriorated mortar, missing stones, and areas of small voids up to 24" deep. The concrete portion of the abutments exhibits 1/8" wide cracks and spalls up to 4" deep. The wingwalls exhibit areas of deteriorated and missing mortar with voids up to 24" deep and heavy debris accumulation in front for the full length. There is a broken stone at the top of the northwest wingwall. There is heavy vegetation with light moss growth on the north wingwalls and ballast overspilling the south wingwalls.

The track is tangent and is on a 0.37% downgrade toward the west. There are no obstructions to the horizontal track clearance on the structure.

The inspection survey indicates that no significant deterioration affecting the ratings has occurred since the previous inspection. The previous rating results based on assumed steel reinforcement indicate that the structure has insufficient structural capacity to support the standard AREMA Cooper E-80 loading at the Maximum and Normal levels. The controlling as-built and as-inspected ratings for the reinforced concrete slab based on shear are E-50 at the Normal level and E-63 at the Maximum level. NJ Transit equipment loads can be carried without speed restrictions except for the 286 kip cars, which are restricted to 38 mph.

## CONCLUSIONS AND RECOMMENDATIONS (CONTINUED)

We recommend that the following repairs be made to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

1. Replace the severely split and missing ties along both approaches (Photo 5-08).

2. Secure the loose tie plates and raised spikes and replace the missing spikes on the bridge and along both approaches (Photos 5-09 and 5-10).

3. Remove all unsound concrete, clean and paint any exposed reinforcement and repair the spalls in the parapets/slab at both fascias and abutment seat areas with epoxy concrete (Photos 5-09, 5-12, and 5-15).

4. Seal the medium to wide cracks in the parapet and slab at the south fascia and in the east abutment seat area with a pressure injected epoxy sealer (Photos 5-12 and 5-13).

5. Install gabion walls along the southeast and southwest approach shoulders to stabilize the slopes and prevent ballast erosion (Photo 5-12).

6. Fill the voids/missing stones with epoxy concrete throughout the abutments and wingwalls (Photos 5-14, 5-16, and 5-18).

7. Repoint the deteriorated and missing mortar throughout the abutments and wingwalls (Photos 5-14, 5-16, and 5-17).

8. Remove debris accumulation beneath the bridge (Photos 5-02 and 5-17).

9. Install a waterproofing membrane and provide adequate drains throughout the slab (Photos 5-06 and 5-11).

10. Remove graffiti from both abutment breastwalls and the southeast wingwall and remove vegetation behind the north wingwalls (Photos 5-16 and 5-17).

11. Since this structure no longer functions as a cattle pass, and due to low ratings based on assumed steel reinforcement, consideration should be given to fill in under the structure.

12. The structure should be re-inspected during the next regularly scheduled period.

# COST ESTIMATE SUMMARY AND WORK SHEETS

## COST ESTIMATE AND BACK-UP WORKSHEETS

DISCLAIMER: The provided cost estimates are for scoping purposes only and shall not be construed as actual construction costs.

### ESTIMATED REPAIR COSTS

| ITEM NO. | REPAIR RECOMMENDATION | UNIT | QUANTITY | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|
| 1 | REPLACE THE SEVERELY SPLIT & MISSING TIES ALONG BOTH APPROACHES | EACH | 9 | $415 | $3,735 |
| 2 | SECURE THE LOOSE TIE PLATES AND RAISED SPIKES ON THE BRIDGE & ALONG BOTH APPROACHES | CREW DAY | 1 | $2,080 | $2,080 |
| 3 | REMOVE ALL UNSOUND CONCRETE, CLEAN AND PAINT ANY EXPOSED REINFORCEMENT AND REPAIR SPALLS IN THE PARAPETS & S. SLAB FASCIA WITH EPOXY CONCRETE | SF | 20 | $155 | $3,100 |
| 4 | SEAL THE MEDIUM TO WIDE CRACKS IN THE PARAPET & SLAB AT THE SOUTH FASCIA & IN THE EAST ABUTMENT SEAT AREA WITH PRESSURE INJECTED EPOXY | LF | 10 | $185 | $1,850 |
| 5 | INSTALL GABION WALLS ALONG THE SE AND SW APPROACH SHOULDERS TO STABLIZE THE SLOPES AND PREVENT BALLAST EROSION | LF | 20 | $1,040 | $20,800 |
| 6 | FILL THE VOIDS/MISSING STONES WITH EPOXY CONCRETE THROUGHOUT THE ABUTMENTS & WINGWALLS | SF | 75 | $155 | $11,625 |
| 7 | REPOINT THE DETERIORATED & MISSING MORTAR THROUGHOUT THE ABUTMENTS AND WINGWALLS | LF | 120 | $20 | $2,400 |
| 8 | REMOVE GRAFFITI FROM BOTH ABUTMENT BREASTWALLS AND REMOVE VEGETATION BEHIND THE NE & NW WINGWALLS | CREW DAY | 1 | $2,080 | $2,080 |
| 9 | REMOVE DEBRIS ACCUMULATION BENEATH THE BRIDGE | CREW DAY | 1 | $2,080 | $2,080 |
| 10 | WATERPROOF THE DECK SLAB | | | | |
| | A. REMOVE & REINSTALL TRACK & BALLAST | LF/TRACK | 14 | $1,350 | $18,900 |
| | B. INSTALL WATERPROOFING MEMBRANE | SY | 52 | $60 | $3,120 |
| | C. INSTALL DECK DRAINS | EACH | 4 | $520 | $2,080 |
| 11 | SINCE THE BRIDGE NO LONGER FUNCTIONS AS A CATTLE PASS, CONSIDER FILLING IN UNDER THE STRUCTURE | (CY) | (240) | ($125) | ($30,000) |

| | |
|---|---|
| Sub-Total: | $73,850 |
| 30% Railroad Escalation: | $22,155 |
| Total: | $96,005 |
| Say | **$97,000** |

## COST ESTIMATE AND BACK-UP WORKSHEETS

### ESTIMATED REPAIR QUANTITIES

| ITEM NO. | REPAIR RECOMMENDATION | QUANTITY | TOTAL QUANTITY |
|---|---|---|---|
| 1 | REPLACE THE SEVERELY SPLIT & MISSING | APPROACHES: E = 5; W = 4; | 9 EACH |
| | TIES ALONG BOTH APPROACHES | | |
| 2 | SECURE THE LOOSE TIE PLATES AND | SAY 1 CREW DAY | 1 CREW DAY |
| | RAISED SPIKES ON THE BRIDGE & ALONG | | |
| | BOTH APPROACHES | | |
| 3 | REMOVE ALL UNSOUND CONCRETE, CLEAN | PARAPETS: N = 2 SF; S = 5 SF | 20 SF |
| | AND PAINT ANY EXPOSED REINFORCEMENT | FASICAS / SLAB: | |
| | AND REPAIR SPALLS IN THE PARAPETS & S. | N = 0 SF; S = 5 SF | |
| | SLAB FASCIA WITH EPOXY CONCRETE | TOTAL = 12 SF SAY 20 SF | |
| 4 | SEAL THE MEDIUM TO WIDE CRACKS IN THE | PARAPET: N = 0 LF; S = 2 LF; | 10 LF |
| | PARAPET & SLAB AT THE SOUTH FASCIA & | FASICAS / SLAB: N = 0 LF; S = 4 LF; | |
| | IN THE EAST ABUTMENT SEAT AREA WITH | E. ABUTMENT = 3 LF; | |
| | PRESSURE INJECTED EPOXY | TOTAL = 9 LF SAY 10 LF | |
| 5 | INSTALL GABION WALLS ALONG THE SE | 2 SHOUDLERS X 10 LF / SHOULDER = 20 LF | 20 LF |
| | AND SW APPROACH SHOULDERS TO | | |
| | STABLIZE THE SLOPES AND PREVENT | | |
| | BALLAST EROSION | | |
| 6 | FILL THE VOIDS/MISSING STONES WITH | VOIDS / MISSING STONES: | 75 SF |
| | EPOXY CONCRETE THROUGHOUT THE | ABUTMENTS: E = 4 SF; W = 11.5 SF; | |
| | ABUTMENTS & WINGWALLS | WINGWALLS: NE = 15 SF; NW = 18 SF; SE = 3 SF; | |
| | | SW = 5 SF; | |
| | | TOTAL = 56.5 SF SAY 75 SF | |
| 7 | REPOINT THE DETERIORATED & MISSING | DETERIORATED / MISSING MORTAR: | 120 LF |
| | MORTAR THROUGHOUT THE ABUTMENTS | ABUTMENTS: E = 5 LF; W = 5 LF; | |
| | AND WINGWALLS | WINGWALLS: NE = 50 LF; NW = 40 LF; SE = 8 LF; | |
| | | SW = 8 LF; | |
| | | TOTAL 116 LF SAY 120 LF | |
| 8 | REMOVE GRAFFITI FROM BOTH ABUTMENT | SAY 1 CREW DAY | 1 CREW DAY |
| | BREASTWALLS AND REMOVE VEGETATION | | |
| | BEHIND THE NE & NW WINGWALLS | | |
| 9 | REMOVE DEBRIS ACCUMULATION BENEATH | SAY 1 CREW DAY | 1 CREW DAY |
| | THE BRIDGE | | |
| 10 | WATERPROOF THE DECK SLAB | | |
| | A. REMOVE & REINSTALL TRACK & BALLAST | 1 TRACK X 14' = 14 LF/TRACK | 14 LF/TRACK |
| | B. INSTALL WATERPROOFING MEMBRANE | L X 2 = 14' X 33.5' / 9 = 52 SY | 52 SY |
| | C. INSTALL DECK DRAINS | 4 EACH | 4 EACH |
| 11 | SINCE THE BRIDGE NO LONGER FUNCTIONS | FILL VOLUME: | (240 CY) |
| | AS A CATTLE PASS, CONSIDER FILLING IN | 34'W X 10'H X 12' + 2(1/2(10'H) X 20'W X 12'L) | |
| | UNDER THE STRUCTURE | = 6480 / 27 CY = 240 CY | |

# APPENDIX 1

# RATING SUMMARY AND COMPUTATIONS

# RATING SUMMARY - NORMAL

**BRIDGE:** Morristown Line MP 57.49 over Cattle Pass
**CONSULTANT:** Hardesty & Hanover, LLC
**DATE:** 5/17/16 **CYCLE: 5 INFO TAKEN FROM CYCLES NO. 2, 3, & 4**

**CONTROLLING RATING OF BRIDGE: E-50**

| **MEMBER** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | | | **LOADED LENGTH FT.** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | **AS - BUILT** | | **AS - INSPECTED** | | **FATIGUE** | | |
| | **E-MOMENT** | **E-SHEAR** | **E-MOMENT** | **E-SHEAR** | | | |
| Slab | E58 | **E50** | E58 | **E50** | -- | 14.17 ft | |
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| **COLUMNS** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | **LOADED LENGTH FT.** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|
| | **AS - BUILT** | **AS - INSPECTED** | **FATIGUE** | | |
| | **E-AXIAL** | **E-AXIAL** | | | |
| N/A | | | | | |
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Notes:
Reference Cycles 2, 3, and 4 for previous rating calcs.

# RATING SUMMARY - MAXIMUM

**BRIDGE:** Morristown Line MP 57.49 over Cattle Pass
**CONSULTANT:** Hardesty & Hanover, LLC
**DATE:** 5/17/16 **CYCLE: 5 INFO TAKEN FROM CYCLES NO. 2, 3, & 4**

**CONTROLLING RATING OF BRIDGE: E-63**

| **MEMBER** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | | | **LOADED LENGTH FT.** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | **AS - BUILT** | | **AS - INSPECTED** | | **FATIGUE** | | |
| | **E-MOMENT** | **E-SHEAR** | **E-MOMENT** | **E-SHEAR** | | | |
| Slab | E72 | **E63** | E72 | **E63** | -- | 14.17 ft | No speed restrictions for NJ Transit operating |
| | | | | | | | equipment at the Maximum level except for the |
| | | | | | | | 286K car (38 MPH). |
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| **COLUMNS** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | **LOADED LENGTH FT.** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|
| | **AS - BUILT** | **AS - INSPECTED** | **FATIGUE** | | |
| | **E-AXIAL** | **E-AXIAL** | | | |
| N/A | | | | | |
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Notes:
Reference Cycles 2, 3, and 4 for previous rating calcs.

**5th CYCLE REVIEW OF RATINGS**

## 1. GEOMERTY & FRAMING

*a. Field Observations*

- Per the Cycle 5 inspection report, no changes to the geometry or framing system have been observed.

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

- The following information is taken directly from the previous cycles; these inputs will be used throughout the calculations below.

**Member Length =** 14.17 ft

## 2. CUTOFF SECTIONS

- There are no cutoff sections to be evaluated for this concrete deck element.

## 3. SECTION PROPERTIES

*a. Field Observations*

- Per the Cycle 5 inspection report, no significant section losses have occurred since the last report.

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

## 4. ALLOWABLE STRESSES & CAPACITIES

*b. Errors/Omissions in Previous Cycles*

- The assumption for reinforcement layout in the previous rating cycles is as accurate as can be without some form of GPR or pachometer use.
- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

## 5. DEAD LOAD (1.3.2, 7.3.2.1)

*a. Field Observations*

- Per the Cycle 5 inspection report, no changes to the dead load of the structure have been observed.

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

## 6. LIVE LOAD (1.3.3, 1.3.4, 7.3.2.2)

*b. Errors/Omissions in Previous Cycles*

- For live load analysis, Cycle 3 correctly accounts for longitudinal distribution through the ballast and deck per AREMA Ch. 8 2.2.3.c(2).
- As demonstrated in Cycle 3, the distribution length is limited by the axle spacing of the Cooper E80 train.
- Therefore, since the total length of the 80-kip axles exceeds the span length of the rated member, a uniform load can be applied equal to 80 kips, divided by 5 ft axle spacing and divided by the effective beam width.

**Max Shear, V =** 12.4 k *(from Cycle 3 rating)*
**Max Mom., M =** 40.9 k-ft *(from Cycle 3 rating)*

## 7. IMPACT EFFECTS (1.3.5, 7.3.2.3)

*b. Errors/Omissions in Previous Cycles*

- The impact value was updated using the correct equation as per AREMA, Ch 8, 2.2.3(d):

$I = 225/\sqrt{L}$
$I = 59.77\%$

## 8. CENTRIFUGAL EFFECTS (1.3.6, 7.3.2.4)

- The track on this bridge is straight; therefore, there are no centrifugal effects to consider for this rating.

## 9. TRACK ECCENTRICITY EFFECTS

- For the given effective beam width analyzed here, track eccentricity effects have negligible effect on the overall rating; as such, no consideration for track offset is made here.

## 10. WIND LOADS (1.3.7, 1.3.8, 7.3.2.5)

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

## 11. OTHER LATERAL LOADS

*b. Errors/Omissions in Previous Cycles*

- AREMA 19.5.1 states that the following loads must be considered in a load rating: dead, live, impact, centrifugal, wind on train, wind on structure, longitudinal from live load, longitudinal from friction among others. NJ Transit Exhibit 19 requires that wind be the only lateral force included in the rating equation.

## 12. FATIGUE

- AREMA makes no reference to rating concrete elements for fatigue; consequently, no fatigue rating will be provided herein.

## 13. CONNECTIONS

- There are no connections to be checked for the rating of this member.

## 14. RATINGS

- Rating for this member can be found in the rating summary sheet on page 6 of 6.

**Notes**: - The following table summarizes all forces and factors to be used in the rating procedure of all sections. See the individual calculations for more information.
- Values highlighted in **blue** have been revised from the Cycle 4 ratings.
- Section locations are measured from the centerline of end bearing.

| | | | | FORCE SUMMARY | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MEMBER** | **LENGTH (ft)** | **SECT.** | **LOC. (ft)** | **BENDING (k-ft)** | | | **SHEAR (kips)** | | | **AXIAL (kips)** | | | **FAT. (k-ft)** | **FACTORS** | | |
| | | | | $M_{DL}$ | $M_{LL}$ | $M_{WL}$ | $V_{DL}$ | $V_{LL}$ | $V_{WL}$ | $P_{DL}$ | $P_{LL}$ | $P_{WL}$ | $M_{LL}$ | I | C | ECC |
| **AS-BUILT** | | | | | | | | | | | | | | | | |
| **Slab** | 14.17 | -- | -- | 11 | **41** | 1 | 3 | **12** | 0 | -- | -- | -- | -- | **0.598** | 0.000 | 0.000 |
| **AS-INSPECTED** | | | | | | | | | | | | | | | | |
| **Slab** | 14.17 | -- | -- | 11 | **41** | 1 | 3 | **12** | 0 | -- | -- | -- | -- | **0.598** | 0.000 | 0.000 |

Hardesty & Hanover
engineering that moves you

**Calculation** NJ Transit
MEL MP 57.49
Capacity Summary

**Made By** RZ **Date** 5/17/2016 **Job No.** 3147
**Checked By** MCR **Date** 5/17/2016 **Sec. No.** 00
**B.Checked By** RZ **Date** 5/18/2016 **Page No.** 3 of 6

**Notes**: - The following table summarizes all member capacities to be used in the rating procedure. See individual calculations for more information.
- Values highlighted in **blue** have been revised from the Cycle 4 ratings.
- Section locations are measured from the centerline of end bearing.

| | | | | CAPACITY SUMMARY | | | |
|---|---|---|---|---|---|---|---|
| MEMBER | LENGTH (ft) | SECT. | LOC. (ft) | BENDING (k-ft) | SHEAR (kips) | AXIAL (kips) | FAT. (k-ft) |
| | | | | M | V | P | $M_{fat}$ |
| AS-BUILT | | | | | | | |
| **Slab** | 14.17 | -- | -- | 70 | 19 | -- | -- |
| AS-INSPECTED | | | | | | | |
| **Slab** | 14.17 | -- | -- | 70 | 19 | -- | -- |

**Notes**: - The following table summarizes normal and maximum ratings for every section of every rated member, under as-built and as-inspected criteria.
- Values highlighted in red do not rate for E80 loading; note that this is only critical when a member does not rate for E80 loading in the maximum level.
- Live load capacity, $CAP_{i.LL}$ = n * CAP - DL - WL *where:* *i* = rating level, WL only applied overstress cases (Eq. 19-2, 19-5)
- Net live load capacity, $CAP_{i.n}$ = $CAP_{i.LL}$ / [1 + I + C] *n* = overstress factor, table below presents governing case
- Rating = [$CAP_{i.n}$ / ($LL_{E80}$ * ECC)] * 80
- No reductions in the impact factor due to speed restrictions are considered in this table in accordance with NJ Transit Exhibit 19.

| | | | **MAXIMUM RATING** | | | | | | | | | **NORMAL RATING** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MEMBER** | **SECT.** | **LOC. (ft)** | **BENDING (k-ft)** | | | **SHEAR (kips)** | | | **AXIAL (kips)** | | | **BENDING (k-ft)** | | | **SHEAR (kips)** | | | **AXIAL (kips)** | | | **FATIGUE (k-ft)** | |
| | | | $M_{m.LL}$ | $M_{m.n}$ | E | $V_{m.LL}$ | $V_{m.n}$ | E | $P_{m.LL}$ | $P_{m.n}$ | E | $M_{n.LL}$ | $M_{n.n}$ | E | $V_{n.LL}$ | $V_{n.n}$ | E | $P_{n.LL}$ | $P_{n.n}$ | E | $M_{sr.n}$ | E |
| **AS-BUILT** | | | | | | | | | | | | | | | | | | | | | | |
| **Slab** | -- | -- | 59 | 37 | E72 | 15 | 10 | E63 | -- | -- | -- | 47 | 30 | E58 | 12 | 8 | E50 | -- | -- | -- | -- | -- |
| **AS-INSPECTED** | | | | | | | | | | | | | | | | | | | | | | |
| **Slab** | -- | -- | 59 | 37 | E72 | 15 | 10 | E63 | -- | -- | -- | 47 | 30 | E58 | 12 | 8 | E50 | -- | -- | -- | -- | -- |

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*engineering that moves you*

**Calculation** NJ Transit
MEL MP 57.49
Equipment Comparison

**Made By** RZ
**Checked By** MCR
**B.Checked** RZ

**Date** 5/17/2016
**Date** 5/17/2016
**Date** 5/18/2016

**Job No.** 3147
**Sec. No.** 00
**Page No.** 5 of 6

**Notes**: - The following table compares the as-inspected capacity of the member under maximum loading with the equivalent E loading for the special equipment trains presented in NJ Transit Exhibit 19.
- If the capacity of the member exceeds the equivalent E-load of all equipment loads, then no speed restrictions are required.
- Equivalent E ratings herein assume no longitudinal distribution of live load; this approach yields acceptable results.
- Speed restrictions, if any, are computed based on the speed reduction required to achieve an acceptable maximum rating in accordance with AREMA Ch. 8, 19.3.4.3.b.

| MEMBER | E-CAP | F40PH-2 | 2 F40PH-2 | GP40PH-2 | 2 GP40PH-2 | GP40FH-2 | 2 GP40FH-2 | SW-1500 | ALP-44 | 2 ALP-44 | ALP-46 | 2 ALP-46 | PL-42 | 2 PL-42 | GP40-2 | 2 GP40-2 | ALP-45 | 2 ALP-45 | 286K Car | Restrict Speed? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BENDING** | | | | | | | | | | | | | | | | | | | | |
| **Slab** | **E72** | E41 | E41 | E47 | E47 | E45 | E45 | E41 | E32 | E32 | E33 | E33 | E45 | E45 | E45 | E45 | E45 | E45 | E59 | NO |
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| **Restriction (mph)** | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| **SHEAR** | | | | | | | | | | | | | | | | | | | | |
| **Slab** | **E63** | E46 | E46 | E52 | E52 | E50 | E50 | E45 | E36 | E36 | E37 | E37 | E49 | E49 | E50 | E50 | E49 | E49 | E63 | YES |
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| **Restriction (mph)** | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | **38.027** | |
| **AXIAL** | | | | | | | | | | | | | | | | | | | | |
| **Girder G3** | **--** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NO |
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**BRIDGE:** Morristown Line MP 57.49 over Cattle Pass
**CONSULTANT:** Hardesty & Hanover
**DATE:** 4/29/2016 **CYCLE NO.:** 5 **INFO TAKEN FROM CYCLE NO.:** 3 **CONTROLLING RATING OF BRIDGE:** E50

***NORMAL***

| MEMBER [Gov. Section] | CAPACITY OF THE BRIDGE Cooper E-Load | | | | | | | LOADED LENGTH | Engine Restrictions: note type, moment or shear control, and indicate speed without restriction. |
|---|---|---|---|---|---|---|---|---|---|
| | As-Built | | | As-Inspected | | | Fatigue | | |
| | E-Moment | E-Shear | E-Axial | E-Moment | E-Shear | E-Axial | | | |
| **Slab** | E58 | E50 | -- | E58 | E50 | -- | -- | 14.17 ft | |

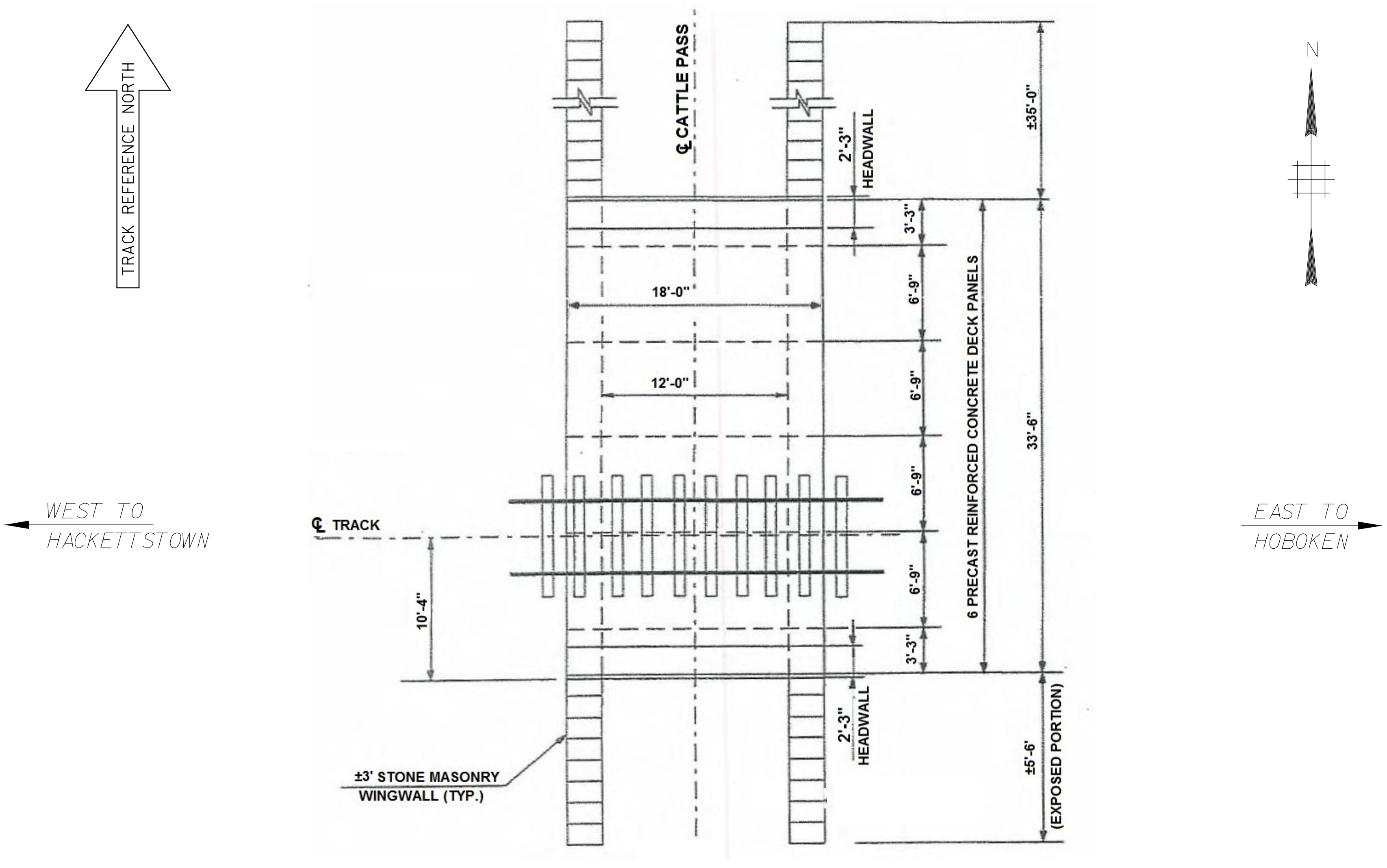
**CONTROLLING RATING OF BRIDGE:** E63

***MAXIMUM***

| MEMBER [Gov. Section] | CAPACITY OF THE BRIDGE Cooper E-Load | | | | | | | LOADED LENGTH | Engine Restrictions: note type, moment or shear control, and indicate speed without restriction. |
|---|---|---|---|---|---|---|---|---|---|
| | As-Built | | | As-Inspected | | | Fatigue | | |
| | E-Moment | E-Shear | E-Axial | E-Moment | E-Shear | E-Axial | | | |
| **Slab** | E72 | E63 | -- | E72 | E63 | -- | -- | 14.17 ft | **No speed restrictions for NJ Transit** |
| | | | | | | | | | **operating equipment at the** |
| | | | | | | | | | **Maximum level except for the** |
| | | | | | | | | | **286K car (38 MPH).** |

# APPENDIX 2

# DRAWINGS AND PHOTOGRAPHS



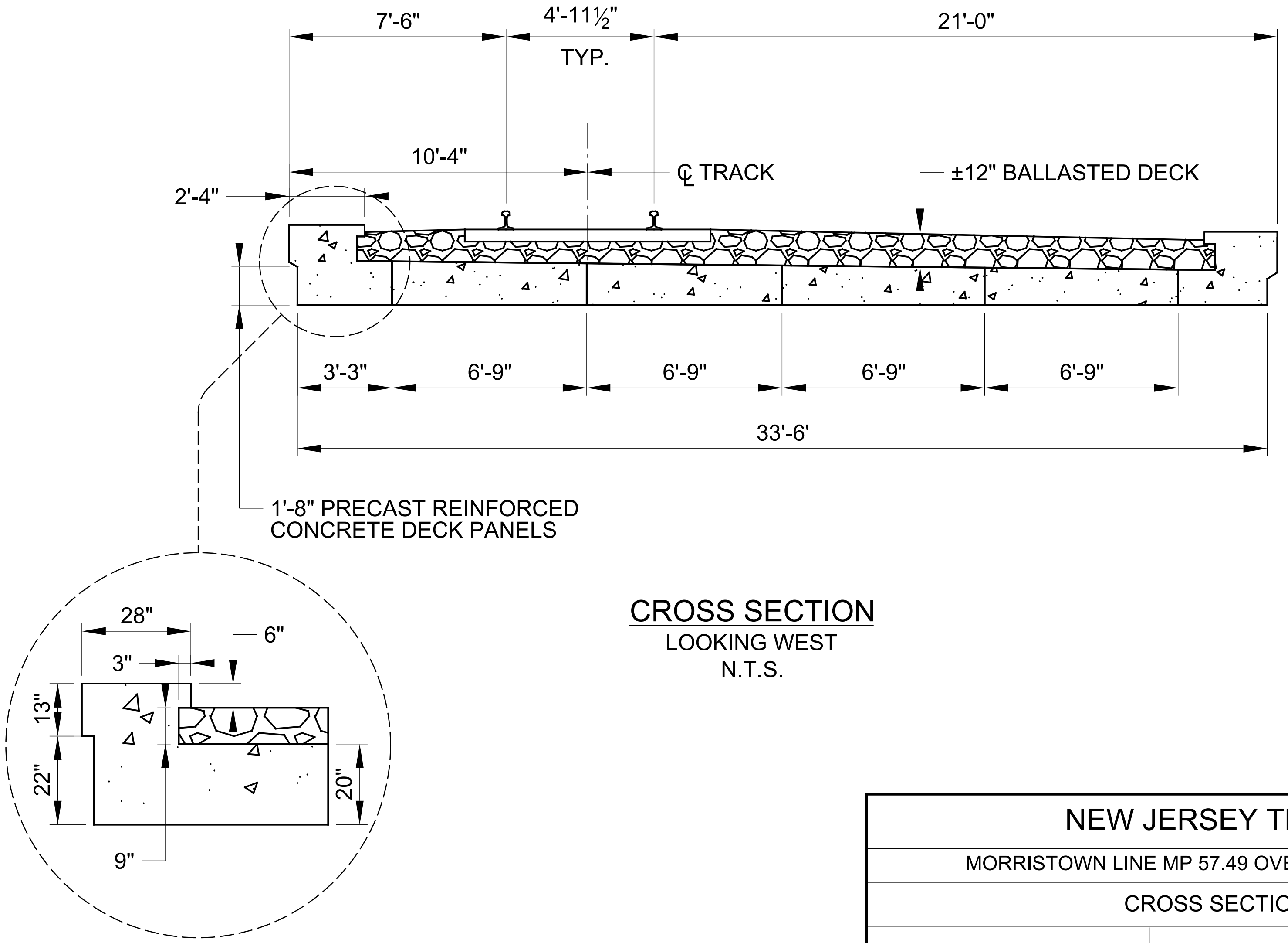
PLAN
N.T.S.

## NEW JERSEY TRANSIT

MORRISTOWN LINE MP 57.49 OVER CATTLE PASS

GENERAL PLAN

| | | |
|---|---|---|
| Munic.: Hackettstown, NJ | Cycle No.: 5 | Hardesty & Hanover |
| County: Warren | Date: 01/05/16 | 850 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |



## CROSS SECTION

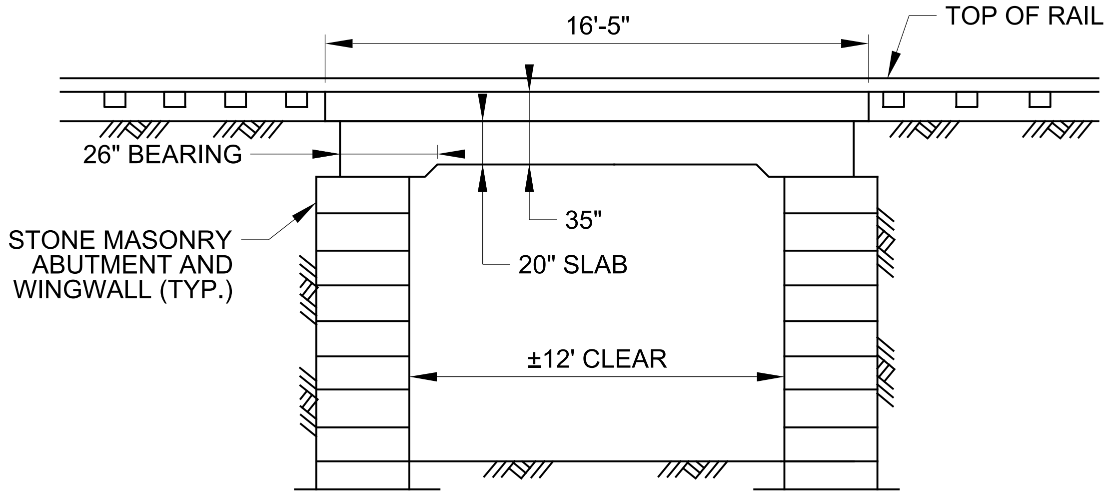
LOOKING WEST
N.T.S.

NEW JERSEY TRANSIT

MORRISTOWN LINE MP 57.49 OVER CATTLE PASS

CROSS SECTION

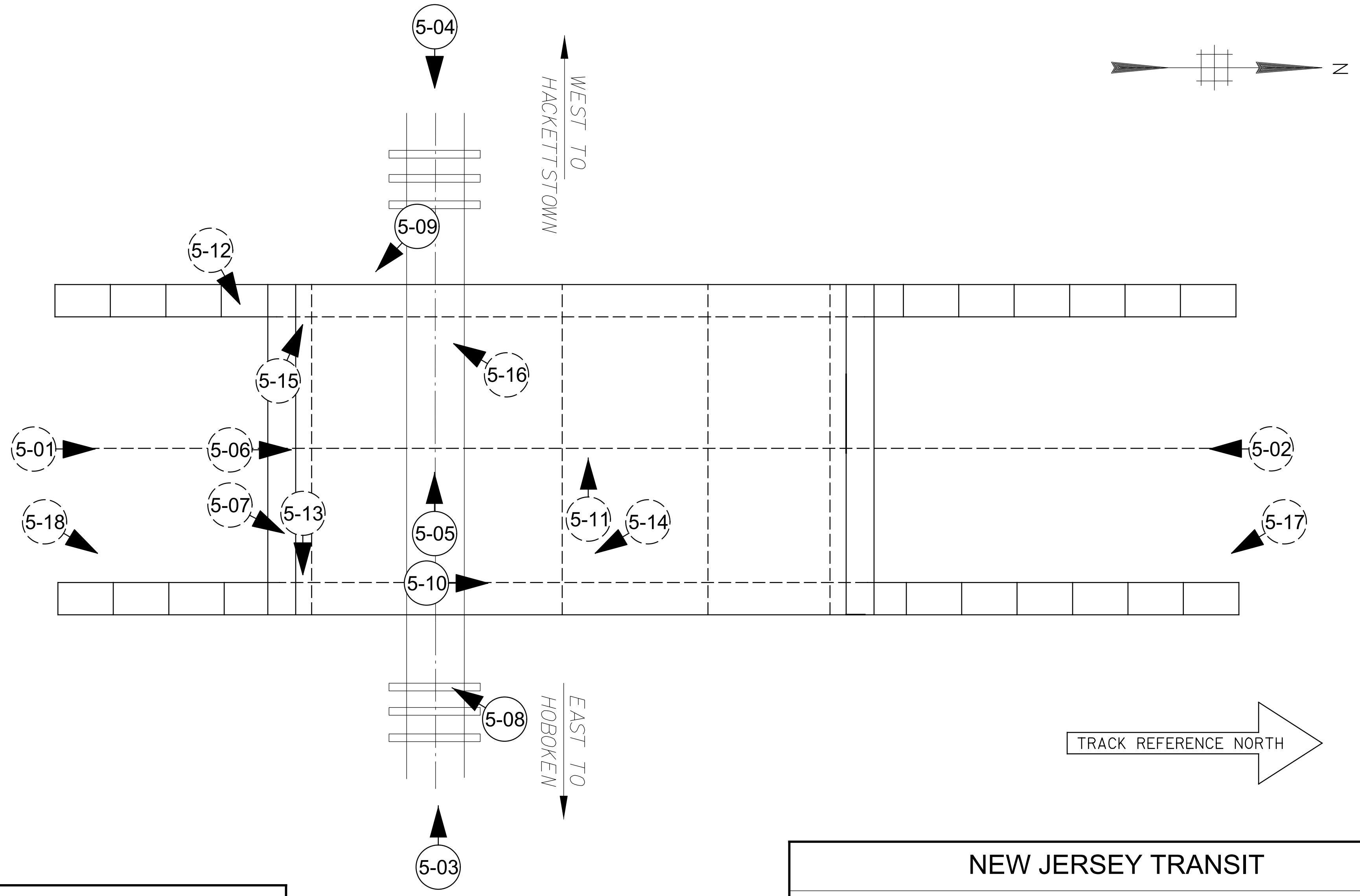
| | | |
|---|---|---|
| Munic.: Hackettstown, NJ | Cycle No.: 5 | Hardesty & Hanover |
| County: Warren | Date: 01/05/16 | 850 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |



ELEVATION
N.T.S.

NEW JERSEY TRANSIT
MORRISTOWN LINE MP 57.49 OVER CATTLE PASS
ELEVATION

| | | |
|---|---|---|
| Munic.: Hackettstown, NJ | Cycle No.: 5 | Hardesty & Hanover |
| County: Warren | Date: 01/05/16 | 850 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |



**KEY:**

○ ➤ **PHOTO TAKEN ABOVE DECK LEVEL**

◌ ➤ **PHOTO TAKEN BELOW DECK LEVEL**

## PHOTO LOCATION PLAN

N.T.S.

NEW JERSEY TRANSIT

MORRISTOWN LINE MP 57.49 OVER CATTLE PASS

PHOTO LOCATION PLAN

| | | |
|---|---|---|
| Munic.: Hackettstown, NJ | Cycle No.: 5 | Hardesty & Hanover |
| County: Warren | Date: 01/05/16 | 850 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |

**Photo No: 5-01**

| | |
|---|---|
| **Location:** | South elevation, looking north. |
| **Description:** | General view. |

**Photo No: 5-02**

| | |
|---|---|
| **Location:** | North elevation, looking south. |
| **Description:** | General view. Note: Heavy debris under the bridge and along the wingwalls (typical throughout). |

**Photo No: 5-03**

| | |
|---|---|
| **Location:** | East approach, looking west. |
| **Description:** | General view. Note: Ballast overspilling ties outside of north rail. |

**Photo No: 5-04**

| | |
|---|---|
| **Location:** | West approach, looking east. |
| **Description:** | General view. |

**Photo No: 5-05**

| | |
|---|---|
| **Location:** | Deck ties on bridge, looking west. |
| **Description:** | General view. |

**Photo No: 5-06**

| | |
|---|---|
| **Location:** | Underside of superstructure, looking north. |
| **Description:** | General view. Note: Deteriorated and peeling waterproofing membrane on roof slab. |

**Photo No: 5-07**

| | |
|---|---|
| **Location:** | East abutment, looking northeast. |
| **Description:** | General view. |

**Photo No: 5-08**

| | |
|---|---|
| **Location:** | East approach, looking southwest. |
| **Description:** | One tie missing completely. Several ties exhibit wide splits and checks and require replacement (typical at west approach). |

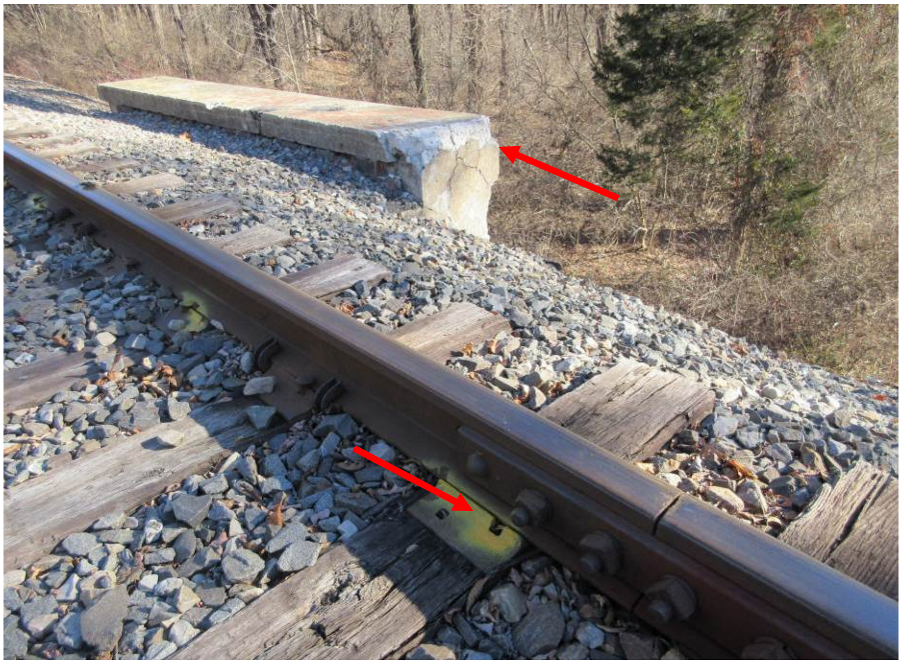


**Photo No: 5-09**

| | |
|---|---|
| **Location:** | West approach, east end, looking southeast. |
| **Description:** | Missing spike near rail joint. Spalled and delaminated area at west end of south parapet (spalling typical at north parapet). |

**Photo No: 5-10**

| | |
|---|---|
| **Location:** | North rail at east end of bridge, looking north. |
| **Description:** | Spikes raised on bridge (typical at both approaches). |

**Photo No: 5-11**

| | |
|---|---|
| **Location:** | Underside of superstructure near midspan, looking west. |
| **Description:** | Peeling asphaltic waterproofing membrane and water staining throughout slab. Hairline transverse cracks with minor efflorescence. Small popout with exposed rebar. |

**Photo No: 5-12**

| | |
|---|---|
| **Location:** | South slab fascia, looking northeast. |
| **Description:** | Spalls and light map cracking at both ends of slab/parapet. Delaminated area at west end of slab/parapet and fine to medium cracks throughout. Note moderate erosion of ballast at the steep south embankments near the bridge. |

<table>
<tr><td colspan="2"></td><td><b>Photo No: 5-13</b></td></tr>
<tr><td><b>Location:</b></td><td colspan="2">South end of east abutment, looking east.</td></tr>
<tr><td><b>Description:</b></td><td colspan="2">Vertical crack in concrete with efflorescence and light map cracking.</td></tr>
<tr><td colspan="2"></td><td><b>Photo No: 5-14</b></td></tr>
<tr><td><b>Location:</b></td><td colspan="2">East abutment near mid-length, looking southeast.</td></tr>
<tr><td><b>Description:</b></td><td colspan="2">Area of missing mortar, missing stones, and voids.</td></tr>
</table>

**Photo No: 5-15**

| | |
|---|---|
| **Location:** | West abutment, south end, looking northwest. |
| **Description:** | Spall with efflorescence in concrete portion near south fascia. |

**Photo No: 5-16**

| | |
|---|---|
| **Location:** | West abutment, below slab panels 3 & 4, looking southwest. |
| **Description:** | Area of large voids/missing and deteriorated mortar/missing stones. Note graffiti on breastwall (typical at east abutment and southeast wingwall). |

**Photo No: 5-17**

| | |
|---|---|
| **Location:** | Northeast wingwall, looking southeast. |
| **Description:** | Loss of mortar throughout (typical at all wingwalls). Large accumulation of debris in front of wall and heavy vegetation on top of wall (typical at northwest wingwall). |

**Photo No: 5-18**

| | |
|---|---|
| **Location:** | Southeast wingwall, looking northeast. |
| **Description:** | Void between stones. Loss of mortar throughout, and ballast accumulation at base and on top of wall (typical at southwest wingwall). |

# APPENDIX 3

# FIELD OBSERVATIONS

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## GENERAL

LINE: Morristown MILEPOST: 57.49

NAME OF BRIDGE: Cattle Pass

NJDOT STRUCTURE NO.: Unknown CONSULTANT BRIDGE NO.: F20

ROUTE NO.: 4004 DATE: TOP OF DECK: 01/05/16

SUPERSTRUCTURE: 02/23/16

USRA LINE CODE: 6192 SUBSTRUCTURE: 02/23/16

MUNICIPALITY: Hackettstown COUNTY: Warren

CONSULTANT: Hardesty & Hanover, LLC

CREW CHIEF: R. Zahalan, P.E. WEATHER: Sunny 01/05/16
Overcast 02/23/16

CREW MEMBER(S): S. Trelles TEMPERATURE: 21°F 01/05/16
33°F 02/23/16

TYPE OF BRIDGE: Single span, reinforced concrete slab

YEAR BUILT: 1927 YEAR OF MAJOR REPAIRS: N/A

WORK DONE: None.

OPEN DECK/[✓ BALLASTED DECK] ELECTRIFIED/[✓ NON-ELECTRIFIED]

INDEPENDENT BRIDGES: YES/[✓ NO]

BRIDGE # 1 = TRACK # N/A = GIRDERS = N/A
BRIDGE # 2 = TRACK # = GIRDERS =
BRIDGE # 3 = TRACK # = GIRDERS =
BRIDGE # 4 = TRACK # = GIRDERS =

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## GENERAL

### (CONTINUED)

LINE: Morristown

MP: 57.49

[✓ TANGENT]/CURVED TRACK

NO. OF TRACKS: 1

C/C DISTANCE BETWEEN TRACKS: N/A

TRACK #____ AND TRACK #____: C/C=____
TRACK #____ AND TRACK #____: C/C=____
TRACK #____ AND TRACK #____: C/C=____

ECCENTRICITY IN TRACK: N/A

NUMBER 1:____ SOUTH/NORTH
NUMBER 2:____ SOUTH/NORTH
NUMBER 3:____ SOUTH/NORTH
NUMBER 4:____ SOUTH/NORTH

OVERALL RATING OF BRIDGE (G, [✓ F], P, B): Fair

INDIVIDUAL ELEMENT CODES AND GENERAL OBSERVATIONS OF CONDITIONS:

APPROACHES (G, [✓ F], P, B) The timber ties typically exhibit moderate checks and splits. A total of eight (8) ties exhibit severe splits and rot on both approaches and one (1) tie is missing at the east approach. The rails exhibit moderate rust and up to a 1/8" lip. There are two loose tie plates at each approach and several spikes raised up to 1 1/2". The tie plates and spikes exhibit moderate rust. The south embankments exhibit moderate erosion near the bridge. The ballast is clean and of adequate depth.

DECK (G, [✓ F], P, B): The timber ties exhibit minor checks and splits and do not require replacement. The rails exhibit up to a 1/8" lip. The tie plates and spikes exhibit moderate rust throughout. There are two loose tie plates several spikes are raised up to 1 1/2". The parapets exhibit spalls (6 SF total) up to 4" deep and cracks up to 1/8" wide with missing bricks and waterproofing liner along the north parapet. The ballast is clean and of adequate depth.

SUPERSTRUCTURE (G, [✓ F], P, B): The concrete slab exhibits deteriorated asphaltic waterproofing that is peeling off throughout the underside of the slab. There is fine map cracking throughout the underside with minor efflorescence. There are a few small popouts with exposed rebar and water staining throughout the underside. The south panel exhibits spalls and fine to medium cracks with efflorescence on the fascia. The north fascia is in good condition with minor scaling.

SUBSTRUCTURE (G, [✓ F], P, B): The stone masonry abutments exhibit areas of missing and deteriorated mortar, missing stones, and areas of small voids up to 24" deep. The concrete portion of the abutments exhibits 1/8" wide cracks and spalls up to 4" deep. The wingwalls exhibit areas of deteriorated and missing mortar with voids up to 24" deep and heavy debris accumulation in front for the full length. There is a broken stone at the top of the northwest wingwall (3 SF). There is heavy vegetation with light moss growth on the north wingwalls and ballast
~~WATERWAY (G, F, P, B~~): overspilling the south wingwalls.

WATERWAY (G, F, P, B): N/A (unused cattle pass)

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### EAST

LINE: Morristown MP: 57.49 PHOTOS: 5-03, 5-08

[✓ TANGENT] / CURVED TRACK GRADE: -0.37% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT:______ LENGTH:______

CONDITION: N/A

WEIGHT OF RAIL: 105 LB/YD WELDED / [✓ JOINTED]

RAILS: CONDITION: South Rail: 1/8" lip on outer edge. Inner edge is smooth. Moderate rust throughout.
North Rail: 1/16" lip on outer edge.

*No passenger train service west of Hackettstown station.
No train traffic observed during current cycle inspection.

PUMPING: RAILS: YES / [✓ NO]*

| | | | |
|---|---|---|---|
| TRACK:_____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:_____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:_____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:_____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |

TIES: YES / [✓ NO]*

| | | | |
|---|---|---|---|
| TRACK:_____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:_____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:_____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:_____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |

TIE SIZE: LENGTH: 8'-6" WIDTH: ±8" DEPTH: 6"

TIES: C/C OF TIES: Varies 18"-24" NO. NEEDING REPLACEMENT: 5 of 30

CONDITION Ties typically exhibit moderate splits and checks. Four (4) ties exhibit wide splits and checks and rot and require replacement. One (1) tie is missing approximately 25'-30' east of the bridge (Photo 5-08). Ballast is overspilling on tie edges outside of north rail (Photo 5-03).

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### EAST/CONTINUED

LINE: Morristown MP: 57.49 PHOTOS: 5-03, 5-12

TIE PLATES: NO. MISSING: 0 NO.LOOSE: 2

CONDITION: Tie plates exhibit moderate rust throughout.

TIE PADS: YES / [✓ NO]

CONDITION: N/A

SPIKES: CONDITION: Spikes exhibit moderate rust throughout. Four (4) spikes are raised ±1 1/2". One (1) spike is tilted 1/2" to the southwest on south rail. Two (2) spikes not securing tie plate on north and south rails.

BALLAST: [✓ CLEAN] / UNCLEAN ADEQUATE DEPTH: [✓ YES] / NO

DESCRIPTION:

SHOULDERS: (CONDITIONS): SOUTH: No shoulder. The embankment is steep and exhibits moderate erosion of ballast at the end of the bridge (Photo 5-12).

NORTH: Stable/flat.

TRACK TO BE RAISED / LOWERED: YES / [✓ NO]

LOW APPROACH / SAG: YES / [✓ NO]

NO TRESPASSING SIGNS:

[✓ NONE]

YES LOCATION: N/A

OTHER OBSERVATIONS: Ballast is overspilling on ties outside of the north rail (Photo 5-03).

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### WEST

LINE: Morristown MP: 57.49 PHOTOS: ---

[✓ TANGENT] / CURVED TRACK GRADE: -0.37% TOWARD EAST/[✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT:______ LENGTH:______

CONDITION: N/A

WEIGHT OF RAIL: 105 LB/YD WELDED / [✓ JOINTED]

RAILS: CONDITION: South Rail: 1/16" lip on outer edge. Inner edge is smooth.
North Rail: 1/16" lip on outer edge. Inner edge is smooth. Moderate rust throughout.

PUMPING: RAILS: YES / [✓ NO]*

*No passenger train service west of Hackettstown station.
No train traffic observed during current cycle inspection.

TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______

TIES: YES / [✓ NO]*

TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______

TIE SIZE: LENGTH: 8'-6" WIDTH: ±8" DEPTH: 6"

TIES: C/C OF TIES: Varies 20"-24" NO. NEEDING REPLACEMENT: 4 of 30

CONDITION Ties typically exhibit moderate splits and checks. Four (4) ties exhibit wide splits and checks and require replacement.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### WEST/CONTINUED

LINE: Morristown MP: 57.49 PHOTOS: 5-09, 5-12

TIE PLATES: NO. MISSING: 0 NO.LOOSE: 2

CONDITION: Tie plates exhibit moderate rust throughout.

TIE PADS: YES / [✓ NO]

CONDITION: N/A

SPIKES: CONDITION: Spikes typically exhibit moderate rust. Five (5) spikes raised ±1 1/2". 30% of spikes are raised ±1/4". Few spikes are slightly twisted, and there is a missing spike on the south rail near the bridge (Photo 5-09).

BALLAST: [✓ CLEAN] / UNCLEAN ADEQUATE DEPTH: [✓ YES] / NO

DESCRIPTION:

SHOULDERS: (CONDITIONS): SOUTH: Steep embankment with moderate erosion of ballast near end of bridge (Photo 5-12).

NORTH: Stable/flat.

TRACK TO BE RAISED / LOWERED: YES / [✓ NO]

LOW APPROACH / SAG: YES / [✓ NO]

NO TRESPASSING SIGNS:

[✓ NONE]

YES LOCATION: N/A

OTHER OBSERVATIONS: Small rail gouges on both rails approximately 40' west of bridge.

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## SUPERSTRUCTURE SPAN NO. Single

LINE: Morristown MP: 57.49 PHOTOS: 5-05

TRACK NUMBER: 1 OPEN / [✓ BALLASTED] [✓ TANGENT] / CURVED TRACK

SPAN TYPE: Single span reinforced concrete slab SPAN LENGTH: 12'-0" c/c

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT:______ LENGTH:______
CONDITION: N/A

CONDITION OF RAILS: South Rail: ±1/8" lip on inner edge.
North Rail: ±1/8" lip on inner edge. Outer edge is smooth.

PUMPING: RAILS: YES / [✓ NO]*

*No passenger train service west of Hackettstown station. Structure was not observed during freight train loads.

| | | | |
|---|---|---|---|
| TRACK:____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |

TIES: YES / [✓ NO]*

| | | | |
|---|---|---|---|
| TRACK:____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |
| TRACK:____ | NORTH RAIL: | AMOUNT:______ | LENGTH:______ |
| | SOUTH RAIL: | AMOUNT:______ | LENGTH:______ |

TIE SIZE: LENGTH: 8-6" WIDTH: 8" DEPTH: 6"

TIES: C/C OF TIES: Varies 20"-22" NO. NEEDING REPLACEMENT: 0
CONDITION Ties typically exhibit minor to moderate splits and checks throughout. No ties require replacement.

RIBBON GUARD / TIE YES / [✓ NO] TYPE AND SIZE: N/A
SPACER BLOCKS: YES / [✓ NO]

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## SUPERSTRUCTURE SPAN NO. Single

## (CONTINUED)

LINE: Morristown MP: 57.49 PHOTOS: 5-09, 5-12

BACKWALL TIES: SIZE: N/A CONDITION:

TIE PLATES: NO. MISSING: 0 NO. LOOSE: 2

CONDITION: Tie plates typically exhibit moderate rust throughout.

TRACKS SHIMMED: YES / [✓ NO]

TIE PADS: YES / [✓ NO] CONDITION: N/A

CONDITION OF SPIKES: ±5 spikes are raised up to 1 1/2". 20% are raised up to 1/4" (Photo 5-10).
Spikes typically exhibit moderate rust.

CONDITION OF ANCHOR / J-HOOK BOLTS: N/A

BALLAST: DEPTH: ±12" [✓ CLEAN] / UNCLEAN

WALKWAYS: STEEL / TIMBER / UNDEFINED

LOCATION: N/A

CONDITION:

HANDRAILS: STEEL / TIMBER / UNDEFINED

CONDITION: N/A

CONDITION OF PARAPET WALLS / CURBS: South Parapet: West end is spalled and delaminated for a 3 SF x 3" deep area (Photos 5-09 and 5-12). East end is spalled (2 SF x 2" deep) and has a 1/8" x 2 LF crack in the south face at the east end. Small popout on south parapet near midspan (8" x 4"). See other observations below.

MILEAGE BOARDS: YES: LOCATION:

[✓ NO] / NEEDED: LOCATION: N/A

OBSTRUCTIONS: [✓ NO] / YES: TYPE AND DISTANCE: N/A

OTHER OBSERVATIONS: Few localized areas of excess ballast topping north ends of ties (no repair required).
North Parapet: East end is spalled (2 SF x 4" deep). South face is missing bricks and waterproofing liner along bottom for 15' L x 6" H. Few cracks throughout both parapets (10 LF total).

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## CONCRETE DECK SLAB

LINE: Morristown

MP: 57.49

PHOTOS: 5-11, 5-12

SPAN: 1

SPAN LENGTH: 12'-0" c/c

WATER LEAKAGE [✓ YES] / NO

%DECK AREA 20%

SUFFICIENT CURB HEIGHT: [✓ YES] / NO
(BALLAST OVERFLOW)

CRACKS: The asphaltic waterproofing membrane is completely deteriorated and peeling off throughout the underside of the deck slab. There is fine map cracking throughout (mostly transverse, in the third panel from the south) the deck underside with minor efflorescence (Photo 5-11).

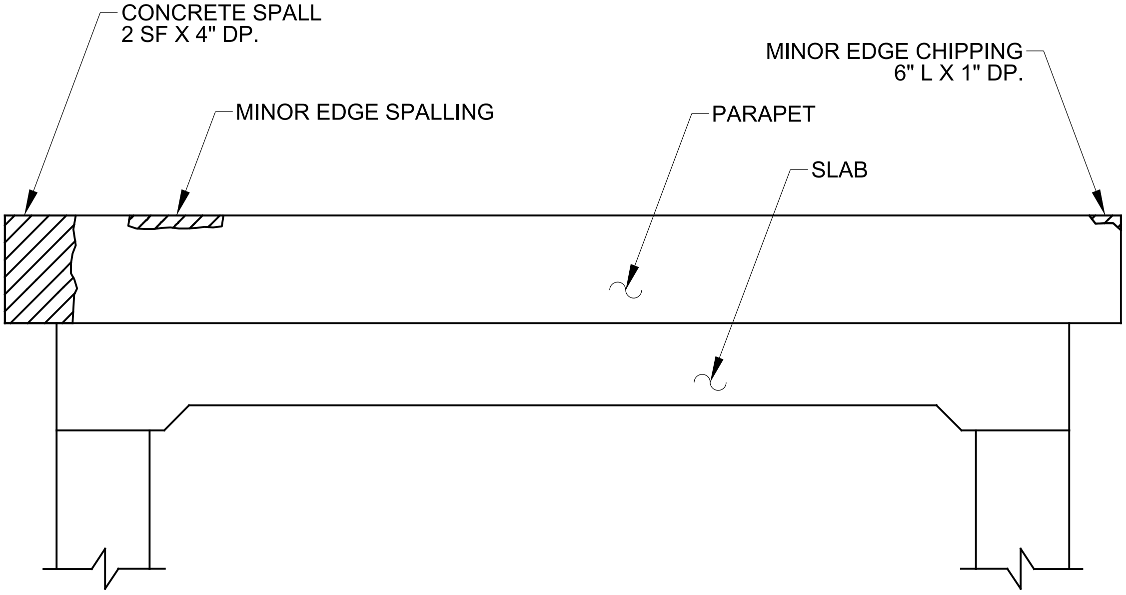
SPALLS: Few small popouts (<3" Ø each) with exposed rebar (4 total, 2 with exposed rebar at midpoint of slab and near the north end) (Photo 5-11).

OTHER OBSERVATIONS: The underside of slab exhibits water staining throughout, heaviest at the joints of the slab panels and near the bearing seats. The south panel at the south fascia exhibits spalls and fine to medium cracks with efflorescence (Photo 5-12). The north fascia is in overall good condition and exhibits minor scaling. See fascia sketch for details.

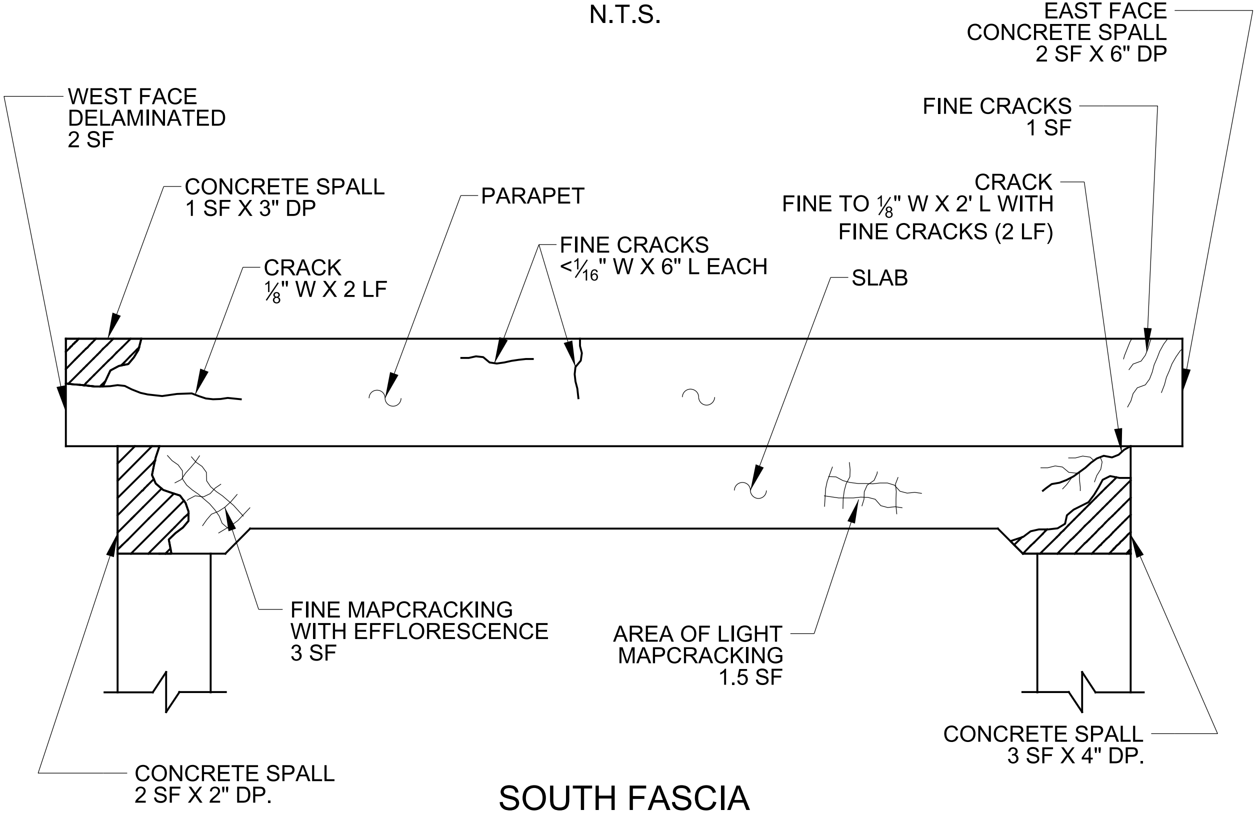
SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

LINE MORRISTOWN MP 57.49 PHOTOS 5-09, 5-12



NORTH FASCIA
LOOKING SOUTH
N.T.S.



SOUTH FASCIA
LOOKING SOUTH
N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ABUTMENT BREASTWALL

### EAST

LINE: Morristown MP: 57.49 PHOTOS: 5-13, 5-14

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE [✓ STONE] / BRICK / TIMBER

LENGTH: 33'-6" HEIGHT: ±10'-6"

WIDTH: AT BEARING: 2'-0" AT GROUND LEVEL: Unknown

STRUCTURAL CRACKS: SIZE: 1'-2' H WIDTH: 1/8" LOCATION: At abutment ends
SIZE: WIDTH: LOCATION:
SIZE: WIDTH: LOCATION:

CONDITIONS: Areas beneath the fascia slab panels are filled with concrete (±5 LF at south end, ±8 LF at north end). Vertical cracks (1/8" wide) with efflorescence in the concrete areas at both ends of the abutment(Photo 5-13). Few small voids throughout near the base of the abutment (up to 18" deep) and near mid-height at the south end of the abutment. There is a 3 SF area of voids (up to 18" deep) with missing mortar and missing stones near the center of the wall (Photo 5-14). See abutment sketch for more details.

CONDITION OF BEARING SEAT: Not visible.

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION: N/A

GRAFFITI: [✓ YES] / NO [✓ PLUMB] / TILT: N/A

FOUNDATION CONDITIONS: Not visible.

TRAFFIC PROTECTION: YES CONDITION: N/A
[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: Graffiti (20 SF) on breastwall.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ABUTMENT BREASTWALL

### WEST

LINE: Morristown MP: 57.49 PHOTOS: 5-15, 5-16

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

LENGTH: 33'-6" HEIGHT: ±10'-6"

WIDTH: AT BEARING: 2'-0" AT GROUND LEVEL: Unknown

STRUCTURAL CRACKS: None
SIZE: N/A WIDTH: N/A LOCATION: N/A
SIZE: WIDTH: LOCATION:
SIZE: WIDTH: LOCATION:

CONDITIONS: Areas beneath the fascia slab panels are filled with concrete (±5 LF at each end). There is a 1.5 SF x 4" deep concrete spall at the top of the wall near the south end (Photo 5-15) , and a void 8 sq in. x 15" deep at the same point near the base of the wall. Mortar is missing/deteriorated at numerous locations throughout the wall (primarily in the center). There is a 10 SF x up to 24" deep area of voids/missing mortar/missing stones near the center of the wall (Photo 5-16). See abutment sketch for details.

CONDITION OF BEARING SEAT: Not visible.

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION: N/A

GRAFFITI: [✓ YES] / NO [✓ PLUMB] / TILT: N/A

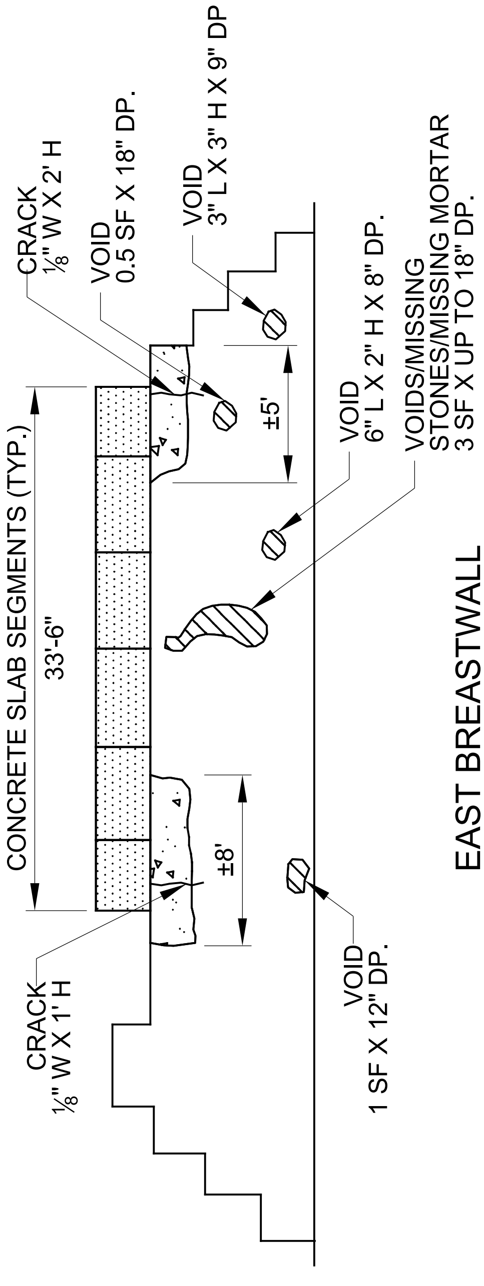
FOUNDATION CONDITIONS: Not visible.

TRAFFIC PROTECTION: YES CONDITION: N/A
[✓ NO] / NEEDED LOCATION: N/A

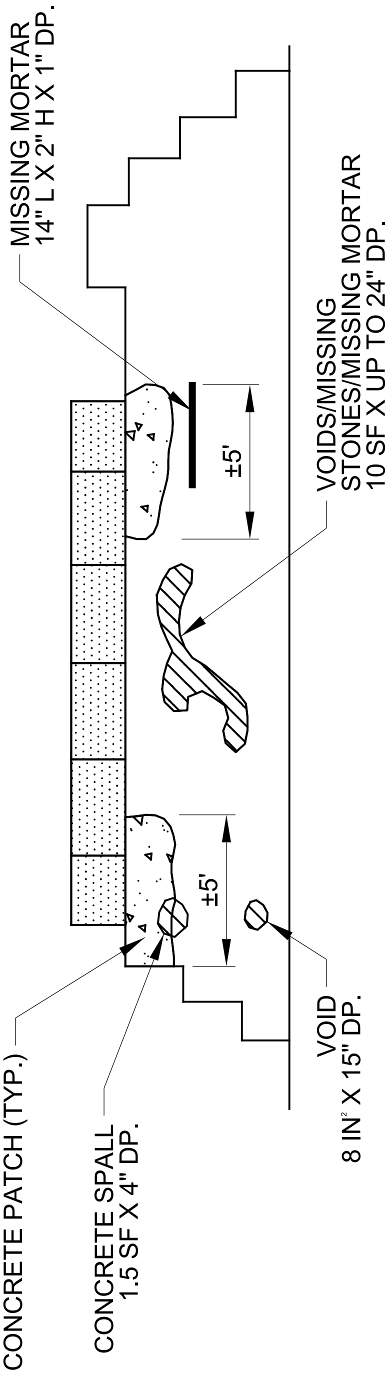
OTHER OBSERVATIONS: Graffiti (50 SF) on breastwall (Photo 5-16).

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

LINE MORRISTOWN MP 57.49 PHOTOS 5-13, 5-14, 5-15, 5-16



EAST BREASTWALL
LOOKING EAST
N.T.S.



WEST BREASTWALL
LOOKING WEST
N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

[✓ EAST] / WEST

[✓ NORTH] / SOUTH

LINE: Morristown

MP: 57.49

PHOTOS: 5-02, 5-17

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: ±15'-0"

WIDTH: 3'-0"

LENGTH: ±35'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Heavy vegetation

LOCATION: Above, behind, and on top of wall

CONDITIONS: Wall exhibits loss of mortar throughout (±50 LF) with voids up to 12" deep (15 SF total). Water staining on the face of the wall near the bridge and light moss growth (10%) throughout. Large accumulation of debris in front of the wall (Photo 5-17). See northeast wingwall sketch for details.

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO]

[✓ PLUMB] / TILT: N/A

TRAFFIC PROTECTION: YES

CONDITION: N/A

[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: Heavy accumulation of debris under bridge along base of wall for full length (Photo 5-02).

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

EAST / [✓ WEST]
[✓ NORTH] / SOUTH

LINE: Morristown

MP: 57.49

PHOTOS: 5-02

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: 15'-0"

WIDTH: ±3'-0"

LENGTH: ±35'

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: 4" ∅ tree & heavy vegetation

LOCATION: Above, behind, and on top of wall

CONDITIONS: Wall exhibits loss of mortar (±40 LF) with voids up to 12" deep (15 SF total) throughout. There is a broken stone at the top of the wall (3 SF) and light moss growth on the face of the wall (25%). See northwest wingwall sketch for details.

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO]

[✓ PLUMB]/TILT: N/A

TRAFFIC PROTECTION: YES

CONDITION: N/A

[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: Heavy accumulation of debris under bridge along base of wall for full length (Photo 5-02).

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

[✓ EAST] / WEST
NORTH / [✓ SOUTH]

LINE: Morristown MP: 57.49 PHOTOS: 5-18

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: 8'-0" WIDTH: 3'-0" LENGTH: ±5'-0" (exposed portion of wall)

TREE / VEGETATION GROWTH ON WINGWALL: YES / [✓ NO]

DESCRIPTION: N/A LOCATION: N/A

CONDITIONS: Wingwall exhibits deteriorated/missing mortar (8 LF total) with voids up to 24" deep (±3 SF) (Photo 5-18). Ballast is spilling over the top of the wingwall. See southeast wingwall sketch for details.

FOUNDATIONS: Not visible.

GRAFFITI: [✓ YES] / NO [✓ PLUMB] / TILT: N/A

TRAFFIC PROTECTION: YES CONDITION: N/A

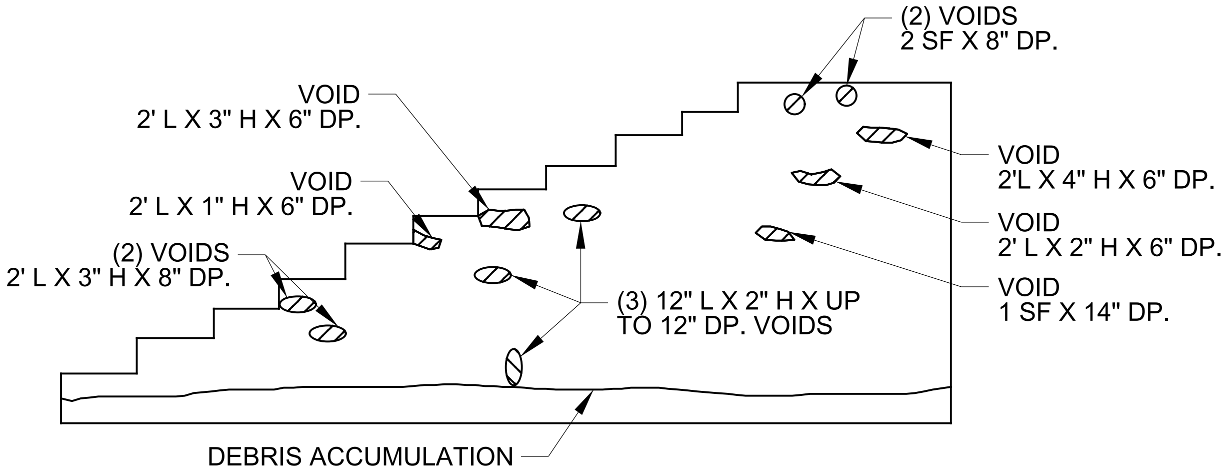
[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: Heavy accumulation of debris and ballast between south wingwalls for full length. Graffiti (<0.5 SF) present on wall.

SKETCH (IF NEEDED):

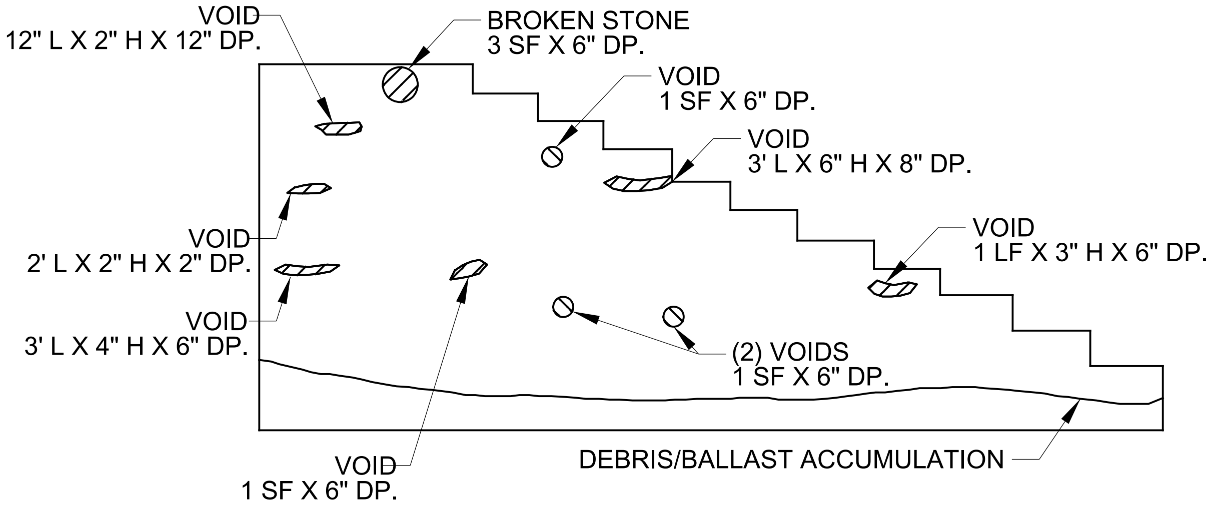
# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

LINE MORRISTOWN MP 57.49 PHOTOS 5-17, 5-18



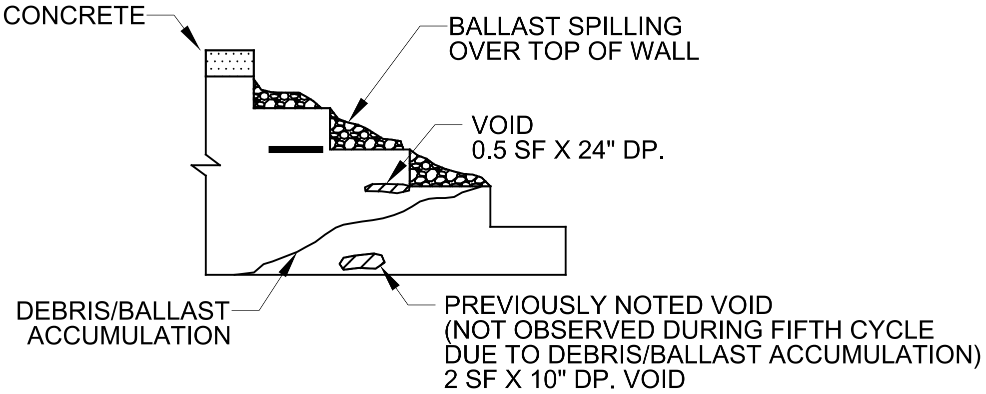
## NORTHEAST WINGWALL

N.T.S.



## NORTHWEST WINGWALL

N.T.S.



## SOUTHEAST WINGWALL

N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

**EAST / [✓ WEST]**
**NORTH / [✓ SOUTH]**

LINE: Morristown
MP: 57.49
PHOTOS: ---

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: 8'-0"
WIDTH: 3'-0"
LENGTH: ±6'-0" exposed portion of wall

TREE / VEGETATION GROWTH ON WINGWALL: YES / [✓ NO]

DESCRIPTION: N/A
LOCATION: N/A

CONDITIONS: Wall exhibits deteriorated/missing mortar (8 LF total) with voids up to 6" deep (5 SF total).
Ballast is spilling over the top of the wall.

FOUNDATIONS: Not visible.

GRAFFITI: YES / [✓ NO]
[✓ PLUMB] / TILT: N/A
TRAFFIC PROTECTION: YES
CONDITION: N/A
[✓ NO] / NEEDED LOCATION: N/A

OTHER OBSERVATIONS: Heavy accumulation of debris and ballast between south wingwalls for full length.

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ROADWAY/RAILROAD UNDERCLEARANCE

LINE: Morristown MP: 57.49 PHOTOS: ---

NAME: Cattle pass (unused)

← WEST TO: Hackettstown EAST TO: Hoboken →

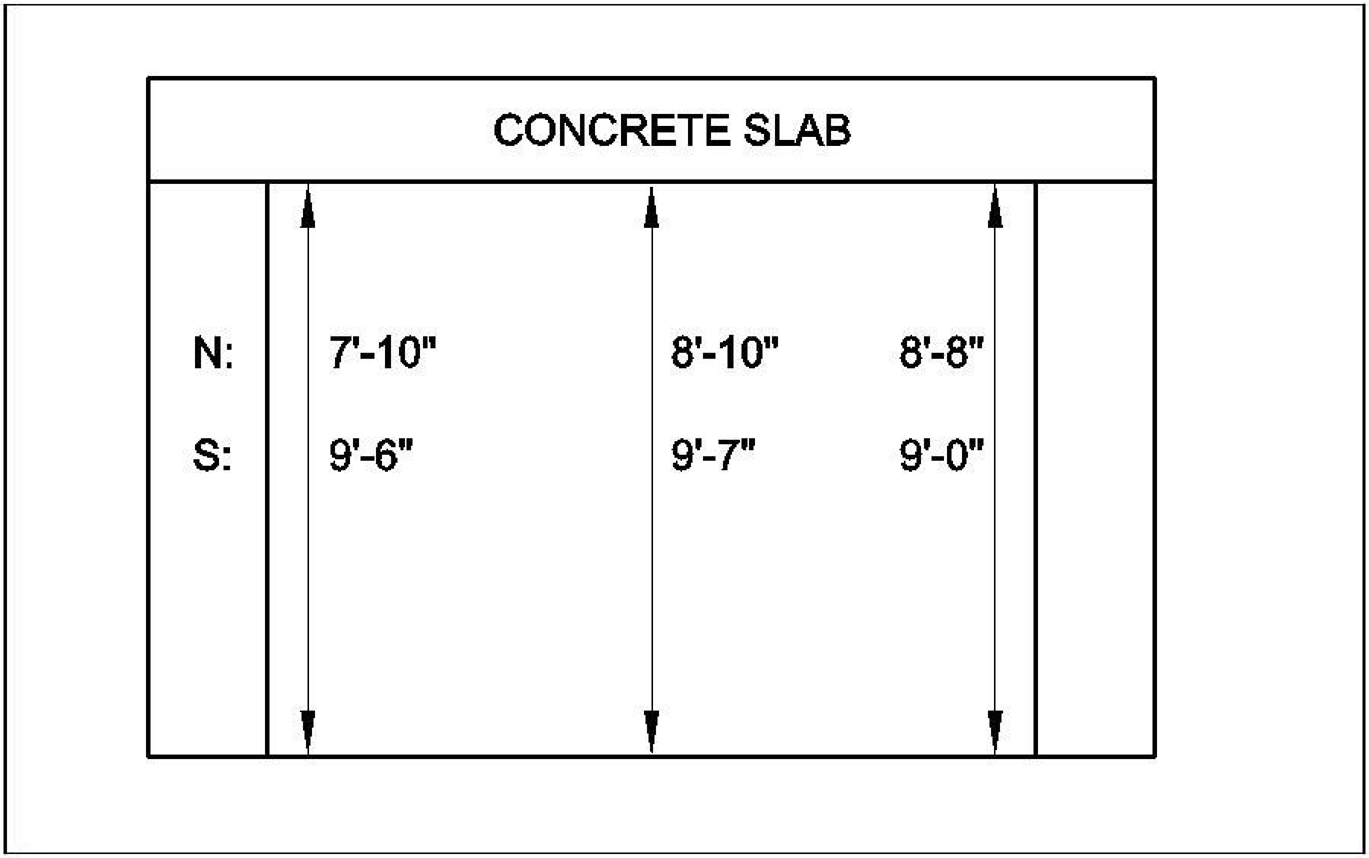


TABLE 1 – CLEARANCE DIAGRAM

(SPAN(S) 1 )

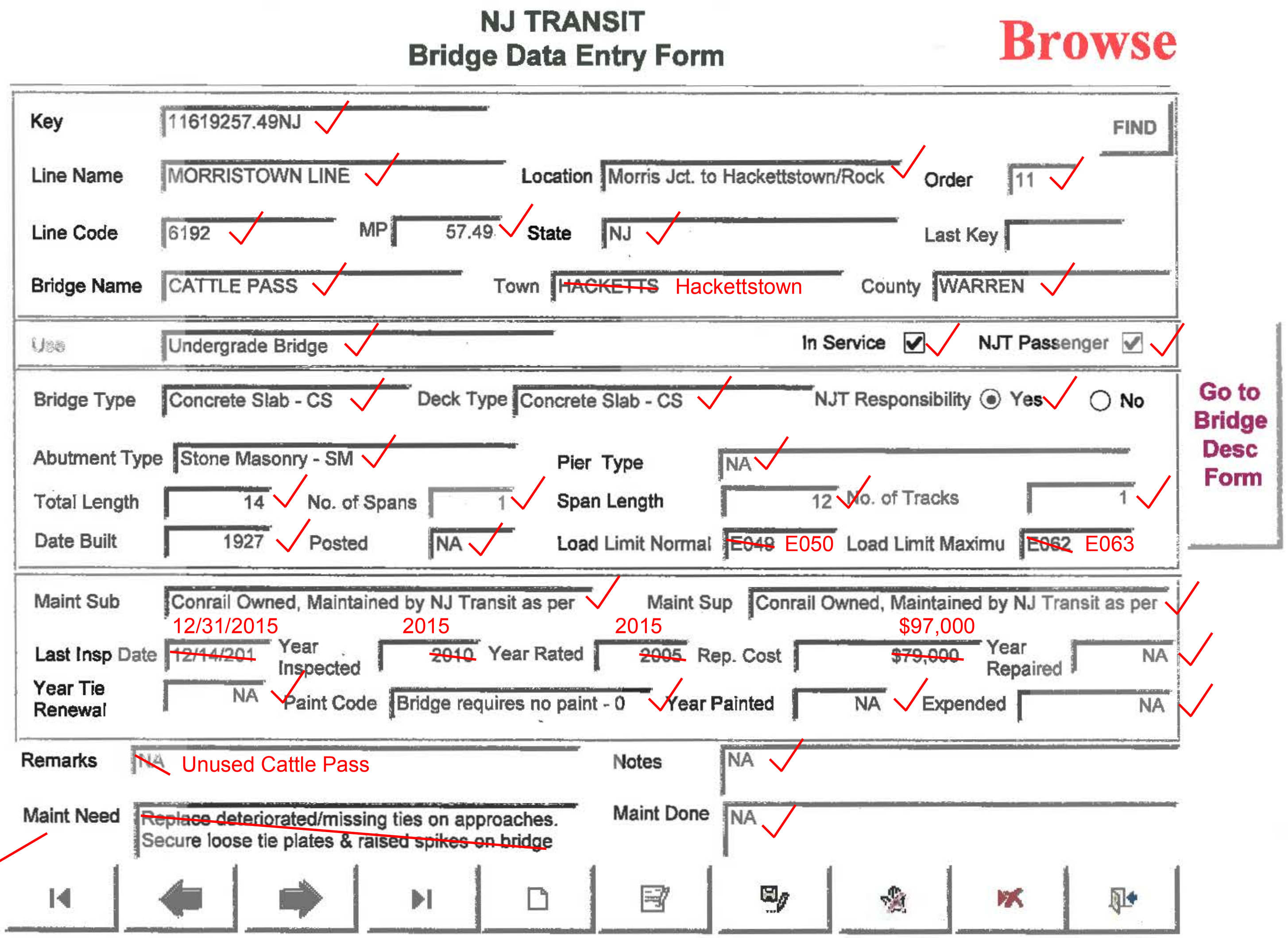
MINIMUM VERTICAL CLEARANCE: 7'-10"

MINIMUM RIGHT LATERAL CLEARANCE: N/A

MINIMUM LEFT LATERAL CLEARANCE: N/A

# APPENDIX 4

# BRIDGE MANAGEMENT SYSTEM INPUT FORMS



# NJ TRANSIT
## Bridge Data Entry Form

**Browse**

Key: 11619257.49NJ ✓

Line Name: MORRISTOWN LINE ✓
Location: Morris Jct. to Hackettstown/Rock ✓
Order: 11 ✓

Line Code: 6192 ✓
MP: 57.49 ✓
State: NJ ✓
Last Key:

Bridge Name: CATTLE PASS ✓
Town: ~~HACKETTS~~ Hackettstown
County: WARREN ✓

Use: Undergrade Bridge ✓
In Service ☑ ✓
NJT Passenger ☑ ✓

Bridge Type: Concrete Slab - CS ✓
Deck Type: Concrete Slab - CS ✓
NJT Responsibility ● Yes ✓ ○ No

Abutment Type: Stone Masonry - SM ✓
Pier Type: NA ✓

Total Length: 14 ✓
No. of Spans: 1 ✓
Span Length: 12 ✓
No. of Tracks: 1 ✓

Date Built: 1927 ✓
Posted: NA ✓
Load Limit Normal: ~~E048~~ E050
Load Limit Maximu: ~~E062~~ E063

Maint Sub: Conrail Owned, Maintained by NJ Transit as per ✓
Maint Sup: Conrail Owned, Maintained by NJ Transit as per ✓

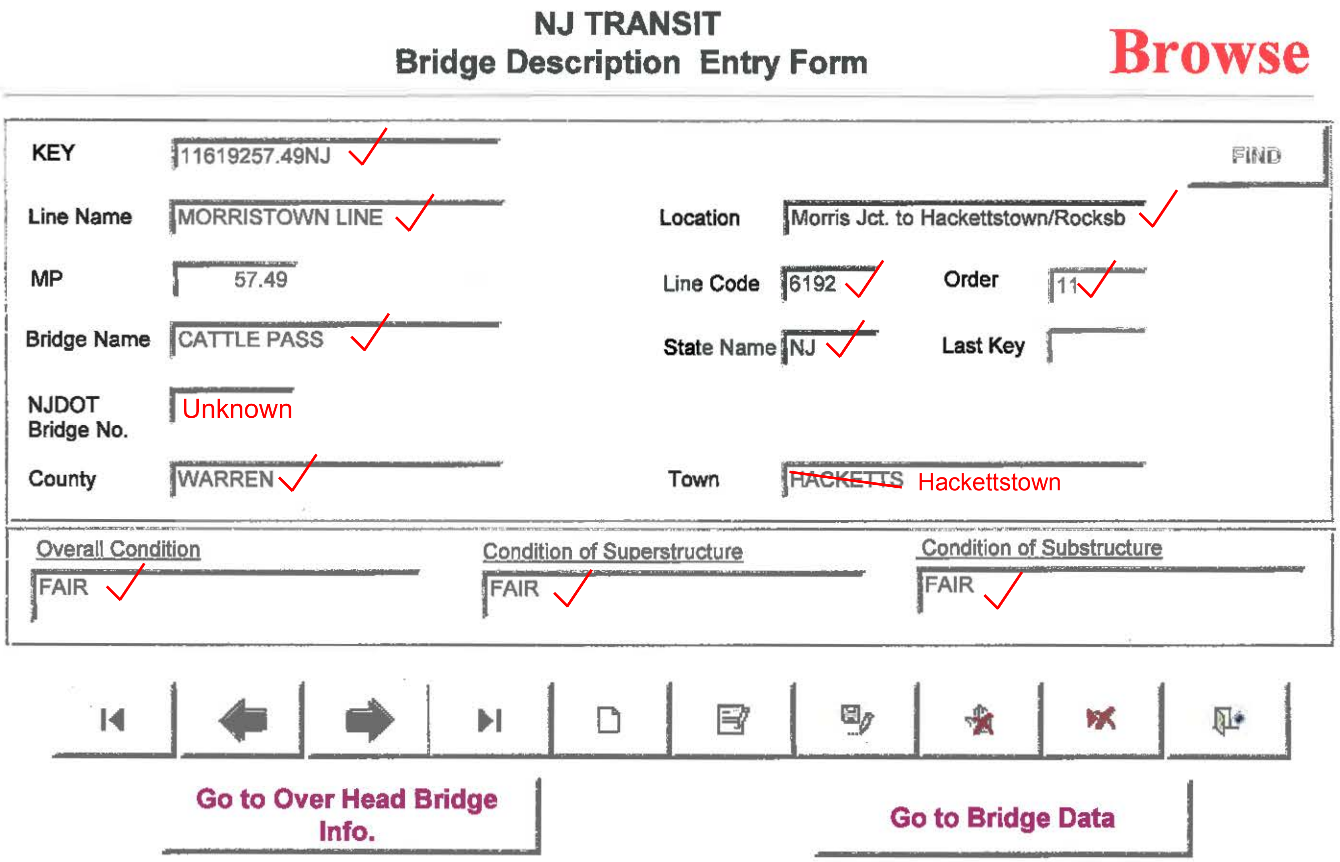
Last Insp Date: ~~12/14/201~~ 12/31/2015
Year Inspected: ~~2010~~ 2015
Year Rated: ~~2005~~ 2015
Rep. Cost: ~~$79,000~~ $97,000
Year Repaired: NA ✓

Year Tie Renewal: NA ✓
Paint Code: Bridge requires no paint - 0 ✓
Year Painted: NA ✓
Expended: NA ✓

Remarks: ~~NA~~ Unused Cattle Pass
Notes: NA ✓

Maint Need: ~~Replace deteriorated/missing ties on approaches. Secure loose tie plates & raised spikes on bridge~~
Maint Done: NA ✓

1. Install a waterproof membrane and provide adequate drains throughout the slab.
2. Fill the voids/missing stones with epoxy concrete throughout the abutments and wingwalls.
3. Repoint the deteriorated and missing mortar throughout the abutments and wingwalls.
4. Remove all unsound concrete, clean and paint any exposed reinforcement and repair the spalls in the parapets/slab at both fascias and abutment seat areas with epoxy concrete.
5. Seal the medium to wide cracks in the parapet and slab at the south fascia and in the east abutment seat area with a pressure injected epoxy sealer.
6. Replace the severely split and missing ties along both approaches (Photo 5-08).
7. Secure the loose tie plates and raised spikes and replace the missing spikes on the bridge and along both approaches.
8. Install gabion walls along the southeast and southwest approach shoulders to stabilize the slopes and prevent ballast erosion.
9. Remove debris accumulation beneath the bridge.
10. Remove graffiti from both abutment breastwalls and the southeast wingwall and remove vegetation behind the north wingwalls.
11. Since this structure no longer functions as a cattle pass, and due to low ratings based on assumed steel reinforcement, consideration should be given to fill in under the structure.



## NJ TRANSIT
## Bridge Description Entry Form

**Browse**

**KEY** 11619257.49NJ ✓

**Line Name** MORRISTOWN LINE ✓

**MP** 57.49

**Bridge Name** CATTLE PASS ✓

**NJDOT Bridge No.** Unknown

**County** WARREN ✓

**Location** Morris Jct. to Hackettstown/Rocksb ✓

**Line Code** 6192 ✓

**Order** 11 ✓

**State Name** NJ ✓

**Last Key**

**Town** ~~HACKETTS~~ Hackettstown

**Overall Condition** FAIR ✓

**Condition of Superstructure** FAIR ✓

**Condition of Substructure** FAIR ✓

# NEW JERSEY TRANSIT CORPORATION

# BRIDGE EVALUATION SURVEY REPORT

## MORRISTOWN LINE MP 58.00
## OVER GRAND AVENUE (COUNTY ROUTE 629)
## HACKETTSTOWN, WARREN COUNTY

**ROUTE NUMBER: 4004**
**USRA LINE CODE: 6192**

**NJDOT STRUCTURE NO.: UNKNOWN**

**FIFTH CYCLE**

**DATE OF INSPECTION**

**DECEMBER 31, 2015**

**Prepared by:**

**Hardesty & Hanover, LLC**
**850 Bear Tavern Road, Suite 206**
**West Trenton, NJ 08628**

Hardesty
&Hanover
engineering that moves you

850 Bear Tavern Road, Suite 206, West Trenton, NJ 08628
T: 609.538.8233• F: 609.538.8238
www.hardesty-hanover.com

July 20, 2016

Ms. Lisa Fanning, PE
Assistant Chief Engineer – Structures
Infrastructure Engineering – Structures Department
New Jersey Transit Corporation
One Penn Plaza East
Newark, New Jersey 07105-2246

Re: Bridge Inspection Survey and Evaluation
Morristown Line MP 58.00 over Grand Avenue
Hackettstown, Warren County
NJDOT Structure No. Unknown
Contract No. 09-108 Group F

Dear Ms. Fanning,

In accordance with Undergrade Bridge Inspections Contract No. 14-051F Group F, Purchase Order No. L-92549, dated December 23, 2015, we are pleased to submit three (3) copies of the **FINAL REPORT** of the bridge inspection for the above-referenced structure.

The in-depth inspection of the above referenced structure was done in accordance with established accepted practices, however there is no representation made that all defects have been disclosed or discovered. The report presented herein is based upon a thorough inspection of the bridge for the primary purpose of identifying important changes in condition and behavior, which have occurred since the previous inspection. Recommendations for the repair of major defects and load rating analyses are included based on inspection findings. The bridge was inspected in accordance with New Jersey Transit guidelines and current AREMA standards by an NBIS qualified team leader and crew. The report has been reviewed in accordance with the approved quality management system, per the project agreement and our scope of work.

If you have any questions or comments, please contact me at 609-583-5023.

Very truly yours,
HARDESTY & HANOVER, LLC

Paul J. Connolly, PE
Principal Associate

Enclosures:
cc: Mr. Paul Falkowski, PE (w/enclosures)

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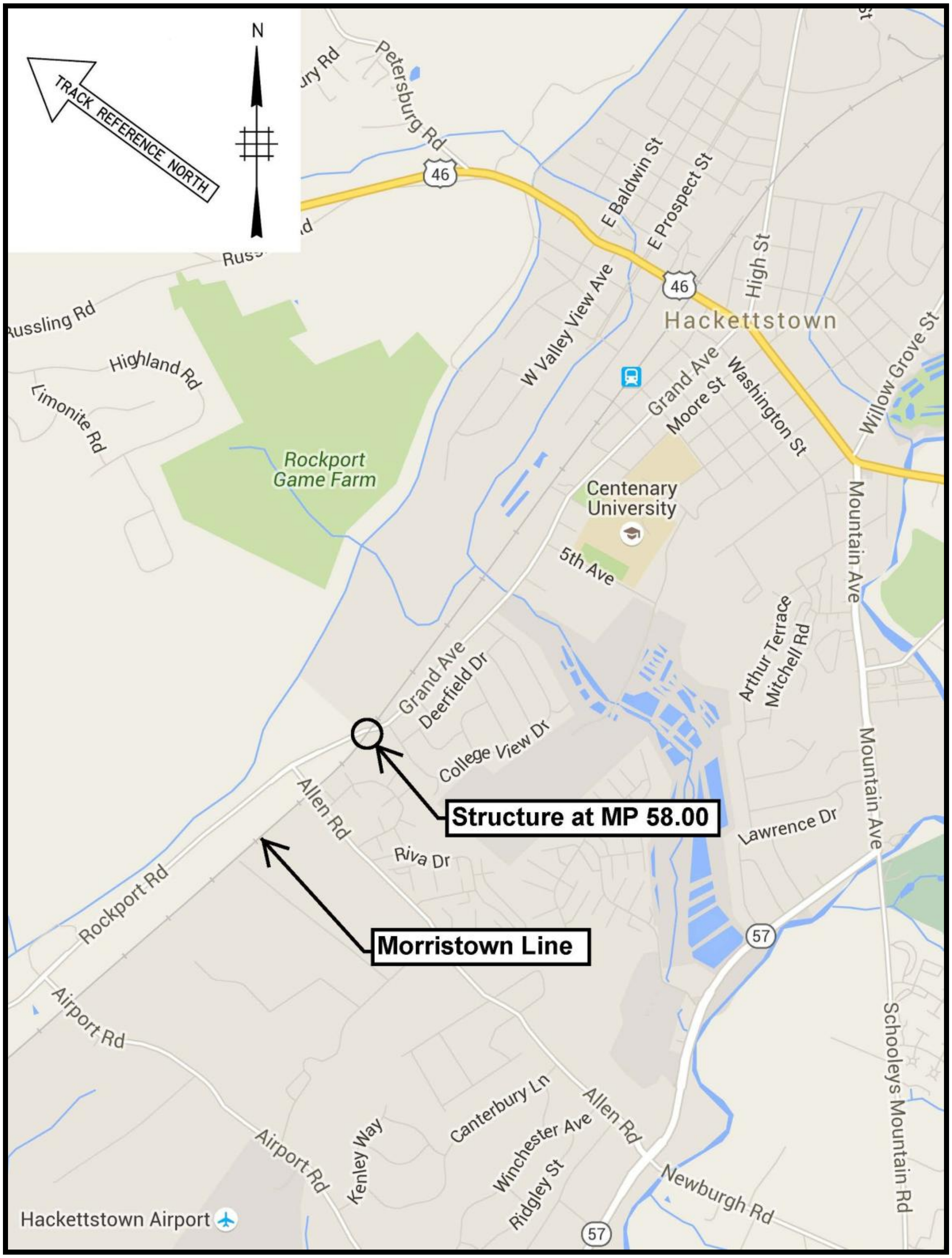
# BRIDGE LOCATION MAP



NJ TRANSIT
The Way To Go.

LOCATION MAP
MORRISTOWN LINE MP 58.00
Over GRAND AVENUE
HACKETTSTOWN, WARREN COUNTY
NEW JERSEY

**Hardesty & Hanover, LLC**

DATE: 01/05/2016

# STRUCTURAL DATA SHEET

# NEW JERSEY TRANSIT
## INFRASTRUCTURE ENGINEERING – STRUCTURES
## BRIDGE EVALUATION SURVEY REPORT
## CYCLE NO. 5

## STRUCTURAL DATA

**NJDOT Structure No.:** Unknown

**Year Built:** 1924 **Year Rehab:** N/A

**USRA Line Code:** 6192

**Length:** 27'-1" **Width:** 32'-2"

**Route No.:** 4004

**Date of this Evaluation:** 01/05/2016
**By:** Hardesty & Hanover, LLC

**Line:** Morristown

**Date of Previous Evaluation:** 12/15/2010
**By**: HNTB Corporation

**MP & Name:** MP 58.00 over Grand Avenue

**Structure Type:** Single span reinforced concrete slab

**Special Equipment Used:** None

**OVERALL CONDITION:** Fair
SUPERSTRUCTURE CONDITION: Fair
SUBSTRUCTURE CONDITION: Fair

**WORK DONE:** West approach has been reballasted for full length (Photo 5-04). Telephone cable along top of the west abutment has been removed (Photo 5-07). Small tree on top of northeast wingwall has been cut at base; stump remains on top of wall (Photo 5-14).
New clearance postings have been installed on the north and south fascias of the bridge (Photos 5-01 and 5-02) and new approach vertical clearance postings have been installed on both the north and south approaches (Photo 5-16).

**RATINGS:** The following load ratings were computed in the 3rd Cycle Bridge Evaluation Survey Report and were updated based on the as-inspected conditions found during the 4th cycle inspection in accordance with updated AREMA standards. As-inspected conditions during this 5th cycle inspection did not warrant a ratings update based on section loss. However, ratings were updated in this 5th Cycle inspection based on a refined live load analysis, resulting in the ratings decreasing slightly:

| | Controlling Member | As-Built | As-Inspected |
|---|---|---|---|
| **Normal:** | Reinforced Concrete Slab (Shear) | E-59 | E-59 |
| **Maximum:** | Reinforced Concrete Slab (Shear) | E-75 | E-75 |

# CONCLUSIONS AND RECOMMENDATIONS

## CONCLUSIONS AND RECOMMENDATIONS

Morristown Line MP 58.00 over Grand Avenue (County Route 629) consists of a single span reinforced (precast) concrete slab supported on stone masonry abutments. The bridge carries one active track on a ballasted deck. The overall condition of the structure is fair.

The approaches are in fair condition. The west approach track components are completely covered with ballast and were not visible for inspection. The ties on the east approach typically exhibit fine checks and splits but two ties exhibit wide checks and splits. There is light rust on the rails with a 1/16" lip. Pumping was not observed since passenger train service ceases west of the Hackettstown station and only occasional freight trains cross the bridge. The tie plates and spikes exhibit moderate rust. Several spikes are raised and six tie plates are loose on the east approach. Ballast is mixed with dirt along all approach shoulders and is of adequate depth.

The deck components are in fair condition. Several ties exhibit fine checks and splits and four ties exhibit wide checks. The rails have a minor lip on the inner edges. The tie plates and spikes have moderate rust with fourteen loose tie plates and several spikes raised up to 1". Four spikes are not securing the tie plates and one is missing on the north rail. Pumping was not observed due to lack of trains. Ballast is mixed with dirt throughout. Large stones cover the west half of the bridge along the north shoulder.

The superstructure is in fair condition. The underside of the precast concrete slab exhibits fine map cracks throughout, and small spalls and scrape marks at the fascias due to vehicular impact damage. There is water staining with a completely deteriorated waterproofing membrane and light efflorescence on the underside, and edge chipping between the panel joints. There are small spalls, fine map cracks, fine to medium cracks, graffiti, and light moss growth on the headwalls. The south headwall exhibits an edge spall due to vehicular impact damage.

The substructure is in fair condition. The stone masonry abutments exhibit areas of deteriorated and missing mortar with voids up to 38" deep. Four stones on the east abutment and one stone on the west abutment exhibit vertical cracks up to 1/2" and 3/16" wide, respectively. The wingwalls exhibit missing and deteriorated mortar with voids up to 36" deep. There are random fine to medium cracks in the wingwalls with a 1 1/2" wide vertical crack in the southwest wingwall near the abutment. One capstone is displaced and one is missing near the center of the southwest wingwall. The wingwalls exhibit graffiti, vegetation, moss, and tree growth. The southeast wingwall exhibits bulging stones (inactive) and is slightly tilted to the north. The reflective chevron marker at the corner of the northwest wingwall is missing a top screw anchor.

The minimum vertical clearance of 10'-8" measured below the south end of the slab does not meet the minimum vertical underclearance criteria required by MUTCD. The bridge is currently posted for a 10'-8" vertical underclearance on both fascias and along both approaches of Grand Avenue.

The track is tangent and is on a 0.86% upgrade toward the west. There are no obstructions to the horizontal track clearance on the structure.

## CONCLUSIONS AND RECOMMENDATIONS (CONTINUED)

The inspection survey indicates that no significant deterioration affecting the ratings has occurred since the previous inspection. Load ratings were performed during the previous cycle based on revised impact values, and revised live load moment and shear and wind load effects per AREMA. Updated load ratings were performed during this cycle based on refined live load analysis to account for longitudinal force distribution. Although the ratings have increased, the rating results based on assumed steel reinforcement indicate that the structure has insufficient structural capacity to support the standard AREMA Cooper E-80 loading at the Maximum and Normal level, however, New Jersey Transit operating equipment loads can be carried by bridge without engine speed restrictions. The controlling as-built and as-inspected ratings for the concrete slab based on shear are E-75 at the Maximum level and E-59 at the Normal level.

## CONCLUSIONS AND RECOMMENDATIONS (CONTINUED)

We recommend that the following repairs be made to retard further deterioration, preserve the structural integrity of the bridge, improve safety and extend its useful life:

1. Install a waterproof membrane and provide adequate drains (Photos 5-06 and 5-12).

2. Patch concrete spalls in the underside of the deck slab, parapet, fascias and northwest wingwall cap (Photos 5-06, 5-12, and 5-13).

3. Repoint areas of deteriorated and missing mortar and seal the wide cracks in the abutments and wingwalls (Photos 5-07 and 5-14).

4. Reset the loose and bulging stones in the southeast and northwest wingwalls (Photo 5-15).

5. Install a gabion retaining wall at the northeast, southwest, and southeast corners of the bridge at the top of the embankment to retain ballast (Photo 5-09).

6. Seal the medium to wide cracks in the parapets and the southwest wingwall cap (Photo 5-10).

7. Replace the severely split and rotted ties along the east approach and on the bridge (Photo 5-05).

8. Remove trees, debris and vegetation growth behind the wingwalls and graffiti from the abutments and parapets (Photos 5-01, 5-02, 5-11, and 5-13).

9. Install hand rails along both sides of the bridge for the full length (Photo 5-03).

10. The structure should be re-inspected during the next regularly scheduled period.

# COST ESTIMATE SUMMARY AND WORK SHEETS

## COST ESTIMATE AND BACK-UP WORKSHEETS

DISCLAIMER: The provided cost estimates are for scoping purposes only and shall not be construed as actual construction costs.

### ESTIMATED REPAIR COSTS

| ITEM NO. | REPAIR RECOMMENDATION | UNIT | QUANTITY | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|
| 1 | WATERPROOF SLAB | | | | |
| | A. REMOVE & REINSTALL TRACK & BALLAST | LF/TRACK | 50 | $1,350 | $67,500 |
| | B. INSTALL WATERPROOF MEMBRANE | SY | 100 | $60 | $6,000 |
| | C. INSTALL DRAINS | EACH | 2 | $520 | $1,040 |
| 2 | PATCH CONCRETE SPALLS IN THE UNDERSIDE OF THE DECK SLAB, PARAPETS, FASCIAS AND NW WINGWALL CAP | SF | 15 | $155 | $2,325 |
| 3 | REPOINT AREAS OF DETERIORATED AND MISSING MORTAR AND SEAL THE WIDE CRACKS IN THE ABUTMENTS & WINGWALLS | LF | 250 | $20 | $5,000 |
| 4 | RESET THE LOOSE BULGING STONES IN THE SE AND NW WINGWALLS | CREW DAY | 2 | $2,080 | $4,160 |
| 5 | INSTALL GABION RETAINING WALL AT THE NE, SW & SE CORNERS OF THE BRIDGE AT THE TOP OF THE EMBANKMENT TO RETAIN BALLAST | LF | 50 | $1,040 | $52,000 |
| 6 | SEAL MEDIUM/WIDE CRACKS IN THE PARAPETS & SW WINGWALL CAP | LF | 25 | $185 | $4,625 |
| 7 | REPLACE THE SEVERELY SPLIT AND ROTTED TIES ALONG EAST APPROACH AND ON THE BRIDGE | EACH | 6 | $415 | $2,490 |
| 8 | REMOVE TREES, DEBRIS & VEGETATION GROWTH BEHIND THE WINGWALLS AND GRAFFITI FROM THE ABUTMENTS AND PARAPETS | CREW DAY | 2 | $2,080 | $4,160 |
| 9 | INSTALL HAND RAILS ALONG BOTH SIDES OF THE BRIDGE FOR THE FULL LENGTH | LF | 60 | $105 | $6,300 |

Sub-Total: $155,600
30% Railroad Escalation: $46,680
Grand Total: $202,280

Say **$203,000**

## COST ESTIMATE AND BACK-UP WORKSHEETS

### ESTIMATED REPAIR QUANTITIES

| ITEM NO. | REPAIR RECOMMENDATION | QUANTITY | TOTAL QUANTITY |
|---|---|---|---|
| 1 | WATERPROOF SLAB | BRIDGE = 27'; APPROACHES = 2 X 10' = 20' | 50 LF/TRACK |
| | A. REMOVE & REINSTALL TRACK & BALLAST | 27'+20' = 47' SAY 50 LF/TRACK | |
| | B. INSTALL WATERPROOF MEMBRANE | (27' X 32') / 9 = 96 SY SAY 100 SY | 100 SY |
| | C. INSTALL DRAINS | 2 EACH | 2 EACH |
| | | | |
| 2 | PATCH CONCRETE SPALLS IN THE | UNDERSIDE OF DECK SLAB = 5.5 SF; | 15 SF |
| | UNDERSIDE OF THE DECK SLAB, PARAPETS, | FASCIAS: N = 2 SF; S = 6 SF; NW WW = 1 SF | |
| | FASCIAS AND NW WINGWALL CAP | TOTAL = 14.5 SF SAY 15 SF | |
| | | | |
| 3 | REPOINT AREAS OF DETERIORATED AND | ABUTMENTS: E = 40 LF; W = 20 LF; | 250 LF |
| | MISSING MORTAR AND SEAL THE WIDE | WINGWALLS: NE = 30 LF; NW = 35 LF; | |
| | CRACKS IN THE ABUTMENTS & WINGWALLS | SE = 65 LF; SW = 25 LF; | |
| | | TOTAL = 215 LF SAY 250 LF | |
| | | | |
| 4 | RESET THE LOOSE BULGING STONES IN THE | SAY 2 CREW DAYS | 2 CREW DAYS |
| | SE AND NW WINGWALLS | | |
| | | | |
| 5 | INSTALL GABION RETAINING WALL AT THE | NE CORNER = 15' | 50 LF |
| | NE, SW & SE CORNERS OF THE BRIDGE AT | SE CORNER = 15' | |
| | THE TOP OF THE EMBANKMENT TO RETAIN | SW CORNER = 15' | |
| | BALLAST | TOTAL = 45 LF SAY 50 LF | |
| | | | |
| 6 | SEAL MEDIUM/WIDE CRACKS IN THE | PARAPETS: N = 2 LF; S = 6 LF | 25 LF |
| | PARAPETS & SW WINGWALL CAP | SE WW = 10 LF; SW WW = 4 LF | |
| | | TOTAL = 22 LF; SAY 25 LF | |
| | | | |
| 7 | REPLACE THE SEVERELY SPLIT AND ROTTED | APPROACHES: E = 2; W = 0; | 6 EACH |
| | TIES ALONG EAST APPROACH AND ON | BRIDGE = 4; | |
| | THE BRIDGE | TOTAL = 6 EACH | |
| | | | |
| | | | |
| 8 | REMOVE TREES, DEBRIS & VEGETATION | SAY 2 CREW DAYS | 2 CREW DAYS |
| | GROWTH BEHIND THE WINGWALLS AND | | |
| | GRAFFITI FROM THE ABUTMENTS AND | | |
| | PARAPETS | | |
| | | | |
| 9 | INSTALL HAND RAILS ALONG BOTH SIDES | BRIDGE = 27' x 2 sides = 54 LF | 60 LF |
| | OF THE BRIDGE FOR THE FULL LENGTH | TOTAL = 54 LF SAY 60 LF | |

# APPENDIX 1

# RATING SUMMARY AND COMPUTATIONS

# RATING SUMMARY - NORMAL

**BRIDGE:** Morristown Valley Line MP 58.00 over Grand Avenue
**CONSULTANT:** Hardesty & Hanover, LLC
**DATE:** 5/5/16 **CYCLE: 5 INFO TAKEN FROM CYCLES NO. 2, 3, & 4**

**CONTROLLING RATING OF BRIDGE: E-59**

| MEMBER | CAPACITY OF THE BRIDGE COOPER E - LOAD | | | | | LOADED LENGTH FT. | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | AS - BUILT | | AS - INSPECTED | | FATIGUE | | |
| | E-MOMENT | E-SHEAR | E-MOMENT | E-SHEAR | | | |
| Slab | E66 | **E59** | E66 | **E59** | -- | 19.83 ft | |
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| COLUMNS | CAPACITY OF THE BRIDGE COOPER E - LOAD | | | LOADED LENGTH FT. | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|
| | AS - BUILT | AS - INSPECTED | FATIGUE | | |
| | E-AXIAL | E-AXIAL | | | |
| N/A | | | | | |
| | | | | | |
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Notes:
Reference Cycles 2, 3, and 4 for previous rating calcs.

# RATING SUMMARY - MAXIMUM

**BRIDGE:** Morristown Valley Line MP 58.00 over Grand Avenue
**CONSULTANT:** Hardesty & Hanover, LLC
**DATE:** 5/5/16 **CYCLE: 5 INFO TAKEN FROM CYCLES NO. 2, 3, & 4**

**CONTROLLING RATING OF BRIDGE: E-75**

| **MEMBER** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | | | **LOADED LENGTH FT.** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|---|---|
| | **AS - BUILT** | | **AS - INSPECTED** | | **FATIGUE** | | |
| | **E-MOMENT** | **E-SHEAR** | **E-MOMENT** | **E-SHEAR** | | | |
| Slab | E83 | **E75** | E83 | **E75** | -- | 19.83 ft | No speed restrictions required for NJ Transit operating equipment at the Maximum Level. |

| **COLUMNS** | **CAPACITY OF THE BRIDGE COOPER E - LOAD** | | | **LOADED LENGTH FT.** | **ENGINE RESTRICTIONS:** NOTE TYPE AND MOMENT OR SHEAR CONTROLS, INDICATE SPEED AT WHICH RESTRICTION CAN BE LIFTED, MAX. % OVERSTRESS |
|---|---|---|---|---|---|
| | **AS - BUILT** | **AS - INSPECTED** | **FATIGUE** | | |
| | **E-AXIAL** | **E-AXIAL** | | | |
| N/A | | | | | |

Notes:
Reference Cycles 2, 3, and 4 for previous rating calcs.

**1. GEOMERTY & FRAMING**

*a. Field Observations*

- Per the Cycle 5 inspection report, no changes to the geometry or framing system have been observed.

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

- The following information is taken directly from the previous cycles; these inputs will be used throughout the calculations below.

**Member Length =** 19.83 ft

**2. CUTOFF SECTIONS**

- There are no cutoff sections to be evaluated for this concrete deck element.

**3. SECTION PROPERTIES**

*a. Field Observations*

- Per the Cycle 5 inspection report, no significant section losses have occurred since the last report.

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

**4. ALLOWABLE STRESSES & CAPACITIES**

*b. Errors/Omissions in Previous Cycles*

- The assumption for reinforcement layout in the previous rating cycles is as accurate as can be without some form of GPR or pachometer use.
- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

**5. DEAD LOAD (1.3.2, 7.3.2.1)**

*a. Field Observations*

- Per the Cycle 5 inspection report, no changes to the dead load of the structure have been observed.

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

**6. LIVE LOAD (1.3.3, 1.3.4, 7.3.2.2)**

*b. Errors/Omissions in Previous Cycles*

- Cycle 3 correctly revised live load analysis to account for longitudinal distribution through the ballast and deck per AREMA Ch. 8 2.2.3.c(2); Cycle 4 incorrectly changed the calculation to assume no distribution.
- As demonstrated in Cycle 3, the distribution length is limited by the axle spacing of the Cooper E80 train.
- Therefore, since the total length of the 80-kip axles exceeds the span length of the rated member, a uniform load can be applied equal to 80 kips, divided by 5 ft axle spacing and divided by the effective beam width.

**Max Shear, V =** 17.2 k *(from Cycle 3 rating)*
**Max Mom., M =** 82.1 k-ft *(from Cycle 3 rating)*

**7. IMPACT EFFECTS (1.3.5, 7.3.2.3)**

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

**8. CENTRIFUGAL EFFECTS (1.3.6, 7.3.2.4)**

- The track on this bridge is straight; therefore, there are no centrifugal effects to consider for this rating.

**9. TRACK ECCENTRICITY EFFECTS**

- For the given effective beam width analyzed here, track eccentricity effects have negligible effect on the overall rating; as such, no consideration for track offset is made here.

**10. WIND LOADS (1.3.7, 1.3.8, 7.3.2.5)**

*b. Errors/Omissions in Previous Cycles*

- The approach and methodology used in the previous load rating is acceptable; no calculation errors or omissions were observed.

**11. OTHER LATERAL LOADS**

*b. Errors/Omissions in Previous Cycles*

- AREMA 19.5.1 states that the following loads must be considered in a load rating: dead, live, impact, centrifugal, wind on train, wind on structure, longitudinal from live load, longitudinal from friction among others. NJ Transit Exhibit 19 requires that only wind be the only lateral force included in the rating equation.

**12. FATIGUE**

- AREMA makes no reference to rating concrete elements for fatigue; consequently, no fatigue rating will be provided herein.

**13. CONNECTIONS**

- There are no connections to be checked for the rating of this member.

**14. RATINGS**

- Rating for this member can be found in the rating summary sheet on page 5-15.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Calculation** | NJ Transit | **Made By** | MCR | **Date** | 4/29/2016 | **Job No.** | 3147 |
| | ML MP 58.00 | **Checked By** | DMM | **Date** | | **Sec. No.** | 00 |
| | **Force Summary** | **B.Checked By** | MCR | **Date** | | **Page No.** | 2 of 6 |

**Notes**: - The following table summarizes all forces and factors to be used in the rating procedure of all sections. See the individual calculations for more information.
- Values highlighted in **blue** have been revised from the Cycle 4 ratings.
- Section locations are measured from the centerline of end bearing.

| | | | | **FORCE SUMMARY** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MEMBER** | **LENGTH (ft)** | **SECT.** | **LOC. (ft)** | **BENDING (k-ft)** | | | **SHEAR (kips)** | | | **AXIAL (kips)** | | | **FAT. (k-ft)** | **FACTORS** | | |
| | | | | $M_{DL}$ | $M_{LL}$ | $M_{WL}$ | $V_{DL}$ | $V_{LL}$ | $V_{WL}$ | $P_{DL}$ | $P_{LL}$ | $P_{WL}$ | $M_{LL}$ | **I** | **C** | **ECC** |
| **AS-BUILT** | | | | | | | | | | | | | | | | |
| **Slab** | 19.83 | -- | -- | 30 | **82** | 2 | 6 | **17** | 0 | -- | -- | -- | -- | 0.505 | 0.000 | 0.000 |
| **AS-INSPECTED** | | | | | | | | | | | | | | | | |
| **Slab** | 19.83 | -- | -- | 30 | **82** | 2 | 6 | **17** | 0 | -- | -- | -- | -- | 0.505 | 0.000 | 0.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Calculation** | NJ Transit | **Made By** | MCR | **Date** | 4/29/2016 | **Job No.** | 3147 |
| | ML MP 58.00 | **Checked By** | DMM | **Date** | | **Sec. No.** | 00 |
| | Capacity Summary | **B.Checked By** | MCR | **Date** | | **Page No.** | 3 of 6 |

**Notes**: - The following table summarizes all member capacities to be used in the rating procedure. See individual calculations for more information.
- Values highlighted in **blue** have been revised from the Cycle 4 ratings.
- Section locations are measured from the centerline of end bearing.

| | | | | CAPACITY SUMMARY | | | |
|---|---|---|---|---|---|---|---|
| **MEMBER** | **LENGTH (ft)** | **SECT.** | **LOC. (ft)** | **BENDING (k-ft)** | **SHEAR (kips)** | **AXIAL (kips)** | **FAT. (k-ft)** |
| | | | | **M** | **V** | **P** | **$M_{fat}$** |
| **AS-BUILT** | | | | | | | |
| **Slab** | 19.83 | -- | -- | 159 | 31 | -- | -- |
| **AS-INSPECTED** | | | | | | | |
| **Slab** | 19.83 | -- | -- | 159 | 31 | -- | -- |

**Notes**: - The following table summarizes normal and maximum ratings for every section of every rated member, under as-built and as-inspected criteria.
- Values highlighted in **red** do not rate for E80 loading; note that this is only critical when a member does not rate for E80 loading in the maximum level.
- Live load capacity, $CAP_{i.LL}$ = n * CAP - DL - WL *where:* *i* = rating level, WL only applied overstress cases (Eq. 19-2, 19-5)
- Net live load capacity, $CAP_{i.n}$ = $CAP_{i.LL}$ / [1 + I + C] *n* = overstress factor, table below presents governing case
- Rating = [$CAP_{i.n}$ / ($LL_{E80}$ * ECC)] * 80
- No reductions in the impact factor due to speed restrictions are considered in this table in accordance with NJ Transit Exhibit 19.

| | | | MAXIMUM RATING | | | | | | | | | NORMAL RATING | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEMBER | SECT. | LOC. (ft) | BENDING (k-ft) | | | SHEAR (kips) | | | AXIAL (kips) | | | BENDING (k-ft) | | | SHEAR (kips) | | | AXIAL (kips) | | | FATIGUE (k-ft) | |
| | | | $M_{m.LL}$ | $M_{m.n}$ | E | $V_{m.LL}$ | $V_{m.n}$ | E | $P_{m.LL}$ | $P_{m.n}$ | E | $M_{n.LL}$ | $M_{n.n}$ | E | $V_{n.LL}$ | $V_{n.n}$ | E | $P_{n.LL}$ | $P_{n.n}$ | E | $M_{sr.n}$ | E |
| AS-BUILT | | | | | | | | | | | | | | | | | | | | | | |
| **Slab** | -- | -- | 129 | 86 | **E83** | 24 | 16 | **E75** | -- | -- | -- | 102 | 68 | **E66** | 19 | 13 | **E59** | -- | -- | -- | -- | -- |
| AS-INSPECTED | | | | | | | | | | | | | | | | | | | | | | |
| **Slab** | -- | -- | 129 | 86 | **E83** | 24 | 16 | **E75** | -- | -- | -- | 102 | 68 | **E66** | 19 | 13 | **E59** | -- | -- | -- | -- | -- |

| Calculation | NJ Transit | Made By | MCR | Date | 4/29/2016 | Job No. | 3147 |
|---|---|---|---|---|---|---|---|
| | ML MP 58.00 | Checked By | DMM | Date | | Sec. No. | 00 |
| | Equipment Comparison | B.Checked | MCR | Date | | Page No. | 5 of 6 |

**Notes**: - The following table compares the as-inspected capacity of the member under maximum loading with the equivalent E loading for the special equipment trains presented in NJ Transit Exhibit 19.
- If the capacity of the member exceeds the equivalent E-load of all equipment loads, then no speed restrictions are required.
- Equivalent E ratings herein assume no longitudinal distribution of live load; this approach yields acceptable results.
- Speed restrictions, if any, are computed based on the speed reduction required to achieve an acceptable maximum rating in accordance with AREMA Ch. 8, 19.3.4.3.b.

| MEMBER | E-CAP | F40PH-2 | 2 F40PH-2 | GP40PH-2 | 2 GP40PH-2 | GP40FH-2 | 2 GP40FH-2 | SW-1500 | ALP-44 | 2 ALP-44 | ALP-46 | 2 ALP-46 | PL-42 | 2 PL-42 | GP40-2 | 2 GP40-2 | ALP-45 | 2 ALP-45 | 286K Car | Restrict Speed? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | BENDING | | | | | | | | | | |
| **Slab** | **E83** | E38 | E38 | E43 | E43 | E41 | E41 | E38 | E30 | E30 | E31 | E31 | E41 | E41 | E41 | E42 | E41 | E41 | E63 | NO |
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| **Restriction (mph)** | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | | | | | | | | | SHEAR | | | | | | | | | | |
| **Slab** | **E75** | E41 | E41 | E46 | E46 | E44 | E44 | E40 | E32 | E32 | E33 | E33 | E44 | E44 | E44 | E44 | E44 | E44 | E62 | NO |
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| **Restriction (mph)** | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | | | | | | | | | AXIAL | | | | | | | | | | |
| **Girder G3** | **--** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NO |
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**BRIDGE:** Morristown Valley Line MP 58.00 over Grand Avenue
**CONSULTANT:** Hardesty & Hanover
**DATE:** 4/29/2016 **CYCLE NO.:** 5 **INFO TAKEN FROM CYCLE NO.:** 1-4 **CONTROLLING RATING OF BRIDGE:** E59

***NORMAL***

| MEMBER [Gov. Section] | CAPACITY OF THE BRIDGE Cooper E-Load | | | | | | | LOADED LENGTH | Engine Restrictions: note type, moment or shear control, and indicate speed without restriction. |
|---|---|---|---|---|---|---|---|---|---|
| | As-Built | | | As-Inspected | | | Fatigue | | |
| | E-Moment | E-Shear | E-Axial | E-Moment | E-Shear | E-Axial | | | |
| **Slab** | E66 | E59 | -- | E66 | E59 | -- | -- | 19.83 ft | |
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**CONTROLLING RATING OF BRIDGE:** E75

***MAXIMUM***

| MEMBER [Gov. Section] | CAPACITY OF THE BRIDGE Cooper E-Load | | | | | | | LOADED LENGTH | Engine Restrictions: note type, moment or shear control, and indicate speed without restriction. |
|---|---|---|---|---|---|---|---|---|---|
| | As-Built | | | As-Inspected | | | Fatigue | | |
| | E-Moment | E-Shear | E-Axial | E-Moment | E-Shear | E-Axial | | | |
| **Slab** | E83 | E75 | -- | E83 | E75 | -- | -- | 19.83 ft | |
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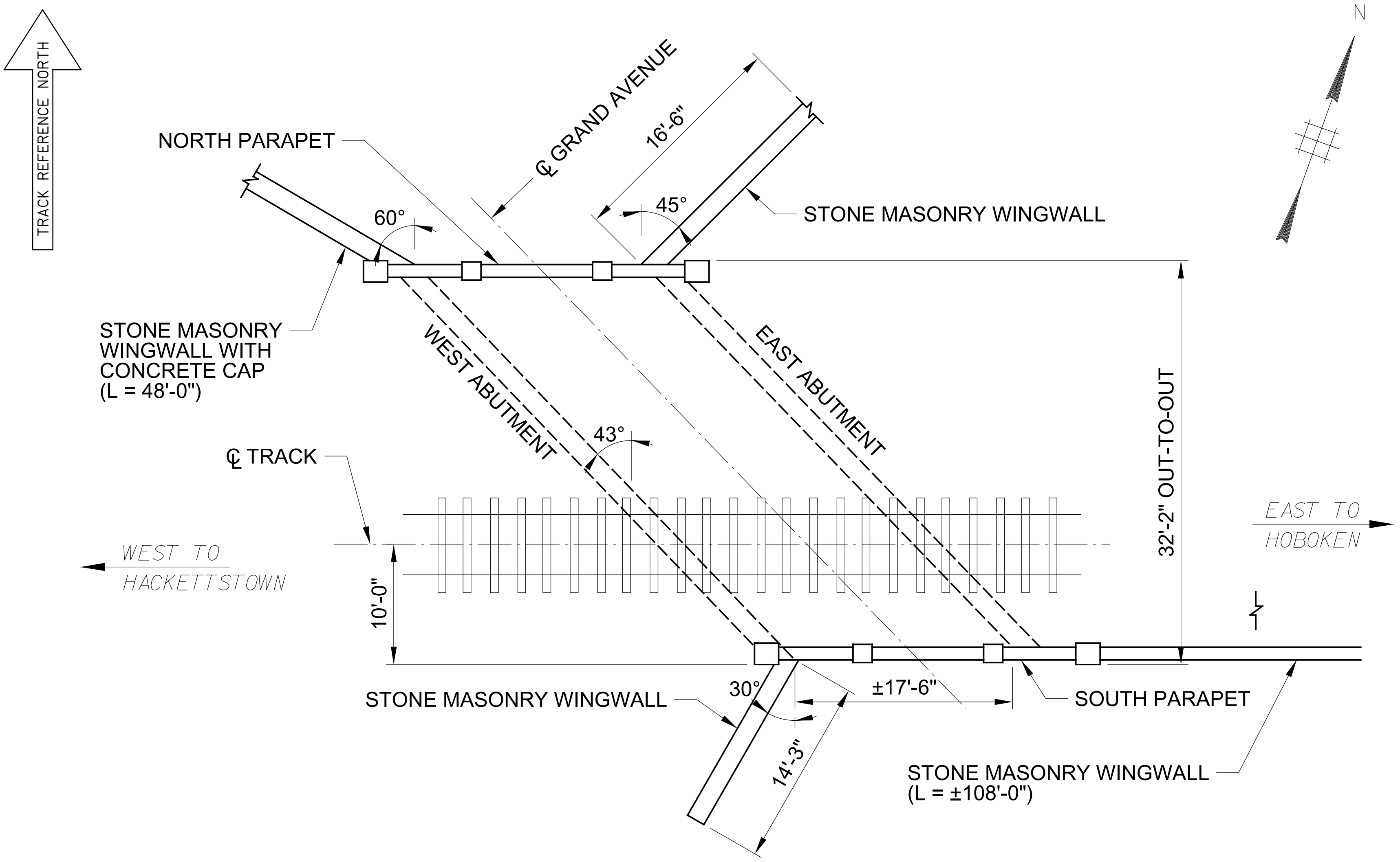
# APPENDIX 2

# DRAWINGS AND PHOTOGRAPHS



## GENERAL PLAN

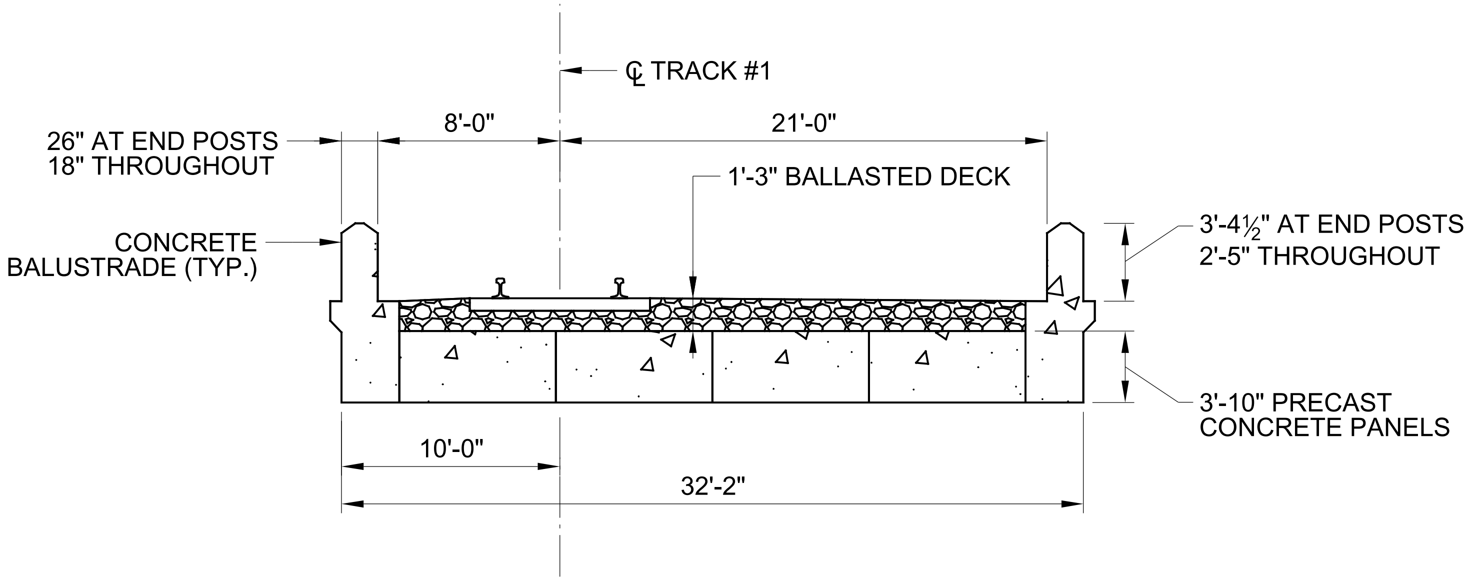
N.T.S.

**NEW JERSEY TRANSIT**

MORRISTOWN LINE MP 58.00 OVER GRAND AVENUE

GENERAL PLAN

| | | |
|---|---|---|
| Munic.: Hackettstown | Cycle No.: 5 | Hardesty & Hanover |
| County: Warren | Date: 01/05/16 | 850 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |



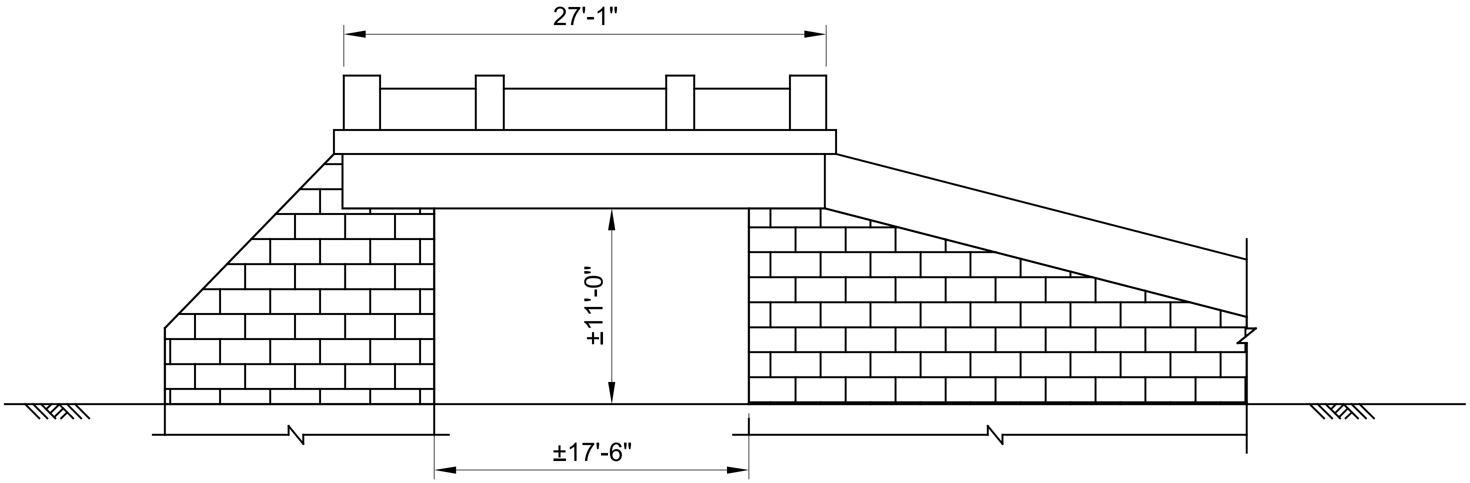
CROSS SECTION
LOOKING WEST
N.T.S.

**NEW JERSEY TRANSIT**

MORRISTOWN LINE MP 58.00 OVER GRAND AVENUE

CROSS SECTION

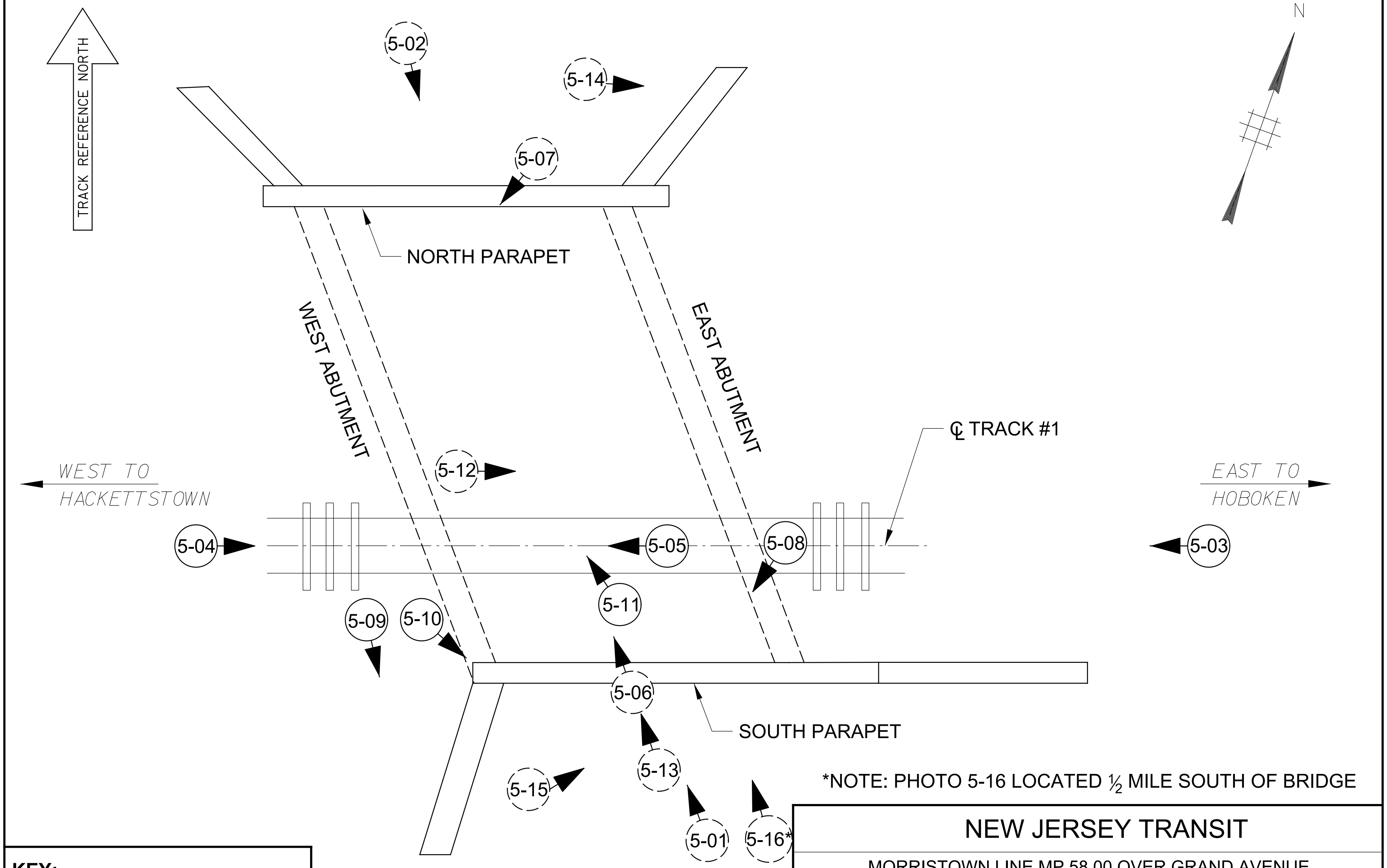
Munic.: Hackettstown
Cycle No.: 5
Hardesty & Hanover
County: Warren
Date: 01/05/16
850 BEAR TAVERN ROAD
WEST TRENTON, NJ 08628



SOUTH ELEVATION
LOOKING NORTH
N.T.S.

NEW JERSEY TRANSIT
MORRISTOWN LINE MP 58.00 OVER GRAND AVENUE
SOUTH ELEVATION

| | | |
|---|---|---|
| Munic.: Hackettstown | Cycle No.: 5 | Hardesty & Hanover |
| County: Warren | Date: 01/05/16 | 850 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |



*NOTE: PHOTO 5-16 LOCATED ½ MILE SOUTH OF BRIDGE

**KEY:**

○ **PHOTO TAKEN ABOVE DECK LEVEL**

◌ **PHOTO TAKEN BELOW DECK LEVEL**

PHOTO LOCATION PLAN

N.T.S.

NEW JERSEY TRANSIT

MORRISTOWN LINE MP 58.00 OVER GRAND AVENUE

PHOTO LOCATION PLAN

| | | |
|---|---|---|
| Munic.: Hackettstown | Cycle No.: 5 | Hardesty & Hanover |
| County: Warren | Date: 01/05/16 | 850 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |

**Photo No: 5-01**

| | |
|---|---|
| **Location:** | South elevation, looking north. |
| **Description:** | General view. Note: Vegetation growth behind the wingwall. Work Done: 10’-8” clearance sign installed on south fascia. |

**Photo No: 5-02**

| | |
|---|---|
| **Location:** | North elevation, looking south. |
| **Description:** | General view. Note: Vegetation growth behind the wingwalls. Work Done: 10’-8” clearance sign installed on north fascia. |

**Photo No: 5-03**

| | |
|---|---|
| **Location:** | East approach, looking west. |
| **Description:** | General view. Note: No railing above low parapet on both sides of the bridge. |

**Photo No: 5-04**

| | |
|---|---|
| **Location:** | West approach, looking east. |
| **Description:** | General view. Note: Work Done: Full length of west approach along track and north embankment has been reballasted (ballast covers ties and tie plates). |

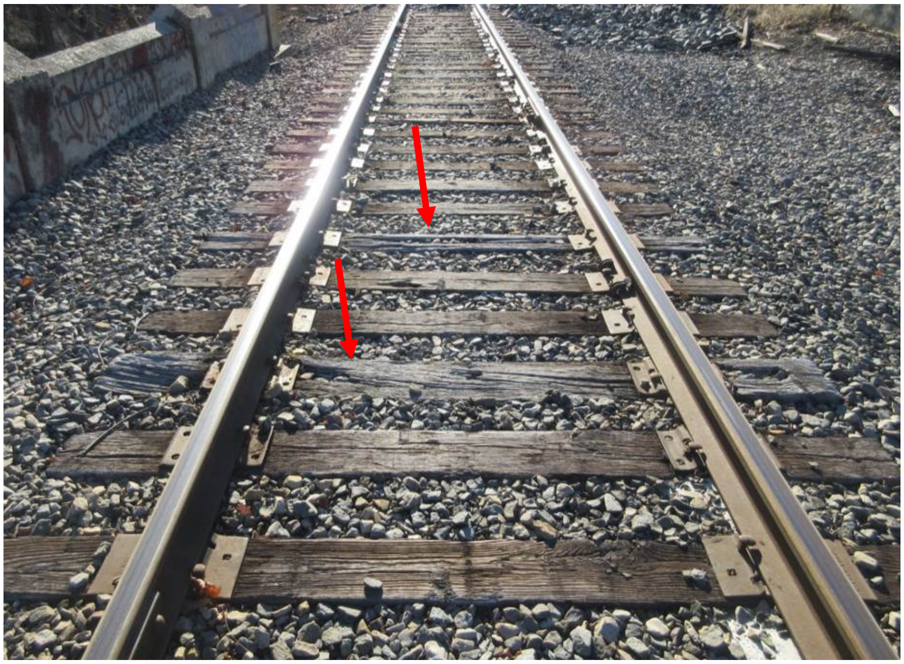


**Photo No: 5-05**

| | |
|---|---|
| **Location:** | Deck ties on bridge, looking west. |
| **Description:** | General view. Note: Several ties exhibit wide splits and checks and rot and require replacement (typical on east approach). |

**Photo No: 5-06**

| | |
|---|---|
| **Location:** | Underside of superstructure, looking north. |
| **Description:** | General view. Note: Minor edge spalling and water leakage/staining between slab panels (typical). Impact damage (scrape marks and minor chipping) throughout. |

**Photo No: 5-07**

| | |
|---|---|
| **Location:** | West abutment, looking southwest. |
| **Description:** | General view. Note: Missing/deteriorated mortar at several locations throughout wall with voids (typical at east abutment). Work Done: Previously observed phone cable running across the top of the west abutment has been removed. |

**Photo No: 5-08**

| | |
|---|---|
| **Location:** | East approach near bridge, looking southwest. |
| **Description:** | Few spikes raised on east approach (typical on west approach and on structure). |

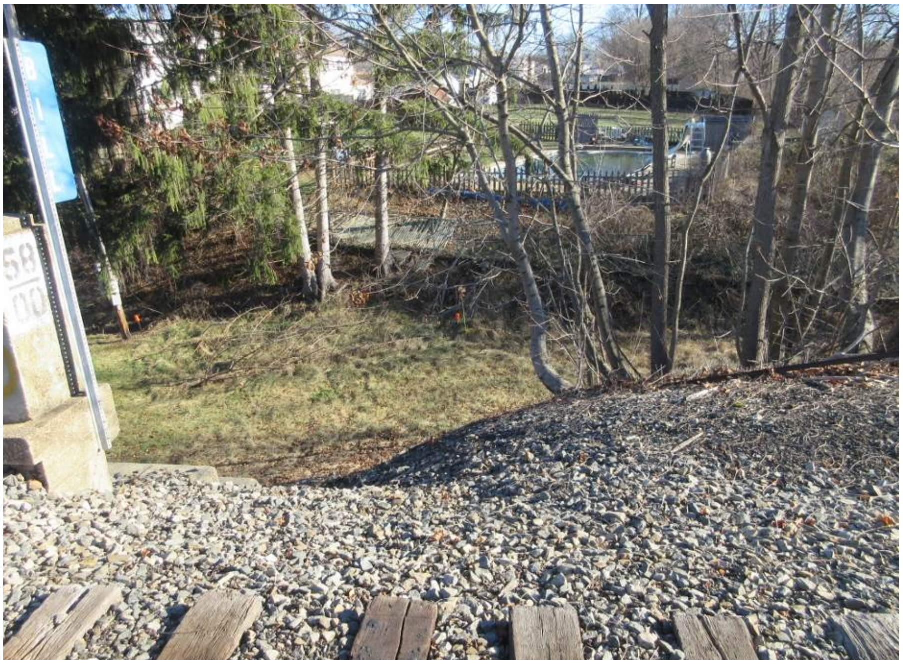


**Photo No: 5-09**

| | |
|---|---|
| **Location:** | Southwest corner of bridge, looking south. |
| **Description:** | Ballast is unstable at west approach near south headwall and is mixed with dirt throughout the full length of the approach (typical at east approach and on structure). |

**Photo No: 5-10**

| | |
|---|---|
| **Location:** | West end of south parapet, looking southeast. |
| **Description:** | Medium to wide cracks and light honeycombing in parapet pylon. |

**Photo No: 5-11**

| | |
|---|---|
| **Location:** | West end of structure, looking northwest. |
| **Description:** | Large stones are covering the north shoulder of the bridge. Light graffiti on parapet face (100% covered). |

**Photo No: 5-12**

| | |
|---|---|
| **Location:** | Underside of superstructure at panel joints, looking east. |
| **Description:** | Water leakage and staining with light efflorescence and minor edge chipping at panel joint. Scrape marks on underside of deck slab (typical throughout). |

**Photo No: 5-13**

| | |
|---|---|
| **Location:** | South fascia, looking north. |
| **Description:** | Spall above clearance posting. Minor edge spalling and scrape marks to base of headwall due to impact damage. Note graffiti on parapet. |

**Photo No: 5-14**

| | |
|---|---|
| **Location:** | Northeast wingwall, looking east. |
| **Description:** | Areas of deteriorated/missing mortar throughout wall with voids (typical at all wingwalls). Work Done: Small tree has been cut at base; stump remains on wall. |

**Photo No: 5-15**

| | |
|---|---|
| **Location:** | Southeast wingwall, looking northeast. |
| **Description:** | The north end of the wall exhibits outward bulging and loss of mortar and there is moss growth between stones (typical at northwest wingwall). |

**Photo No: 5-16**

| | |
|---|---|
| **Location:** | South approach roadway, ½ mile from bridge, looking north. |
| **Description:** | Work Done: 10'-8" clearance posting with "1/2 MILE" sign installed along south approach. Similar postings at south approach (10'-8" clearance postings with "2000 FT" sign installed), north approach (10'-8" clearance posting with "1/4 MILE" sign installed), and at the intersection of Grand Avenue and 5th Avenue (10'-8" clearance posting with right arrow sign installed). |

# APPENDIX 3

# FIELD OBSERVATIONS

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## GENERAL

LINE: Morristown

MILEPOST: 58.00

NAME OF BRIDGE: Grand Avenue (County Route 629)

NJDOT STRUCTURE NO.: Unknown

CONSULTANT BRIDGE NO.: F23

ROUTE NO.: 4004

DATE: TOP OF DECK: 01/05/16
SUPERSTRUCTURE: 02/23/16
SUBSTRUCTURE: 02/23/16

USRA LINE CODE: 6192

MUNICIPALITY: Hackettstown

COUNTY: Warren

CONSULTANT: Hardesty & Hanover, LLC

CREW CHIEF: R. Zahalan, P.E.

WEATHER: Sunny 01/05/16
Rainy 02/23/16

CREW MEMBER(S): S. Trelles

TEMPERATURE: 27°F 01/05/16
35°F 02/23/16

TYPE OF BRIDGE: Single span reinforced concrete slab with stone abutments

YEAR BUILT: 1924

YEAR OF MAJOR REPAIRS: N/A

WORK DONE: West approach has been reballasted for full length (Photo 5-04). Telephone cable along top of the west abutment has been removed (Photo 5-07). Small tree on top of northeast wingwall has been cut at base; stump remains on top of wall (Photo 5-14). New clearance postings have been installed on the north and south parapets of the bridge (Photo 5-01 & Photo 5-02) and new approach vertical clearance postings have been installed on both the north and south approaches (see roadway sheet for more details) (Photo 5-16).

OPEN DECK/[✓ BALLASTED DECK]

ELECTRIFIED/[✓ NON-ELECTRIFIED]

INDEPENDENT BRIDGES: YES/[✓ NO]

BRIDGE # 1 = TRACK # N/A = GIRDERS = N/A
BRIDGE # 2 = TRACK # = GIRDERS =
BRIDGE # 3 = TRACK # = GIRDERS =
BRIDGE # 4 = TRACK # = GIRDERS =

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## GENERAL

### (CONTINUED)

LINE: Morristown

MP: 58.00

[✓ TANGENT]/CURVED TRACK

NO. OF TRACKS: 1

C/C DISTANCE BETWEEN TRACKS: N/A

TRACK #__________ AND TRACK #_____: C/C=_______
TRACK #__________ AND TRACK #_____: C/C=_______
TRACK #__________ AND TRACK #_____: C/C=_______

ECCENTRICITY IN TRACK:

NUMBER 1: None SOUTH/NORTH
NUMBER 2:______________ SOUTH/NORTH
NUMBER 3:______________ SOUTH/NORTH
NUMBER 4:______________ SOUTH/NORTH

OVERALL RATING OF BRIDGE (G, [✓ F], P, B): Fair

INDIVIDUAL ELEMENT CODES AND GENERAL OBSERVATIONS OF CONDITIONS:

APPROACHES (G, [✓ F], P, B The approaches are in fair condition. The west approach track components are completely covered with ballast and were not visible for inspection. The ties on the east approach typically exhibit fine checks and splits but two ties exhibit wide checks and splits and require replacement. There is light rust on the rails with a 1/16" lip. The tie plates and spikes exhibit moderate rust. Several spikes are raised and six tie plates are loose on the east approach. Ballast is mixed with dirt along all approach shoulders and is of adequate depth.

DECK (G, [✓ F], P, B): The deck components are in fair condition. Several ties exhibit fine checks and splits and four ties exhibit wide checks and require replacement. The rails have a minor lip on the inner edges. The tie plates and spikes have moderate rust with fourteen loose tie plates and several spikes raised up to 1". Four spikes are not securing the tie plates and one is missing on the north rail. Pumping was not observed due to lack of trains. Ballast is mixed with dirt throughout. Large stones cover the west half of the bridge along the north shoulder.

SUPERSTRUCTURE (G, [✓ F], P, B): The superstructure is in fair condition. The underside of the precast concrete slab exhibits fine map cracks throughout, and small spalls and scrape marks at the fascias due to impact damage. There is water staining with a completely deteriorated waterproofing membrane and light efflorescence on the underside, and edge chipping between the panel joints. There are small spalls, fine map cracking, fine to medium cracks, graffiti, and light moss growth on the headwalls. The south headwall exhibits a 15' L x 3" wide x 3" H edge spall due to impact damage. The fascias have been posted with 10'-8" vertical underclearance signs.

SUBSTRUCTURE (G, [✓ F], P, B): The substructure is in fair condition. The stone masonry abutments exhibit areas of deteriorated and missing mortar with voids up to 38" deep (60 SF total). Four stones on the east abutment and one stone on the west abutment exhibits cracks up to 1/2" and 3/16" wide, respectively. The wingwalls exhibit missing and deteriorated mortar (±150 LF total) with voids up to 36" deep (40 SF total). There are a few fine to medium cracks in the wingwalls with one 10" x up to 1 1/2" wide vertical crack in the southwest near the abutment. One capstone is displaced and one is missing near the center of the southwest wingwall. The wingwalls exhibit graffiti, vegetation, moss, and tree growth but the tree on top of the northeast wingwall has been removed. The reflective marker at the corner of the northwest wingwall is missing a top screw anchor.

WATERWAY (G, F, P, B): N/A

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### EAST

LINE: Morristown MP: 58.00 PHOTOS: ---

[✓ TANGENT] / CURVED TRACK GRADE: +0.86% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT:__________ LENGTH:__________

CONDITION: N/A

WEIGHT OF RAIL: 105 LB/YD WELDED / [✓ JOINTED]

RAILS: CONDITION: Both rails exhibit a 1/16" lip on the inner edge.

*No passenger train service west of Hackettstown station. Structure was not observed during freight train loads.

PUMPING: RAILS: YES / NO*

TRACK:_____ NORTH RAIL: AMOUNT:__________ LENGTH:__________
SOUTH RAIL: AMOUNT:__________ LENGTH:__________
TRACK:_____ NORTH RAIL: AMOUNT:__________ LENGTH:__________
SOUTH RAIL: AMOUNT:__________ LENGTH:__________
TRACK:_____ NORTH RAIL: AMOUNT:__________ LENGTH:__________
SOUTH RAIL: AMOUNT:__________ LENGTH:__________
TRACK:_____ NORTH RAIL: AMOUNT:__________ LENGTH:__________
SOUTH RAIL: AMOUNT:__________ LENGTH:__________

TIES: YES / NO*

TRACK:_____ NORTH RAIL: AMOUNT:__________ LENGTH:__________
SOUTH RAIL: AMOUNT:__________ LENGTH:__________
TRACK:_____ NORTH RAIL: AMOUNT:__________ LENGTH:__________
SOUTH RAIL: AMOUNT:__________ LENGTH:__________
TRACK:_____ NORTH RAIL: AMOUNT:__________ LENGTH:__________
SOUTH RAIL: AMOUNT:__________ LENGTH:__________
TRACK:_____ NORTH RAIL: AMOUNT:__________ LENGTH:__________
SOUTH RAIL: AMOUNT:__________ LENGTH:__________

TIE SIZE: LENGTH: 8'-6" WIDTH: ±8" DEPTH: 6"

TIES: C/C OF TIES: Varies 18"-22" NO. NEEDING REPLACEMENT: 2 of 30

CONDITION Ten (10) ties exhibit medium checks and splits (no repair required). Two (2) ties exhibit wide splits and checks and require replacement.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### EAST/CONTINUED

LINE: Morristown MP: 58.00 PHOTOS: 5-08

TIE PLATES: NO. MISSING: 0 NO.LOOSE: 6
CONDITION: Tie plates typically exhibit moderate rust throughout.

TIE PADS: YES / [✓ NO]
CONDITION: N/A

SPIKES: CONDITION: Spikes typically exhibit moderate rust throughout. 25% of spikes are raised ±1/2", and ±5 spikes are raised up to 1" (Photo 5-08).

BALLAST: CLEAN / [✓ UNCLEAN] ADEQUATE DEPTH: [✓ YES] / NO
DESCRIPTION: Ballast is mixed with dirt throughout north and south shoulders.

SHOULDERS: (CONDITIONS):
SOUTH: Shoulder is steep/stable, and uneven for most of the length of the approach. Ballast is mixed with dirt throughout.

NORTH: Shoulder is steep/stable, and uneven for most of the length of the approach. Ballast is mixed with dirt throughout.

TRACK TO BE RAISED / LOWERED: YES / [✓ NO]

LOW APPROACH / SAG: YES / [✓ NO]

NO TRESPASSING SIGNS:
[✓ NONE]
YES LOCATION: N/A

OTHER OBSERVATIONS: There is ballast spilling over the top of the northeast wingwall.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### WEST

LINE: Morristown MP: 58.00 PHOTOS: 5-04

[✓ TANGENT] / CURVED TRACK GRADE: +0.86% TOWARD EAST / [✓ WEST]

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT:______ LENGTH:______

CONDITION: N/A

WEIGHT OF RAIL: 105 LB/YD WELDED / [✓ JOINTED]

RAILS: CONDITION: Both rails exhibit a 1/16" lip on the inner edge.

PUMPING: RAILS: YES / NO *

*No passenger train service west of Hackettstown station.
Structure was not observed during freight train loads.

TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______

TIES: YES / NO *°

°Ties on west approach are covered with ballast.

TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______
TRACK:_____ NORTH RAIL: AMOUNT:______ LENGTH:______
SOUTH RAIL: AMOUNT:______ LENGTH:______

TIE SIZE: LENGTH: 8'-6"° WIDTH: ±8"° DEPTH: 6"°

TIES: C/C OF TIES: ±1'-7" ° NO. NEEDING REPLACEMENT: 0

CONDITION Ties are covered with ballast for the full length of the west approach and were not visible and thus not able to be inspected (Photo 5-04).Ties previously exhibited medium splits and checks throughout, and values for tie size and C/C spacing of ties have been retained from the previous cycle.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## APPROACH

### WEST/CONTINUED

LINE: Morristown MP: 58.00 PHOTOS: 5-04, 5-09

TIE PLATES: NO. MISSING: 0 NO.LOOSE: 0

CONDITION: Tie plates typically exhibit moderate rust throughout. North rail tie plates are completely covered by ballast.

TIE PADS: YES / [✓ NO]

CONDITION: N/A

SPIKES: CONDITION: Spikes typically exhibit moderate rust throughout. Ten (10) spikes are raised up to 1/2", and two (2) spikes are raised up to 1". Spikes along north rail are completely covered by ballast.

BALLAST: CLEAN / [✓ UNCLEAN] ADEQUATE DEPTH: [✓ YES] / NO

DESCRIPTION: Ballast is unstable at the southwest corner of the bridge. Ballast is mixed with dirt throughout both shoulders (Photo 5-09).

SHOULDERS: (CONDITIONS): SOUTH: Slope is steep/stable. Uneven and eroded for most of the length of the approach with minor erosion near the bridge. Ballast is mixed with dirt throughout.

NORTH: Slope is flat/stable. Uneven for most of the length of the approach and there is minor slope erosion near the bridge. Ballast is mixed with dirt throughout. Work Done: Ballast has been added near the bridge (Photo 5-04).

TRACK TO BE RAISED / LOWERED: YES / [✓ NO]

LOW APPROACH / SAG: YES / [✓ NO]

NO TRESPASSING SIGNS:

[✓ NONE]

YES LOCATION: N/A

OTHER OBSERVATIONS: There is a railroad posting at the west end of the south approach. Ballast is spilling over the top of the southwest wingwall. Ballast is covering all ties and tie plates and spikes along the north rail for the full length of the west approach.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## SUPERSTRUCTURE SPAN NO. Single

LINE: Morristown MP: 58.00 PHOTOS: 5-05

TRACK NUMBER: 1 OPEN / [✓ BALLASTED] [✓ TANGENT] / CURVED TRACK

SPAN TYPE: Single span reinforced concrete slab SPAN LENGTH: 27'-1" c/c

GUARD RAILS: YES / [✓ NO] / NEEDED WEIGHT: ________ LENGTH: ________
CONDITION: N/A

CONDITION OF RAILS: South Rail: 1/32" lip on inner edge.
There is light rust on both edges of both rails.

*No passenger train service west of Hackettstown station.
Structure was not observed during freight train loads.

PUMPING: RAILS: YES / NO *
TRACK: ____ NORTH RAIL: AMOUNT: ________ LENGTH: ________
SOUTH RAIL: AMOUNT: ________ LENGTH: ________
TRACK: ____ NORTH RAIL: AMOUNT: ________ LENGTH: ________
SOUTH RAIL: AMOUNT: ________ LENGTH: ________
TRACK: ____ NORTH RAIL: AMOUNT: ________ LENGTH: ________
SOUTH RAIL: AMOUNT: ________ LENGTH: ________
TRACK: ____ NORTH RAIL: AMOUNT: ________ LENGTH: ________
SOUTH RAIL: AMOUNT: ________ LENGTH: ________

TIES: YES / NO *
TRACK: ____ NORTH RAIL: AMOUNT: ________ LENGTH: ________
SOUTH RAIL: AMOUNT: ________ LENGTH: ________
TRACK: ____ NORTH RAIL: AMOUNT: ________ LENGTH: ________
SOUTH RAIL: AMOUNT: ________ LENGTH: ________
TRACK: ____ NORTH RAIL: AMOUNT: ________ LENGTH: ________
SOUTH RAIL: AMOUNT: ________ LENGTH: ________
TRACK: ____ NORTH RAIL: AMOUNT: ________ LENGTH: ________
SOUTH RAIL: AMOUNT: ________ LENGTH: ________

TIE SIZE: LENGTH: 8'-6" WIDTH: 8 1/2" DEPTH: 6"

TIES: C/C OF TIES: 1'-7" NO. NEEDING REPLACEMENT: 4 of 25
CONDITION Ties typically exhibit fine splits and checks throughout. Four (4) ties exhibit wide splits and checks (and/or have a broken section) and require replacement (Photo 5-05). Few ties near the west end of the structure are covered with ballast.

RIBBON GUARD / TIE YES / [✓ NO] TYPE AND SIZE: N/A
SPACER BLOCKS: YES / [✓ NO]

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## SUPERSTRUCTURE SPAN NO. Single

## (CONTINUED)

LINE: Morristown    MP: 58.00    PHOTOS: 5-10, 5-11

BACKWALL TIES: SIZE: N/A    CONDITION:

TIE PLATES: NO. MISSING: 0    NO. LOOSE: 14
CONDITION: Tie plates exhibit moderate rust throughout.

TRACKS SHIMMED: YES / [✓ NO]

TIE PADS: YES / [✓ NO]    CONDITION: N/A

CONDITION OF SPIKES: Spikes typically exhibit moderate rust throughout. 25% of spikes are raised up to 1/2". ±10 spikes are raised up to 1", and one (1) spike is raised 2". Four (4) spikes are not securing tie plates on both rails, and one (1) spike is missing on the north rail.

CONDITION OF ANCHOR / J-HOOK BOLTS: N/A

BALLAST: DEPTH: 1'-3"    CLEAN / [✓ UNCLEAN]

WALKWAYS: STEEL / TIMBER / UNDEFINED
LOCATION: N/A
CONDITION:

HANDRAILS: STEEL / TIMBER / UNDEFINED
CONDITION: N/A

CONDITION OF [✓ PARAPET WALLS] / CURBS: South: Base of parapet is covered with vegetation and large stones There are fine to medium cracks and light honeycombing at the top, north, and east faces(Photo 5-10). North: Base of parapet is covered with ballast. Lower portion of east face exhibits scaling for 2.5 SF x 4" deep.

MILEAGE BOARDS: [✓ YES]    LOCATION: East end of north parapet and west end of south parapet.
NO / NEEDED: LOCATION:

OBSTRUCTIONS: [✓ NO] / YES:    TYPE AND DISTANCE: N/A

OTHER OBSERVATIONS: Both faces of both parapets are 100% covered with graffiti (light). Large stones are covering the west half of the bridge north of the track (Photo 5-11). Ballast is unclean with dirt and soil mixed in.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## CONCRETE DECK SLAB

LINE: Morristown MP: 58.00 PHOTOS: 5-06, 5-12, 5-13

SPAN: 1 SPAN LENGTH: 19'-10" c/c

WATER LEAKAGE [✓ YES]/ NO %DECK AREA ±30%

SUFFICIENT CURB HEIGHT: YES /[✓ NO] Ballast overspilling over SE, SW & NE corners
(BALLAST OVERFLOW)

CRACKS: Underside of concrete deck slab panels exhibit fine map cracks throughout.

SPALLS: Spall (1.5 SF x 2" deep) at the north fascia due to impact damage. Minor edge spalling (up to 1" deep) and water staining with light efflorescence are typical at slab panel joints (Photos 5-06 and 5-12). Localized areas of moderate scaling near midspan (7 SF total). See underside of deck sketch for more details.

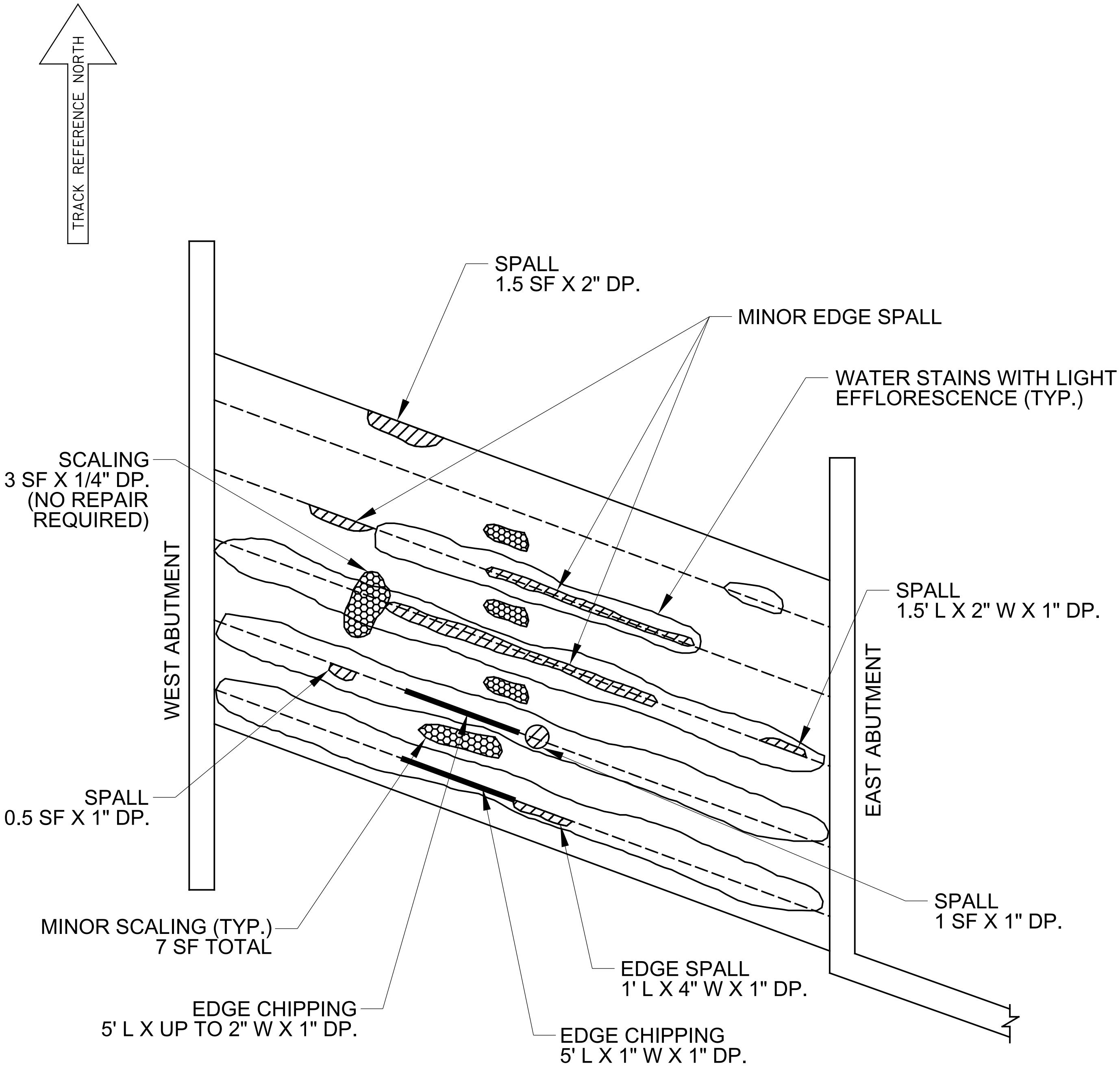
OTHER OBSERVATIONS: The waterproofing membrane has completely deteriorated. Minor impact damage (scrape marks and minor chipping) are present on both the north and south fascias and throughout the underside of the deck (Photos 5-06 and 5-12).

~~SKETCH (IF NEEDED)~~:

HEADWALL CONDITIONS: North: North headwall exhibits 2 spalls (2 SF total x up to 2" deep) with light moss growth. There is fine mapcracking (2 SF) at the west end, and scrape marks due to impact damage at the base. South: South headwall exhibits a 15' L x 3" W x 3" H edge spall due to impact damage at the base, and a 2 SF x 2" deep spall directly above the clearance posting and there is graffiti on the entire face of the headwall (Photo 5-13). There are two (2) cracks (6 LF total x up to 1/8" wide) on the north face of the parapet and adjacent concrete cap. See headwall sketches for more details.

## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

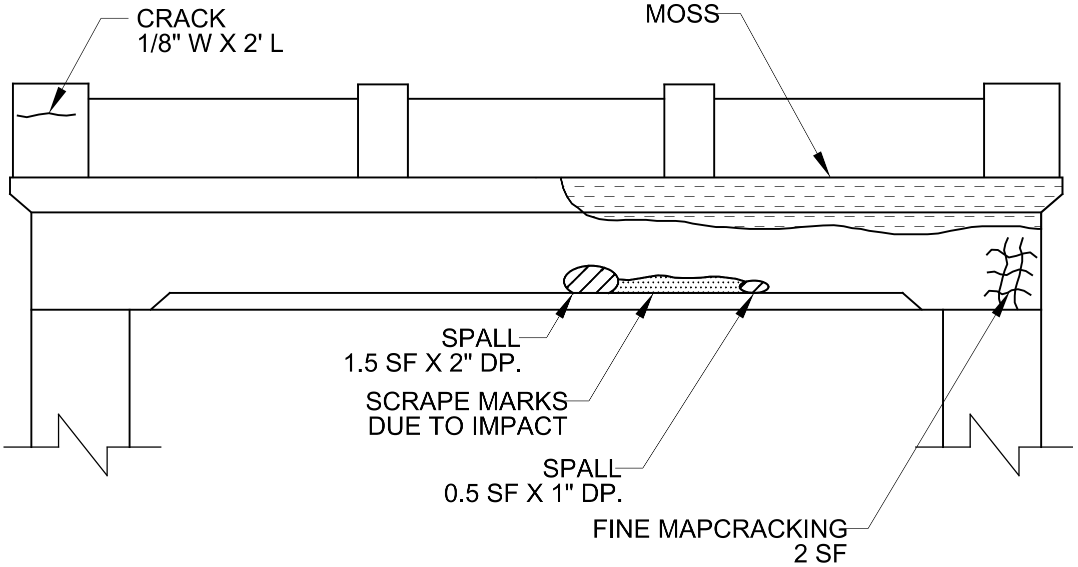
LINE MORRISTOWN MP 58.00 PHOTOS 5-06, 5-12



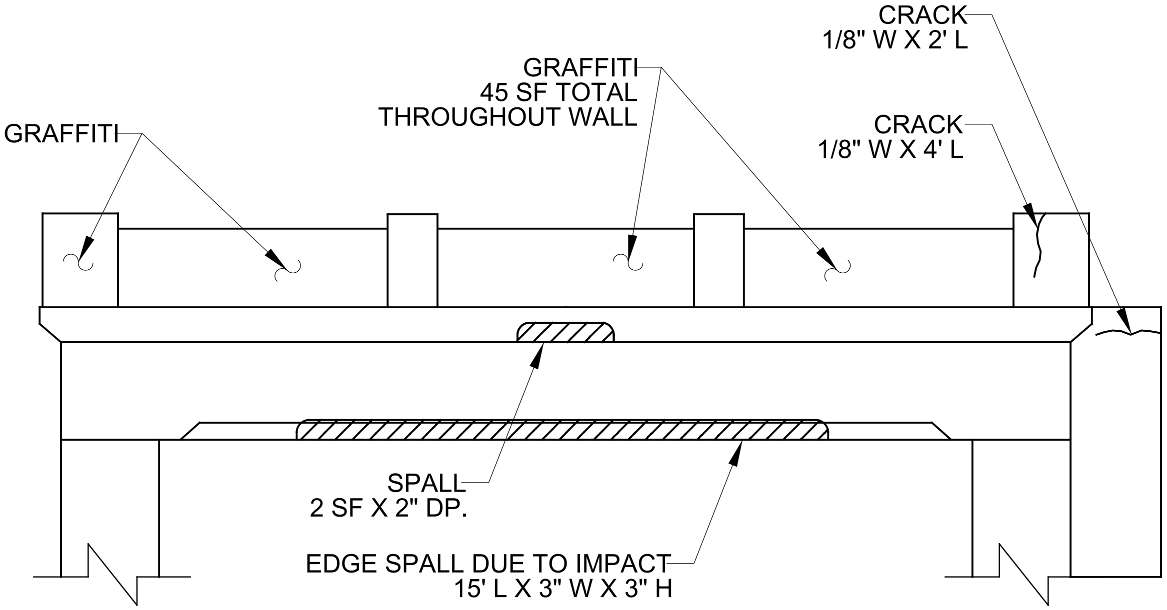
UNDERSIDE OF DECK
N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

LINE MORRISTOWN MP 58.00 PHOTOS 5-10, 5-11, 5-13



NORTH HEADWALL
LOOKING SOUTH
N.T.S.



SOUTH HEADWALL
LOOKING NORTH
N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ABUTMENT BREASTWALL

### EAST

LINE: Morristown MP: 58.00 PHOTOS: ---

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

LENGTH: 45'-0" HEIGHT: Varies 10'-8" to 11'-3"

WIDTH: AT BEARING: Unknown AT GROUND LEVEL: Unknown

STRUCTURAL CRACKS:
SIZE: 2 @ 1 LF WIDTH: 1/16" LOCATION: See abutment sketch
SIZE: 1.5LF WIDTH: 1/16" LOCATION: Mid-height near south end
SIZE: 1 LF WIDTH: 1/2" LOCATION: Mid-height near north end

CONDITIONS: There is missing/deteriorated mortar at several locations throughout the wall with voids up to 10 square inches x 38" deep (40 LF total). Four (4) stones exhibit cracks up to 1/2" wide. See abutment sketch for more details.

CONDITION OF BEARING SEAT: Not visible.

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION: N/A

GRAFFITI: [✓ YES] / NO [✓ PLUMB] / TILT:

FOUNDATION CONDITIONS: Not visible.

TRAFFIC PROTECTION: YES CONDITION: N/A
[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: There is graffiti along the middle of wall (40 SF). The upper ±6" of the wall is concrete filled and is in good condition with minor leakage stains.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ABUTMENT BREASTWALL

### WEST

LINE: Morristown MP: 58.00 PHOTOS: 5-07

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

LENGTH: 45'-0" HEIGHT: 10'-9"

WIDTH: AT BEARING: Unknown AT GROUND LEVEL: Unknown

STRUCTURAL CRACKS: SIZE: 2 LF WIDTH: 3/16" LOCATION: Near south end
SIZE: WIDTH: LOCATION:
SIZE: WIDTH: LOCATION:

CONDITIONS: There is missing/deteriorated mortar at several locations throughout the wall with voids up to 1 SF x up to 20" deep (20 LF total). One stone near the south end of the wall exhibits a 3/16" W x 2' L vertical crack. There is a 3 SF void with active water leakage toward the base of the wall near the north end. See abutment sketch for more details.

CONDITION OF BEARING SEAT: Not visible.

PUMPING DUE TO LOAD: YES / [✓ NO] DESCRIPTION: N/A

GRAFFITI: [✓ YES] / NO [✓ PLUMB] / TILT:

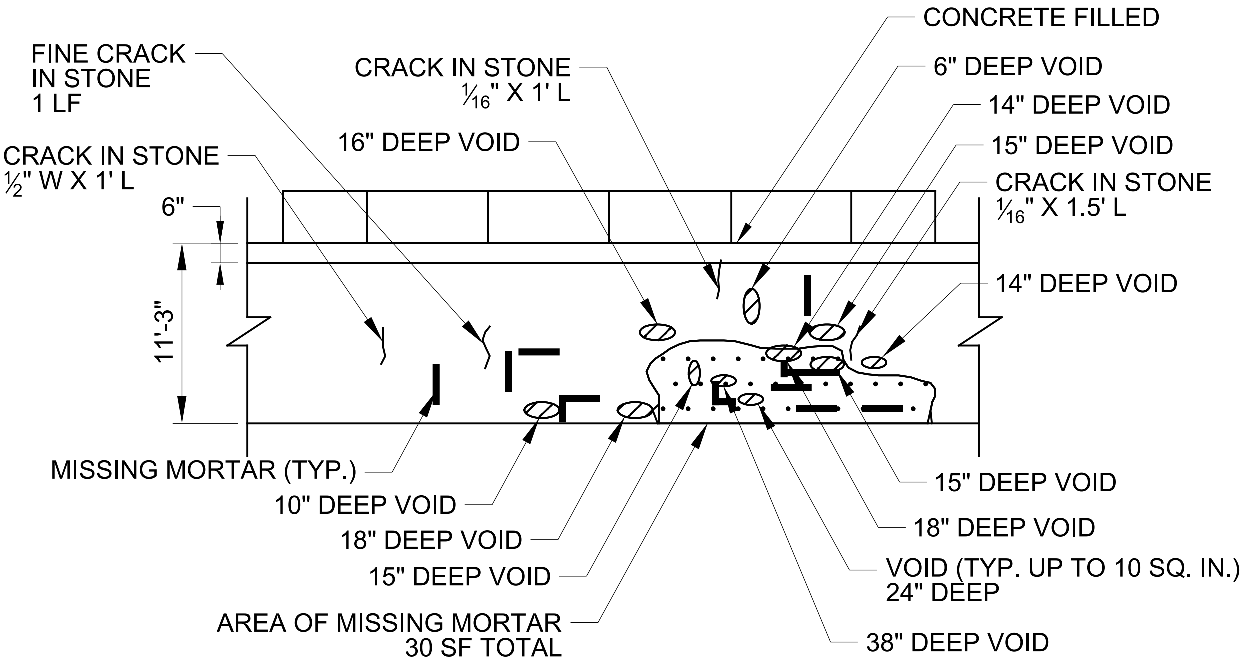
FOUNDATION CONDITIONS: Not visible.

TRAFFIC PROTECTION: YES CONDITION: N/A
[✓ NO] / NEEDED LOCATION:

OTHER OBSERVATIONS: There is graffiti on the wall (10 SF). The upper ±6" of the wall is concrete filled and is in good condition with minor leakage stains. Work Done: Previously observed phone cable running across the top of the west abutment has been removed (Photo 5-07).

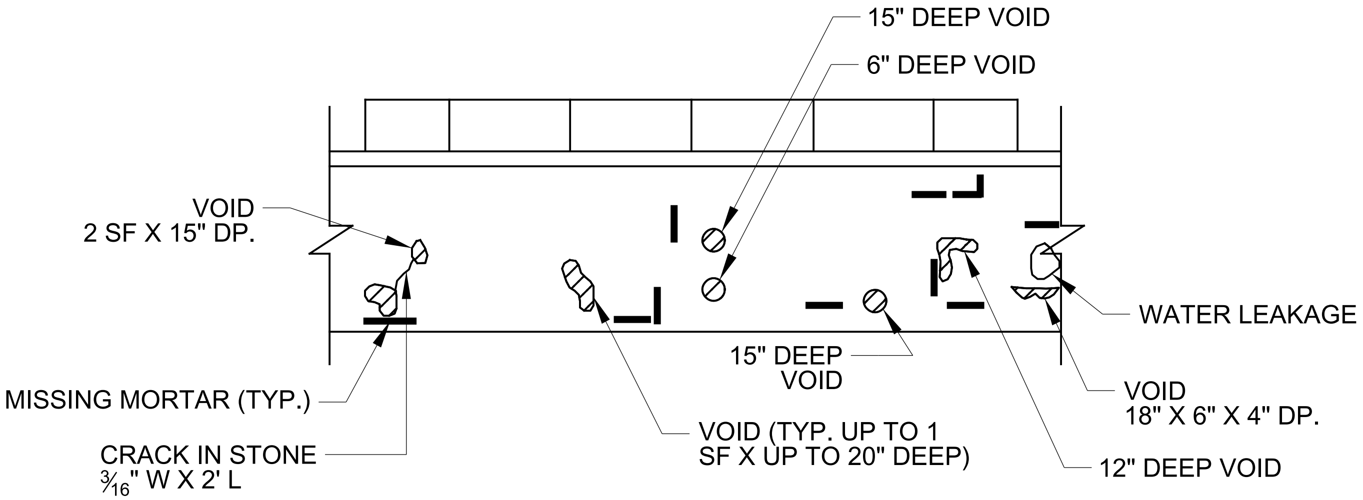
# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

LINE MORRISTOWN MP 58.00 PHOTOS 5-07



## EAST BREASTWALL

LOOKING EAST
N.T.S.



## WEST BREASTWALL

LOOKING WEST
N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

**[✓ EAST] / WEST**
**[✓ NORTH] / SOUTH**

LINE: Morristown MP: 58.00 PHOTOS: 5-14

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: ±13'-0" WIDTH: Unknown LENGTH: 16'-6"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Vegetation/brush LOCATION: On top of and behind wall

CONDITIONS: There is missing/deteriorated mortar at several locations throughout the wall (±30 LF) with voids up to 24" deep (±10 SF total). There are two fine cracks with efflorescence in the concrete cap at the top of the wall (±3' L total). Work Done: Small tree on top of wall has been cut at base , stump remains on top of wall (Photo 5-14).

FOUNDATIONS: Not visible.

GRAFFITI: [✓ YES] / NO [✓ PLUMB] / TILT:

TRAFFIC PROTECTION: YES CONDITION: N/A

[✓ NO] / NEEDED LOCATION: (Local road)

OTHER OBSERVATIONS: Chevron stripe reflective marker at corner of wingwall & abutment. There is 15 SF of graffiti throughout wall.

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

**EAST / [✓ WEST]**
**[✓ NORTH] / SOUTH**

LINE: Morristown MP: 58.00 PHOTOS: ---

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: ±15'-1" WIDTH: Unknown LENGTH: 48'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Moderate vegetation and small trees LOCATION: On top of and behind wall

CONDITIONS: There is missing/deteriorated mortar at several locations throughout the wall (±35 LF) with voids up to 3 SF and up to 20" deep (±10 SF total). Concrete cap along the top of the wall exhibits light scaling (±15 SF) and moss growth (25% of cap). There is a spall (1 SF x 4" deep) south of the joint in the concrete cap. There is a 25 SF area near the center of the wall that exhibits outward bulging (5"). See wingwall sketch for more details.

FOUNDATIONS: Not visible.

GRAFFITI: [✓ YES] / NO [✓ PLUMB] / TILT: 5" outward bulging of stones in a 25 SF area (see sketch).

TRAFFIC PROTECTION: YES CONDITION: N/A

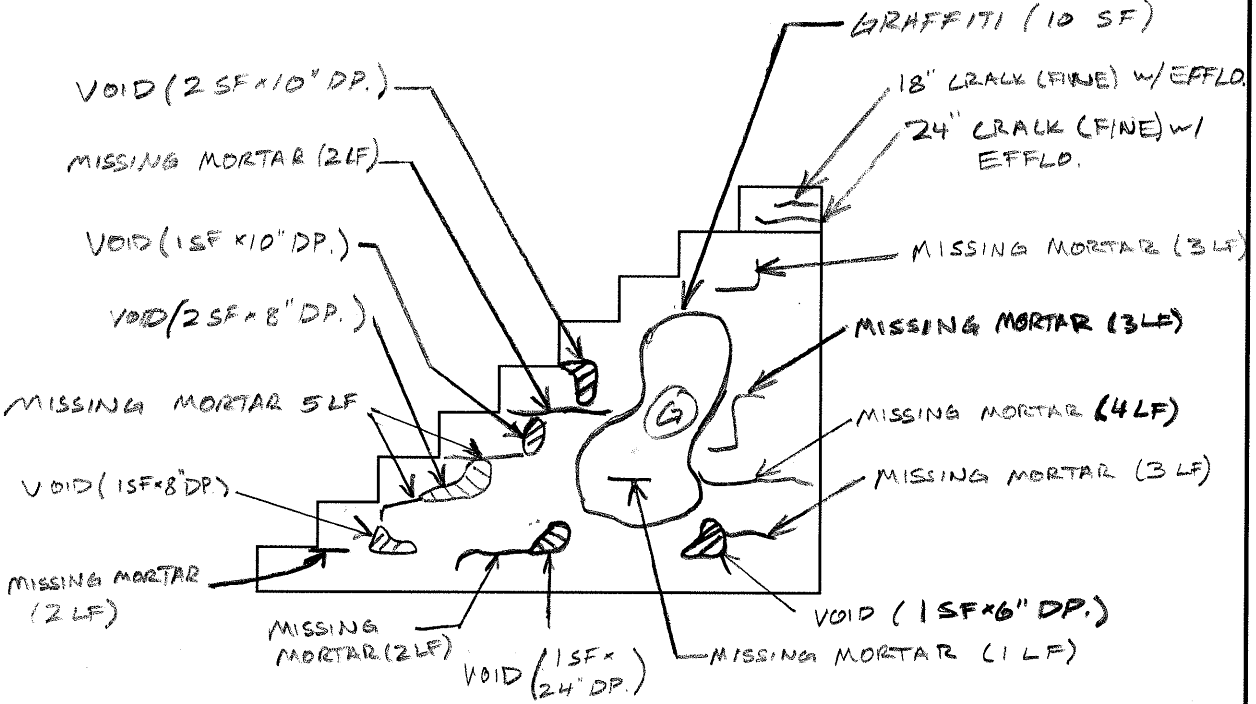
[✓ NO] / NEEDED LOCATION: (Local road)

OTHER OBSERVATIONS: Chevron stripe reflective markers at corner of wingwall & abutment and is missing top screw anchor. There is faint graffiti (8 SF) on face of wingwall.

SKETCH (IF NEEDED):

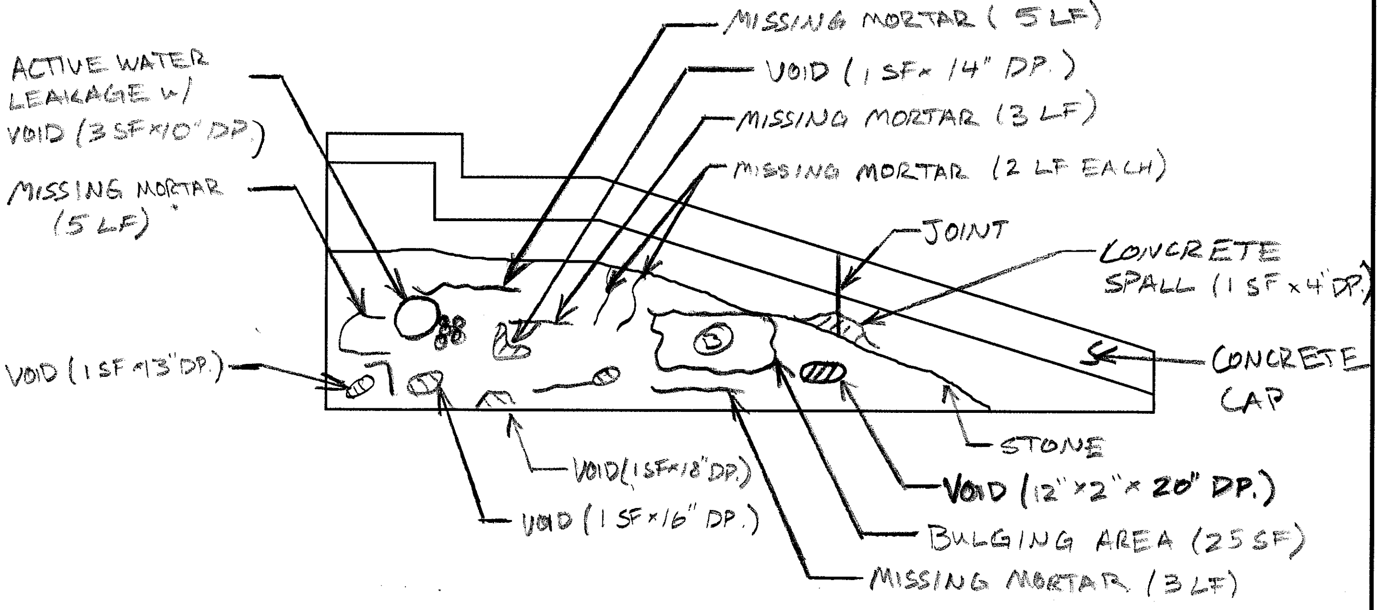
## NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

LINE MORRISTOWN MP 58.00 PHOTOS 5-14



NORTHEAST WINGWALL

N.T.S.



NORTHWEST WINGWALL

N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

**[✓ EAST] / WEST**
**NORTH / [✓ SOUTH]**

LINE: Morristown MP: 58.00 PHOTOS: 5-15

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: 14'-8" WIDTH: Unknown LENGTH: ±108'-0"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Moss LOCATION: On top of wingwall and face of wingwall

CONDITIONS: There is missing/deteriorated mortar at several locations throughout the wall (±65 LF) with voids up to 1 SF and up to 24" deep (±10 SF total). A stone near the abutment exhibits a fine 2 LF crack, and there is a stone missing near the abutment (3 SF). A 35 SF area towards the north end of the wall exhibits outward bulging (9") and loss of mortar and there is moss growth between stones (25% of wall) (Photo 5-15). Concrete cap along the top of the wall that exhibits light scaling along the full length (±30 SF). The cap exhibits few cracks up to 1/8" wide (±10 LF total) and a 0.5 SF spall near the joint. See southeast wingwall sketch for more details.

FOUNDATIONS: Not visible.

GRAFFITI: [✓ YES] / NO PLUMB/[✓ TILT]: Tilted towards north (no repair required)
TRAFFIC PROTECTION: YES CONDTION: N/A
[✓ NO] / NEEDED LOCATION: (Local road)

OTHER OBSERVATIONS: Chevron stripe reflective marker at corner of wingwall & abutment. There is 15 SF of graffiti.

SKETCH (IF NEEDED):

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## WINGWALLS

**EAST / [✓ WEST]**
**NORTH / [✓ SOUTH]**

LINE: Morristown MP: 58.00 PHOTOS: ---

TYPE: REINFORCED CONCRETE / PLAIN CONCRETE / [✓ STONE] / BRICK / TIMBER

HEIGHT: 12'-2" WIDTH: Unknown LENGTH: 14'-3"

TREE / VEGETATION GROWTH ON WINGWALL: [✓ YES] / NO

DESCRIPTION: Moss LOCATION: On face of wall

CONDITIONS: There is missing/deteriorated mortar at several locations throughout the wall (±25 LF) with voids up to 36" deep (±10 SF total). Concrete cap along the top of the wall that exhibits a vertical crack near the abutment (10" x up to 1 1/2" wide) and a horizontal crack (3 LF x 1/8" wide). One (1) capstone has been displaced and one (1) capstone is completely missing near mid-length of the wall. Minor moss growth on the face of the wall (<10%).

FOUNDATIONS: Not visible.

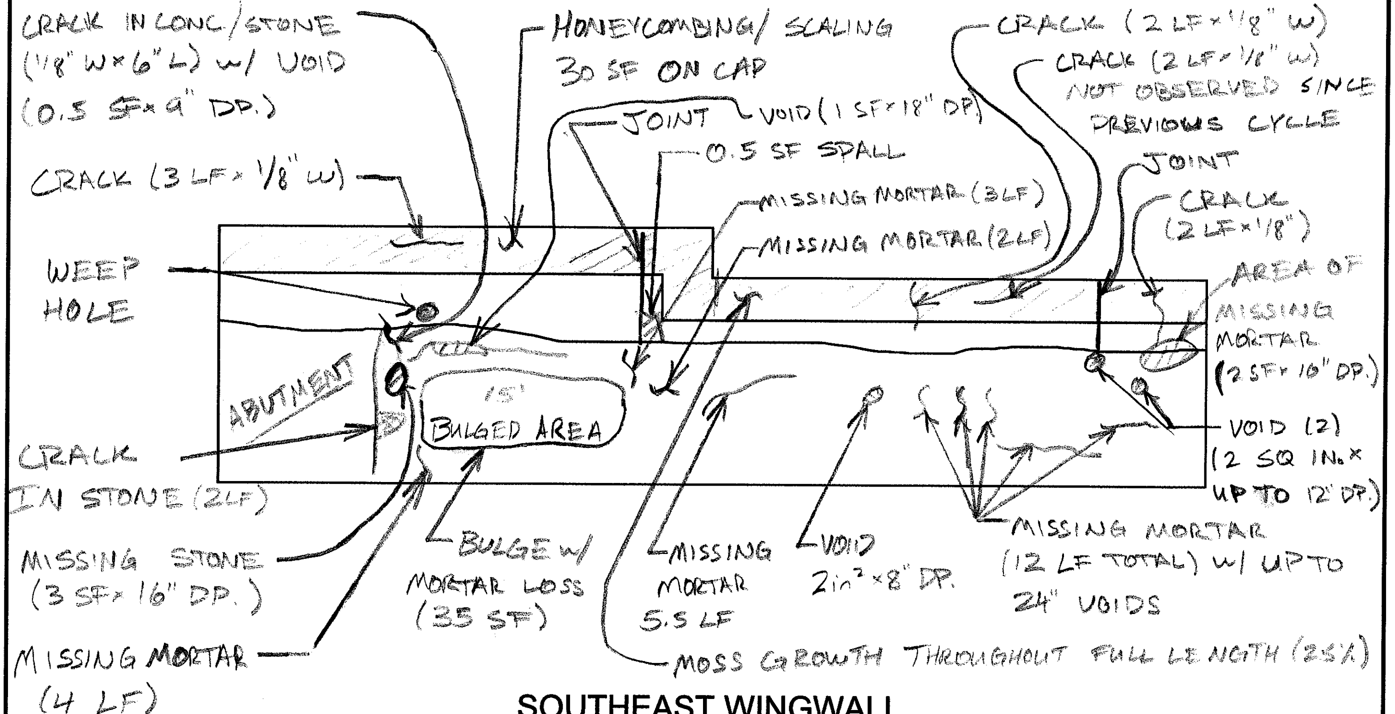
GRAFFITI: [✓ YES] / NO [✓ PLUMB] / TILT:
TRAFFIC PROTECTION: YES CONDTION: N/A
[✓ NO] / NEEDED LOCATION: (Local road)

OTHER OBSERVATIONS: Chevron stripe reflective marker at corner of wingwall & abutment. There is 6 SF of graffiti throughout face of wall. Ballast is spilling over the top of the wall.

SKETCH (IF NEEDED):

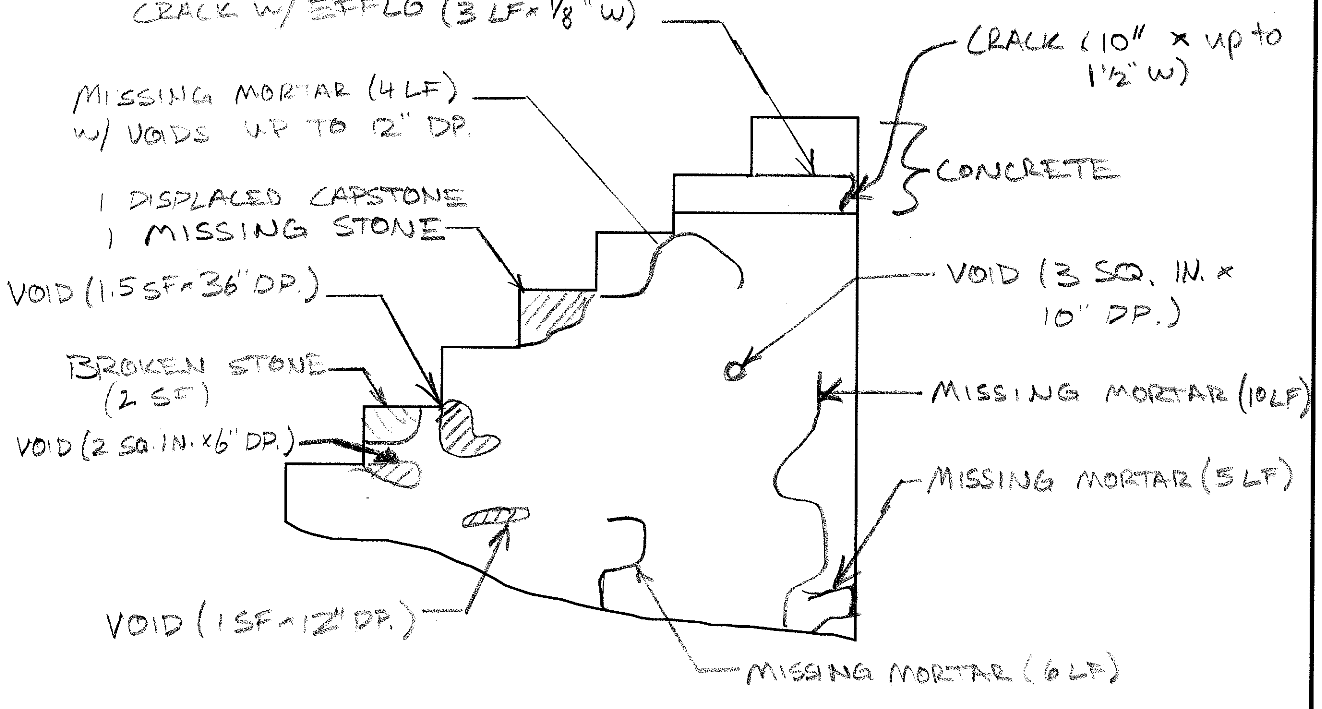
# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS - FIELD NOTES

LINE MORRISTOWN MP 58.00 PHOTOS ---



SOUTHEAST WINGWALL

N.T.S.



SOUTHWEST WINGWALL

N.T.S.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ROADWAY/RAILROAD BELOW BRIDGE

(REFER TO CLEARANCE DIAGRAM SHEET)

LINE: Morristown MP: 58.00 PHOTOS: 5-01, 5-02, 5-07, 5-16

STRAIGHT / [✓ CURVED]

SIGHT DISTANCE: NORTH: Poor, ±100'

SOUTH: Poor, ±100'

ROADWAY WIDTH: ±17'-6" NUMBER OF LANES: 1

SIDEWALKS/SAFETY WALKS: WIDTH: None (EAST / WEST)
WIDTH: None (EAST / WEST)

VERTICAL CLEARANCE POSTED: [✓ YES] / NO BRIDGE: [✓ NORTH] / [✓ SOUTH]
APPROACHES: [✓ NORTH] / [✓ SOUTH]

CONDITION / ADEQUACY OF POSTING: Good, see observations below.

OTHER POSTING (TYPE AND LOCATION): Chevron stripe warning signs on all four wingwalls.

UTILITIES: Work Done: Telephone cable along top of west abutment has been removed (Photo 5-07).

DRAINAGE: None

LIGHTING: None

OBSERVATIONS: Signs sketched below appear on approaches as shown.
*10'-8" clearance posting appears several times on each approach:
North Approach: 1/4 MILE AHEAD, None (10'-8" sign alone)
South Approach: 1/2 MILE, 2000 FEET, LOW CLEARANCE
Grand Avenue: 6/10 MILE & LEFT ARROW
Allen Road: RIGHT ARROW
One lane roadway, two-way traffic (no yield sign).
See below for work done since previous cycle.

Work Done: Clearance postings have been installed on both the north and south headwalls of the bridge (Photo 5-01 & Photo 5-02). 10'-8" clearance posting with "1/2 MILE" and "2000 FT" signs below have been posted on the south approach (Photo 5-16). At the intersection of Grand Avenue and Allen Road, a 10'-8" clearance posting with right arrow sign has been replaced since the previous cycle. 10'-8" clearance posting with "1/4 MILE" sign is no longer exists on the south approach and is present on the north approach. 10'-8" clearance sign with "15 MPH" speed limit sign below is no longer present on the south approach, and "ONE LANE BRIDGE, 15 MPH" postings are no longer present along either approach.

# NJ TRANSIT UNDERGRADE BRIDGE INSPECTIONS — FIELD NOTES

## ROADWAY/RAILROAD UNDERCLEARANCE

LINE: Morristown MP: 58.00 PHOTOS: ---

NAME: Grand Avenue (Country Route 629)

← WEST TO: Hackettstown EAST TO: Hoboken →

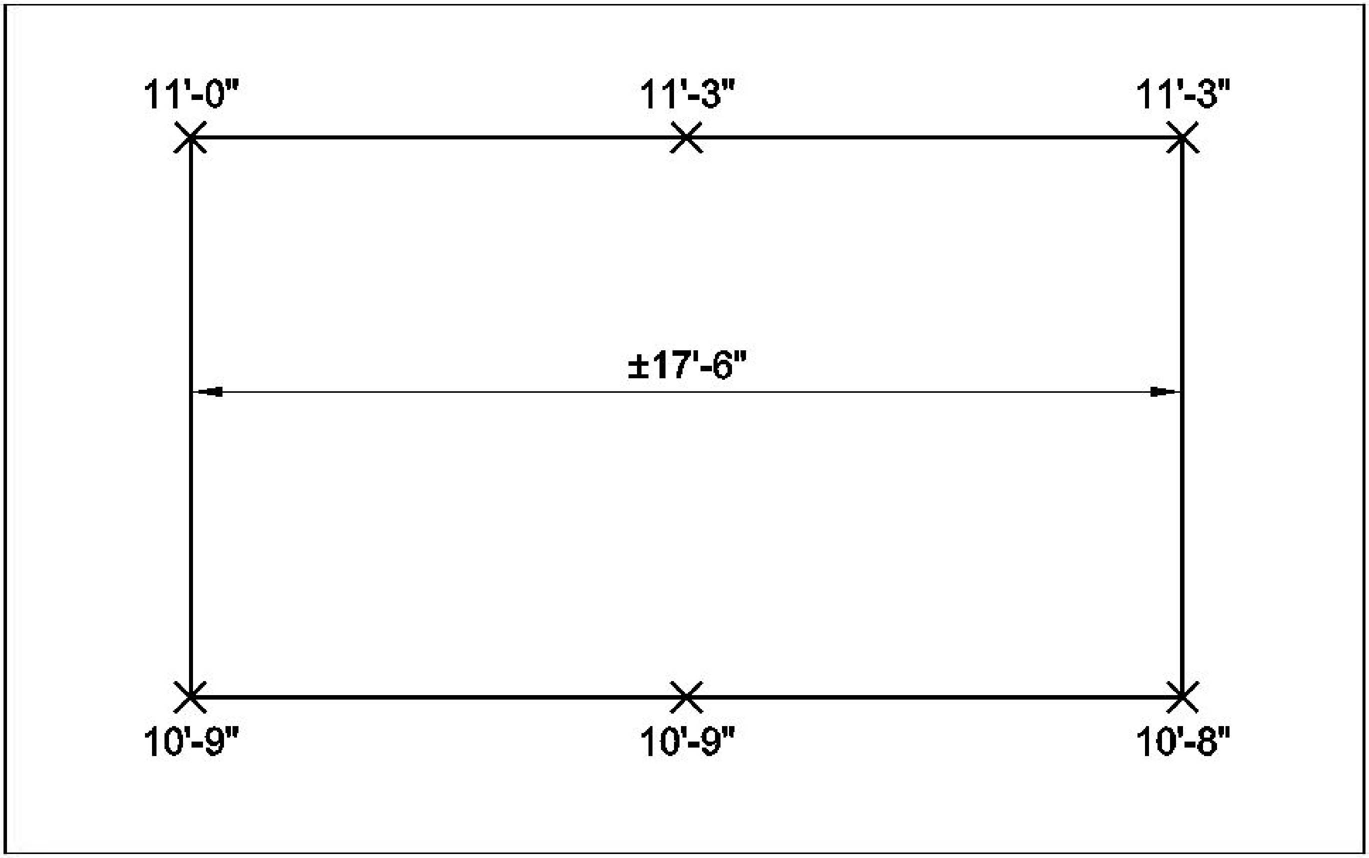


**TABLE 1 – CLEARANCE DIAGRAM**

(SPAN(S) 1 )

MINIMUM VERTICAL CLEARANCE: 10'-8"

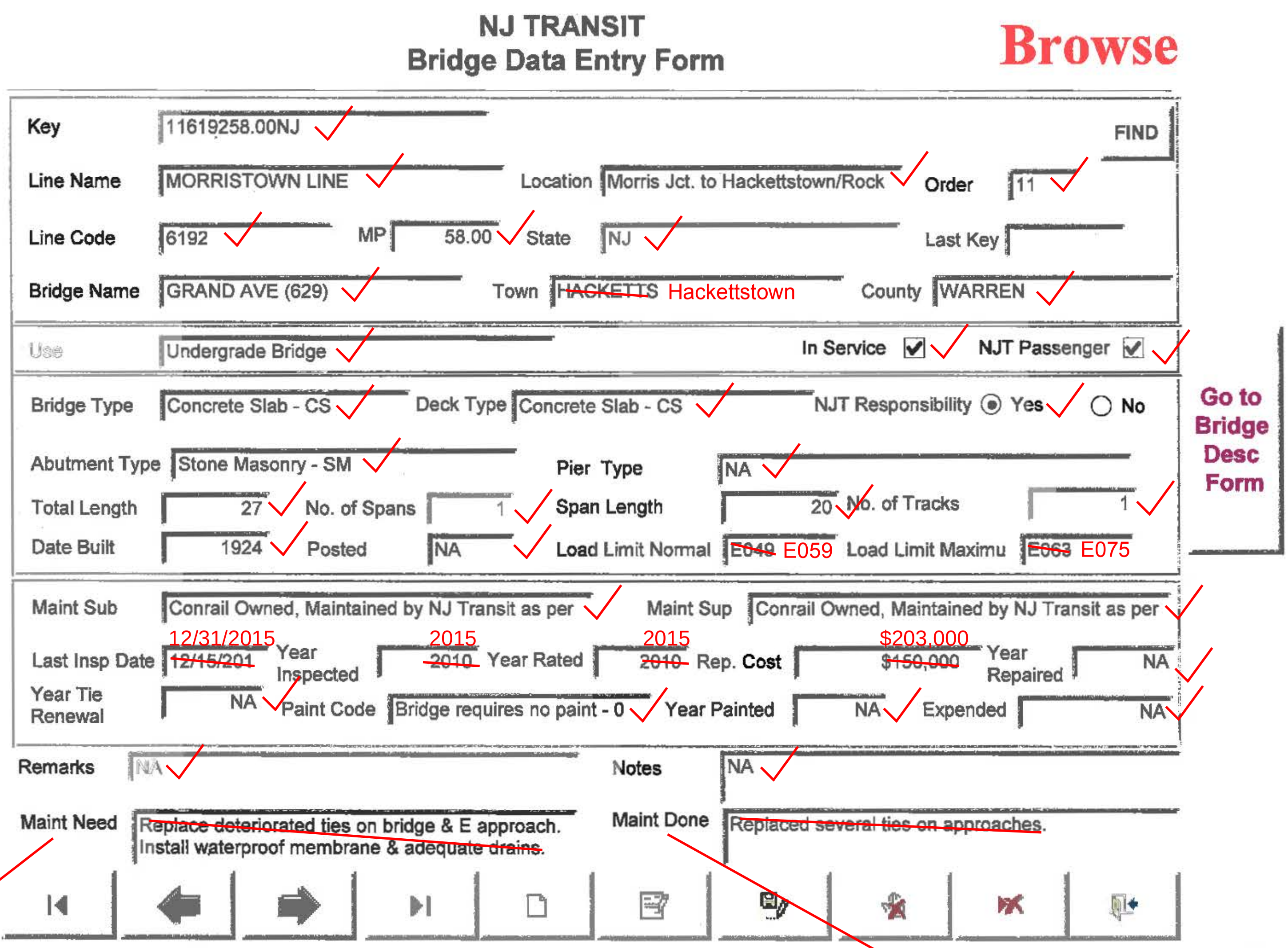
MINIMUM RIGHT LATERAL CLEARANCE: 2'-9"

MINIMUM LEFT LATERAL CLEARANCE: 2'-9"

*One lane underpass with 12' lane assumed

# APPENDIX 4

# BRIDGE MANAGEMENT SYSTEM INPUT FORMS



NJ TRANSIT
Bridge Data Entry Form

**Browse**

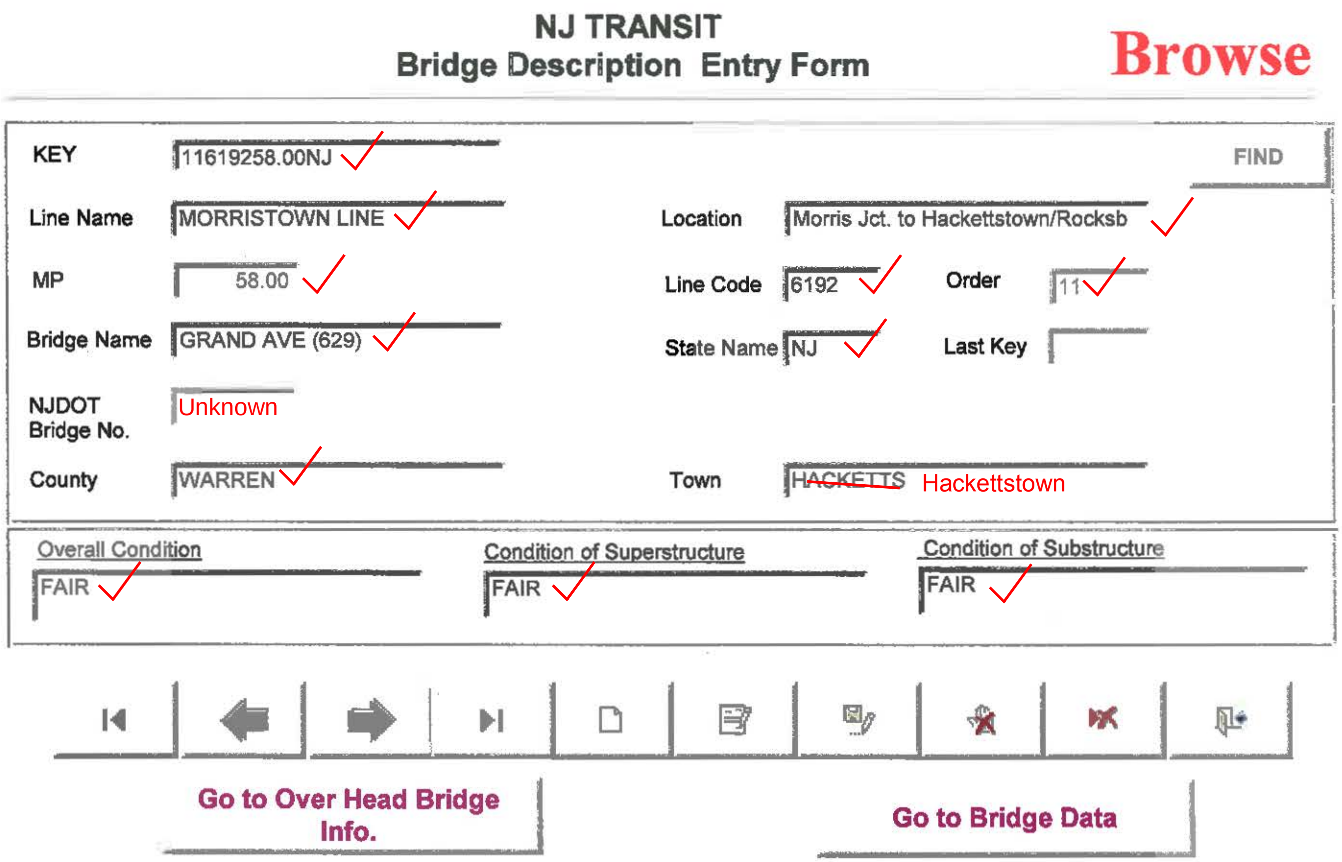
Key: 11619258.00NJ ✓

Line Name: MORRISTOWN LINE ✓
Location: Morris Jct. to Hackettstown/Rock ✓
Order: 11 ✓
Line Code: 6192 ✓
MP: 58.00 ✓
State: NJ ✓
Last Key:
Bridge Name: GRAND AVE (629) ✓
Town: ~~HACKETTS~~ Hackettstown
County: WARREN ✓
Use: Undergrade Bridge ✓
In Service ☑ ✓
NJT Passenger ☑ ✓

Bridge Type: Concrete Slab - CS ✓
Deck Type: Concrete Slab - CS ✓
NJT Responsibility ● Yes ✓ ○ No
Abutment Type: Stone Masonry - SM ✓
Pier Type: NA ✓
Total Length: 27 ✓
No. of Spans: 1 ✓
Span Length: 20 ✓
No. of Tracks: 1 ✓
Date Built: 1924 ✓
Posted: NA ✓
Load Limit Normal: ~~E049~~ E059
Load Limit Maximu: ~~E063~~ E075
Maint Sub: Conrail Owned, Maintained by NJ Transit as per ✓
Maint Sup: Conrail Owned, Maintained by NJ Transit as per ✓
Last Insp Date: ~~12/15/201~~ 12/31/2015
Year Inspected: ~~2010~~ 2015
Year Rated: ~~2010~~ 2015
Rep. Cost: ~~$150,000~~ $203,000
Year Repaired: NA ✓
Year Tie Renewal: NA ✓
Paint Code: Bridge requires no paint - 0 ✓
Year Painted: NA ✓
Expended: NA ✓
Remarks: NA ✓
Notes: NA ✓
Maint Need: ~~Replace deteriorated ties on bridge & E approach. Install waterproof membrane & adequate drains.~~
Maint Done: ~~Replaced several ties on approaches.~~

1. Install a waterproof membrane and provide adequate drains.
2. Patch concrete spalls in the underside of the deck slab, parapet, fascias and northwest wingwall cap.
3. Repoint areas of deteriorated and missing mortar and seal the wide cracks in the abutments and wingwalls.
4. Reset the loose and bulging stones in the southeast and northwest wingwalls.
5. Install a gabion retaining wall at the NE, SW, SE corners of the bridge at the top of the embankment.
6. Seal the medium to wide cracks in the parapets and the southwest wingwall cap.
7. Replace the severely split and rotted ties along the east approach and on the bridge.
8. Remove trees, debris and vegetation growth behind the wingwalls and graffiti from the abutments and parapets.
9. Install hand rails along both sides of the bridge for the full length.

West approach has been reballasted near for full length.
Telephone cable along top of the west abutment has been removed.
Small tree on top of northeast wingwall has been cut at base; stump remains on top of wall.
New clearance postings have been installed on the north and south headwalls of the bridge and new approach postings have been installed on both the north and south approaches.



NJ TRANSIT
Bridge Description Entry Form

KEY: 11619258.00NJ ✓

Line Name: MORRISTOWN LINE ✓

MP: 58.00 ✓

Bridge Name: GRAND AVE (629) ✓

NJDOT Bridge No.: Unknown

County: WARREN ✓

Location: Morris Jct. to Hackettstown/Rocksb ✓

Line Code: 6192 ✓

Order: 11 ✓

State Name: NJ ✓

Last Key:

Town: ~~HACKETTS~~ Hackettstown

Overall Condition: FAIR ✓

Condition of Superstructure: FAIR ✓

Condition of Substructure: FAIR ✓

# Appendix C

## Stakeholder Outreach and Agency Coordination

# North Jersey Transportation Planning Authority

# Elimination of Weight Limitations on the Washington Secondary

Freight Concept Development Program

NJTPA Freight Concept Development Program

## PUBLIC INVOLVEMENT ACTION PLAN

## A. Purpose

The purpose of the Public Involvement Action Plan (PIAP) is to provide a transparent and understandable process in which the concept development study will provide information to the public and opportunities for meaningful feedback during the study. This document describes the study and its purpose, the project team's approach and objectives related to public outreach, the planned schedule for engagement, and expected outcomes. The PIAP also includes a list of identified stakeholders at the outset of the project (which will be updated throughout the course of the project), and potential community challenges with strategies to address them.

## B. Project Description

The project area is located in the Town of Hackettstown, Warren County, New Jersey. The Washington Secondary/Morristown Line Corridor extends from Phillipsburg to Morristown and provides rail freight access to businesses in Warren and Morris Counties. Approximately twenty (20) businesses, located along the corridor and the connecting branch lines, rely on rail freight to receive commodities, ship finished products and compete in a global economy. The bridge over the drain is structurally deficient and limits the weight of rail cars that can be carried across it resulting in the short-loading of many of the rail cars that serve the businesses along the corridor and the connecting branch lines.

Currently, loading of rail cars moved along the corridor is limited to 263,000 pounds (263K) per rail car. Since 1995, the Association of American Railroads has maintained a national standard allowing loading of up to 286,000 pounds (286K) per rail car. Improvements to the bridge to allow the movement of 286K rail cars would allow more cost-effective transport of materials to and from the rail-dependent businesses, supporting the growth of these business and the jobs and economic value they offer to the local and state economy.

This project is studying ways to provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement particularly with the existing weight restrictions of the 3rd Avenue Drainage Culvert under the Washington Secondary/Morristown Line in Hackettstown. Rehabilitation or replacement of the Drain Bridge would permit the movement of 286K railcars on the Washington Secondary / Morristown Line Corridor, increasing the efficiency of the transportation of raw materials and finished goods to customers served by the line. This increased efficiency would enhance the economic competitiveness of the existing businesses and facilitate attraction of new rail served businesses to the region.

## C. Public Involvement Process Overview

The public outreach approach to the Elimination of Weight Limitations on the Washington Secondary Concept Development Study will consist of both traditional methods of communication in the form of press releases and in-person engagement, as well as the use of technology via a website and social media. This approach will provide flexibility in reaching the public and stakeholders early in the process of project development. By engaging the public early, it provides the Project Team an opportunity to clearly explain the project, its goals, properly educate the public on the extent of the study, and address questions and/or misconceptions. The following sections provide specific details related to actions, schedule, considerations related to ensuring the community is effectively engaged, and deliverables.

## D. Public Involvement Process

The following describes the expected actions to encourage public involvement during the concept development program schedule.

### 1. Stakeholder List and Database

A project stakeholder list will be developed and maintained throughout the duration of the project. This list will include local, county, and state officials, and other key stakeholders from municipal, county, state, and other governmental agencies. Community stakeholders from local advocacy, cultural, historical, environmental, business, neighborhood, and other organizations will be included and updated as needed. This list will be provided at the Local Officials Briefings for further input and refinement.

The stakeholder list includes representation from the following governmental agencies, businesses, or organizations. A stakeholder list with contact information will be maintained separately to the below list:

**County and Municipal Officials and Organizations**

- Warren County Officials, Engineer, Planner
- Morris County Officials Engineers and Planners
- Legislative Representatives, State Senate and Assembly
- Town of Hackettstown Mayor, Administrator, Clerk
- Historic societies
- Potentially affected private residential and commercial property owners

**Federal, State, and Regional Agencies**

- North Jersey Transportation Planning Authority
- NJDOT
- NJDEP
- NJ TRANSIT

**Businesses and Business Organizations**

- Norfolk Southern Railway
- Dover & Rockaway River Railroad

In addition to the contact list, a database will be maintained that will track key issues raised by them for consideration during alternatives development.

## 2. Project Website

A project website will be developed and maintained throughout the course of the project, with the URL, www.HackettstownRailStudy.org. The website will be act as a will be a clearinghouse for project materials that will keep the public informed of the study. In addition to providing materials for view and download, the website will provide the following information:

- Project timeline
- Meeting dates/locations
- Technical materials and deliverables
- Meeting summaries
- Articles to communicate specific topics/issues

The site will be translatable to other languages with a Google Translate add-on. It will also contain links to related social media accounts and the various agencies and organizations involved in the project. There will be the ability for the public to sign-up for future notifications of meetings or when new project materials are added.

The following strategies will be used to engage the public and maintain interest in the project:

- Build a base - Identify and follow similar themed accounts (Transportation agencies, Hackettstown, etc.)
- Engage on regular intervals
- Respond (even if you don’t say anything)
- Work with partners to expand network
- Talk about it even off social media
- Integrate into other materials
- Reciprocity – *if you share, they will too*

## 3. Local Official Briefings

It is anticipated two Local Officials Briefings will be held during the course of the project. The first briefing will introduce the project to the Local Officials, to obtain information on the concerns/comments, potential problems and/or additional issues from their perspective, and to identify potential stakeholders and local interest groups to further refine the stakeholder database. The project team will arrange for a meeting at a location convenient to the local stakeholders, possible the Hackettstown Municipal Building. Key local officials, identified in the stakeholder database, will be invited in addition to Project Team members and key regional stakeholders such as Warren County. For all Local Officials Briefings, meeting logistics, including email notification, will be provided and telephone follow-up calls will be made as necessary. The Project Team will provide an agenda, meeting facilitation, meeting minutes, and action items. A list of potential invitees will be provided to the NJTPA no later than one month prior to the date of the Local Officials Briefing.

Meeting materials will be designed to clearly define the project and the official's role in the public involvement process. Each official will be provided with hard copies of project information including:

- Project Fact Sheet
- Purpose and need statement
- Community profile
- Results of environmental screening
- Public Involvement Action Plan
- Project schedule

A second Local Officials Briefing will also be held in for input and concurrence to the Preliminary Preferred Alternative (PPA) and to provide a Resolution of Support for the PPA. At this briefing, the Project Team will provide information on the development of the alternatives, public feedback gathered through the Public Information Center, website, Twitter, and other means, and why the PPA was selected. The Project Team will provide an agenda, meeting facilitation, meeting minutes, and action items. A list of potential invitees will be provided to the NJTPA no later than one month prior to the date of the Local Officials Briefing.

## 4. Public Information Centers

The Project Team will plan, organize, and facilitate two Public Information Centers (PIC) over the course of the project. It is anticipated that the information centers will have an "open house" style format with a short presentation at the beginning of the session. This will allow individuals to attend the session at their convenience and have questions answered by members of the project team. For the first Public Information Center, posters will be prepared to display information about the study which will include:

- Purpose of the study
- Map of the study area
- Conditions maps
    - Zoning and land use
    - Transportation network
    - Demographics
    - Hazardous materials
    - Environmental conditions
    - Environmental constraints
    - Utilities
    - Cultural resources

The second Public Information Center will follow the same general format as the first one. The posters developed will focus on the studied alternatives, and the PPA. In addition, the alternatives matrix and the stormwater management matrix will be displayed. The posters from the first PIC will also be set up, to provide a "complete picture" of the study, especially for attendees who did not attend the first PIC.

The Project Team will arrange for facilities to host the Public Information Center, coordinating with key stakeholders to ensure they will properly accommodate the public. The goal of selecting the facility will be to procure a space that is accessible to affected populations within the study area, and ensuring accessibility by people with limited mobility and transit dependent populations will be important considerations. Centers will be adequately staffed by members of the Project Team to ensure attendees can have their immediate questions and concerns addressed. In addition, a station will be set up, where members of the public can separately submit questions and comments, and sign up for project updates.

Following the public information sessions, the Project Team will review any comments and questions submitted, and develop responses. Once approved, these responses will be posted on the project website for public availability. We will develop and maintain mailing lists, meeting notifications, press releases, handouts, and presentation materials for the Public Information Centers. All materials will be reviewed and approved by the NJTPA prior to public distribution. All presentation materials will be submitted to the NJTPA for their approval no later than two weeks prior to any Public Information Center. Within two weeks following each Public Information Center, a meeting summary will be prepared. This summary will be used for documentation as part of the Public Outreach Summary to be included in the final Concept Development Report.

As required by the Project Manager, materials will be translated to Spanish to ensure that local residents, where English is not their first language, have equal accessibility to the Public Information Centers. In addition, notifications, such as flyers, will include the ability to request assistance for Limited English Proficiency Speakers. The Project Team will seek to coordinate for facilitation at meetings, if requested.

## E. Schedule of Public Involvement Initiatives

The following presents a list of major public outreach activities for the duration of the projects. Dates are approximate and may be scheduled according to availability.

| Action # | Action | Scheduled Completion |
|---|---|---|
| 1 | Draft Stakeholder List | April 19, 2019 |
| 2 | Draft Project Website | April 26, 2019 |
| 3 | Live Project Website | May 3, 2019 |
| 4 | Contact Local Officials for Briefing | May 24, 2019 |
| 5 | Coordinate for Local Officials Briefing 1 | July 19, 2019 |
| 6 | Coordinate for Public Information Center 1 | July 26, 2019 |
| 7 | Develop Public Information Center 1 materials | August 2, 2019 |
| 8 | Conduct Local Officials Briefing 1 | June 3, 2019 |
| 9 | Advertise Public Information Center 1 | August 7, 2019 |
| 10 | Local Officials Briefing Summary | June 17, 2019 |
| 11 | Conduct Public Information Center 1 | September 10, 2019 |
| 12 | Public Information Center 1 Summary | September 24, 2019 |
| 13 | Coordinate for Local Officials Briefing 2 | November 25, 2019 |
| 14 | Conduct Local Officials Briefing 2 | December 19, 2019 |
| 15 | Local Officials Briefing Summary | January 6, 2020 |
| 16 | Coordinate for Public Information Center 2 | January 7, 2020 |
| 17 | Develop Public Information Center 2 materials | January 8, 2020 |
| 18 | Advertise Public Information Center 2 | January 22, 2020 |
| 19 | Conduct Public Information Center 2 | February 26, 2020 |

| Action # | Action | Scheduled Completion |
|---|---|---|
| 20 | Public Information Center 2 Summary | March 11, 2020 |
| 21 | Public Outreach Summary for CD Report | May 29, 2020 |

## F. Special Considerations for Public Involvement

The following section identifies special considerations for engaging Environmental Justice (EJ) populations as identified by the Dover Community Profile.

### 1. Limited English Proficiency (LEP) populations

An estimated 20.8% of Hackettstown's estimated population of 9,569 identify themselves as Hispanic/Latino of any race, and 17.3% of the Town's population speak Spanish. While this percentage of LEP population in Hackettstown is relatively low, there may be some consideration for their attendance. Strategies to provide opportunities for this population to participate in the study include providing a Google Translate widget onto the project website, providing public study materials in English and Spanish, and partnering with local organizations to provide translation services at Public Information Centers.

### 2. Income and Mobility

Income and personal mobility may influence an individual's or household's ability to participate in the outreach process with respect to attendance at the Public Information Centers. This can be measured in two key ways. First, the percentage of population living at or below the Federal Poverty Line provides an indication of the financial ability to own an automobile or have discretionary incomes for other than non-elastic (i.e. work, school, food shopping, etc.) trips. The second is the availability of an automobile, measured at the household level. According to the 2011-2015 American Community Survey (ACS) 5-year Estimates, 10.7% of the Town's population lives below the Federal Poverty Level. This is a significant percentage of the Town's population and more than the percentage of Warren County as a whole. Strategies to help encourage people with limited incomes and mobility options to participate in the public outreach process include distributing flyers to areas which provide assistance to lower income individuals, such as the Warren County Office of Temporary Assistance and Social Services. Public Information Centers could be also located within close proximity of NJ TRANSIT bus routes to accommodate transit-dependent populations.

### 3. Senior Population

The percentage of population 65 and over living within the Town of Hackettstown is 14%, slightly lower the Warren County's total 65 and over population of 16.5%. Considerations for engaging with an older population include distributing flyers to senior/civic centers, libraries, and hosting Public Information Centers at locations with good accessibility at a time of day of which they might be more likely to attend.

### 4. Disability Status

According to the Community Profile, the percentage of populations with hearing, visual, cognitive, or mobility impairments within the Project Area Census Tracts are generally higher than the rest of Warren County's population. As the Community Profile notes, the percentages associated with hearing and visual impairments may not be a concern. The significantly higher than County average of people with mobility impairments in the study area does present a concern, however. Meeting locations with good ADA accessibility and/or coordination with community transportation services should be a special consideration for the Public Information Centers. The higher than County average percentages of population with cognitive impairments living within the study area is also a concern, and presents a potentially greater challenge, as there are few guidelines on how to best engage with these populations. In guidance for health care professionals dealing with patients with cognitive impairments, it is advised they speak directly to the person (as opposed to a caregiver who may be in attendance) and use literal terminology while using visual aids to demonstrate concepts or information. In this instance, the use of posters at the Public Information Centers can aid in discussions if the need arises.

## G. Public Involvement Deliverables

The following lists the expected deliverables of the public outreach process for the Phillipsburg South Main Street Rail Clearance Concept Development Program.

1. Website and web traffic reports
2. Project Fact Sheet
3. Public Information Center Publicity Materials
4. Display Posters
5. Comment/Question Forms
6. Meeting Summaries
7. Public Outreach Summary Report

NJTPA Freight Concept
Development Program

**North Jersey Transportation Planning Authority**
**Freight Concept Development Program**

## Program Compliance Review (PCR) No. 1 for:
## Hackettstown Drain Bridge Weight Restriction Elimination Project

The role of the PCR is to perform interim reviews throughout the concept development phase to confirm that the project's development is in compliance with the program's requirements. The first PCR review is conducted once the draft purpose and need is finalized, with the second PCR review conducted once the Preliminary Preferred Alternative (PPA) is finalized but before it is presented to the local officials or the public.

***Sign-off from the members of the PCR Committee on behalf of their respective divisions and bureaus that the project's development is in compliance with the program's requirements is required before the development of alternative solutions to meet the project purpose and need can be advanced.***

### Program Compliance Review Approval

Based upon involvement in the project process to date and review of the Project Summary Memo and the draft Purpose and Need Statement provided, it has been determined that the project development to date has been conducted in compliance with the program requirements.

**Nazhat Aboobaker** **Date:**
**NJDOT - Division of Local Aid**

Sweet 7-22-19
**James Sweet** **Date:**
**NJDOT – Bureau of Environmental Program Resources**

7/19/2019
**Andrew Ludasi** **Date:**
**NJDOT - Bureau of Multimodal Services**

**Richard Wisneski** **Date:**
**NJ TRANSIT – Rail Operations**

**Lisa Fanning** **Date:**
**NJ TRANSIT – Rail Operations**

NJTPA Freight Concept
Development Program

**North Jersey Transportation Planning Authority**
**Freight Concept Development Program**

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***Sign-off from the members of the PCR Committee on behalf of their respective divisions and bureaus that the project's development is in compliance with the program's requirements is required before the development of alternative solutions to meet the project purpose and need can be advanced.***

### Program Compliance Review Approval

Based upon involvement in the project process to date and review of the Project Summary Memo and the draft Purpose and Need Statement provided, it has been determined that the project development to date has been conducted in compliance with the program requirements.

**Nazhat Aboobaker** **Date:**
**NJDOT - Division of Local Aid**

**James Sweet** **Date:**
**NJDOT – Bureau of Environmental Program Resources**

**Andrew Ludasi** **Date:**
**NJDOT - Bureau of Multimodal Services**

**Richard Wisneski** **Date:**
**NJ TRANSIT – Rail Operations**

6/26/19

**Lisa Fanning** **Date:**
**NJ TRANSIT – Rail Operations**

NJTPA Freight Concept
Development Program

**North Jersey Transportation Planning Authority**
**Freight Concept Development Program**

## Program Compliance Review (PCR) No. 1 for:
## Hackettstown Drain Bridge Weight Restriction Elimination Project

The role of the PCR is to perform interim reviews throughout the concept development phase to confirm that the project's development is in compliance with the program's requirements. The first PCR review is conducted once the draft purpose and need is finalized, with the second PCR review conducted once the Preliminary Preferred Alternative (PPA) is finalized but before it is presented to the local officials or the public.

***Sign-off from the members of the PCR Committee on behalf of their respective divisions and bureaus that the project's development is in compliance with the program's requirements is required before the development of alternative solutions to meet the project purpose and need can be advanced.***

### Program Compliance Review Approval

Based upon involvement in the project process to date and review of the Project Summary Memo and the draft Purpose and Need Statement provided, it has been determined that the project development to date has been conducted in compliance with the program requirements.

Nazhat Aboobaker 7/15/19

**Nazhat Aboobaker** **Date:**
**NJDOT - Division of Local Aid**

**James Sweet** **Date:**
**NJDOT – Bureau of Environmental Program Resources**

**Andrew Ludasi** **Date:**
**NJDOT - Bureau of Multimodal Services**

**Richard Wisneski** **Date:**
**NJ TRANSIT – Rail Operations**

**Lisa Fanning** **Date:**
**NJ TRANSIT – Rail Operations**

NJTPA Freight Concept Development Program

**North Jersey Transportation Planning Authority**
**Freight Concept Development Program**

# Program Compliance Review (PCR) No. 2 for:
# Hackettstown Drain Bridge Weight Restriction Elimination Project

The role of the PCR is to perform interim reviews throughout the concept development phase to confirm that the project's development is in compliance with the program's requirements. The first PCR review was conducted once the draft purpose and need is finalized, with the second PCR review conducted once the recommendation for the Preliminary Preferred Alternative (PPA) is finalized but before it is presented to the public.

***Sign-off from the members of the PCR Committee on behalf of their respective divisions and bureaus that the project's development is in compliance with the program's requirements is required before the second Public Information Center may be held, selection of the Preferred Alternative finalized and preparation of the Concept Development report.***

## Program Compliance Review Approval

Based upon involvement in the project process to date and review of the Project Summary Memo provided, it has been determined that the project development to date has been conducted in compliance with the program requirements.

___________________________________________________________________________

**Nazhat Aboobaker** **Date:**
**NJDOT - Division of Local Aid**

___________________________________________________________________________

**James Sweet** **Date:**
**NJDOT – Bureau of Environmental Program Resources**

2020/01/15

___________________________________________________________________________

**Andrew Ludasi** **Date:**
**NJDOT - Bureau of Multimodal Services**

___________________________________________________________________________

**Lisa Fanning** **Date:**
**NJ TRANSIT – Rail Infrastructure Engineering**

NJTPA Freight Concept
Development Program

**North Jersey Transportation Planning Authority**
**Freight Concept Development Program**

## Program Compliance Review (PCR) No. 2 for:
## Hackettstown Drain Bridge Weight Restriction Elimination Project

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**Nazhat Aboobaker** **Date:**
**NJDOT - Division of Local Aid**

James R Sweet 1-17-2020
**James Sweet** **Date:**
**NJDOT – Bureau of Environmental Program Resources**

**Andrew Ludasi** **Date:**
**NJDOT - Bureau of Multimodal Services**

**Lisa Fanning** **Date:**
**NJ TRANSIT – Rail Infrastructure Engineering**

NJTPA Freight Concept
Development Program

**North Jersey Transportation Planning Authority**
**Freight Concept Development Program**

## Program Compliance Review (PCR) No. 2 for:
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**James Sweet** **Date:**
**NJDOT – Bureau of Environmental Program Resources**

________________________________________

**Andrew Ludasi** **Date:**
**NJDOT - Bureau of Multimodal Services**

Lisa Fanning 2/4/2020
________________________________________

**Lisa Fanning** **Date:**
**NJ TRANSIT – Rail Infrastructure Engineering**

NJTPA Freight Concept Development Program

**North Jersey Transportation Planning Authority**
**Freight Concept Development Program**

## Program Compliance Review (PCR) No. 2 for:
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**Program Compliance Review Approval**

Based upon involvement in the project process to date and review of the Project Summary Memo provided, it has been determined that the project development to date has been conducted in compliance with the program requirements.

Nazhat Aboobaker 1/5/2020

**Nazhat Aboobaker** **Date:**
**NJDOT - Division of Local Aid**

**James Sweet** **Date:**
**NJDOT – Bureau of Environmental Program Resources**

**Andrew Ludasi** **Date:**
**NJDOT - Bureau of Multimodal Services**

**Lisa Fanning** **Date:**
**NJ TRANSIT – Rail Infrastructure Engineering**

NJTPA Freight Concept Development Program

# Interagency Review Committee November 17, 2020 Attendees

## North Jersey Transportation Planning Authority

Anne Strauss-Wieder
Jakub Rowinski
Sascha Frimpong

## Federal Highway Administration

Mamun Rashid

## New Jersey Department of Transportation

Laine Rankin
Nicole Minutoli
Elkins Green
Deven Patel
Nazhat Aboobaker
Genevieve Clifton
Andrew Ludasi
Lauralee Rappleye
James Sweet

## NJ TRANSIT

Lisa Fanning
David Althaver
Alan Kearns
Adam DiSarro

## Morris County

John Hayes
Benjamin Peacock

## Warren County

Brian Appezzato

## Jacobs Engineering Group Inc.

Scott Parker

# Hackettstown Weight Restriction Elimination Project

Interagency Review Committee

November 17, 2020

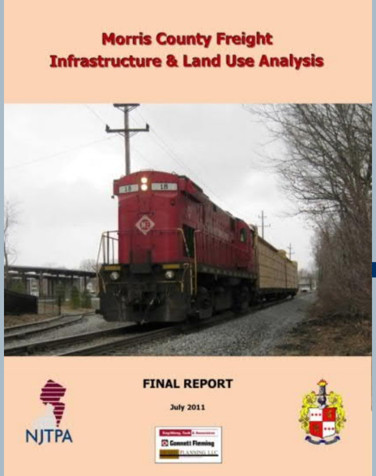
Jakub Rowinski, NJTPA Project Manager

Scott Parker, Jacobs Engineering Project Manager

NJTPA

# Project Background and Future

Need first identified in **"Morris County Freight Infrastructure and Land Use Analysis"** (2011)



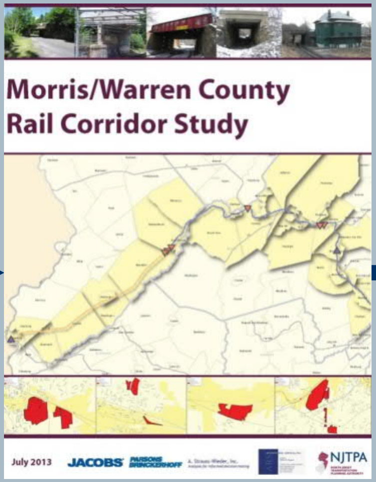
Morris County Freight Infrastructure & Land Use Analysis

FINAL REPORT

July 2011

NJTPA

Detailed Investigation in **"Morris / Warren County Rail Corridor Study"** (2013)



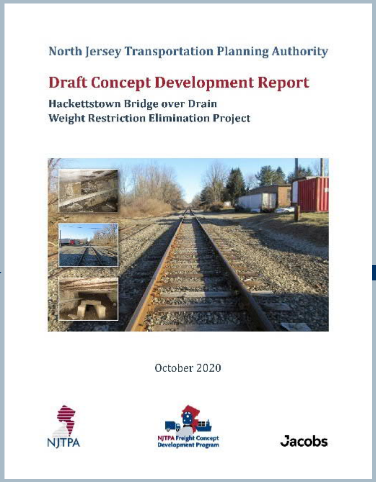
Morris/Warren County Rail Corridor Study

July 2013

JACOBS

NJTPA

Current Study **"Hackettstown Bridge over Drain Weight Restriction Elimination Study"**



North Jersey Transportation Planning Authority

Draft Concept Development Report

Hackettstown Bridge over Drain Weight Restriction Elimination Project

October 2020

NJTPA

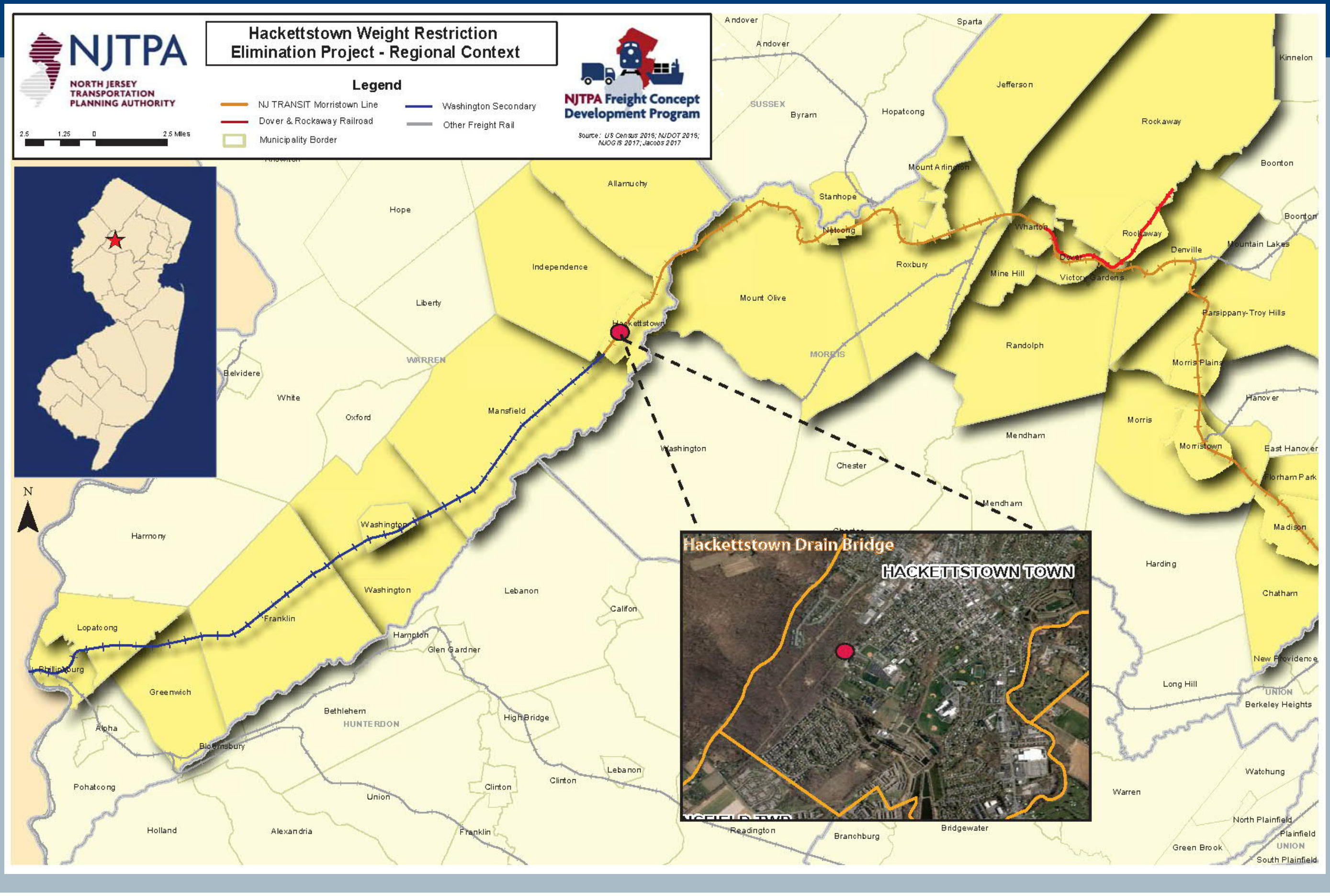
NJTPA Freight Concept Development Program

Jacobs

Next Steps

**Design And Construction**

# Regional Context



# Bridge Location

Bridge Over Drain

NJTPA

# Existing Condition

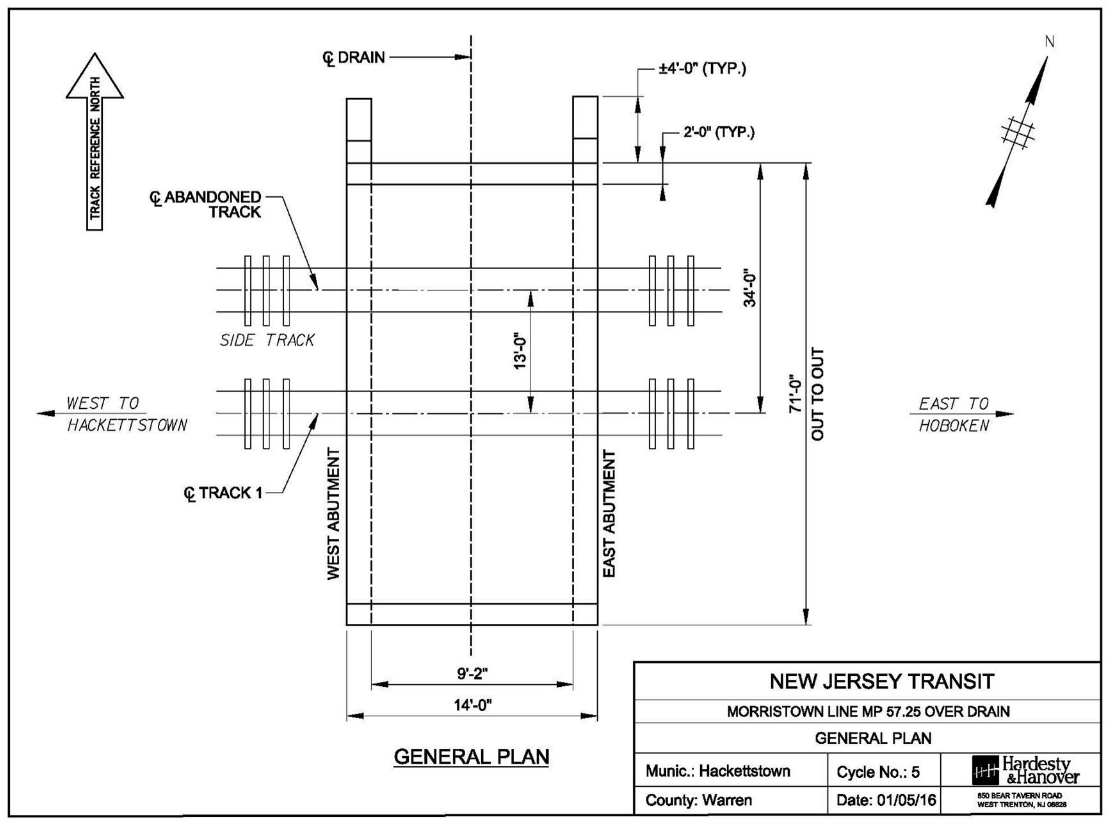
View Beneath Bridge

North End of Structure Looking South

NJTPA

# Existing Condition

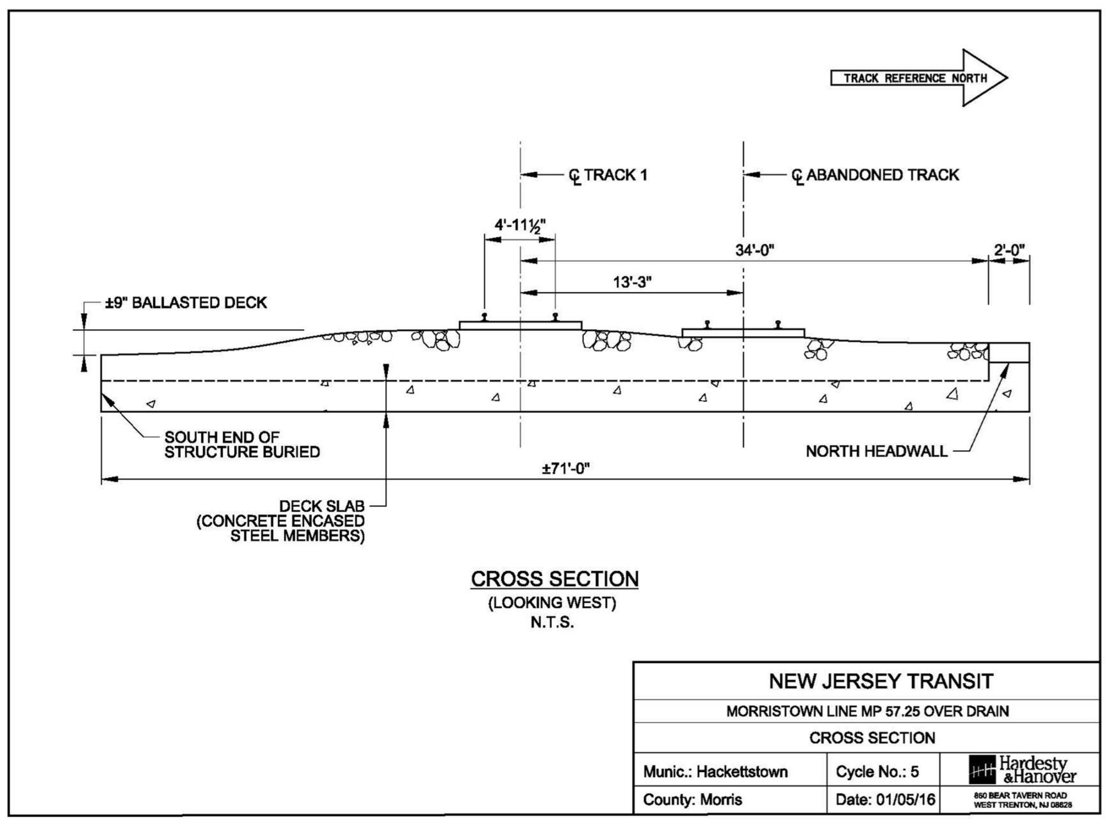
Plan View of Bridge



NJTPA

# Existing Condition

Cross Section of Bridge



# Structural Rating

- Bridge Restricted to 263,000 lb. Rail Cars
- Current Maximum Rating E55
- Current Normal Rating E44
- Need Normal Rating of E55 to Accommodate Industry Standard 286,000 lb. Rail Cars

NJTPA

Based on NJ TRANSIT Bridge Evaluation Survey Report, 5th Cycle, December 31, 2015

# Project Purpose and Need Statement

*Provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement, particularly the ability to accommodate the movement of 286,000 pound (286K) railcars over the Washington Secondary/Morristown Line in Hackettstown.*

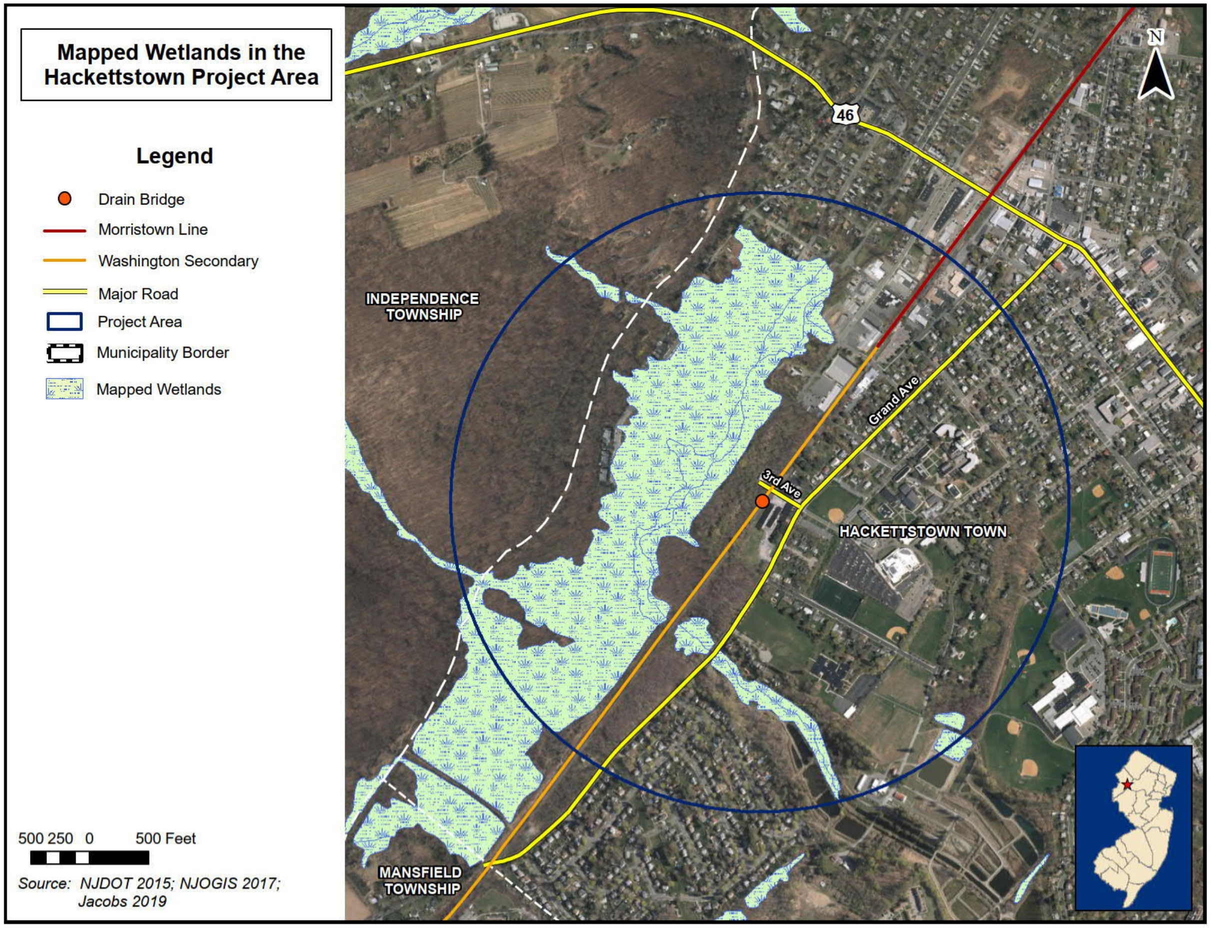
NJTPA

# Key Constraints

- Wetlands
- Flood Hazard Areas
- Hazardous Materials
- Threatened and Endangered Species
- Utilities
- Historic / Cultural Resources

NJTPA

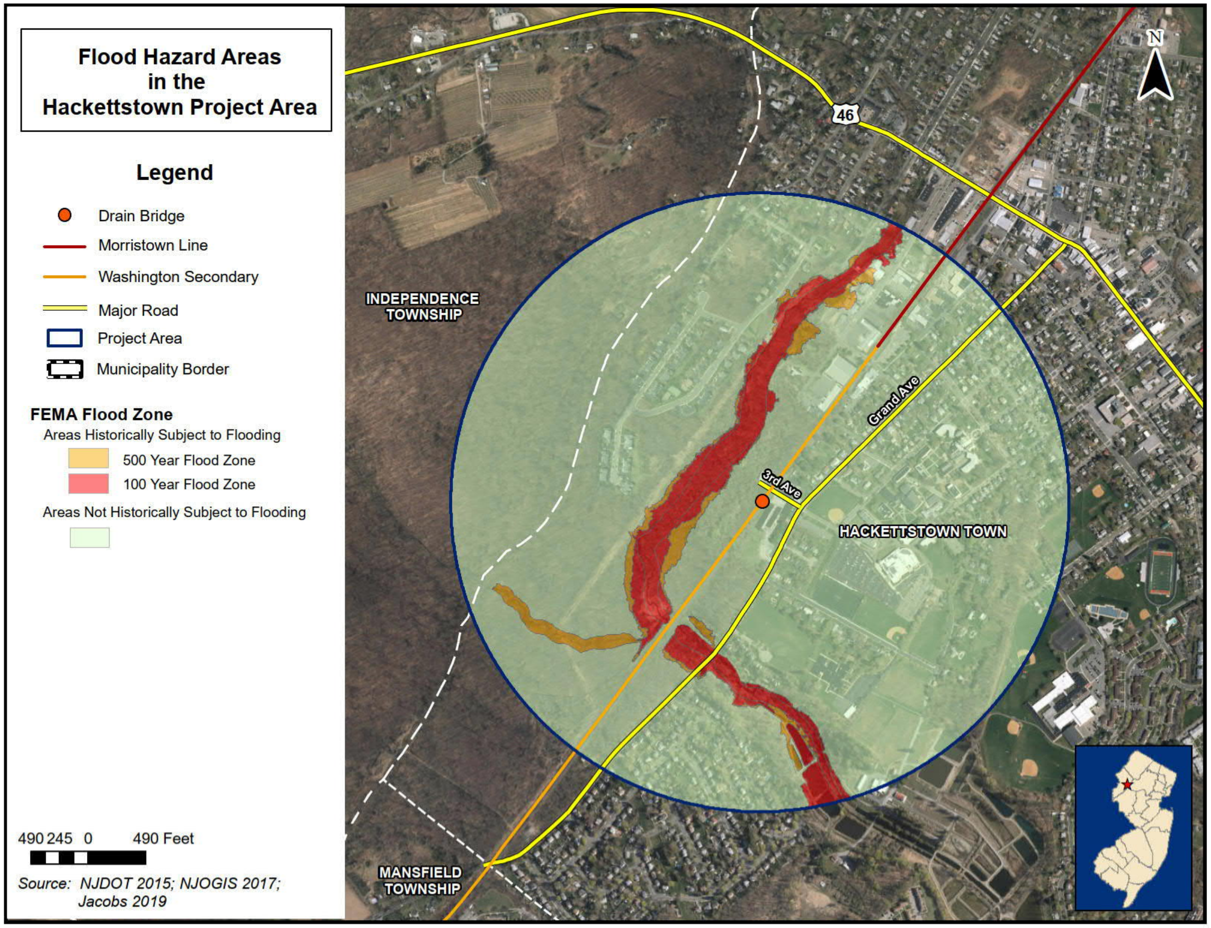
# Environmental Constraints



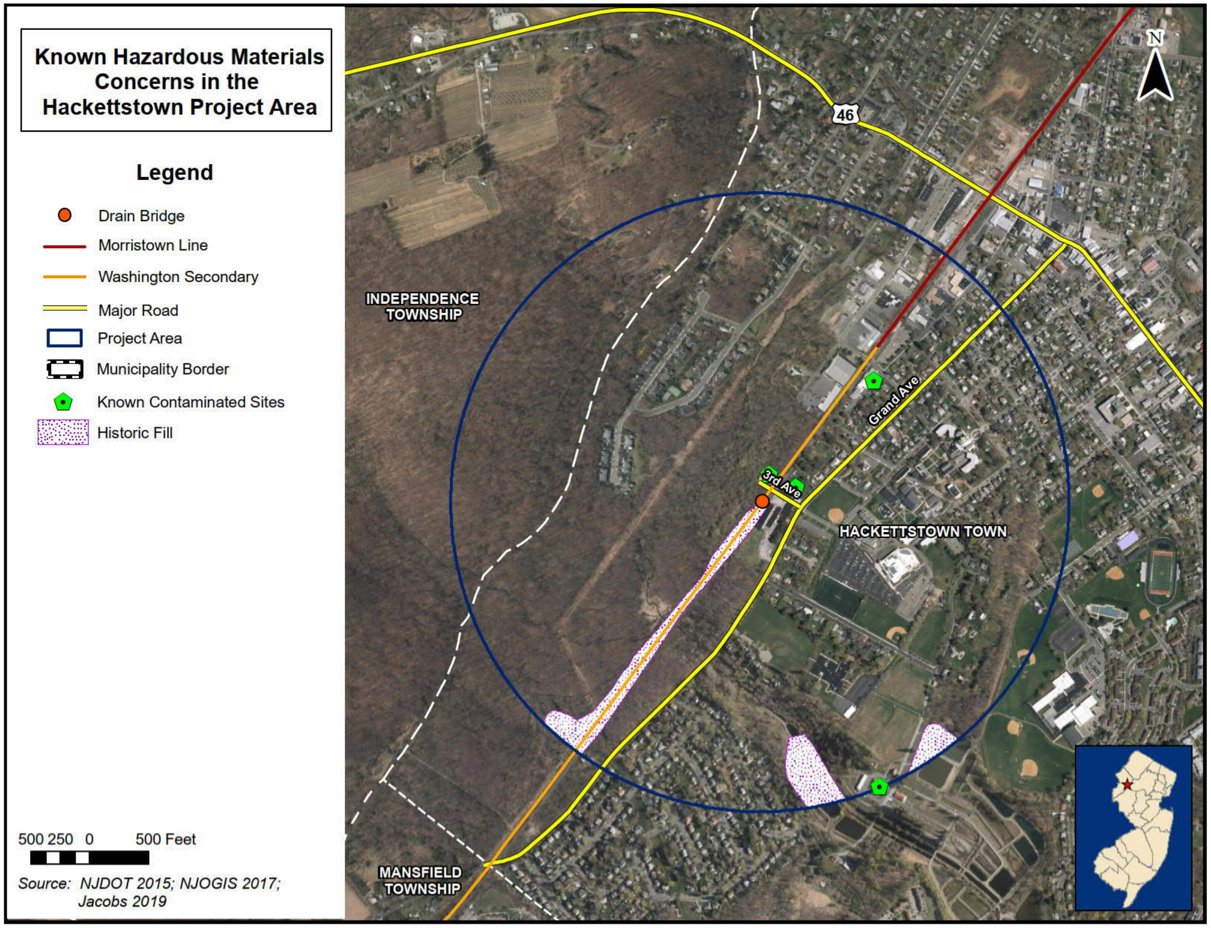
*Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019*

NJTPA

# Environmental Constraints



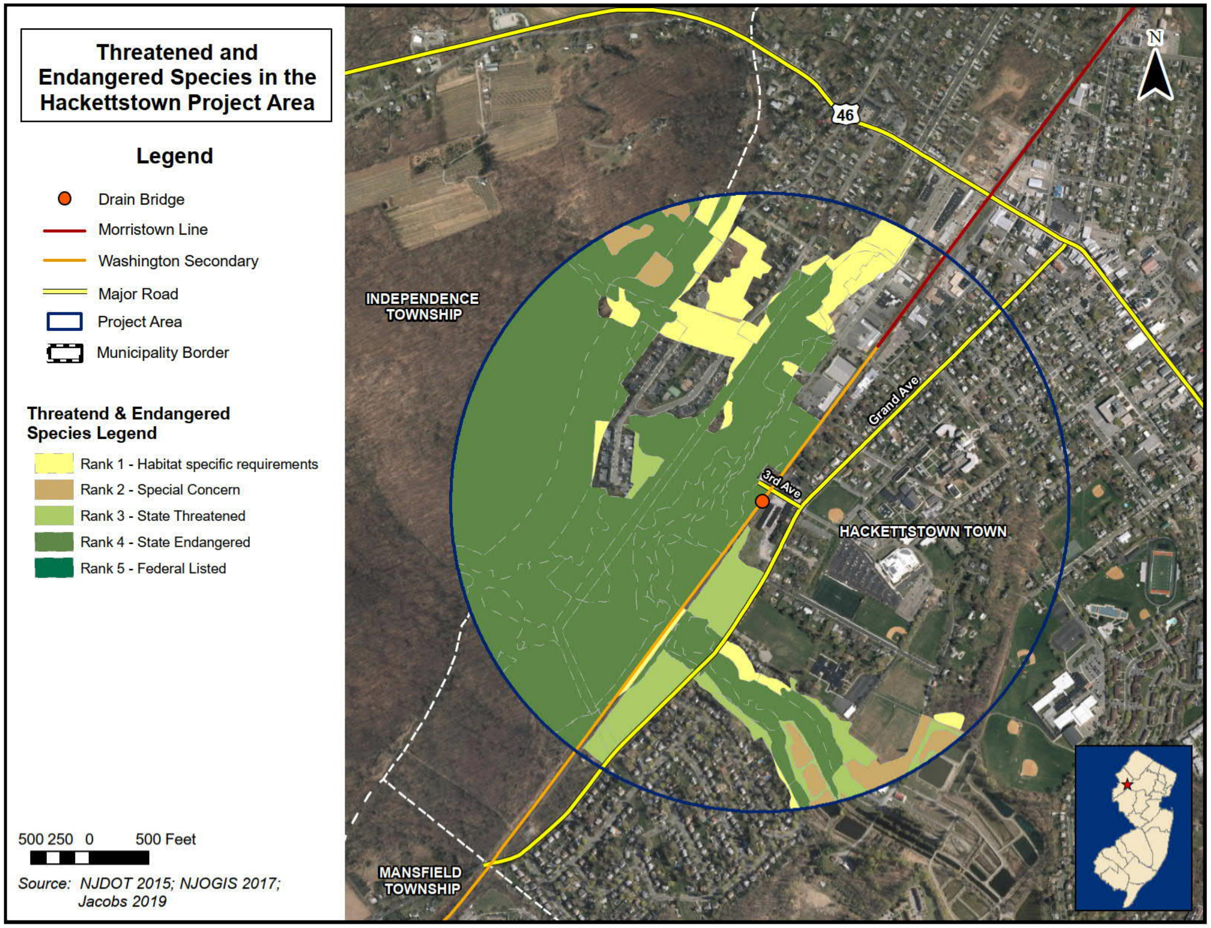
# Environmental Constraints



Known Hazardous Materials Concerns in the Hackettstown Project Area

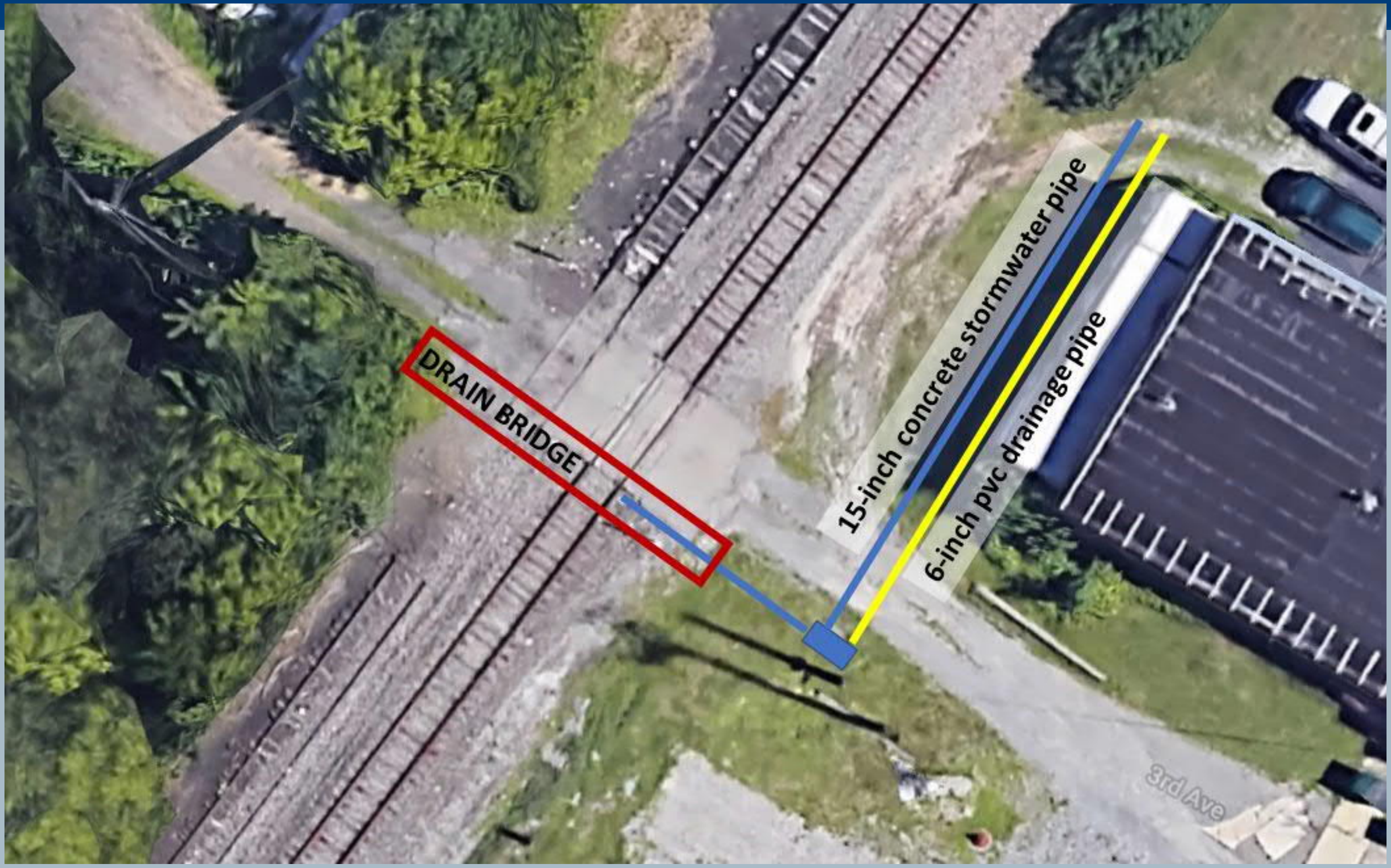
Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

# Environmental Constraints



*Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019*

# Utilities - Stormwater Drainage



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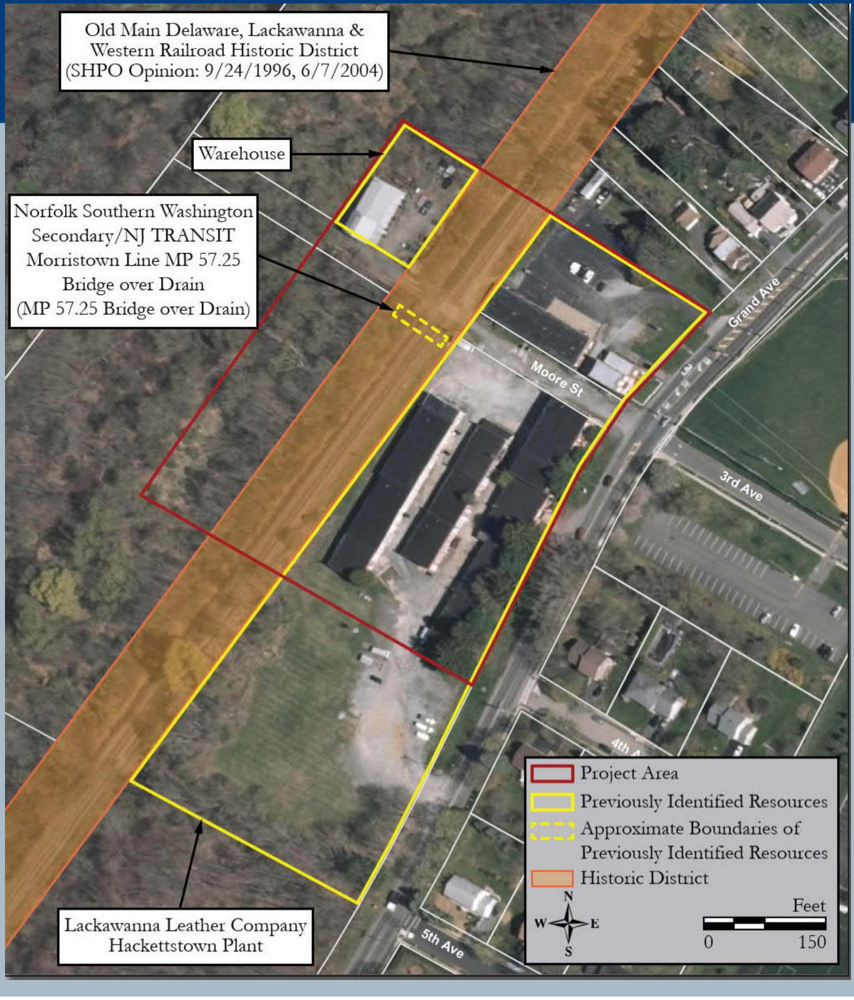
# Historic and Cultural Resources



# Public and Stakeholder Outreach

PROJECT TEAM

- NJTPA, Morris County, Warren County
- NJ TRANSIT – Planning, Engineering
- NJDOT – Local Aid, Multimodal Services, Bureau of Environmental Program Resources
- Consultant Team Led by Jacobs Engineering
- Monthly working meetings to exchange information, review progress and study products
- Additional meetings and coordination with key Subject Matter Experts
  - ✓ NJ TRANSIT Structures
  - ✓ NJDOT BEPR
  - ✓ SHPO
  - ✓ Hackettstown DPW

# Public and Stakeholder Outreach

LOCAL OFFICIALS BRIEFINGS and PUBLIC INFORMATION CENTERS

- Local Officials Briefing No. 1 - June 3, 2019
- Public Information Center No. 1 – September 10, 2019
  - ✓ Present the project objectives and process
- Local Officials Briefing No. 2 - December 19, 2019
- Public Information Center No. 2 – February 26, 2020
  - ✓ Present study findings, alternatives considered and recommendation of PPA
- Resolutions of Support
  - ✓ Town of Hackettstown - Adopted February 13, 2020
  - ✓ Warren County – Adopted April 8, 2020

# Public and Stakeholder Outreach

INFORMATION OUTLETS

- Project website - Hackettstownrailstudy.org
- Advertising of Public Meetings
  - ✓ Project, county and municipal websites
  - ✓ Legal Notices – Star Ledger and Warren Gazette – English and Spanish
  - ✓ Posted Flyers – Municipal building and high traffic locations in Hackettstown
- Presentation to the NJTPA Freight Initiatives Committee

NJTPA

# Alternatives Evaluated

Driven by Key Constraints and Maintenance of Operation Need

- Full Slab Replacement
- Partial Slab Replacement
- Full Slab Replacement w/Runaround Track
- Fill - Concrete Injection
- Replace with Pre-Fab Culvert
- Extend Culvert - Grout Fill
- Extend Culvert - Soil Fill
- Extend Pipe - Grout Fill
- Extend Pipe - Soil Fill

# Alternatives Scoring

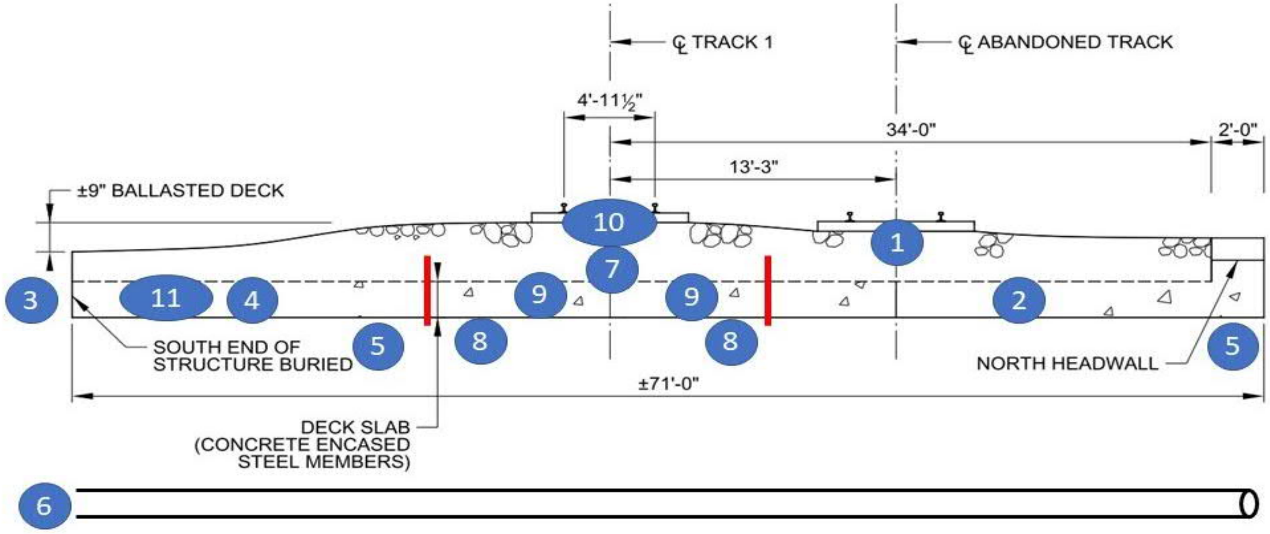
| Criteria | Full Slab Replacement | Partial Slab Replacement | Full Slab Replacement w/Runaround Track | Fill - Concrete Injection | Replace with Pre-Fab Culvert | Extend Culvert - Grout Fill | Extend Pipe - Soil Fill | Extend Pipe - Grout Fill | Extend Pipe - Soil Fill |
|---|---|---|---|---|---|---|---|---|---|
| Freight Rail Operations Impacts / Benefits | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Passenger Rail Operations Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adjacent and Proximate Land Use Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic and Cultural Resources Impacts / Benefits | 0 | -1 | 0 | -5 | -5 | -3 | -5 | -3 | -5 |
| Community Profile & Environmental Justice/Title VI Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wetlands Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Floodplains & Aquifers Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Threatened & Endangered Species Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stormwater and Drainage Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hazardous Materials Impacts / Benefits | -1 | -1 | -1 | -1 | -3 | -1 | -1 | -1 | -1 |
| Air Quality & Noise Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Community Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Safety Impacts / Benefits | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Utility Impacts / Relocation Requirements | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Track Length (LF) | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 |
| SUMMARY SCORE | 3 | 2 | 3 | -2 | -4 | 0 | -2 | 0 | -2 |

# Value Engineering Review

- High Level Overview and Data Transfer to VE Team
- Independent review of alternatives and consideration of additional alternatives
- VE Recommendation concurred with PPA identified in the study

NJTPA

# Preliminary Preferred Alternative



1. Remove side track and ballast to allow clearing of the slab
2. Remove northern concrete and rail slab
3. Excavate south end of structure to expose drainage pipe below slab
4. Remove southern concrete and slab and earth covering drainage pipe
5. Repoint abutments and repair headwall
6. Extend 15-inch drainage pipe into culvert
7. Remove active track, ballast and slab
8. Level top of abutments with grout
9. Set two (2) new precast 8-ft by 14-ft slabs
10. Place new ballast and new track panels. Reopen track for service
11. Install remaining slabs

# Draft Concept Development Report

- Draft CDR circulated for review and comment by the Project Team - August 7, 2020
- Comments received addressed with revised report circulated for final review and comment by the Project Team on September 11, 2020
- Additional comments received addressed with final draft for Interagency Review Committee (IRC) review circulated on October 8, 2020 for IRC review

NJTPA

# Next Steps

- Anticipated NEPA Classification: Categorical Exclusion
- Cost Estimate: $498,300
- Potential Source of Funding for Design and Construction: New Jersey Rail Freight Assistance Program (RFAP)
- Additional Anticipated Considerations

NJTPA

# Requesting IRC Approval

- IRC approval of the CDR and its recommendations is the final step in completion of the study
- IRC approval allows the PPA to graduate into the preliminary and final design
- IRC approval *DOES NOT* commit any agency to any financial or project advancement obligations

NJTPA

# Thank You/Questions?

Jakub Rowinski – NJTPA
jrowinski@njtpa.org

Scott Parker – Jacobs Engineering
scott.parker@Jacobs.com

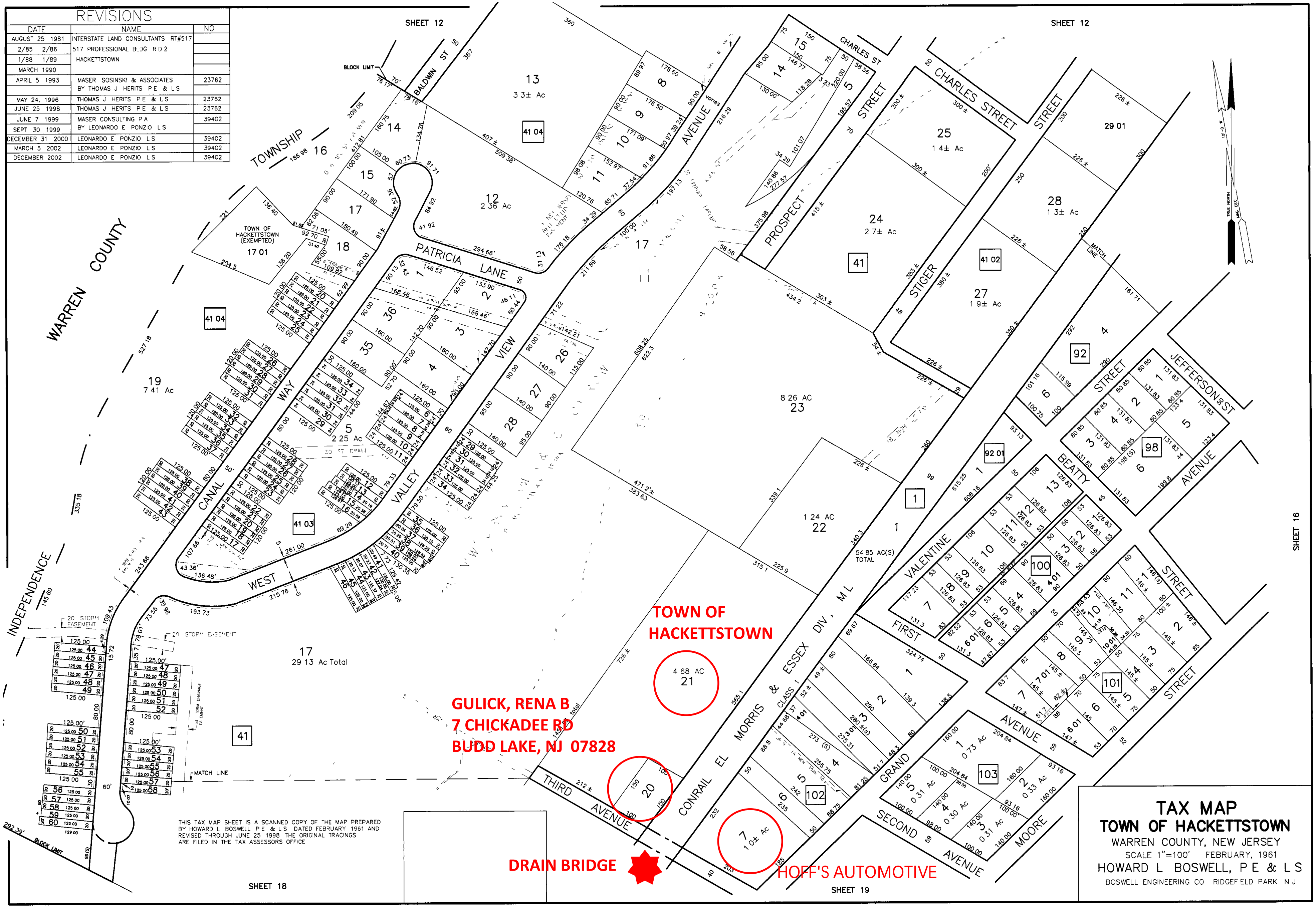
Website –
www.hackettstownrailstudy.org

NJTPA

## Hackettstown Drain Bridge - Adjacent Property Owners

| BLOCK | LOT | ADDRESS | OWNER |
|---|---|---|---|
| 41 | 18 | 680 Grand Avenue<br>Hackettstown Town, NJ 07840 | Town of Hackettstown |
| 41 | 19 | Grand Avenue<br>Hackettstown Town, NJ 07840 | State of New Jersey DEP |
| 41 | 20 | 100-102 Third Avenue<br>Hackettstown Town, NJ 07840 | Gulick, Rena B.<br>7 Chikadee Road<br>Budd Lake, NJ 07828 |
| 41 | 21 | Third Avenue<br>Hackettstown Town, NJ 07840 | Town of Hackettstown |
| 108 | 1 | 700 Grand Avenue<br>Hackettstown Town, NJ 07840 | General Graphics Corp. |
| 108 | 2 | Grand Avenue<br>Hackettstown Town, NJ 07840 | State of New Jersey DEP |
| 102 | 7 | 630 Grand Avenue<br>Hackettstown Town, NJ 07840<br>Warren County | 630 Grand Avenue<br>Hackettstown Town, NJ 07840<br>Warren County |

# Hackettstown Drain Bridge - Adjacent Property Owners



| DATE | NAME | NO |
|---|---|---|
| AUGUST 25 1981 | INTERSTATE LAND CONSULTANTS RT#517 | |
| 2/85 2/86 | 517 PROFESSIONAL BLDG R D 2 | |
| 1/88 1/89 | HACKETTSTOWN | |
| MARCH 1990 | | |
| APRIL 5 1993 | MASER SOSINSKI & ASSOCIATES<br>BY THOMAS J HERITS P E & L S | 23762 |
| MAY 24, 1996 | THOMAS J HERITS P E & L S | 23762 |
| JUNE 25 1998 | THOMAS J HERITS P E & L S | 23762 |
| JUNE 7 1999 | MASER CONSULTING P A<br>BY LEONARDO E PONZIO L S | 39402 |
| SEPT 30 1999 | | |
| DECEMBER 31 2000 | LEONARDO E PONZIO L S | 39402 |
| MARCH 5 2002 | LEONARDO E PONZIO L S | 39402 |
| DECEMBER 2002 | LEONARDO E PONZIO L S | 39402 |

THIS TAX MAP SHEET IS A SCANNED COPY OF THE MAP PREPARED BY HOWARD L BOSWELL P E & L S DATED FEBRUARY 1961 AND REVISED THROUGH JUNE 25 1998 THE ORIGINAL TRACINGS ARE FILED IN THE TAX ASSESSORS OFFICE

TAX MAP
TOWN OF HACKETTSTOWN
WARREN COUNTY, NEW JERSEY
SCALE 1"=100' FEBRUARY, 1961
HOWARD L BOSWELL, P E & L S
BOSWELL ENGINEERING CO RIDGEFIELD PARK N J

# Hackettstown Drain Bridge - Adjacent Property Owners

## REVISIONS

| DATE | NAME | NO |
|---|---|---|
| AUGUST 25 1981 | INTERSTATE LAND CONSULTANTS RT#517 | |
| FEBRUARY 1986 | 517 PROFESSIONAL BLDG R D 2 | |
| MARCH 1990 | HACKETTSTOWN | |
| APRIL 5 1993 | MASER SOSINSKI & ASSOCIATES | 23762 |
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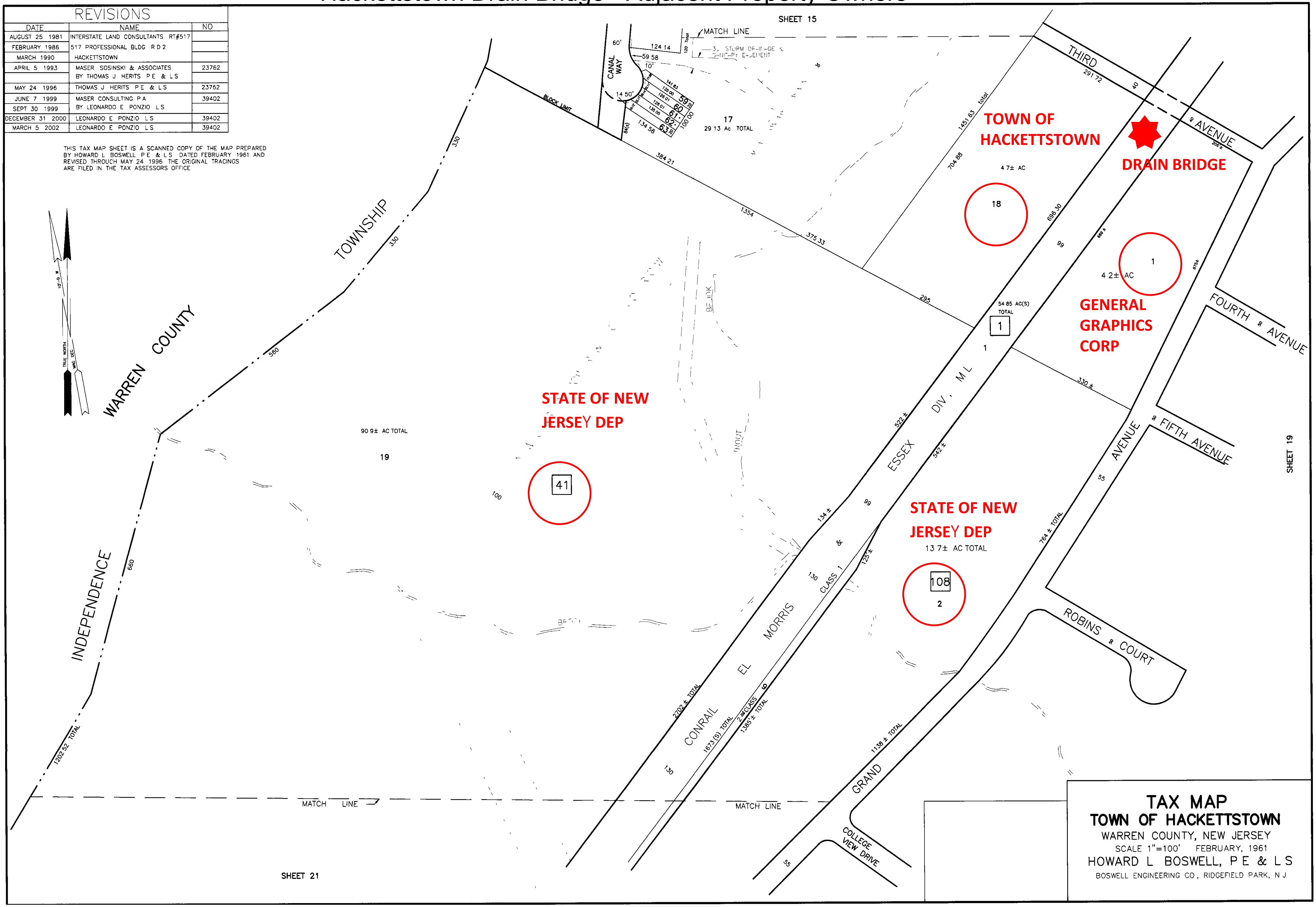

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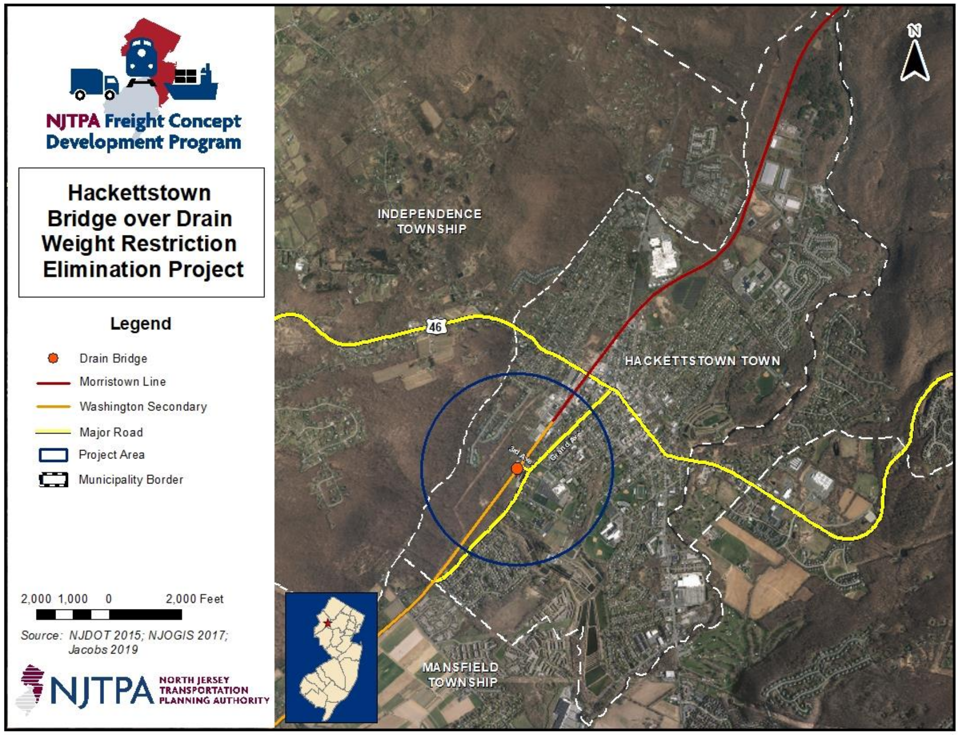
WARREN COUNTY, NEW JERSEY
SCALE 1"=100' FEBRUARY, 1961
HOWARD L BOSWELL, P E & L S
BOSWELL ENGINEERING CO, RIDGEFIELD PARK, N J

NJTPA Freight Concept Development Program

NJTPA
NORTH JERSEY
TRANSPORTATION
PLANNING AUTHORITY

# NJTPA Pilot Freight Concept Development Program

## Hackettstown Bridge over Drain Weight Restriction Elimination Project



### *Draft Project Purpose and Need*

The purpose of this project is to provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement particularly the ability to accommodate the movement of 286,000 pound (286K) railcars over the Washington Secondary/Morristown Line in Hackettstown, New Jersey.

### *The Project*

Develop and evaluate potential alternatives to improve the carrying capacity of the bridge and identify the preferred alternative to be advanced into design and implementation.

### *Background*

The Washington Secondary/Morristown Line Corridor extends from Phillipsburg to Morristown and provides rail freight access to businesses in Warren and Morris Counties. The bridge over the drain is structurally deficient and limits the weight of rail cars that can be carried across it. Currently, loading of rail cars moved along the corridor is limited to 263,000 pounds (263K). Since 1995, the Association of American Railroads has maintained a national standard allowing loading of up to 286K per rail car. Improvements to the bridge to allow the movement of 286K rail cars would allow more cost-effective transport of materials to and from the rail-dependent businesses, supporting the growth of these business and the jobs and economic value they offer to the local and state economy.

### *Further Information*

Jakub Rowinski, Project Manager, NJTPA
Phone: (973) 639-8443
Email: jrowinski@njtpa.org

### *Schedule*

- This effort began in April 2019
- Purpose & Need Statement Complete, June 2019
- Selection of Preliminary Preferred Alternative, December 2019
- Concept Development Report Complete, June 2020

TOWN OF HACKETTSTOWN
MUNICIPAL BUILDING
215 W. STIGER STREET • HACKETTSTOWN • NEW JERSEY 07840
TEL: 908-852-3130 • FAX: 908-852-5728
WWW.HACKETTSTOWN.NET

**MAYOR**
Maria DiGiovanni

**MEMBERS OF COUNCIL**
Gerald DiMaio, Jr.
Matthew Engelau
Robert Hinrichs
Leonard Kunz
Scott Sheldon
Eric Tynan

**TOWN CLERK/ ADMINISTRATOR**
William W. Kuster, Jr.
RMC/CMC/CMR

**CHIEF FINANCIAL OFFICER**
Danette Dyer
CMFO/QPA

**MUNICIPAL ASSESSOR**
Jason Cohen
CTA

**TAX COLLECTOR**
Patricia Noll
CTC

**CONSTRUCTION OFFICIAL**
Richard O'Connor

**ZONING OFFICIAL**
David Diehl

# Resolution

WHEREAS, the North Jersey Transportation Planning Authority (NJTPA) has developed the Pilot Freight Concept Development Program to identify and study freight mobility needs through the northern New Jersey region; and

WHEREAS, the NJTPA, in conjunction with Warren County, has identified the existing wight restriction of the 3rd Avenue Drainage Culvert under the Washington Secondary/Morristown Line in the Town of Hackettstown as a critical detriment to providing 286,000-pound rail service between along the rail line; and

WHEREAS, business in the region relies on rail freight to receive commodities, ship finished products and compete in a global economy, supporting the growth of business served by the Washington Secondary/Morristown Line and the jobs and economic value they offer to the local and state economy; and

WHEREAS, the bridge over the Drainage Culvert is structurally deficient and limits the weight of rail cars that can be carried across it is resulting in the short-loading of many of the rail cars that serve the e businesses along the corridor and the connecting branch lines; and

WHEREAS, the NJTPA and Warren County met with local officials to discuss the issue, held a public information center, and hosted a website to gain public input from town residents and stakeholders; and

WHEREAS, after extensive study, the full replacement of the concrete slab component of the bridge and repair of the existing abutments supporting slab was identified as the most effective solution to address the existing 286,000-pound rail limitation and was selected as the preliminary preferred alternative.

NOW THEREFORE BE IT RESOLVED that the Town of Hackettstown formally supports the preliminary preferred alternative identified in the Hackettstown Bridge over Drain Weight Restriction Elimination Project study, and the pursuit of public funding to eliminate the existing 286,000-pound weight restriction.

Roll Call Vote:
Yes: DiMaio, Engelau, Kunz and Hinrichs
No: None Abstain: None
Absent: Sheldon and Tynan

William W. Kuster, Jr.
Town Clerk/Administrator
February 13, 2020

# Hackettstown Weight Restriction Elimination Project

## Local Officials Briefing

June 3, 2019

Jakub Rowinski, NJTPA Project Manager

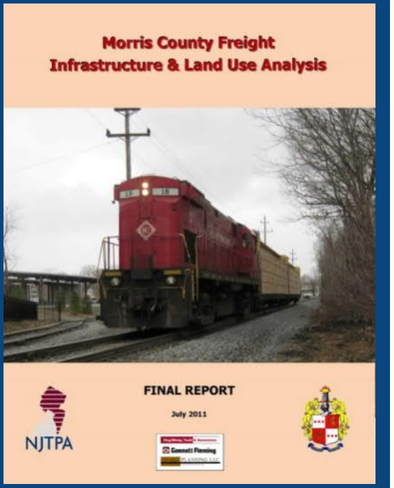
Scott Parker, Jacobs Engineering Project Manager

# Meeting Agenda

- Introductions
- Project Background
- Project Overview
- Stakeholder Involvement
- Ongoing and Future Activities

# Project Background

- Two previous studies identified a range of issues constraining state-of-the-industry freight rail operations on the Washington Secondary
- Pilot Freight Concept Development Program Study investigating potential improvements to eliminate constraints
  - Hackettstown Weight Restriction Elimination Project
  - Dover & Rockaway Rail Realignment Project

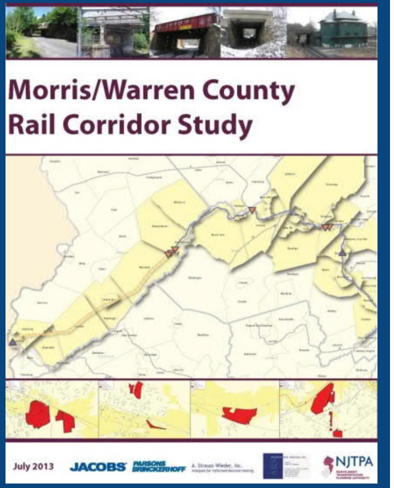


Morris County Freight
Infrastructure & Land Use Analysis

FINAL REPORT

July 2011

NJTPA



Morris/Warren County
Rail Corridor Study

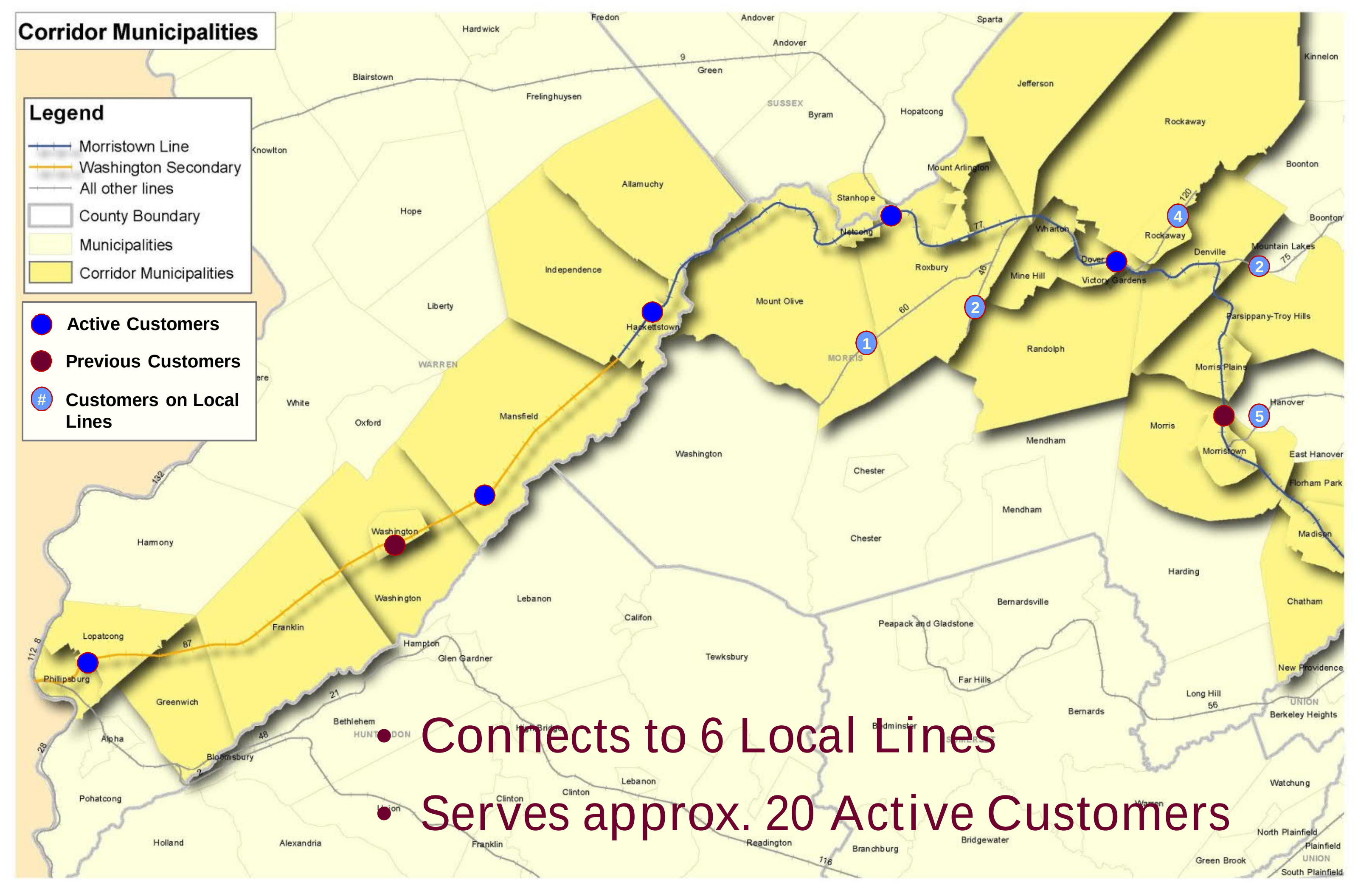
July 2013

JACOBS

PARSONS BRINCKERHOFF

NJTPA

# The Washington Secondary Regional Context



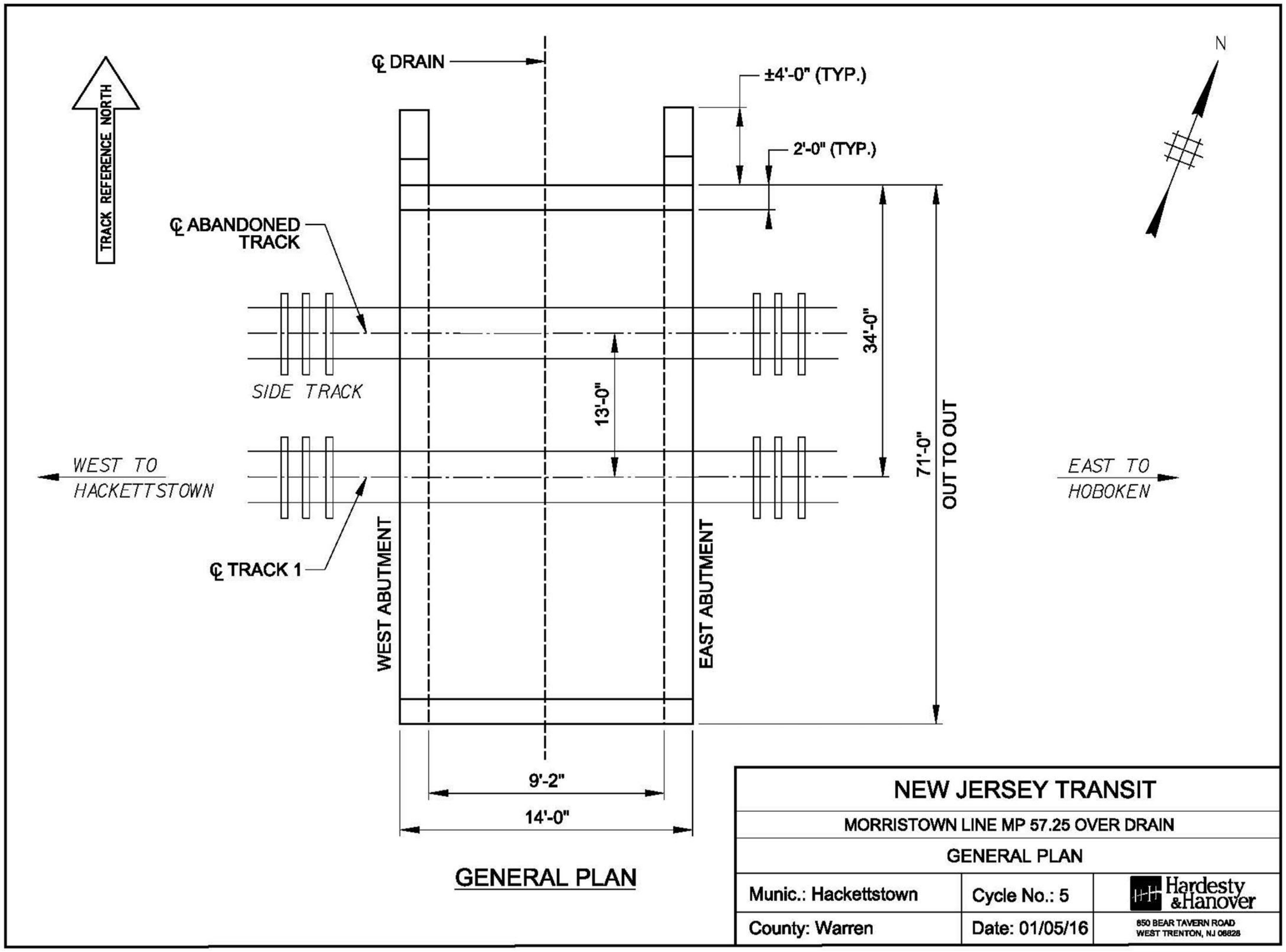
- Connects to 6 Local Lines
- Serves approx. 20 Active Customers

# Bridge Location

**Bridge Over Drain**

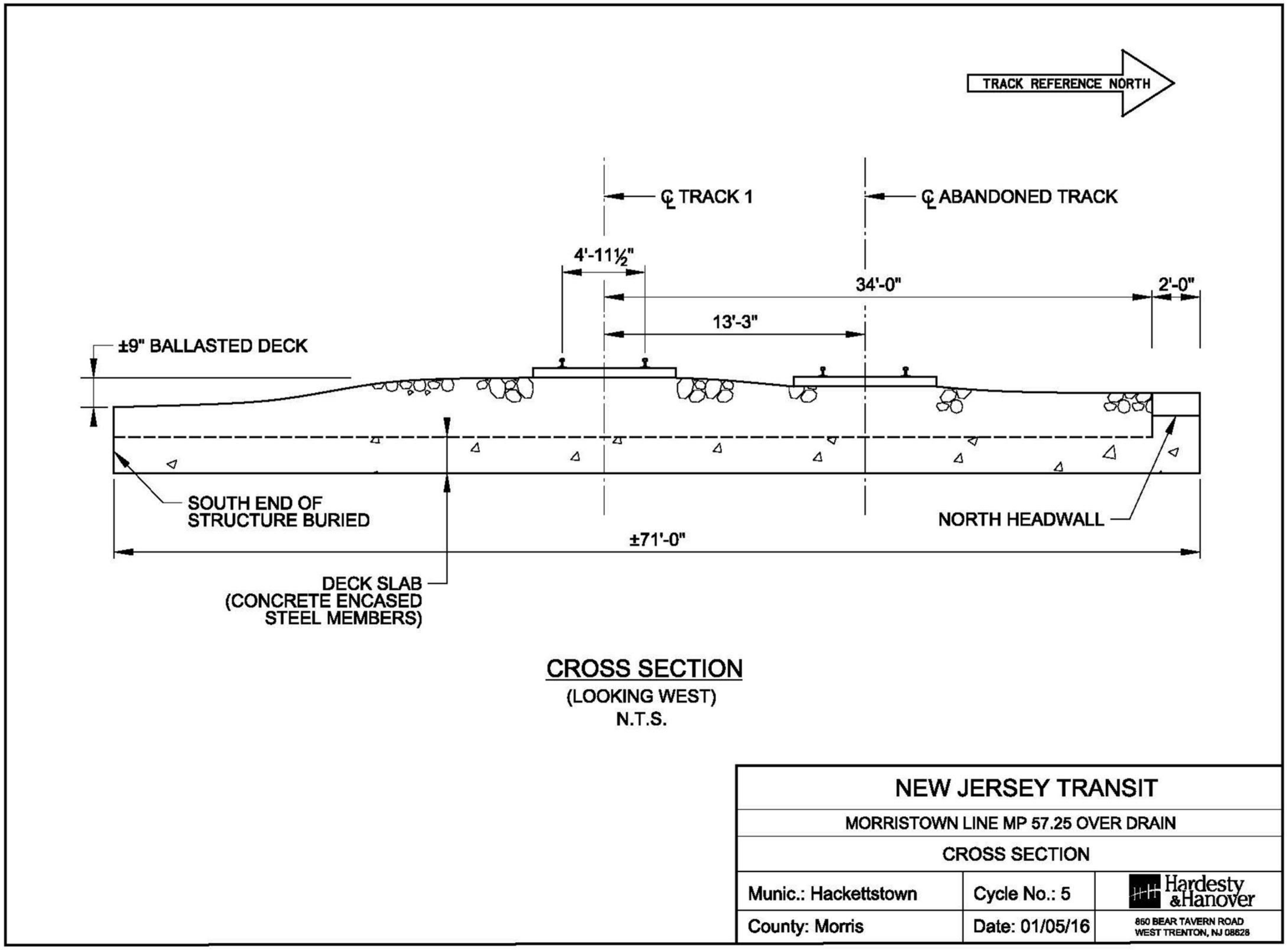
# Bridge Configuration

Plan View of Bridge



# Bridge Configuration

Cross Section Parallel to Bridge



# Bridge Condition

View Beneath Bridge - South End of Structure Looking South

# Structural Rating

- Maximum rating E55
- Normal rating E44
- Restricted to 263,000 lb rail cars
- Need normal rating of E55 to accommodate industry standard 286,000 lb rail cars

# Categories of Options for Investigation

- Replace the bridge slab
- Replace the bridge slab and abutments with box culvert
- Fill in – Convert to at-grade rail line (with or without extension of pipes and culvert)

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# Potential Issues and Constraints

- Adjacent and Proximate Land Uses
- Historic and Cultural Resources
- Community Profile & Environmental Justice/Title VI
- Wetlands
- Floodplains & Aquifers
- Threatened & Endangered Species
- Stormwater
- Hazardous Materials

# Get Involved

Stakeholder involvement is critical

- Help develop a comprehensive Purpose and Need Statement
- Consider local issues in the development and screening of improvement concepts
- Identify the preferred alternative

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# Get Involved

- Public Officials Briefings (2)
- Stakeholder Outreach Meetings
- Public Information Centers (2)
- Project Website
- Social Media (Twitter)

# Ongoing Data Collection

- Assemble available existing data from the project stakeholders and other sources
- Perform environmental screening – foundation for constraints mapping
- Identify existing design deficiencies
- Formulate location specific purpose and need statement

# Future Activities

- Finalize the Purpose and Need Statement
- Develop engineering alternatives
- Alternatives assessment
- Construction cost estimates
- Selection of preliminary preferred alternative
- Alternative analysis documentation
- Value engineering/constructability review
- Risk management review and documentations

# Thank You/Questions?

*Defining the Vision. Shaping the Future.*

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NORTH JERSEY
TRANSPORTATION
PLANNING AUTHORITY

Jakub Rowinski
jrowinski@njtpa.org
(973) 639-8443

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# Hackettstown Weight Restriction Elimination Project

## Local Officials Briefing

December 19, 2019

Jakub Rowinski, NJTPA Project Manager

Scott Parker, Jacobs Engineering Project Manager

NJTPA

# Meeting Agenda

- Project Overview
- Data Collection
- Stakeholder Engagement
- Alternatives Scoring and Selection of Preliminary Preferred Alternative (PPA)
- Next Steps

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# Project Overview

**Bridge Over Drain**

# Project Overview

View Beneath Bridge - South End of Structure Looking South

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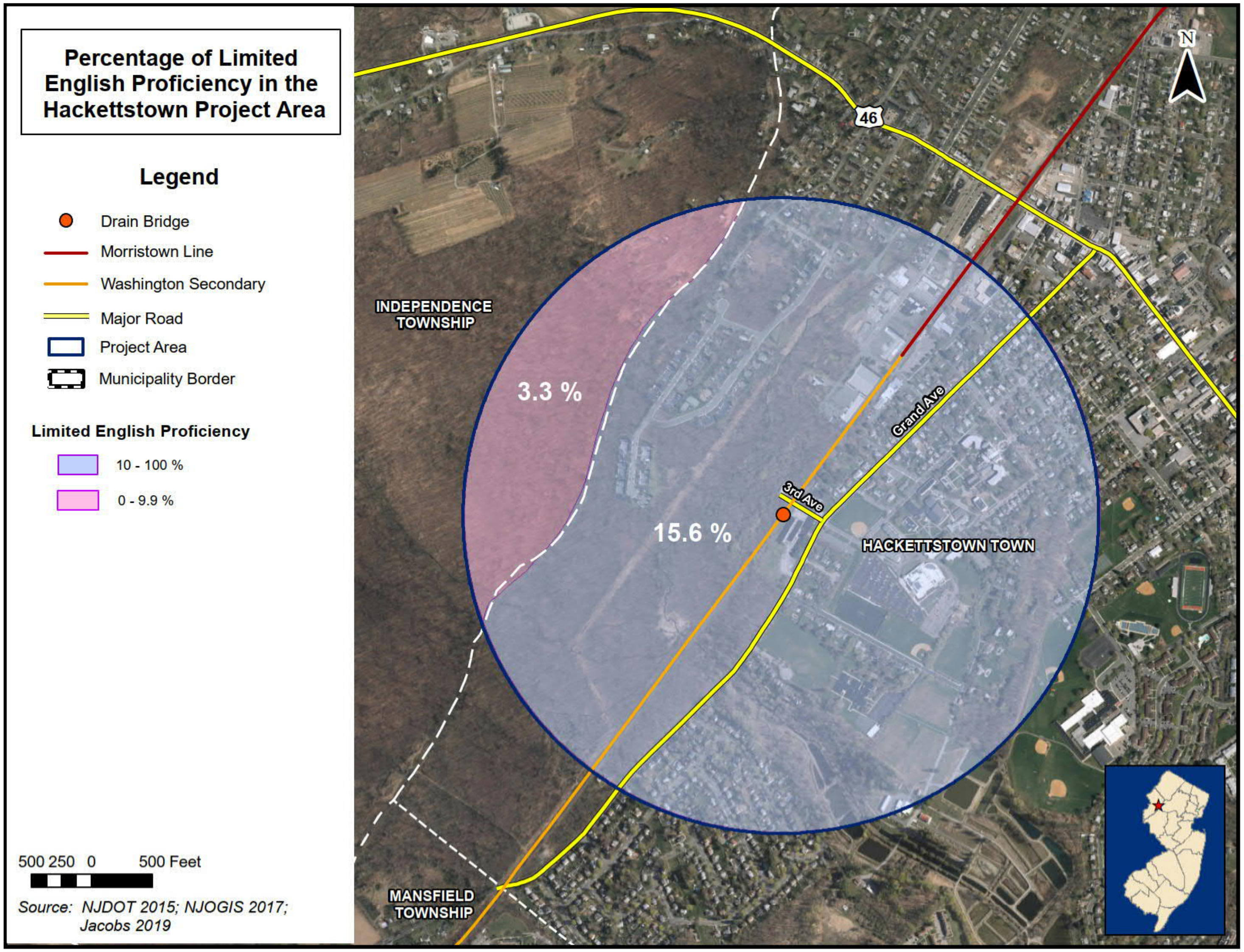
# Data Collection

- Bridge Inspection and Rating Reports
- Community Profile
- Environmental Constraints
- Historic and Cultural Resource Screening
- Utilities and Infrastructure
- Stormwater Drainage

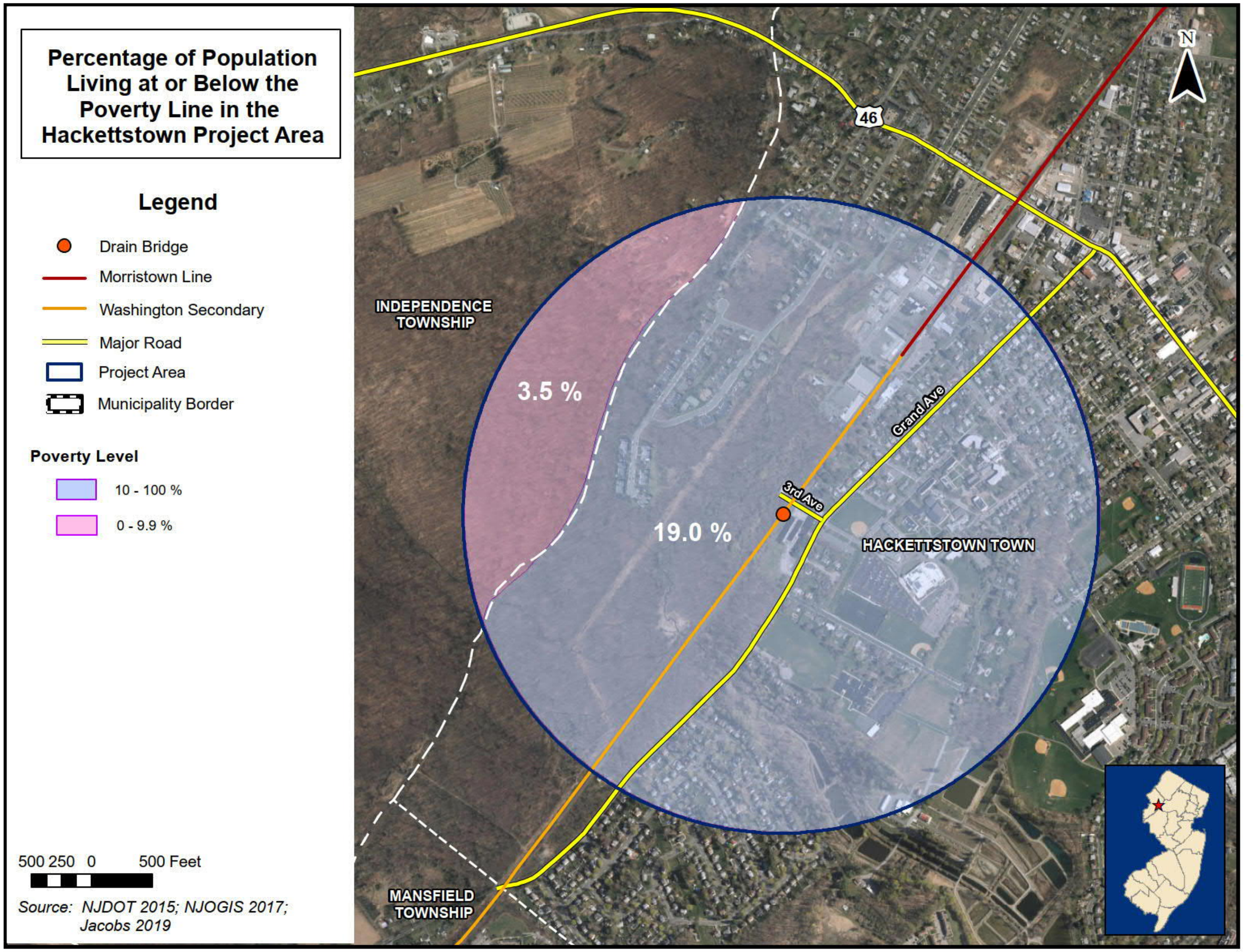
NJTPA

# Community Profile



Source: *NJDOT 2015; NJOGIS 2017; Jacobs 2019*

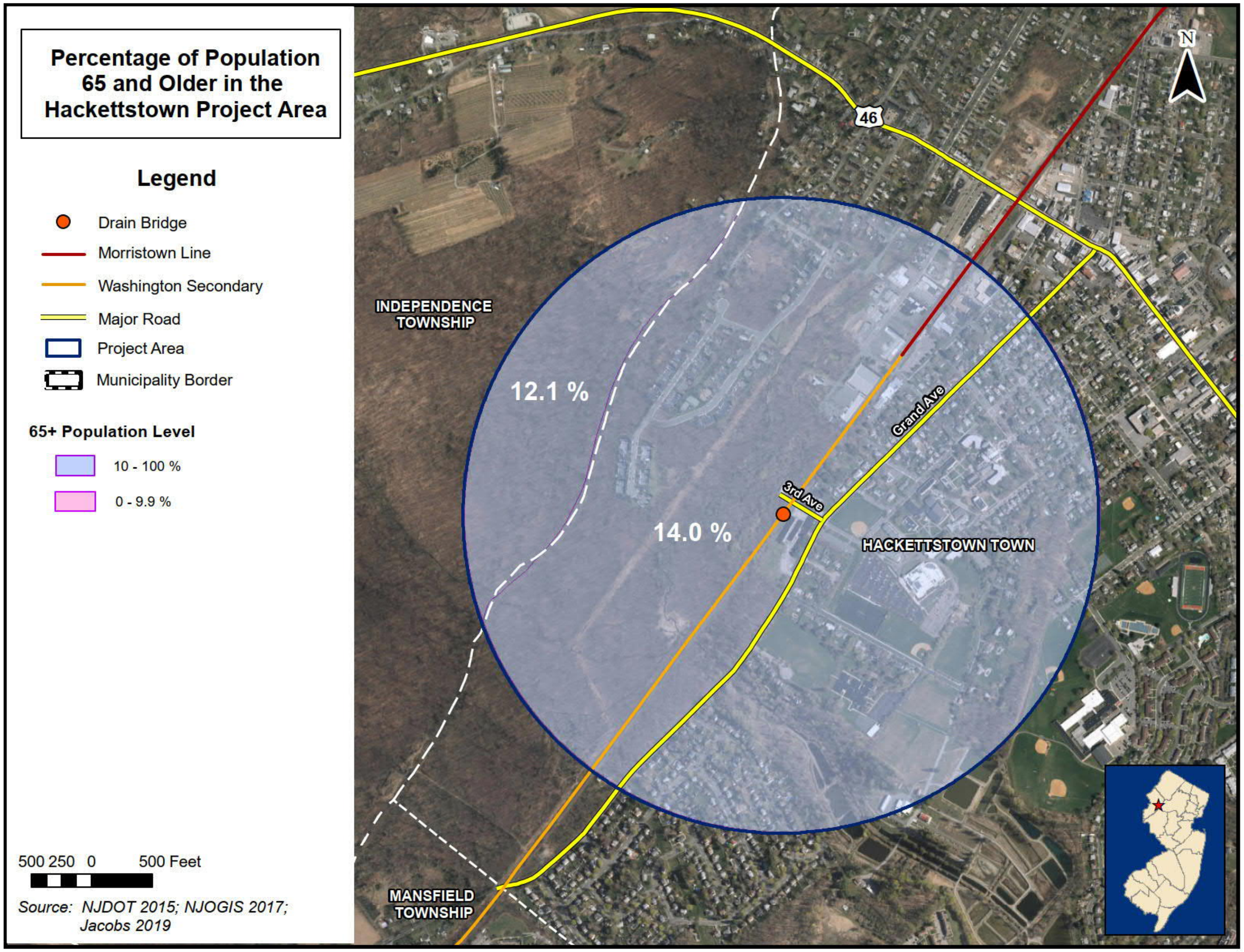
# Community Profile



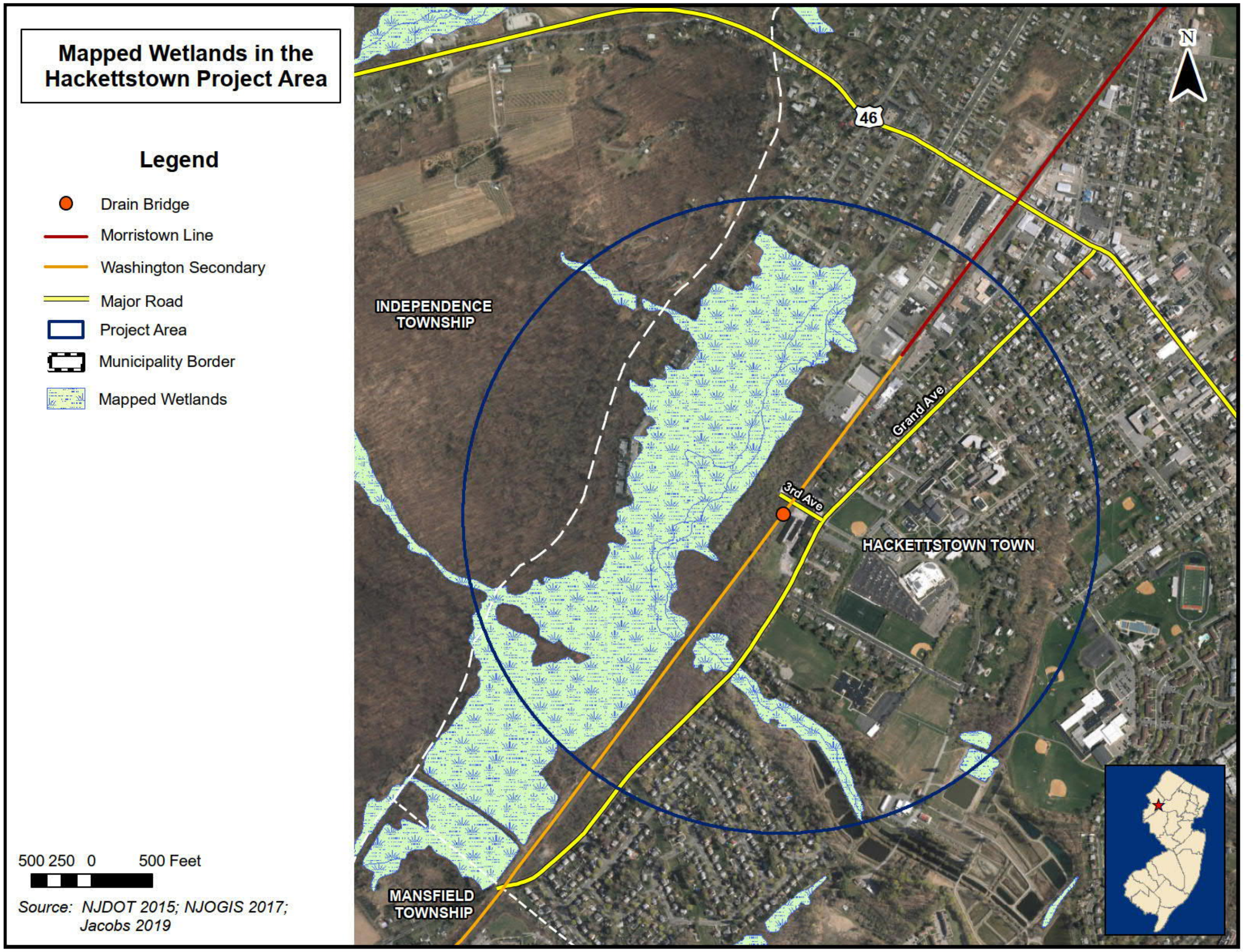
**Percentage of Population Living at or Below the Poverty Line in the Hackettstown Project Area**

*Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019*

# Community Profile

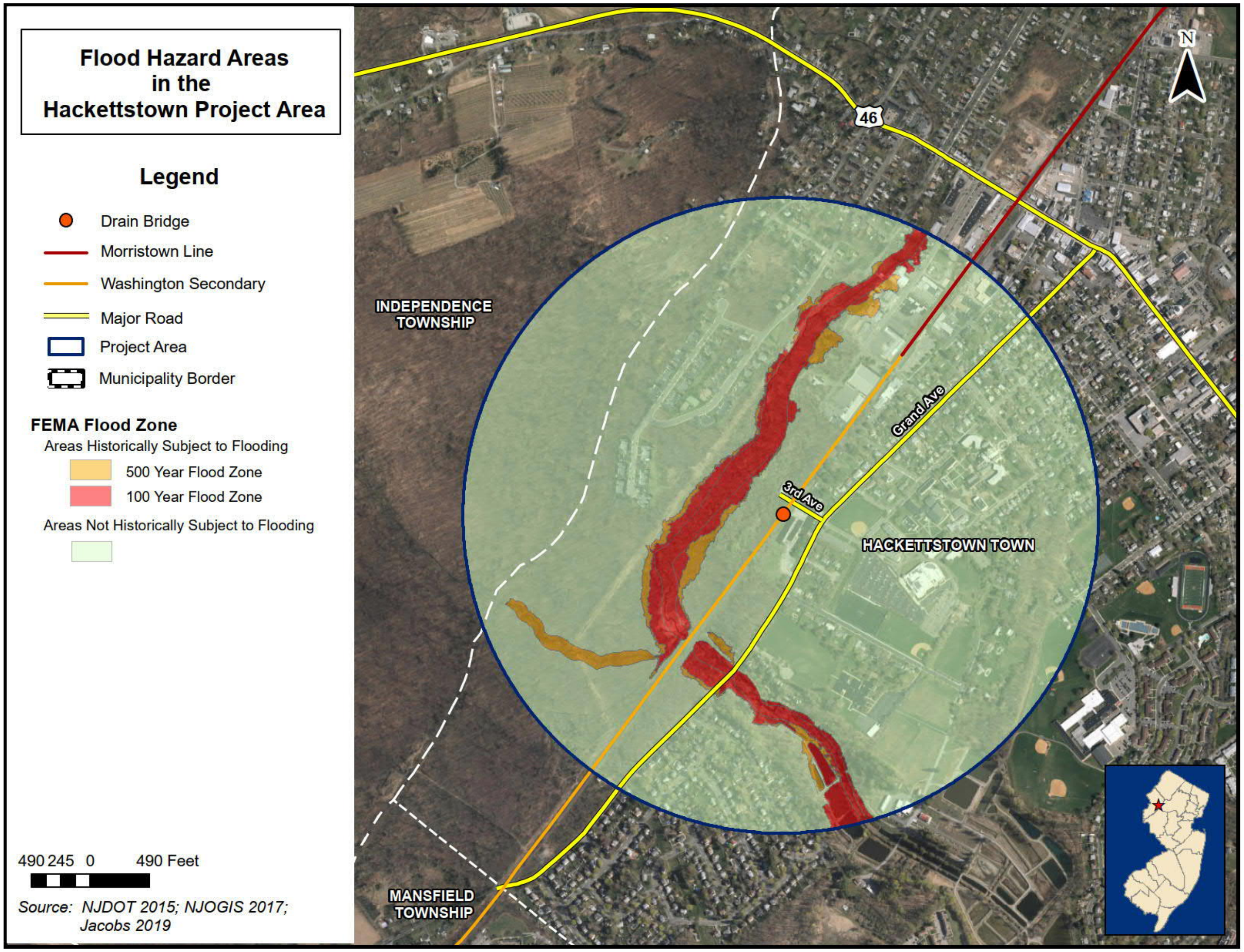


# Environmental Constraints



*Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019*

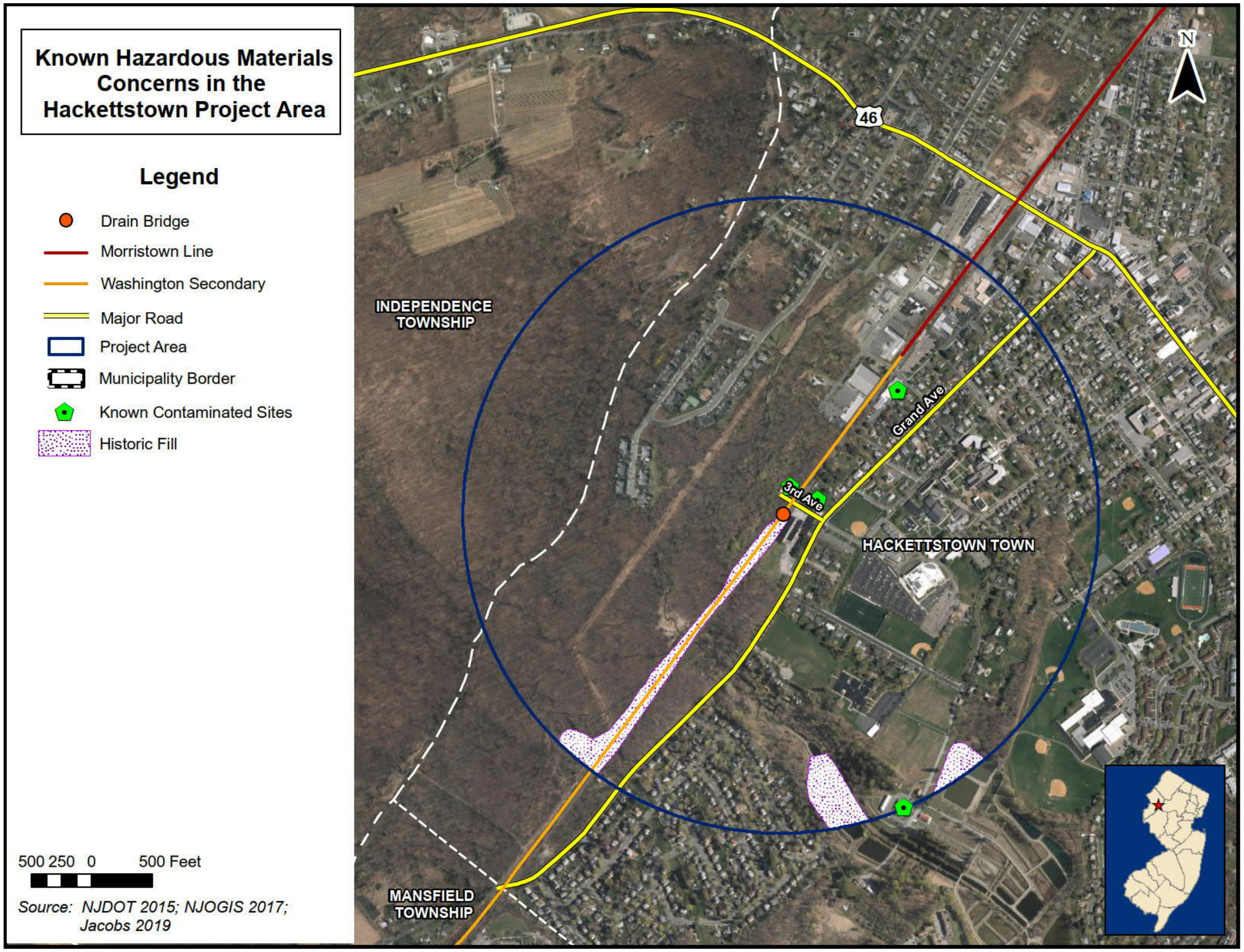
# Environmental Constraints



Flood Hazard Areas in the Hackettstown Project Area

Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

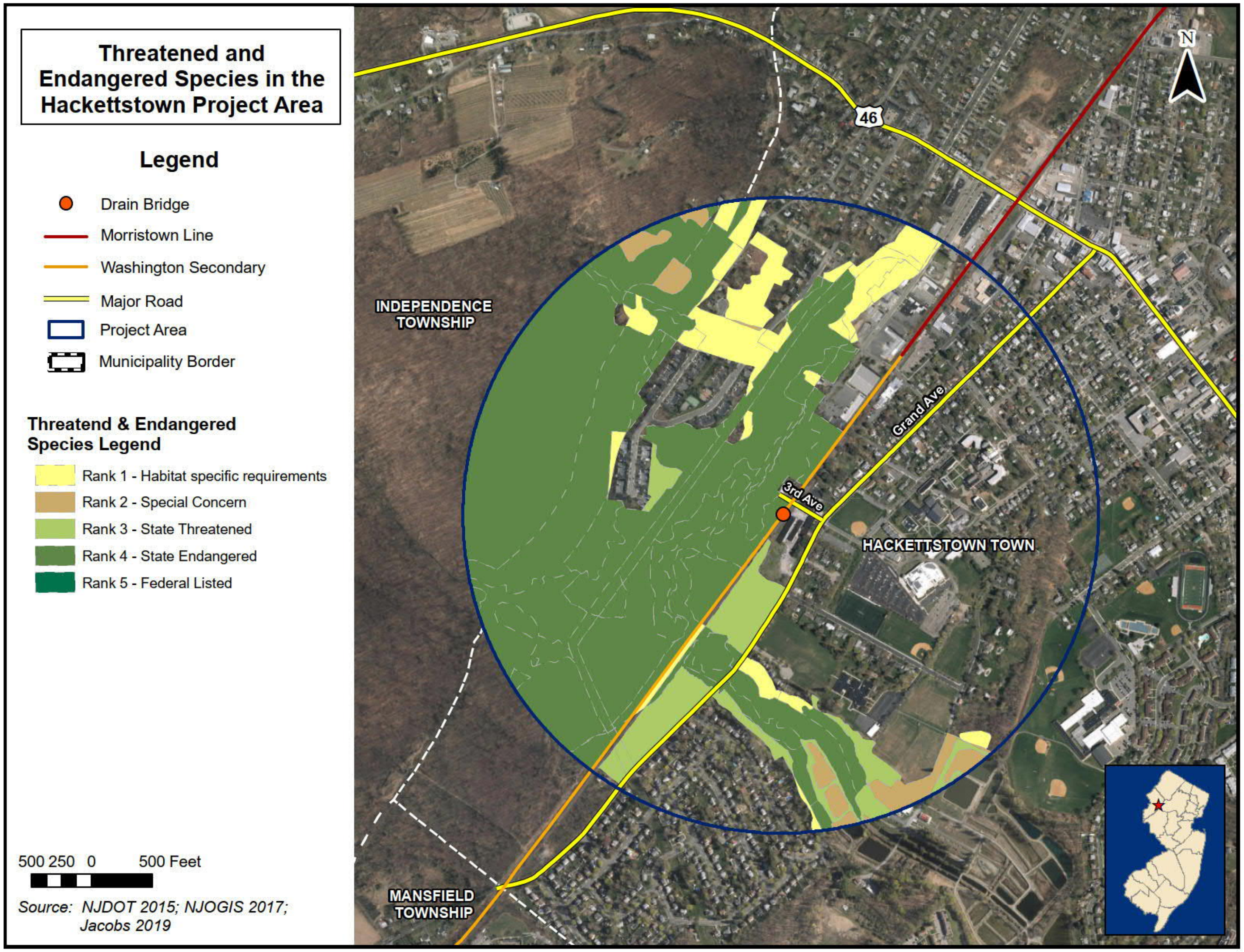
# Environmental Constraints



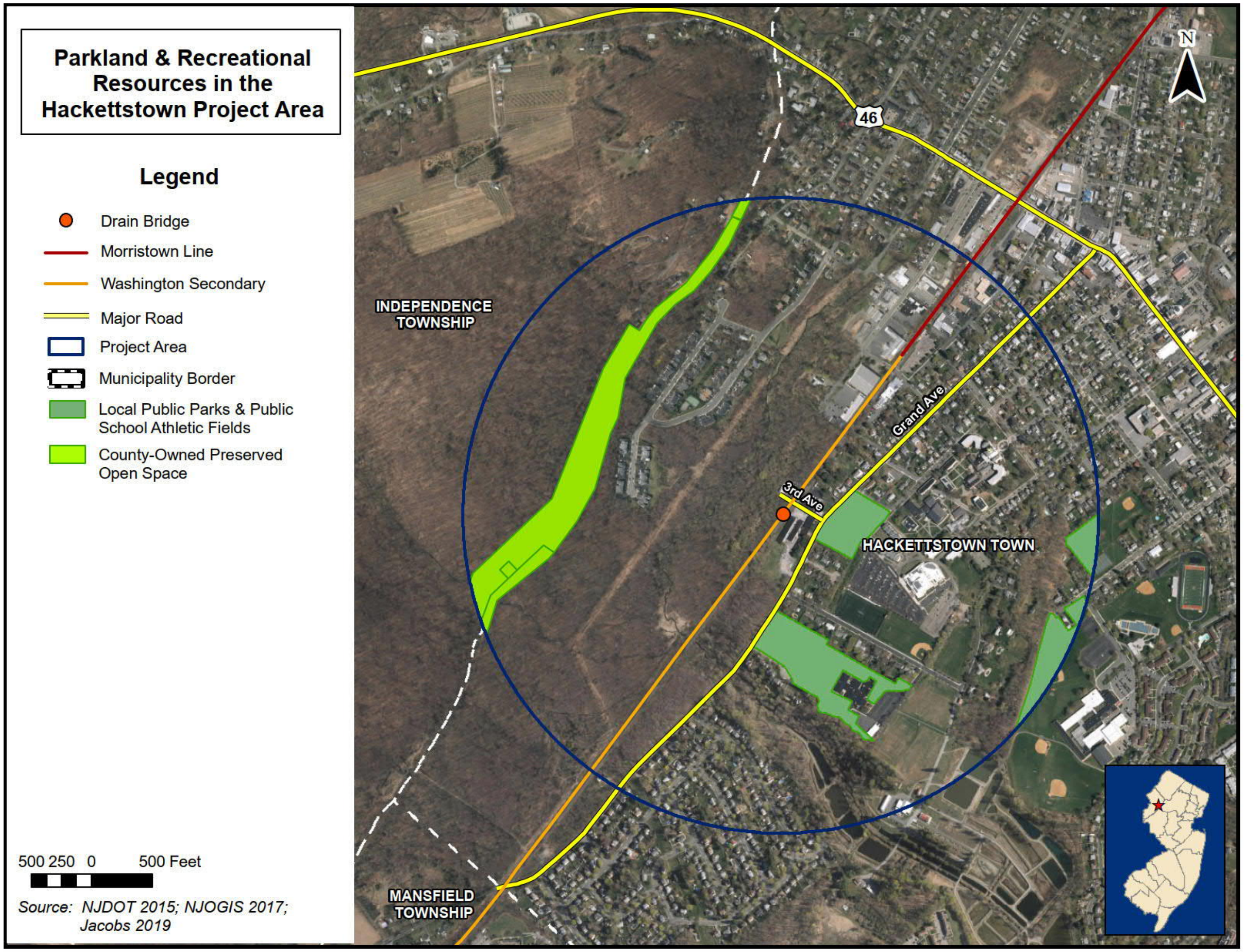
**Known Hazardous Materials Concerns in the Hackettstown Project Area**

Source: *NJDOT 2015; NJOGIS 2017; Jacobs 2019*

# Environmental Constraints



# Environmental Constraints



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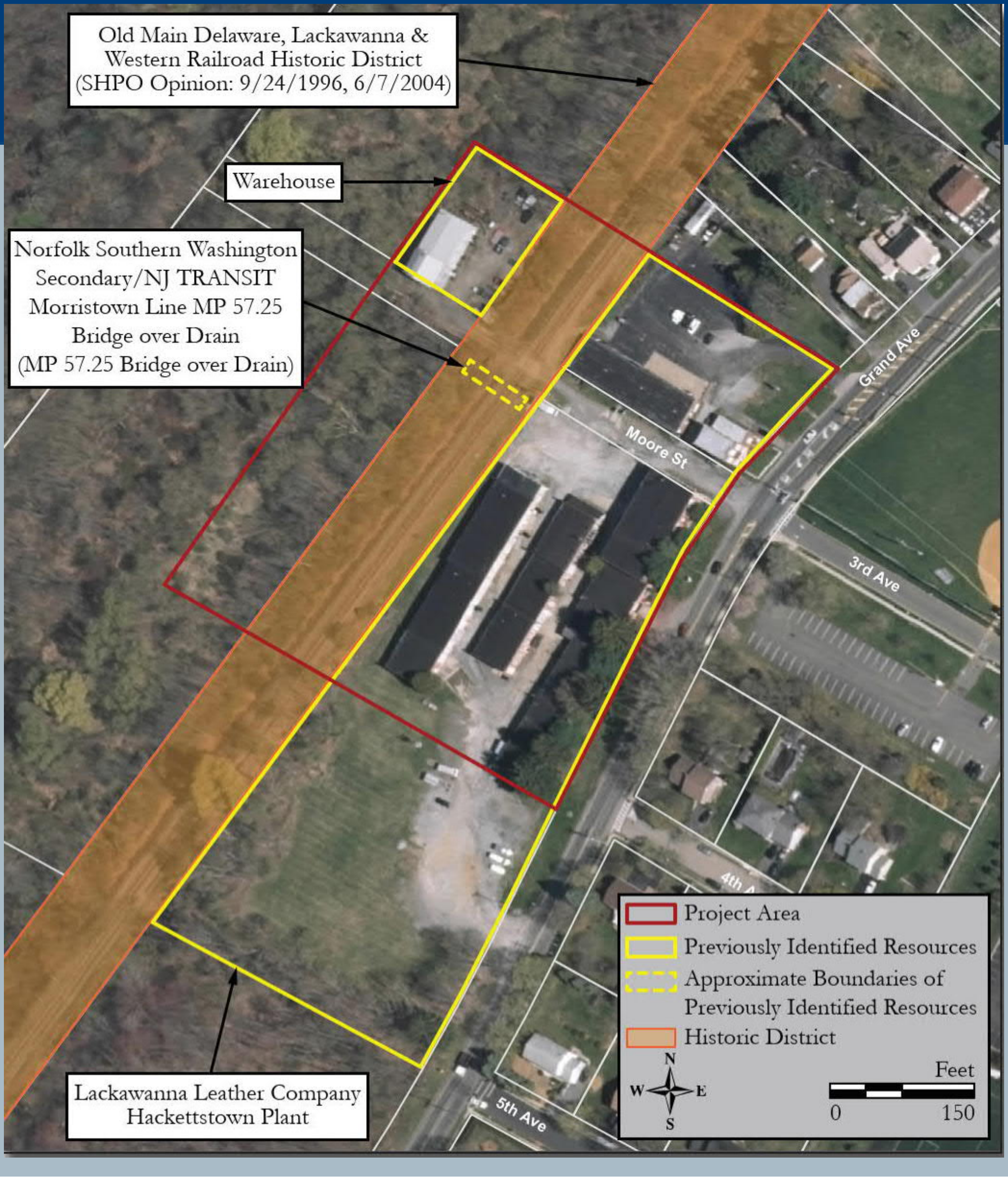
# Historic and Cultural Resources



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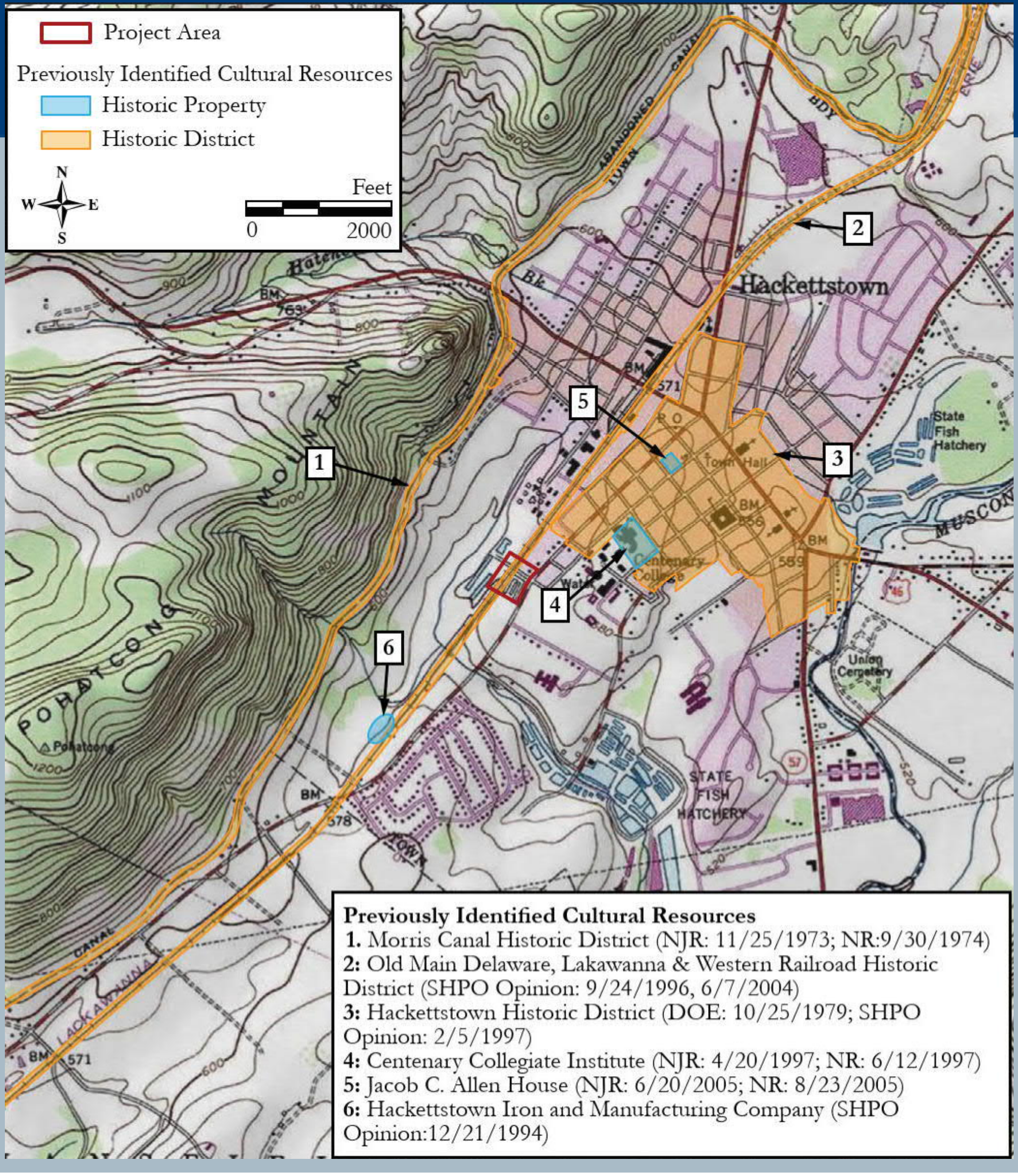
# Historic and Cultural Resources



**Previously Identified Cultural Resources**

**1:** Morris Canal Historic District (NJR: 11/25/1973; NR:9/30/1974)

**2:** Old Main Delaware, Lakawanna & Western Railroad Historic District (SHPO Opinion: 9/24/1996, 6/7/2004)

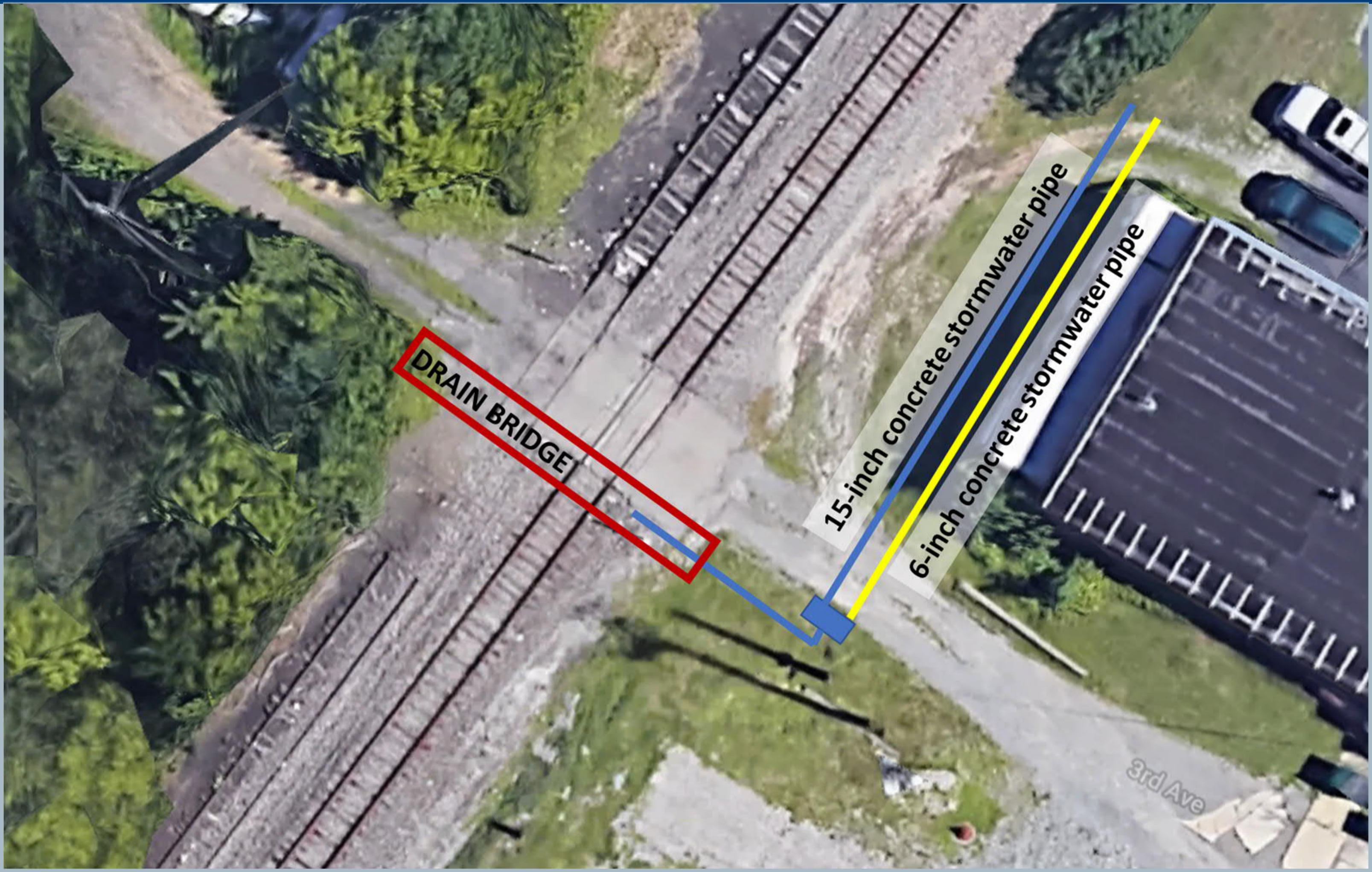
**3:** Hackettstown Historic District (DOE: 10/25/1979; SHPO Opinion: 2/5/1997)

**4:** Centenary Collegiate Institute (NJR: 4/20/1997; NR: 6/12/1997)

**5:** Jacob C. Allen House (NJR: 6/20/2005; NR: 8/23/2005)

**6:** Hackettstown Iron and Manufacturing Company (SHPO Opinion:12/21/1994)

# Stormwater Drainage



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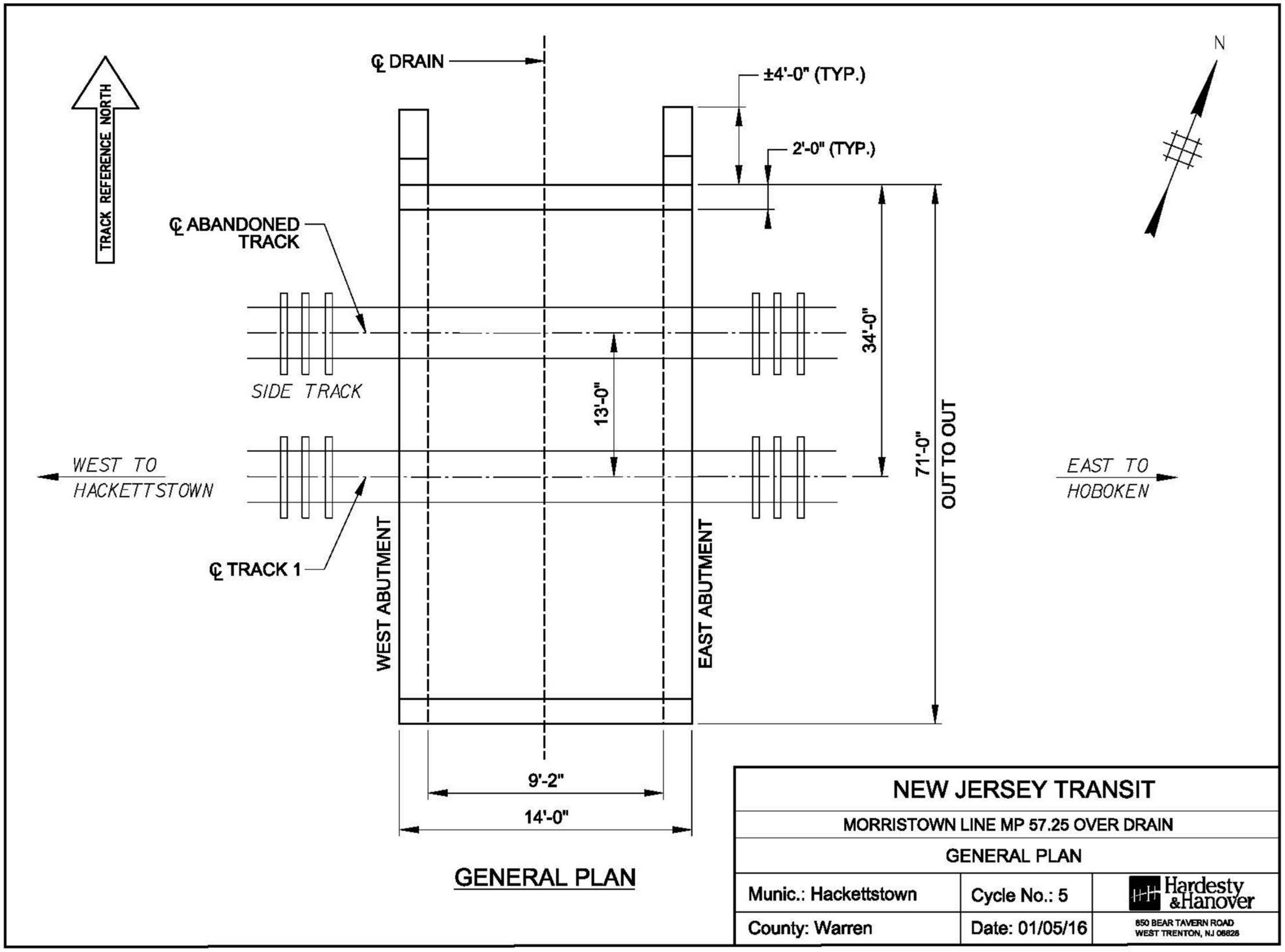
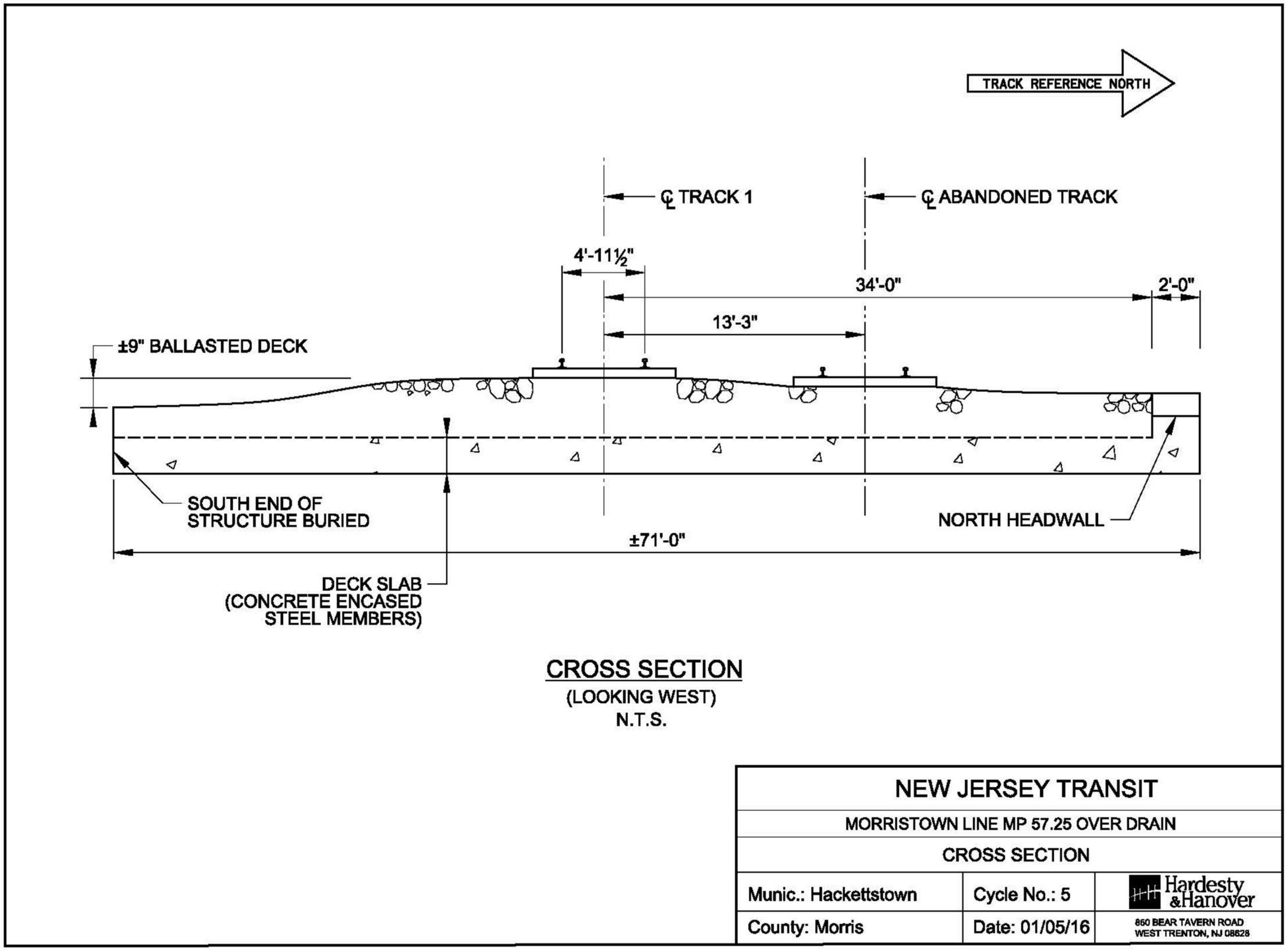
# Alternatives

Plan View of Bridge



# Alternatives

Cross Section Parallel to Bridge



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# Alternatives Evaluated

- Full Slab Replacement
- Partial Slab Replacement
- Full Slab Replacement w/Runaround Track
- Fill - Concrete Injection
- Replace with Pre-Fab Culvert
- Extend Culvert - Grout Fill
- Extend Culvert - Soil Fill
- Extend Pipe - Grout Fill
- Extend Pipe - Soil Fill

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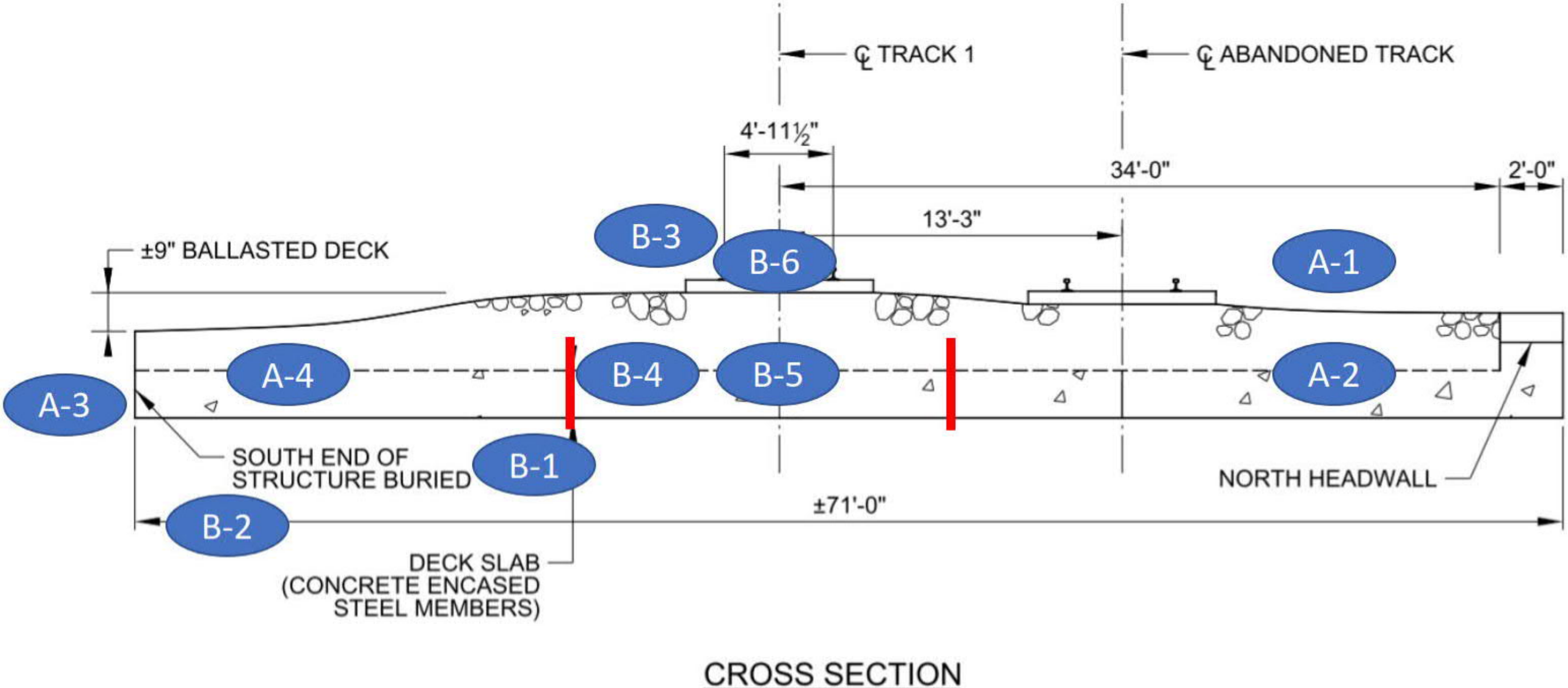
# Alternatives Scoring

| Criteria | Full Slab Replacement | Partial Slab Replacement | Full Slab Replacement w/Runaround Track | Fill - Concrete Injection | Replace with Pre-Fab Culvert | Extend Culvert - Grout Fill | Extend Pipe - Soil Fill | Extend Pipe - Grout Fill | Extend Pipe - Soil Fill |
|---|---|---|---|---|---|---|---|---|---|
| Freight Rail Operations Impacts / Benefits | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Passenger Rail Operations Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adjacent and Proximate Land Use Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic and Cultural Resources Impacts / Benefits | 0 | -1 | 0 | -5 | -5 | -3 | -5 | -3 | -5 |
| Community Profile & Environmental Justice/Title VI Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wetlands Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Floodplains & Aquifers Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Threatened & Endangered Species Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stormwater and Drainage Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hazardous Materials Impacts / Benefits | -1 | -1 | -1 | -1 | -3 | -1 | -1 | -1 | -1 |
| Air Quality & Noise Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Community Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Safety Impacts / Benefits | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Utility Impacts / Relocation Requirements | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Track Length (LF) | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 |
| SUMMARY SCORE | 3 | 2 | 3 | -2 | -4 | 0 | -2 | 0 | -2 |

# Preliminary Preferred Alternative (PPA)



CROSS SECTION
(LOOKING WEST)
N.T.S.

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# Preliminary Preferred Alternative (PPA)

A. Maintain Existing Track in Service
   1. Remove side track and ballast to allow clearing of the slab
   2. Remove northern concrete and rail slab
   3. Excavate south end of structure to determine existing conditions (drainage pipe below slab)
   4. Remove southern concrete and rail slab and earth covering drainage pipe

# Preliminary Preferred Alternative (PPA)

B. Take Track Out of Service ≈ 4 Days

1. Repoint abutments and repair headwall
2. Extend 15-inch drainage pipe into culvert
3. Remove active track, ballast and slab
4. Level top of abutments with grout
5. Set two (2) new precast 8-ft by 14-ft slabs
6. Place new ballast and new track panels.
7. Reopen track for service
8. Install remaining slabs

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# Next Steps

- Value Engineering (VE) Workshop
- Program Compliance Review No. 2
- Public Information Center No. 2
- Draft Concept Development Report
- Interagency Review Meeting
- Finalize Concept Development Report

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# Thank You/Questions?

*Defining the Vision. Shaping the Future.*

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NORTH JERSEY
TRANSPORTATION
PLANNING AUTHORITY

Jakub Rowinski
jrowinski@njtpa.org
(973) 639-8443

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# Hackettstown Weight Restriction Elimination Project

## Public Information Center

September 10, 2019

Jakub Rowinski, NJTPA Project Manager

Scott Parker, Jacobs Engineering Project Manager

NJTPA

NJTPA Freight Concept Development Program

# Project Background

- Need Identified in:
    - Morris County Freight Infrastructure and Land Use Study (2011)
    - NJTPA Morris / Warren County Rail Corridor Study (2013)

Morris County Freight Infrastructure & Land Use Analysis

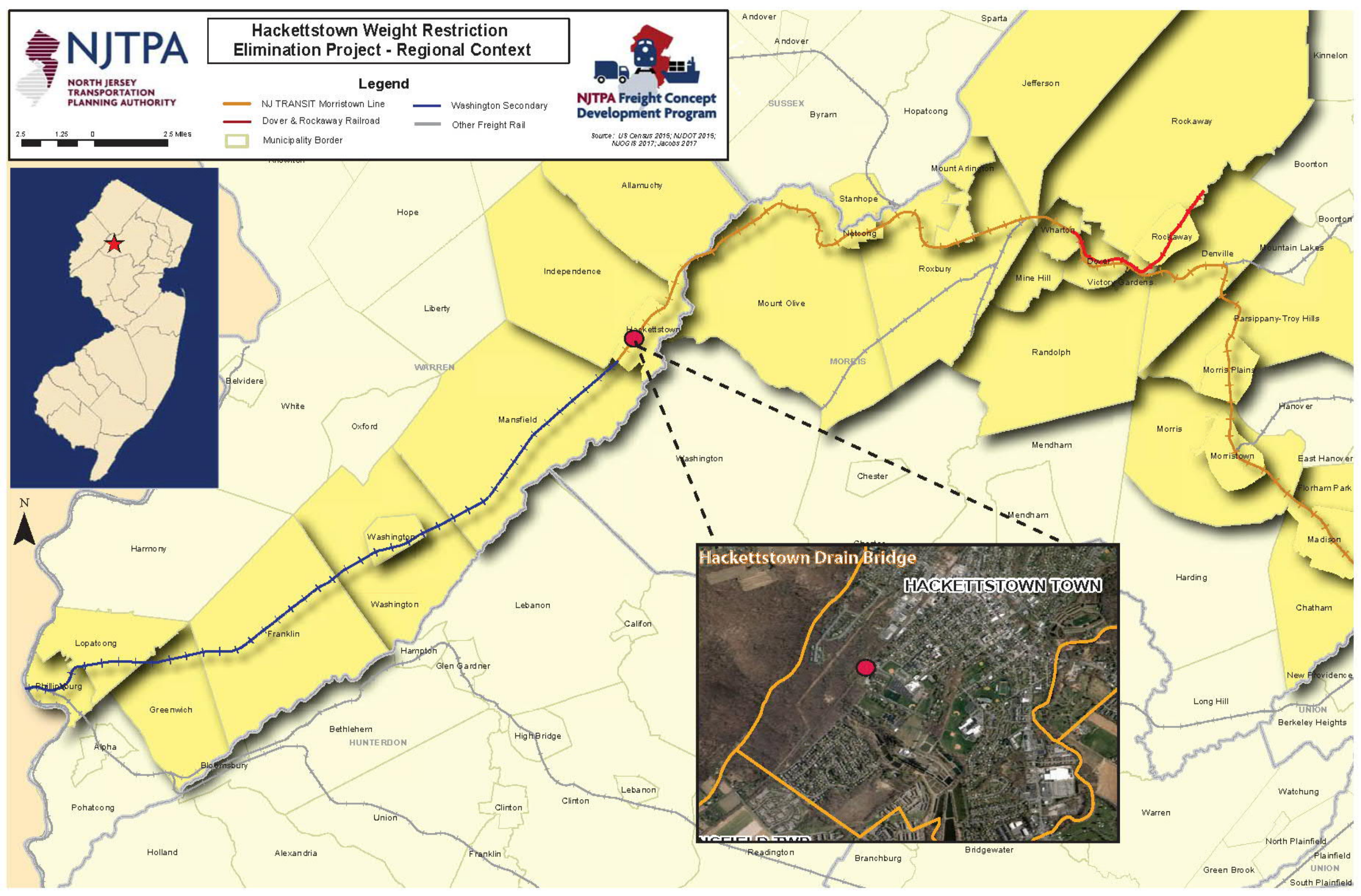
FINAL REPORT

July 2011

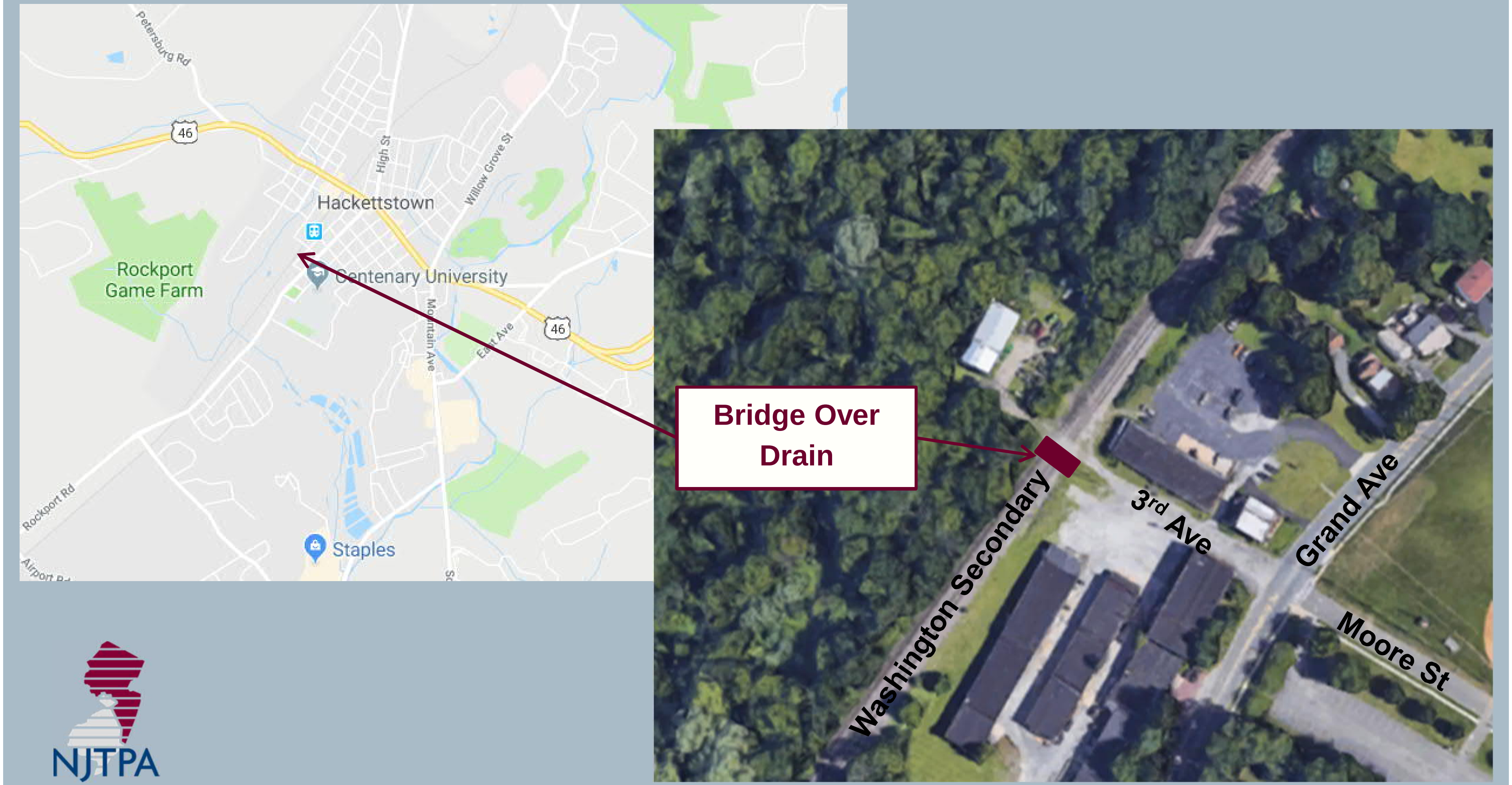
Morris/Warren County Rail Corridor Study

July 2013

# Regional Context



# Bridge Location



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# Existing Condition

View Beneath
Bridge - South
End of Structure
Looking South

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# Structural Rating

- Bridge restricted to 263,000 lb. rail cars
- Current maximum rating E55
- Current normal rating E44
- Need normal rating of E55 to accommodate industry standard 286,000 lb. rail cars

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NJTPA Freight Concept Development Program

# Draft Project Purpose and Need Statement

*Provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement, particularly the ability to accommodate the movement of 286,000 pound (286K) railcars over the Washington Secondary/Morristown Line in Hackettstown.*

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**NJTPA Freight Concept Development Program**

# Potential Categories of Options

- Replace the bridge slab with new slab
- Replace the bridge slab and abutments with box culvert
- Fill in – Convert to at-grade rail line (with or without extension of pipes and culvert)

# Get Involved

Stakeholder involvement is critical

- Help develop a comprehensive Purpose and Need Statement
- Consider local issues in the development and screening of improvement concepts
- Identify the preferred alternative

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NJTPA Freight Concept Development Program

# Stay Informed

- Future public meetings
- Website: www.hackettstownrailstudy.org

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NJTPA Freight Concept Development Program

# What's Next

- Finalize the Purpose & Need Statement
- Develop and Evaluate Alternatives
- Public Information Center
- Select Preliminary Preferred Alternative
- Complete Concept Development Report

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**NJTPA Freight Concept Development Program**

# Thank You/Questions?

Jakub Rowinski – NJTPA
jrowinski@njtpa.org

Scott Parker – Jacobs Engineering
scott.parker@Jacobs.com

Website –
www.hackettstownrailstudy.org

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NJTPA Freight Concept Development Program

# Hackettstown Weight Restriction Elimination Project

## Public Information Center

## February 26, 2020

Jakub Rowinski, NJTPA Project Manager

Scott Parker, Jacobs Engineering Project Manager

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# Project Background

- Need Identified in:
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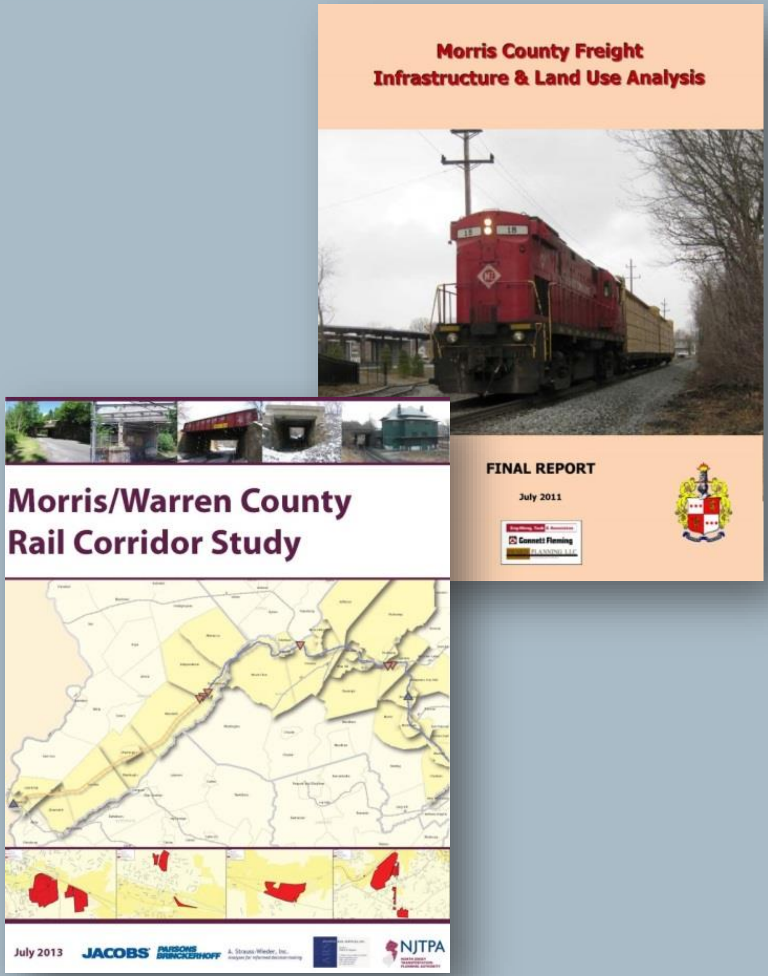
    - NJTPA Morris / Warren County Rail Corridor Study (2013)



Morris County Freight Infrastructure & Land Use Analysis

FINAL REPORT

July 2011

Morris/Warren County Rail Corridor Study

July 2013

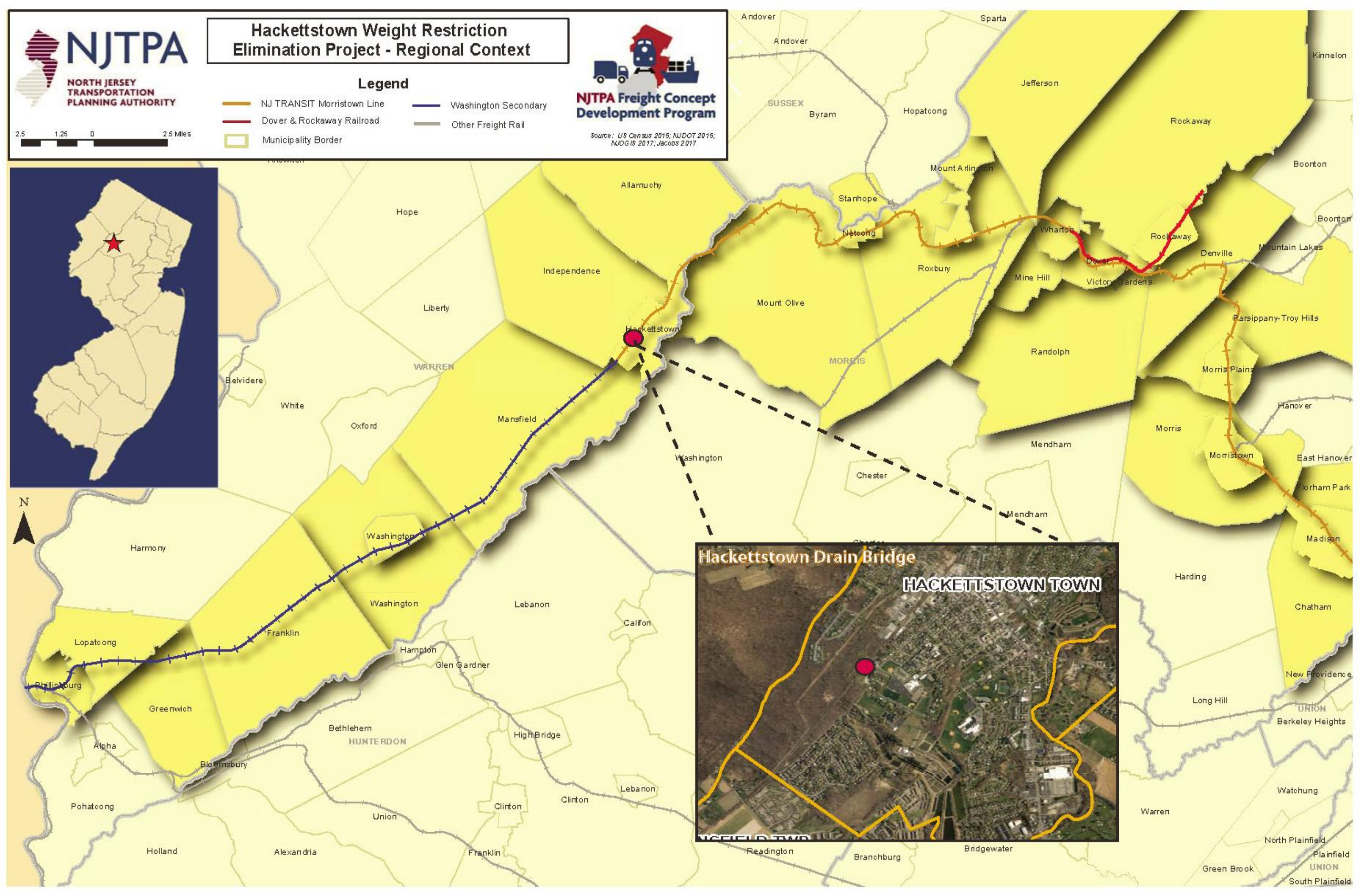
JACOBS

PARSONS BRINCKERHOFF

A. Strauss-Wieder, Inc.

NJTPA

# Regional Context



# Bridge Location

**Bridge Over Drain**

NJTPA

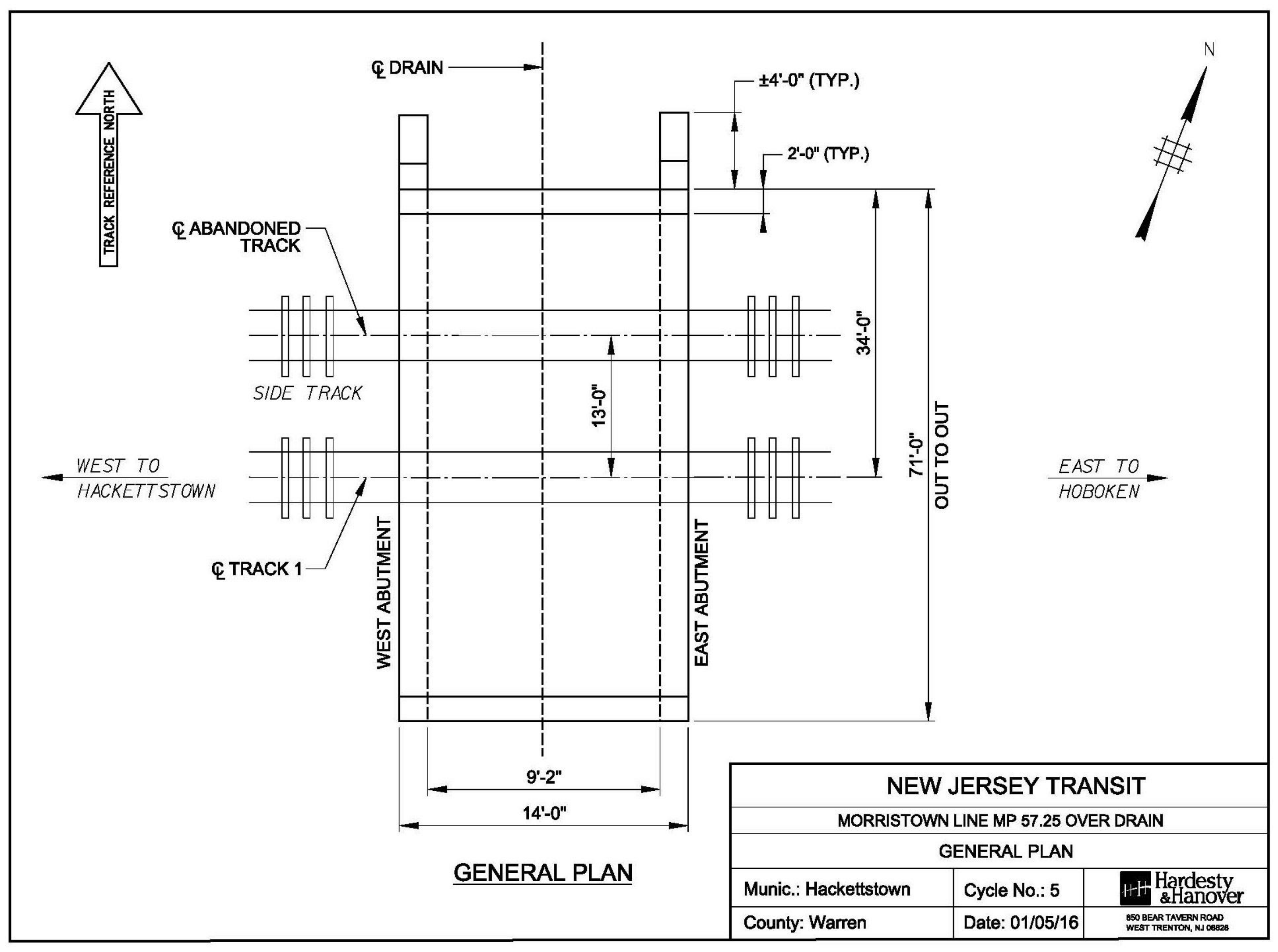
# Existing Condition

View Beneath
Bridge - South
End of Structure
Looking South

NJTPA

# Existing Condition

Plan View of Bridge



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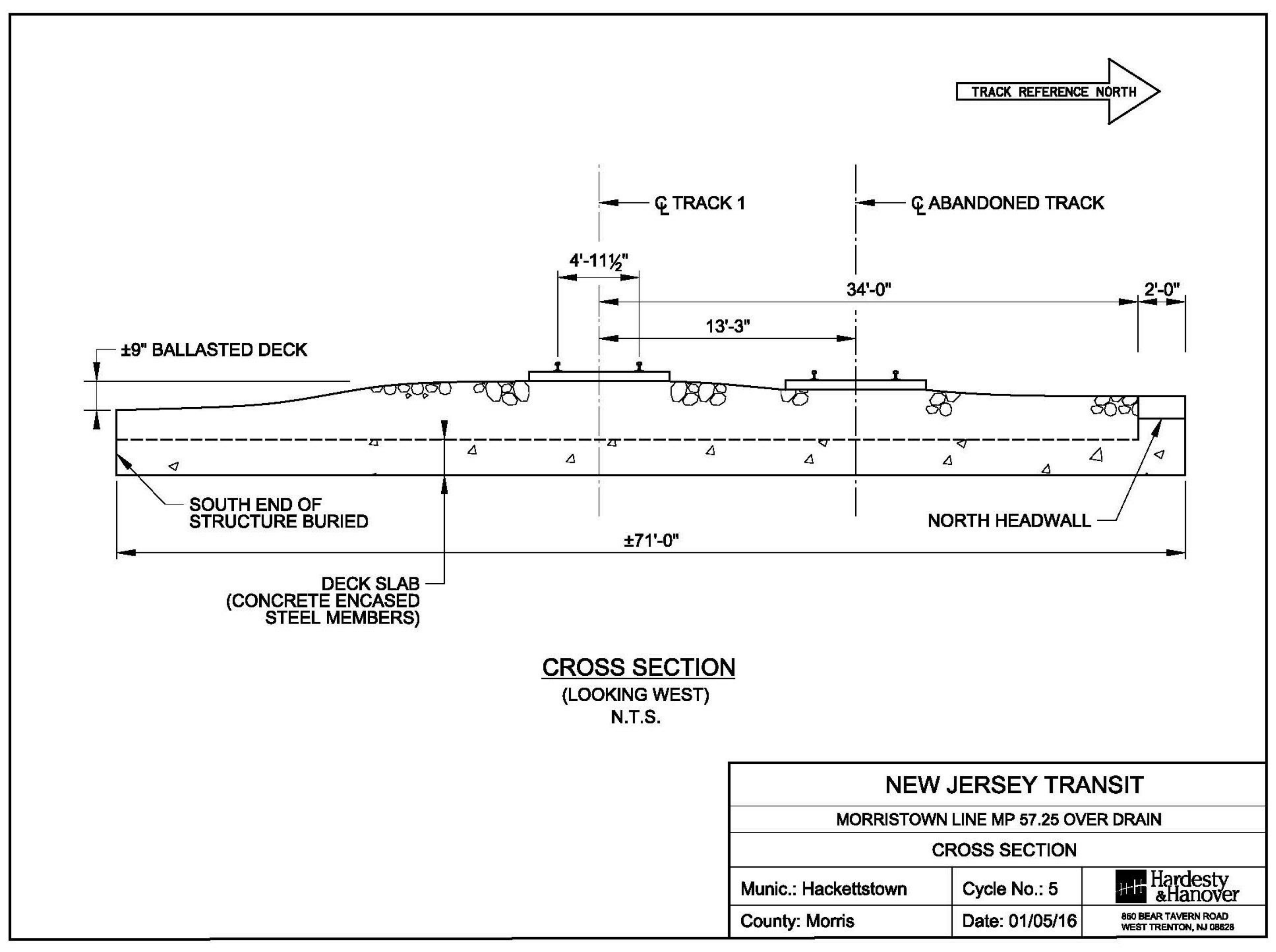
# Existing Condition

Cross Section Parallel to Bridge



CROSS SECTION
(LOOKING WEST)
N.T.S.

NEW JERSEY TRANSIT
MORRISTOWN LINE MP 57.25 OVER DRAIN
CROSS SECTION

| | | |
|---|---|---|
| Munic.: Hackettstown | Cycle No.: 5 | Hardesty & Hanover |
| County: Morris | Date: 01/05/16 | 860 BEAR TAVERN ROAD<br>WEST TRENTON, NJ 08628 |

NJTPA

# Structural Rating

- Bridge restricted to 263,000 lb. rail cars
- Current maximum rating E55
- Current normal rating E44
- Need normal rating of E55 to accommodate industry standard 286,000 lb. rail cars

NJTPA

# Project Purpose and Need Statement

*Provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement, particularly the ability to accommodate the movement of 286,000 pound (286K) railcars over the Washington Secondary/Morristown Line in Hackettstown.*

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# Key Constraints

- Wetlands
- Flood Hazard Areas
- Hazardous Materials
- Threatened and Endangered Species
- **Utilities**
- **Historic / Cultural Resources**

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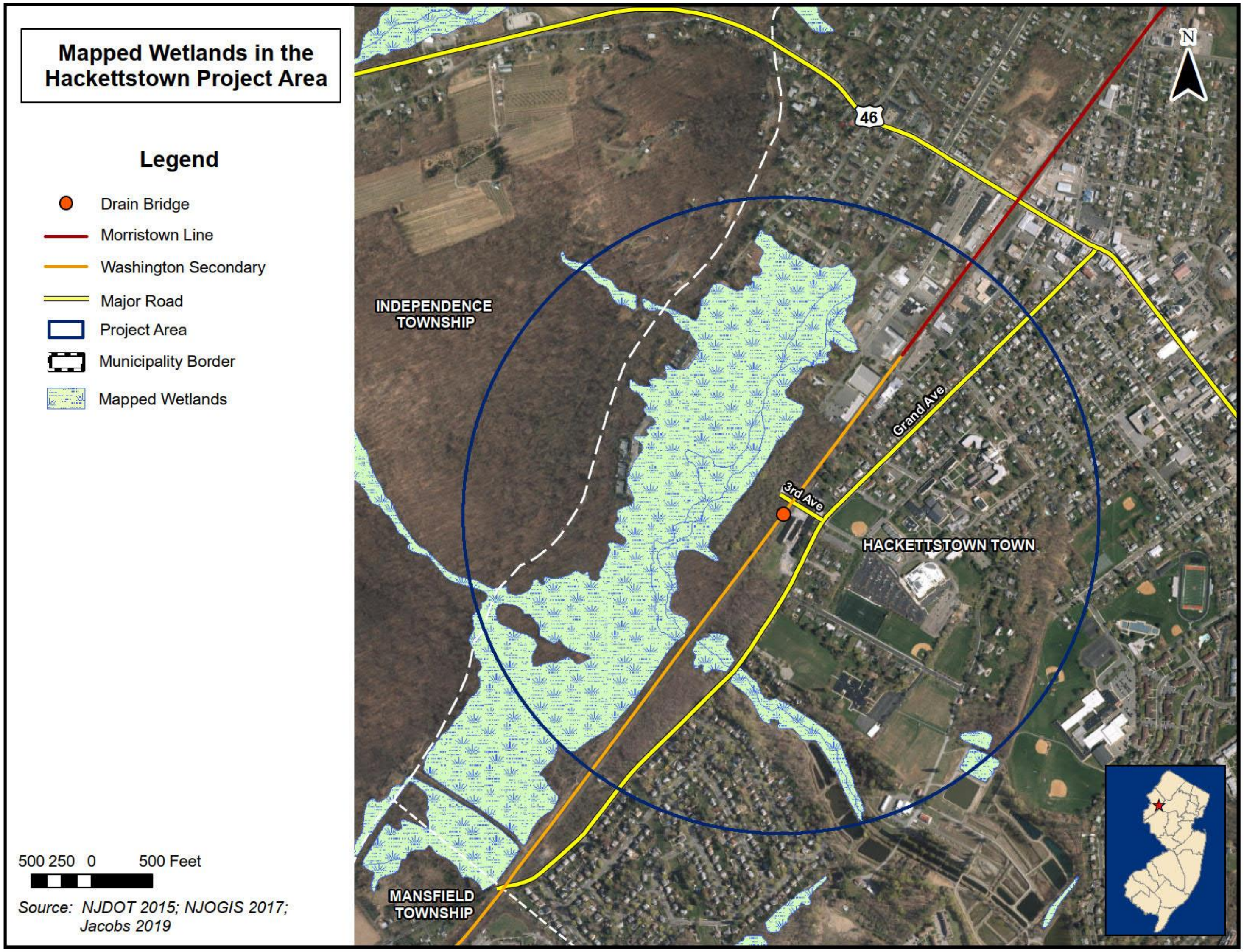
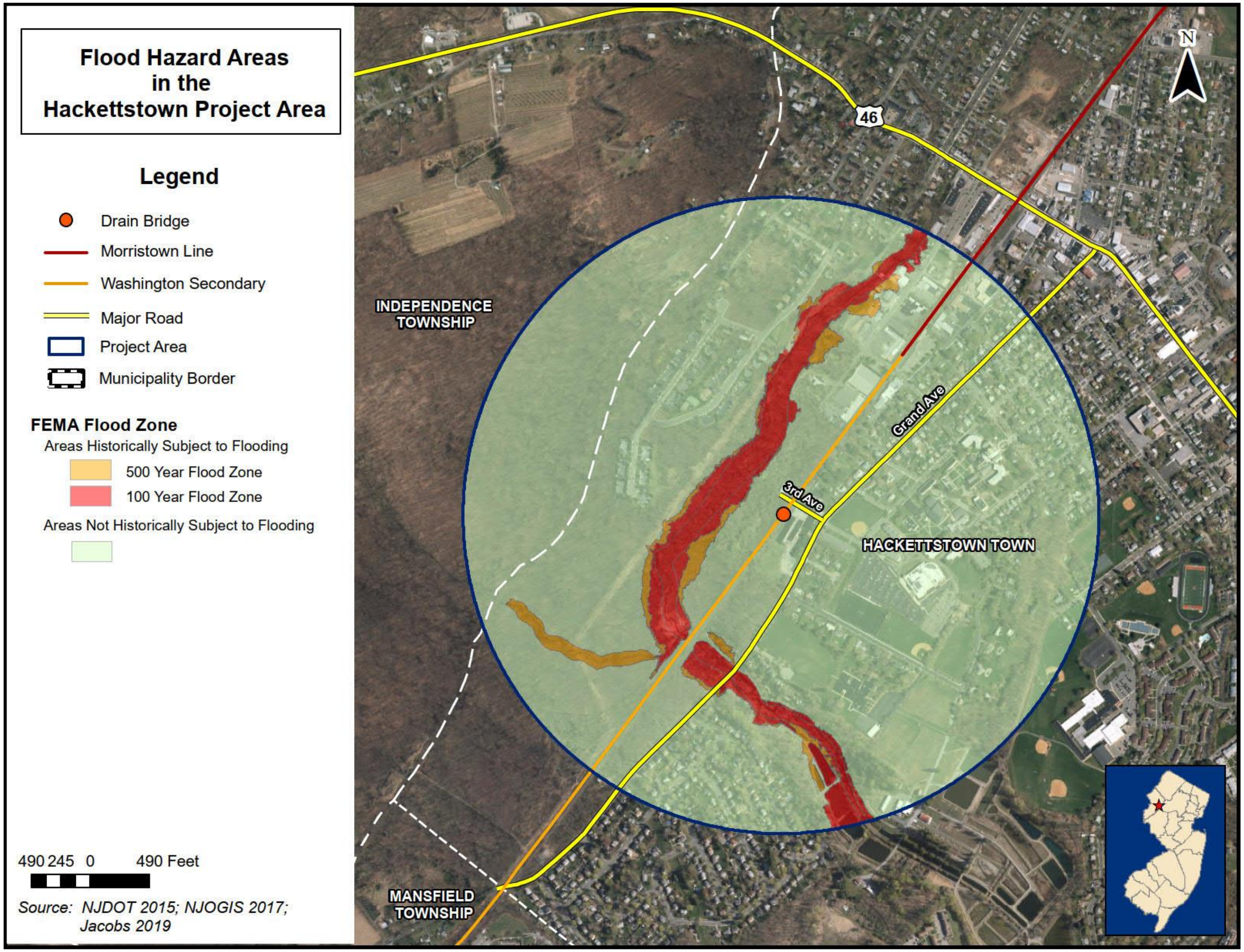
# Environmental Constraints



Mapped Wetlands in the Hackettstown Project Area

*Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019*

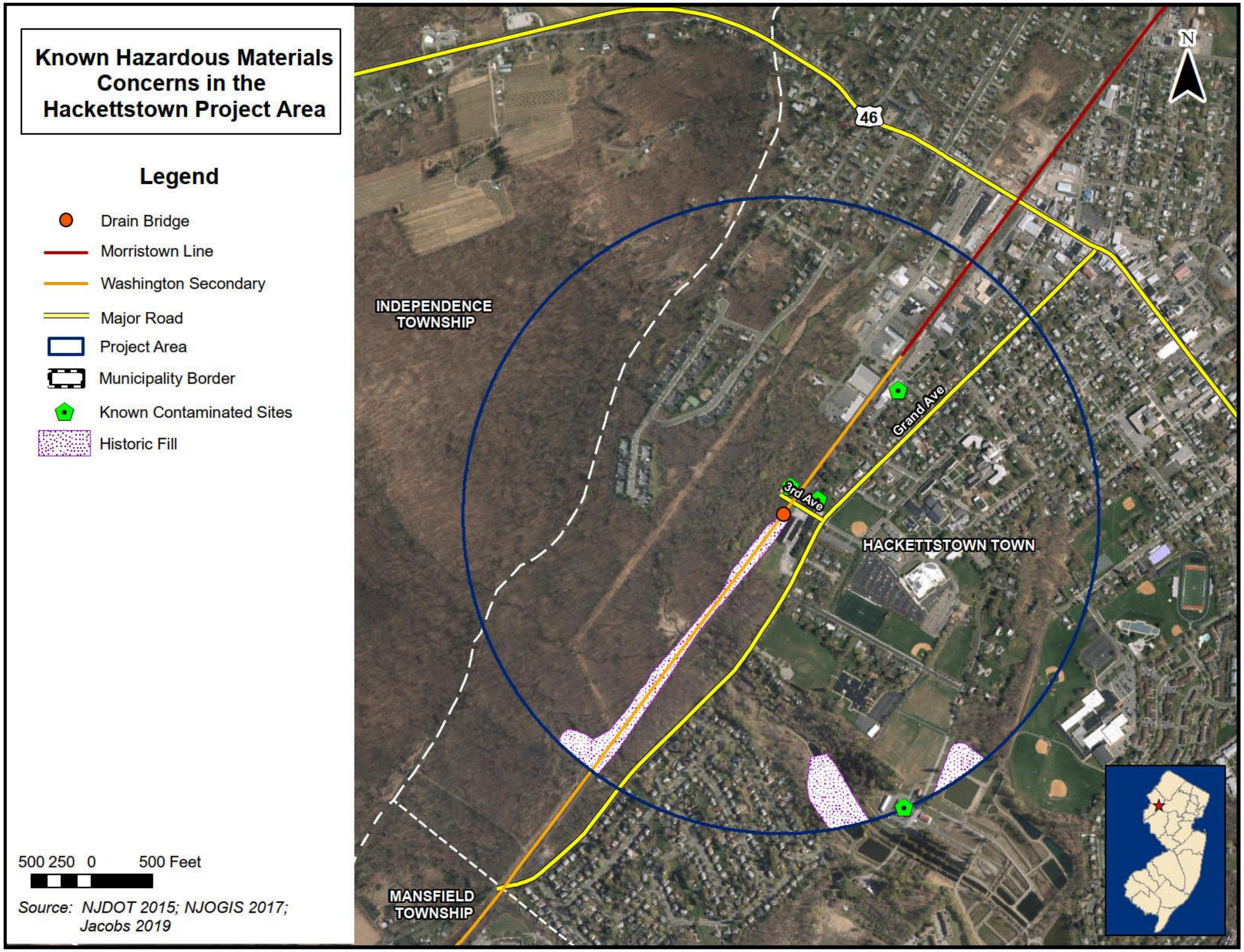
# Environmental Constraints



**Flood Hazard Areas in the Hackettstown Project Area**

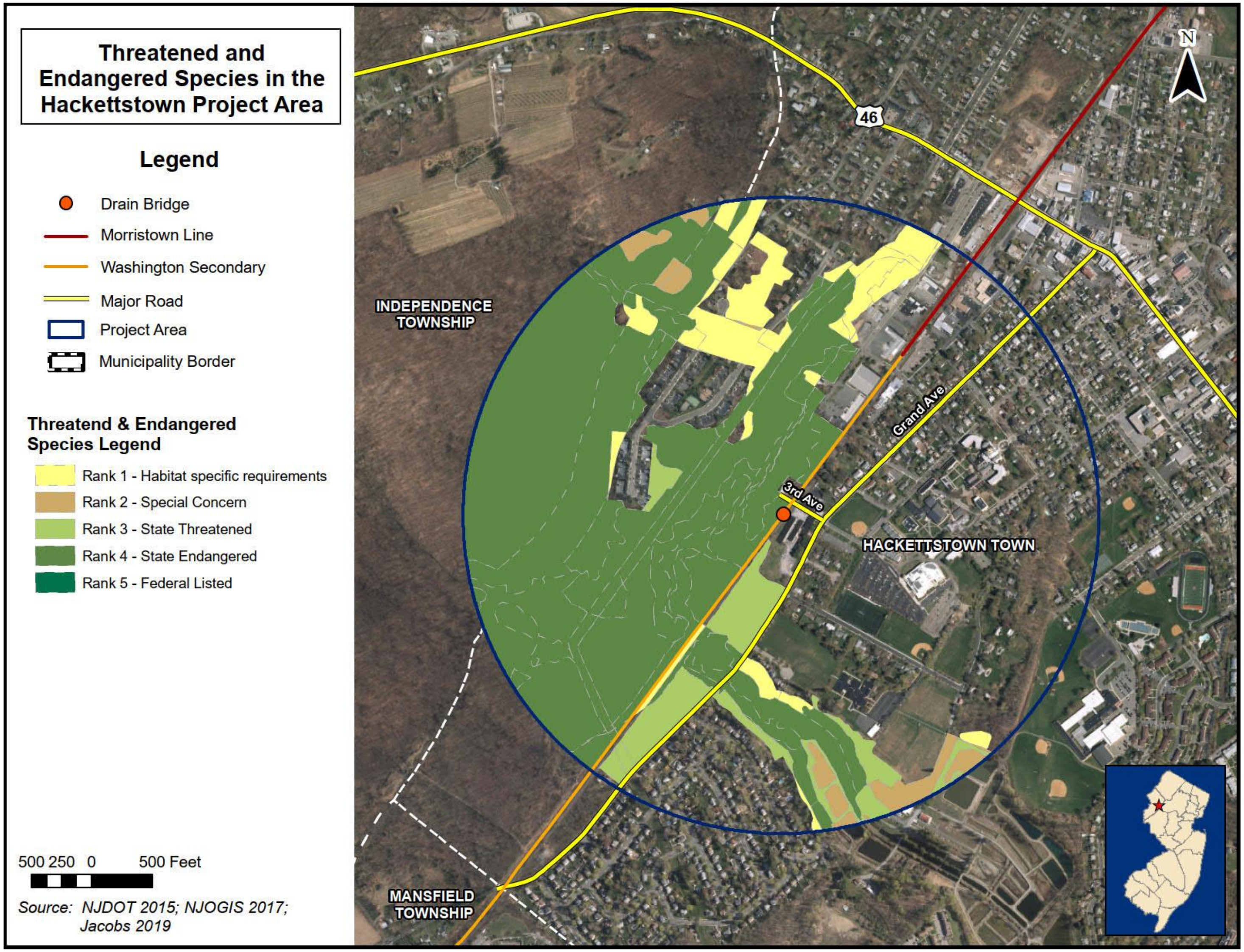
*Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019*

# Environmental Constraints



Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019

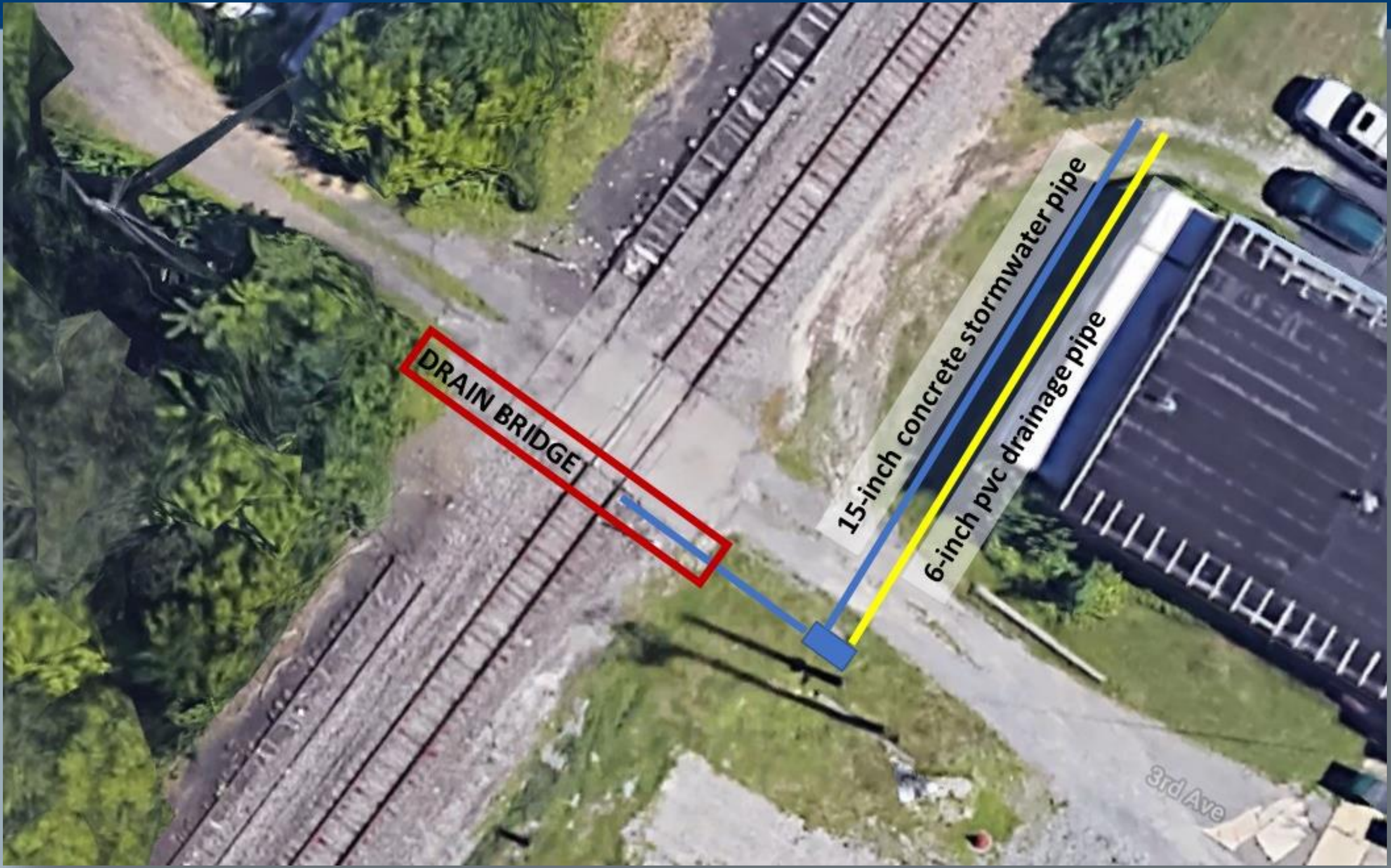
# Environmental Constraints



Threatened and Endangered Species in the Hackettstown Project Area

*Source: NJDOT 2015; NJOGIS 2017; Jacobs 2019*

# Utilities - Stormwater Drainage



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# Historic and Cultural Resources

# Alternatives Evaluated

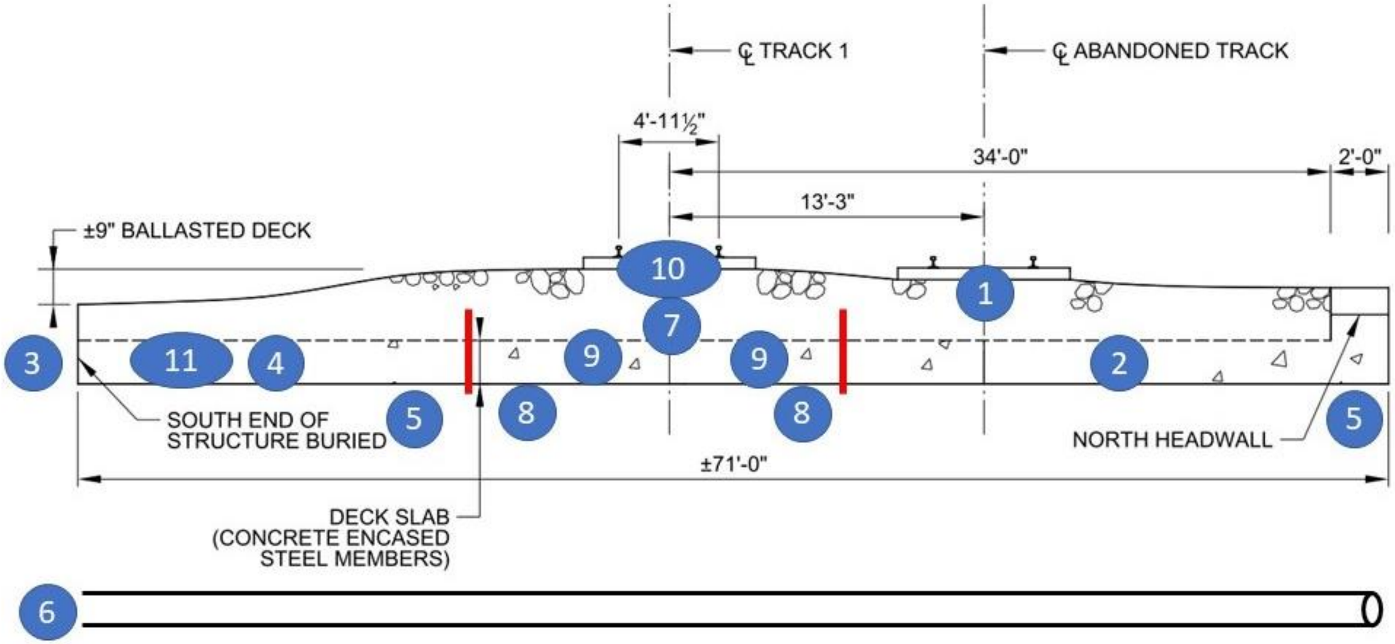
- Full Slab Replacement
- Partial Slab Replacement
- Full Slab Replacement w/Runaround Track
- Fill - Concrete Injection
- Replace with Pre-Fab Culvert
- Extend Culvert - Grout Fill
- Extend Culvert - Soil Fill
- Extend Pipe - Grout Fill
- Extend Pipe - Soil Fill

NJTPA

# Alternatives Scoring

| Criteria | Full Slab Replacement | Partial Slab Replacement | Full Slab Replacement w/Runaround Track | Fill - Concrete Injection | Replace with Pre-Fab Culvert | Extend Culvert - Grout Fill | Extend Pipe - Soil Fill | Extend Pipe - Grout Fill | Extend Pipe - Soil Fill |
|---|---|---|---|---|---|---|---|---|---|
| Freight Rail Operations Impacts / Benefits | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Passenger Rail Operations Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adjacent and Proximate Land Use Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic and Cultural Resources Impacts / Benefits | 0 | -1 | 0 | -5 | -5 | -3 | -5 | -3 | -5 |
| Community Profile & Environmental Justice/Title VI Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wetlands Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Floodplains & Aquifers Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Threatened & Endangered Species Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stormwater and Drainage Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hazardous Materials Impacts / Benefits | -1 | -1 | -1 | -1 | -3 | -1 | -1 | -1 | -1 |
| Air Quality & Noise Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Community Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Safety Impacts / Benefits | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Utility Impacts / Relocation Requirements | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Track Length (LF) | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 | 0 |
| **SUMMARY SCORE** | **3** | **2** | **3** | **-2** | **-4** | **0** | **-2** | **0** | **-2** |

# Preliminary Preferred Alternative



1. Remove side track and ballast to allow clearing of the slab
2. Remove northern concrete and rail slab
3. Excavate south end of structure to expose drainage pipe below slab
4. Remove southern concrete and slab and earth covering drainage pipe
5. Repoint abutments and repair headwall
6. Extend 15-inch drainage pipe into culvert
7. Remove active track, ballast and slab
8. Level top of abutments with grout
9. Set two (2) new precast 8-ft by 14-ft slabs
10. Place new ballast and new track panels. Reopen track for service
11. Install remaining slabs

NJTPA

# Next Steps

- Complete Value Engineering (VE) Study
- Draft Concept Development Report
- Final Recommendation of Preferred Alternative
- Interagency Review Meeting
- Finalize Concept Development Report

NJTPA

# Thank You/Questions?

Jakub Rowinski – NJTPA
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Scott Parker – Jacobs Engineering
scott.parker@Jacobs.com

Website –
www.hackettstownrailstudy.org

NJTPA

# Appendix D

## Purpose and Need Statement & NJDOT Problem Statement

## Purpose & Need Statement

*The purpose of this project is to optimize freight movement and improve safety by reducing conflicts between the Dover & Rockaway Railroad ("D&R") freight line and vehicular and pedestrian traffic especially in downtown Dover.*

## Existing Conditions & Issues

The project area is located primarily in the Town of Dover and Rockaway Borough in addition to Denville Township, Mine Hill Township, Randolph Township, Rockaway Township, Victory Gardens Borough, and Wharton Borough in Morris County. Established along the Rockaway River, the Town of Dover, in its past, had extensive industry especially mining within the project area as a result of its various transportation modes including rail and water. In 1986, with the collapse of the railroad industry, Morris County stepped in to buy the D&R in order to retain existing businesses and to attract future businesses on the line.

As described in the preceding study, Morris County Freight Infrastructure & Land Use Analysis, the D&R is an approximately six mile long rail line that runs at grade level through the older neighborhood of mixed residential, commercial, and industrial uses in downtown Dover. The D&R currently connects to the NJ TRANSIT Morristown Line at the D&R Junction west of Dover. The D&R also runs parallel to the NJ TRANSIT alignment on the north side of the Rockaway River in downtown Dover. East of downtown Dover, the D&R turns north and runs along the Rockaway River through the center of Rockaway Borough before terminating to north of Interstate 80 (I-80). Though owned by Morris County, the D&R is operated by the Dover & Rockaway River Railroad ("DRRV"), which services five active customers along the D&R. Four customers are located in an industrial park just north of I-80 on the east side of Green Pond Road (County Route 513) and one customer located in the Town of Dover off Richards Avenue.

As depicted on Figure 1, the D&R has 18 un-gated at-grade road crossings, of which 13 are within the Town of Dover and 5 are within the Township of Rockaway, many of which are in close proximity to one another. The close spacing of grade crossing and lack of gates poses safety issues especially for vehicular traffic. Drivers along the street do not expect to stop for a train due to the relative low frequency of railcar movement along the D&R, resulting in driver uncertainty and confusion.

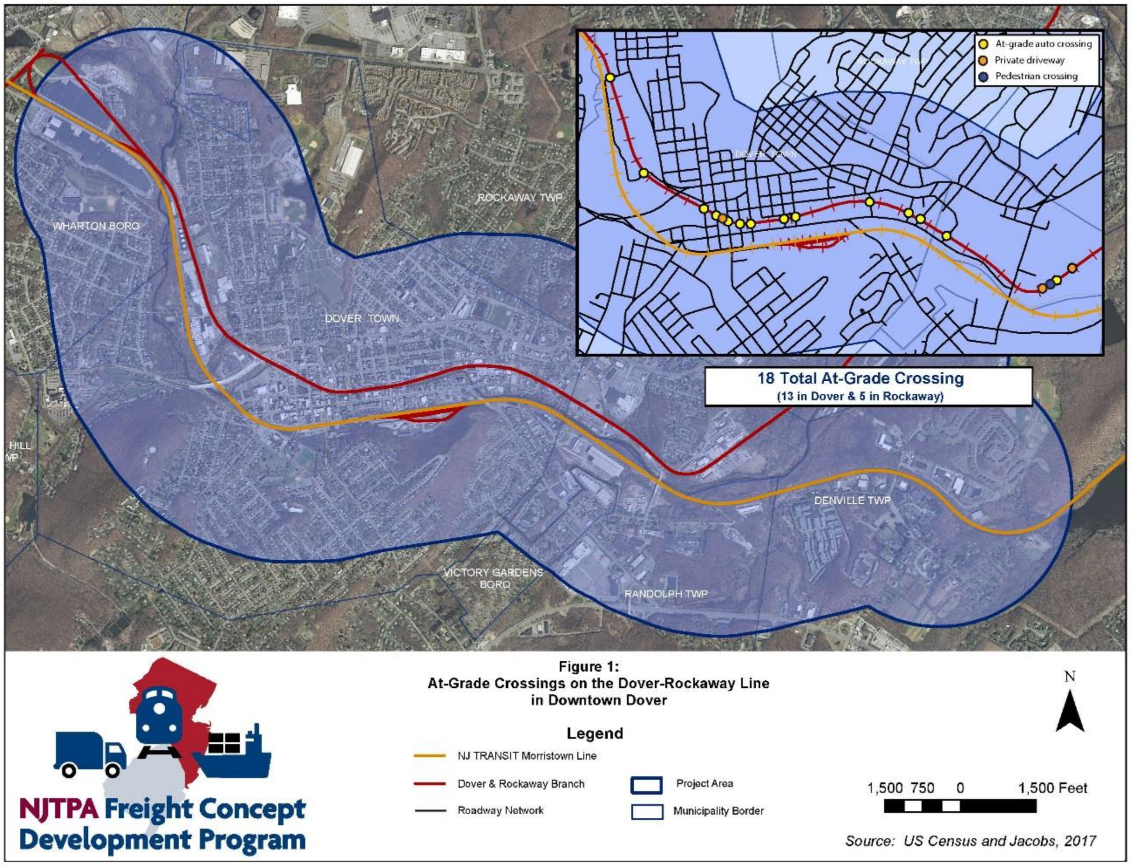
The un-gated at-grade crossings also pose a safety issue for the walking public. The Town of Dover Transit Oriented Development Plan and Town Master Plan have identified the need for better pedestrian connections between neighborhoods and between those neighborhoods and the downtown business district. Although it is trespassing, residents use the existing rail alignment as a walking path between neighborhoods and between home and downtown. The same low frequency and unpredictable service schedule that impacts traffic movement also therefore presents a serious safety risk to pedestrians.

The existing alignment and freight movement along the D&R also affect the sense of place of the town by segmenting it into a northern section and a southern section. The Town of Dover's goals are to enhance the cohesive sense of community within the town, which will improve the overall quality of life for residents and facilitate the delivery of services.

Eliminating grade crossings to improve safety as well as upgrading key rail corridors to accommodate 286K Plate F railcars is fully consistent with the goals and priorities set forth in the plans listed below which supports investments in the rail infrastructure within the NJTPA region and throughout New Jersey. Improvements to the rail service within the corridor would create opportunities for growing the existing rail served businesses and attracting new developments which would, as a result, increase the number of jobs as well as economic vitality of the region. Removing the rail freight traffic from downtown Dover would also promote freight as a good neighbor, reduce community impacts, and improve safety within the project area. The project is also expressly supported by the Town of Dover's locally-adopted plans.

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA Rail Freight Capacity and Needs Assessment to Year 2040, June 2013
- NJDOT Freight Rail Strategic Plan, June 2014
- Town of Dover Transit Oriented Development Plan, June 2006
- Town of Dover Master Plan, January 2007

**Figure 1 – At-Grade Rail Crossings**



Source: US Census and Jacobs, 2017

## GOALS AND OBJECTIVES

The primary goals of this project are to:

1. Enhance operational efficiency along the D&R Branch
2. Support future freight-related development
3. Address traffic safety concerns through downtown Dover along the existing D&R Branch
4. Support quality of life within Dover
5. Balance economic transportation benefits with local historic preservation and redevelopment benefits.

Within each of these overarching goals, specific objectives have been identified as noted below.

1. Enhance operational efficiency along the D&R
   - A. **Reduce** freight travel time associated with substantially-reduced speeds through the 18 non-signalized at-grade crossings, for approximately 3 miles, in the Town of Dover and Rockaway Township

2. Support future freight-related development
   - A. **Potentially** reduce the operational cost of rail movement along the D&R Branch for customers
   - B. **Attract** investment to vacant industrial parcels along the D&R Branch
   - C. **Improve** access to the DRRV Transload Facility in Rockaway Borough for freight customers

3. Address traffic safety concerns through downtown Dover along the existing D&R Branch
   - A. **Reduce** the number of potential pedestrian, bicycle, and vehicular conflicts with freight rail at 18 un-gated at-grade rail crossings

4. Support quality of life within Dover
   - A. **Encourage** walking and bicycling within downtown Dover by reducing traffic safety conflicts with freight rail and converting the D&R Branch in downtown Dover from an active freight line to a linear park or bicycle path. Eight-teen percent (18%) of Dover households have no vehicle[1] and Dover is a "communities of concern"[2] municipality.
   - B. **Support** reinvestment in a downtown neighborhood that has a pedestrian-friendly "main street" retail, restaurants, and residential properties that are in walking distance of a NJ TRANSIT commuter rail station
   - C. **Reduce** noise and air quality impacts for residents that abut the D&R Branch in downtown Dover

5. Balance freight rail transportation benefits with local historic preservation and redevelopment benefits.

---

[1] 2015 U.S. Census Bureau

[2] 2015 Together North Jersey Plan

A. **Coordinate** alternative development with affected stakeholders, including local leadership and freight-dependent businesses.

# New Jersey Department of Transportation
## Transportation Problem Statement Form

**NOTE**: **To add text** - click on gray box, then start typing.
**To mark a check box** - double-click, under Default Value click checked, then click OK

## CONTACT INFORMATION

| | |
|---|---|
| Name: Ted Matthews | Organization: North Jersey Transportation Planning Authority |
| Phone/E-Mail: (973) 639-8404 tmatthews@njtpa.org | Name/ Phone/E-mail of Alternate: Jakub Rowinski / (973) 639-8443 / jrowinski@njtpa.org |

## PROBLEM LOCATION & DESCRIPTION

**Please provide applicable location information of the problem** (if field doesn't apply, type N/A):

Route: NS Washington Secondary

Mileposts: 57.25 (railroad milepost)

Other Limits: 500 yards west of NJ TRANSIT Hackettstown Station - Hackettstown

Structure Number: N/A

County: Warren

Municipality: Town of Hackettstown

Other:

**Please check those items that best catagorizes the problem, along with a detailed description:**

### Existing Highway Problem:

☐ Capacity:

☐ Operational:

☐ Physical:

☐ Safety:

☐ Other:

### Existing Bridge Problem:

☒ Capacity: Bridge is not structurally sufficient to accommodate 286K railcar service

☐ Operational:

☐ Physical:

☐ Safety:

☐ Other:

### Sub-corridor/Corridor/Sub-regional/Regional Problem:

☐ Need for Corridor Study:

☐ Possible Highway on New Alignment:

☐ Possible New Transit Line:

☐ Possible New Park & Ride Lot:

☐ Other:

## NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

| | |
|---|---|
| **Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location** | ☐ Maintain and Renew Transportation Infrastructure<br>☒ Integrate Transportation and Land Use Planning<br>☐ Increase Safety and Security<br>☒ Improve Mobility, Accessibility, Reliability<br>☐ Respect the Environment<br>☒ Optimize Freight Movement<br>☐ Operate Efficiently<br>☐ Continue To Improve Agency Effectiveness |
| **Provide any additional information here ➡ that details how mitigating the problem meets the goal(s)** | This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties |

## OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

**Please provide additional information that details how mitigating this problem location meets OTHER goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:**

Constraint to the movement of 286K Plate "F" rail cars identified as a high priority issue requiring immediate action in the New Jersey Statewide Freight Rail Strategic Plan

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

## ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

**Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:**

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

## PROBLEM LOCATION PRIORITY

**Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:**

Problem location and nature is unique and cannot be readily compared with comparable problem locations

## MISC

**Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):**

This issue was identified and addressed at a conceptual level in three (3) recent studies including:
- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA's Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

This project is supported by:
- County of Warren Planning Department
- Morris County Planning Department
- North Jersey Transportation Planning Authority

**Signature of Initiator:** ______________________________

**Date of Signature:** ______________________________

**Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards of Trustees; approved documents from other official decision-making bodies; etc.**

**Send this completed form and support material to:**

**Thomas Wospil, Director**
**Capital Investment Planning and Development**
**New Jersey Department of Transportation**
**PO Box 600**
**Trenton, NJ 08625-0600**

**FOR NJDOT USE ONLY**

Assigned DB Number:

Legislative District:

Congressional District:

Program Category:

Information on the Form Has Been Verified by:

## Attachment 1

Information required on all Transportation Problem Statements:

- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
- Statement of the extent to which the proposed capital improvement project or removal of the identified deficiency would advance the Department's objectives as identified in the Statewide Capital Investment Strategy
- Current traffic counts, accident data and/or other appropriate supplemental data, and associated analyses (e.g.; Highway Capacity Software analysis), as well as images (ground level or aerial) and/or mapping that further confirms the problem
- Identification of individuals or groups who may be sponsoring or supporting the proposed project
- As available, summary of any identified environmental issues within the

probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

**NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.**

# New Jersey Department of Transportation
# Transportation Problem Statement
# Attachment – Description of the Problem

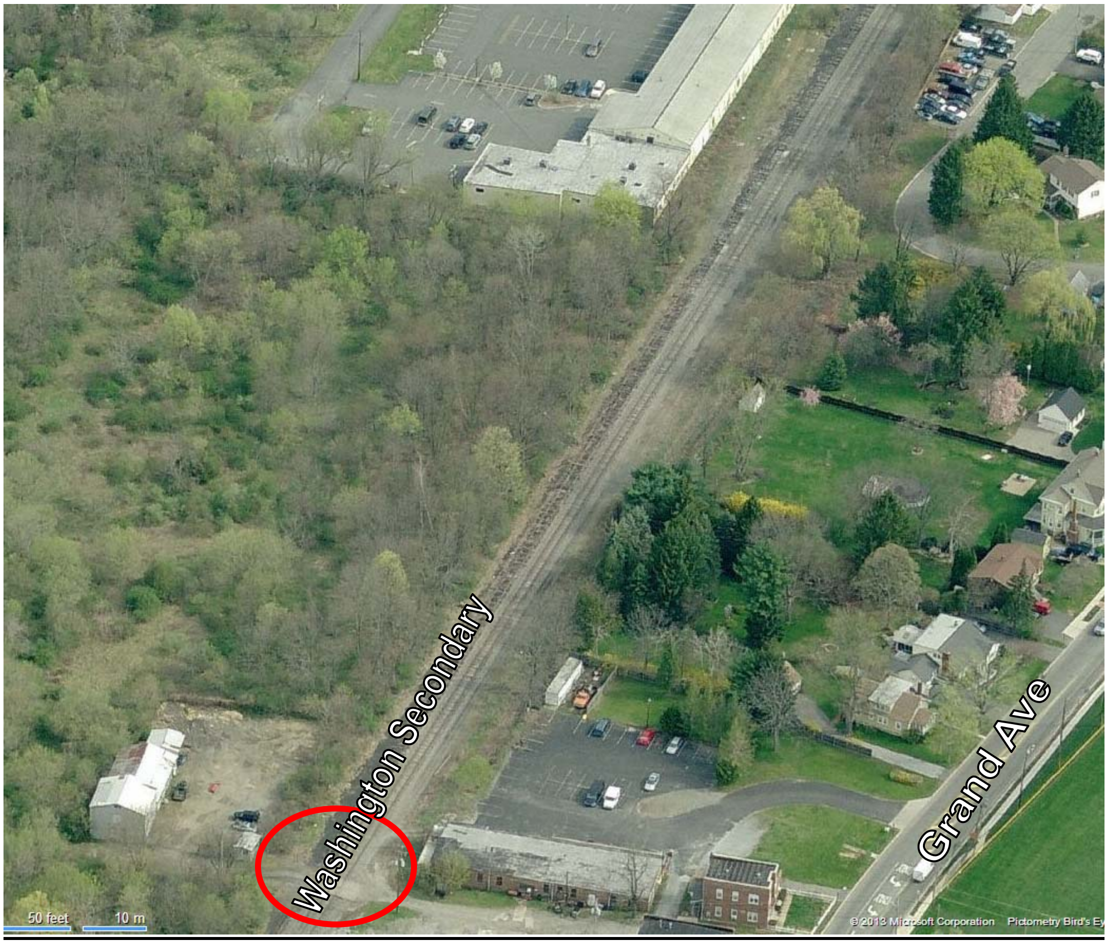
**LOCATION**: **Drain (railroad milepost 57.25)**

**Route (if applicable)**: N/A

**Mileposts (if applicable):** N/A

**Structure number (if applicable):** N/A

**Limits:** Norfolk Southern's Washington Secondary Line from the junction with the Lehigh Line (milepost 80.30) eastward to approximately Milepost 57.25



## DESCRIPTION OF THE PROBLEM

Norfolk Southern’s Washington Secondary Line and NJ TRANSIT’s Morristown Line (the “Corridor”) form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and weight restricted bridges limit the size and loading of the rail cars that can be used to serve customers along the Corridor and connecting branch lines. These limitations place these businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate “F” rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17’-6” between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate “F” rail cars. Along electrified sections, a minimum of 17’-8” between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate “F” rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds (“263K”) per rail car. Since 1995, the Association of American Railroads (“AAR”) has maintained a national standard allowing loading of up to 286,000 pounds (“286K”) per rail car.

Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

**Drain (MP 57.25) – Hackettstown**

This bridge, located approximately 500 yards west of NJ TRANSIT's Hackettstown Station, is a single span bridge with a concrete superstructure supported on concrete abutments. This bridge serves to accommodate a mix of drainage pipes and stormwater runoff conveyed from the south side to the north side of the tracks.

Similar to the Cattle Pass bridge at MP 57.49, this bridge is located within the Delaware Lackawanna & Western Historic Corridor and as such is likely considered an historic bridge of cultural and architectural significance. Removal of the bridge would require coordination with the SHPO. The recommended option for improvements to this location to accommodate 286K railcars is removal of the bridge, replacing the existing concrete slab superstructure and abutments with a precast concrete box structure.

***Recommendation / Cost***

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the replacement of the structure with a precast concrete box structure be advanced into engineering, design and implementation. It is proposed to remove the existing bridge and install a precast concrete box structure. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between $1.5 and $2.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

## SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate "F" railcars is fully consistent with the goals and priorities set forth in the NJTPA's current Regional Transportation Plan ("Plan 2035"). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey's Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

## ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

# Appendix E

## Alternatives Considered & Alternatives Scoring Matrix

## Hackettstown Drain Bridge - Washington Secondary MP 57.25
## Alternatives Considered for Elimination of Weight Restriction

| Alternative | | Description |
|---|---|---|
| 1 | Full Slab Replacement | Repointing of existing abuttments and full replacement of the entire existing contrete slab.  Construction activities to require temporary stoppage of active rail service on the corridor. |
| 2 | Partial Slab Replacement | Repointing of existing abuttments and full replacement of the portion of the existing contrete slab carrying the active track.  Construction activities to require temporary stoppage of active rail service on the corridor. |
| 3 | Full Slab Replacement w/Runaround Track | Repointing of existing abuttments and full replacement of the entire existing contrete slab.  Initial phase would reconstruct the currently inactive passing siding to all maintenance of rail activy during construction. |
| 4 | Fill - Concrete Injection | Core holes in the existing concrete slab and pressure-inject to fill the void with high strength concrete.  Effectively converts the undergrade bridge to at-grade rail. |
| 5 | Replace with Pre-Fab Culvert | Replace existing abuttments and concrete slab with pre-cast culvert.  Construction activities to require temporary stoppage of active rail service on the corridor. |
| 6 | Extend Culvert - Grout Fill | Extend existing culvert beneath the bridge.  Core holes in the existing concrete slab and pressure-inject to fill the void with high strength concrete.  Effectively converts the undergrade bridge to at-grade rail. |
| 7 | Extend Pipe - Soil Fill | Extend existing culvert beneath the bridge.  Fill void with compacted soils.Core holes in the existing concrete slab and pressure-inject to fill the void with high strength concrete.  Effectively converts the undergrade bridge to at-grade rail. |
| 8 | Extend Pipe - Grout Fill | Replace existing culvert beneath the bridge with 15-inch pipe extension from inlet on south side of the rail line.  Core holes in the existing concrete slab and pressure-inject to fill the void with high strength concrete.  Effectively converts the undergrade bridge to at-grade rail. |
| 9 | Extend Pipe - Soil Fill | Replace existing culvert beneath the bridge with 15-inch pipe extension from inlet on south side of the rail line. Fill void with compacted soils.Core holes in the existing concrete slab and pressure-inject to fill the void with high strength concrete.  Effectively converts the undergrade bridge to at-grade rail. |

## Hackettstown Drain Bridge - Washington Secondary MP 57.25
## Evaluation of Alternatives Considered for Elimination of Weight Restriction

| Criteria | Full Slab Replacement | Partial Slab Replacement | Full Slab Replacement w/Runaround Track | Fill - Concrete Injection | Replace with Pre-Fab Culvert | Extend Culvert - Grout Fill | Extend Pipe - Soil Fill | Extend Pipe - Grout Fill | Extend Pipe - Soil Fill |
|---|---|---|---|---|---|---|---|---|---|
| Freight Rail Operations Impacts / Benefits | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Passenger Rail Operations Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adjacent and Proximate Land Use Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic and Cultural Resources Impacts / Benefits | 0 | -1 | 0 | -5 | -5 | -3 | -5 | -3 | -5 |
| Community Profile & Environmental Justice/Title VI Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wetlands Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Floodplains & Aquifers Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Threatened & Endangered Species Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stormwater and Drainage Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hazardous Materials Impacts / Benefits | -1 | -1 | -1 | -1 | -3 | -1 | -1 | -1 | -1 |
| Air Quality & Noise Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Community Impacts / Benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Safety Impacts / Benefits | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Utility Impacts / Relocation Requirements | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SUMMARY SCORE | 3 | 2 | 3 | -2 | -4 | 0 | -2 | 0 | -2 |

Relative Scores

| Relative Level of Benefit / Impact | Score |
|---|---|
| Highly Beneficial | 5 |
| Moderately Beneficial | 3 |
| Minorly Beneficial | 1 |
| Neutral | 0 |
| Minorly Detrimental | -1 |
| Moderatly Detrimental | -3 |
| Highly Detrimental | -5 |
| Fatally Flawed | -100 |

# Appendix F

## Value Engineering Assessment

May 15, 2020

## Study Identification

### Project

- Hackettstown Weight Restriction Elimination Project

### VE Team Members

- Gerald Fry PE, Project Manager, JMT, 610-366-2500, gfry@jmt.com
- Joel Schmoyer PE, Structural Engineer, JMT, 610-366-2510, jschmoyer@jmt.com
- Morgan Moldoff PE, Rail Specialist, JMT of New York, 518-218-5947, mmoldoff@jmt.com
- Amy Altimare, NEPA Specialist, JMT, 717-741-6239, aaltimare@jmt.com
- Mark Neves, CADD Technician, JMT, 610-366-2519, mneves@jmt.com

## Information Phase

- Scott Parker PE, Project Manager, Jacobs Engineering Group, 862-242-7326, scott.parker@jacobs.com
- Jakub Rowinski, Manager of Freight Planning, NJTPA, 973-639-8443, jrowinski@njtpa.org

Mr. Parker and Mr. Rowinski conducted an overview of the Hackettstown Weight Restriction Elimination Project with the VE Team at the offices of Jacobs Engineering Group in Morristown, NJ on Wednesday, December 11, 2019. The in-office overview was followed by a site visit to the project site also lead by Mr. Parker and Mr. Rowinski.

The following documents were made available to the VE Team and were treated as project source documents:

1. Purpose and Needs Statement (including Existing Conditions and Issues Statement and Goals and Objectives Statement)
2. Phasing Narrative and Sketches
3. Alternatives Evaluation Matrix
4. Preliminary Cost Estimate
5. December 31, 2015 Bridge Inspection Report
6. Stormwater Lines Sketch
7. Project Area Maps
    a. Location Map
    b. Census Tracts Map
    c. Limited English Proficiency Map
    d. Poverty Ratio Map
    e. 65 and Older Population Map
    f. Threatened and Endangered Species Map
    g. Wetlands Maps
    h. Parks and Recreational Resources Map
    i. Flood Hazards Map

j. Hazardous materials Map

## Creative Idea Phase

The VE Team met on December 19, 2019 in JMT's Allentown, PA Office. This meeting focused on the creative ideas phase of the VE project. A traditional preliminary engineering level cost breakdown is in a rudimentary form for the Hackettstown Weight Restriction Elimination project and therefore is not yet available.

The creative idea phase focused on alternatives that might leave a lesser impact on the project area resources, while meeting the stated purpose and need. These ideas could include:

- An intuitively lower cost alternative
- An alternative with a smaller impact on identified cultural and natural resource
- An alternative that has a smaller real estate impact

## Hackettstown Weight Restriction Elimination Project – Purpose and Need

The Purpose and Need for this project is stated as:

*"The purpose of this project is to provide freight transportation infrastructure that meets current industry standards in order to promote economic development and optimize freight movement particularly the ability to accommodate the movement of 286,000 pound (286K) railcars over the Washington Secondary/Morristown Line in Hackettstown, New Jersey."*

The VE Team reviewed the existing alternatives studied including the identified preferred alternative drafted by Jacob's Engineering, and conducted a facilitated brainstorming session to identify additional new alternatives. The following options were identified as potential alternatives. The team's concepts and initial alternative pros and cons are listed below.

Options:

1. Do Nothing
    a. This option would take no action to improve the current transportation route.
    b. This option was dismissed as it fails to meet the project purpose and need.
2. Replace ballast with (2nd) deck slab.
    a. This option would replace existing track and tie in surface track for approx. 2500 feet.
    b. This option would still need some surfacing and would require the replacement of the at-grade crossing.
    c. This option would require removing the existing rail, then removing the ballast from the existing slab and adding the prefabricated slab, then reconnecting the rail directly to the top of the 2nd slab.
    d. The contractor would need to dispose of ballast and ties in an environmentally appropriate manner.
    e. The new slab would need to be rated to carry the 286K railcars.
    f. This option was dismissed because the slab underneath still cannot be rated.
3. Replace with culvert (with hard or soft bottom).
    a. This option involves installing in a 3- or 4-sided culvert.
    b. This option would require coordination with the NJ SHPO to determine if this approach is viable from their perspective. Also, it would need to be determined if the existing ditch is considered a NJ state open water or an ordinary wetland per NJ DEP.

    c. The 4-sided culvert would be easier to construct, would be less costly, would require less excavation, and would have less hazardous waste implications (Railroad and former tannery concerns) than the 3-sided culvert.
    d. This option raises concerns with excavation due to the RR and adjacent old tannery and the potential to expose environmentally sensitive materials (hazardous waste).
    e. This option would require tie and surfacing of existing track, disposal of ballast and ties as required.

4. Divert flow w/ jacked pipe under R/R (fill in culvert).
    a. This option involves diverting flow through a minimum 18" jacked pipe and then filling in the culvert.
    b. This option has fewer environmental impacts because it requires filling in under the culvert, no excavation is required.
    c. Jacking can be costly.
    d. Similar to Option 3, coordination would be required with the NJ SHPO and it would need to be determined if the existing ditch is considered a NJ state open water or an ordinary wetland per NJ DEP.
    e. Installed pipe will need to meet railroad loading requirements.
5. Option 3 and 4 combined
    a. Option 5 involves extending the pipe from existing drainage structure under the culvert outlet to the existing and backfilling the culvert.
    b. The pipe would be approximately 5' - 10' short of the end of the structure.
    c. Coordination with the RR regarding sidetrack impacts will be required.
    d. This option would include the option of backfilling under both tracks.
6. Replace the slab only during track outage. (Jacobs preferred option)
    a. This option would involve closing the rail line, removing the existing slab, and replacing it with a precast slab without impacting the existing abutment walls.
    b. The railroad has indicated they can tolerate a five-day track closure.
    c. This option would require replacing the adjacent at-grade crossing including tying and resurfacing the track.

There is a preliminary opinion from the NJ SHPO that the existing abutment walls are a contributing element to an historic resource (the rail line itself). Assuming this decision is the final word on the matter any option that replaces or covers the abutment walls from potential public view is unlikely to be implemented.

The VE Team recommends the cost estimate be updated for this project, as the current cost estimate may not consider all the impacts of the preferred option. The following investigations would need to be conducted on the listed options:

1. Do Nothing.
    a. No further investigations are required. The option was dismissed because it does not meet the purpose and need.
2. Replace ballast with (2nd) deck slab.
    a. This option was dismissed because the slab cannot be rated; therefore, no further investigations are required.
3. Replace with culvert (with hard or soft bottom).

    a. Continued coordination with the NJ SHPO is required, as well as coordination with NJ DEP to determine if the existing ditch is considered a NJ state open water or an ordinary wetland. In addition, hazardous waste concerns need to be addressed.

4. Divert flow w/ jacked pipe under R/R (fill in culvert).
    a. Continued coordination with the NJ SHPO is required, as well as coordination with NJ DEP to determine if the existing ditch is considered a NJ state open water or an ordinary wetland. In addition, hazardous waste concerns need to be addressed.
5. Option 3 and 4 combined.
    a. Continued coordination with the NJ SHPO is required, as well as coordination with NJ DEP to determine if the existing ditch is considered a NJ state open water or an ordinary wetland. In addition, hazardous waste concerns need to be addressed.
6. Replace slab only during track outage.
    a. Continued coordination with the NJ SHPO is required.

For all options that do not involve leaving the existing structure in place and backfilling with structural fill, the adjacent grade crossing will have to be replaced.

## Conclusion/Findings

The VE Team believes that there are several more cost-effective options than the Option 6 slab replacement;  however, they all conflict with the regulatory finding that the existing structure abutments are a contributing element  to the historic rail line and must be preserved as part of the project. Given this constraint, the VE Team concurs with the recommendation of Option 6 as the preferred option. The VE team believes a more robust cost estimate should be developed.

# Appendix G

## Grant Programs and Funding Sources

**Potential Funding Programs for Advancement of PPA into Design and Construction**

| Funding Option | Funding Source | Funding Availability | Match / Funding / Application Requirements | Eligible Applicants | Eligible Modes / Projects *(use grouped columns to specify)* | Eligible Project Phases *(use grouped columns to specify)* | Eligibility Requirements | Discretionary or Formula | Source | Contact | Misc. Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Consolidated Rail Infrastructure and Safety Improvements (CRISI) | FRA | $1,103 million authorized; $593 million appropriated in Fiscal Year (FY) 2018 (up to $10 million per project) | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public and/or private sector funding<br>Apply directly through the FRA | A State; a group of States; an Interstate Compact; a public agency or publicly chartered authority established by one or more States; a political subdivision of a State; Amtrak or another Rail Carrier that provides Intercity Rail Passenger Transportation; a Class II railroad or Class III railroad; any Rail Carrier or rail equipment manufacturer in partnership a public organization; the Transportation Research Board together with any entity with which it contracts in the development of rail-related research, including cooperative research programs; a University transportation center engaged in rail-related research; or a non-profit labor organization representing a class or craft of employees of Rail Carriers or Rail Carrier contractors. | Rail line improvements, rail line relocation, regional rail and corridor service development planning, and deployment of railroad safety technology | Final design, construction | Capital projects addressing safety, efficiency and reliability including rail line improvements, rail line relocation, regional rail and corridor service development planning, and deployment of railroad safety technology, such as positive train control systems. | Discretionary | CRISI - Info link | Amy Houser (Amy.houser@dot.gov) | Most recent round of applications closed on 9/17/2018, 2019 round of application is TBD |
| Federal-State Partnership for State of Good Repair Program | FRA | $997 million authorized; FY 2018 Notice of Funding Opportunity (NOFO) announced $272 million in funding available (applications due 3/18/19) | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public and/or private sector funding<br>Apply directly through the FRA | A State; a group of States; an Interstate Compact; a public agency; a political subdivision of a State; Amtrak, acting on its own behalf or under a cooperative agreement with one or more States | Rehabilitation or replacement of railroad assets | Construction, (final design considered only if in conjunction with construction activities funding) | Capital projects to replace or rehabilitate qualified railroad assets including replacement with assets in-kind, with assets that increase capacity, or with rehabilitated assets (state of good repair). | Discretionary | State of Good Repair Program - Info Link | Amy Houser (Amy.houser@dot.gov) | Application deadline on 3/18/19 |
| Positive Train Control Grant Program (PTC) | FRA | $199 million appropriated in FY2017 ($0.5 million to $9 million per project) | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public and/or private sector funding<br>Apply directly through the FRA | A State; a group of States; an Interstate Compact; A public agency; A political subdivision of a State; Amtrak or another Rail Carrier that provides Intercity Rail Passenger Transportation; Any Rail Carrier or rail equipment manufacturer in partnership with at least one of the aforementioned entities; the Transportation Research Board together with any entity with which it contracts in the development of rail-related research, including cooperative research programs; A University transportation center engaged in rail-related research; A non-profit labor organization representing a class or craft of employees of Rail Carriers or Rail Carrier contractors | Installation of PTC systems projects: back office systems; wayside, communications, and onboard hardware equipment; and spectrum acquisition. | Final design, construction | PTC Grant Program funds the installation of PTC systems that include back office systems; wayside, communications, and onboard hardware equipment; and spectrum acquisition. Under this grant program, the intended outcomes and benefits of the funded projects are accelerated implementation, increased interoperability, and improved reliability of PTC systems. | Discretionary | PTC - Info Link | Amy Houser (Amy.houser@dot.gov) | |
| Surface Transportation Block Grants (STBG) | FTA/ FHWA | $281 million appropriated to New Jersey in FY 2018; $287 million appropriated to New Jersey in FY 2019 | Federal share does not exceed 80% of total project costs (90% for projects on the Interstate System); minimum of 20% non-Federal match may be public and/or private sector funding.<br>Funds distributed by the state | A State; a local government | Highway, bridges, tunnels, and transit; maintenance expenses for existing services. | Construction | Capital projects including highway, bridges, tunnels, and transit; maintenance expenses for existing services. | Formula | STBG - Info Link | David Bartz (dbartz@dot.gov) | App due the last day of each calendar year 12/31/2019 |
| Railway-Highway Crossings (Section 130) Program | FTA/ FHWA | FY 2019: $240 million<br>FY 2020: $245 million<br>$3.9 million set-aside appropriated to New Jersey in FY 2018; $4.0 million set-aside appropriated to New Jersey in FY 2019 | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public and/or private sector funding. 2% of Section 130 funding can be used for for compilation and analysis of data to support the reporting requirements;<br>Funds can be used as incentive payments for local agencies to close public crossings provided there are matching funds from the railroad.<br>Funds distributed by the state | A State with projects with any public crossings including roadways, bike trails and pedestrian paths | Projects at all public crossings including roadways, bike trails and pedestrian paths. | Preliminary engineering, final design, construction, right-of-way | Projects at all public crossings including roadways, bike trails and pedestrian paths. 50% of a State's apportionment is dedicated for the installation of protective devices at crossings. The remainder of the funds apportionment can be used for any hazard elimination project, including protective devices. The FAST Act extends eligibility to include projects at grade crossings to eliminate hazards posed by blocked crossings due to idling trains. | Formula | Railway-Highway Crossings Program - Info Link | James Dahlem (James.dahlem@dot.gov; 202 - 493 - 0571)<br>Kelly Morton (kelly.morton@dot.gov) | |
| National Highway Performance Program (NHPP) | FTA/ FHWA | $558 million appropriated to New Jersey in FY 2018; $571 million appropriated to New Jersey in FY 2019 | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public or private sector funding.<br>2% of a State's NHPP funding is to be set aside for State Planning & Research;<br>NHPP funds can be used as the non-Federal share to match the 50 percent Federal share for projects funded by the Local Technical Assistance Program.<br>Funds distributed by the state | A State | NHPP funds may be obligated only for a project on an "eligible facility" (located on NHS); that is a project, part of a program of projects, or an eligible activity supporting progress toward the achievement of national performance goals for improving infrastructure condition, safety, congestion reduction, system reliability, or freight movement on the NHS. | Planning, environmental, construction | Capital projects for new facilities on the National Highway System (NHS), maintenance of the NHS, and transit projects more cost effective than a NHS improvement, in the same corridor and in proximity to a fully access-controlled NHS highway.<br>Projects must be identified in the Statewide Transportation Improvement Program (STIP)/Transportation Improvement Program (TIP) and be consistent with the Long-Range Statewide Transportation Plan and the Metropolitan Transportation Plan(s). | Formula | NHPP - Info Link | David Bartz - dbartz@dot.gov | |
| Metropolitan & Statewide Planning, and Non-Metropolitan Transportation Planning | FTA | $139 million total FY 2019 | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public and/or private sector funding<br>Funds distributed by the state | A State; Metropolitan Planning Organization (MPOs) | Multimodal transportation planning in metropolitan areas and states. | Planning, final design, research | Provides funding and procedural requirements for multimodal transportation planning in metropolitan areas and states that is cooperative, continuous and comprehensive, resulting in long-range plans and short-range programs of transportation investment priorities. The planning programs are jointly administered by FTA and the Federal Highway Administration (FHWA), which provides additional funding. | Formula | Metropolitan & Statewide Planning - Info link | Office of Planning and Environment, FTA, 202-366-4033 | |

**Potential Funding Programs for Advancement of PPA into Design and Construction**

| Funding Option | Funding Source | Funding Availability | Match / Funding / Application Requirements | Eligible Applicants | Eligible Modes / Projects *(use grouped columns to specify)* | Eligible Project Phases *(use grouped columns to specify)* | Eligibility Requirements | Discretionary or Formula | Source | Contact | Misc. Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| National Highway Freight Program (NHFP) | FHWA | Estimated funding for FY 2019 is $1,350 million and for FY 2020 is $1,500 million;<br>$30 million appropriated to New Jersey in FY 2018; $33.9 million appropriated to New Jersey in FY 2019 | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public and/or private sector funding<br>Funds distributed by the state | A State | Activities that enhance movement of freight, including: Planning, feasibility, and other development phase activities; construction, reconstruction, and rehabilitation | Planning, environmental, final design, construction | Capital projects that contribute to the efficient movement of freight on the National Highway Freight Network and identified in a freight investment and State's freight plan. Eligible projects include planning, feasibility, and other development phase activities; construction, reconstruction, and rehabilitation; and other activities that enhance movement of freight. | Formula | NHFP - Info Link | Caitlin Hughes Rayman<br>(202-394-0457) | |
| Competitive Highway Bridge Program (CHBP) | FHWA | $225 million available in funding in FY2019 | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public and/or private sector funding. For states on the sliding scale, Federal share of the cost of the project is up to 95%<br>Apply directly through FHWA | State DOTs from States that have a population density of 100 individuals per square mile based on the 2010 decennial census. | Highway bridge replacement and rehabilitation projects | Final design, construction | CHBP funds must be used for highway bridge replacement and rehabilitation projects on public roads that demonstrate cost savings by bundling multiple highway bridge projects. | Discretionary | CHBP - Info link | Douglas Blade<br>(CHBPgrant@dot.gov; 202-366-4622) | |
| Congestion Mitigation and Air Quality Improvement Program (CMAQ) | FHWA | $2,449 million FY 2019<br>$2,499 million FY 2020<br>$109 million appropratied to New Jersey in FY 2019 | Federal share does not exceed 80% of total project costs; minimum of 20% non-Federal match may be public or private sector funding.<br>2% set-aside for State Planning and Research<br>Funds distributed through the state | A State; Metropolitan Planning Organization (MPOs); non-profit organization; a private entity contributing to public-private partnership | Transportation project or program that contributes to improving the air quality standard | Construction, planning/research | Transportation project or program that is likely to contribute to the attainment or maintenance of a national ambient air quality standard, with a high level of effectiveness in reducing air pollution. 2% for State Planning and Research | Formula | CMAQ - Info Link | Mark Glaze<br>(mark.glaze@dot.gov) | |
| BUILD Grants | USDOT | $1,500 million appropriated in FY 2018; $900 million proposed for FY 2019<br>Minimum grant award is $5 million in urban areas,<br>Maximum grant award is $25 million in urban areas;<br>FY 2018 grant awards ranged from $5 million to $25 million | Federal share does not exceed 80% (urban area) or up to 100% (rural area) of total project costs; minimum of 20% non-Federal match may be public or private sector funding.<br>Non-Federal financial contributions can include State, local, and private sector funding; or other forms of cost share such right of way contributions, toll credits, or recycled revenue from the competitive sale or lease of publicly owned or operated assets.<br>Apply directly through USDOT | A State; a local government; a tribal government, including U.S territories; Transit Agencies; Port Authorities; Metropolitan Planning Organizations (MPOs); political subdivisions of State or Local governments | Highway, bridge, public transit, passenger and freight rail, port, and intermodal projects | Planning, environmental, final design, construction | Capital projects that have a significant impact on the nation, a region, or a metropolitan area including road, rail, transit, port and intermodal improvements. | Discretionary | Build Grant - Info Link | Contact:<br>buildgrants@dot.gov; 202-266-0301 | |
| INFRA Grants | BAB | Estimated total FY 2017 – FY 2018 apportionment $1,560 million, $855 - $902.5 million available for projects in FY2019 NOFO<br>Minimum total project cost for large projects in New Jersey is $100 million;<br>25% of INFRA funds reserved for projects (large or small) in rural areas;<br>FY 2017 - 2018 grant awards ranged from $6 million to $184 million | An INFRA grant may not exceed 60% of the total eligible project costs. An additional 20% of project costs may be funded with other Federal assistance, bringing total Federal participation in the project to a maximum of 80%. There is an exception for projects carried out by Federal land management agencies, which can use Federal funds to pay the non-Federal share of the project cost, bringing the total Federal participation up to 100%.<br>Apply directly through the BAB | A State; A group of States; A Metropolitan Planning Organization (MPOs) that serves an Urbanized Area with a population of more than 200,000 individuals; A unit of local government; A group of local goverments; A political subdivision of a State or local government; A special purpose district or public authority with transportation function including a port authority; a Federal land management agency that applies jointly with a State or group of States; A Tribal government or a consortium of tribal governments; A Multi-State or multijurisdictional group of public entities | Eligible projects include: highway freight projects, highway or bridge, railway-highway grade crossing or grade<br>separation projects; or a freight project | Planning, environmental, final design, construction | Capital projects of national or regional significance including highway freight projects on the NHFN, highway or bridge projects on the NHS, railway-highway grade crossing or grade-separation projects, intermodal and freight rail projects, and projects within the boundaries of a freight rail, water, or intermodal facility that facilitates direct access and improve freight movement on the network. | Discretionary | INFRA Grant - Info Link | Paul Baumer<br>(infragrants@dot.gov; 202-366-1092) | This round of applications due March 4, 2019 |
| Transportation Trust Fund (TTF)<br>*(Program specifics listed in the group of rows below)* | NJDOT | FY2019 funds programmed at $2,000 million:<br>$810 million NJDOT<br>$430 million Local Aid<br>$760 million for NJ TRANSIT | The State pays 75% of the funds at the time of award concurrence and the remainder on a reimbursement basis after acceptance by the municipality and the State of the work completed. | Local Public Agencies (LPAs) | Road, bridge, and other transportation projects | Construction | The 2016 legislation included authorization of a TTF capital program of $16 billion over 8 years, a minimum appropriation of $25 million per FY for freight rail projects, and $28 million per year for the newly created Local Freight Impact Fund.<br>The TTF also provides $400 million annually to local governments for the funding of road, bridge and other transportation projects (more details below) | Formula | TTF - Info Link | Contact form link:<br>https://www.state.nj.us/ttfa/email.shtml | |
| Local Aid and Economic Development Program<br>*(Program specifics listed in group of rows below)* | NJDOT | FY2019 funds programmed at $430 million for Local Aid:<br>Municipal Aid: $150 million<br>County Aid: $150 million<br>Local Bridges Fund: $44 million<br>Local Freight Impact: $28 million<br>Local Aid Infrastructure Fund: $7.5 million<br>Transportation Infrastructure Bank Fund: $2.5 million | The State pays 75% of the funds at the time of award concurrence and the remainder on a reimbursement basis after acceptance by the municipality and the State of the work completed. | Local Public Agencies (LPAs) | See specific program details below. | Construction | See specific program details below. | Discretionary and Formula | State Aid Handbook - Link | Contact appropriate district:<br>1. District 1: 973-601-6700<br>2. District 2: 973-877-1500<br>3. District 3: 609-530-5271<br>4. District 4: 856-486-6618 | |

**Potential Funding Programs for Advancement of PPA into Design and Construction**

| Funding Option | Funding Source | Funding Availability | Match / Funding / Application Requirements | Eligible Applicants | Eligible Modes / Projects *(use grouped columns to specify)* | Eligible Project Phases *(use grouped columns to specify)* | Eligibility Requirements | Discretionary or Formula | Source | Contact | Misc. Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Municipal Aid (Local Aid and Economic Development Program) | NJDOT | Municipal Aid: $150 million (up to $0.5 million per project) | The State pays 75% of the funds at the time of award concurrence and the remainder on a reimbursement basis after acceptance by the municipality and the State of the work completed.<br>Apply through NJDOT | A Municipality | Mobility, bikeway, bridge preservation, pedestrian safety, roadway preservation, roadway safety. | Construction | The TTF sets aside $400 million annually for the Local Aid and Economic Development Programs. Municipal Aid: road improvement projects, bridge improvements, pedestrian safety improvements and bikeway improvements. | Discretionary | Municipal Aid Handbook - Link | Contact appropriate district:<br>1. District 1: 973-601-6700<br>2. District 2: 973-877-1500<br>3. District 3: 609-530-5271<br>4. District 4: 856-486-6618 | |
| County Aid (Local Aid and Economic Development Program) | NJDOT | County Aid: $150 million | The State pays 75% of the funds at the time of award concurrence and the remainder on a reimbursement basis after acceptance by the municipality and the State of the work completed.<br>Apply through NJDOT | A County | Public roads and bridges under county jurisdiction | Construction | The TTF sets aside $400 million annually for the Local Aid and Economic Development Programs. County Aid: roads and bridges under county jurisdiction, public transportation and other transportation projects. The Division of Local Aid is currently accepting application for County Aid program through SAGE. Annual Transportation Program Deadline: February 1, 2019 | Discretionary | State Aid Handbook - Link | Contact appropriate district:<br>1. District 1: 973-601-6700<br>2. District 2: 973-877-1500<br>3. District 3: 609-530-5271<br>4. District 4: 856-486-6618 | |
| Local Bridges Future Needs Fund (Local Aid and Economic Development Program) | NJDOT | Local Bridges Fund: $44 million | The State pays 75% of the funds at the time of award concurrence and the remainder on a reimbursement basis after acceptance by the municipality and the State of the work completed. | A County | Preventive maintenance, rehabilitation and selective replacement of bridges | Construction | The TTF sets aside $400 million annually for the Local Aid and Economic Development Programs. Local Bridges Fund: Bridges - preventive maintenance, rehabilitation and selective replacement of bridges. | Discretionary | Local Bridge Aid Handbook - Link | Contact appropriate district:<br>1. District 1: 973-770-5070<br>2. District 2: 973-877-1500<br>3. District 3: 732-308-4002<br>4. District 4: 856-486-6618 | |
| Local Freight Impact Fund (LFIF) (Local Aid and Economic Development Program) | NJDOT | Local Freight Impact: $28 million | The State pays 75% of the funds at the time of award concurrence and the remainder on a reimbursement basis after acceptance by the municipality and the State of the work completed.<br>Apply through NJDOT | A County; a municipality | Project categories include: pavement preservation, truck safety and mobility, bridge preservation, new construction | Construction | The TTF sets aside $400 million annually for the Local Aid and Economic Development Programs. Local Freight Impact Funds assists counties and municipalities with the impacts associated with the freight industry's use of infrastructure. NJDOT will be taking applications from counties and municipalities to select projects for this fund. This program accepted applications for FY 2018 in July 2017 (an applicant may submit up to two applications per fiscal year). | Discretionary | Local Freight Impact Fund Handbook - Link | Contact appropriate district:<br>1. District 1: 973-601-6700<br>2. District 2: 973-877-1500<br>3. District 3: 609-530-5271<br>4. District 4: 856-486-6618 | |
| Local Aid Infrastructure Fund (LAIF) (Local Aid and Economic Development Program) | NJDOT | Local Aid Infrastructure Fund: $7.5 million | The State pays 75% of the funds at the time of award concurrence and the remainder on a reimbursement basis after acceptance by the municipality and the State of the work completed.<br>Apply through NJDOT | A County; a municipality | Projects that address emergency needs, pedestrian safety and bikeway projects. | Construction | The TTF sets aside $400 million annually for the Local Aid and Economic Development Programs. Local Aid Infrastructure: helps fund emergency and regional needs | Discretionary | State Aid Handbook - Link | Contact appropriate district:<br>1. District 1: 973-601-6700<br>2. District 2: 973-877-1500<br>3. District 3: 609-530-5271<br>4. District 4: 856-486-6618 | |
| Transportation Infrastructure Bank Fund (Local Aid and Economic Development Program) | NJDOT | Transportation Infrastructure Bank Fund: $2.5 million | The State pays 75% of the funds at the time of award concurrence and the remainder on a reimbursement basis after acceptance by the municipality and the State of the work completed.<br>Apply through NJDOT and funds are distributed through NJDOT | A County; a municipality;a county or regional transportation authority; any political subdivision of the State authorized to construct, operate, and maintain public highways or transportation projects | Road, bridge, and other transportation projects | Construction | The TTF sets aside $400 million annually for the Local Aid and Economic Development Programs. Transportation Infrastructure Bank Fund: financial assistance to public or private entities for the planning, acquisition, engineering, construction, reconstruction, repair, and rehabilitation of a transportation project or for any other purpose permitted under the federal program. | Formula | Transportation Infrastructure Bank - Info Link | Contact appropriate district:<br>1. District 1: 973-601-6700<br>2. District 2: 973-877-1500<br>3. District 3: 609-530-5271<br>4. District 4: 856-486-6618 | |
| Rail Freight Assistance Program | NJDOT | $25 million annually | Class I railroads: financial assistance may be provided at 50% of the total eligible cost with the remaining 50% to be paid by the sponsor;<br>Class II railroads: financial assistance may be provided at 70% of the total eligible cost with the remaining 30% to be paid by the sponsor; and<br>Class III railroads: financial assistance may be provided at 90% of the total eligible cost with the remaining 10% to be paid by the sponsor.<br>Apply directly through NJDOT | Owners of rail projects; operators of rail freight service; public agencies or authorities for projects included in the annual list of projects eligible for participation in the RFAP | Projects that would improve and support existing freight rail system and acquisition of property needed for these projects are eligible as well | Final design, construction | The Assistance Program distributes $10 million annually to eligible capital improvement projects that result in the continuation of economically viable rail freight services. This grant is supported through multimodal grant and programs. | Discretionary | Rail Freight Assistance Program - Info Link | Kim Giddens (609-530-5644) | 2019 program ran through August 15, 2018 through October 9, 2018 |

**Potential Funding Programs for Advancement of PPA into Design and Construction**

| Funding Option | Funding Source | Funding Availability | Match / Funding / Application Requirements | Eligible Applicants | Eligible Modes / Projects *(use grouped columns to specify)* | Eligible Project Phases *(use grouped columns to specify)* | Eligibility Requirements | Discretionary or Formula | Source | Contact | Misc. Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Local Capital Project Delivery (LCPD) Program | NJTPA | $1.5 million in FY 2018 (projects ranged from $0.35 million to $0.5 million);<br>$1.25 million for FY 2019 | Each subregion may submit one (1) application<br>Apply directly through NJTPA | NJTPA Subregions | Existing highway or bridge, pedestrian/bikeway facility | Planning, environmental | Provides funding to NJTPA subregions to prepare projects for construction using federal funding. The program involves completing the multi-step Capital Project Delivery Process which was developed by the NJDOT. This new process is designed to streamline project development and provide a common and consistent framework for federally funded projects at the local, regional and State level. | Discretionary | Local Capital Project Delivery (LCPD) Program - Info Link | https://www.njtpa.org/about-njtpa/contact-us | |
| Nationally Significant and Highway Projects | USDOT | $950 M for FY 2019; $1 B for FY 2020 | There are large project and small project thresholds. The Department may offer a project selected under this program credit assistance under the TIFIA program and may use amounts under the NSFHP to pay the subsidy and administrative costs required for such assistance | A State; A group of States; A Metropolitan Planning Organization (MPOs) that serves an Urbanized Area with a population of more than 200,000 individuals; A unit of local government; A group of local governments; A political subdivision of a State or local government; a special purpose district; public authority with a transportation function including a port authority; a Federal land management agency that applies jointly with a State or group of States; a tribal government or a consortium of tribal governments; a multistate or multijurisdictional group of entities aforementioned | A highway freight project on the National Highway Freight Network, a highway or bridge project on the National Highway System, a freight intermodal or freight rail project, a project within the boundaries of a public or private freight rail, water (including ports) and railway highway grade crossing or grade separation project | Planning, environmental, preliminary engineering, right of way, final design, construction | For large projects, the total projects must be reasonably anticipated to equal or exceed the lesser of $100 million or located in one state, 30% of the state's federal-aid highway apportionment in the most recently completed fiscal year; or located in more than one state, 50% of the amount apportioned to the state with the largest Federal-aid highway apportionment in the most recently completed fiscal year; For small projects, the Secretary shall consider the cost effectiveness of the proposed project; and the effect of the proposed project on mobility in the state and region in which the project is carried out | | NSHFP Info link | Benjamin Fischer<br>518-431-8863<br>Benjamin.Fischer@dot.gov | |