# 4. EXISTING CONSTRAINTS, RESOURCES AND DESIGN CONSIDERATIONS

## 4.1 Environmental Constraints

An environmental constraints assessment was conducted to inform the study. This assessment consisted of a screening-level investigation of known and presumed environmental and civic/social features present in the study area. Using Geographic Information Systems (GIS) software, data layers were displayed over aerial photography of the study area corridor, and areas of environmental or regulatory constraint noted.

Data sets for the Western Waterfront study area were obtained from the City of Jersey City through direct transfer of data, the New Jersey Department of Environmental Protection (NJDEP) through the New Jersey GIS clearinghouse (NJGIN), and directly from the NJDEP Bureau of Information Services and Program Support. Many data sets were examined. Only those with features mapped within the study area were included in the constraints screening. To verify that potentially critical constraints data were not overlooked, the following chapter describes the data type and source of data used, as well as data examined but found not to be relevant to the study area.

### 4.1.1 Federal Data

Floodplain mapping provided by the Federal Emergency Management Agency (FEMA) was used to identify 100 year flood zones within the study area. Two areas of 100-year flood zones were identified: Zone AE and Zone AH. Zone AE consists of 100-year flood zones where the base flood elevation (BFE) is known. For the study area, the BFE is nine feet above sea level. Any project improvements connected to the flood zones that are constructed at a lower elevation are likely to flood. This would apply to drainage pipes and other such connective infrastructure. Zone AH is the same as Zone AE with the added condition that flood depths of one to three feet have been known to occur within the zone.

### 4.1.2 Jersey City Data

To assist the mapping of constraints, the City of Jersey City made available all pertinent updated GIS shape file data. Shape files used specifically in this effort included the following:

- **Parcel Data** - Polygon shape file containing all parcels within Jersey City, identified by Jersey City's unique tax identification code. Each sheet of Jersey City's tax records is saved as a separate file, totaling 300 in all. The aggregation of this data is described in the Methodology section below.
- **Civic Points** – Point data shape file displaying institutional features, including parks, schools, and government facilities.
- **Zoning** – Polygon shape file containing current zoning for all of Jersey City.
- **Roads** – Line shape file containing all local roads, arterials, and highways within Jersey City. This shape file was preferred over existing NJDOT data, which may not have been as accurate on the local level.
- **Cemeteries** – Polygon shape file used to confirm the boundaries of a cemetery observed on aerial photography.
- **Bike Routes** and **Hackensack River Walkway** – Line shape files containing bicycle and pedestrian improvements as featured in the Circulation Element of the Jersey City Master Plan. These files were included to identify existing non-motorized circulation in the vicinity of Route 440/Routes 1&9T.

### 4.1.3 NJDEP Data

NJDEP data is the standard used by NJDEP in environmental screening for NJDEP permits; however, due to the statewide nature of the data, field verification is advised to confirm the accuracy of NJDEP data. NJDEP shape files used in this effort include:

- **Known Contaminated Sites** – Point shape file identifying the general location where a reported hazardous materials event occurred. The edition used was February 2006, the latest information available. Conversion of this data to parcel-based polygon data is described in Methodology, below.
- **Wetlands** – Polygon shape file containing wetland areas identified using 1986 land use/land cover data. These wetlands are known as "mapped wetlands." Field investigation is required to identify other wetland areas that may exist but are not reflected in the mapping.
- **Historic Fill** – Polygon shape file containing mapped areas of historic fill. The data was last revised and updated in February 2009. The historic fill data was developed by

NJDEP pursuant to the Brownfield Contaminated Site Remediation Act and used historic atlases dating between 1840 and 1910, supplemented by aerial photography. This data was used to supplement the 1887 Atlas data provided by Jersey City.

- **NJDEP Classification Exception Areas/Well Restriction Areas** – Polygon shape file containing mapped area of ongoing groundwater contamination monitoring. This data set was revised and updated in 2009.
- **Land Use/Land Cover** – 1986 polygon shape file containing all land use categories as published by NJDEP. This data was used to develop a shape file for Parks and Recreational facilities, verified by Jersey City parcel data.
- **NJDEP Green Acres** – Database provided by NJDEP listing the block and lots of county and municipal Green Acres parcels. Jersey City parcel data was used to convert this tabular data into a GIS polygon shape file.

### 4.1.4 Environmental Data without Features in the Study Area

The constraints screening sought to determine whether a variety of environmental features were present within the immediate vicinity of the proposed construction and would, by virtue of their presence, require modifications to the potential design schemes or result in additional cost of construction, the result of avoidance, mitigation, or additional planning to manage these features. Due to the heavily urbanized location, several layers of traditional constraints data were found not to exist within the study area. This data included the following:

- **Natural Heritage Priority Sites** – This shape file identifies areas critically important to conserve New Jersey's biological diversity.
- **State-Owned Preserved Land** – This shape file identifies open space and farmland areas purchased in fee by the State of New Jersey. This land is different from Green Acres land as described above.
- **Environmentally Sensitive Areas** – These are areas identified under the Permit Extension Act of 2008 and include the Pinelands, Highlands, and historic or previously identified environmental sites.

### 4.1.5 Methodology

The compact nature of the study area and goals of the Route 440/Routes 1&9T study required careful consideration in the application and interpretation of data. The following section describes the approach taken to maximize the usefulness of the available environmental and cultural shape file data.

#### *4.1.5.1 Definition of the Study Area*

The purpose of the Route 440/Routes 1&9T project is to improve existing and future safety, traffic operations, multi-modal mobility, and accessibility; to support and interconnect growth areas and livable communities along both sides of the corridor; and to support local and regional economic development. Furthermore, a goal of the Circulation Element of the Jersey City Master Plan is to improve the corridor to create an urban boulevard hospitable to pedestrians and bicyclists. The purpose and goals suggested the potential need for significant widening or relocation of the Route 440/Routes 1&9T corridor. Accordingly, the study area was defined broadly enough to support the examination of a number of potential corridor right-of-way alignments that were anticipated at the onset of the study process.

The study area was defined as the Newark Bay and Hackensack River waterfront from the Bayonne border north to Route 7 in Jersey City. The study area extends from the waterfront to a distance 1500 feet east of the centerline of Route 440/ Routes 1&9T. The 1500-foot distance is often used by Neotraditional planners to define the ideal walkable distance for pedestrian-oriented development. The study area, therefore, contains the existing road alignment and properties reasonably considered to be affected by any improvements within the existing roadway alignment. Some properties represent constraints, such as Green Acres parkland, that, to the greatest extent possible, should not be disturbed. Other properties, such as housing and bicycle routes, may be considered to be origins or destinations that future redevelopment plans may want to consider linking through non-motorized modes of travel.

#### *4.1.5.2 Aggregation, Clipping, and Redefinition of Data*

All shape files with the exception of parcel data were clipped to the study area boundary. Parcel data, which exists in separate sheets based on the tax assessor's atlas, was aggregated by combining all sheet shape files that fell within or were crossed by the study area boundary.

Civic Point data is displayed as point data, representing potential origin/destination locations for consideration in developing linkages between community resources. Civic Point data included a variety of government and social uses, but not all were sufficiently identified in the data attribute file. That is, a point was included in the data set, but the supporting data was incomplete such that it was not clear what type of use was represented. Of 174 Civic Points found within the study area boundary, only 51 were named. Only named points were displayed on the constraints maps. One point, indicating public housing, appeared north of the Pulaski Skyway on a lot that aerial photography indicated was occupied by industrial uses. This point was deleted. The remaining, unnamed points may be included following a more intensive research and mapping effort.

#### *4.1.5.3 Known Contaminated Locations*

The mapping of potential hazardous materials constraints data required extensive verification and conversion to be useful in the constraints analysis. Known contaminated location (KCL) data is compiled by NJDEP and published in a GIS-compatible data set as point data. Each point represents one hazardous materials event or report assigned a case number by NJDEP. Attribute data associated with each point identifies the street address of the case, business name at the time of the event or report, bureau responsible for monitoring remediation, and status. Block and lot data is not provided in the NJDEP KCL data set.

**It is important to note that the sites mapped as known contaminated locations represent the probable location of hazardous materials within the study areas. However, contaminated materials are not confined to these locations. Given the density of known contaminated sites, limitations of data accuracy, and presence of historic fill, field investigation is necessary to establish the presence or absence of contaminated materials prior to initiating any disturbance in the study area.**

The methodology used by NJDEP is not immediately useful for developing a parcel-based constraints analysis. Point data does not represent an area, only a point of data. Additionally, one event or report may cover a range of street address, for example, “5 -11 E. Main Street.” One point would be used although four individual parcels are likely affected. Conversion of the point data to parcel data was deemed necessary to present a more accurate picture of potential hazardous materials contamination in the study area.

The conversion of NJDEP KCL data required review and verification of the addresses provided by the KCL attribute data, then conversion of addresses to block and lot data mappable using

parcel data provided by Jersey City. New Jersey Parcel Maps Online (NJPM Online), a subscription service, was used to convert address information to parcel information. NJPM Online was necessary as Jersey City digital parcel data did not include street address information.

The verification and conversion of KCL address to parcel data was complicated by several factors. First, NJDEP address data is, in many cases, nearly 20 years old. Of the 71 KCL sites in the study area, 30 cases were initiated in 1993 or earlier. An additional 22 were initiated between 1994 and 2000. As a result, only 19 of the 71 cases were opened by NJDEP in the last ten years. All but one of the older cases has received a No Further Action (NFA) letter. The remainder were still active remediation or monitoring sites according to NJDEP data and should be mapped as contaminated constraints. The challenge in mapping these older parcels was overcoming nearly two decades of real estate changes affecting the study area, including lot line adjustments and consolidation of parcels.

The two parcel nomenclature schemes used by Jersey City were a further complicating factor. It is the understanding of the study team from conversations with Jersey City staff that parcel data is reported in at least two schemes, which are being consolidated into one universal program for parcel data identification. While the newer parcel naming system is being implemented, some parcel tax information is still recorded in the old system, but some is reported in the new lot numbering system. As a result, street addresses that were found by NJPM Online often could not be found on the associated tax maps. Although the parcels existed, the parcel name in the record was the old system, while the tax map showed both the old and new parcel name. In most instances, the relationship between a parcel and its two identifiers was clear enough after a careful review of tax maps. For example, 555 Route 440 was identified as parcel 1290.A-1E in the tax records, but when the tax map was requested, no such parcel existed. Lot 1290.A-1E was also recorded as Lot 1290.A-2, which was mapped.

Discrepancies between the recent digital parcel data provided by Jersey City and tax map data available through NJPM Online presented another obstacle. Jersey City parcel data showed aggregations of lots that were still reported as separate lots by NJPM Online, and not all parcels in the digital data set were assigned block and lot identification. In the example above, lot 1290.A-2 was not named as such in the parcel data set. That lot and lots adjacent to it were identified as “4.” Other parcels were collectively identified as “1.” The tax map data from NJPM Online was used to identify which of the “4” lots corresponded to 1290.A-2, and the unique FID code assigned by ArcMap for each polygon was used to distinguish between these unnamed parcels in the digital data set. For example, 1290.A-2 is associated with FID 9076;

1290.A-5 is FID 9073. Use of the FID code allowed the unnamed parcels to be mapped in ArcMap. When tax record data indicated one lot was affected but the Jersey City digital parcel data indicated that the parcel was now part of a larger lot composed of that lot plus others, the entire larger new lot was identified as the known contaminated site.

The last and most difficult issue consisted of those circumstances where no street number was given by NJDEP in the address field, or the address was nonsensical, and the case name provided no clues as to the use, which could have informed an aerial photography review of the area. For example, NJDEP Case 64060 was identified as "HUDSON COUNTY CHROMATE 70" and the address was given only as "COMMUNIPAW AVE." Tax records do not identify the owner or use as "Hudson County Chromate 70." As a result, NJDEP KCL point data was used to identify the likely affected lot. If the point data fell on the lot, the lot was considered to be the affected parcel. If the point was located on a parcel but adjacent to the property line, it was assumed that the adjacent parcel was the affected lot. This methodology was indicated by confirmed instances of points placed in the roadway rights-of-way adjacent to parcels fronting the street. The parcel whose property line touched the point was the known contaminated parcel.

**It is important to note that the sites mapped as known contaminated locations represent the probable location of hazardous materials within the study areas. However, contaminated materials are not confined to these locations. Given the density of known contaminated sites, limitations of data accuracy, and presence of historic fill, field investigation is necessary to establish the presence or absence of contaminated materials prior to initiating any disturbance in the study area.**

Three of the KCL points could not be mapped:

- HUDSON COUNTY CHROMATE 187; SITE ID 64434
  - Address was given as "Route 440 & Danforth Ave & Carbon Place"
  - Carbon Place and Danforth Avenue both intersect Route 440, but do not intersect each other. The distance between Danforth Avenue and Carbon Place covers several city blocks.
  - Without a north-south roadway named east of Route 440, it was not possible to determine with certainty how large this area may be, assuming that the streets named in the address represent eastern, northern, and southern boundaries.
  - The area potentially included in this location was included in several other KCLs, so the potential for contamination is identified even without mapping this case.
- NJDOT ST PAULS AVE BRIDGE; SITE ID 79794; and,

- HACKENSACK RIVER BRIDGE; SITE ID 67738
    - Both are located within the street right-of-way and do not have parcel identifiers.

#### *4.1.5.4 Horizontal Limits of Contamination*

NJDEP additionally provided HazSite data representing monitoring locations (wells and test pits) for 34 of the 71 KCL sites within the study area. HazSite data was not used in the development of the constraints report for the following reasons:

- **Inconsistent Coordinate Systems –** There is no standard coordinate system used by NJDEP case managers to log HazSite data. As a result, displaying 34 sets of HazSite would have required manipulation of each data set to establish a coordinate system that would have allowed all data sets to display correctly. This process opens the analysis for potential errors.
- **Known Inaccuracies –** NJDEP HazSite staff indicated that there were likely errors in some data sets. Without knowing which points were correct and which were errors or artifacts, the 34 data sets could not be coordinated and projected with confidence. For example, it could not be known whether a point located in the Hackensack River is the result of a coordinate system or projection error, or was itself an error in data input at NJDEP, or was a correct identification of river bottom contamination.
- **Usefulness of the Data –** If the above two issues could have been easily addressed, the issue of the usefulness of the data remains. The HazSite data shows where contaminants are located, not where they are not located. Any boundary drawn from the HazSite points would only indicate where contamination was present at the time of the sampling. The data would not indicate the line where contamination ceased to be identified in sampling.
- **Potential for Misinterpretation –** Although it represents a more detailed level of analysis, HazSite data does not represent definitive boundaries of contamination. Field verification is required. Inclusion of HazSite data in the constraints report carried the potential of inadvertently misleading decision-makers and the public into thinking that the HazSite data represents the final determination on the boundaries of contamination.

#### *4.1.5.5 Graphic Design and Display*

Due to the volume of information generated by the constraints analysis, three maps of the study area were prepared. Figure 4.1: Known Contaminated Properties and Areas of Potential Hazardous Material Contamination depicts historic fill, known contaminated locations (modified as described above), flood zones, and groundwater contamination areas indicated by Classification Exemption Areas (CEAs). Figure 4.2: Civic and Natural Constraints depicts non-hazardous constraints, including wetlands, Green Acres properties, Civic Points, bicycle routes, major developments, and other such features. Figure 4.3: All Constraints is a composite of the hazardous and non-hazardous features maps.

**Figure 4.1: Known Contaminated Properties and Areas of Potential Hazardous Material Contamination**

**Figure 4.2: Civic and Natural Constraints**

**Figure 4.3: All Constraints**

## 4.1.6 Summary of Findings

### *4.1.6.1 Environmental Constraints*

***Historic Fill and Known Contaminated Properties*** - The Route 440 right-of-way is underlain by historic fill for its entire length. South of Kellogg Street, the fill is found on the east and the west sides of Route 440/ Routes 1&9T. Between Kellogg Street and Communipaw Avenue, the fill is primarily confined to areas beneath and west of Route 440/ Routes 1&9T. From Communipaw Avenue to the Pulaski Skyway, the fill extends from the Hackensack River waterfront to approximately 300 feet east of Route 440/ Routes 1&9T.

The presence of historic fill is significant, particularly for this area of the state. Jersey City's waterfront was under continual development dating back at least as far as the 1887 Atlas provided by Jersey City. Fill was placed to raise the riverfront, protect development from erosion, and level the ground for construction projects. More recently, Jersey City's waterfront areas were used as fill sites for industrial waste, much of which has been found to contain chromium.

**The presence of historic fill does not necessarily indicate the presence of hazardous material contamination; however, given the history of the area, there is likelihood that the fill is contaminated in some locations. Field verification is required to ascertain the type and extent of contamination attributed to historic fill.**

The study area contains 71 known contaminated sites. Contaminants found on these sites are listed in the Appendix 4.1 by case number. Seven of these sites are monitored under NJDEP's Classification Exception Areas (CEA) / Well Restriction Area program. These are sites where New Jersey Ground Water Quality Standards (NJGWQS) have been exceeded for specific pollutants. The pollutants identified in CEAs have the potential to migrate with groundwater flows. The most significant of the CEA sites is the PJP Landfill, which is also included in the known contaminated sites list. The groundwater at this location is contaminated with volatile organic compounds as well as metals.

Three properties received limited No Further Action (NFA) letters, indicating that these properties had completed their remedial efforts, but the reuse of the site is limited to certain uses that are compatible with the potential for some residual contamination. The three limited NFA properties include:

- Gaines Motor Lines Inc; Site Id 50431; Block 1775.1 Lot 90
- M. Pasaelinsky & Sons Inc; Site Id 45508; Block 1287.A Lots 9 And 11
- Pegasus Industrial Center; Site Id 54900; Block 1622 Lot S

Exposure to potentially-contaminated materials during construction is a matter of health and safety for construction personnel as well as for the surrounding community. Direct skin contact and inhalation, as well as exposure to contaminated groundwater are concerns that will need to be addressed through a health and safety plan developed and implemented prior to any disturbance in the study area. The plan will also be required to include measures to prevent the escape of contaminated dust, which can pose a health risk for residential and commercial uses in the area. Best management practices can minimize most of the risk associated with construction in areas of known contamination.

#### *4.1.6.2 Flood Zones and Wetlands*

Several areas designated as 100-year flood zones, designated Zone AE and AH, are found between the Hackensack River waterfront and Route 440/Routes 1&9T. The majority of Lincoln Park is within the AE zone, which, in this location, extends across Routes 1&9T. The flood zones in the study area have an established base flood elevation (BFE) of nine feet. Any proposed construction work that would connect with the identified flood zones would require special consideration if the improvements are proposed to be constructed at an elevation lower than nine feet.

NJDEP mapping indicated 20 areas of mapped wetlands within the study area. Typically, a 50-foot buffer is assumed to be required when work is to be conducted in the vicinity of mapped wetlands; however, the proximity of the resource to the potential construction areas does not allow for a 50-foot buffer. Disturbance of wetlands, if it occurs, will require wetlands take permits and mitigation at a ratio ranging from 2:1 to 4:1, based on the quality of the resource.

Two of the wetland areas are located on the known contaminated PJP Landfill site adjacent to Routes 1&9T southbound. The limits of these wetland areas as identified on the NJDEP mapping come to approximately 20 feet of the western pavement edge of Routes 1&9T. These wetlands are identified as modified and disturbed, possibly requiring the lower-end range of mitigation. The remaining wetland areas are identified as PEM1B and PEM1E, potentially requiring the greater mitigation ratio of 4:1.

Field reconnaissance is required to confirm the presence and quality of these wetland areas and identify other wetland resources not included in the NJDEP's generalized mapping. A threatened and endangered species survey is usually required when habitat areas, including wetlands, are identified within an area proposed for development. This survey may be conducted concurrently with the wetland field assessment during preliminary engineering.

#### *4.1.6.3 Green Acres and Recreational and Open Space*

Lincoln Park, located in the northern section of the study area corridor, bisected by Routes 1&9T, is a County recreational facility covered by the NJ Green Acres program and the New Jersey County Park Commission Act. The entire park property was purchased in fee to remain as a recreational facility; consequently, any taking of parkland for non-recreational uses, including road widening projects, is subject to the Green Acres vacation process. The Green Acres vacation process requires documentation of the need for the taking, alternatives including land swaps and/or financial compensation, and at least one public hearing. The Green Acres process can take as long as a year to complete. Under the County Park Commission Act, there is no known process for vacating land that is to be used for a roadway improvement.

Holy Name cemetery, operated by the Roman Catholic Archdiocese, is located north of Lincoln Park on the east side of the Routes 1&9T right-of-way. The cemetery abuts the existing highway right of way. Impacts to this civic resource are best avoided.

#### *4.1.6.4 Civic Opportunities*

Civic Points within the study area identify opportunities for connectivity between existing civic resources and the proposed urban boulevard. Existing bicycle routes, the Hackensack River Walkway, and Civic Points were reviewed to identify convergences of and potential linkages between these features.

One significant aggregation of civic features occurs east of Route 440, in the city blocks bordered by Audubon Avenue and Culver Avenue. This area contains several academic, religious, and government facilities and is crossed by a bike route. Opposite this area on the west side of Route 440 will be the planned Hackensack RiverWalk. The combination of existing resources in this area indicates the potential for pedestrian and bicycle flows across Route 440; consequently, improvements to facilitate movement across Route 440 may be a valid

consideration at this location. Additional locations may be identified as additional civic parameters are defined in the future.

#### *4.1.6.5 Conclusion*

Improvements that would impact a constrained location could potentially invoke additional regulatory processes, extending the project schedule or adding to the cost of corridor improvement. The analysis identified a number of constraints that would best be avoided and some that must be avoided in the implementation of corridor improvements. Specifically, two areas of typical environmental constraint and one area of administrative or regulatory constraint were identified in the data review.

The environmental constraints include the known contaminated properties/CEAs and wetland areas. Although the health risks associated with exposure to known pollutants can be severe, contaminated soils and groundwater are not insurmountable obstacles to the redevelopment of the Route 440/Routes 1&9T corridor. Given the history of the general vicinity, it is likely that most, if not all, development and redevelopment projects (both public and private) must contend with contaminated materials. Available technology and best management practices can be employed to reduce the risk associated with disturbing known contaminated areas. As a consequence, encroachment into the mapped areas of contamination should not be considered a fatal flaw in the development of a preferred corridor improvement alternative. Additional consultation with NJDEP may be required in the preliminary engineering phase of project development subsequent to the identification of a locally preferred alternative.

Wetlands have been mapped adjacent to the paved surface of Route 440 and Routes 1&9T, but the NJDEP mapping is generalized and may not accurately represent existing conditions in the field. Field reconnaissance, including delineation of wetlands, will likely be required in the preliminary engineering phase to confirm the presence and quality of wetland areas within the limits of construction and estimate the potential impacts to these resources. Given the highly urbanized area, it is unlikely that the wetland areas located between the paved surface of Route 440/Routes 1&9T and development to the west are high-quality wetlands requiring extensive buffering that would constrain road widening. For the purposes of concept development, wetland areas should be considered a feature of greater potential constraint than contamination, but not fatal flaws.

Lincoln Park, a Green Acres facility, represents a notable regulatory constraint. The taking of parkland for \ non-recreational uses requires processing by NJDEP's Green Acres vacation process. The vacation process can take up to a year, involves public hearings, and is focused on the replacement of recreational land with undeveloped land (as opposed to financial compensation), which is scarce in Hudson County. Lincoln Park was created by the former Hudson County Parks Commission. The Parks Commission was established under New Jersey Revised Statutes 40:37-96 to 40:37 174. Within this enabling legislation, RS 40:37-133 addresses the obligation of the Parks Commission to "keep and maintain its parks system perpetually for the public benefit without extraneous diversions". While the Parks Commission has been abandoned, the park properties created by the Commission are still bound by the conditions of the enabling legislation. Accordingly, simple acquisition of property within Lincoln Park for non-park use is prohibited. For these reasons, the avoidance of impacts to Lincoln Park is highly advisable.

## 4.2 Sub-Surface Utilities

Improvements to the Route 440/Routes 1&9T corridor will likely require relocation of existing subsurface utilities, or the incorporation of special measures to protect the integrity of existing utility infrastructure that may otherwise be impacted by the construction of a corridor alternative. To inform the study of potential constraints or the need for special consideration related to existing utility infrastructure, an inventory of existing utility infrastructure was performed. This effort, described in detail below, identified potential constraints and special conditions that would affect the development of boulevard alternatives.

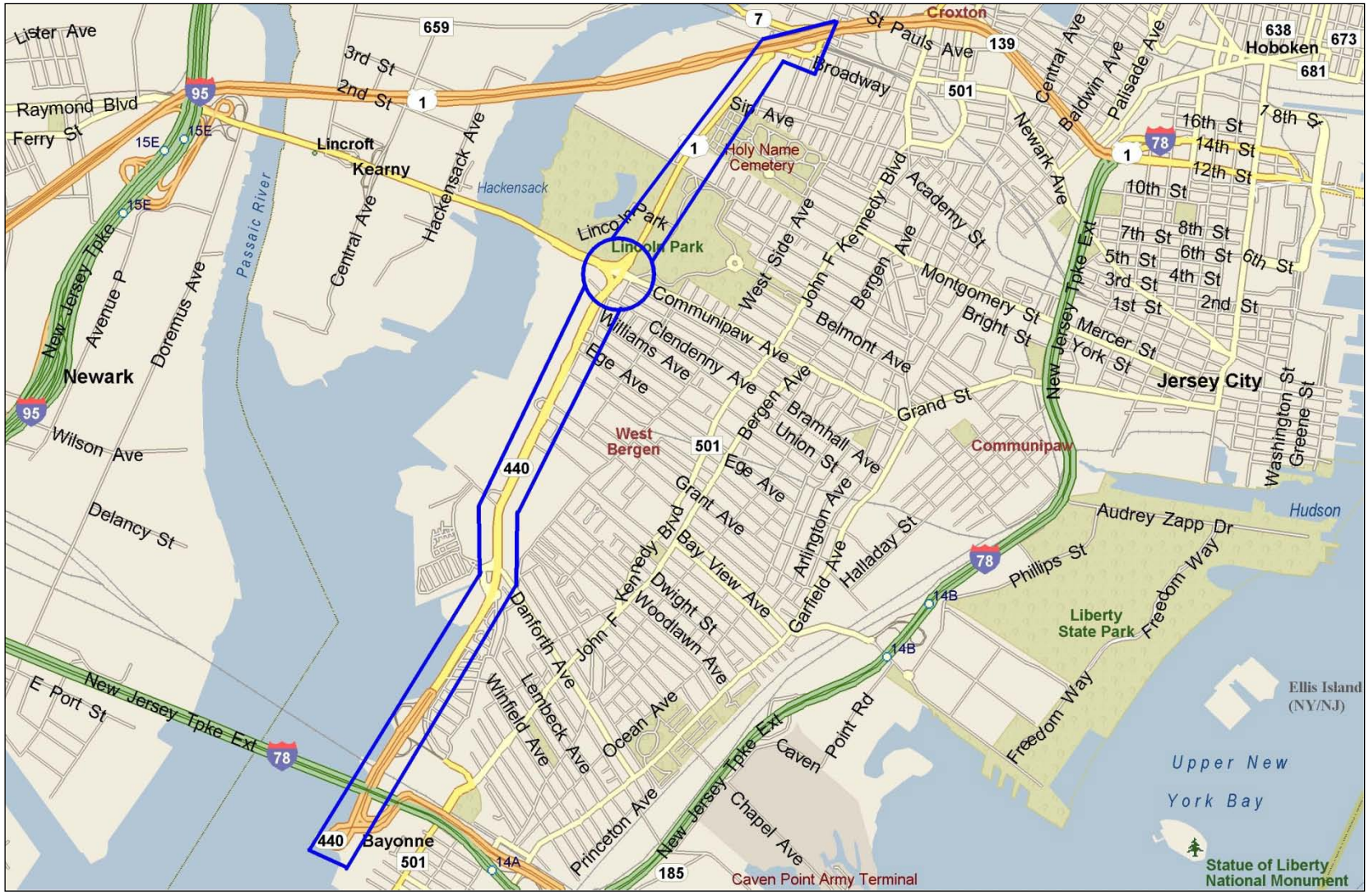
### 4.2.1 Assembly of Available Data

As a first step in the identification of significant existing utility infrastructure, an area of interest was defined. This area (Figure 4.4) extends from the Jersey City border with the City of Bayonne to the intersection of Routes 1&9T with NJ Route 7. The primary area or interest was defined as being generally centered along the existing Route 440/ Routes 1&9T roadway, extending approximately 400 feet to each side of the roadway centerline.

Written requests for data and information were submitted to all of the utility owners in the study area. The letter requests included a copy of the Figure 4.4 map, provided an overview of the project, and stated the need to identify and determine which facilities and utility infrastructure exist within the study area that would be problematic and costly if impacted. The following municipal utility authorities and private utility owners were contacted as part of this effort.

- Jersey City Municipal Utilities Authority (JCMUA)
- Bayonne Municipal Utilities Authority (BMUA)
- Secaucus Municipal Utilities Authority
- Passaic Valley Sewerage Commission
- North Hudson Sewerage Authority
- Hess Corporation
- International-Matex Tank Terminals
- PSE&G
- AT&T
- Cablevision
- Williams
- Verizon
- Comcast

**Figure 4.4: Utility Investigation Study Area**



Information was received in various forms (plan sheets, verbal commentary, e-mail descriptions, etc). Following is a summary of the potentially significant utility infrastructure that exists within the subject corridor. These facilities are depicted on maps in Appendix 4.2.

**Water Supply Facilities**

- 12-inch water line which runs in Route 440 from Danforth Avenue to Clendenny Avenue.
- 16-inch water main along Routes 1&9T from Duncan Avenue to Broadway Avenue.
- 20-inch water main at the intersection of Route 1&9T with Broadway Avenue.
- 42-inch BMUA water line which runs within the median of the Route 440/Routes 1&9T corridor from Danforth Avenue to Clendenny Avenue.
- 48-inch combined sanitary and waste water sewer line which runs within the center median of Route 440 from Danforth Avenue to Clendenny Avenue.

**Sewer Facilities (City of Jersey City and the City of Bayonne Municipal Utilities Authorities)**

- 24-inch sewer crossing under Routes 1&9T from Newark Avenue
- 72-inch reinforced concrete pipe (RCP) within Route 440 and Routes 1&9T from Broadway to Carbon Place (Westside Pumping station)
- 44-inch x 72-inch sewer crossing under Routes 1&9T from Sip Avenue
- 42-inch concrete brick (CB) sewer crossing under Routes 1&9T from Duncan Avenue
- 106-inch x 68-inch and 60-inch sewer crossing under Route 440 from Clendenny Avenue
- 48-inch sewer crossing under Route 440 from Claremont Avenue
- Near Fisk Street and Route 440 (Westside Pumping Station), the following utilities were identified:
    - 54-inch force main crossing under Route 440 from Pollock Ave.
    - 96-inch sewer crossing under Route 440 from Fisk Street
    - 36-inch sanitary force main (Bayonne MUA) in Route 440/Fisk Street to Danforth Ave.
    - 48-inch interceptor sewer from Route 440/Carbon Place to Danforth Ave.
- Within the Route 440 right of way near the intersection with Danforth Ave:
    - 48-inch CB sewer
    - 96-inch RCP sewer
    - 53-inch 83-inch Horizontal Elliptical Reinforced Concrete Pipe (HERCP)
    - 96-inch RCP sewer crossing under Route 440 from Mina Ave.

**Fuel / Oil Facilities (Hess)**

- 14-inch fuel oil pipeline within a 48-inch casing crossing under Route 440 at southern end of the study corridor roughly paralleling the CSX (former Lehigh Valley RR) tracks.

**Outfall Tunnel (Passaic Valley Sewerage Commission)**

- 126-inch wide by 150-inch high effluent outfall tunnel crossing under Route 440 just north of 63rd Street. This tunnel is extremely deep with an invert elevation 250 feet below sea level. It is not considered to be a constraint.

**Electrical**

- 138 kv underground electrical transmission line traversing Route 440 from south of Danforth Avenue to Communipaw Avenue along the western edge of the right of way.

**Gas**

- 24-inch natural gas transmission line within Route 440 from south of Danforth Avenue to Communipaw Avenue

**Communication (Verizon)**

- Verizon responded that they did not feel there would be any impacts to their central offices or controlled environmental vaults (CEV).
- Verizon maintains overhead lines running the length of the corridor and periodically crossing Route 440 and Routes 1&9T. These overhead lines are not considered a constraint in that they can be readily relocated if needed.
- Verizon maintains underground conduits at a variety of locations. These locations are primarily at existing major intersections. Relocation and/or extension of the conduits may be required at various locations based upon the configuration of the final boulevard alternative selected for advancement.

In addition to the major utility lines that run within, along and across the corridor, the JC MUA maintains a series of combined sewer regulators along the western side of the Route 440 corridor. Access to these regulators for routine inspection and maintenance operations must be maintained in the future. Three of these regulators are located within 60 feet of the existing western edge of the Route 440 right of way within the area reserved for construction of the boulevard and complete street. These locations include:

- Within the Culver Avenue jughandle on the southwest quadrant of the intersection of Route 440 with Culver Avenue.
- Within the southwest quadrant of the intersection of Route 440 with Claremont Avenue.
- West of Route 440 across from the intersection with Clendenny Avenue.

Redesign and relocation of the combined sewer system that serves the study area must relocate these three regulators to locations that are accessible for maintenance and inspection without obstructing traffic flow along the boulevard and complete street.

## 4.3 Geotechnical Screening

The majority of the alternatives proposed for the Route 440/Routes 1&9T corridor would involve disturbance to the roadbed. In some instances, the work proposed would require shallow digging to expand the cartway of the highway; in other instances, the proposed construction would involve a tunnel or underpass, requiring a more substantial quantity of earthwork. While the constraints screening performed for the study corridor provided an overview of geotechnical issues, a more focused effort is warranted given the potential for significant excavation proposed under some alternatives.

The geotechnical survey investigated an area 600 feet in width centered on the center line of Route 440/Routes 1&9T and Lincoln Highway. The soil and geotechnical data described below was provided by Rutgers University "Engineering Soil Survey of New Jersey" for Hudson County, augmented by soil boring data obtained through the New Jersey Department of Transportation on-line database.

### 4.3.1 Site Location and Geology

The study area is located in Hudson County, which lies entirely in the Piedmont Plateau subdivision of the Appalachian geographic province. Geologically, Hudson County can be divided into two generalized areas. The western section is categorized by areas of tidal marsh. The eastern portion is a broad ridge, which forms a continuation of the Palisades. The Hackensack River runs roughly through the middle of the county, while the Passaic River forms much of the western boundary. The rivers meet at Newark Bay.

The study area runs mainly north to south, along Newark Bay and the Hackensack River, within Jersey City and Bayonne, New Jersey. The Route 440/Routes 1&9T corridor is immediately adjacent to Newark Bay along the very southern portion of the study area, while the northern portion of the corridor is slightly more inland.

### 4.3.2 Subsurface Conditions

Route 440/Routes 1&9T is generally located along a poorly defined boundary of two soil types; Marine Tidal Marsh and Glacial Stratified Drift, both intermixed and/or covered with Fill[1]. Generally, the Tidal Marsh soils underlie most of Route 440/Routes 1&9T and the land west toward the river. The Glacial Drift materials can generally be found east of Route 440/Routes 1&9T, especially within the middle section of the study area.

The Marine Tidal Marsh is of marine origin, composed of silty clays deposited in salt water during the recessional period of the Wisconsin Glaciation. The soil type is characterized by stratified silts and clays that are usually very soft and highly compressible.

The top two to five feet of the stratified silty clays are intertwined with, and underlain by, organic, swampy deposits in such an inconsistent pattern that separation is extremely difficult. The organic layer consists of decomposed roots from tidal marsh plant growth. The marsh areas tend to have poor drainage and low permeability due to the high silt and clay content.

The Fill layer represents all man-made fill placed over the natural deposits. The material composing the Fill was placed, usually, to cover unsatisfactory soils or to raise the ground surface above the water level. The Fill constituents were frequently industrial or municipal waste. Fill can also contain miscellaneous construction material including sand, gravel, cinders, and brick. The thickness of the Fill layer varies throughout the area. The filled areas have extended well beyond the natural shoreline, and frequently overlie recent soft, silty riverbed deposits. Additionally, the Fill placed over the Tidal Marsh is mixed with the marsh soils such that separation of these individual layers is also not practical.

Underlying the marine organic material is a thick, stiff deposit of varved, or alternating layers of, silts and clays. This layer is a result of underwater settling of the silt- and clay-size particles that occurred during the recession of the Wisconsin Glacier. A dense to very dense granular deposit is typically found below the varved silt and clay layer and above bedrock. The stratum generally consists of a dense matrix of sand and gravel with varying amounts of silt and occasional boulders.

[1] Note that in this section “Fill” represents a specific soil type and is therefore capitalized per the conventions of geotechnical science.

The Glacial Stratified Drift material was designated but not well defined within the study area. The Drift is comprised of sands and gravels, with silt and clay of varying proportions.

The underlying bedrock formation is diabase; however, some borings describe a grey and/or tan sandstone. Just east of the study area, bedrock can be encountered under a shallow mantle of glacial ground moraine or the glacial drift material. When bedrock was encountered within the study area, it was typically at a depth greater than 90 feet.

The New Jersey DOT on-line database findings, which included soil boring location plans and soil boring logs, are presented in Appendix 4.3. The database search revealed three areas where soil boring data was available. The three areas are depicted on Figures 4.5, 4.6, and 4.7, as Sites A, B, and C, respectively. The subsurface soil conditions indicated on the test boring logs are typical of the geology of the Hudson County area and were used to supplement the subsurface conditions described above. The depth of each layer varies along the length of the study area.

**Figure 4.5: Historic Soil Boring Log Location A**

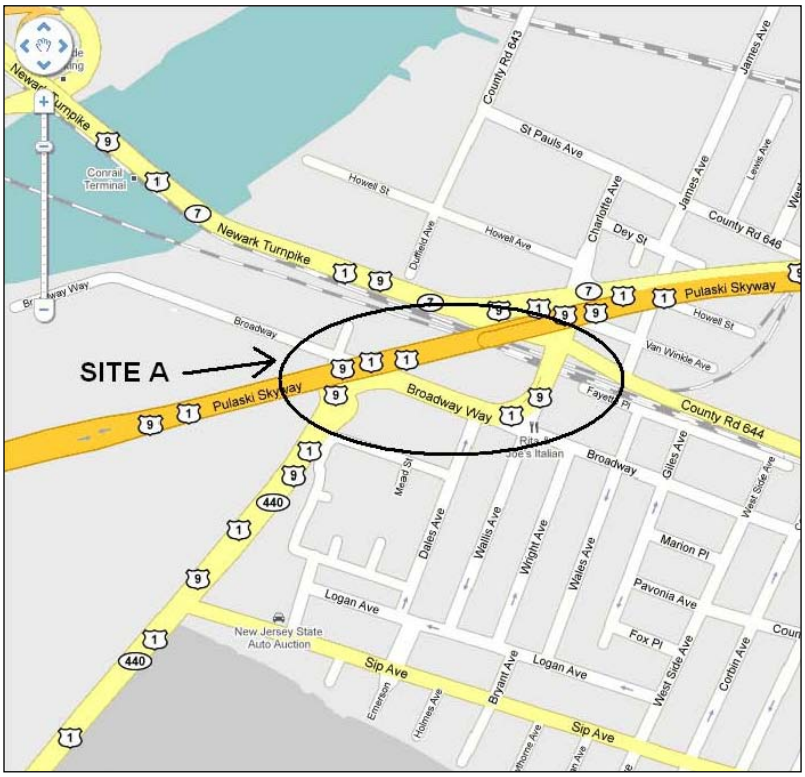


**Figure 4.6: Historic Soil Boring Log Location B**

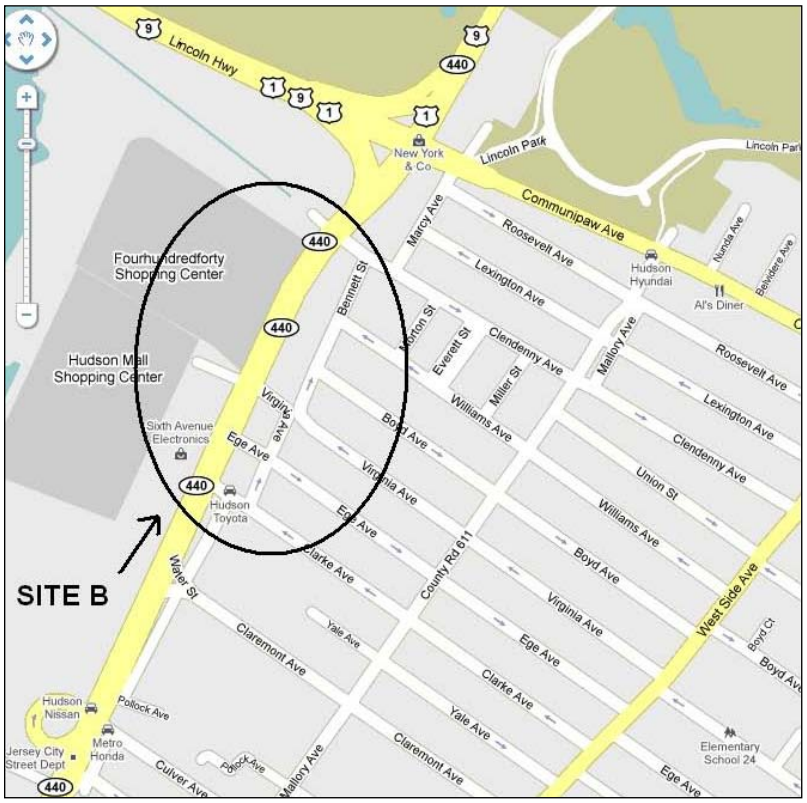
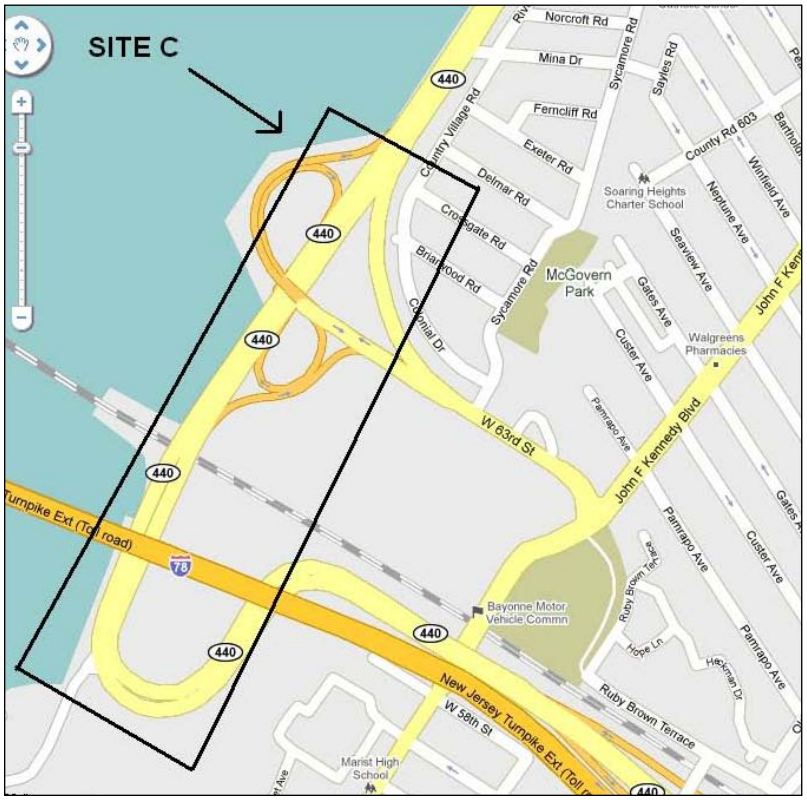



**Figure 4.7: Historic Soil Boring Log Location C**



### 4.3.3 Conclusions

The surficial soils are typically Fill, comprised of a wide range of materials. The thickness of the Fill can vary significantly, and is generally underlain by soft organic silt intermixed with organics, quite often with a high percentage of organics. The pavement section design will depend on the type and consistency of the fill material. As the majority of the soil boring data is from the 1960s and modifications to the land may have occurred since the original soil survey report and boring tests, pavement designs to be performed in the future will require new soil borings along the proposed roadway alignment.

The compressibility of the existing soils presents a significant design consideration with respect to the existing subsurface utilities located within and adjacent to the roadway corridor. Subsequent to identification of the Locally Preferred Alternative, a supplemental investigation of potential effects on underground utilities was conducted. The supplemental investigation was initiated based upon the potential implications of two elements of the LPA: elevation of the corridor along the central section (Danforth Avenue to Communipaw Avenue) and the desire to plant trees within the medians in the central section.

Many of the major subsurface utilities that exist within and adjacent to the existing right-of-way are older system. These systems could be damaged by additional loads and vibrations from vehicular traffic, if the alternative includes locating roadway lanes above the utility alignment. In a number of locations along the corridor, the existing road surface is below the base flood elevation for a 100-year storm event. Elevation of the road surface through the addition of fill material would increase the dead load along the corridor, resulting in some level of compression in the existing soil layers below. This compression could introduce a flexing in the existing utility lines resulting in damage to the utility infrastructure. This is particularly true with respect to the existing force main that runs along the eastern edge of the right of way.

This 36-inch diameter force main owned by the Bayonne Municipal Utilities Authority (BMUA) currently runs parallel to the Route 440 corridor along the northbound side just east of the existing roadway right-of-way line. The line parallels Route 440 from Danforth Avenue to Carbon Place. Along this section, the force main is constructed at varying depths along Route 440, with the top of pipe in some sections being approximately 1 foot beneath the surface (at Kellogg Street and along the section south of Carbon Place).

The line was constructed using Prestressed Concrete Cylinder Pipe (PCCP) (Figure 4.8). This type of pipe consists of steel cylinder lines on the inside and outside with concrete. The pipe is further wrapped with a sheet of pre-stressed steel wires, allowing the pipe to accommodate higher internal pressures. This type of pipe cannot be cut in mid-section, as breaching of the steel wires adversely affects the strength of the pipe.

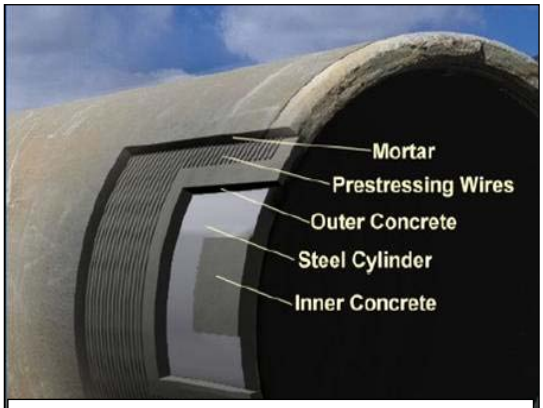



**Figure 4.8**
**Typical Prestressed Concrete Cylinder Pipe**

Geotechnical investigations and a review of soil boring logs along the corridor indicate the existence of compressible soils throughout the area. Elevation of Route 440 by 4± feet would add a considerable static load above the pipe and would create compression in the soil layers both above and below the force main. While compression of soil above the pipe does not present a significant concern, compression of the soil layer below the force main would result in some amount of deflection of the pipe. This deflection could potentially damage the steel wires that reinforce the pipe, resulting in reduced structural integrity and an increased potential for failure of the pipe. Leakage resulting from failure of the pipe would present a human health risk.

Therefore, any increase in elevation of the surface grade would likely require replacement of the force main in either the current alignment or in a new alignment. Use of alternate materials that are not as sensitive to deflection should be considered in the design of the relocated force main. As for location, it is recommended that the replacement force main be constructed in a new alignment (as opposed to replacement in its current location) so that the existing force main may remain in operation during construction. Ideally, the new force main should not be located beneath travel lanes, and should be situated to facilitate ease of access in the event that future repairs or maintenance are necessary. Locating the force main beneath the bike lane to be constructed in the minor median of the boulevard would satisfy these location considerations.

In addition to the force main, a water main owned by the BMUA and a combined sewer line owned by the Jersey City Municipal Utilities Authority (JCMUA) are located within the center median of Route 440. These pipes could potentially be affected by the additional static load that would result from elevation of the roadway by 4± feet. Accordingly, it is recommended that these pipelines be reconstructed in a new alignment beneath the bike lane to be

constructed in the minor median along the southbound side of Route 440. Design of these new pipelines should consider the future demand that will be placed upon them by the anticipated future development and be sized accordingly.

## 4.4 Cultural and Historic Resources

The development of potential Route 440/Routes 1&9T alternatives may necessitate alterations to the existing environment. To inform the study of potential constraints related to cultural resources, a cultural resources survey was performed. This effort, described in detail below, identified potential cultural constraints as well as opportunities for incorporating cultural resources in the redesign effort.

The cultural resources survey involved three phases: identification of the Area of Potential Effect (APE), document research, and field reconnaissance. All phases of the study occurred between August 31 and November 30, 2009. The study area covered the Route 440/Routes 1&9T corridor from the City of Jersey City/City of Bayonne boundary to NJ Route 7, a distance of approximately 3.6 miles.

### 4.4.1 Definition of the Area of Potential Effect (APE)

The initial step in the analysis involved the definition of the Area of Potential Effect (APE) for the project corridor. The APE was established based on the area of potential disturbance to existing structures and potential buried resources and covered the maximum anticipated extent of construction work on Route 440/Routes 1&9T. The APE was defined as a 400-foot-wide corridor centered on the existing centerline of Route 440/Routes 1&9T. Within this corridor, all historic architectural, archaeological, landscape, and linear transportation resources of potential concern were identified, including resources already in receipt of an historic designation or evaluation.

### 4.4.2 Document Research

The second step in the analysis involved the compilation of background research information on the study corridor, with a particular emphasis on gathering historic maps and historic aerial photographs. In addition, information concerning all previously identified historic architectural

and archaeological resources in the project vicinity was assembled, including details of resources that have previously received historic designation at the federal, state and local levels. City and state agency cultural resource files were also consulted, and technical reports from earlier cultural resource studies conducted in the area were reviewed. Published secondary sources on the history of Jersey City, the Morris Canal and area railroads and highways were studied for relevant information. Finally, the as-built plans for Route 440/Routes 1&9T, dating from 1965, were examined for pertinent data on the location and potential survival of cultural resources.

A large number of historic maps and aerial photographs exist for Jersey City. A series of these were carefully selected for detailed analysis.

Background research was conducted primarily in Jersey City and Trenton. Data was gathered from the following agencies and repositories: the New Jersey State Library; the New Jersey State Archives; the New Jersey State Museum; the New Jersey Historic Preservation Office; the New Jersey Department of Transportation; the Jersey City Public Library; the Jersey City Division of City Planning; and the Jersey City Historic Preservation Officer.

### 4.4.3 Field Reconnaissance

Following the extrapolation of historical data from the data sources onto modern aerial photographs and maps, the entire study corridor was thoroughly examined on foot. Modern maps and aerial photographs were annotated, and cultural resources of interest were photographed and described. This task was accomplished over the course of three days in the field.

### 4.4.4 Work Products

After the field-checking operation was complete, all research and field data were systematically processed, a final tabulation of resources was undertaken and cultural resources geographic information system (GIS) mapping was developed.

The tabulated cultural resources data (Appendix 4.4), contains a summary of identified cultural resources including a description of the resource, its history, significance, and relevant source data. The tabular data served as the attribute data for the graphical aspect of the work.

The GIS mapping plotted cultural resource locational data obtained through research and field reconnaissance on modern aerial orthophotographs. This method of mapping presented a reliable and useful graphical representation of potential cultural resource constraints. The GIS graphical data was linked to the tabular data described above, providing a comprehensive map identifying potential cultural resource constraints with explanations of their significance, in the context of the present-day conditions on Route 440/Routes 1&9T. The mapping is presented in Appendix 4.4, along with a comprehensive listing of all bibliographic, cartographic, and aerial photographic sources used in the research. The listing provides complete documentation of the source data used to identify the cultural resources tabulated and mapped.

### 4.4.5 Potential Concern

#### *4.4.5.1 Listing of Resources*

Cultural resources of potential concern are depicted on the maps and highlighted in the tables in Appendix 4.4 and described below[2]. In total, there are 33 resources of potential concern including historic architectural resources, potential archaeological resources, landscape resources, and linear transportation features. Cultural resources seldom fit neatly into one category of expression as the resource itself is often associated with human activity that extends beyond the walls of a specific structure. For example, an historic church may be considered an architectural resource, but it may also be considered of archaeological potential associated with the church grounds. As the church building itself and the property on which it sits are considered to be part of the same resource, the church resource is characterized as having an architectural expression (the building itself) and an association with potential archaeological resources.

As a result, of the 33 highlighted resources in Appendix 4.4, only 16 belong to only one category: one resource is characterized as an historic landscape resource; two are linear transportation resources, six are architectural, and seven are archaeological. The remaining 18 resources are included in more than one category. The majority of these dual-category resources, eight in total, are considered to be both architectural and linear transportation resources. These resources include railroads which are linear transportation resources that include structures (bridges, trestles, and stations) that are considered to be or potentially to be

[2] *Note: The table in Appendix 4.4 was compiled as research progressed and potential resources were identified and confirmed or dismissed from consideration. Gaps in numbering indicate the refinement of the research, not the omission of potential resources.*

historic architectural resources. Three linear transportation resources are also considered to be potential archaeological resources because they are not associated with visible structures but may be associated with buried foundations or other buried artifacts. Two resources, Lincoln Park and Blakeslee Monument, are considered to be historic landscape resources with an architectural component, and five resources are considered to be both architectural and archaeological resources for the reasons described in the sample scenario above.

Several of the cultural resources identified as being of potential concern have been previously evaluated and have received historic designations or formal opinions concerning their eligibility for inclusion in the New Jersey and National Registers of Historic Places. Listing on either the New Jersey or National Register of Historic places confers specific protections to resources that have met the criteria established by either the State Historic Preservation Officer (for the New Jersey Register) or the Secretary of the Interior (for the National Register). Extensive documentation has proven that the resource is associated with an important time in history, associated with important persons in history, or stands as an example of a particular architectural or design style important in the history of the United States. A State Historic Preservation Office (SHPO) opinion of eligibility means that research and documentation submitted to the SHPO meets enough of the requirements to determine that a resource is likely a significant historic or archaeological resource, but more documentation is required to place the resource on the State Register. Potential resources are those for which the documentation reviewed by the project team in the course of this investigation indicates the likelihood of a SHPO opinion of eligibility. Additional research focusing on any of these resources that may be impacted by the LPA will be required during the preliminary engineering phase of project development prior to submitting for a SHPO determination. For the purpose of this screening report, resources that are listed as having a SHPO opinion of eligibility, or are noted as a resource of potential concern are considered cultural resource constraints. These resources are as follows:

**Resources Listed New Jersey and National Registers of Historic Places**

1. ***Morris Canal*** – listed in the New Jersey and National Registers of Historic Places (NJ/NRHP)

**SHPO Opinion of Eligibility**

2. ***Lehigh Valley Railroad Historic District*** – SHPO opinion of eligibility
3. ***Lincoln Park*** – SHPO opinion of eligibility

4. ***Pulaski Skyway/U.S. Route 1&9T Corridor Historic District*** – SHPO opinion of eligibility
5. ***New Jersey Railroad Bergen Cut Historic District*** – SHPO opinion of eligibility
6. ***Jersey City Waterworks Pipeline*** – SHPO opinion of eligibility
7. ***Pennsylvania Railroad (PATH) Bridge*** – SHPO opinion of eligibility (individual; also contributing resource within Hackensack River Lift Bridge Historic District and New Jersey Railroad Bergen Cut Historic District)
8. ***Pennsylvania Railroad (Conrail/CSX) Harsimus Branch Bridge*** – SHPO opinion of eligibility (individual; also contributing resource within Hackensack River Lift Bridge Historic District and New Jersey Railroad Bergen Cut Historic District)
9. ***Wittpenn Bridge*** – SHPO opinion of eligibility (individual; also contributing resource within Hackensack River Lift Bridge Historic District and New Jersey Railroad Bergen Cut Historic District)
10. ***Hackensack River Lift Bridge Historic District*** – SHPO opinion of eligibility

**Potentially Eligible Resource**

11. ***Jersey City Branch No. 1 Lehigh Valley Railroad*** – Potentially eligible resource
12. ***Standard Oil/Water Pipeline*** – Potentially eligible resource
13. ***Elco Crane*** – Potentially eligible resource
14. ***New Jersey Turnpike Extension (Route I-78)*** – Potentially eligible resource
15. ***Potential Site of Barges*** – Potentially eligible resource
16. ***Site of Newark Bay Shore House/Newark Bay Yacht Club*** – Potentially eligible resource
17. ***Site of Bath House*** – Potentially eligible resource
18. ***Site of Detwiller & Street Fireworks Manufacturing Company Plant*** – Potentially eligible resource
19. ***Newark and New York Railroad Corridor*** – Potentially eligible resource
20. ***Crucible Steel Co./ Cummings Car Works*** – Potentially eligible resource
21. ***Cummings Car Works*** – Potentially eligible resource

22. ***Industrial Buildings (resources 77 and 78 in Appendix 4.4)*** – Potentially eligible resource
23. ***Site of Unidentified Canal-related Building*** – Potentially eligible resource
24. ***Lincoln Park Contributing Resources*** – Potentially eligible
    - ***Maintenance Sheds***
    - ***Site of Unidentified Complex of Buildings***
    - ***Lincoln Park Administration Building***
    - ***Handball Courts***
25. ***Holy Name Cemetery*** – Potentially eligible resource
26. ***Blakeslee Monument*** – Potentially eligible resource
27. ***Marion Gardens Apartments U.S.H.A. Project*** – Potentially eligible resource
28. ***Marion Flats Apartments*** – Potentially eligible resource
29. ***Communipaw Avenue*** – Potentially eligible resource
30. ***Newark Avenue*** – Potentially eligible resource

Due to its linear nature and listing on the State and National Registers of Historic Places, the most critical cultural resource constraint along the project corridor is the Morris Canal. The Morris Canal runs parallel to, immediately east of and partly beneath Route 440 from Danforth Avenue to Communipaw Avenue. The below-ground condition of the canal is not known, although its main channel may remain intact and be filled with mid-20th-century debris.

Over time, the Morris Canal was converted to other uses that availed themselves of the linear alignment of the canal. The Lehigh Valley Railroad Jersey City Branch No. 1 and the Standard Oil pipeline/water line, both of which lie within the Morris Canal/Route 440 corridor, have received SHPO opinions of eligibility. As a consequence, disturbance to the Morris Canal will also affect these two related resources.

Resources located in proximity to Route 440/Routes 1&9T are also potentially affected by redevelopment adjacent to the Route 440/Routes 1&9T corridor. These resources include Lincoln Park, the Blakeslee Monument, and the Holy Name Cemetery. Newark Avenue, which

crosses Route 440/Routes 1&9T north of Communipaw Avenue, is a linear transportation feature that may hold some archaeological potential along its frontage. As a consequence, excavation in the vicinity of Newark Avenue may affect presently undocumented resources, as well.