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Public Archaeology Laboratory

Archaeological Overview Survey - Addendum #2 to Technical Report
New Jersey-New York Expansion Project
Staten Island and Manhattan, New York

Submitted to:

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FERC Docket No. CP11-56-000
PAL No. 2367.02

Spectra Energy Transmission, LLC
150 Warren Street
Jersey City, New Jersey 07304

Spectra Energy Corp (Spectra Energy) is proposing to expand its pipeline systems in the New Jersey-New York region to meet the immediate and future demand for natural gas in the largest United States metropolitan area. To accomplish this, Spectra Energy pipeline companies, Texas Eastern Transmission, LP (Texas Eastern) and Algonquin Gas Transmission, LLC (Algonquin) are seeking a Certificate of Public Convenience and Necessity (Certificate) from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) authorizing the construction and operation of the New Jersey-New York Expansion Project (NJ-NY Project) located in New Jersey, New York, and Connecticut. The NJ-NY Project will create a new transportation path for 800,000 decatherms per day (Dth/d) of natural gas from multiple receipt points on the Spectra Energy systems to new delivery points in New Jersey and New York.

This addendum to the previous technical report completed for the NJ-NY Expansion Project (Elquist et al. 2010b) presents the results of the archaeological overview survey for the terrestrial portion of the Project changes described below and recommends for any necessary additional archaeological investigations. The methodology and sensitivity model including environmental and cultural contexts utilized for the overview survey of these Project changes is the same as outlined in *Archaeological Overview Survey, Texas Eastern Transmission, LP, New Jersey-New York Expansion Project, FERC Docket #CP11-56-000, Staten Island, Manhattan, and Ramapo, New York* (Elquist et al. 2010b). The Project changes that traverse the workspace for the Hudson River entry point, or landing in the Hudson River waterway have been studied separately as a marine archaeological assessment included as an appendix in the above report (Southeastern Archaeological Research [SEARCH] 2010). No previously identified offshore marine resources are present in the New York reach of the currently proposed Hudson River crossing (see below).

Project Changes since the December 2010 Filing

On February 15, 2011, the Applicants filed the *Supplemental Information for the New Jersey – New York Expansion Project* ("February Supplement") with the Federal Energy Regulatory Commission ("FERC") in Docket No.CP11-56-000 to describe route changes that were incorporated into the current NJ-NY Expansion pipeline route since filing the formal Certificate application on December 20, 2010. On February 28, 2011, the Applicants filed its *Responses to the February 2, 2011 FERC Environmental Data Request* ("Responses") with the FERC to respond to the

information requested by FERC staff on February 2nd to assist in its analysis of the NJ-NY Project. The purpose of this supplement is to describe the remaining route modifications that have been incorporated into the pipeline route during the month of March, which reflect the results of further consultation with property owners and other stakeholders (Figures 1 and 2). The route modifications include:

- MP 4.92R – MP 5.35R – Route Variation 53; and
- MP 18.87R – MP 20.04 – Route Variation 54.

A detailed description of these route variations is provided below.

MP 4.92R – MP 5.35R – Route Variation 53

Route Variation 53 reflects the original pipeline route along Western Avenue that was filed in the Applicants' Pre-Filing Draft Resource Reports in September 2010 ("Applicants' September 2010 Pre-filing"). It is located in the Borough of Staten Island in Richmond County, New York between MPs 4.92R and 5.35R (see Figure 1). Port Authority has indicated that it does not have immediate plans to demolish the Procter & Gamble building complex that lies along the proposed route filed in December 2010. Therefore, Texas Eastern modified its pipeline route so that it follows its original pipeline route (filed in September 2010) along Western Avenue.

Route Variation 53, approximately 0.43 mile in length, deviates from the proposed NJ-NY Expansion ROW at MP 4.92R and heads in a northerly direction along the eastern side of Western Avenue for approximately 0.38 miles before it intersects with Richmond Terrace. It follows Richmond Terrace for approximately 0.05 miles before it rejoins the ROW at MP 5.35R. The primary advantage of Route Variation 53 is that it is a constructible route within the alignment of an existing roadway, since the existing buildings along the proposed route will not be removed prior to construction. Other advantages are that it will affect less land during construction and require less land for operations and maintenance (O&M).

MP 18.87R – MP 20.04R – Route Variation 54

Route Variation 54 is located in the City of Jersey City in Hudson County, New Jersey and the Borough of Manhattan in New York County, New York between MPs 18.87R and 20.04 (see Figure 2). Texas Eastern modified its pipeline alignment after a more detailed engineering design and utility investigation was completed across State Route 9A and in further consultation with the New York State Department of Transportation ("NYS DOT"). In addition to the State Route 9A crossing modifications, the Hudson River HDD entry point location and alignment were adjusted based on additional engineering review and analysis. Route Variation 54 is approximately 1.11 miles in length, deviates from the originally proposed NJ-NY Expansion ROW at MP 18.87R in the Hudson River in Jersey City, and rejoins the ROW in Manhattan at MP 20.04. The advantages of Route Variation 54 are that it minimizes the number of concrete road panels that will be impacted when crossing State Route 9A and moves the crossing away from the intersection between the Department of Sanitation driveway, Gansevoort Street, and State Route 9A. This alignment also minimizes the number of existing utilities that are affected by pipeline construction. Route Variation 54 will still cross the existing bike lane/pedestrian walkway that parallels State Route 9A.

In order to ensure that the bike lane and walkway remain accessible, Applicants will work with NYS DOT to establish a detour around the construction area.

Results

MP 4.92R - MP 5.35R – Route Variation 53

Route Variation 53 is located between STA 259+81.6 and 282+39.2 in Staten Island, New York (Figures 3 thru 5), and reflects the original pipeline route along Western Avenue as presented in the Applicants' September 2010 pre-filing. From south to north, the route follows the Western Avenue and Richmond Terrace roadways. This section of the Project route was subject to an archaeological overview survey, the results of which were included in the pre-filing technical report for the Project (Elquist et al. 2010a).

The previous archaeological overview survey indicated the presence of several recorded archaeological sites within or in proximity to the Route Variation 53 Project APE, and that there is some potential for intact soils below the existing Western Avenue and Richmond Terrace roadbeds. Recorded pre-contact sites include the Old place Site (A085-01-0134 and A085-01-2366), Skinner's Mariner's Harbor area (Boesch 1994:No. 105 and STD-MH), finds at the adjacent Proctor and Gamble complex and along Western Avenue, and/or Site 8505 (NYSM site files), the Bowman's Brook Site (NYSM 4594 and 7321), and the Bowman's Brook North Site (A085-01-2364). Post-contact resources identified in proximity to the Project route include the portion of the former Proctor and Gamble Port Ivory plant west of Western Avenue that was determined eligible for listing in the State and National Registers for its association with American industrial and commercial history (HAA 2002:9); potentially significant remains of the Milliken Brothers iron and steel foundry south of Richmond Terrace (Flagg 1991a, 1991b); the Richmond Terrace Historic Archaeological Site (A085-01-2365); and potential archaeological remains associated with the Richmond Terrace Coffee Shop and Richmond Terrace White House standing structures (Payne and Baumgardt 1986). These latter two structures are no longer standing (Elquist et al. 2010b). Though nearby in some cases, none of these post-contact resources are present within the Project alignment for Route Variation 53 situated within existing roadbeds.

The September 2010 pre-filing report concluded that the area of Route Variation 53 contained high sensitivity for pre-contact resources that could be associated with Archaic, Woodland or contact period deposits associated with the above-noted sites (Elquist et al. 2010a). In addition, the portion of Route Variation 53 along Richmond Terrace may be additionally sensitive for human remains likely associated with the Bowman's Brook Site as remains were reportedly found near the south side of the road during construction of the Milliken Bros. foundry (Skinner 1898-1909, 1909a). In addition, Kardas and Larrabee (1982:7) cite a 1926 Skinner report which states that possible Revolutionary War period remains were found by workmen digging a trench on the former Milliken property that lines both sides of Richmond Terrace containing the Project route. As the route as this location is contained within the existing roadbeds of Western Avenue and Richmond Terrace where no documented structures were present and where modern disturbances including utility easements are present, no post-contact sensitivity was assigned to the Project route (Elquist et al. 2010a).

Given the high sensitivity for Route Variation 53 to contain pre-contact resources (see Figure 3 thru 5), PAL continues to recommend additional investigations in the form of soil borings for this area

to determine the presence and depth of ground disturbances, fill, or marsh deposits, and of any sediments that have the potential to contain pre-contact resources below these deposits. In comment letters regarding the September 2010 pre-filing technical report, the New York State Office of Parks, Recreation and Historic Preservation, the Office of the State Historic Preservation Officer (SHPO) (Letter dated October 22, 2010) and the City of New York Landmarks Preservation Commission (LPC) (Letter dated Oct. 18, 2010) concurred with the September 2010 pre-filing report assessment and recommendations for this area.

MP 18.87R – MP 20.04 – Route Variation 54

Route Variation 54 is located in Manhattan between STA 1022+80.8 and 1058+32.7 (Figures 6 thru 8). The portion of the route between STA 1022+80.8 and 1052+07.9 consists of a HDD located within the New York reach of the Hudson River, and contains the HDD entry point and associated workspace (see Figure 8). The alignment of the HDD route, associated offshore workspace, and entry point is similar to the originally proposed route. The area containing the offshore workspace and HDD entry point or "landing" point was previously surveyed in a separate marine archaeological assessment which concluded that the potential for submerged archaeological resources was low and that no additional investigations in the form of a remote sensing survey were necessary (SEARCH 2010:5). No previously identified archaeological resources are present along the remaining portion of the HDD route within the New York reach of the Hudson River. In addition, the HDD along this portion of the route is expected to be of sufficient depths that no impacts will occur (see Figure 9). As such, no further archaeological investigations are recommended for this portion of Route Variation 54.

The remaining portion of this route is situated on land between STA 1052+07.9 and 1058+32.7 (see Figure 8). The only significant deviation from the originally proposed route lies between STA 1055+00 and its terminus at STA 1058+32.7. Beginning near the southwest corner of the Gansevoort peninsula, the route travels east across the south edge of the peninsula before turning north and paralleling the Hudson River Greenway for 150 feet. The route then turns east crossing West Street (Route 9A) and terminating on the east side of the 10th Avenue service road extension at its intersection with Gansevoort Street. The Project APE for this portion of Route Variation 54 includes the pipeline route and associated workspace and a 17-x-26-ft proposed underground vault. Historic maps indicate Route Variation 54 was originally situated offshore (Hassler 1845; USGS 1891) and the early historic period shoreline was situated nearly two blocks east of this area between present-day Greenwich and Washington avenues. The area currently consists of made land.

The only potential Native American resource in the vicinity is Sapokanickan, a contact period Native American habitation site in Greenwich Village in the vicinity of the former Gansevoort Market noted on early maps and in colonial records (Empire State Development Corporation 1998; Skinner 1909b). Skinner notes that the village may have been occupied up to 1661 and suggests that the early explorer Hudson landed at Sapokanickan and traded with the Native American inhabitants (Skinner 1909b:41–42). It was situated on the original west shoreline outside of and roughly two blocks east of the Project pipeline route near present-day Gansevoort Street.

The other identified potential resources within or immediately adjacent to Route Variation 54 consist of post-contact resources. Several cultural resource studies have been conducted in areas that are in proximity to the Project pipeline route. These include surveys undertaken for the

Westside Highway or Westway Project (HCI 1983), the Route 9A Project (HAA 1990), and the Hudson River Park Project (Empire State Development Corporation 1998; Kirkorian et al. 1997). The 1983 Westside Highway Cultural Resource Survey identified four areas along the West Side of Manhattan between Battery Place and West 44th Street as having the potential to contain significant resources (HCI 1983), none of which are within or adjacent to the Project pipeline route.

The HAA 1990 archaeological assessment for the Route 9A Project overlaps the eastern portion of the Project pipeline route from approximately STA 1056+74.5 to the terminus. The HAA 1990 study identified three areas of historic sensitivity within or immediately adjacent to this area. The locations of "former ca. 1879 pier sheds" along the south edge of the Gansevoort peninsula; an undefined building at the northwest corner of the intersection of present-day West Street and Gansevoort Street; and an early twentieth century former building and a pumphouse associated with the Gansevoort Market (HAA 1990:VIII-2). The lot containing the pumphouse and buildings lies within the boundaries of the Gansevoort Market Historic District located adjacent to and east of the Project pipeline route. The Gansevoort Market area was designated a Historic District in 2003 (NYCLPC 2003). Of these, it appears that the location of the "former ca. 1879 pier sheds" and that of undefined building to the immediate north on either side of Gansevoort Street are within the current Route Variation 54 alignment between approximately STA 1054+00 and STA 1056+50. The Final Environmental Impact Statement (FEIS) for the Route 9A Project and associated concurring comments by SHPO indicated that the documented pier sheds were of little value archaeologically as structures of these types leave little or no visible or interpretable archaeological footprint because they functioned as storage areas and were constructed on pier platforms (Empire State Development Corporation 1998; Kirkorian et al. 1997).

An assessment of a portion of the Hudson River Park Project and the 1998 FEIS for that project both identified the Hudson River Bulkhead as a significant historic resource (Empire State Development Corporation 1998; Kirkorian et al. 1997). The Project route crosses the Hudson River Bulkhead, which has been determined eligible for listing in the National Register (see Appendix C; NY SHPO 1997). The bulkhead was constructed piecemeal between 1871 and 1936 mainly in response to deteriorating waterfront conditions. The majority of the bulkhead constructed prior to 1920 is granite-faced, after which concrete characterized the appearance of bulkhead sections (NY SHPO 1997). A small percentage of the remaining bulkhead along the western Manhattan waterfront consists of timber cribbing. The Project route intersects and runs along the portion of bulkhead that consists of the south-facing edge of the Gansevoort peninsula. The bulkhead at this location is of an atypical material type consisting of collapsed pile-supported platforms and/or rip rap that is not considered significant (NY SHPO 1997:Figure 1). A masonry bulkhead was never built in this particular area of made land between the Gansevoort and Chelsea Piers (NY SHPO 1997:8). This area of made land consists of solid fill originally retained by a timber-crib bulkhead, and was the location of a Department of Docks work yard, and the later West Washington Market before becoming the site of the present-day Gansevoort Destructor Plant sanitation facility (NY SHPO 1997:8). Only the northern facing side of the sanitation pier has visible surviving timber bulkhead (Muesler Rutledge 1989a, 1989b; NY SHPO 1997). Extruding up from the sloping rip rap observed on the south side of the sanitation pier are what appear to be pilings likely associated with former Pier 52 constructed between 1894 and 1902 as part of the Gansevoort Pier Plan.

The cultural resources survey undertaken for the Hudson River Park Project noted that the Gansevoort peninsula, the site of the 1889 West Washington Market, contained by 1902, 10 red brick buildings that housed live-poultry markets (Figure 10) (Kirkorian et al. 1997:VI-4 and VI-12).

The West Washington Market was demolished in 1950 to make way for the sanitation and incinerator facility, although it still appears as such on the 1950 Sanborn insurance map. The Hudson River Park Project cultural resources assessment concluded that the area containing the former market buildings was likely disturbed by installation of the incinerator plant, and that "the associative value of the earlier market structures is questionable given their late date, extensive documentation, and function" (Kirkorian et al. 1997:VII-4). Kirkorian et al. noted that in regards to the Route 9A Project, SHPO concluded that the resource category of markets did not require further consideration due to a lack of archaeological visibility (1997:VII-5).

Review of nineteenth- and twentieth-century historical maps indicates that the portion of present-day Gansevoort Street containing the Project pipeline route was planned as early as the 1830s, but filling did not begin along the shoreline until sometime in the early 1850s. The 1811 (Bridges), 1832 (Burr), and 1845 (Hassler) maps of New York City all depict the shoreline as being approximately two blocks to the east of the present-day shoreline. By 1852 Gansevoort Street had been extended west to the so-called Thirteenth Avenue (Dripps 1852). Based on the 1852 map the filling of the Manhattan shoreline along the Hudson River in this area was completed by constructing an outer bulkhead and then infilling between the original shoreline and the bulkhead. The 1859 (Perris) map depicts the blocks south of Gansevoort Street between West Street and Thirteenth Avenue as having been completely filled in and built upon by that time. The east side of the lot just south of Gansevoort Street closest to the Project pipeline route contained a lumberyard and small office building situated at the corner of Gansevoort and West Street. The west side of the lot fronting Gansevoort Street contained a "Kindling Wood Yard" with three buildings, two small sheds adjacent to Thirteenth Avenue and a larger wood-frame structure to the east. According to the 1859 Perris map, the area to the north had not been filled by this time, although the unnamed building, noted by HAA in their 1990 study, at the northwest side of the intersection of West and Gansevoort Streets, was also present at that time.

The 1856 (Colton) and 1860 (Walling) maps depict made land in the block areas between West Street and Thirteenth Avenue north and south of Gansevoort Street, although no buildings or other details are shown on either map. The 1879 (Bromley) atlas map depicts a lumberyard and an ironworks on the north side of Gansevoort Street, and west side of West Street and a vacant lot to the east. South of Gansevoort Street and west of West Street is a lumberyard to the west and a paint works to the east. The southern half of the lot to the south contained a tin works to the east and a lumber yard to the west at that same time. The 1880 (Spielmann and Brush) map depicts made land in this area, but does not depict any building details. The 1891 (Bromley) map depicts much expansion of buildings in the same block between West Street and Thirteenth Avenue south of Gansevoort Street. The northern half of the block contained brick and wood-frame buildings in the former lumberyard and paint works lots. The southern half of the block contained the brick building complex occupied by the Eagle Iron Works (former Tin Works in 1879) and other unnamed wood-frame buildings (former Lumber Yard in 1879). The riverfront to the west of Thirteenth Avenue contained a number of piers that extended westward from all of the cross streets. The pipeline route passes just south of the pier occupied by the LeHigh Valley Railroad Company at that time. The 1895 Sanborn insurance map of the river waterfront in Manhattan depicts a scaled-back building configuration in this same block. The ironworks was still present in the southeast corner, but some of the buildings are indicated as vacant. The area to the west is identified as a "Wagon Yard" with only a few small structures remaining. The lots to the north appear to contain a mix of dwellings, stables, and commercial buildings.

By the time of the 1899 (Bromley) atlas map, the made land south of Gansevoort Street and west of West Street had been removed as part of the city's Chelsea – Gansevoort Pier Plan for the lower half of Manhattan. This plan, issued in 1871 by the newly formed Department of Docks, called for the razing of buildings on 23 city blocks and the excavations of the blocks themselves back into deep water. The redevelopment efforts of this river area included the construction of 21 new piers to be built on the Hudson between West 11th and West 23rd streets. The excavations were carried out in the 1890s, except for the ca. 1850 landfill between Gansevoort and Bloomfield streets, on which the West Washington Market opened in 1889 (Howe 2007). Gansevoort Street was still present after the landfill excavations, but more than half of the block to the south had been dredged back to shoreline and reconfigured into piers and bulkheads running parallel and perpendicular to West Street (see Figure 10). The five Gansevoort Piers, as they were known, were opened to the Cunard, White Star, and Leyland lines for their passenger trade in 1902. The luxury steamship companies at these piers became clientele for the Gansevoort area ship provisioners and hotel suppliers (Howe 2007). The piers closest to the Project pipeline route along Gansevoort Street and to the south off Horatio Street (later known as Piers 51 and 52) were occupied by the Cunard Steamship Line. As part of the shoreline redevelopment in this area, West Street was widened to more than double its original width. All of the earlier commercial and industrial structures that were present in the blocks west of West Street from as early as 1859 were demolished.

The Project pipeline route traverses the early-twentieth-century Cunard steamship line pier (Pier 52), which contained a long, rectangular multi-story brick building, then turns north intersecting the southern edge of the West Washington Market before it terminates in the widened West Street (see Figure 10). The 1904 Sanborn insurance map depicts the "Cunard Line Steamship Co. Freight and Passenger Pier" that bordered Gansevoort Street to the north. The pier, building, and West Street configuration remained the same throughout the first half of the twentieth century, although the pier changed ownership by different shipping companies throughout this period (Bromley 1911, 1916, 1920, 1930; Sanborn 1921, 1950).

By 1969 the freight pier (Pier 52) had been shortened to approximately half of its original length and the earlier multi-story brick building was gone. The other shipping piers to the south remained unchanged. The area to the north of Gansevoort Street had been reconfigured and infilled to create the City of NY Sanitation Pier, aka Gansevoort Peninsula. The project area and peninsula to the north has remained relatively unchanged in terms of landform since that time, except for the addition of Miller (Hudson River) Highway and Marginal Street from parts of West Street in the 1970s and 1980s (Sanborn 1975, 1979, 1980, 1983, 1985, 1987, 1988, 1993, 1994). Today, these roadbeds are collectively part of the modern West Street/Route 9A highway and the parallel Hudson River Greenway that runs along the shoreline for pedestrian and bike access only as part of the Hudson River Park. During the walkover survey, wooden pilings were observed in the rip rap along the southwest edge of Gansevoort peninsula near the proposed pipeline route crossing which likely represent the remains of Pier 52.

Early-nineteenth-century maps of Manhattan also indicate that Fort Gansevoort, built for the War of 1812, was constructed on made land located to the northeast of the terminus of the pipeline route. Historical maps indicate that it lay within the area bounded today by Gansevoort, West, Little West 12th, and Washington Streets. Additionally, workmen drilling holes for foundation pilings during construction of the Gansevoort Market and Meat Center (located on the lot northeast of the eastern terminal end of the Project route) reportedly encountered timbers between eight and 25 feet below the surface, believed to be remnants of Fort Gansevoort (Robins 2002). These remains could also

have been associated with the original vertical pilings for the bulkhead used to construct the land on which the fort was erected.

Sources of landfill for the Project vicinity in the 1800s could have included natural sediments from former shorefront bluffs, residential debris, garbage collected on piers and wharves, and coal ash and rubbish. Citing Buttenweiser's 1987 *Manhattan Water Bound*, the Route 9A archaeological assessment noted that a pier used as a garbage dumping board was present at Gansevoort Street in 1844, that sediment from bluffs leveled to make land for development and the associated debris was deposited into the river in the vicinity of the current Project area, and that the area between West 12th and Gansevoort streets was partially filled with the remains of former notable family estates (HAA 1990:VI-4). The Westside Highway cultural resources study noted that a Committee on Wharves and Piers resolution called for coal ash and rubbish to be used as fill for what is now the Gansevoort peninsula area (HCI 1983:98). Fill comprising the present-day Gansevoort peninsula dates to the 1850s and 1860s. The Project pipeline route traverses fill to the south of Gansevoort Street that was placed sometime between 1852 and 1859, according to the Dripps and Perris maps. The filled land in the Project pipeline route contained various commercial and industrial buildings from the 1850s through the 1890s when the area was excavated to create the shipping piers south of Gansevoort Street. The documented mid- to late-nineteenth-century buildings were part of the maritime and building trades that filled the wide-open spaces of the new blocks created by landfilling the river west of West Street to extend the Gansevoort waterfront. These trades included lumber, coal, and stone yards, plaster works, white lead refiners, foundries, turpentine distilleries, and iron foundries (Howe 2007).

Remains of shoreline structures such as piers, old bulkheads and retaining structures were reportedly encountered on a frequent basis during construction of the Miller elevated highway in the 1930s (HAA 1990:VI-10). As summarized in the Hudson River Park FEIS and cultural resources assessment for the portion of that project between West Houston and little West 12th Street, the FEIS for the Route 9A Project concluded, and SHPO concurred, that piers would make little contribution to the archaeological record as they were rebuilt on a continuous basis and reflect technology at the end of their use rather than that used when they were originally constructed (Empire State Development Corporation 1998 7-16; Kirkorian et al 1997:VII-1). Other SHPO comments regarding the Route 9A Project also indicated that landfill and retaining devices such as old bulkheads predating the present Hudson River bulkhead would have limited research potential as 1) landfill episodes along the West side of Manhattan have been well-documented and landfill remains lack integrity and contextual association, and 2) retaining devices were continuously rebuilt so that remains would represent rebuilding episodes rather than their original form (Empire State Development Corporation 1998:7-16; Kirkorian et al. 1997:VII-4).

Known disturbance and development in the Project vicinity is related to the creation of made land, building construction, building demolition and the excavation of the landfill, construction of the present West Street roadway as well as the previous construction of the Hudson River Rail Road, High Line and Miller Elevated Highway, and construction of the Department of Sanitation incinerator and Hudson River Park. There was no specific available information about existing utilities in this area, but numerous underground utilities are expected to be present in the area given the presence of manhole covers, street lights and fire hydrants along West Street. Additionally, elements of the late-nineteenth-century underground refrigeration piping associated with the Manhattan Refrigerating Company may be present under West and Gansevoort streets, and 10th Avenue.

The removal of made land and dredging at this location down to a depth of 40 feet (Kirkorian et al. 1997:VI-7) likely impacted the southern edge of the modern sanitation pier along the Project pipeline route. Post-contact resources consisting of rubble from the demolition of piers and buildings, docks, and old bulkhead or retaining structures and dredging of the made land are likely to be present in the fill areas along the southern portion of the sanitation pier. Furthermore, the construction of the elevated Miller Highway also likely caused substantial disturbance in the immediate Project vicinity as it included sinking 4 to 5 foot wide cast-iron cassions 40 to 48 feet deep along the present route of West Street (HAA 1990:VI-10). Belowground remnants of these cassions could also be present.

In summary, the Project pipeline route in Manhattan traverses made land that served for the extension of Gansevoort Street and adjacent commercial and industrial lots in the second half of the nineteenth century (ca. 1850s to ca. 1890s). The documented structures on the lots to the south of Gansevoort Street were situated on made land that was excavated in the 1890s, except for the very northern limits along the south side of Gansevoort Street. This area was converted into a freight and passenger pier continuously used and built upon in the first half of the twentieth century, and then following 1950 it was absorbed into the present-day New York City sanitation pier on the Gansevoort peninsula. The remaining portion of the Project pipeline route was reconfigured into the present day highway roadbeds and belowground support infrastructure. Given the nature and extent of modern period disturbances in the former block west of West Street and south of Gansevoort Street, which included repeated filling, construction, demolition, and excavation/dredging episodes, it is not considered likely that any intact, articulated buried nineteenth-century streetscapes, buildings, or other features have survived in the Project pipeline route. The documented location of Fort Gansevoort is situated to the north outside of the Project pipeline route, so there are no potential impacts to any remains that may be present belowground in this general area.

In regards to pre-contact period resources, a cartographic shoreline reconstruction was created for the Westside Highway Project cultural resources study based on soil boring data (HCI 1983). The shoreline reconstruction map indicates that the depth of the former surface available for human occupation ranged between 40 and 100 feet below the present sea level, and the configuration of the contour lines indicates that this area was steeply sloped (HCI 1983:Figure 4). The contour map also indicated that the Gansevoort Street area containing the present Project pipeline route was last available for human occupation prior to ca. 7,200 years before being completely inundated by the Hudson River, although the steep slope was not likely to have been attractive to inhabitants. On this basis alone, the route is considered to have very low pre-contact sensitivity, and proposed pipeline construction impacts are not expected to exceed 20 feet.

Based on the above summarized information, the pipeline route is considered to have no to low sensitivity for both pre-contact and post-contact period resources. No further archaeological investigations or soil borings are recommended between STA 1052+07.9 and 1058+32.7.

Summary

Due to the high sensitivity for pre-contact archaeological resources, additional investigations in the form of soil borings are recommended for Route Variation 53 between MP 4.92R and MP 5.35R (see Table 1). The remaining Project change consisting of Route Variation 54 between MP 18.87R and MP 20.04 is assessed as having no archaeological sensitivity based on documented fill/disturbance, and the expectation that the Hudson River HDD beyond the workspace associated

with the HDD entry point will be of sufficient depth that no impacts will occur. No further archaeological investigations are recommended for this latter area. Further investigations in the form of soil borings are recommended for Route Variation 53. The proposed maximum boring interval for this area is 200 feet wherever possible. Identifying areas of disturbance and characterizing/dating sediment deposits through a soil boring program will be crucial in determining whether or not an archaeologically sensitive area of the Project APE will require additional investigations, including but not limited to hand and/or machine-assisted subsurface investigations for pre-contact and/or post-contact period resources.

Table 1. Summary of Archaeological Sensitivity and Recommendations

Borough	Facility/ Mile Post Location	STA No. Location	Figure	Pre-contact Sensitivity	Post-contact Sensitivity	Recommendations
Staten Island	MP 4.92R to MP 5.35R	STA 259+81.6 to 282+39.2	3-5	High	None	Soil borings
Manhattan	MP 18.87R to MP 20.04	STA 1022+80.8 to 1052+07.9	6-8	None	None	Offshore HDD area, and no expected impacts. No further archaeological investigations
		STA 1052+07.9 and 1058+32.7	8	Low	Low	No further archaeological investigations.

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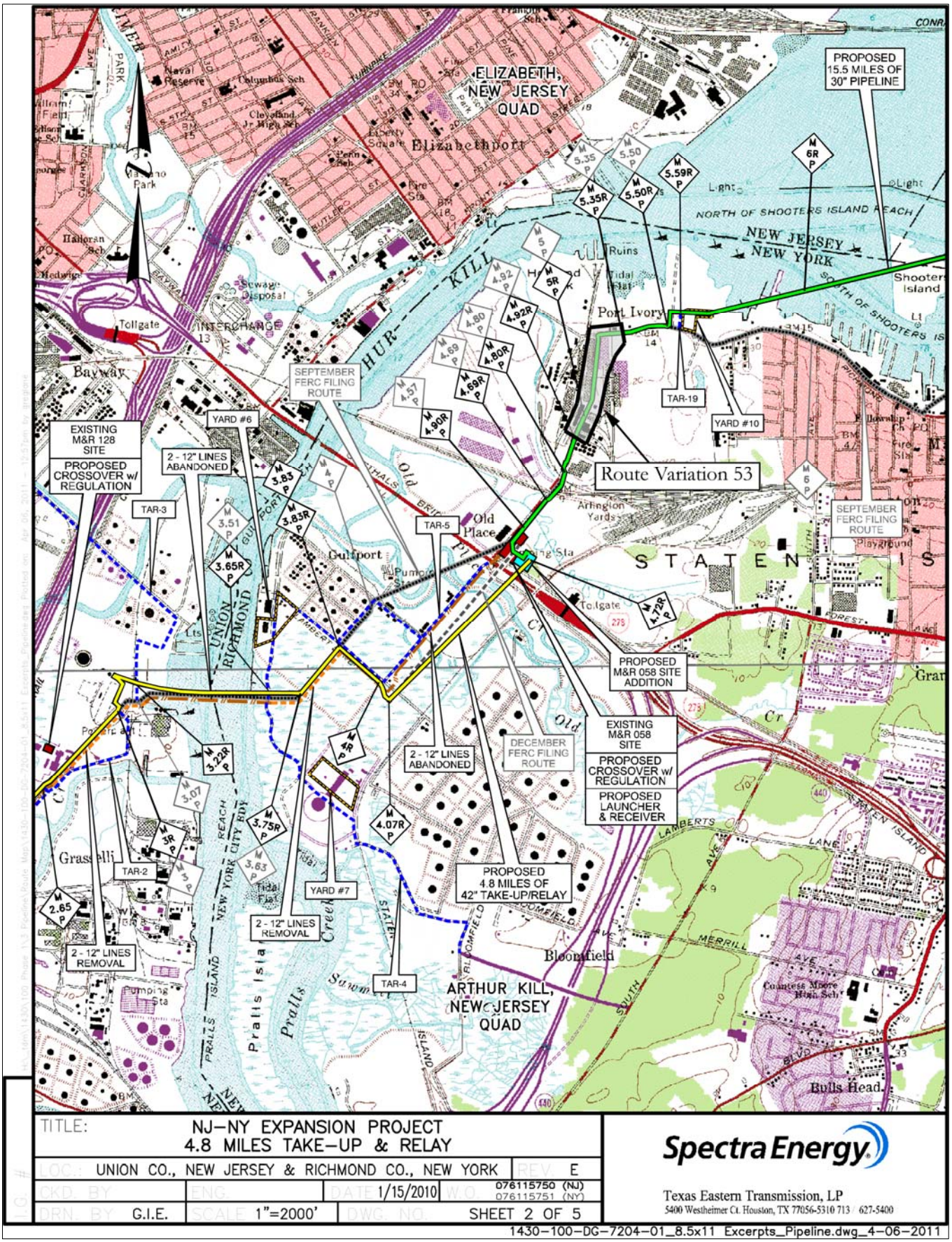


Figure 1. Location of the NJ-NY Project area, showing the location of Project changes on the Elizabeth, NJ and Arthur Kill, NY, USGS topographic quadrangle, 7.5 minute series.

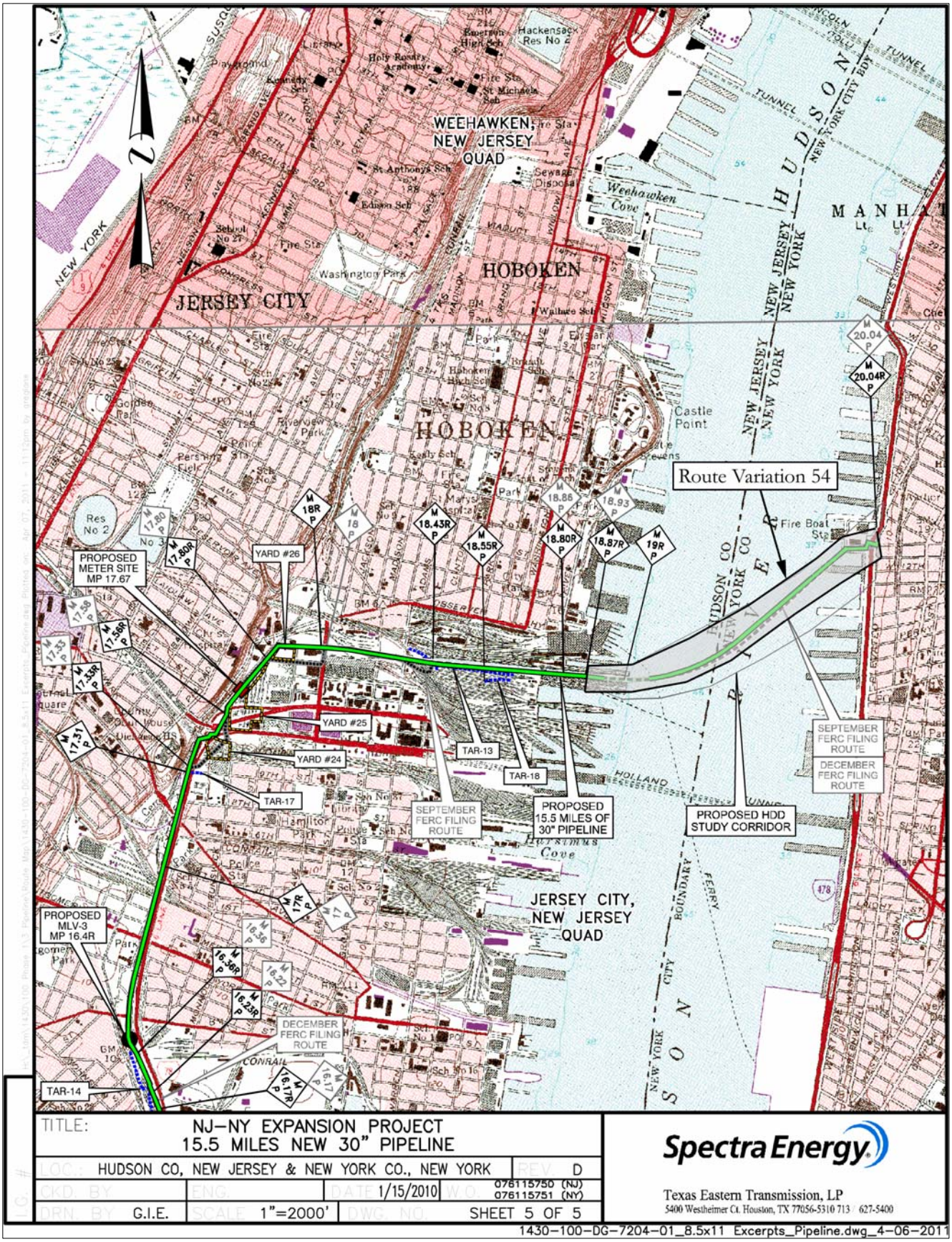


Figure 2. Location of the NJ-NY Project area, showing the location of Project Changes on the Jersey City City and Weehawken NJ, USGS topographic quadrangles, 7.5 minute series.

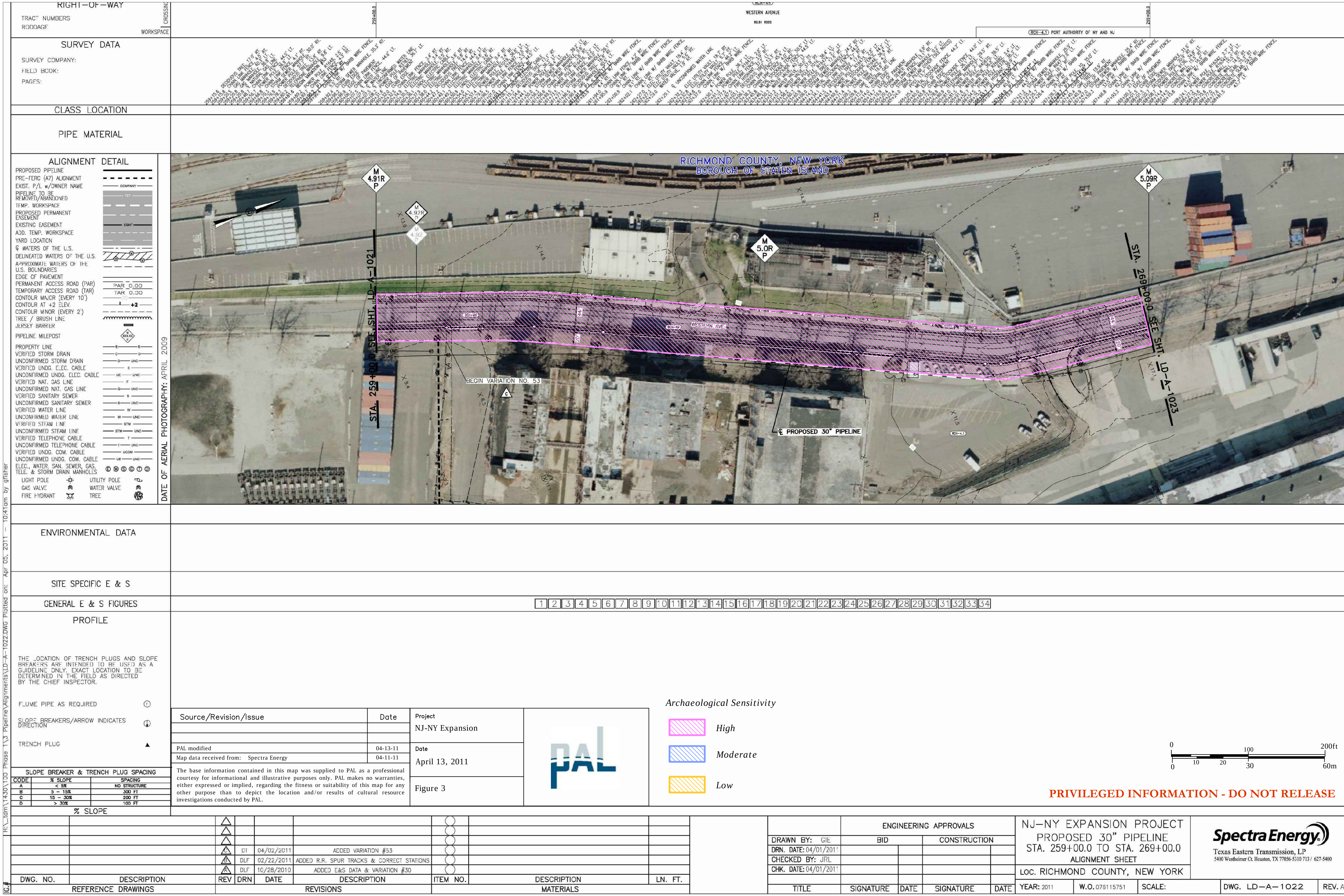


Figure 3. Map of Route Variation 53, showing archaeological sensitivity.

RIGHT-OF-WAY

TRACT NUMBERS

RODDAGE

CROSSING

WORKSPACE

SURVEY DATA

SURVEY COMPANY:

FIELD BOOK:

PAGES:

CLASS LOCATION

PIPE MATERIAL

ALIGNMENT DETAIL

PROPOSED PIPELINE

PRE-FERC (A7) ALIGNMENT

EXIST. F/L w/OWNER NAME — COMPANY

PIPELINE TO BE REMOVED/ABANDONED — TBR

TEMP. WORKSPACE

PROPOSED PERMANENT EASEMENT

EXISTING EASEMENT — ESMT

ADD. TEMP. WORKSPACE

YARD LOCATION

℄ WATERS OF THE U.S.

DELINEATED WATERS OF THE U.S.

APPROXIMATE WATERS OF THE U.S. BOUNDARIES

EDGE OF PAVEMENT

PERMANENT ACCESS ROAD (PAR) — PAR C.OO

TEMPORARY ACCESS ROAD (TAR) — TAR O.OO

CONTOUR MAJOR (EVERY 10') — 10

CONTOUR AT +2 ELEV. — +2

CONTOUR MINOR (EVERY 2')

TREE / BRUSH LINE

JERSEY BARRIER

PIPELINE MILEPOST — MM XXXX

PROPERTY LINE — P

VERIFIED STORM DRAIN — D

UNCONFIRMED STORM DRAIN — D UNC

VERIFIED UNDG. ELEC. CABLE — E

UNCONFIRMED UNDG. ELEC. CABLE — E UNC

VERIFIED NAT. GAS LINE — G

UNCONFIRMED NAT. GAS LINE — G UNC

VERIFIED SANITARY SEWER — S

UNCONFIRMED SANITARY SEWER — S UNC

VERIFIED WATER LINE — W

UNCONFIRMED WATER LINE — W UNC

VERIFIED STEAM LINE — STM

UNCONFIRMED STEAM LINE — STM UNC

VERIFIED TELEPHONE CABLE — T

UNCONFIRMED TELEPHONE CABLE — T UNC

VERIFIED UNDG. COM. CABLE — COM

UNCONFIRMED UNDG. COM. CABLE — UF UNC

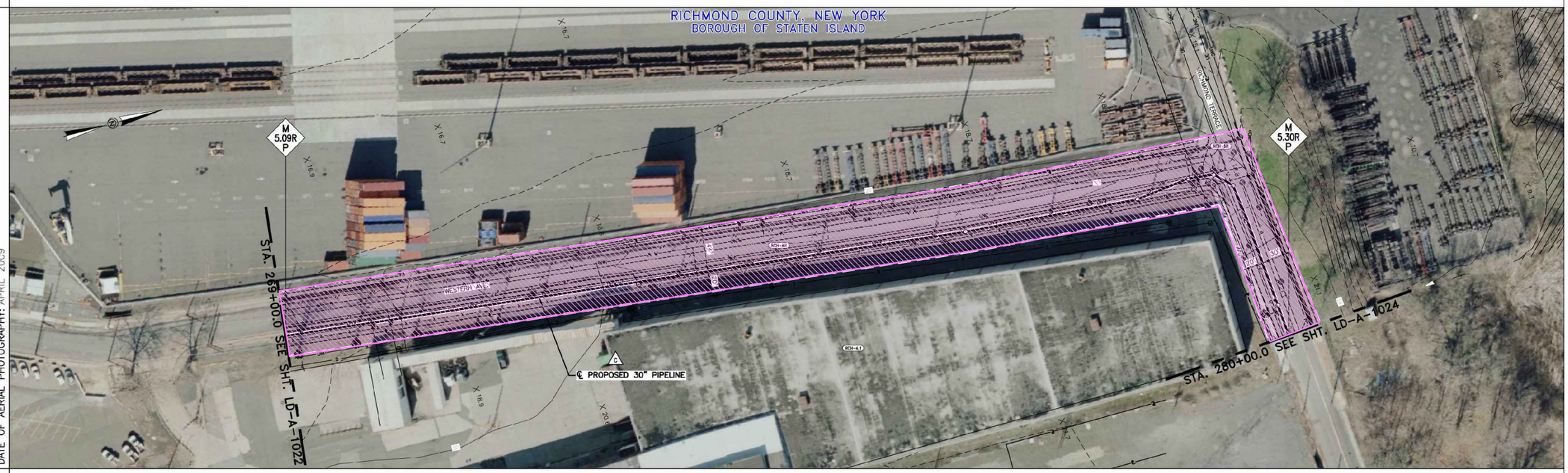
ELEC., WATER, SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES

LIGHT POLE — UTILITY POLE

GAS VALVE — WATER VALVE

FIRE HYDRANT — TREE

DATE OF AERIAL PHOTOGRAPHY: APRIL 2009



ENVIRONMENTAL DATA

SITE SPECIFIC E & S

GENERAL E & S FIGURES

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

PROFILE

THE LOCATION OF TRENCH PLUGS AND SLOPE BREAKERS ARE INTENDED TO BE USED AS A GUIDELINE ONLY. EXACT LOCATION TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE CHIEF INSPECTOR.

FLUME PIPE AS REQUIRED — F

SLOPE BREAKERS/ARROW INDICATES DIRECTION — B

TRENCH PLUG

SLOPE BREAKER & TRENCH PLUG SPACING

CODE	% SLOPE	SPACING
A	< 5%	NO STRUCTURE
B	5 – 15%	300 FT
C	15 – 30%	200 FT
D	> 30%	100 FT

% SLOPE

Source/Revision/Issue	Date
PAL modified	04-13-11
Map data received from: Spectra Energy	04-11-11

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Project: NJ-NY Expansion

Date: April 13, 2011

Figure 4

Archaeological Sensitivity

High

Moderate

Low

0 100 200ft

0 10 20 30 60m

PRIVILEGED INFORMATION - DO NOT RELEASE

DWG. NO.	DESCRIPTION	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.
REFERENCE DRAWINGS		REVISIONS				MATERIALS		
		4	DT	04/02/201'	ADDED VARIATION #53			
		3	DLF	02/22/201'	ADDED SURVEY DATA			
		2	DLF	10/28/2010	ADDED E&S DATA & VARIATION #30			

ENGINEERING APPROVALS

	BID		CONSTRUCTION	
DRAWN BY: CIE				
DRN. DATE: 04/01/2011				
CHECKED BY: JRL				
CHK. DATE: 04/02/2011				
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

NJ-NY EXPANSION PROJECT
PROPOSED 30" PIPELINE
STA. 269+00.0 TO STA. 280+00.0
ALIGNMENT SHEET
LOC. RICHMOND COUNTY, NEW YORK

Spectra Energy
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2010 | W.O. 076115751 | SCALE: | DWG. LD-A-1023 | REV. A12

H:_tdm\14301\100 Phase 1\3 Pipeline\Alignments\LD-A-1023.DWG Plotted on: Apr 05, 2011 - 10:47am by gfisher

Figure 4. Map of Route Variation 53, showing archaeological sensitivity.

RIGHT-OF-WAY

TRACT NUMBERS

RODDAGE

CROSSING

WORKSPACE

280+00.0

RICHMOND TERRACE

65.05 RODS

292+73.5

DCAS

7.68 RODS

292+00.0

SURVEY DATA

SURVEY COMPANY:

FIELD BOOK:

PAGES:

CLASS LOCATION

PIPE MATERIAL

ALIGNMENT DETAIL

- PROPOSED PIPELINE
- PRE-FERC (A7) ALIGNMENT
- EXIST. P/L w/OWNER NAME — COMPANY
- PIPELINE TO BE REMOVED/ABANDONED
- TEMP. WORKSPACE — TEMP
- PROPOSED PERMANENT EASEMENT
- EXISTING EASEMENT — ESMT
- ADD. TEMP. WORKSPACE
- YARD LOCATION — YARD
- ℄ WATERS OF THE U.S.
- DELINEATED WATERS OF THE U.S.
- APPROXIMATE WATERS OF THE U.S. BOUNDARIES
- EDGE OF PAVEMENT
- PERMANENT ACCESS ROAD (PAR) — PAR 0.00
- TEMPORARY ACCESS ROAD (TAR) — TAR 0.00
- CONTOUR MAJOR (EVERY 10') — +2
- CONTOUR AT +2 ELEV.
- CONTOUR MINOR (EVERY 2')
- TREE / BRUSH LINE
- JERSEY BARRIER
- PIPELINE MILEPOST — EXAMPLE 10.00
- PROPERTY LINE — P
- VERIFIED STORM DRAIN — D
- UNCONFIRMED STORM DRAIN — D UNC
- VERIFIED UNDG. ELEC. CABLE — E
- UNCONFIRMED UNDG. ELEC. CABLE — UE UNC
- VERIFIED NAT. GAS LINE — #
- UNCONFIRMED NAT. GAS LINE — G UNC
- VERIFIED SANITARY SEWER — S
- UNCONFIRMED SANITARY SEWER — S UNC
- VERIFIED WATER LINE — W
- UNCONFIRMED WATER LINE — W UNC
- VERIFIED STEAM LINE — STM
- UNCONFIRMED STEAM LINE — STM UNC
- VERIFIED TELEPHONE CABLE — T
- UNCONFIRMED TELEPHONE CABLE — T UNC
- VERIFIED UNDG. COM. CABLE — UCOM
- UNCONFIRMED UNDG. COM. CABLE — UC UNC
- ELEC., WATER, SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES — E W S G T D
- LIGHT POLE
- UTILITY POLE
- GAS VALVE
- WATER VALVE
- FIRE HYDRANT
- TREE

DATE OF AERIAL PHOTOGRAPHY: APRIL 2009

ENVIRONMENTAL DATA

SITE SPECIFIC E & S

GENERAL E & S FIGURES

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

PROFILE

THE LOCATION OF TRENCH PLUGS AND SLOPE BREAKERS ARE INTENDED TO BE USED AS A GUIDELINE ONLY. EXACT LOCATION TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE CHIEF INSPECTOR.

- FLUME PIPE AS REQUIRED — Ⓕ
- SLOPE BREAKERS/ARROW INDICATES DIRECTION
- TRENCH PLUG — ▲

SLOPE BREAKER & TRENCH PLUG SPACING

CODE	% SLOPE	SPACING
A	< 5%	NO STRUCTURE
B	5 – 15%	300 FT
C	15 – 30%	200 FT
D	> 30%	100 FT

% SLOPE

Source/Revision/Issue	Date
PAL modified	04-13-11
Map data received from: Spectra Energy	04-11-11

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Project: NJ-NY Expansion

Date: April 13, 2011

Figure 5

Archaeological Sensitivity

- *High*
- *Moderate*
- *Low*

0 100 200ft

0 10 20 30 60m

PRIVILEGED INFORMATION - DO NOT RELEASE

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		2	DLF	10/28/2010	ADDED E&S DATA & VARITAIONS #30 & #22			
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ENGINEERING APPROVALS

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DRAWN BY: GIE				
DRN. DATE: 4/1/2011				
CHECKED BY: JRL				
CHK. DATE: 4/2/2011				
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

NJ-NY EXPANSION PROJECT
PROPOSED 30" PIPELINE
STA. 280+00.0 TO STA. 292+00.0
ALIGNMENT SHEET
LOC. RICHMOND COUNTY, NEW YORK

Spectra Energy
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2010 | W.O. 076115751 | SCALE: | DWG. LD-A-1024 | REV. A12

H:_dm\1430\100 Phase 1\3 Pipeline Alignments\LD-A-1024.DWG Plotted on: Apr 05, 20** - 1:54pm by glister

Figure 5. Map of Route Variation 53, showing archaeological sensitivity.

RIGHT-OF-WAY

TRACT NUMBERS

ROADAGE

CROSSING

WORKSPACE

SURVEY DATA

SURVEY COMPANY:

FIELD BOOK:

PAGES:

CLASS LOCATION

PIPE MATERIAL

ENVIRONMENTAL DATA

SITE SPECIFIC E & S

GENERAL E & S FIGURES

PROFILE

THE LOCATION OF TRENCH PLUGS AND SLOPE BREAKERS ARE INTENDED TO BE USED AS A GUIDELINE ONLY. EXACT LOCATION TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE CHIEF INSPECTOR.

FLUME PIPE AS REQUIRED (F)

SLOPE BREAKERS/ARROW INDICATES DIRECTION

TRENCH PLUG

SLOPE BREAKER & TRENCH PLUG SPACING

CODE	% SLOPE	SPACING
A	< 5%	NO STRUCTURE
B	5 – 15%	300 FT
C	15 – 30%	200 FT
D	> 30%	100 FT

% SLOPE

ALIGNMENT DETAIL

- PROPOSED PIPELINE
- PRE-FERC (A7) ALIGNMENT
- EXIST. P/L w/OWNER NAME — COMPANY —
- PIPELINE TO BE REMOVED/ABANDONED — TIET —
- TEMP. WORKSPACE
- PROPOSED PERMANENT EASEMENT
- EXISTING EASEMENT — ESMT —
- ADD. TEMP. WORKSPACE
- YARD LOCATION
- ℄ WATERS OF THE U.S.
- DELINEATED WATERS OF THE U.S.
- APPROXIMATE WATERS OF THE U.S. BOUNDARIES
- EDGE OF PAVEMENT
- PERMANENT ACCESS ROAD (PAR) — PAR 0.00 —
- TEMPORARY ACCESS ROAD (TAR) — TAR 0.00 —
- CONTOUR MAJOR (EVERY 10') — 20 —
- CONTOUR AT +2 ELEV. — +2 —
- CONTOUR MINOR (EVERY 2')
- TREE / BRUSH LINE
- JERSEY BARRIER
- PIPELINE MILEPOST — M 19.28R P —
- PROPERTY LINE — E — E —
- VERIFIED STORM DRAIN — D — C —
- UNCONFIRMED STORM DRAIN — D — UNC —
- VERIFIED UNDG. ELEC. CABLE — E —
- UNCONFIRMED UNDG. ELEC. CABLE — UE — UNC —
- VERIFIED NAT. GAS LINE — G —
- UNCONFIRMED NAT. GAS LINE — G — UNC —
- VERIFIED SANITARY SEWER — S —
- UNCONFIRMED SANITARY SEWER — S — UNC —
- VERIFIED WATER LINE — W —
- UNCONFIRMED WATER LINE — W — UNC —
- VERIFIED STEAM LINE — STM —
- UNCONFIRMED STEAM LINE — STM — UNC —
- VERIFIED TELEPHONE CABLE — T —
- UNCONFIRMED TELEPHONE CABLE — T — UNC —
- VERIFIED UNDG. COM. CABLE — UCOM —
- UNCONFIRMED UNDG. COM. CABLE — UE — UNC —
- ELEC., WATER, SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES
- LIGHT POLE — UTILITY POLE
- GAS VALVE — WATER VALVE
- FIRE HYDRANT — TREE

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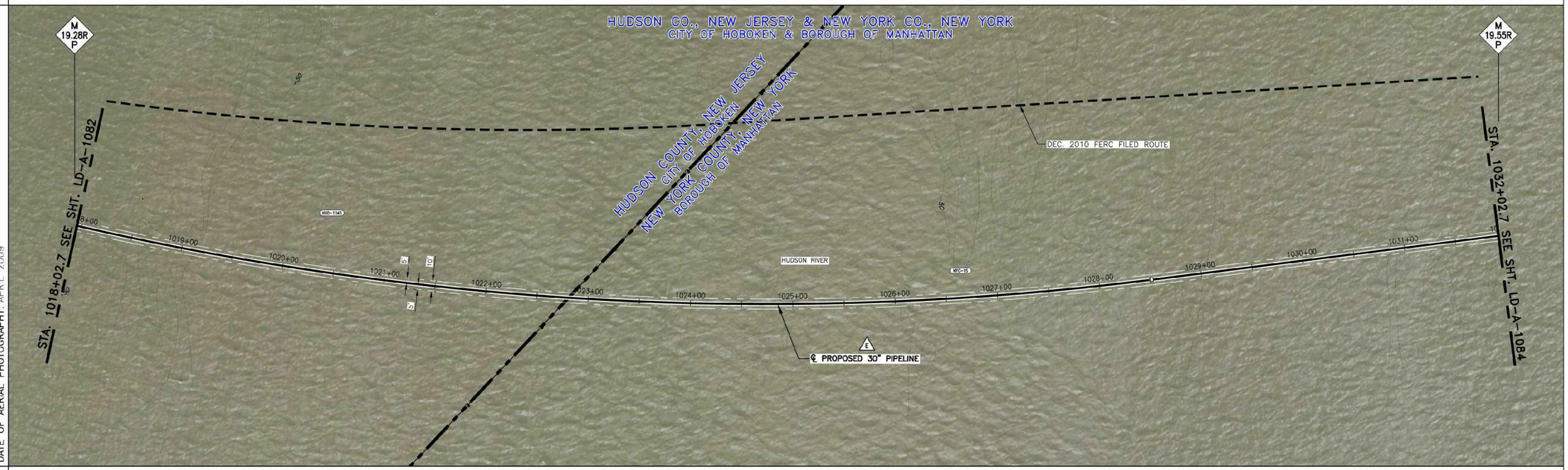

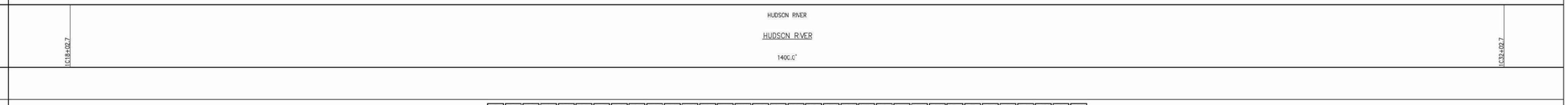

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

FOR HUDSON RIVER HDD DETAIL DESIGN, REFER TO DWG. NO. LD-H-1080

Source/Revision/Issue	Date
PAL modified	04-13-11
Map data received from: Spectra Energy	04-11-11

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Project: NJ-NY Expansion

Date: April 13, 2011

Figure 6

Archaeological Sensitivity

- *High*
- *Moderate*
- *Low*

0 100 200ft

0 10 20 30 60m

PRIVILEGED INFORMATION - DO NOT RELEASE

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		3	DLF	11/10/2010	ADDED HDD REFERENCE NOTE			
		2	DLF	10/28/2010	ADDED E&S DATA & REVISED TRACT NUMBERS			
		1	DLF	8/16/2010	ADDED BATHEMETRY			
REFERENCE DRAWINGS		REVISIONS				MATERIALS		

ENGINEERING APPROVALS

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DRAWN BY: GIF		
DRN. DATE: 04/06/2011		
CHECKED BY: JRL		
CHK. DATE: 04/06/2011		
TITLE	SIGNATURE / DATE	SIGNATURE / DATE

NJ-NY EXPANSION PROJECT
PROPOSED 30" PIPELINE
STA. 1018+02.7 TO STA. 1032+02.7
ALIGNMENT SHEET
LOC. HUDSON CO., NEW JERSEY & NEW YORK CO., NEW YORK

Spectra Energy
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2011 | W.O. 076115751 | SCALE: | DWG. LD-A-1083 | REV. A12

H:_doc\12430\Engineering & Technical\10_Pipeline\FERC_ALIGNMENT_C-FERCOUT\LD-A-1083.DWG Plotted on: Apr 08, 2011 - 12:01am by gfisher

Figure 6. Map of Route Variation 54, showing archaeological sensitivity.

RIGHT–OF–WAY

TRACT NUMBERS

RODDAGE

CROSSING

WORKSPACE

1032+02.7

(NYC-1S)

HUDSON RIVER (STATE OF NEW YORK)

8485 9005

1046+02.7

SURVEY DATA

SURVEY COMPANY:

FIELD BOOK:

PAGES:

CLASS LOCATION

PIPE MATERIAL

ALIGNMENT DETAIL

PROPOSED PIPELINE

PRE–FERC (A7) ALIGNMENT

EXIST. F/L w/OWNER NAME — COMPANY

PIPELINE TO BE REMOVED/ABANDONED — TPT

TEMP. WORKSPACE

PROPOSED PERMANENT EASEMENT

EXISTING EASEMENT — ESMT

ADD. TEMP. WORKSPACE

YARD LOCATION

℄ WATERS OF THE U.S.

DELINEATED WATERS OF THE U.S.

APPROXIMATE WATERS OF THE U.S. BOUNDARIES

EDGE OF PAVEMENT

PERMANENT ACCESS ROAD (PAR) — PAR 0.00

TEMPORARY ACCESS ROAD (TAR) — TAR 0.00

CONTOUR MAJOR (EVERY 10') — 10

CONTOUR AT +2 ELEV. — +2

CONTOUR MINOR (EVERY 2')

TREE / BRUSH LINE

JERSEY BARRIER

PIPELINE MILEPOST — (MILEPOST)

PROPERTY LINE — E — E

VERIFIED STORM DRAIN — D — D

UNCONFIRMED STORM DRAIN — D — UNC

VERIFIED UNDG. ELEC. CABLE — E — E

UNCONFIRMED UNDG. ELEC. CABLE — UE — UNC

VERIFIED NAT. GAS LINE — G

UNCONFIRMED NAT. GAS LINE — G — UNC

VERIFIED SANITARY SEWER — S

UNCONFIRMED SANITARY SEWER — S — UNC

VERIFIED WATER LINE — W

UNCONFIRMED WATER LINE — W — UNC

VERIFIED STEAM LINE — STM

UNCONFIRMED STEAM LINE — STM — UNC

VERIFIED TELEPHONE CABLE — T

UNCONFIRMED TELEPHONE CABLE — T — UNC

VERIFIED UNDG. COM. CABLE — UCOM

UNCONFIRMED UNDG. COM. CABLE — UE — UNC

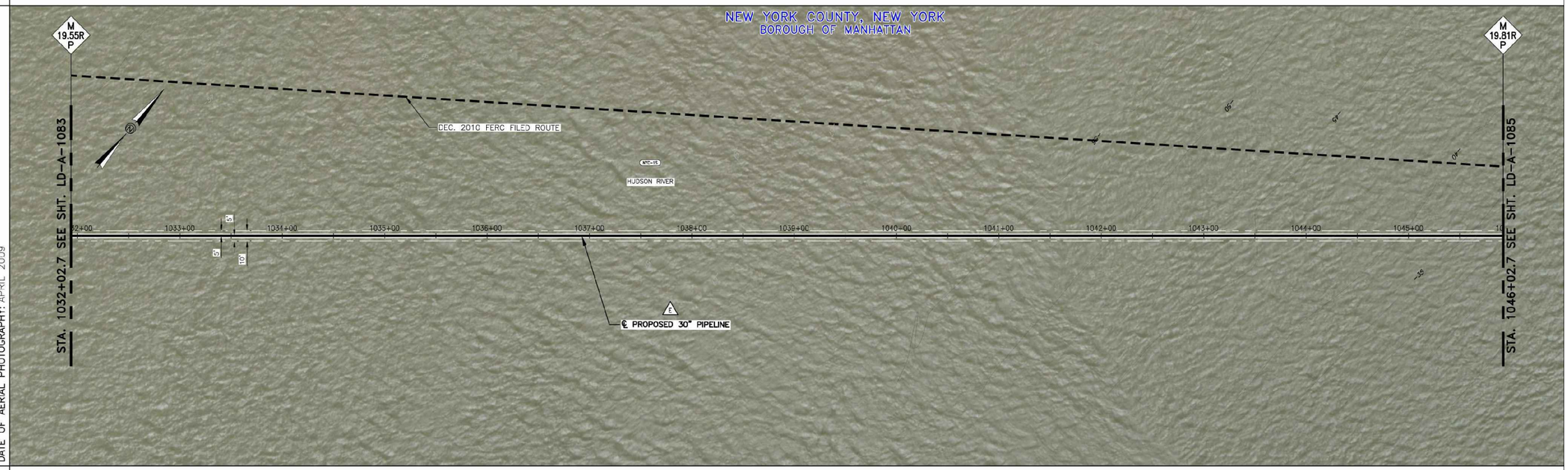
ELEC., WATER, SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES — E W S G T D

LIGHT POLE — UTILITY POLE

GAS VALVE — WATER VALVE

FIRE HYDRANT — TREE

DATE OF AERIAL PHOTOGRAPHY: APRIL 2009



ENVIRONMENTAL DATA

1032+02.7

HUDSON RIVER

HUDSON RIVER

1400.0'

1046+02.7

SITE SPECIFIC E & S

GENERAL E & S FIGURES

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

PROFILE

FOR HUDSON RIVER HDD DETAIL DESIGN, REFER TO DWG. NO. LD-H-1080

THE LOCATION OF TRENCH PLUGS AND SLOPE BREAKERS ARE INTENDED TO BE USED AS A GUIDELINE ONLY. EXACT LOCATION TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE CHIEF INSPECTOR.

FLUME PIPE AS REQUIRED — F

SLOPE BREAKERS/ARROW INDICATES DIRECTION

TRENCH PLUG

SLOPE BREAKER & TRENCH PLUG SPACING

CODE	% SLOPE	SPACING
A	< 5%	NO STRUCTURE
B	5 – 15%	300 FT
C	15 – 30%	200 FT
D	> 30%	100 FT

% SLOPE

Source/Revision/Issue	Date
PAL modified	04-13-11
Map data received from: Spectra Energy	04-11-11

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Project: NJ-NY Expansion

Date: April 13, 2011

Figure 7

Archaeological Sensitivity

High

Moderate

Low

0 100 200ft

0 10 20 30 60m

PRIVILEGED INFORMATION - DO NOT RELEASE

DWG. NO.	DESCRIPTION	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.
REFERENCE DRAWINGS		REVISIONS				MATERIALS		
		7	DT	04/07/2011	ADDED VARIATION #54			
		6	DLF	02/23/2011	REVISED ROUTE PER JD HAIR DRAWINGS, REVISED TRACT NUMBER			
		5	DLF	11/10/2010	ADDED HDD REFERENCE NOTE			
		4	DLF	10/28/2010	ADDED E&S DATA & REVISED TRACT NUMBERS			
		3	DLF	8/16/2010	ADDED BATHEMETRY			

ENGINEERING APPROVALS

	BID		CONSTRUCTION	
DRAWN BY: GIE				
DRN. DATE: 04/06/2011				
CHECKED BY: JRL				
CHK. DATE: 04/06/2011				
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

NJ–NY EXPANSION PROJECT
PROPOSED 30" PIPELINE
STA. 1032+02.7 TO STA. 1046+02.7
ALIGNMENT SHEET
LOC. NEW YORK COUNTY, NEW YORK

Spectra Energy
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713/ 627-5400

YEAR: 2011 | W.O. 076115751 | SCALE: | DWG. LD–A–1084 | REV. A12

H:_dac\14300\Engineering & Technical\10_Pipeline\FERC_ALIGNMENT_CHECKOUT\LD-A-1084.DWG Plotted on: Apr 07, 2011 – 11:59pm by cfisher

Figure 7. Map of Route Variation 54, showing archaeological sensitivity.

RIGHT-OF-WAY

TRACT NUMBERS

RODDAGE

CROSSING

WORKSPACE

1044+02.7 | NYC-1S HUDSON RIVER (STATE OF NEW YORK) 36.12 RODS | 1044+93.2 | NYC-2 STATE OF NEW YORK 38.43 RODS | 1058+32.7

SURVEY DATA

SURVEY COMPANY:

FIELD BOOK:

PAGES:

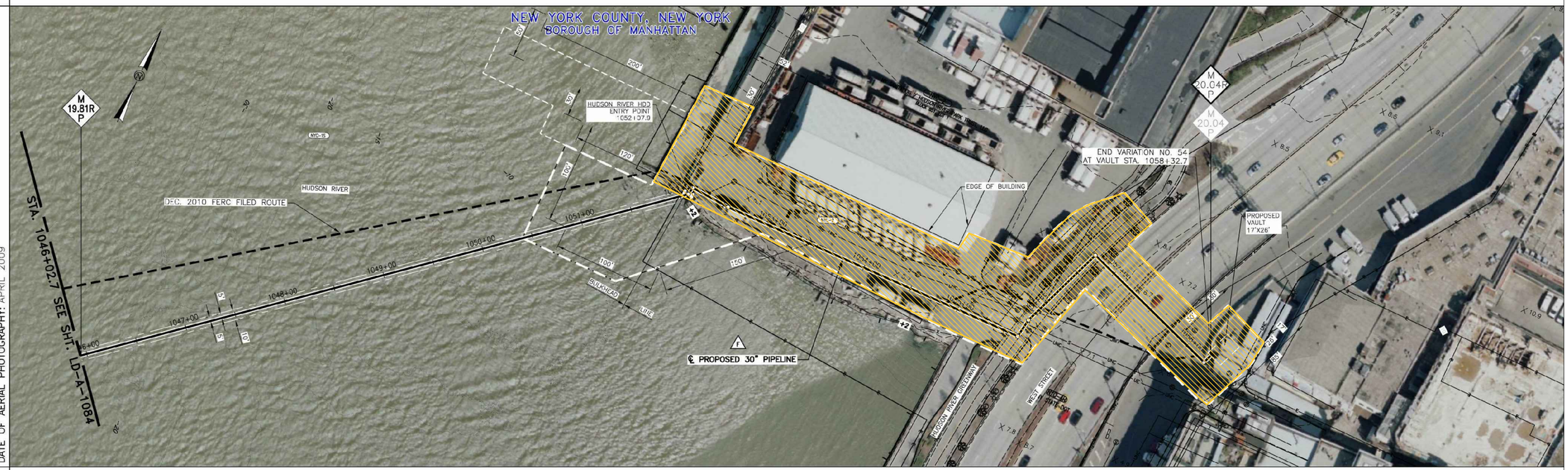
CLASS LOCATION

PIPE MATERIAL

ALIGNMENT DETAIL

- PROPOSED PIPELINE
- PRE-FERC (A7) ALIGNMENT
- EXIST. P/L w/OWNER NAME — COMPANY
- PIPELINE TO BE REMOVED/ABANDONED — TBR
- TEMP. WORKSPACE
- PROPOSED PERMANENT EASEMENT
- EXISTING EASEMENT — ESMT
- ADD. TEMP. WORKSPACE
- YARD LOCATION
- ℄ WATERS OF THE U.S.
- DELINEATED WATERS OF THE U.S.
- APPROXIMATE WATERS OF THE U.S. BOUNDARIES
- EDGE OF PAVEMENT
- PERMANENT ACCESS ROAD (PAR) — PAR 0.00
- TEMPORARY ACCESS ROAD (TAR) — TAR 0.00
- CONTOUR MAJOR (EVERY 10') — 20
- CONTOUR AT +2 ELEV. — +2
- CONTOUR MINOR (EVERY 2')
- TREE / BRUSH LINE
- JERSEY BARRIER
- PIPELINE MILEPOST — XXX.XX
- PROPERTY LINE — P
- VERIFIED STORM DRAIN — D
- UNCONFIRMED STORM DRAIN — D UNC
- VERIFIED UNDG. ELEC. CABLE — E
- UNCONFIRMED UNDG. ELEC. CABLE — UE UNC
- VERIFIED NAT. GAS LINE — G
- UNCONFIRMED NAT. GAS LINE — G UNC
- VERIFIED SANITARY SEWER — S
- UNCONFIRMED SANITARY SEWER — S UNC
- VERIFIED WATER LINE — W
- UNCONFIRMED WATER LINE — W UNC
- VERIFIED STEAM LINE — STM
- UNCONFIRMED STEAM LINE — STM UNC
- VERIFIED TELEPHONE CABLE — T
- UNCONFIRMED TELEPHONE CABLE — T UNC
- VERIFIED UNDG. COM. CABLE — UCOM
- UNCONFIRMED UNDG. COM. CABLE — UE UNC
- ELEC., WATER, SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES — E W S G T D
- LIGHT POLE
- UTILITY POLE
- GAS VALVE
- WATER VALVE
- FIRE HYDRANT
- TREE

DATE OF AERIAL PHOTOGRAPHY: APRIL 2009



ENVIRONMENTAL DATA

1046+02.7 | HUDSON RIVER | HUDSON RIVER | 601.0' | 1052+03.7

SITE SPECIFIC E & S

GENERAL E & S FIGURES

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

PROFILE

THE LOCATION OF TRENCH PLUGS AND SLOPE BREAKERS ARE INTENDED TO BE USED AS A GUIDELINE ONLY. EXACT LOCATION TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE CHIEF INSPECTOR.

- FLUME PIPE AS REQUIRED — (F)
- SLOPE BREAKERS/ARROW INDICATES DIRECTION — (D)
- TRENCH PLUG — ▲

SLOPE BREAKER & TRENCH PLUG SPACING

CODE	% SLOPE	SPACING
A	< 5%	NO STRUCTURE
B	5 – 15%	300 FT
C	15 – 30%	200 FT
D	> 30%	100 FT

% SLOPE

FOR HUDSON RIVER HDD DETAIL DESIGN, REFER TO DWG. NO. LD-H-1080

Source/Revision/Issue	Date
PAL modified	04-13-11
Map data received from: Spectra Energy	04-11-11

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Project: NJ-NY Expansion

Date: April 13, 2011

Figure 8

Archaeological Sensitivity

- *High*
- *Moderate*
- *Low*

0 100 200ft

0 10 20 30 60m

PRIVILEGED INFORMATION - DO NOT RELEASE

DWG. NO.	DESCRIPTION	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.
REFERENCE DRAWINGS		REVISIONS				MATERIALS		
		7	DT	04/07/2011	ADDED VARIATION #54			
		6	DLF	02/23/2011	REVISED ROUTE PER JD HAIR DRAWINGS			
		5	DLF	01/16/2011	ADDED HDD ENTRY POINT			
		4	DLF	11/10/2010	ADDED HDD REFERENCE NOTE			
		3	DLF	10/28/2010	ADDED E&S DATA & REVISED TRACT DATA			
		2	DLF	8/16/2010	ADDED CONTOURS, UTILITIES & SURVEY DATA			

ENGINEERING APPROVALS

	BID		CONSTRUCTION	
DRAWN BY: GIE				
DRN. DATE: 04/06/2011				
CHECKED BY: JRL				
CHK. DATE: 04/06/2011				
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

NJ-NY EXPANSION PROJECT
PROPOSED 30" PIPELINE
STA. 1046+02.7 TO STA. 1058+32.7
ALIGNMENT SHEET
LOC. NEW YORK COUNTY, NEW YORK

Spectra Energy
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

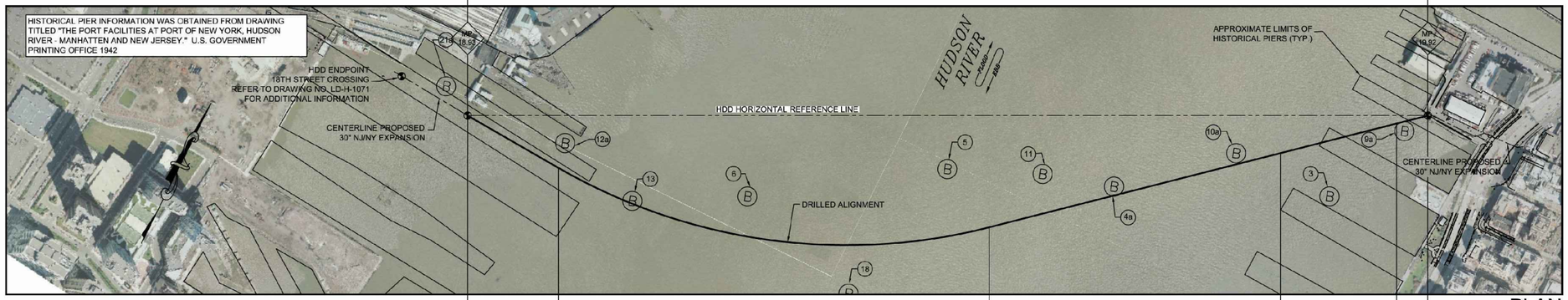
YEAR: 2011 | W.O. 076115751 | SCALE: | DWG. LD-A-1085 | REV. A12

Figure 8. Map of Route Variation 54, showing archaeological sensitivity.

JERSEY CITY, NEW JERSEY

HORIZONTAL REFERENCE LENGTH = 4,998'
HORIZONTAL PLAN LENGTH = 5,223'

MANHATTAN, NEW YORK



PLAN
SCALE: 1" = 300'

EXIT POINT @ 8°
46+98.02, -13.53', 0.00' LT
PROJECT STATION 999+85
N 14795265.90, 1909767.93

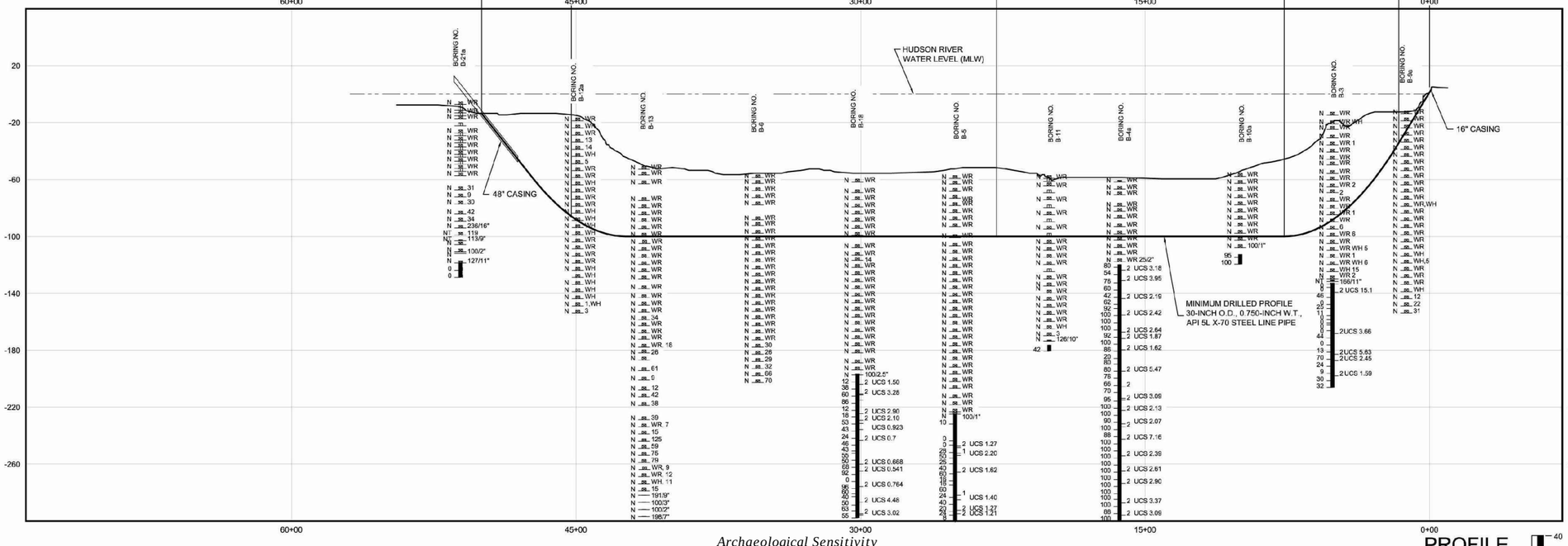
P.T. 44.3° SIDE BEND
45+83.86, -65.50', 273.15' LT

P.C. 44.3° SIDE BEND
22+83.81, -100.00', 582.13' LT
RADIUS = 3,000'

P.T. 12° SAG BEND
7+67.29, -100.00', 195.58' LT

P.C. 12° SAG BEND
1+62.88, -34.44', 41.52' LT
RADIUS = 3,000'

ENTRY POINT @ 12°
0+00.00, 1.25, 0.00 LT
PROJECT STATION 1052+09
N 14797460.01, 1914236.12



PROFILE
SCALE: 1" = 300' HORIZONTAL
1" = 40' VERTICAL

0 300 600 1200ft
0 150 300m

Archaeological Sensitivity

- *High*
- *Moderate*
- *Low*

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

SURVEY NOTES

1. ALL TOPOGRAPHIC LAND SURVEY DATA WAS PROVIDED BY SGC ENGINEERING.

2. RIVER BOTTOM DEPTHS WERE DERIVED FROM A HYDROGRAPHIC SURVEY PERFORMED BY OCEAN SURVEYS, INC. DATED AUGUST 09, 2010.

3. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 18, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO THE HDD HORIZONTAL REFERENCE LINE LOCATED IN THE PLAN VIEW.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

BORING LOCATION

SPLIT SPOON SAMPLE

53 / N 23 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

SHELBY TUBE OR PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6.25 — UNCONFINED COMPRESSIVE STRENGTH (KSI)
53 / 6 — MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY MUESER RUTLEDGE CONSULTING ENGINEERS, NEW YORK CITY, NEW YORK. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED 01-OCT-10 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT UTILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ELEVATION - PLUS 0 FEET, MINUS 20 FEET.

2. ALIGNMENT - PLUS OR MINUS 20 FEET.

3. ENTRY POINT - AT THE STAKED LOCATION.

4. EXIT POINT - PLUS OR MINUS 5 FEET IN ALIGNMENT, PLUS 50 FEET AND MINUS 0 FEET IN LENGTH.

5. CURVE RADIUS - NO LESS THAN 1,500 FEET.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

Source/Revision/Issue	Date
PAL modified	04-13-11
Map data received from: Spectra Energy	04-11-11

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Project: NJ-NY Expansion

Date: April 13, 2011

Figure 9

PRIVILEGED INFORMATION - DO NOT RELEASE

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	CLC	JMS	REVISED ROUTE AND GEOMETRY (4-5-11)
		2	CLC	NONE	ISSUED FOR STATE APPROVAL (1-17-11)
		1	CLC	NONE	ISSUED FOR FERC APPROVAL (11-22-10)

John Deering Hair
Professional Engineer
New Jersey Lic.# 24GE04547300
New York Lic.# 080869
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS				
DRAWN BY:	PRELIMINARY		CONSTRUCTION	
PROJECT MANAGER	JMS	11/10		
DESIGN ENGINEER	CLC	11/10		
DESIGN CHECKER	CLC, KMN	11/10		
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

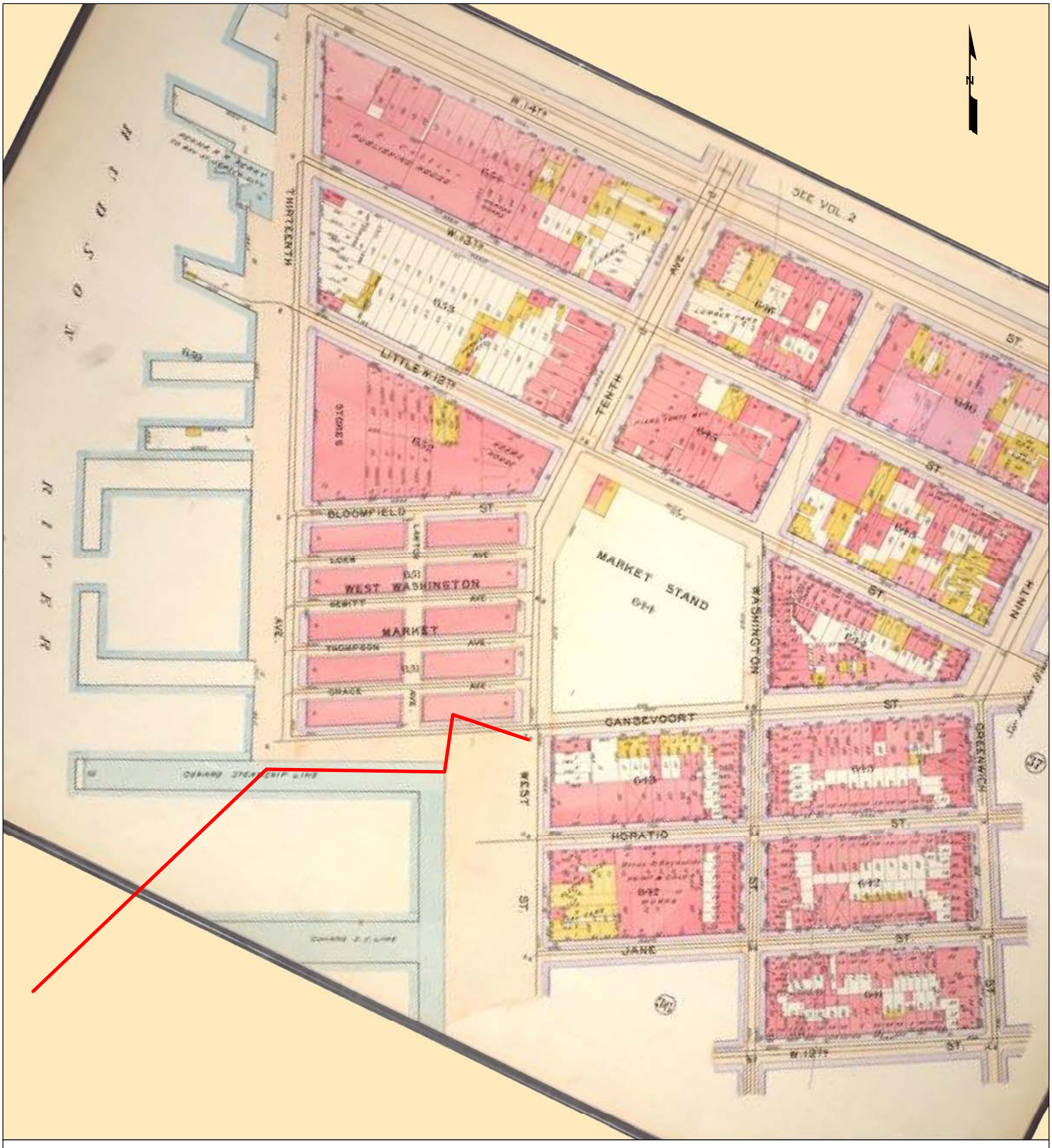
PLAN AND PROFILE
30" HUDSON RIVER CROSSING
SPECTRA - NJ-NY EXPANSION PROJECT

LOC. HUDSON CNTY., NJ., AND NEW YORK CNTY., NY.

Spectra Energy
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

YEAR: 2011 | W.O. | DWG. LD-H-1080 | REV. 3

Figure 9. Plan view and profile drawing of Route Variation 54 HDD, showing archaeological sensitivity.



PAL

Revisions / Modifications / Data Source	
PAL revised: Pipeline reroute	4-13-2011
PAL modified: Historic map georeferenced	7-14-2010
Client Data: GIE	7-1-2010
Historic base imagery: Bromley	1899

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PRIVILEGED INFORMATION - DO NOT RELEASE

KEY:

Project Pipeline Route

0 200 400 Feet

0 50 100 Meters

Figure 10. 1899 atlas map of the City of New York, Borough of Manhattan, with the location of Route Variation 54.