



**Archaeological Overview Survey –
Addendum #3 to Technical Report
New Jersey-New York Expansion
Project
Staten Island and Manhattan, New York**

Submitted to:

November 9, 2011
FERC Docket No. CP11-56-000
PAL No. 2367.03
NY SHPO No. 09PR05949
NYCLPC No. FERC / 106-Y

Spectra Energy Transmission
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 (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 *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* presents the results of the archaeological sensitivity assessment and overview survey for the Project changes described below, and includes recommendations for any additional work. The methodology utilized for the archaeological overview survey of these Project changes is the same as outlined in the previous December filing report for this Project (Elquist et al. 2010a).

Project Changes since the December 2010 Filing

Texas Eastern has incorporated six route changes into the current pipeline, and one workspace revision in the Staten Island (Richmond County) and Manhattan (New York County) portion of the Project area (Figures 1 and 2). These changes are proposed in response to further consultation with property owners and other stakeholders. The route variations are described below with their corresponding milepost (MP) locations.

MPs 3.14R to 3.75R - Route Variation 80

Route Variation 80 is located in the City of Linden in Union County, New Jersey and the Borough of Staten Island in Richmond County, New York (Figures 3 through 6: New York portion on Alignment Sheets LD-A-1014 to 1015B). It is approximately 0.61 miles in length, deviates from

the proposed NJ-NY Expansion pipeline right-of-way (ROW) at MP 3.14R, and rejoins the ROW at MP 3.75R. The portion of Route Variation 80 that lies within New York begins after MP 3.30R at STA 182+36.5 within the Arthur Kill waterway (see Figures 3 through 6). Texas Eastern incorporated Route Variation 80 into the pipeline route because it eliminates the horizontal side bend along the Arthur Kill Horizontal Directional Drill (HDD), thereby allowing for more efficient constructability across and under the Arthur Kill. Route Variation 80 also lengthens the Arthur Kill HDD to accommodate a request from the landowner, 380 Development LLC (380 Development) at the exit point. 380 Development is in the process of redeveloping its property and has requested that either: (1) the exit point of the Arthur Kill HDD be adjusted to the south so that it would be on Texas Eastern's existing ROW or (2) ensure that the HDD will be at an elevation of -70 feet at the point where the pipeline alignment would cross a proposed future marine docking facility. Texas Eastern considered both options; however, the relocation of the HDD exit point was eliminated from further consideration because it increases the engineering risks associated with the crossing of an existing 12-inch oil pipeline owned by International-Matex Tank Terminal (IMTT). To avoid this risk, and accommodate 380 Development's request, Texas Eastern will extend the HDD exit point approximately 90 feet to the east to ensure that the depth of the drill will be at an elevation of -70 feet at the point where the pipeline alignment would cross a proposed future marine docking facility.

Route Variation 80 will not affect any new landowners. The proposed HDD workspace at the new exit point (MP 3.75R) will be reduced by 0.29 acres. This reduction will occur entirely within the "open land" category for land use. The majority of the workspace reduction (0.23 acres) occurs within Wetland SI-W1A. Because Route Variation 80 eliminates the horizontal side bend along the Arthur Kill HDD, will improve the constructability of this HDD crossing, addresses 380 Development's initial concerns, and will result in less land use and wetland impacts, Texas Eastern has incorporated it into the proposed pipeline route.

MPs 4.07R to 4.71R - Route Variation 74

Route Variation 74 is located in the Borough of Staten Island in Richmond County, New York (Figures 7 through 11: Alignment Sheets LD-A-1017A to 1020). It is approximately 0.64 miles in length, deviates from the proposed NJ-NY Expansion pipeline ROW at MP 4.07R, and rejoins the ROW at MP 4.71R. This route variation involves an adjustment to the alignment of the Goethals Bridge HDD. Texas Eastern incorporated Route Variation 74 into the pipeline route to minimize impacts on a wooded parcel of land at the HDD entry point at MP 4.71R that contains sensitive archaeological resources. This parcel is owned by Texas Eastern and is located southeast of Metering and Regulating (M&R) Station 058. To accomplish this route variation, Texas Eastern realigned the Goethals's Bridge HDD exit point approximately 100 feet west of the proposed exit point on said Texas Eastern property. In addition, Texas Eastern has maintained a 100-foot offset from the proposed bridge abutment for the new Goethals Bridge reconstruction. This route variation will reduce the workspace associated with the HDD by approximately 27 percent or 0.61 acres and will occur entirely within the "forest/woodland" category for land use. Because Route Variation 74 minimizes impacts on sensitive archaeological resources while still facilitating the completion of the Goethals Bridge HDD, Texas Eastern has incorporated it into the proposed pipeline route.

MPs 4.71R to 4.80R - Route Variation 58

Route Variation 58 is located in the Borough of Staten Island in Richmond County, New York (Figure 12: Alignment Sheet LD-A-1021). It is approximately 0.13 miles in length, deviates from the proposed NJ-NY Expansion pipeline ROW at MP 4.71R, and rejoins the ROW at MP 4.80R. Texas Eastern incorporated Route Variation 58 into the pipeline route to accommodate Consolidated Rail Corporation's (Conrail) request to avoid its existing rail switching equipment on the current pipeline route crossing location. An additional 0.25 acres of permanent easement and 0.06 acres of temporary construction workspace will be required to construct this route variation on a parcel already affected by the Project, as compared to the proposed route. These additional impacts will occur entirely within the "industrial/commercial" category for land use. Because Route Variation 58 accommodates Conrail's request to avoid impacting existing active rail switches, Texas Eastern has incorporated it into the proposed pipeline route.

MPs 4.80R to 5.27R - Route Variation 76

Route Variation 76 is located in the Borough of Staten Island in Richmond County, New York (Figures 13 through 15: Alignment Sheets LD-A-1021 to 1023). It is approximately 0.48 miles in length, deviates from the proposed NJ-NY Expansion pipeline ROW at MP 4.80R, and rejoins the ROW at MP 5.27R. Texas Eastern incorporated Route Variation 76 into the pipeline route after additional engineering work and field investigations revealed that there is insufficient area to construct the proposed route due to existing underground utilities within the roadway layout of Western Avenue. Texas Eastern determined that to construct the pipeline within the roadway would require the relocation of portions of the known existing infrastructure. Additionally, "Dig-Safe" marking along the roadway for ongoing construction indicated the presence of utilities of which no mapping is available. Utilizing the revised alignment will avoid both of these issues. As such, Texas Eastern relocated the pipeline alignment slightly east of Western Avenue and out of the roadway ROW as it crosses Port Authority property.

Route Variation 76 will not affect any new landowners or any additional environmental resources. Overall, Route Variation 76 requires an additional 2.3 acres of land to construct the pipeline. The additional impact will occur within the "industrial/commercial" category for land use. By moving outside of Western Avenue, the ROW configuration will now include a 50-foot permanent easement. Of the 2.3 acres of impact, 1.6 acres is attributable to the 50-foot permanent easement. Because Route Variation 76 provides a work area along Western Avenue that is not encumbered with underground utilities and avoids construction and operational impacts to the integrity of these facilities, Texas Eastern has incorporated the route variation into the proposed pipeline route.

MP 5.54R Workspace

The workspace at MP 5.54R (Figure 16) has been revised in order address concerns over impacts to wetland SI-W10 which encroaches onto the permanent ROW, and therefore cannot be completely avoided. Texas Eastern reviewed the workspace layout at this location and has determined that a 30-foot by 140-foot wide additional temporary workspace (ATWS) area on the west side of the ROW can be relocated to the east side of the ROW to avoid wetland impacts. By reconfiguring the ATWS at approximately MP 5.54R, wetland impacts within Arlington Marsh can be reduced.

MPs 17.85R to 19.85R - Route Variations 64/79

These route variations are located in the cities of Jersey City and Hoboken in Hudson County, New Jersey and Borough of Manhattan in New York County (Figures 17 through 19: New York portion on Alignment Sheets LD-A-1083 to 1085). They are approximately 2.0 miles in length, deviate from the proposed NJ-NY Expansion pipeline ROW at MP 17.85R, and rejoin the ROW at MP 19.85R. Texas Eastern incorporated Route Variations 64/79 into the pipeline route because making slight adjustments to the 18th Street/Long Slip HDD and the Hudson River HDD allows Texas Eastern to avoid conflicts with an existing 102-inch brick sewer outfall and can ensure that the property owned by Newport Associates Development Company (Newport) will not be affected by any permanent ROW.

To avoid the conflicts with the sewer outfall crossing, Texas Eastern relocated the exit point of the 18th Street/Long Slip HDD in Jersey City at Coles and 18th Streets, approximately 28 feet to the south. Texas Eastern adjusted the pipeline, permanent easement and temporary construction ROW at this location. The permanent ROW was reduced by 0.1 acres and the temporary construction ROW was reduced by 0.12 acres. This route variation will occur entirely within the “industrial/commercial” category for land use. No other workspace changes were required for these variations. In addition, no additional impacts to environmental resources will occur from these route variations. Because Route Variations 64/79 avoids conflicts between the 18th Street/Long Slip HDD and the existing 102-inch brick sewer outfall and removes any permanent easement from Newport’s property, Texas Eastern has incorporated it into the proposed pipeline route.

Route Variation 64 lies entirely within Jersey City and Hoboken, New Jersey and is not further considered here. However, Route Variation 79 lies within Manhattan, as well as Jersey City and Hoboken, New Jersey. The portion of Route Variation 79 that lies in Manhattan begins within the New York reach of the Hudson River STA 1019+20.4 and terminates at the southwest corner of the Gansevoort Peninsula (see Figures 17 through 19).

MPs 19.85R to 20.04R - Route Variation 75

Route Variation 75 is located in the Borough of Manhattan in New York County, New York (Figure 19: Alignment Sheet LD-A-1085). It is approximately 0.12 miles in length, deviates from the proposed NJ-NY Expansion pipeline ROW at MP 19.85R and terminates at MP 20.04R in Manhattan. Texas Eastern adjusted the pipeline alignment on the Gansevoort Peninsula currently utilized by the NYC Department of Sanitation on property owned by the State of New York and leased to the Hudson River Park Trust (HRPT), from the point where it makes landfall to the crossing of State Route 9A (West Street) to: (1) avoid having to relocate an existing 20-inch diameter water main located under the bike path parallel to State Route 9A, (2) allow sufficient room to install required new sewer manholes farther from State Route 9A, and (3) increase the safety of construction activities in the highly utilized area by offsetting the construction area adjacent to State Route 9A.

Route Variation 75 will not affect any new landowners or any additional environmental resources. An additional 0.01 acres of temporary construction workspace will be required to construct the pipeline and install the necessary cathodic protection equipment. These additional impacts will occur entirely within the “industrial/commercial” category for land use. It should also be noted that of the total construction ROW impact of 1.16 acres, 0.19 acres will be new permanent ROW.

Because Route Variation 75 avoids or minimizes impacts on existing and proposed infrastructure and reduces the proximity of construction adjacent to State Route 9A, Texas Eastern has incorporated them into the proposed pipeline route.

Results

MPs 3.14R to 3.75R - Route Variation 80

The portion of Route Variation 80 that lies within Staten Island, New York includes both a water crossing via HDD and a terrestrial section. The HDD continues from the New Jersey side across the Arthur Kill and onto the Staten Island shoreline exiting at MP 3.74R (see Figure 4). The pipeline then continues as a short section of open cut construction to the terminus of Route Variation 80 at MP 3.75R.

Previously identified cultural resources along Route Variation 80 are limited to the remains of a barge mooring rack used historically by the Gulf Oil Corporation, and which is visible on Project alignment sheets (see Figure 4 and 5). The barge mooring rack was identified during a previous shoreline investigation, which concluded that it was not considered eligible to the National Register (Raber et al. 1996:43).

The Arthur Kill HDD portion of Route Variation 80 in New York extends between ca. 0 and 160 feet (ft) in depth (Figure 20). It was concluded in the December filing report, the portion of the HDD between STA 195+00 and STA 197+41.9 that represents its exit point may have vertical impacts on sediments potentially containing archaeological deposits. This latter section of the HDD as well as the terrestrial open-cut portion of Route Variation 80 represents a minor variation from the December filing route. This area was previously assessed in the December filing archaeological overview survey report as having high sensitivity for pre-contact resources and no post-contact sensitivity (Elquist et al. 2010a). It was noted in this report that expected pre-contact resources pre-dating marine transgression could consist of isolated finds or campsites underlying documented marsh and fill deposits in this area (Elquist et al. 2010a:74). This same area was considered to lack any post-contact sensitivity due to the presence of extensive marshlands prior to mid-twentieth century filling associated with the oil refinery complex. Additional work in the form of soil borings were recommended for the archaeologically sensitive portions of this area (Elquist et al. 2010a). In comment letters regarding the December 2010 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 April 25, 2011) and the City of New York Landmarks Preservation Commission (LPC) (Letter dated Jan. 7, 2011) concurred with the December 2010 filing report assessment and recommendations for this area.

Since the completion of the December filing report, geotechnical boring B-1A (SI) for the Project (Universal No. IR-22-1-HDD-1) placed at the location of the HDD exit point was made available to PAL for review. The log for this boring indicates the presence of petroleum contaminated fill to a depth of 3 feet overlying organic silty clay likely representing estuarine conditions to a depth of 18 feet. The organic silty clay deposits are underlain by peat that extends to 22.5 feet in depth which overlies a grey fine to medium sand with a trace of silt to a depth of approximately 30 feet. This latter stratum is underlain by a coarser sand deposit with a trace to some silt to 36.5 feet that overlies decomposed rock and bedrock.

The deposit of fine to medium sand with a trace of silt underlying the peat between 22.5 and 30 feet below the surface may represent sediments that have the potential to contain archaeological resources, and PAL continues to assess this area as containing high sensitivity for pre-contact deposits that predate marine transgression of the area. These archaeologically sensitive sediments lie between approximately STA 195+50 and 197+00 which consists of a HDD that will pass upward through the archaeologically sensitive stratum between 22.5 and 30 feet below the surface to the HDD exit point (see Figure 4 and 5, 20). The remaining portions of Route Variation 80 between STA 195+00 and 195+50, and STA 197+00 and 198+00.5 are now considered to have no sensitivity for pre-contact resources as these portions of the Project APE will be placed in sediments (fill, organic silty clay, peat, or coarser sand deposits) that are not considered to have potential to contain significant archaeological resources.

While the proposed HDD will impact the archaeologically sensitive strata (22.5 to 30 ft below ground surface between approximately STA 195+50 and 197+00) of Route Variation 80, archaeological subsurface investigations are not considered to be practical or prudent at this location. This section of the pipeline route lies within a documented area of environmentally sensitive wetlands where ground disturbances are to be as minimal as possible. The project impact for the pipeline through the sensitive strata will be less than 4-ft in diameter, which is a much smaller area of disturbance than would be needed for archaeological subsurface excavations to expose and investigate such deeply buried sediments. In light of these mitigating factors, PAL recommends no further archaeological investigations (Table 1).

Route Variation 80 also includes a workspace for pull back heading east of this portion of the pipeline route (see Figures 5 and 6). Only minimal surface impacts to the filled wetland area containing the pull back area are proposed and no further investigations are recommended.

MPs 4.07R to 4.71R - Route Variation 74

Route Variation 74 includes the Goethals Bridge HDD between MP 4.07R and 4.71R, workspace for pullback, and a reduced workspace surrounding the HDD entry point at MP 4.71R (see Figures 6 through 10, Figure 21). The presently proposed route represents a relatively minor variation from the earlier proposed route (Route Variation 50), which was previously assessed for archaeological sensitivity (Elquist and Cherau 2011a). The previous assessment report noted that south of Old Place Creek no previously recorded archaeological sites were present, the area had low to no potential to contain post-contact cultural resources, and that with the exception of its exit point, the HDD was of sufficient depth that any potential pre-contact deposits at this location would not be impacted. Additional work in the form of soil borings was recommended at the HDD exit point, which only minimally varies from the presently proposed exit point for Route Variation 74 (see Figure 8).

Subsequent data from an environmental geotechnical boring undertaken in the immediate vicinity of the exit point was presented in a report summarizing the results of geoarchaeological borings undertaken for the Project to date (Cherau 2011). The geotechnical boring revealed 16 ft of petroleum contaminated sandy fill underlain by organic silty clay to 20 ft at which point a fibric peat was encountered. Given the presence of the deep fill and marsh deposits, this area was reassessed as having no archaeological sensitivity, and no further work was recommended (Cherau 2011:5-6). Comment letters from the New York SHPO (Letter dated June 16, 2011) and LPC

(Letter dated May 26, 2011) indicate both reviewing agencies concurred with the geoarchaeological boring report assessment and recommendations.

The portion of the Route Variation 74 HDD between Old Place Creek and the HDD workspace to the north is situated some 100 feet west of the previously proposed route between approximately STA 242+00 and STA 247+25 (see Figure 10). No previously recorded archaeological sites are present within the presently proposed Project route at this location, though historic maps (Beers 1874; Butler 1853; Dripps 1872; Hassler 1845; Walling 1860) indicate that the Old Place Mill and associated dwelling were present along or in the immediate vicinity of the route (Figure 22). Deposits associated with the previously recorded Old Place Site (A08501.0134 and A08501.2366) may be present in the vicinity. First reported by Alanson Skinner in the early twentieth century, the Old Place Site has subsequently been investigated by both avocational and professional archaeologists and has yielded evidence of Archaic, Woodland and Contact period components (Anderson 1964, 1967; HAA 2002; Payne and Baumgardt 1986; Ritchie and Funk 1971; Skinner 1909). Other recorded post-contact sites in the vicinity include seven house and outbuilding sites on the west side of Western Avenue identified during the 1986 Howland Hook Marine Terminal survey (Payne and Baumgardt 1986). These sites include several loci consisting of domestic and other associated structures ranging in date from the seventeenth through the twentieth centuries (A0815-01-2371, A085-01-2372, A085-01-2373, A085-01-2374, A085-01-2367, A085-01-2368, and A085-01-2369). Closest to Route Variation 74 is Tunissen's 1680 Domestic Structure Site (A085-01-2374) situated along the northwest corner of Western Avenue and what is now Goethals Road North according to Payne and Baumgardt's map (1986). Given the location of all these post-contact sites west of Western Avenue, the current Project route is not expected to impact these sites. In any case, the APE at this location extends between ca. 30 and 80 ft in depth and is not expected to impact any potential archaeological deposits at this location (see Figure 20).

The remaining portion of Route Variation 74, which includes the pipeline route within the HDD additional workspace and workspace itself mainly varies from the originally proposed route in that the size of the workspace has been reduced (see Figure 11). This area of Route Variation 74 lies entirely within the boundaries of the previously identified Old Place Neck Site (A08501.002971). The Old Place Neck Site contains both pre- and post-contact components and was identified and evaluated as part of the ongoing archaeological investigations for the Project (Elquist et al. 2011; Elquist and Cherau 2011b).

No additional work is recommended for the portion of Route Variation 74 between STA 215+00 and 247+25 as the route in this area either lacks archaeological sensitivity or is not expected to undergo impacts due to the depth of the Goethals Bridge HDD. The remaining portion of Route Variation 74 comprised of the HDD entry point workspace and route contained therein (STA 247+25 to STA 248+88) is considered to be archaeologically sensitive given the presence of the Old Place Neck Site (see Table 1). The results of the Phase II investigations at this site and recommendations for additional work regarding this latter area are summarized in the additional Phase IB and Phase II report for the Old Place Neck Site (Elquist and Cherau 2011b). Only minimal surface impacts to the filled wetland area containing the pullback area back heading southwest of the Goethals Bridge HDD exit point (see Figures 7 and 8) are proposed and no further investigations are recommended.

MPs 4.71R to 4.80R - Route Variation 58

Route Variation 58 extends the pipeline route about 200 feet east of the previously proposed route (see Figure 12), which was previously sensitized as having high sensitivity for pre-contact resources and moderate to low sensitivity for post-contact resources (Elquist et al. 2010a). Pre-contact sites recorded in the immediate area include the above-noted Old Place Site (A08501.0134 and A08501.2366), and the Mariner's Harbor Site area first reported by Skinner (Boesch 1994:No. 105; STD-MH), and Site 8505 (NYSM site files). Skinner additionally noted finds of projectile points (possibly related to Site 8505) along Western Avenue (Skinner 1898-1909). Post-contact sites documented south of the Staten Island Railroad Crossing include Revolutionary War Period burials related to a skirmish associated with the former Reverend Kinney property (documented as Site A085-01-2375) (Payne and Baumgardt 1986; Skinner 1909). North of the rail crossing, the route overlaps with the southernmost limit of the Proctor and Gamble Port Ivory Plant complex that by the 1920s occupied both sides of Western Avenue. The 1907 Robinson map indicates that a "Milliken Station" was present along a rail spur just north of the Staten Island rail line, which appears to have been torn down by 1937 (Bromley 1907, 1917; Sanborn 1937). By 1962, a manufactory building of the Proctor and Gamble complex for cake mixes was present near the former location of the rail station and appears on Sanborn maps as late as 1996, but is no longer present Sanborn 1962, 1977, 1981, 1983, 1986, 1987, 1988, 1989, 1990, 1992, 1993, 1994, 1995, 1996). However, neither the rail station or the Proctor and Gamble manufactory building lie within the direct alignment of Route Variation 58.

As with the previously proposed route, the presence of previously recorded pre-contact archaeological sites and artifact finds along Western Avenue indicate that Route Variation 58 has high sensitivity for pre-contact cultural resources in intact sediments that may lie below expected deposits of marsh sediments, fill and/or disturbed soils in this area. Expected pre-contact resources could consist of campsite or village components dating to the Archaic through contact periods. The portion of the route south of the Staten Island rail crossing is considered to have moderate sensitivity for eighteenth- and nineteenth-century resources related to the Revolutionary War period skirmish and burials, and/or the Reverend Kinney property, and low sensitivity for later historic resources. The portion of the route north of the rail crossing is considered to have low sensitivity for any significant post-contact period resources. Soil borings are recommended along Route Variation 58 between STA 248+57.7 and 255+66.5 to determine the presence and depth of ground disturbance, fill, or marsh deposits, and of any sediments potentially containing pre-contact and post-contact period resources within or below these deposits (see Table 1).

MPs 4.80R to 5.27R - Route Variation 76

Route Variation 76 reflects a very minor deviation from the originally proposed route assessed in the Pre-filing report (Elquist et al. 2010b). The Pre-filing route was largely contained within the Western Avenue roadbed, while the currently proposed route runs adjacent to the eastern edge of Western Avenue (see Figures 13 through 15). It was concluded in the Pre-filing report that this area contained high sensitivity for pre-contact resources given the presence of Archaic through Woodland finds associated with the Mariner's Harbor site area (Boesch 1994:No. 105; STD-MH), artifact finds along Western Avenue/Site 8505 (NYSM site files; Skinner 1898-1909), and deposits associated with the Bowman's Brook (NYSM 4594 and 7921) and Bowman's Brook North (A085-01-2364) sites to the north and east (Payne and Baumgardt 1986; Skinner 1909). The Pre-filing route was not assessed as having any sensitivity for post-contact resources as no structures,

buildings, or other features associated with the above-noted Proctor and Gamble complex are documented within or along the Western Avenue roadbed (Elquist et al. 2010b:84 and 86).

In comment letters regarding the August 2010 Pre-filing technical report, the New York SHPO (Letter dated Oct. 22, 2010) and the LPC (Letter dated Oct. 28, 2010) concurred with the August 2010 Pre-filing report assessment and recommendations for this area. PAL continues to assess this area as having high sensitivity for pre-contact cultural resources, and no sensitivity for post-contact resources, and additional work in the form of soil borings are recommended to determine the presence of any sediments potentially containing pre-contact deposits (see Table 1).

MP 5.54R Workspace

The additional temporary workspace at approximately MP 5.54R is contiguous with an area previously assessed in the December foiling report (Elquist et al. 2010a:85-86). Previously recorded archaeological sites in the area include the Bowman's Brook (NYSM 4594 and 7921), Bowman's Brook North (A085-01-2364), and Mariner's Harbor site areas (Boesch 1994:No. 105; STD-MH). Post-contact deposits in this same area could include Revolutionary War period burials (Kardas and Larrabee 1982:7, citing Skinner 1926) that could be located on either side of Richmond Terrace south of the workspace, and remains of the Milliken Brothers foundry/Downey Shipbuilding complex that were situated on either side of the Richmond Terrace roadway. Previous cultural resource investigations of the area, however, concluded that the remnants of the industrial complex north of Richmond Terrace do not contain any historical significance (Flagg 1991a, 1991b). It was concluded in the report that this area contained high sensitivity for Archaic and Woodland period remains associated with the Bowman's Brook and Bowman's Brook North Sites, including human remains. Portions of the area were also considered to contain modern sensitivity for Revolutionary War Period burials (Elquist et al. 2010a:86).

In comment letters regarding the December 2010 filing technical report, the New York SHPO (Letter dated April 25, 2011) and the LPC (Letter dated Jan. 7, 2011) concurred with the December 2010 report assessment and recommendations for this area (Elquist et al. 2010a). PAL continues to recommend additional investigations in the form of soil borings for this area to determine the presence of any sediments that have the potential to contain pre- or post-contact deposits (see Table 1).

MPs 17.85R to 19.85R - Route Variations 64 and 79

Route Variation 64 is entirely situated within New Jersey and is not considered further here. The New York portion of Route Variation 79 lies between STA 1019+20.4 and STA 1052+07.9 and is contained entirely within the New York reach of the Hudson River terminating at the southwest corner of the Gansevoort Peninsula (see Figures 17 through 19). It consists of the Hudson River HDD located containing the HDD route, entry point, and associated workspace. 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 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 – Appendix E in Elquist et al. 2010a). 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 (Figure 23). As such, no further archaeological investigations are recommended for this portion of Route Variation 79.

MPs 19.85R to 20.04R - Route Variations 75

Route Variation 75 is located in Manhattan on made land between STA 1052+07.9 and 1058+43.6 and occupies the exact same footprint of the terrestrial portion of previously assessed Route Variation 54. (see Figure 19). It was concluded in the previous assessment that this footprint contained no to low sensitivity for pre- and post-contact cultural resources, and no further work was recommended (Elquist and Cherau 2011c). In comment letters regarding the previous assessment report for Route Variation 54, the New York SHPO (Letter dated June 16, 2011) and the LPC (Letter dated May 26, 2011) concurred with the assessment and recommendations for this area. PAL continues to assess this area as containing no to low sensitivity for archaeological resources and, no further work is recommended for Route Variation 75 (see Table 1).

Summary

No additional archaeological investigations are recommended for all or portions of Route Variations 80, 74, 64/79 and 75 as these are areas that have no to low sensitivity for archaeological deposits and/or are HDDs of sufficient depth that no impacts are expected. Due to the high sensitivity for pre-contact archaeological resources, additional investigations in the form of soil borings are recommended for the archaeologically sensitive portions of Route Variations 80, 74, 58, 76 and the revised workspace configuration at MP 5.54R (see Table 1). Route Variation 58 and the MP 5.54R workspace are also moderately sensitive for post-contact resources. The proposed maximum boring interval for archaeologically sensitive areas 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	Route Variation No.	Facility/ Mile Post Location	STA No. Location	Figure	Pre-contact Sensitivity	Post-contact Sensitivity	Recommendations
Staten Island	80	MP 3.14R to 3.75R	STA 182+36.5 to 195+50	3-5	None	None	No further archaeological investigations.
			STA 195+50 to 197+00	3-5	High	None	No further archaeological investigations, as any such investigations neither prudent nor practical.
			STA 197+00 to 198+00.5	4-5, 20	None	None	No further archaeological investigations.

Borough	Route Variation No.	Facility/ Mile Post Location	STA No. Location	Figure	Pre-contact Sensitivity	Post-contact Sensitivity	Recommendations
Staten Island	74	MP 4.07R to 4.71R	STA 215+00 to 247+25	7-11	High	None	Area of HDD. No impacts expected. No further archaeological investigations.
			STA 247+25 to 248+88	11	High	See Elquist and Cherau 2011b	Further work recommended. See recommendations in Elquist and Cherau 2011b.
	58	MP 4.71R to 4.80R	STA 248+57.7 to 251+50	12	High	Moderate	Soil borings.
			STA 251+50 to 255+66.5	12	High	Low	Soil borings.
	76	MP 4.80R to 5.27R	STA 253+67.1 to 278+45.5	13-15	High	None	Soil borings.
	MP 5.54R Workspace	MP 5.54R	N/A	16	High	Moderate	Soil borings.
Manhattan	64/79	MP 17.85R to 19.85R	STA 1019+20.4 to 1052+07.9	17-19	None	None	Offshore HDD area, and no expected impacts. No further archaeological investigations.
	75	MP 19.85R to 20.04R	STA 1052+07.9 to 1058+43.6	19	Low	Low	No further archaeological investigations.

References

- Anderson, Albert J.
 1964 Old Place and the Old Place Complex. *The Chesopian*, 2:13–14.
- 1967 Stanley Points from the Old Place Site. *The Chesopian*, 5:89.
- Boesch, Eugene J.
 1994 *Archaeological Evaluation and Sensitivity Assessment of Staten Island, New York*. Prepared for the New York City Landmarks Preservation Commission, New York, NY. Report on File at NY State Historic Preservation Office, Waterford, NY.
- Bridges, William
 1811 *Map of the City of New York and Island of Manhattan, as as laid out by the commissioners appointed by the state legislature, April 3d, 1807*. City of New York, NY.

Bromley, G.W.

- 1879 *Atlas of the City of New York*. G.W. Bromley and Company, New York, NY.
- 1907 *Atlas of Richmond County, New York*. G.W. Bromley and Company, New York, NY.
- 1911 *Atlas of the City of New York, Borough of Manhattan*. G.W. Bromley and Company, Philadelphia, PA.
- 1917 *Atlas of Richmond County, New York*. G.W. Bromley and Company, New York, NY.

Burr, David H.

- 1832 *Map of the City and County of New York with Adjacent County*. David H. Burr, New York, NY.

Cherau, Suzanne

- 2011 *Results of Geoarchaeological Soil Borings and Proposed Phase IB Archaeological Surveys, New Jersey-New York Expansion Project, Staten Island, New York and Linden, Bayonne, and Jersey City, New Jersey*. PAL Inc. Report No. 2367.02. Submitted to Spectra Energy Transmission, LLC, Jersey City, NJ.

Colton, J.H.

- 1856 *Topographical Map of the City and County of New York and the Adjacent Country*. J.H. Colton & Co., New York, NY.

Dripps, Matthew

- 1852 *Map of the City of New York, Extending Northward to 50th Street*. M. Dripps, New York, NY.

Elquist, Ora, Suzanne Cherau, Nichole Gillis, and Gregory R. Dubell

- 2010a *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*. PAL Report No. 2367.01B, December 2010. Submitted to Spectra Energy Transmission, LLC, Jersey City, NJ.
- 2010b *Archaeological Overview Survey, Texas Eastern Transmission, LP, New Jersey-New York Expansion Project, FERC Docket No. PF10-17-000, Staten Island, Manhattan, and Ramapo, New York*. PAL Report No. 2367.01B, August 2010. Submitted to Spectra Energy Transmission, LLC, Jersey City, NJ.

Elquist, Ora, Suzanne Cherau, and Gregory R. Dubell

- 2011 *Phase IB Archaeological Identification Survey, Route Variation 50 Additional Workspace, Staten Island, Richmond County, New York, Texas Eastern Transmission, LP, New Jersey-New York Expansion Project, FERC Docket No. CP11-56-000*. PAL Inc. Report No. 2367.02B-3. Submitted to Spectra Energy Transmission, LLC, Jersey City, NJ.

Elquist, Ora and Suzanne Cherau

- 2011a *Archaeological Overview Survey, Addendum #1 to Technical Report, New Jersey-New York Expansion Project, Staten Island, New York.* Submitted by PAL, Inc. to Spectra Energy Transmission, LLC, Jersey City, NJ.
- 2011b *Phase IB Archaeological Identification Survey, M&R 058 Additional Temporary Workspace, and Phase II Archaeological Site Evaluation, Old Place Neck Site (OPRHP No. A08501.002971), Goethals Bridge HDD Workspace, Staten Island, Richmond County, New York.* PAL Inc. Report No. 2367.0B-1. Submitted to Spectra Energy Transmission, LLC, Jersey City, NJ.
- 2011c *Archaeological Overview Survey, Addendum #2 to Technical Report, New Jersey-New York Expansion Project, Staten Island and Manhattan, New York.* Submitted by PAL, Inc. to Spectra Energy Transmission, LLC, Jersey City, NJ.

Flagg, Thomas R.

- 1991a *Cultural Resource Survey, Newark Bay Site: Main Parcel and Pier Parcel, Staten Island, NY. New York City Long Range Sludge Management Plan GEIS III.* Prepared for the New York City Department of Environmental Protection, Roosevelt Island, NY.
- 1991b *Cultural Resource Evaluation, Newark Bay Site, Staten Island, NY.* Prepared by Historical Documentation Services. Report on File at NY State Historic Preservation Office, Waterford, NY.

Hartgen Archaeological Associates, Inc. (HAA)

- 2002 *Phase IA Literature Review and Archeological Sensitivity Assessment, Cross Harbor Freight Movement Project, Port Ivory Yard, Arlington Yard, Eleven Railroad Crossings and Proposed Tunnel, Staten Island, Richmond County, New York.* Prepared by Hartgen Associates, Inc., Rensselaer, NY. Prepared for Allee King Rosen and Fleming, Inc., New York, NY.

Hassler, F.R.

- 1845 *Map of New York Bay and Harbor and the environs.* U.S. Coast Survey, Washington, D.C.

Payne, Ted M., and Kenneth Baumgardt

- 1986 *Howland Hook Marine Terminal Expansion Cultural Resources Reconnaissance.* Prepared by MAAR Associates, Inc., Newark, DE. Prepared for International Technologies, Edison, NJ.

Perris, William

- 1859 *Maps of the City of New York, Volume 4.* Perris and Browne, New York, NY.

Raber, Michael S., Thomas R. Flagg, Gerald Weinstein, Ernest Weigand, and Norman Brouwer
1996a *Reconnaissance Cultural Resource Investigations, Arthur Kill New York Reach, Richmond County, New York, New York Harbor Collection and Removal of Drift Project, U.S. Army Corps of Engineers, New York District.* Prepared for Frederick R. Harris, Inc., New York, NY, Submitted by Raber Associates, Glastonbury, CT.

Ritchie, William A., and Robert E. Funk
1971 Evidence for Early Archaic Occupations on Staten Island. *Pennsylvania Archaeologist.* 41:45–59.

Sanborn Map Company

1937 *Insurance Maps of New York, Richmond Boro.* Sanborn Map Co., New York, NY.

1950-1996 *Insurance Maps of New York, Manhattan and Bronx Boros.* Updated to 1996. Sanborn Map Co., New York, NY.

1950-1996 *Insurance Maps of New York, Richmond Boro.* Updated to 1996. Sanborn Map Co., New York, NY.

Skinner, Alanson

1898–1909 *Catalogue of the Skinner Collection of Staten Island.* Compilation of original notes by Alanson Skinner. Division of Anthropology Archives, American Museum of Natural History, New York, NY.

1909 The Lenape Indians of Staten Island. In *The Indians of Greater New York and the Lower Hudson.* Anthropological Papers of the American Museum of Natural History, Vol. III (Clark Wissler, ed.). Hudson-Fulton Publication, New York, NY.

Southeastern Archaeological Research (SEARCH)

2010 *Summary Report Marine Archaeological Sensitivity Assessment: Contact/Post-Contact Period Archaeological Resources, New Jersey-New York Expansion Project, Jersey City, New Jersey to Manhattan, New York.* Prepared by Southeastern Archaeological Research, Inc., Newberry FLA. Prepared for The Public Archaeology Laboratory, Inc., Pawtucket, RI.

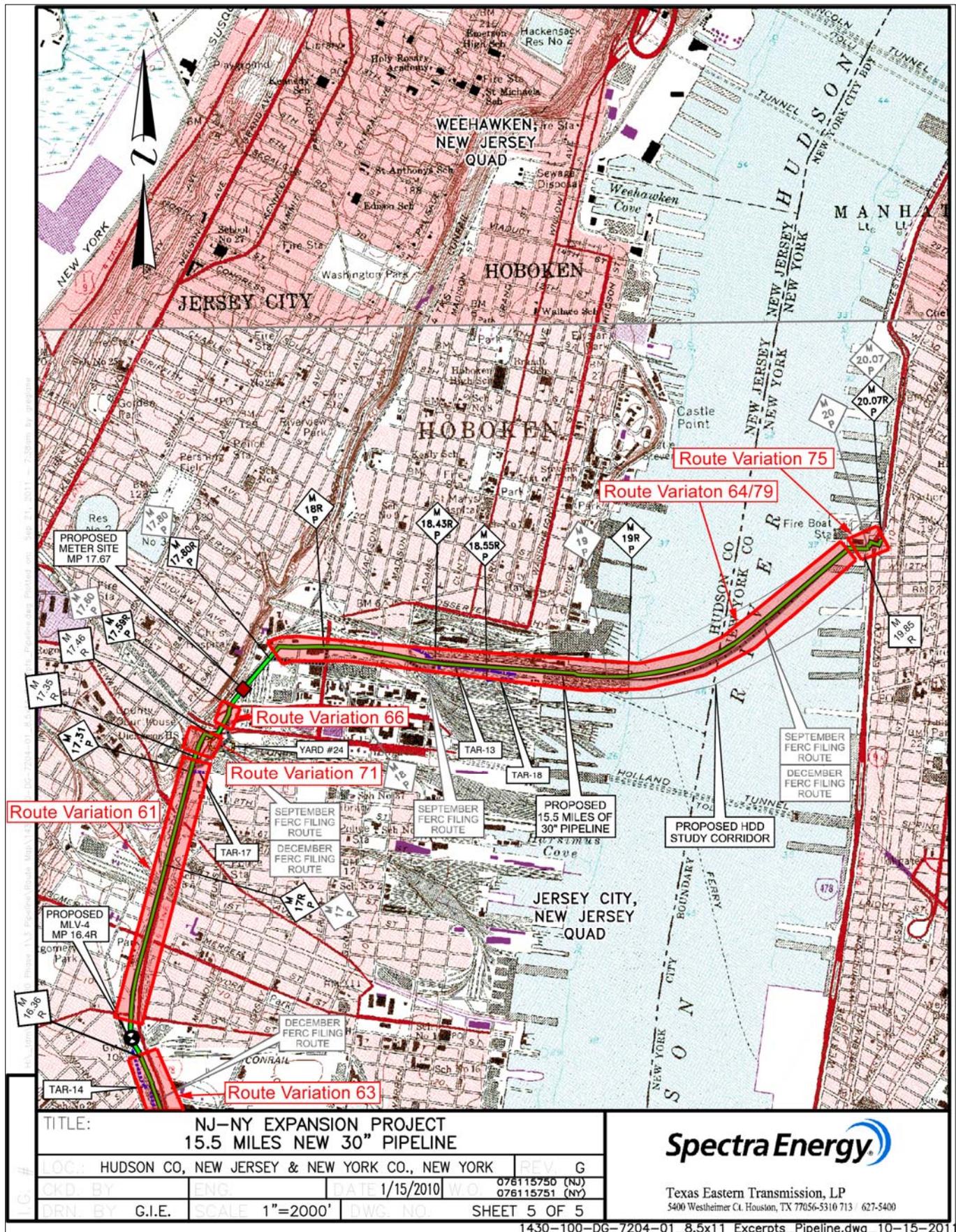


Figure 2. Location of the NJ-NY Expansion Project area, showing the location of the Project changes on the Jersey City, NJ and Weehawken, NJ USGS topographic quadrangles, 7.5 minute series.

SURVEY DATA
SURVEY COMPANY:
FIELD BOOK:
PAGES:

CLASS LOCATION

PIPE MATERIAL

ALIGNMENT DETAIL

PROPOSED PIPELINE
EXIST. P/L w/OWNER NAME
PIPELINE TO BE REMOVED/ABANDONED
TEMP. WORKSPACE
PROPOSED PERMANENT EASEMENT
EXISTING EASEMENT
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 WATER
TRANSITION AREA LIMITS
RIPARIAN ZONE LIMITS
EDGE OF PAVEMENT
PERMANENT ACCESS ROAD (PAR)
TEMPORARY ACCESS ROAD (TAR)
CONTOUR MAJOR (EVERY 10')
CONTOUR AT +2 ELEV.
CONTOUR MINOR (EVERY 2')
TREE / BRUSH LINE
PROPERTY LINE
VERIFIED STORM DRAIN
UNCONFIRMED STORM DRAIN
VERIFIED UNDG. ELEC. CABLE
UNCONFIRMED UNDG. ELEC. CABLE
VERIFIED NAT. GAS LINE
UNCONFIRMED NAT. GAS LINE
VERIFIED SANITARY SEWER
UNCONFIRMED SANITARY SEWER
VERIFIED WATER LINE
UNCONFIRMED WATER LINE
VERIFIED STEAM LINE
UNCONFIRMED STEAM LINE
VERIFIED TELEPHONE CABLE
UNCONFIRMED TELEPHONE CABLE
VERIFIED UNDG. COM. CABLE
UNCONFIRMED UNDG. COM. CABLE
ELEC., WATER, SANI, SEWER, GAS, TELE. & STORM DRAIN MANHOLES

DATE OF AERIAL PHOTOGRAPHY: APRIL, 2009



ENVIRONMENTAL DATA

SITE SPECIFIC E & S

GENERAL E & S FIGURES

PROFILE

SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=20'

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
RIVER WEIGHT OR EQUIVALENT

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

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
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Source/Revision/Issue	Date	Project	
		NJ-NY Expansion	
PAL modified: indicate archaeological sensitivity	11-01-11	Date	
Map data received from: Spectra Energy	11-01-11	November 2011	
The base information contained in this map was supplied to PAL as a professional courtesy for informational and illustrative purposes only. PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the location and/or results of cultural resource investigations conducted by PAL.			Figure 5

Archaeological Sensitivity

- High (Pink hatched)
- Moderate (Blue hatched)
- Low (Yellow hatched)
- None (White)

FOR ARTHUR KILL HDD DETAIL DESIGN, REFER TO DWG. NO. LD-H-1010

SCALE: 0 50 100 200ft / 0 10 20 30 60m

PRIVILEGED INFORMATION - DO NOT RELEASE

LD-A-1015 ALIGNMENT SHEET		REV		DRN		DATE		DESCRIPTION		ITEM NO.		DATE		DESCRIPTION		LN. FT.	
DWG. NO.		REV		DRN		DATE		DESCRIPTION		ITEM NO.		DATE		DESCRIPTION		LN. FT.	
REFERENCE DRAWINGS		REV		DRN		DATE		DESCRIPTION		ITEM NO.		DATE		DESCRIPTION		LN. FT.	

ENGINEERING APPROVALS		NJ-NY EXPANSION PROJECT		
DRAWN BY: GIE	BID	PROPOSED 42" PIPELINE		
DRN. DATE: 07/22/11	CONSTRUCTION	PULL BACK WORKSPACE		
CHECKED BY: GIE		STATE PERMITTING PLAN		
CHK. DATE: 07/25/11		LOC. RICHMOND COUNTY, NEW YORK		
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

DATE: 2011	W.O. 076115751	SCALE: 1"=50'	DWG. LD-A-1015A	REV. A14
------------	----------------	---------------	-----------------	----------

Figure 5. Map of Route Variation 80, showing archaeological sensitivity.

H:\tdm\14301\100 Phase 1\3 Pipeline\alignments\LD-A-1015A.DWG Plotted on: Sep 27, 2011 - 1:22pm by wiaudick

SURVEY DATA

SURVEY COMPANY:
FIELD BOOK:
PAGES:

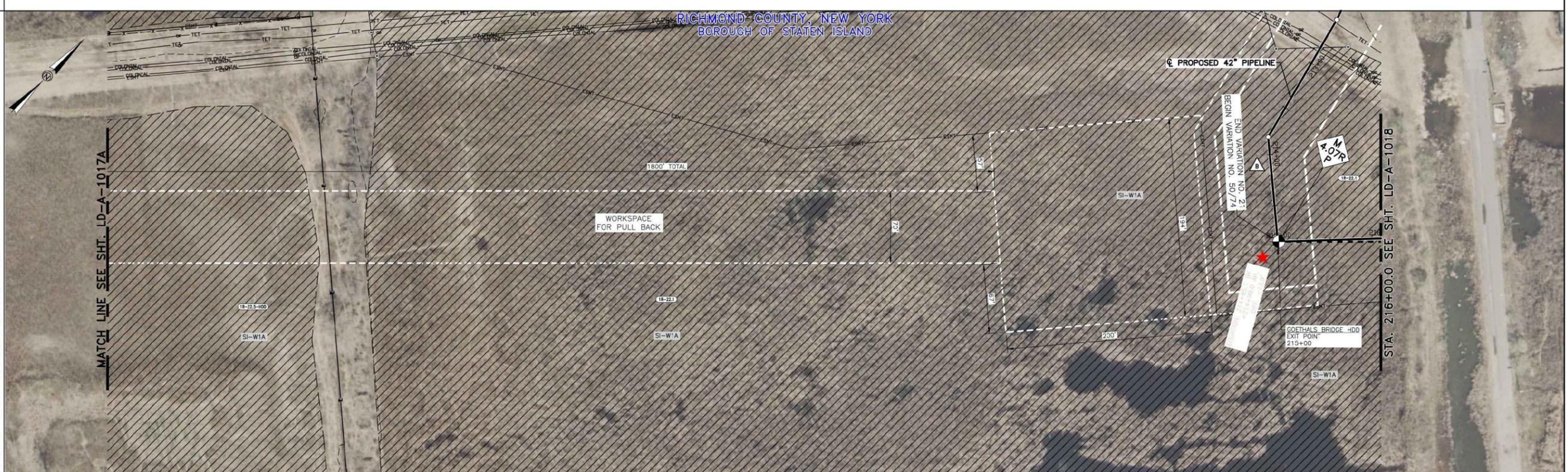
CLASS LOCATION

PIPE MATERIAL

ALIGNMENT DETAIL

PROPOSED PIPELINE
PREVIOUS FERC FILED ROUTE
EXIST. P/L W/OWNER NAME
PIPELINE TO BE REMOVED/ABANDONED
TEMP. WORKSPACE
PROPOSED PERMANENT EASEMENT
EXISTING EASEMENT
ADD. TEMP. WORKSPACE
YARD LOCATION
Q. STREAM / DITCH
DELINATED WETLAND
APPROXIMATE WETLAND BOUNDARY
EDGE OF PAVEMENT
PERMANENT ACCESS ROAD (PAR)
TEMPORARY ACCESS ROAD (TAR)
CONTOUR MAJOR (EVERY 10')
CONTOUR AT +2 ELEV.
CONTOUR MINOR (EVERY 2')
TREE LINE
JERSEY BARRIER
PIPELINE MILEPOST
PROPERTY LINE
VERIFIED STORM DRAIN
UNCONFIRMED STORM DRAIN
VERIFIED LNDG. ELEC. CABLE
UNCONFIRMED LNDG. ELEC. CABLE
VERIFIED NAT. GAS LINE
UNCONFIRMED NAT. GAS LINE
VERIFIED SANITARY SEWER
UNCONFIRMED SANITARY SEWER
VERIFIED WATER LINE
UNCONFIRMED WATER LINE
VERIFIED STEAM LINE
UNCONFIRMED STEAM LINE
VERIFIED TELEPHONE CABLE
UNCONFIRMED TELEPHONE CABLE
VERIFIED LNDG. COM. CABLE
UNCONFIRMED LNDG. COM. CABLE
ELEC., WATER, SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES
LIGHT POLE
GAS VALVE
FIRE HYDRANT
UTILITY POLE
WATER VALVE
TREE

DATE OF AERIAL PHOTOGRAPHY: APRIL 2009



ENVIRONMENTAL DATA

SITE SPECIFIC E & S

GENERAL E & S FIGURES

FOR 380 GOETHALS BRIDGE HDD DETAIL DESIGN, REFER TO DWG. NO. LD-H-1020

PROFILE

SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=20'

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
RIVER WEIGHT OR EQUIVALENT

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

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
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Archaeological Sensitivity

- High
- Moderate
- Low
- None

Source/Revision/Issue	Date	Project
		NJ-NY Expansion
PAL modified: indicate archaeological sensitivity	11-01-11	Date
Map data received from: Spectra Energy	11-01-11	November 2011
		Figure 8

The base information contained in this map was supplied to PAL as a professional courtesy for informational and illustrative purposes only. PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the location and/or results of cultural resource investigations conducted by PAL.

PAL

0 10 20 30 60m
0 50 100 200ft

PRIVILEGED INFORMATION - DO NOT RELEASE

DWG. NO.	ALIGNMENT SHEET DESCRIPTION	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.	ENGINEERING APPROVALS					NJ-NY EXPANSION PROPOSED 42" PIPELINE PULL BACK WORKSPACE ALIGNMENT SHEET		Spectra Energy	
									TITLE	SIGNATURE	DATE	SIGNATURE	DATE	YEAR: 2011	W.O.076115751	SCALE:	DWG. LD-A-1017B
LD-A-1017	ALIGNMENT SHEET			10/01/11	ADDED ROUTE VARIATION NO. 74												
				10/01/11	ISSUED FOR FERC												

Figure 8. Map of Route Variation 74 for pull back, showing archaeological sensitivity.

RIGHT-OF-WAY TRACT NUMBERS RODDAGE	CROSSING 728+00.0	18-224 380 DEVELOPMENT, LLC 72.73 RODS	746+00.0
SURVEY DATA SURVEY COMPANY: FIELD BOOK: PAGES:			
CLASS LOCATION			
PIPE MATERIAL			

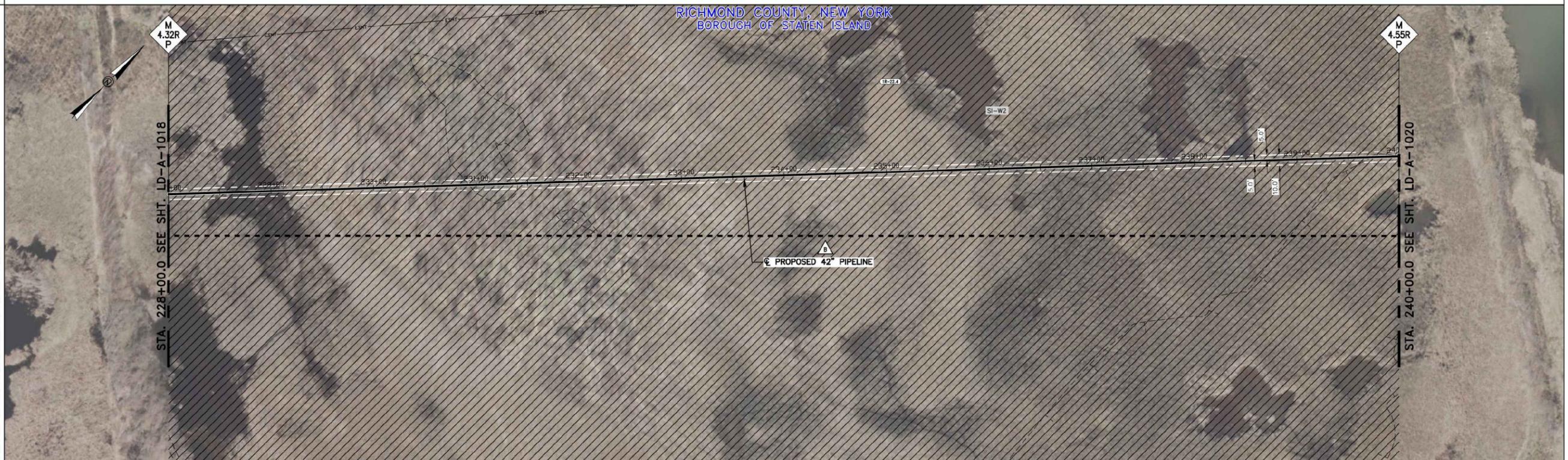
ALIGNMENT DETAIL

PROPOSED PIPELINE
PREVIOUS FERC FILED ROUTE
EXIST. P/L W/OWNER NAME
PIPELINE TO BE REMOVED/ABANDONED
TEMP. WORKSPACE
PROPOSED PERMANENT EASEMENT
EXISTING EASEMENT
ADD. TEMP. WORKSPACE
YARD LOCATION
Q. STREAM / DITCH
DELINEATED WETLAND
APPROXIMATE WETLAND BOUNDARY
EDGE OF PAVEMENT
PERMANENT ACCESS ROAD (PAR)
TEMPORARY ACCESS ROAD (TAR)
CONTOUR MAJOR (EVERY 10')
CONTOUR AT +2 ELEV.
CONTOUR MINOR (EVERY 2')
TREE LINE
JERSEY BARRIER
PIPELINE MILEPOST

PROPERTY LINE
VERIFIED STORM DRAIN
UNCONFIRMED STORM DRAIN
VERIFIED UNDG. ELEC. CABLE
UNCONFIRMED UNDG. ELEC. CABLE
VERIFIED NAT. GAS LINE
UNCONFIRMED NAT. GAS LINE
VERIFIED SANITARY SEWER
UNCONFIRMED SANITARY SEWER
VERIFIED WATER LINE
UNCONFIRMED WATER LINE
VERIFIED STEAM LINE
UNCONFIRMED STEAM LINE
VERIFIED TELEPHONE CABLE
UNCONFIRMED TELEPHONE CABLE
VERIFIED UNDG. COM. CABLE
UNCONFIRMED UNDG. COM. CABLE
ELEC., WATER, SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES
LIGHT POLE
GAS VALVE
FIRE HYDRANT

UTILITY POLE
WATER VALVE
TREE

DATE OF AERIAL PHOTOGRAPHY: APRIL 2009



ENVIRONMENTAL DATA	SI-W2 SI-W2 1,200'
SITE SPECIFIC E & S	6
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

SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=20'

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
RIVER WEIGHT OR EQUIVALENT

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

Source/Revision/Issue	Date	Project
		NJ-NY Expansion
		Date
		November 2011
		Figure 10

PAL modified: indicate archaeological sensitivity 11-01-11
Map data received from: Spectra Energy 11-01-11

The base information contained in this map was supplied to PAL as a professional courtesy for informational and illustrative purposes only. PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the location and/or results of cultural resource investigations conducted by PAL.

Archaeological Sensitivity

- High
- Moderate
- Low
- None

FOR 380 GOETHALS BRIDGE HOOD DETAIL DESIGN, REFER TO DWG. NO. LD-H-1020

0 10 20 30 60m
0 50 100 200ft

PRIVILEGED INFORMATION - DO NOT RELEASE

DWG. NO.	DESCRIPTION	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.
					ADDED ROUTE VARIATION NO. 74			
					ISSUED FOR FERC			

ENGINEERING APPROVALS				
DRAWN BY:	BID	CONSTRUCTION		
GIE				
DRN. DATE: 07/22/11				
CHECKED BY: GIE				
CHK. DATE: 07/25/11				

NJ-NY EXPANSION PROJECT PROPOSED 42" PIPELINE STA. 228+00.0 TO STA. 240+00.0 ALIGNMENT SHEET		Spectra Energy Texas Eastern Transmission, LP 5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400	
LOC. RICHMOND COUNTY, NEW YORK	YEAR: 2011	W.O. 0761-5751	SCALE: 1"=50'
DWG. LD-A-1019	REV. A14		

Figure 10. Map of Route Variation 74, showing archaeological sensitivity.

RIGHT-OF-WAY	TRACT NUMBERS RODDAGE	240+00.0	(1R-22.4) 380 DEVELOPMENT, LLC 9.66 RODS	241+39.4	(1R-22.5S) OLD PLACE CREEK 7.10 RODS	242+76.5	(1R-22.9.6) FRANK LIQUORI, et al 2.09 RODS	243+11.0	(1R-22.9.4) WESTERN AVENUE 4.05 RODS	243+77.8	(1R-22.9.3) DEPT OF REAL ESTATE - CITY OF NEW YORK 5.48 RODS	244+38.3	(1R-22.9.5H) NYS DOT 10.59 RODS	248+43.1	(1R-22.9.2H) GOETHALS ROAD NORTH 3.85 RODS	252+38.7	(1R-22.9.1) TEXAS EASTERN TRANSMISSION, LP 17.35 RODS	264+38.0
--------------	--------------------------	----------	--	----------	--	----------	--	----------	--	----------	---	----------	---------------------------------------	----------	---	----------	---	----------

SURVEY DATA

SURVEY COMPANY:
FIELD BOOK:
PAGES:

CLASS LOCATION

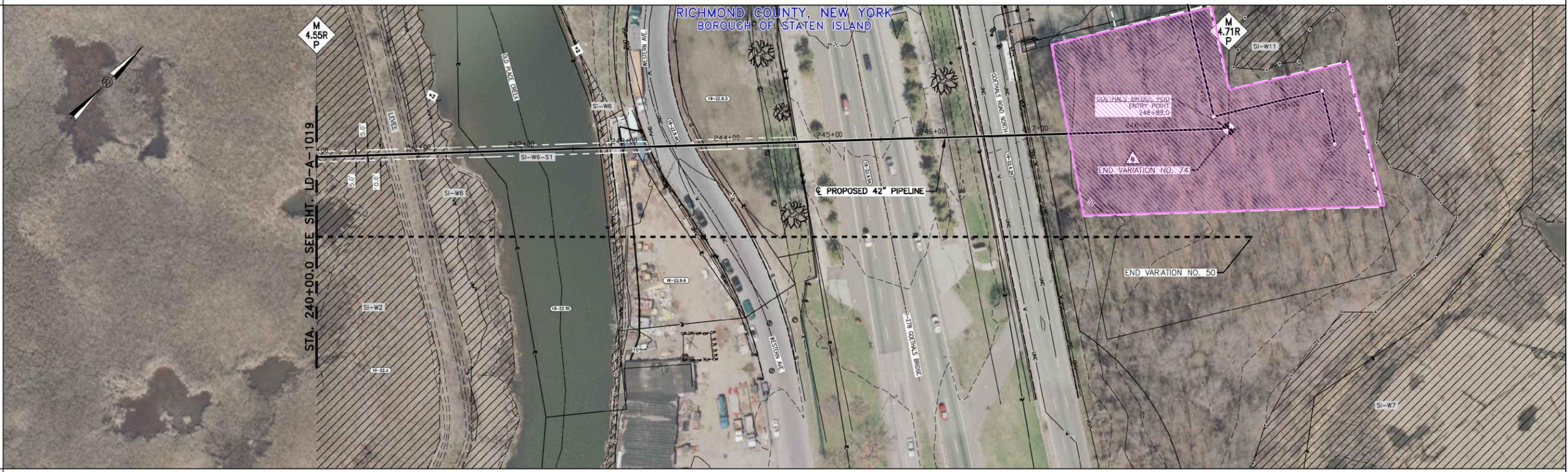
PIPE MATERIAL

ALIGNMENT DETAIL

PROPOSED PIPELINE
PREVIOUS FERC FILED ROUTE
EXIST. F/L W/OWNER NAME
PIPELINE TO BE REINSTATED/ABANDONED
TEMP. WORKSPACE
PROPOSED PERMANENT EASEMENT
EXISTING EASEMENT
ADD. TEMP. WORKSPACE
YARD LOCATION
C. STREAM / DITCH
DELINEATED WETLAND
APPROXIMATE WETLAND BOUNDARY
EDGE OF PAVEMENT
PERMANENT ACCESS ROAD (PAR)
TEMPORARY ACCESS ROAD (TAR)
CONTOUR MAJOR (EVERY 10')
CONTOUR AT -2 ELEV.
CONTOUR MINOR (EVERY 2')
TREE LINE
JERSEY BARRIER
PIPELINE MILEPOST

PROPERTY LINE
VERIFIED STORM DRAIN
UNCONFIRMED STORM DRAIN
VERIFIED UNDC. ELEC. CABLE
UNCONFIRMED UNDC. ELEC. CABLE
VERIFIED NAT. GAS LINE
UNCONFIRMED NAT. GAS LINE
VERIFIED SANITARY SEWER
UNCONFIRMED SANITARY SEWER
VERIFIED WATER LINE
UNCONFIRMED WATER LINE
VERIFIED STEAM LINE
UNCONFIRMED STEAM LINE
VERIFIED TELEPHONE CABLE
UNCONFIRMED TELEPHONE CABLE
VERIFIED UNDC. COM. CABLE
UNCONFIRMED UNDC. COM. CABLE
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

240+00.0	SI-W2	SI-W6	SI-W6-S1	SI-W6
240+168.5	SI-W2	SI-W6	OLD PLACE CREEK	SI-W6
240+172.0	SI-W6	SI-W6	149.7	SI-W6
241+26.8	SI-W6	SI-W6	9.5'	SI-W6
242+76.5	SI-W6	SI-W6	9.5'	SI-W6
242+86.0	SI-W6	SI-W6	9.5'	SI-W6

SITE SPECIFIC E & S

6	6	6
---	---	---

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

SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=20'

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 (A)

TRENCH PLUG (▲)

RIVER WEIGHT OR EQUIVALENT (■)

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

Archaeological Sensitivity

- High (Pink hatched)
- Moderate (Blue hatched)
- Low (Yellow hatched)
- None (White)

Source/Revision/Issue

Source/Revision/Issue	Date
PAL modified: indicate archaeological sensitivity	11-01-11
Map data received from: Spectra Energy	11-01-11

Project
NJ-NY Expansion

Date
November 2011

Figure 11

The base information contained in this map was supplied to PAL as a professional courtesy for informational and illustrative purposes only. PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the location and/or results of cultural resource investigations conducted by PAL.

PAL

SCALE: 0 50 100 200ft
0 10 20 30 60m

DWG. NO.	DESCRIPTION	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.	ENGINEERING APPROVALS					NJ-NY EXPANSION PROJECT PROPOSED 42" PIPELINE STA. 240+00.0 TO 249+10.0 ALIGNMENT SHEET			Spectra Energy Texas Eastern Transmission, LP 5400 Westchimer Ct. Houston, TX 77056-5310 713 / 627-5400
									TITLE	SIGNATURE	DATE	SIGNATURE	DATE	YEAR: 2011	W.O. 076115751	SCALE: 1"=50'	

Figure 11. Map of Route Variation 74, showing archaeological sensitivity.

RIGHT-OF-WAY	CROSSING	WORKSPACE	245+50.0	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION 14.43 RODS	247+88.2	CRCH-3H CITY OF NEW YORK 3.09 RODS	248+39.2	CRCH-3 CITY OF NEW YORK 19.57 RODS	251+82.1	CONRAIL 2.68 RODS	252+06.4	CRCH-4 PORT AUTHORITY NY AND NJ 14.56 RODS	254+46.6	CRCH-4B PORT AUTHORITY NY AND NJ 5.37 RODS	255+30.2	CRCH-4 PORT AUTHORITY NY AND NJ 3.93 RODS	255+86.6	CRCH-4H WESTERN AVE. 13.08 RODS	255+89.3	CRCH-4 PORT AUTHORITY NY AND NJ 0.65 RODS	255+93.3	CRCH-4H WESTERN AVE. 6.48 RODS	257+00.0
--------------	----------	-----------	----------	---	----------	--	----------	--	----------	----------------------	----------	--	----------	--	----------	---	----------	---------------------------------------	----------	---	----------	--------------------------------------	----------

SURVEY DATA

SURVEY COMPANY:
FIELD BOOK:
PAGES:

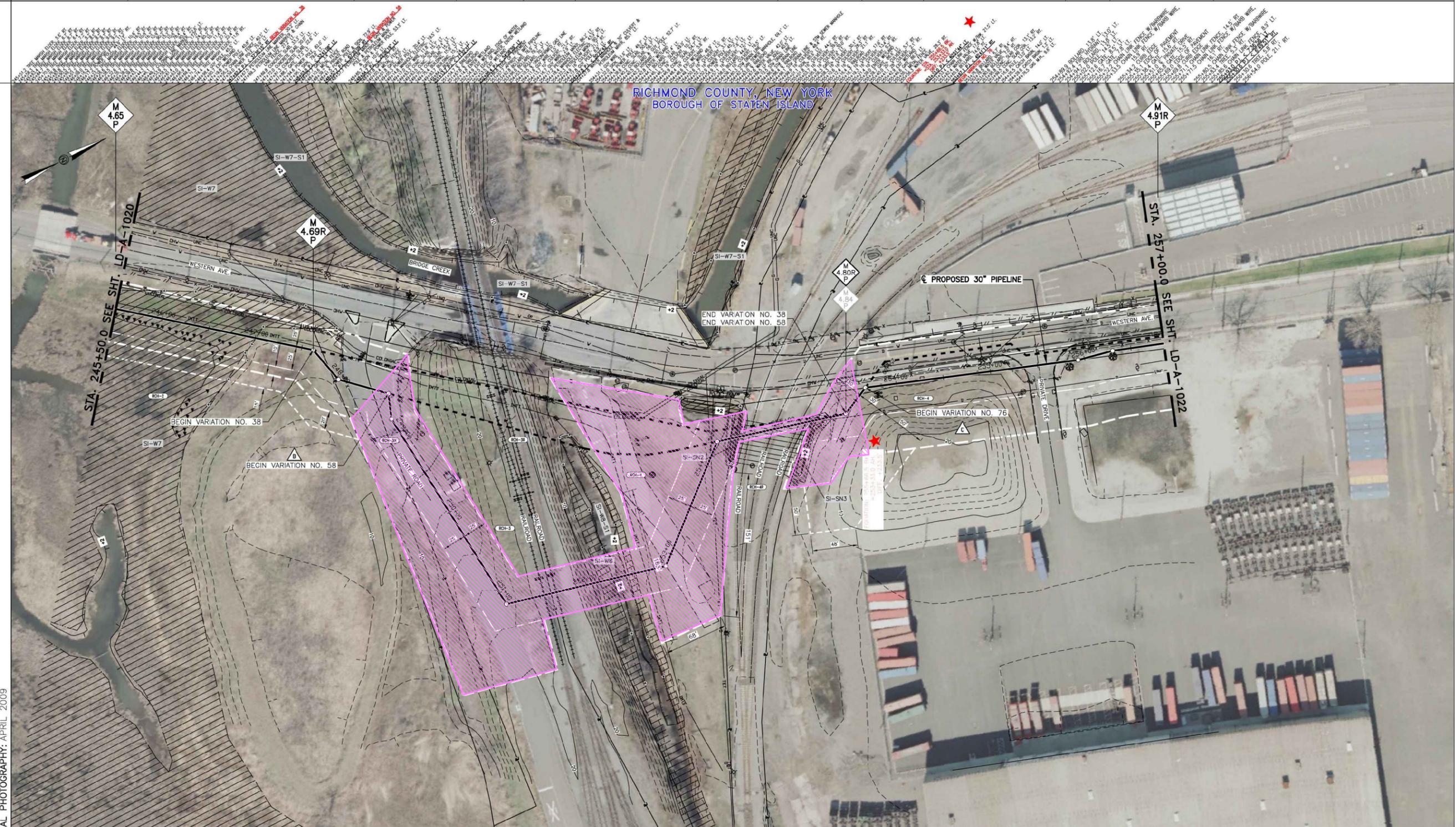
ALIGNMENT DETAIL

PROPOSED PIPELINE
PREVIOUS FERC FILED ROUTE
EXIST. P/L w/OWNER NAME
PIPELINE TO BE REMOVED/ABANDONED
TEMP. WORKSPACE
PROPOSED PERMANENT EASEMENT
EXISTING EASEMENT
ADD. TEMP. WORKSPACE
YARD LOCATION
Q 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)
TEMPORARY ACCESS ROAD (TAR)
CONTOUR MAJOR (EVERY 10')
CONTOUR AT +2 ELEV.
CONTOUR MINOR (EVERY 2')
TREE / BRUSH LINE
JERSEY BARRIER
PIPELINE MILEPOST
PROPERTY LINE
VERIFIED STORM DRAIN
UNCONFIRMED STORM DRAIN
VERIFIED UNDG. ELEC. CABLE
UNCONFIRMED UNDG. ELEC. CABLE
VERIFIED NAT. GAS LINE
UNCONFIRMED NAT. GAS LINE
VERIFIED SANITARY SEWER
UNCONFIRMED SANITARY SEWER
VERIFIED WATER LINE
UNCONFIRMED WATER LINE
VERIFIED STEAM LINE
UNCONFIRMED STEAM LINE
VERIFIED TELEPHONE CABLE
UNCONFIRMED TELEPHONE CABLE
VERIFIED UNDG. COM. CABLE
UNCONFIRMED UNDG. COM. CABLE
ELEC. WATER SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES
LIGHT POLE
GAS VALVE
FIRE HYDRANT
UTILITY POLE
WATER VALVE
TREE

Archaeological Sensitivity

- High
- Moderate
- Low
- None

PHOTOGRAPHY: APRIL 2009



Source/Revision/Issue	Date	Project
		NJ-NY Expansion
PAL modified: indicate archaeological sensitivity	11-01-11	Date
Map data received from: Spectra Energy	11-01-11	November 2011
The base information contained in this map was supplied to PAL as a professional courtesy for informational and illustrative purposes only. PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the location and/or results of cultural resource investigations conducted by PAL.		Figure 12



SI-WB	SI-WB-S1	SI-WB	SI-SN2	SI-SN3
252+14.8	252+34.9	252+53.5	254+42.8	255+28.0
20.1'	7.6'	11'	6'	13.9'
UNNAMED CREEK	SI-WB	SI-SN2	SI-SN3	SI-SN3

0 50 100 200ft
0 10 20 30 60m

PRIVILEGED INFORMATION - DO NOT RELEASE

ENGINEERING APPROVALS

DRAWN BY: GIE	BID	CONSTRUCTION
DRN. DATE: 07/22/11		
CHECKED BY: GIE		
CHK. DATE: 07/25/11		

NJ-NY EXPANSION PROJECT
PROPOSED 30" PIPELINE
STA. 245+50.0 TO STA. 257+00.0
SUPPLEMENTAL ALIGNMENT SHEET
LOC. RICHMOND COUNTY, NEW YORK

Spectra Energy
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5107 | 627-5400

LD-A-1021	ALIGNMENT SHEET	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.
DWG. NO.	DESCRIPTION	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.
LD-A-1021	ALIGNMENT SHEET			10/01/11	ADDED ROUTE VARIATION NO. 76			
				10/01/11	ADDED ROUTE VARIATION NO. 58			
				10/01/11	ISSUED FOR FERC			

TITLE	SIGNATURE	DATE	SIGNATURE	DATE

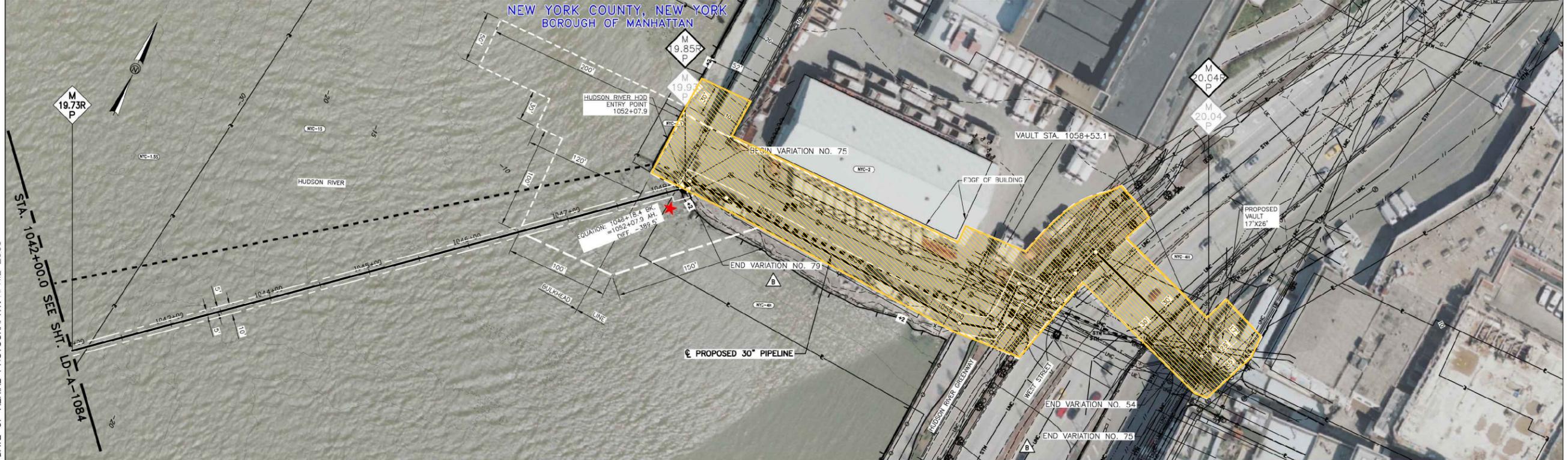
YEAR: 2011	W.O. 076115751	SCALE: 1"=50'	DWG. LD-A-1021A	REV. A14
------------	----------------	---------------	-----------------	----------

Figure 12. Map of Route Variation 58, showing archaeological sensitivity.

RIGHT-OF-WAY	CROSSING	NEW YORK CITY	HUDSON RIVER (STATE OF NEW YORK)	NYC-1D	NYC-1S	NYC-2	NYC-43
TRACT NUMBERS RODDAGE	WORKSPACE	1042+00.0 0.98 RODS 1042+11.1	35.55 RODS	N.Y. SANITATION/HUDSON RIVER PARK TRUST, LLC 23.44 RODS	NEW YORK STATE DOT 19.53 RODS	NEW YORK STATE DOT 19.53 RODS	1059+48.2
SURVEY DATA							
SURVEY COMPANY: FIELD BOOK: PAGES:							
CLASS LOCATION							
PIPE MATERIAL							

ALIGNMENT DETAIL

PROPOSED PIPELINE
PREVIOUS FERC FILED ROUTE
EXIST. P/L W/OWNER NAME
PIPELINE TO BE REMOVED/ABANDONED
TEMP. WORKSPACE
PROPOSED PERMANENT EASEMENT
EXISTING EASEMENT
ADD. TEMP. WORKSPACE
YARD LOCATION
STREAM / DITCH
DELINEATED WETLAND
APPROXIMATE WETLAND BOUNDARY
EDGE OF PAVEMENT
PERMANENT ACCESS ROAD (PAR)
TEMPORARY ACCESS ROAD (TAR)
CONTOUR MAJOR (EVERY 10')
CONTOUR AT +2 F.E.V.
CONTOUR MINOR (EVERY 2')
TREE LINE
JERSEY BARRIER
PIPELINE MILEPOST
PROPERTY LINE
VERIFIED STORM DRAIN
UNCONFIRMED STORM DRAIN
VERIFIED UNDG. ELEC. CABLE
UNCONFIRMED UNDG. ELEC. CABLE
VERIFIED NAT. GAS LINE
UNCONFIRMED NAT. GAS LINE
VERIFIED SANITARY SEWER
UNCONFIRMED SANITARY SEWER
VERIFIED WATER LINE
UNCONFIRMED WATER LINE
VERIFIED STEAM LINE
UNCONFIRMED STEAM LINE
VERIFIED TELEPHONE CABLE
UNCONFIRMED TELEPHONE CABLE
VERIFIED UNDG. COM. CABLE
UNCONFIRMED UNDG. COM. CABLE
ELEC., WATER, SAN. SEWER, GAS, TELE. & STORM DRAIN MANHOLES
LIGHT POLE
UTILITY POLE
GAS VALVE
WATER VALVE
FIRE HYDRANT
TREE



ENVIRONMENTAL DATA

HUDSON RIVER
HUDSON RIVER
614.3'

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

SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=20'

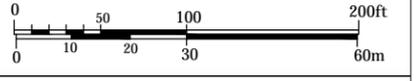
THE LOCATION OF TRENCH PLUGS AND SLOPE BREAKERS ARE INTENDED TO BE USED AS A GUIDELINE ONLY. EXACT LOCATION TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE CHIEF INSPECTOR.

FLUME PIPE AS REQUIRED
SLOPE BREAKERS/ARROW INDICATES DIRECTION
TRENCH PLUG
RIVER WEIGHT OR EQUIVALENT

Source/Revision/Issue	Date	Project
		NJ-NY Expansion
PAL modified: indicate archaeological sensitivity	11-01-11	Date
Map data received from: Spectra Energy	11-01-11	November 2011
The base information contained in this map was supplied to PAL as a professional courtesy for informational and illustrative purposes only. PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the location and/or results of cultural resource investigations conducted by PAL.		Figure 19

Archaeological Sensitivity

- High (Pink hatched)
- Moderate (Blue hatched)
- Low (Yellow hatched)
- None (White)



SLOPE BREAKER & TRENCH PLUG SPACING

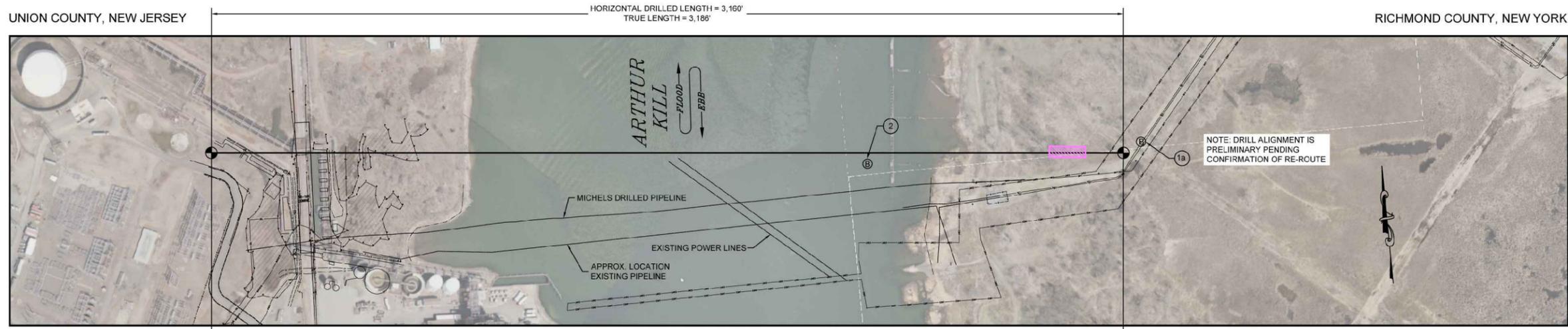
CODE	% SLOPE	SPACING
A	< 5%	NO STRUCTURE
B	5 - 15%	300 FT
C	15 - 30%	200 FT
D	> 30%	100 FT

DWG. NO.	DESCRIPTION	REV	DRN	DATE	DESCRIPTION	ITEM NO.	DESCRIPTION	LN. FT.
	REFERENCE DRAWINGS				REVISIONS		MATERIALS	

PRIVILEGED INFORMATION - DO NOT RELEASE

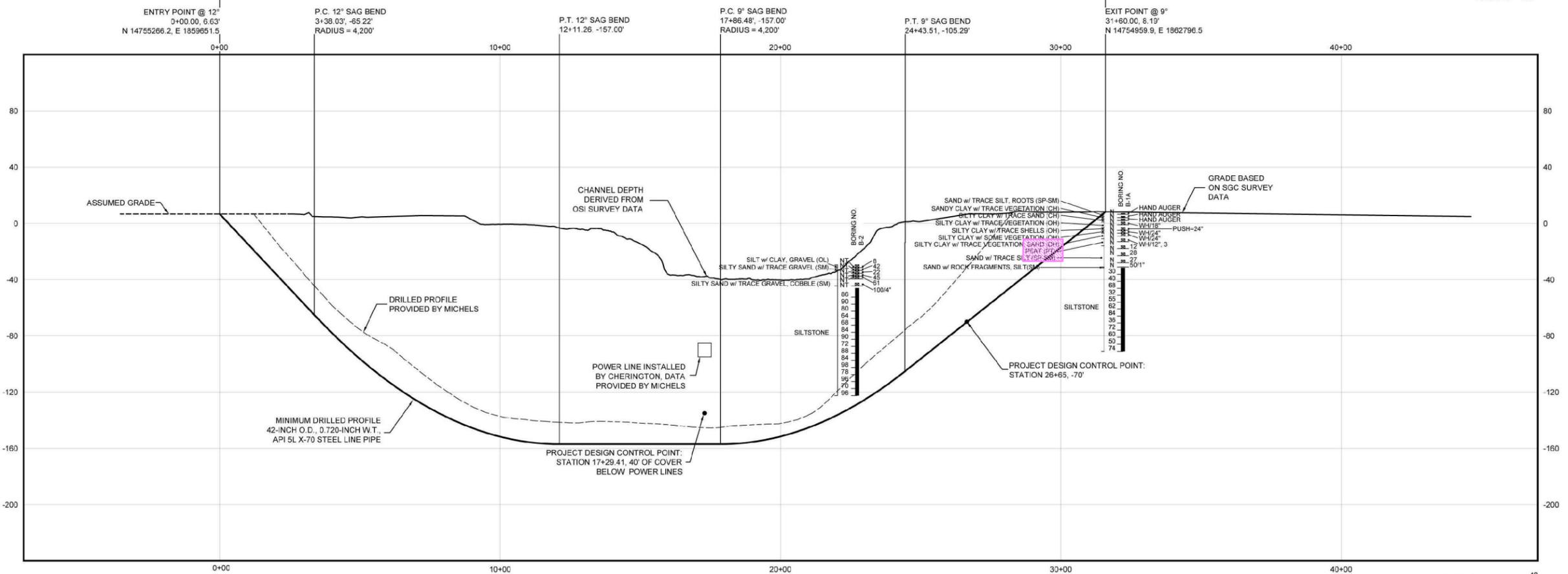
ENGINEERING APPROVALS		NJ-NY EXPANSION PROJECT PROPOSED 30" PIPELINE STA. 1042+00.0 TO STA. 1059+48.2 ALIGNMENT SHEET		 Texas Eastern Transmission, LP 5400 Westheimer C. Houston, TX 77056-5310 713 / 627-5400	
DRAWN BY: GIE	BID	CONSTRUCTION			
DRN. DATE: 07/22/11				LOC. NEW YORK COUNTY, NEW YORK	
CHECKED BY: GIE				YEAR: 2011	W.O.076115751
CHK. DATE: 07/25/11				SCALE: 1"=50'	DWG. LD-A-1085
TITLE	SIGNATURE	DATE	SIGNATURE	DATE	REV. A14

Figure 19. Map of Route Variation 75 and 79, showing archaeological sensitivity.



- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- SURVEY NOTES**
- ALL TOPOGRAPHIC LAND SURVEY DATA WAS PROVIDED BY SGC ENGINEERING.
 - RIVER BOTTOM DEPTHS WERE DERIVED FROM A HYDROGRAPHIC SURVEY PERFORMED BY OCEAN SURVEYS INC DATED OCTOBER 06, 2010.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO, UTM ZONE 18, NAD83.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.
- GEOTECHNICAL LEGEND**
- ⊙ BORING LOCATION
- SPLIT SPOON SAMPLE**
- 53 $\frac{R}{L}$ 23 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
 - ↑ — PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
- CORE BARREL SAMPLE**
- UCS 6,250 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53 $\frac{R}{L}$ 6 — MOHS HARDNESS
 - ↑ — ROCK QUALITY DESIGNATION (PERCENT)
- GEOTECHNICAL NOTES**
- GEOTECHNICAL DATA PROVIDED BY MUESER RUTLEDGE CONSULTING ENGINEERS, NEW YORK, NEW YORK. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
 - 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.
 - 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**
- ELEVATION - PLUS 0 FEET, MINUS 20 FEET.
 - ALIGNMENT - PLUS OR MINUS 10 FEET.
 - ENTRY POINT - AT THE STAKED LOCATION.
 - EXIT POINT - PLUS OR MINUS 5 FEET IN ALIGNMENT, PLUS 15 FEET AND MINUS 15 FEET IN LENGTH.
 - CURVE RADIUS - NO LESS THAN 2,100 FEET.
- PROTECTION OF UNDERGROUND FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 - MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

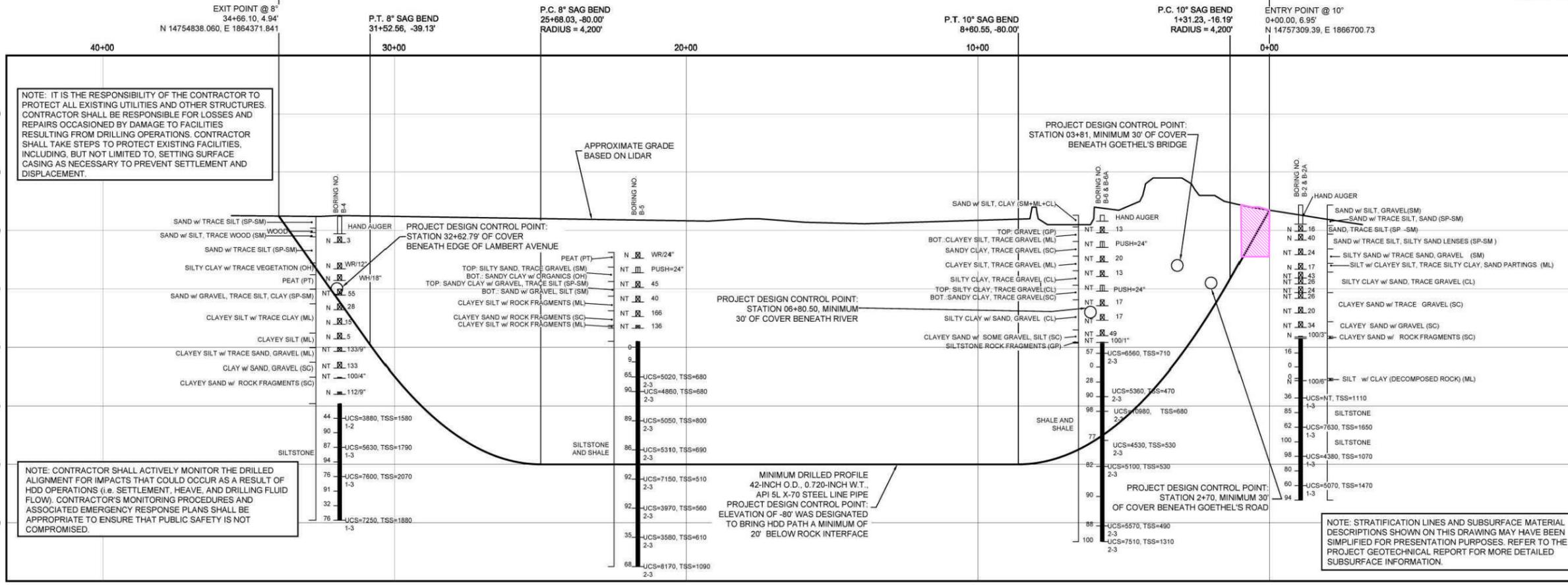
PLAN
SCALE: 1" = 200'



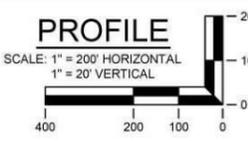


- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- SURVEY NOTES**
- ALL TOPOGRAPHIC LAND SURVEY DATA WAS PROVIDED BY SGC ENGINEERING.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 18, NAD83.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.
- GEOTECHNICAL LEGEND**
- ⊙ BORING LOCATION
- SPLIT SPOON SAMPLE**
- 53 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 6,250 UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - TSS 1,350 TENSILE SPLITTING STRENGTH (PSI)
 - 53 MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

PLAN
SCALE: 1" = 200'



- GEOTECHNICAL NOTES**
- GEOTECHNICAL DATA PROVIDED BY MUESER RUTLEDGE CONSULTING ENGINEERS, NEW YORK, NEW YORK. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
 - 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.
 - 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.
- ELEVATION - PLUS 0, MINUS 20 FEET.
 - ALIGNMENT - PLUS OR MINUS 10 FEET.
 - ENTRY POINT - AT THE STAKED LOCATION.
 - EXIT POINT - PLUS OR MINUS 5 FEET IN ALIGNMENT, PLUS 25 FEET AND MINUS 0 FEET IN LENGTH.
 - CURVE RADIUS - NO LESS THAN 2,100 FEET.
- PROTECTION OF UNDERGROUND FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 - MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.



Source/Revision/Issue	Date	Project
		NJ-NY Expansion
		Date
PAL modified	11-01-11	November 2011
Map data received from: Spectra Energy	11-01-11	

The base information contained in this map was supplied to PAL as a professional courtesy for informational and illustrative purposes only. PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the location and/or results of cultural resource investigations conducted by PAL.

Archaeological Sensitivity

- High
- Moderate
- Low

#	DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION

Professional Engineer		ENGINEERING APPROVALS	
John Deering Hair	Professional Engineer	PRELIMINARY	CONSTRUCTION
New Jersey Lic. # 24,323/4547500			
New York Lic. # 080869			
2424 East 21st Street			
Suite 510			
Tulsa, Oklahoma 74114			

PRIVILEGED INFORMATION - DO NOT RELEASE

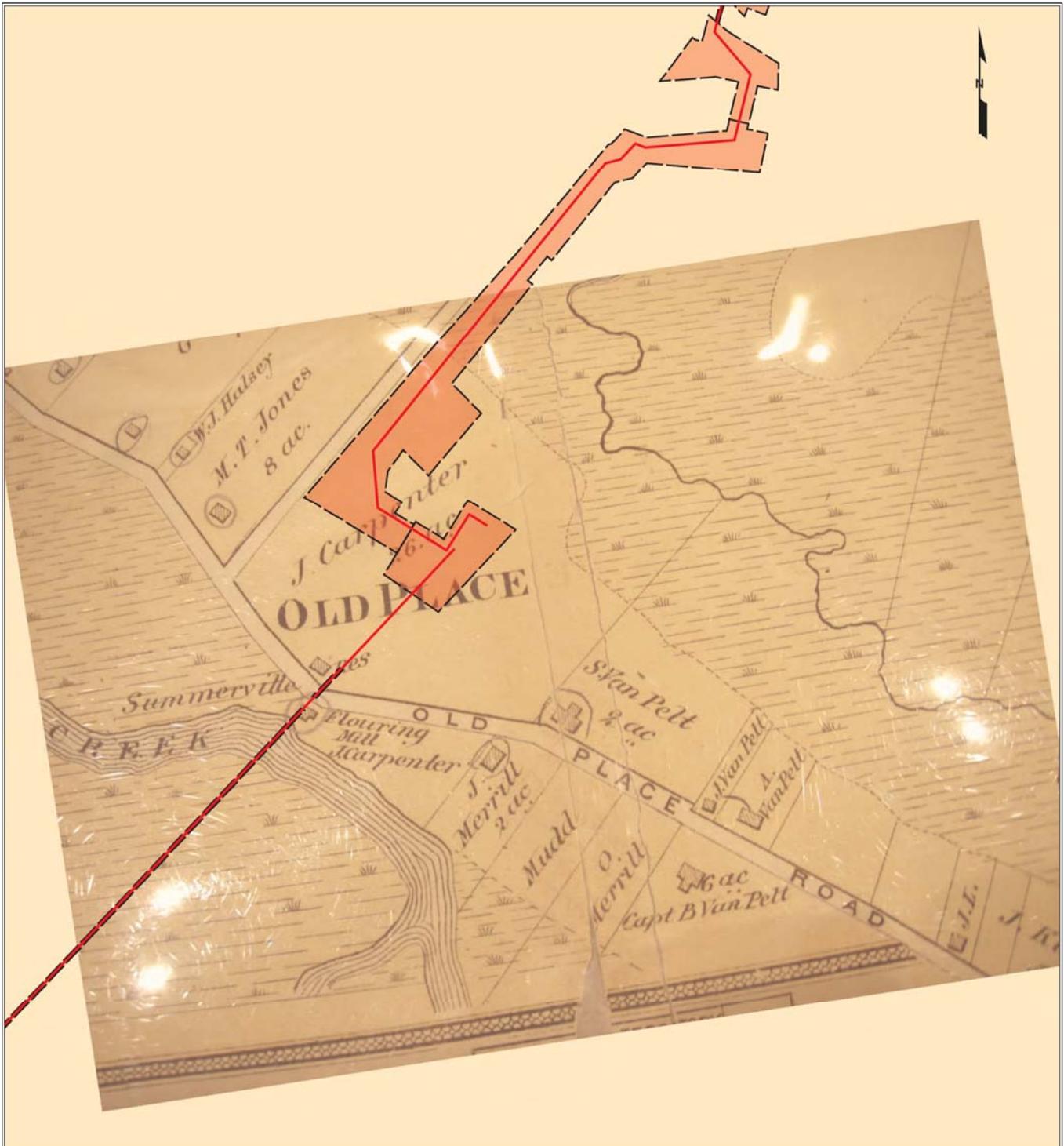
PLAN AND PROFILE
42' GOETHALS BRIDGE CROSSING
SPECTRA NJ-NY EXPANSION PROJECT

LOC. RICHMOND COUNTY, NEW YORK

YEAR: 2010 W.O. SCALE: 1"=200' DWG. LD-H-1020 REV. 5

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

Figure 21. Plan and profile Goethals Bridge HDD, Route Variation 74, showing archaeological sensitivity.



Revisions / Modifications / Data Source	
PAL revised: Testing area added	11-1-2011
PAL modified: Historic map georeferenced	4-18-2011
Client Data: GIE	10-31-11
Historic base imagery: Beers	1874

The base information contained in this map was supplied to PAL as a professional courtesy for informational and illustrative purposes only. PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the location and/or results of cultural resource investigations conducted by PAL.

PRIVILEGED INFORMATION - DO NOT RELEASE

KEY:

- Centerline (A14 REV B)
- Workspace (A14 REV B)

Figure 22. 1874 Beers map with the location of Route Variation 74.

