



Philadelphia Regional Port Authority
U.S. Army Corps of Engineers – Philadelphia District

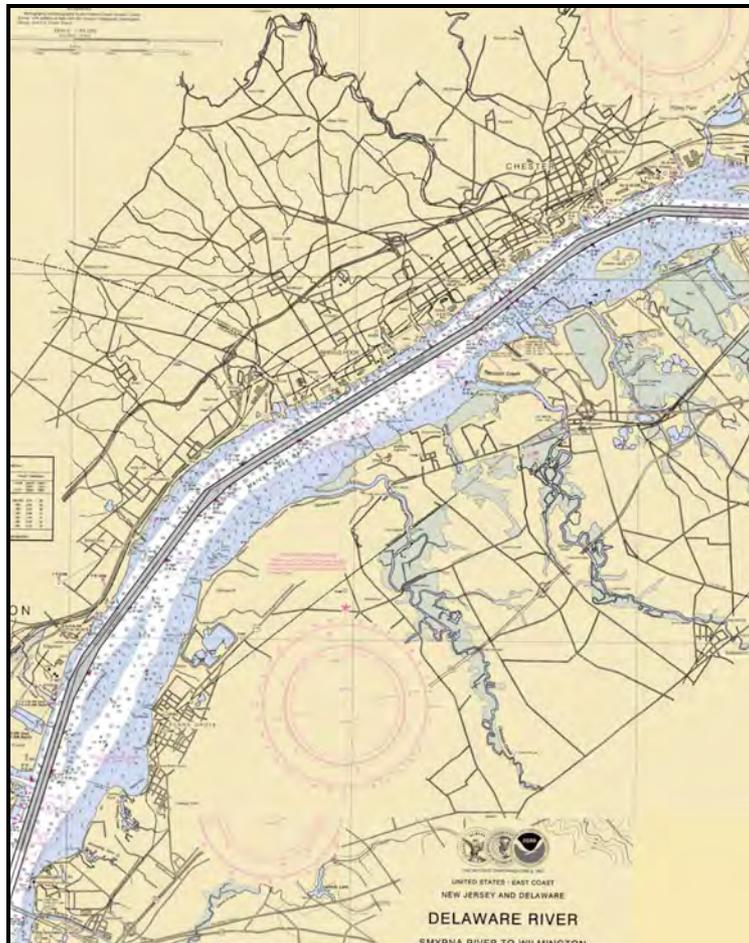


DELAWARE RIVER MAIN CHANNEL DEEPENING PROJECT

Investigation of Submarine Utility Crossings in Reach B Between Stations 96+000 and 176+000

Final Report

June 2011



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1.0 INTRODUCTION

Gahagan & Bryant Associates, Inc. (GBA) conducted an investigation of submarine utility crossings within the Delaware River federal shipping channel for the authorized Delaware River Main Channel Deepening Project (MCD) as shown in Figure 1. The investigation covered Reach B between Stations 96+00 and 176+00.

2.0 PURPOSE

The purpose of this investigation is to update the Corps of Engineers (Corps) 1996 submarine utility crossing investigation. It is vital that the presence of submarine utility crossings be identified and verified. The information gathered as part of this investigation will be used by the Corps and their contractor(s) to develop a plan for the dredging of sediment material (silt, clay, sand, gravel) and rock removal within Reach B as part of the construction of the MCD. The plan calls for sediment removal to 46 feet below the National Oceanic and Atmospheric Administration's Mean Lower Low Water (NOAA MLLW) and rock removal to 47 feet below NOAA MLLW.

3.0 PROJECT SITE

The area for this study is shown on Figure 2 and extends from Station 96+000 to 176+000, approximately 15.3 miles. Within this reach, the Delaware River shipping channel is maintained by the Corps to the authorized depth of 40 feet below NOAA MLLW and a width of 800 feet and is bordered by New Jersey on the east, and Pennsylvania and Delaware to the west.

4.0 SCOPE OF WORK

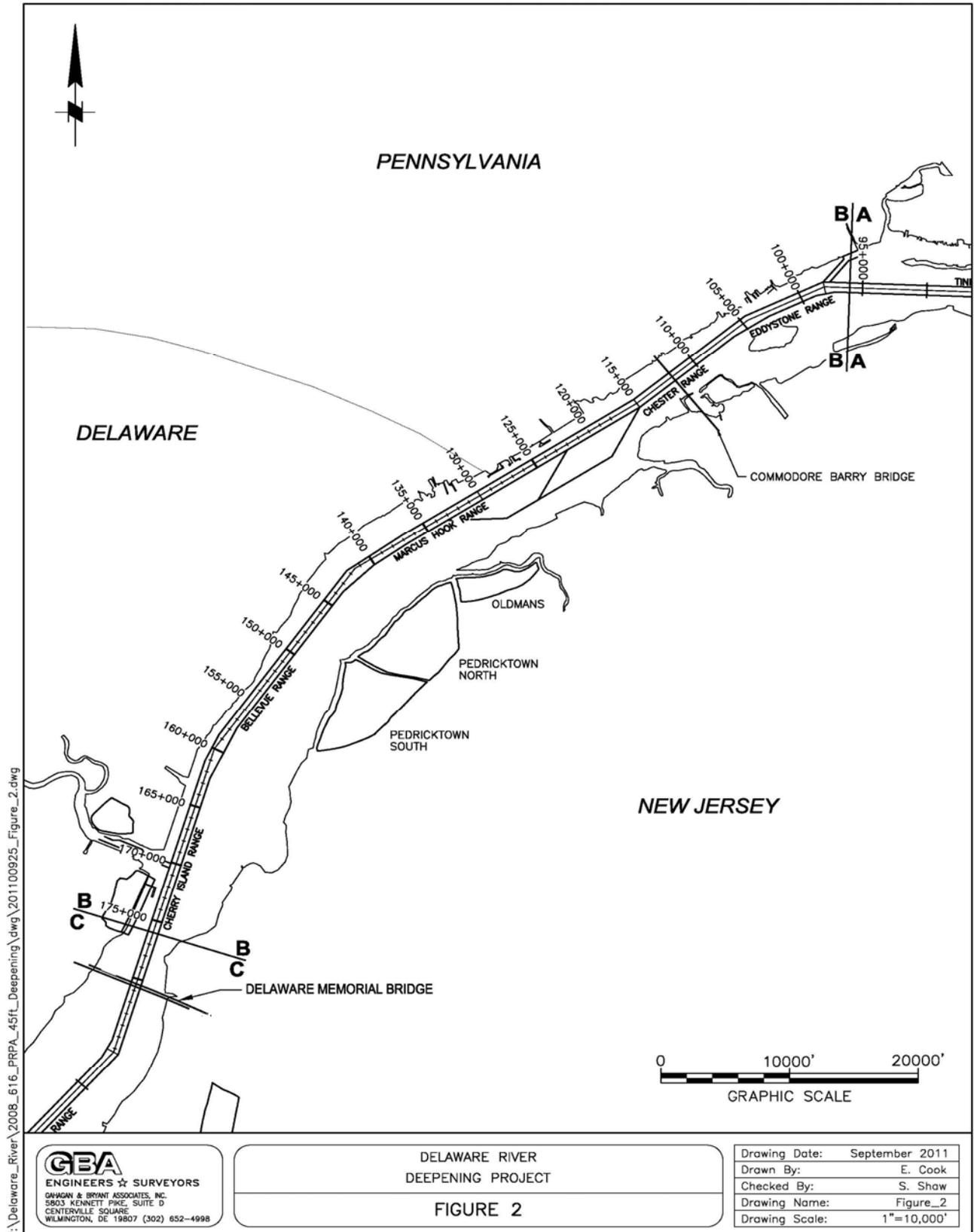
The following tasks were conducted.

- Collection of available information/data prepared by the Corps for the MCD.
- Review of permits issued by the Corps' Regulatory Branch for submarine utility crossings.
- Coordination with United States Coast Guard (USCG) and National Oceanic and Atmospheric Administration (NOAA).
- Compilation and review of collected information/data.
- Coordination with the utility owners/operators to verify existing crossings and to inquire if there are any other utility crossings.
- Performance of landside surveys to verify existing/known utility crossings.
- Documentation of findings.



Figure 1

Investigation of Utility Crossings in Reach B



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GBA
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DELAWARE RIVER
 DEEPENING PROJECT
FIGURE 2

Drawing Date:	September 2011
Drawn By:	E. Cook
Checked By:	S. Shaw
Drawing Name:	Figure_2
Drawing Scale:	1"=10,000'

5.0 GATHERING OF INFORMATION

5.1 Corps Past Investigations

At the outset of this investigation, GBA met with Corps representatives to obtain information and any data that was collected as part of the Corps' 1996 submarine utility investigation and subsequently within Reach B. It was indicated that since 1996, the only effort that was conducted by the Corps dealing with the location of the submarine utility crossings was for geotechnical investigations performed by O'Brien & Gere in May/June 2010 under contract to the Corps. At that time, the Corps contacted the owners of the utility lines to verify the location of their submarine lines. The information gathered from that effort was provided to GBA along with a map of the known crossings.

5.2 Corps Regulatory Permit Process/ Review of Files

Any proposed submarine utility crossing that would transverse the existing Delaware River 40-foot federal channel must be approved by the Corps. The owner needs to submit a permit application for Corps review and approval. The permit needs to include a plan of the proposed crossing that shows the horizontal and vertical layout of the utility line so that a determination can be made if there is a potential impact to the maintenance dredging of the 40-foot federal channel.

GBA met with the Corps to discuss the current permit application process and vertical clearance requirements below the existing authorized Delaware River 40-foot federal channel. A sample copy of the application package for applying for a permit as well as special conditions (effective since September 21, 2006) was furnished. Appendix A contains excerpts from those special conditions that are relevant for submarine cables and pipelines proposed for crossing the federal channel.

GBA was provided access to the Corps' permit files for the Delaware River shipping channel. A review was performed of the files and copies were made of utility crossing permits that were approved by the Corps within Reach B.

5.3 As-Built Survey Drawings

Based on the information that was gathered by the Corps as part of their previous investigations and the information obtained from the Corps' permit files, as-built survey drawings of the utility crossings available in their files were then requested from the Corps.

5.4 Consolidation of Available Information/Data

Using the information that was provided by the Corps as discussed above, and the search of the Corps' permit files, a tabulation of utility crossing information by owner was compiled (see Table 1).

Investigation of Utility Crossings in Reach B

Permits were found for all of the utility crossings listed in Table 1, except utility K, two 20-inch and one 6-inch gas pipelines operated by Williams Gas Pipeline Transco (WGP-Transco). In addition to those for the known crossings, an earlier permit was also found for a 12-inch gas pipeline (utility J2) in the same vicinity, but separate and distinct from, the one for the WGP-Transco 12-inch pipeline listed under utility J.

The Corps was able to provide as built surveys for all of the lines except the active 30-inch line operated by Colonial Pipeline (utility F2) and the initial 12-inch pipeline permitted in 1950 for WGP-Transco (utility J2).

The data gathered, as summarized in Table 1 and the available as built information served as the basis for formal coordination and validation of utility crossings with the owners.

TABLE 1
Delaware River Reach B Submarine Utility Crossings

Utility	Owner/Operator	Utility Description	Permit Information	Location Description
E	Columbia Gas Transmission	One 20-inch submarine gas pipeline	Application Submitted: NA Permit Issued: 06/27/87 Permit #: CENAP-OP-R-87-0239-12	Claymont, DE across Marcus Hook Range to Logan Township, NJ
F2	Colonial Pipeline Company	One 30-inch submarine oil pipeline	Application Submitted: 04/21/87 Permit Issued: 08/03/87 Permit #: CENAP-OP-R-87-0123-12	200' downstream from existing 30" submarine oil pipeline (below)
F	Colonial Pipeline Company	One 30-inch submarine oil pipeline	Application Submitted: 05/28/63 Permit Issued: 10/11/63 Permit #: NAPOP-N	Just south of DE state line across Marcus Hook Range and Anchorage between Claymont, DE and Logan Township, NJ
G	Linde Group	One 8-inch nitrogen submarine pipeline	(See Item H Permit Information)	Lower end of Marcus Hook Anchorage, between New Castle County, DE and Logan Township, NJ
H	Sunoco Logistics	Three 6-inch and three 4-inch submarine chemical pipelines	Application: 11/04/60, rev. 07/20/61 Permit Issued: 05/22/61, rev. 08/02/61 Permit #: NAPOP-N	Lower end of Marcus Hook Anchorage, between New Castle County, DE and Logan Township, NJ
I	Williams Gas Pipeline Transco	One 16-inch submarine gas pipeline	(See Item H Permit Information)	Lower end of Marcus Hook Anchorage, between New Castle County, DE and Logan Township, NJ
J	Williams Gas Pipeline Transco	One 12-inch submarine gas pipeline	Application: 04/25/51, rev. 06/22/51 Permit Issued: 06/28/51 Permit #: NAPKP	<200' downstream from existing natural gas pipeline (below)
J2	Williams Gas Pipeline Transco	One 12-inch submarine gas pipeline	Application: 12/01/49, rev. 06/05/50 & 10/03/50 Permit Issued: 08/04/50, rev. 10/09/50 Permit #: NAPKP	Marcus Hook, PA to a point 1.5-mi downstream from mouth of Raccoon Creek, Logan Township, NJ
K	Williams Gas Pipeline Transco	Two 20-inch and one 6-inch submarine gas pipelines	No permit information found.	Marcus Hook Range between Chester, PA and Logan Township, NJ
N	Comcast Cable	Submerged fiber optics cable	Application: 09/10/97 Permit Issued: 10/31/97 Permit #: CENAP-OP-R-199701939-15	Chester, PA to Bridgeport, NJ

6.0 COORDINATION WITH USCG AND NOAA

Special conditions contained in the more recent Corps permits (1987 and later) for utility crossings require the permittee to coordinate their construction work/procedures with the USCG and to provide NOAA, within 60 days of completion of the work, with a certification that the utility has been installed in compliance with the approved plans (see Appendix A, A.2 Special Permit Conditions for Cables, CABLE 3 and CABLE 10; and Appendix A, A.3 Special Permit Conditions for Pipelines PIPE 3 and PIPE/FED).

It was noted that the above special conditions have only been incorporated in the permits issued for the utility lines operated by the Columbia Gas Transmission Corporation (utility E), Colonial Pipeline Company (utility F2) and Comcast Cable (utility N). They do not appear in permits that were issued before 1987.

6.1 U.S. Coast Guard

GBA contacted the USCG Philadelphia office to determine their involvement with the submarine utility crossings in the Delaware River shipping channel.

Specifically, information was requested for the following:

1. Does the USCG have any authority over submarine utility crossings in the Delaware River?
2. Does the USCG retain or compile a database of submarine utility crossings in the Delaware River? If yes, can it be provided to GBA for the project area (Reach B)?

The Coast Guard stated that their authority over submarine utility crossings only extends to the issuance of advisory Notices to Mariners during the construction/installation process and they do not maintain a database.

6.2 National Oceanic and Atmospheric Administration

GBA reviewed NOAA Nautical Chart 12312 (55th Edition, August 2009), which shows "pipeline and cable areas" crossing the Delaware River navigation channel in Reach B. Subsequently, GBA provided NOAA with a copy of the Corps' drawing showing the Reach B crossings. NOAA was asked to review the Corps' drawing. Furthermore, it was requested that NOAA provide information from their files that they used as a basis for identifying and locating pipeline and cable areas on Chart 12312 and within Reach B, particularly any not shown on the Corps' drawing.

NOAA furnished GBA with copies of the requested file data. The file data was subdivided into two categories as noted below.

Category 1. Information sent directly to NOAA by the permittees per the previously referenced special permit conditions (CABLE 3 and PIPE/FED).

Category 2. Charts marked with general crossing locations provided to NOAA by the Chief, Construction Operations Division, Directorate of Civil Works, Office of the Chief of Engineers.

From the provided files the following observations were made.

Columbia Gas (utility E), Colonial Pipeline (utility F2) and Suburban/Comcast Cable (utility N) were included in category 1. The remaining crossings (utility F, utilities G/H/I, utility J, utility J2 and utility K) were not specifically identified in the category 2 data and only generally located by general terms such as “pipeline crossing area”.

The earliest data in category 1 was available from 1987 and for category 2 the latest data provided to NOAA was in 1975. It is apparent that sometime between 1975 and 1987 special conditions were added to Corps permits for submarine utility crossings requiring the permittee to notify both the USCG and NOAA of their activities. Prior to that time, such notification, if done, appears to have been made directly by the Corps.

No previously unknown crossings were identified through this process.

From the above coordination, it was determined that NOAA is solely responsible for overlaying or marking the location of the submarine utility lines on their navigation charts so as to notify mariners of the potential for damage to the utilities from dragging anchors.

7.0 VERTICAL DATUM CONVERSION/ADJUSTMENTS

Based on the review of the compiled information and data, several different vertical datums were utilized in conducting the various as-built drawings. To convert the information from the as-built drawings to the project datum (NOAA MLLW), a review of varying and historical Delaware River tidal datums was performed.

From the 1960's until the mid to late 1990's, the Philadelphia District Corps utilized Corps of Engineers Mean Low Water (COE MLW) for the Delaware River 40-foot project that extends from Philadelphia, PA to the Delaware Bay, the same foot print as the MCD. COE MLW was referenced to Delaware River Datum (DRD) and all tide gauges and benchmarks were established in DRD. DRD was also referenced to the current geodetic vertical datum of the time, National Geodetic Vertical Datum of 1929 (NGVD 29). DRD was stated to be 2.901 feet below NGVD 29. COE MLW corrections ranged from 0.10 to 0.50 foot above DRD, depending on what range of the Delaware River was being surveyed. The 0.50 foot correction was applied in the vicinity of the Schuylkill River in Philadelphia, PA, and decreased to 0.10 foot in Delaware Bay as the channel headed outbound to the Bay.

The Corps migrated over time (starting in the late 1990's) from COE MLW to NOAA MLLW established by NOAA based upon the most recent tidal epoch and observations. The adjustment from COE MLW to NOAA MLLW was mandated by Executive Order so that the same vertical datum that NOAA utilized for their mapping in and around coastal and river

Investigation of Utility Crossings in Reach B

environments was recognizable nationally. The current NOAA Epoch is 1983-2001, which superseded the previous 1960-1978 Epoch. The North American Vertical Datum of 1988 (NAVD 88) is another reference point that was used. Figure 3 shows the relationships of the various tidal and geodetic datums to the project datum in the vicinity of Reach B.

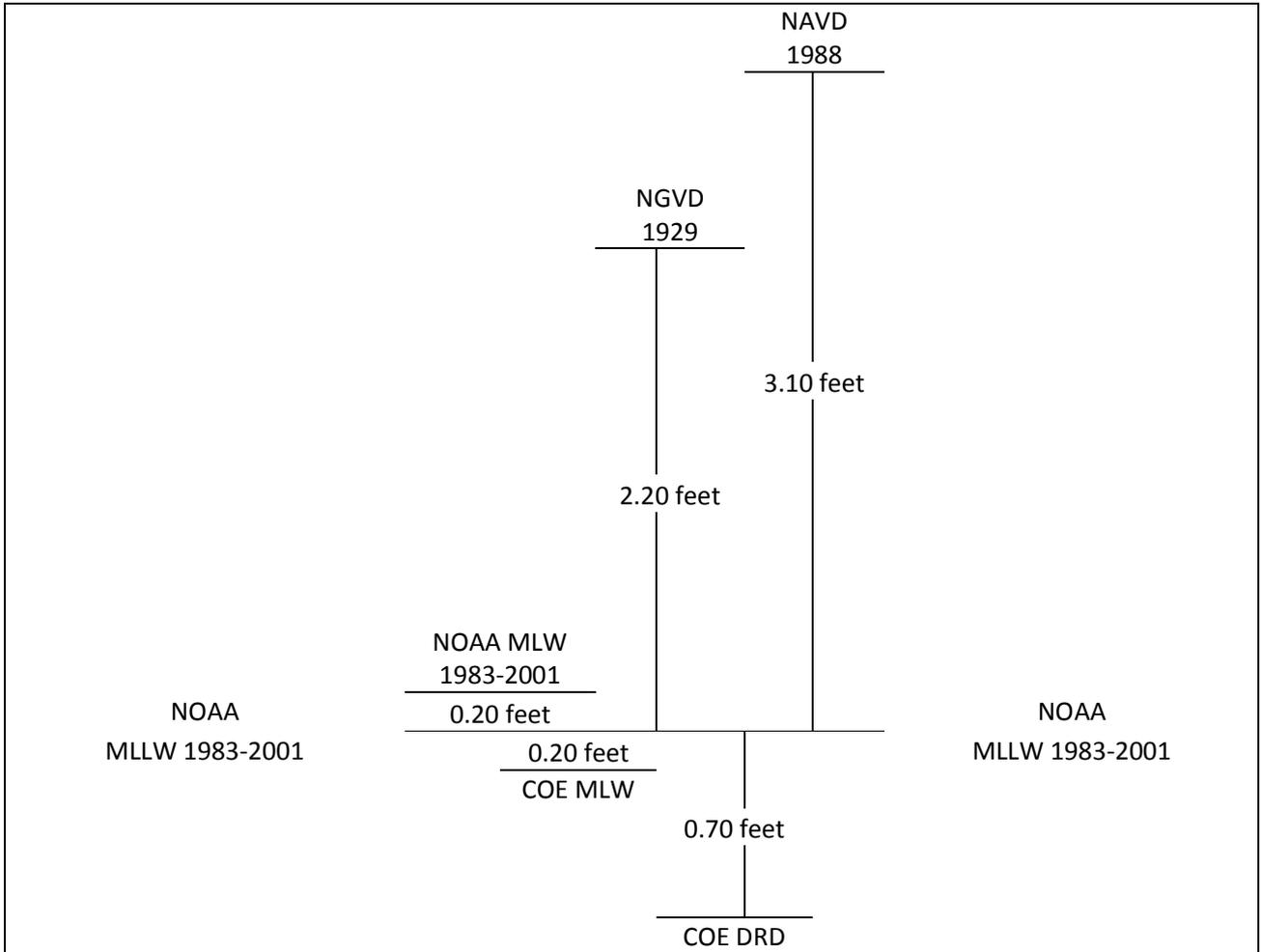


Figure 3 - Vertical Datum Conversions - Marcus Hook Range

- Notes: 1. The above conversions are only applicable in the vicinity of the Marcus Hook Range
2. The correction factor between NAVD 88 and NOAA MLLW has been recently revised from 3.1' to 3.0', which is not reflected in the datum information presented in this report.

GBA reviewed the vertical datums from the as-built drawings available for the utility crossings shown in Table 1 to determine their relationships to the project datum (see Appendix B). Table 2 shows the datum used for each as-built survey drawing and the minimum depth of the utility crossing in the channel referenced to both the as-built datum used and as adjusted to the project datum.

TABLE 2
REACH B SUBMARINE UTILITY CROSSINGS OF THE DELAWARE RIVER
As-Built Survey/Project Vertical Datum Information

Current Owner/Operator	Utility Description	Date of As-Built Survey ²	Minimum Below As-Built Datum In Channel (feet)	As-Built Datum Description	Minimum Below Project Datum In Channel NOAA MLLW (feet)
Columbia Gas (E)	20-inch gas pipeline	01/20/88	62.5	"C.O.E. Datum" (COE MLW Datum - Marcus Hook Range)	62.7
Colonial Pipeline (F2)	30-inch oil pipeline	09/26/88 ³	58.9	"Delaware River Datum" (DRD is 0.54 feet below MLW)	59.6
Colonial Pipeline (F) ¹	30-inch oil pipeline	08/31/65	57.5	"Delaware River Datum" (DRD is 0.54 feet below MLW)	58.2
Linde/Sunoco/Transco (G/H/I)	3-4 inch & 3-6 inch chemical, 1-8 inch nitrogen, 1-16 inch gas pipelines	12/22/61	58	"USCE Delaware River Datum" (High Water and Low Water are 6.0 feet and 0.7 feet above DRD, respectively)	58.7
Transco (J)	1-12 inch gas pipeline	09/10/64	63.8	"MLW" (MLW is 0.7 feet above U.S. Engineers Datum")	63.8
Transco (J2)	1-12 inch gas pipeline	NA	NA	NA	NA
Transco (K)	1-6 inch & 2-20 inch gas pipelines	09/23/64	52	"U.S. Corps of Engineers Delaware River Datum" (that datum being 2.90 feet lower than the USC&GS datum)	52.7
Comcast Cable (N)	Fiber optics cable	03/09/99	74	"Local MLW" (Local MLW is 5.3 feet below Local MHW)	74.1

Notes

¹This as-built shows a pipeline installed in the mid 1960s, now listed as "inactive".

²Date as-built survey drawing issued.

³Date as-built top of pipe survey completed.

8.0 HORIZONTAL GRID CONVERSION/ADJUSTMENTS

As-built drawings for Colonial Pipeline (utility F and utility F2), the Sunoco bundle (utilities G/H/I), and WGP-Transco (utility J and utility K) utilized the Delaware River Grid (DRG) for horizontal stationing. The DRG was established by the Corps (Philadelphia District) specifically for the Delaware River and Bay. The DRG was a Transverse Mercator Projection based upon the north/south alignment of the Delaware River. GBA does not know when the DRG was initially implemented, but is aware that it was utilized as early as the 1950's for the Delaware River Project. It was utilized for all Delaware River surveying related activities and channel coordinates defining the channel alignment until the early 1990's, when the Philadelphia District converted the channel coordinate information from the DRG to a National Geodetic Reference System (i.e. the New Jersey State Plane Coordinate System NAD 83 in feet). Both the Delaware River Grid and the New Jersey State Plane Coordinate Systems were based upon Transverse Mercator Projections. The need for this adjustment was to meet Federal requirements for including all navigation projects as part of the Global Positioning System (GPS).

GBA reviewed the horizontal stationing from the as-built drawings for the utility crossings as shown in Table 1 to determine their relationship to the project grid (see Appendix B).

9.0 COORDINATION WITH OWNER/OPERATORS

GBA prepared letters to the owner/operators as identified in Table 1. The relevant permit information, approximate location of the utility crossing, and a profile of the crossing based on the as-built survey drawing, were included as attachments to each letter. It was requested that the owner/operator closely examine the plan and profile and either acknowledge their veracity or provide the necessary corrections. In addition, the letter requested the owner/operator to identify any other crossings not previously identified, active or inactive, that they were aware of within Reach B. The package sent to each owner/operator and their responses are contained in Appendix C. A summary of the coordination by owner is provided below.

9.1 Columbia Gas Transmission Corporation

- Package sent 13 October 2010. Response letter dated 23 November 2010 states that, "with the knowledge that the Army Corps datum and ours are related so that we can depend on the depth of dredging over our Pipeline 10345, we will not object to the project." Their concern is the nature of the bottom near their facilities and they request more information if blasting or other rock removal is to take place in vicinity of their pipeline.

9.2 Colonial Pipeline Company

- Package sent 4 October 2010. Response letter dated 15 October 2010 agrees that information supplied to owner/operator accurately reflects their facilities in the River.

9.3 Sunoco Logistics

- Package sent 13 October 2010. Response letter dated 23 May 2011 agrees that information supplied to owner/operator is consistent with their as-built information and requests more project information and coordination prior to commencement of work.

9.4 Linde Group

- Package sent 11 October 2010. Response letter dated 22 November 2010 agrees that information supplied to owner/operator is consistent with their as built information, but recommends that GBA properly and definitively locate their pipeline prior to the performance of the work.
- On 24 November 2010, GBA notified Linde that, *“Our charge under our contract is to work with the utility owner/operators to verify the locations and depths of the utilities in Reach B using existing information provided by the Corps of Engineers and the owner/operators. Other than location surveys of the shore-side landings, we have not been given any authority or funding to further define the location of any utility lines in the field.”* Linde was referred to the Corps’ Project Manager for further information.

9.5 Williams Gas Pipeline-Transco

- Package sent 6 October 2010. Response letter dated 10 February 2011 agrees that information supplied to owner/operator is consistent with their as built information, a request more project information and coordination prior to commencement of work, and affirms that they operate and maintain only one 12-inch pipeline in Reach B.

9.6 Comcast Cable

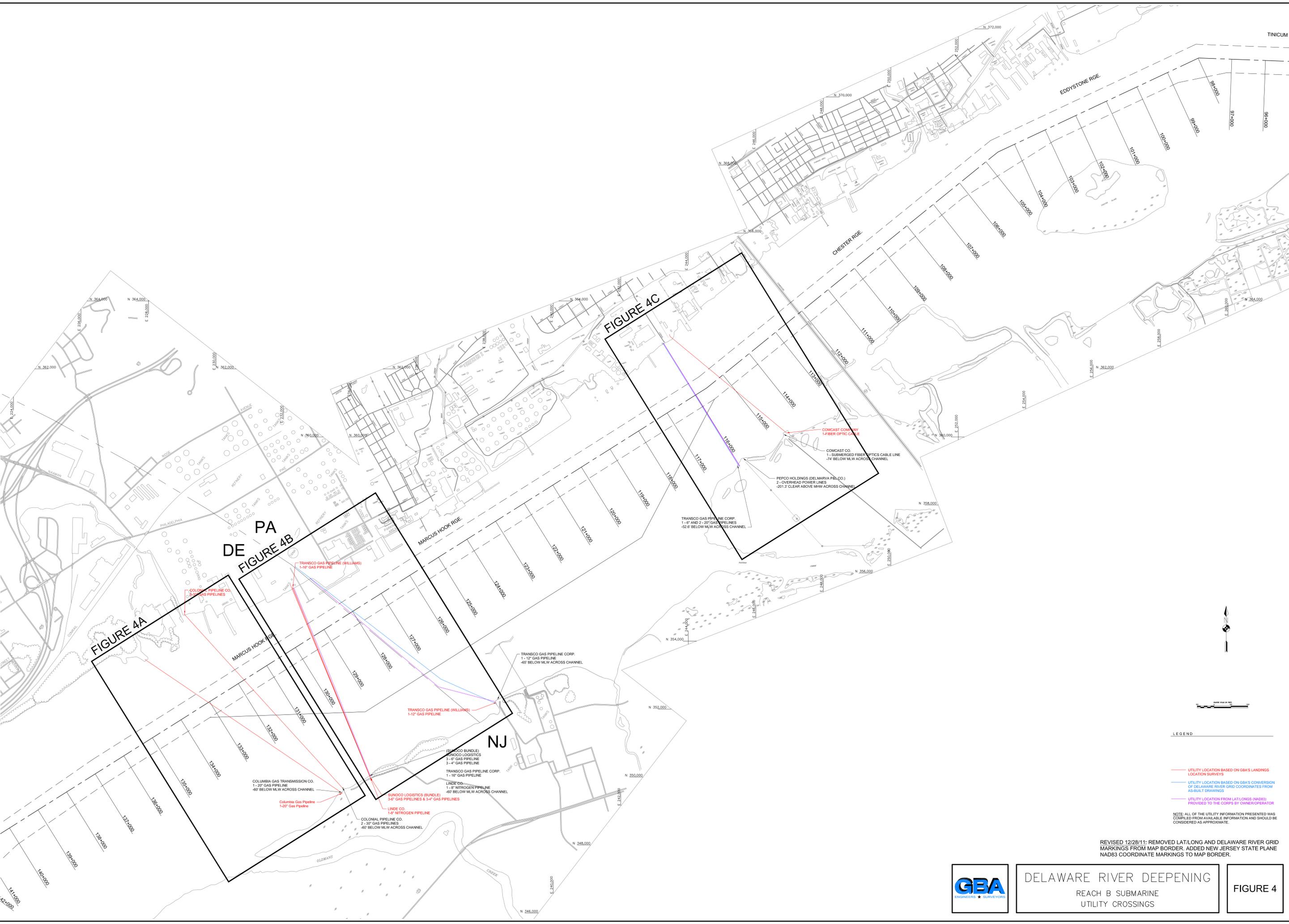
- Package sent 6 October 2010. Response letter dated 3 November 2010 agrees that information supplied looks good and confirms the plan as is.

10.0 LANDSIDE SURVEYS

The approximate locations of the utility crossings as plotted by the Corps were supplied to GBA. These locations were based on information obtained by the Corps from the owner/operators. In order to further verify those locations, GBA contacted the owners/operators of the submarine utilities for permission to access their respective utility landing sites for the purpose of conducting landside surveys. Verbal permission was given, along with contact information from the various owner/operator field representatives. GBA’s surveyor contacted each of the representatives to coordinate the site surveys. The landing location surveys were undertaken on 14 and 17 December 2010 and are included in Appendix D.

Investigation of Utility Crossings in Reach B

Figure 4 depicts the utility crossing locations as plotted by the Corps, supplemented by the utility landing site surveys and other information obtained by GBA as part of this investigation. As noted on Figure 4, there are three cluster areas of utility crossings. These are shown in more detail on Figures 4A, 4B and 4C. For some of the utility crossings (e.g., those with more than one pipeline or a turning point in the alignment) additional information from the permit drawings, correspondence between the Corps and the owner/operators, and the as-built drawings were used to create a “crossing location envelope”. The utilities are expected to be located somewhere in the general vicinity of these individual crossing location envelopes.



LEGEND

- UTILITY LOCATION BASED ON GBA'S LANDINGS LOCATION SURVEYS
- UTILITY LOCATION BASED ON GBA'S CONVERSION OF DELAWARE RIVER GRID COORDINATES FROM AS-BUILT DRAWINGS
- UTILITY LOCATION FROM LAT/LONGS (NAD83) PROVIDED TO THE CORPS BY OWNER/OPERATOR

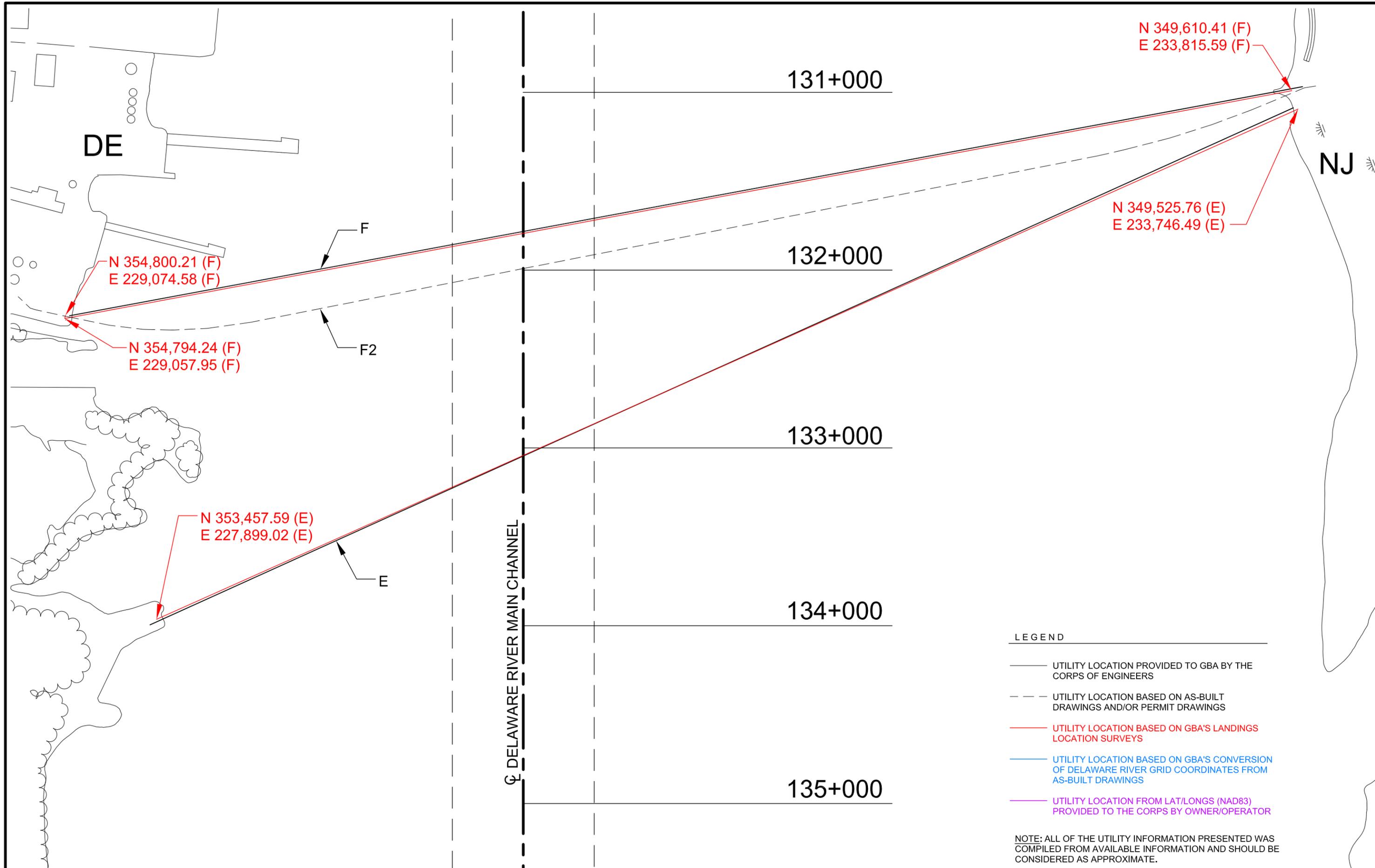
NOTE: ALL OF THE UTILITY INFORMATION PRESENTED WAS COMPILED FROM AVAILABLE INFORMATION AND SHOULD BE CONSIDERED AS APPROXIMATE.

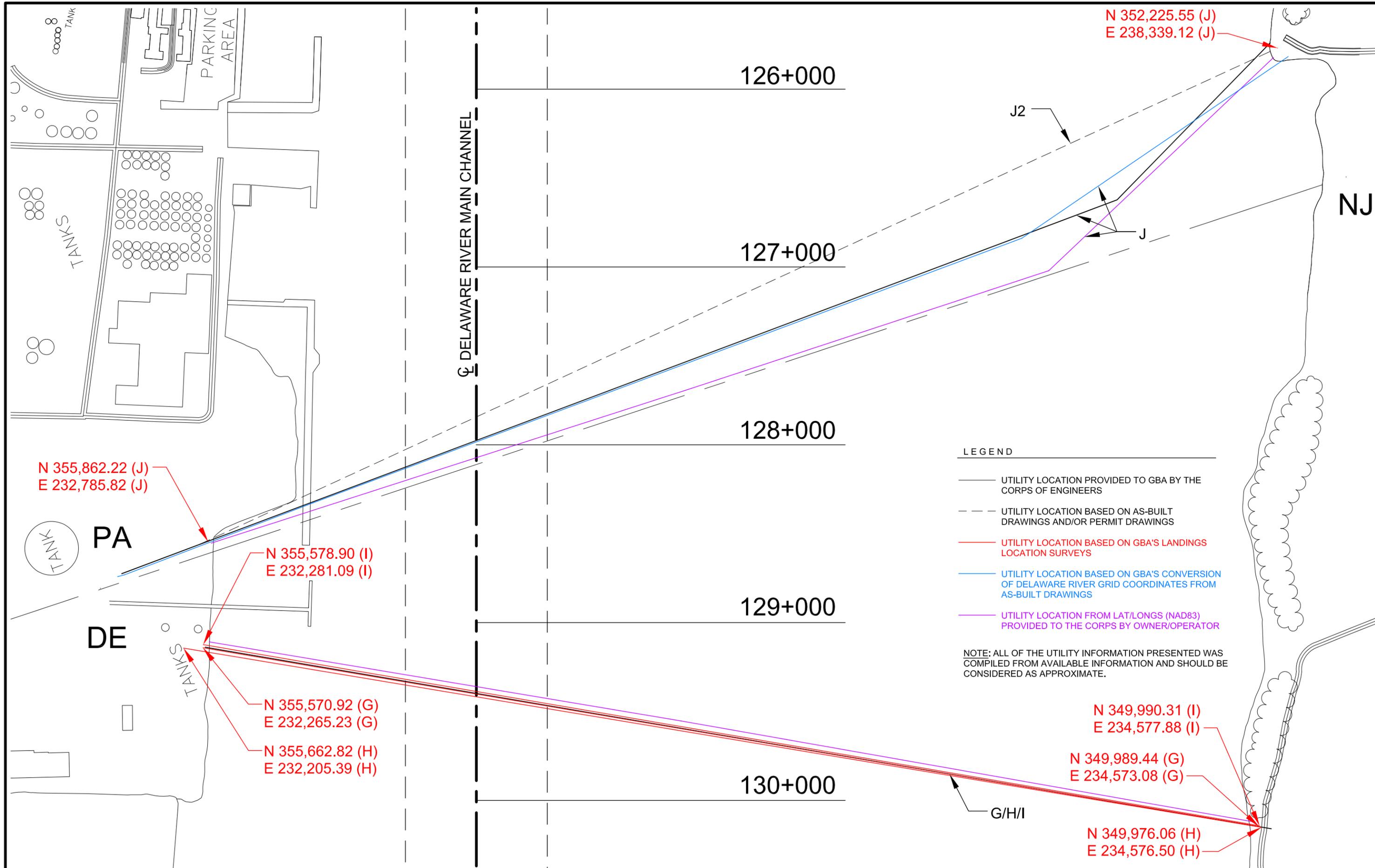
REVISED 12/28/11: REMOVED LAT/LONG AND DELAWARE RIVER GRID MARKINGS FROM MAP BORDER. ADDED NEW JERSEY STATE PLANE NAD83 COORDINATE MARKINGS TO MAP BORDER.

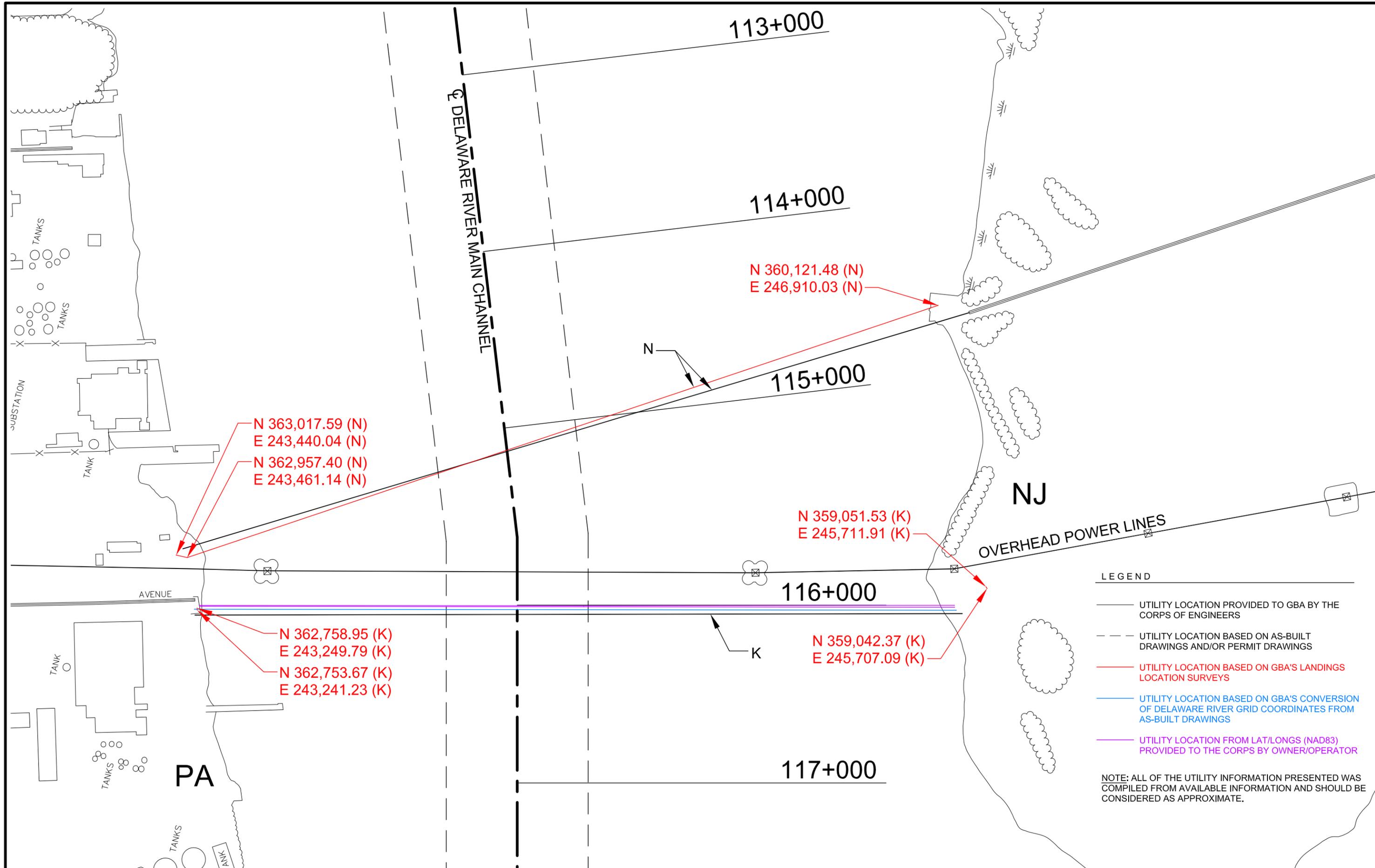


DELAWARE RIVER DEEPENING
REACH B SUBMARINE
UTILITY CROSSINGS

FIGURE 4







11.0 FINDINGS

Based on available existing records and coordination undertaken with the owner/operators as part of this effort, this investigation found evidence that 16 pipelines and one fiber optic conduit were permitted by the Corps for submarine placement across the Delaware River shipping channel within Reach B. The earliest of these permit approvals dates back to 1950, with the latest in 1997. Findings for each of these crossings are itemized below and summarized in Table 3. The relevant permit conditions referenced in the last column of Table 3 are shown verbatim below the Table.

11.1 Columbia Gas Transmission Corporation – Utility E

- Permit No. CENAP-OP-R-87-0239-12 was issued to the Columbia Gas Transmission Corporation on 25 June 1987 to install a 20-inch diameter buried natural gas transmission pipeline across the Delaware River at Channel Station 133+000 between Claymont, DE and Logan Township, NJ (see Figure 5).
- An as-built survey was conducted by the Columbia Gas Transmission Corporation and issued on 8 January 1988.
- The vertical datum for the as-built survey was “Corps of Engineers Mean Low Water – Marcus Hook Range”.
- The as-built datum is 0.2 feet lower than the project datum (NOAA MLLW 1983-2001 Epoch).
- The minimum depth of the top of the pipeline in the Delaware River shipping channel was recorded as 62.5 feet below the as built survey datum (62.7 feet below the project datum).
- The plan view of the utility crossing determined from GBA’s landside surveys (i.e., entry and exit points) conforms to that provided by the Corps (see Figures 4 and 4A).

Investigation of Utility Crossings in Reach B

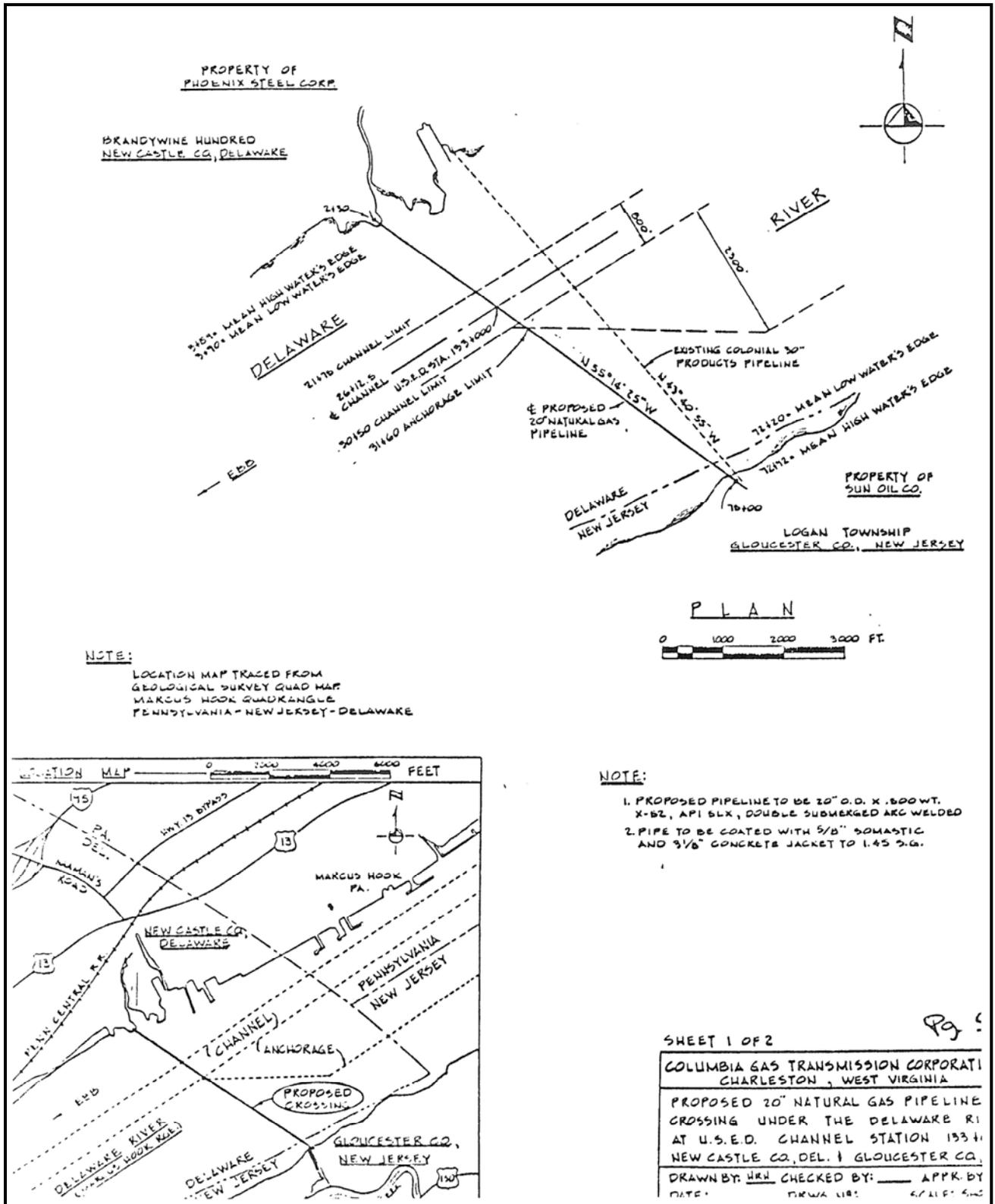


Figure 5 - Columbia Gas (Utility E)

11.2 Colonial Pipeline Company (F & F2)

Utility F

- Permit No. NAPOP-N was issued to the Colonial Pipeline Company on 11 October 1963 to install a 30-inch diameter submarine pipeline across the Delaware River at the lower end of the Marcus Hook Anchorage, between New Castle County, DE and Logan Township, Gloucester County, NJ (see Figure 6).
- The design called for the pipeline to cross the centerline of the Delaware River channel at Station 131+589.
- An as-built survey was conducted by the Colonial Pipeline Company and issued on 31 August 1965. GBA was provided with a scanned version of the as-built survey by the Corps.
- The vertical datum for the as-built survey was the “Delaware River Datum”.
- The as-built datum is 0.7 feet lower than the project datum (NOAA MLLW 1983-2001 Epoch).
- The minimum depth of the top of the pipeline in the Delaware River shipping channel as scaled from the scanned drawing is 57.5 feet below the as-built survey datum (58.2 feet below the project datum).
- The available scanned version of the as-built plan view does not contain sufficient detail to accurately determine the location of the utility crossing.
- The plan view of the utility crossing determined from GBA’s landside surveys conforms to that provided by the Corps (see Figures 4 and 4A).
- **The as-built drawing indicates the pipeline crossing the centerline of the Delaware River channel at Station 131+589.**
- An e-mail dated 24 March 2010, from Colonial Pipeline Company to the Corps, states that this pipeline is “inactive”.
- A telephone conversation with a Colonial representative on 14 March 2011, verified that this line is capped and filled with nitrogen, but could be reactivated if necessary.

Investigation of Utility Crossings in Reach B

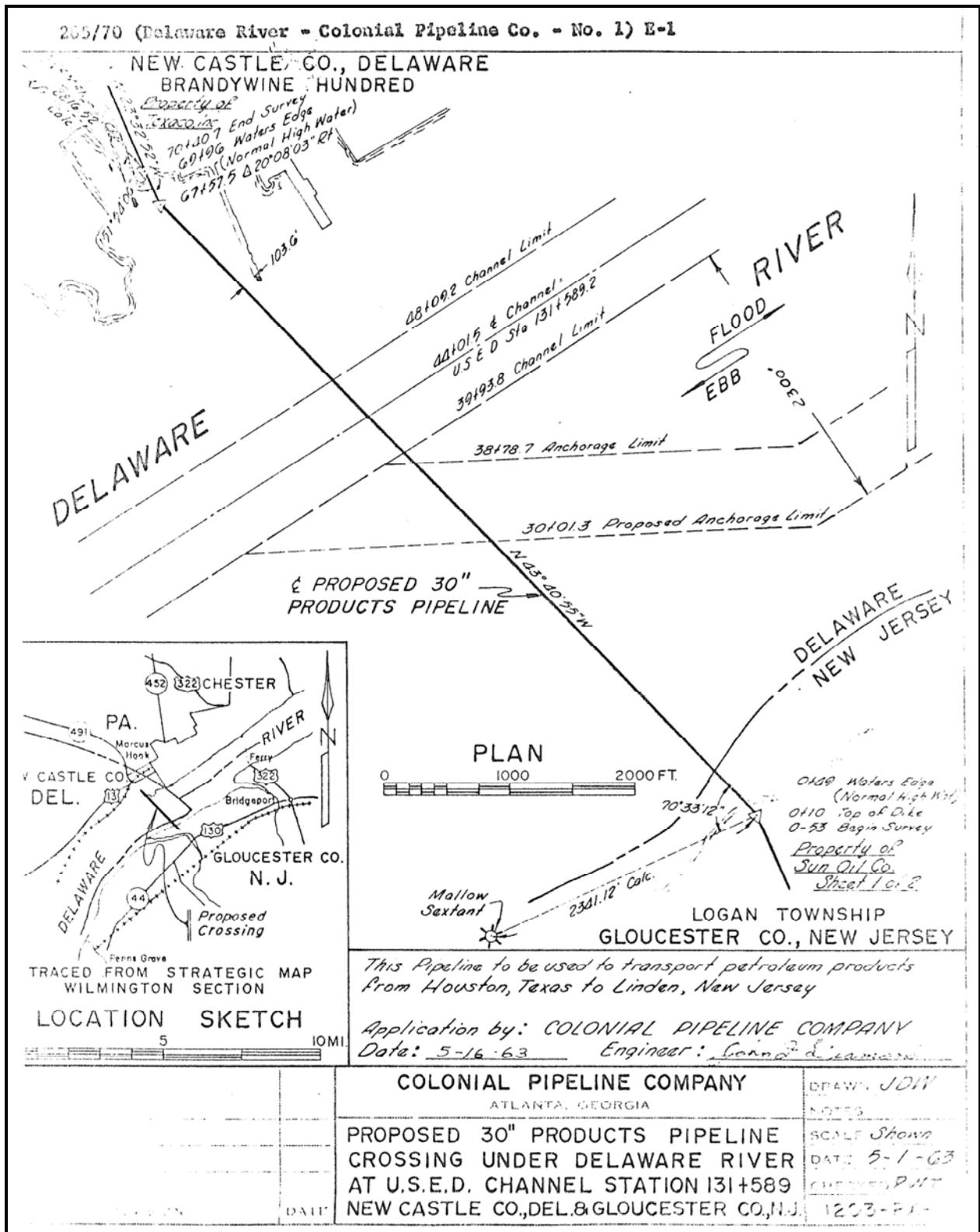


Figure 6 - Colonial Pipeline (Utility F)

Utility F2

- Permit No. CENAP-OP-R-87-0123-12 was issued to the Colonial Pipeline Company on 3 August 1987 to install a 30-inch diameter steel pipeline beneath the Delaware River between the Phoenix Steel Corporation property in Claymont, DE and the Sun Oil Company property in Logan Township, NJ (see Figure 7).
- The design called for the pipeline to cross the centerline of the channel at Station 131+793.
- An as-built survey was conducted by the Colonial Pipeline Company in September 1988. A scanned version of the survey was provided to GBA by Colonial.
- The vertical datum for the as-built survey was the “Delaware River Datum”.
- The as-built datum is 0.7 feet lower than the project datum (NOAA MLLW 1983-2001 Epoch).
- The minimum depth of the top of the pipeline in the Delaware River shipping channel as scaled from the scanned drawing is 58.9 feet below the as-built survey datum (59.6 feet below the project datum).
- The available scanned version of the as-built plan view does not contain the detail to accurately determine the location of the utility crossing.
- Figures 4 and 4A show the best approximation of the location of pipeline F2 based on information from the Corps permit, GBA’s landside surveys, and the scanned as-built drawing provided by Colonial.
- **The as-built drawing indicates the pipeline crossing the centerline of the Delaware River channel at Station 131+793.**

Investigation of Utility Crossings in Reach B

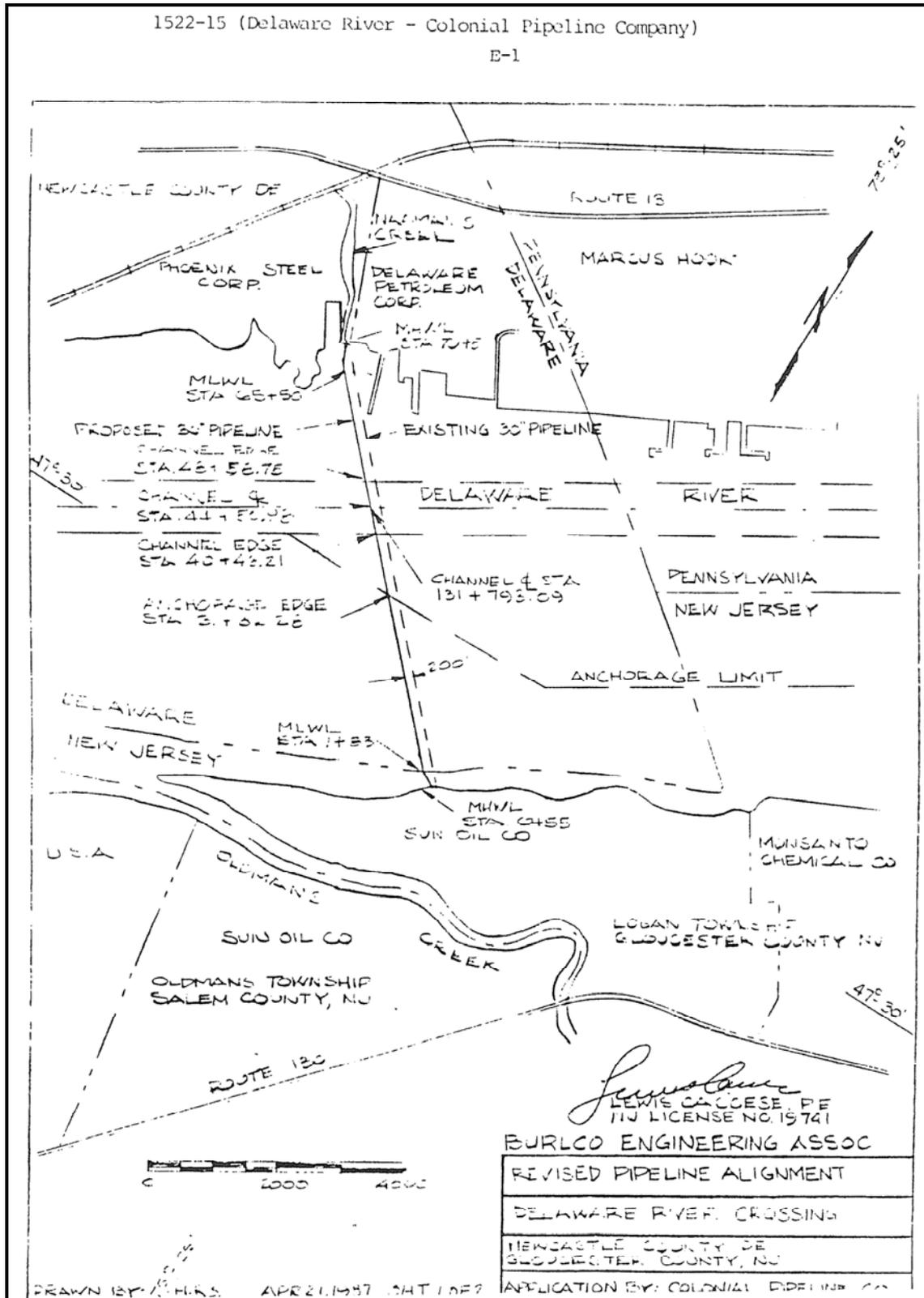


Figure 7 - Colonial Pipeline (Utility F2)

11.3 Sunoco Logistics/Linde Group/ WGP-Transco (G, H & I)

- Permit No. NAPOP-N was issued to the SunOlin Chemical Company on 22 May 1961 and revised on 2 August, 1961 to install a bundle of eight submarine pipelines (three 4-inch, three 6-inch, one 8-inch and one 16-inch) across the Delaware River at the lower end of Marcus Hook Anchorage, between New Castle County, DE and Logan Township, Gloucester County, NJ (see Figure 8).
- An as-built survey was conducted by the SunOlin Chemical Company and issued on 22 December 1961.
- The vertical datum for the as-built survey was the “USCE Delaware River Datum”.
- The as-built datum is 0.7 feet lower than the project datum.
- The minimum depth of the top of the highest pipeline in the Delaware River shipping channel was recorded as 58 feet below the as-built survey datum (58.7 feet below the project datum).
- Within the bundle, Sunoco Pipeline L.P. currently owns and maintains one 4-inch and two 6-inch pipelines and manages two 4-inch and one 6-inch pipelines owned by Sun Pipe Line Company.
- The 8-inch pipeline is currently operated by the Linde Group.
- The 16-inch pipeline is currently operated by WGP-Transco.
- The plan view of the utility crossing bundle determined from GBA’s landside surveys (i.e., entry and exit points) generally conforms to that provided by the Corps (see Figures 4 and 4B).

Investigation of Utility Crossings in Reach B

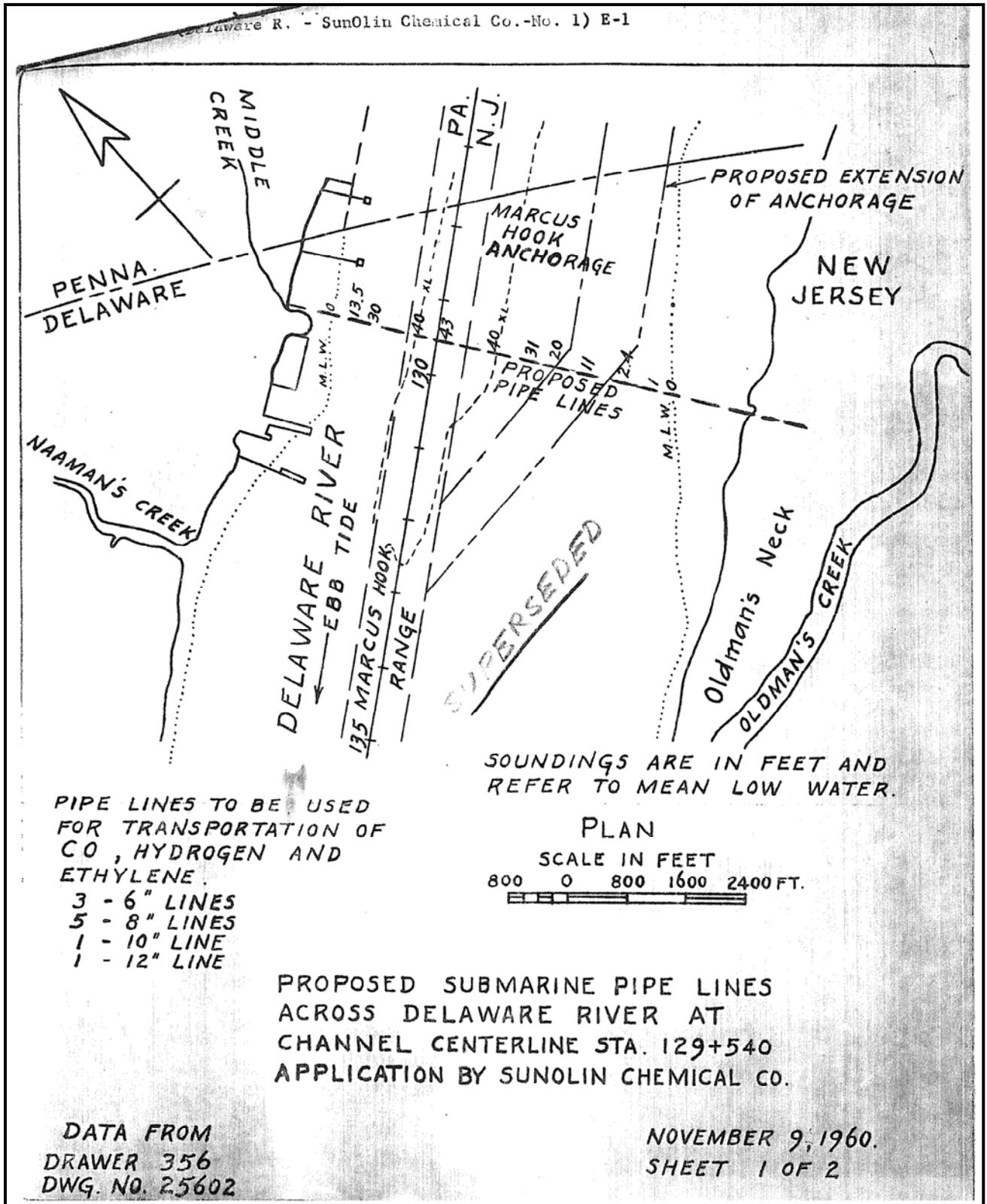


Figure 8 - Sunoco Bundle (G/H/I)

11.4 WGP-Transco (J, J2 & K)

Utility J

- Permit No. NAPKP was issued to the Transcontinental Gas Pipe Line Corporation on 28 June 1951 to lay a 12-inch diameter submarine gas pipeline “**not over 200 feet downstream from an existing submarine gas pipeline**” across the Delaware River between a point just north of the Delaware State line at Marcus Hook, Delaware County, PA, and a point about 1½ miles downstream from the mouth of Raccoon Creek, Logan Township, Gloucester County, NJ (see Figure 9).
- Inspection notes indicate construction commenced on 2 July 1951. “**Backfill over [the] line**” started on 24 December 1951 and was completed on 31 January 1952.
- WGP-Transco maintains that it “operates and maintains (only) one 12- inch pipeline across the Delaware River”, citing an excerpt from a Transcontinental Gas Pipe Line Corporation letter dated 12 February 1952 that states “... it has been decided to defer the installation of the **second crossing.**”
- An as-built plan and profile was issued by the Transcontinental Gas Pipe Line Corporation on 10 September 1964. It superseded a previous “as-built plan and profile of the **2nd Delaware River crossing**”, when the line was placed deeper near the New Jersey shoreline in response to planned expansion of the anchorage area.
- The vertical datum for the as-built survey was “MLW”.
- The as-built datum is the same as the project datum.
- The minimum depth of the top of the pipeline in the Delaware River shipping channel was recorded as 63.8 feet below the as-built survey datum (63.8 feet below the project datum).
- A straight line connecting GBA’s surveyed locations of the landings on either side of the Delaware River could not be used to accurately portray the plan view of the utility crossing as there is a significant alignment change of the pipeline route in the River near the New Jersey side. Three plan views of the pipeline route were plotted to develop a crossing envelope. The three views consist of 1) the alignment provided to GBA by the Corps, 2) an alignment plotted from Latitude/Longitude coordinates provided to the Corps by the owner/operator, and 3) an alignment developed from GBA’s conversion of the DRG coordinates from the as-built drawing (see Figures 4 and 4B).

Investigation of Utility Crossings in Reach B

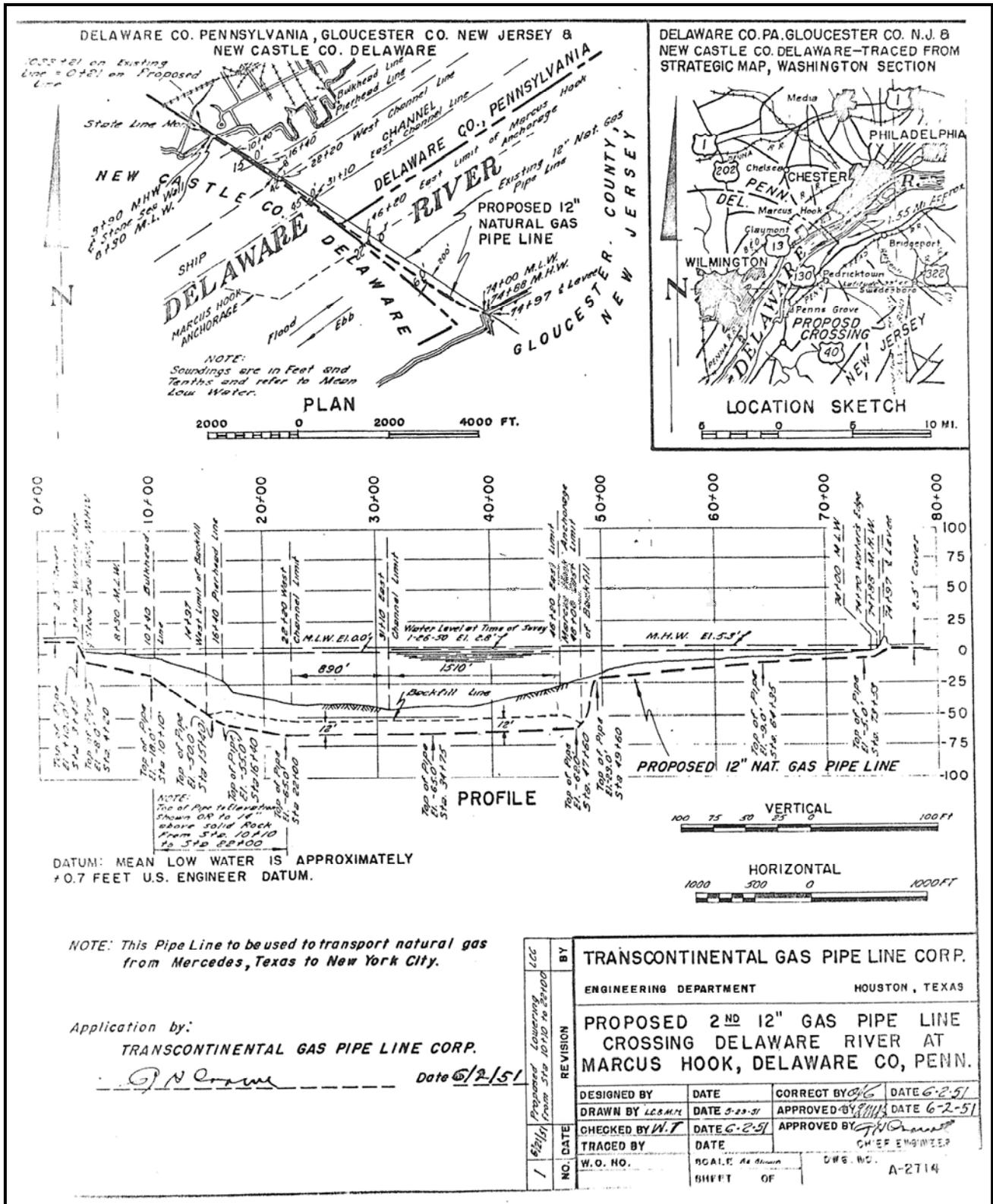


Figure 9 - WGP-Transco (J)

Utility J2

- Permit No. NAPKP was issued to the Transcontinental Gas Pipe Line Corporation on 4 August 1950 and revised on 9 October 1950 to lay a 12-inch diameter submarine gas pipeline across the Delaware River between a point just north of the Delaware State line at Marcus Hook, Delaware County, PA, and a point about 1½ miles downstream from the mouth of Raccoon Creek, Logan Township, Gloucester County, NJ (see Figure 10).
- Inspection notes indicate construction commenced on 12 August 1950 and was completed on 28 December 1950.
- Inspection notes do not confirm the installation of the pipeline, but do indicate a trench was excavated and refilled.
- No as-built survey was available.
- The as-built survey for the pipeline referenced above (WGP-Transco utility J), refers to the existence of utility J2 by showing an onshore (PA side) section of the line and a note indicating that “**6.5 feet [of the] old 12- inch line [was] removed**”.
- Utility J2 may or may not exist (see Utility J, above, and section 12.4 for additional information). Presuming the existence of utility J2, an approximate location, based on information from the permit drawings for utility J and utility J2 and GBA’s landside surveys, is shown on Figures 4 and 4B.

Investigation of Utility Crossings in Reach B

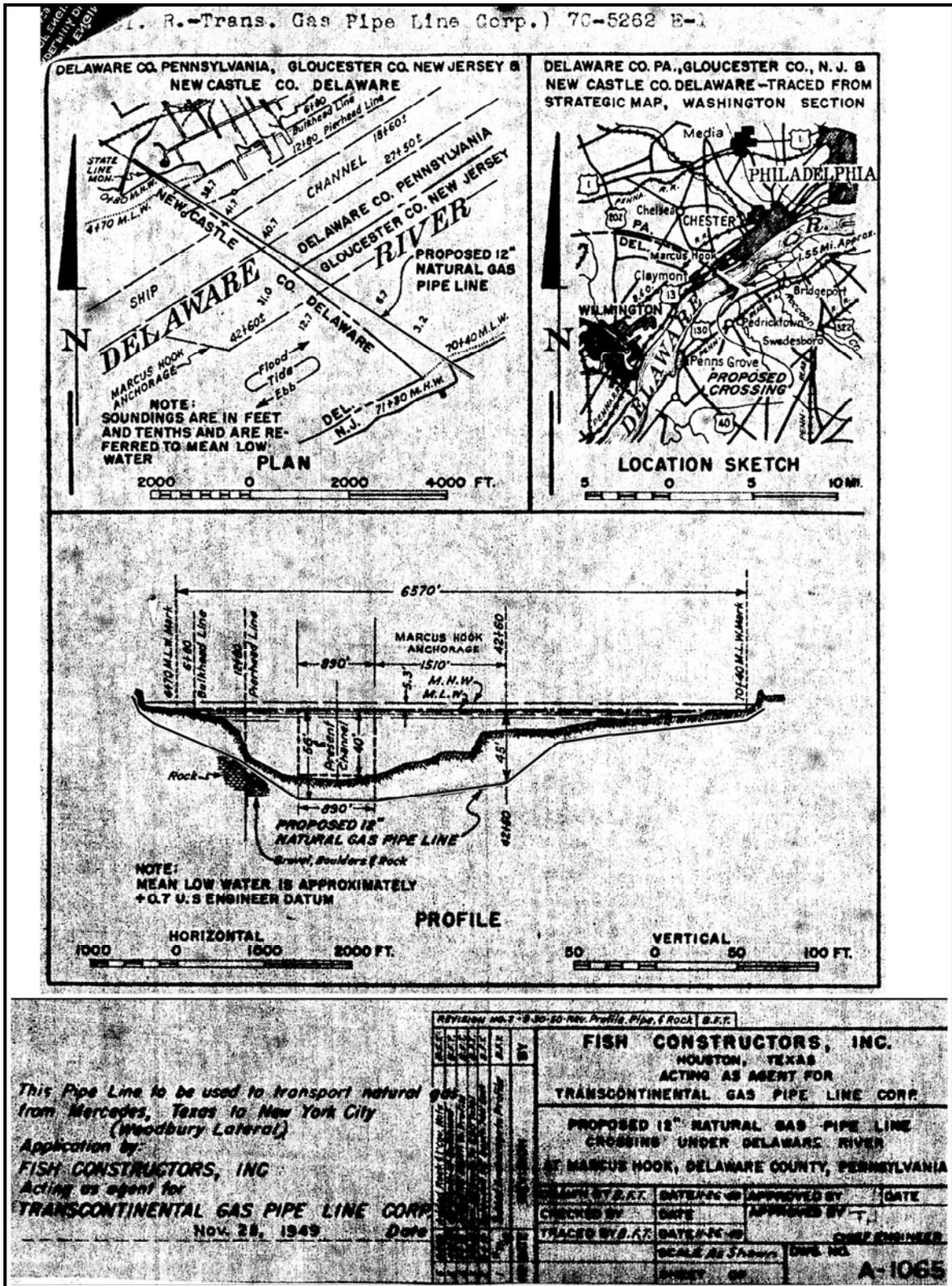


Figure 10 - WGP-Transco (UtilityJ2)

Utility K

- The only permit information found for the two 20-inch and one 6-inch diameter pipelines operated by WGP-Transco was a permit drawing for the “proposed 6-inch pipe line supplementing two 20-inch pipe lines here-to-for authorized” (Figure 11).
- An as-built plan and profile was issued by the Transcontinental Gas Pipe Line Corporation on 23 September 1964.
- The vertical datum for the as-built survey was the "U.S. Corps of Engineers Delaware River Datum".
- The as-built datum is 0.7 feet lower than the project datum.
- The minimum depth of the top of the highest pipeline in the Delaware River shipping channel was recorded as 52 feet below the as-built survey datum (52.7 feet below the project datum).
- A straight line connecting GBA’s surveyed locations of the landings on either side of the Delaware River could not be used to accurately portray the plan view of the utility crossing as there is an alignment change of the pipeline route between its intersection with the shoreline and the surveyed landing location on the New Jersey side. Three plan views of the pipeline route were plotted to develop a crossing envelope. The three views consisted of 1) the alignment provided to GBA by the Corps, 2) an alignment plotted from Latitude/Longitude coordinates provided to the Corps by the owner/operator, and 3) an alignment developed from GBA’s conversion of the DRG coordinates from the as-built drawing (see Figures 4 and 4C).

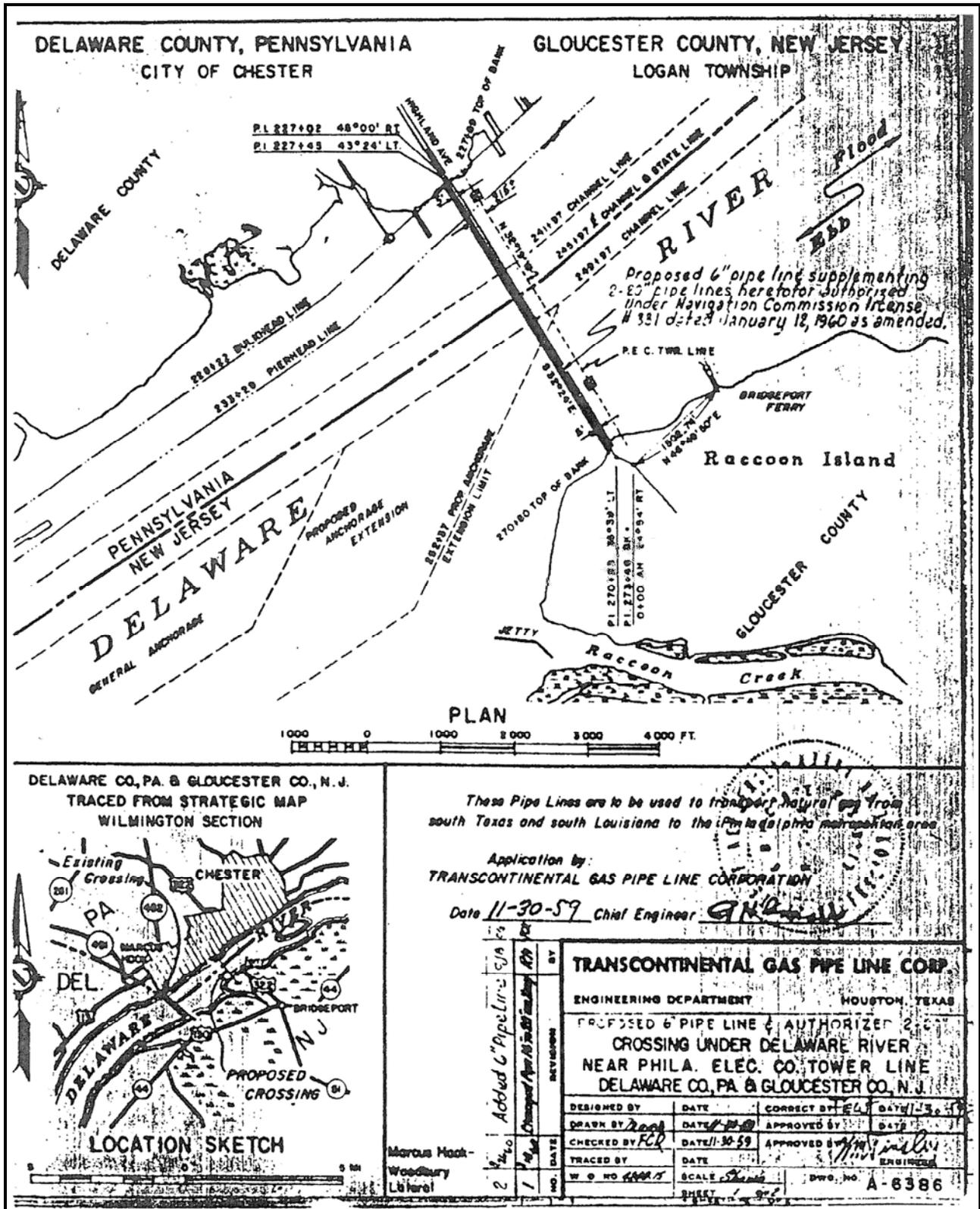


Figure 11 - WGP-Transco (Utility K)

11.5 Comcast Cable (N)

- Permit No. CENAP-OP-R-199701939-15 was issued to Suburban Cable on 31 October 1997 to install a fiber optic conduit under the Delaware River between Chester, PA and Bridgeport, NJ (Figure 12).
- An as-built survey was conducted by George W. Henn, Inc. for Suburban Cable and issued on 9 and 10 March 1999.
- The vertical datum for the as-built survey was “Local Mean Low Water”.
- The as-built datum is 0.1 foot lower than the Project Datum (NOAA MLLW 1983-2001 Epoch).
- The minimum depth of the top of the fiber optic conduit in the shipping channel was recorded as 74 feet below the as-built survey datum (74.1 feet below the project datum).
- The plan view of the utility crossing determined from the GBA’s landside surveys varies from that provided by the Corps (see Figure 4), but not by more than 20 feet where it crosses the Delaware River channel. While the western landing site was identified by a Comcast representative, the eastern landing was not. The GBA surveyor made a “best attempt” at locating the eastern landing (see Appendix D). At a minimum of 74 feet below the project datum the potential horizontal alignment difference should be of negligible consequence.

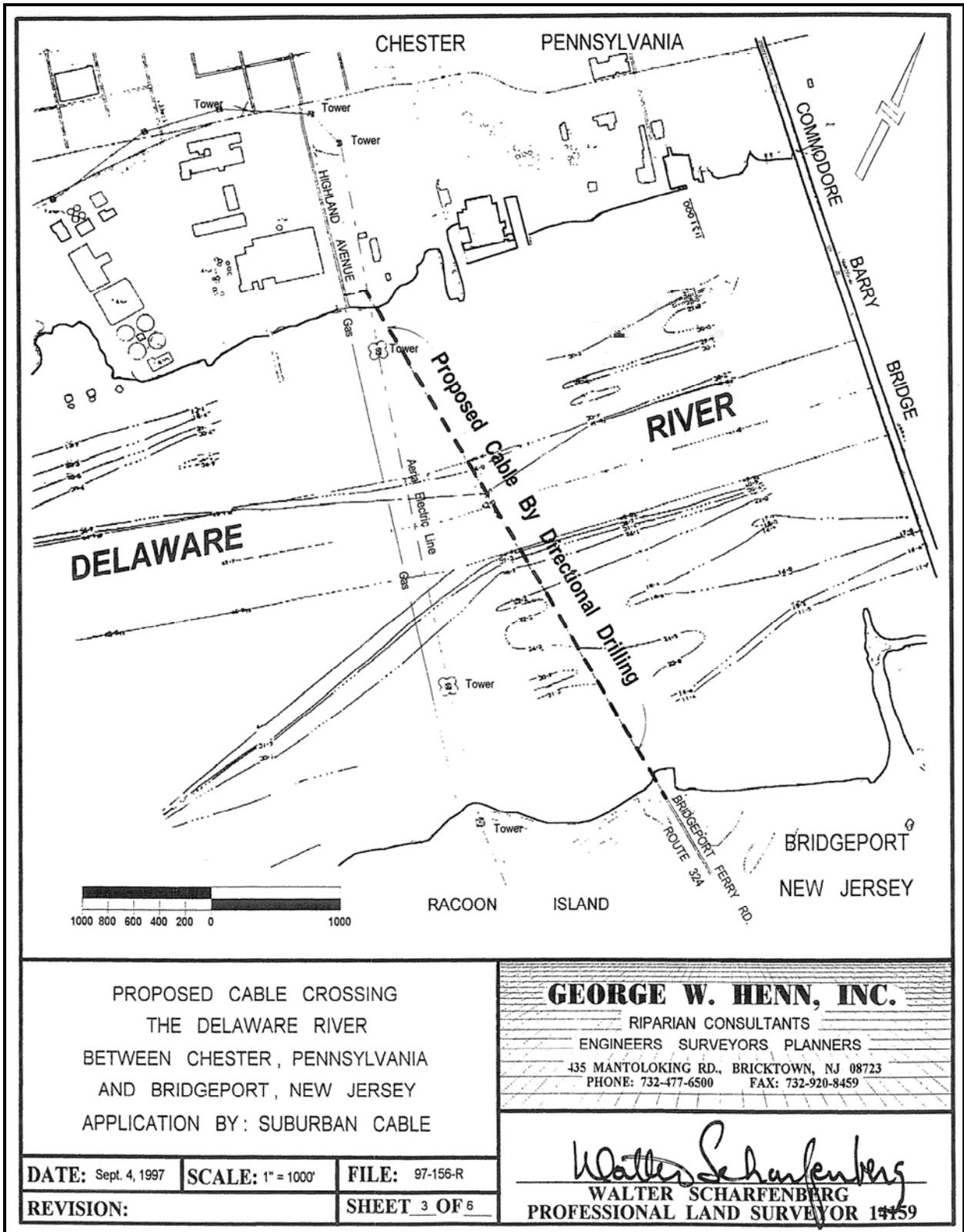


Figure 12 - Comcast Cable (Utility N)

TABLE 3

Delaware River Reach B Submarine Utility Crossings

Note: Coordinates are based in NJ State Plane NAD83

Utility	Owner/Operator	Utility Description	Permit Information	Location Description	West Bank Coordinates	East Bank Coordinates	C/L Channel Stationing	As-Built Depth Below NOAA MLLW	Relevant Permit Conditions
E	Columbia Gas Transmission	One 20-inch submarine gas pipeline	Application Submitted: NA Permit Issued: 06/27/87 Permit #: CENAP-OP-R-87-0239-12	Claymont, DE across Marcus Hook Range to Logan Township, NJ	N353458 E227899	N349526 E233746	133+042	Minimum 62.7 feet across channel	General Condition #2 Special Condition #2 Further Information #3.b.
F2	Colonial Pipeline Company	One 30-inch submarine oil pipeline	Application Submitted: 04/21/87 Permit Issued: 08/03/87 Permit #: CENAP-OP-R-87-0123-12	200' downstream from existing 30" submarine oil pipeline (below)	N354794 E229058	N349610 E233816	131+991 (131+793?)	Minimum 59.6 feet across channel	General Condition #2 Special Condition #2 Further Information #3.b.
F	Colonial Pipeline Company	One 30-inch submarine oil pipeline	Application Submitted: 05/28/63 Permit Issued: 10/11/63 Permit #: NAPOP-N	Just south of DE state line across Marcus Hook Range and Anchorage between Claymont, DE and Logan Township, NJ	N354800 E229075	N349610 E233816	131+793 (131+589?)	Minimum 58.2 feet across channel	Permit Conditions (f) and (g)
G	Linde Group	One 8-inch nitrogen submarine pipeline	(See Item H Permit Information)	Lower end of Marcus Hook Anchorage, between New Castle County, DE and Logan Township, NJ	N355653 E232205	N349976 E234577	129+484 to 129+360	Minimum 58.7 feet across channel	(See Item H Permit Conditions)
H	Sunoco Logistics	Three 6-inch and three 4-inch submarine chemical pipelines	Application: 11/04/60, rev. 07/20/61 Permit Issued: 05/22/61, rev. 08/02/61 Permit #: NAPOP-N	Lower end of Marcus Hook Anchorage, between New Castle County, DE and Logan Township, NJ	N355571 E232265	N349989 E234573	129+484 to 129+360	Minimum 58.7 feet across channel	Permit Conditions (f) and (g)
I	Williams Gas Pipeline Transco	One 16-inch submarine gas pipeline	(See Item H Permit Information)	Lower end of Marcus Hook Anchorage, between New Castle County, DE and Logan Township, NJ	N355579 E232281	N349990 E234578	129+484 to 129+360	Minimum 58.7 feet across channel	(See Item H Permit Conditions)
J	Williams Gas Pipeline Transco	One 12-inch submarine gas pipeline	Application: 04/25/51, rev. 06/22/51 Permit Issued: 06/28/51 Permit #: NAPKP	<200' downstream from existing natural gas pipeline (below)	N355899 E232742	N352226 E238339	128+072 to 127+975	Minimum 63.8 feet across channel	Permit Conditions (f) and (g)
J2	Williams Gas Pipeline Transco	One 12-inch submarine gas pipeline	Application: 12/01/49, rev. 06/05/50 & 10/03/50 Permit Issued: 08/04/50, rev. 10/09/50 Permit #: NAPKP	Marcus Hook, PA to a point 1.5-mi downstream from mouth of Raccoon Creek, Logan Township, NJ	NA	NA	127+843±?	No as-built available.	Permit Conditions (f) and (g)
K	Williams Gas Pipeline Transco	Two 20-inch and one 6-inch submarine gas pipelines	No permit information found.	Marcus Hook Range between Chester, PA and Logan Township, NJ	N362754 N362759 E243241 E243250	N359042 N359052 E245707 E245712	116+053 to 116+002	Minimum 52.7 feet across channel	No permit information found.
N	Comcast Cable	Submerged fiber optics cable	Application: 09/10/97 Permit Issued: 10/31/97 Permit #: CENAP-OP-R-199701939-15	Chester, PA to Bridgeport, NJ	N362957 E243461	N360121 E246910	115+125	Minimum 74.1 feet across channel	General Condition #2 Special Condition #7 Further Information #3.b.

RELEVANT PERMIT CONDITIONS:

Item

- E General Condition #2 - You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
- E Special Condition #2 - That the top of pipe elevation crossing the Federal Project Channel shall be located a minimum of 60 feet below Mean Low Water (MLW) and shall be backfilled with suitable heavy materials to the adjacent river bottom elevation of 48 feet below MLW. In areas outside the Federal project channel, the top of pipe shall be located a minimum of 10 feet below existing river bottom elevation and shall be backfilled with suitable material to the adjacent river bottom elevation.
- E Further Information #3 - Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:
b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
- F2 General Condition #2 - Same as General Condition #2 above.
- F2 Special Condition #2 - That the top of pipe elevation crossing the Federal Project Channel shall be located a minimum of 58 feet below Mean Low Water (MLW) and shall be backfilled with suitable heavy materials to the adjacent river bottom elevation of 48 feet below MLW. In areas outside the Federal project channel, the top of pipe shall be located a minimum of 10 feet below existing river bottom elevation and shall be backfilled with suitable material to the adjacent river bottom elevation.
- F2 Further Information #3 - Same as Further Information #3.b. above.
- F Permit Condition (f) - That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.
- F Permit Condition (g) - That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or from other purposes, and no claim or right to compensation shall accrue from any such damage.
- H Permit Condition (f) - Same as Permit Condition (f) above.
- H Permit Condition (g) - Same as Permit Condition (g) above.
- J Permit Condition (f) - Same as Permit Condition (f) above.
- J Permit Condition (g) - Same as Permit Condition (g) above.
- J2 Permit Condition (f) - Same as Permit Condition (f) above.
- J2 Permit Condition (g) - Same as Permit Condition (g) above.
- K No permit information found.
- N General Condition #2 - Same as General Condition #2 above.
- N Special Condition #7 - That the top of cable elevation crossing the Federal Project Channel shall be located a minimum of 60 feet below Mean Low Water. In areas outside the Federal project channel, the top of cable shall be located a minimum of 10 feet below existing river bottom elevation.
- N Further Information #3 - Same as Further Information #3.b. above.

12.0 CONCLUSIONS

Based on the investigation undertaken, the conclusions reached for each of the crossings identified are presented below.

12.1 Columbia Gas Transmission Corporation (E)

- Utility E, a 20-inch diameter natural gas pipeline, crosses the Delaware River channel as shown in Figures 4 and 4A. The minimum depth of the top of pipeline, where it crosses the channel, is 62.7 feet below the project datum (NOAA MLLW 1983-2001 Epoch).

12.2 Colonial Pipeline Company (F & F2)

- The permit applications and the as-built drawings for Utilities F & F2 both indicate the pipelines crossing the centerline of the channel at stations 131+589 and 131+793, respectively. Based on the GBA landings location surveys and the relative location of each pipeline with respect to each other as shown on the as-built drawing for F2, the stations where F and F2 crossed the channel centerline were determined to be 131+793 and 131+991, respectively.
- Utility F, an inactive 30-inch diameter petroleum products pipeline, crosses the Delaware River channel as shown in Figures 4 and 4A. This is based on the GBA landings location surveys. The minimum depth of the top of pipeline, where it crosses the channel, is 58.2 feet below the project datum (NOAA MLLW 1983-2001 Epoch).
- Utility F2, a 30-inch diameter petroleum products pipeline, crosses the Delaware River channel at the approximate location as shown in Figures 4 and 4A. This is based on its relative location with respect to Utility F as shown on the as-built drawing for Utility F2. The minimum depth of the top of pipeline, where it crosses the channel, is 59.6 feet below the project datum (NOAA MLLW 1983-2001 Epoch).

12.3 Sunoco Logistics/Linde Group/ WGP-Transco (G, H & I)

- Utility bundle G, H & I, consisting of three 4-inch and three 6-inch diameter petroleum products pipelines, one 8-inch diameter nitrogen gas pipeline and one 16-inch diameter natural gas pipeline, crosses the Delaware River channel within the crossing envelope as shown in Figures 4 and 4B. The minimum depth of the top of the pipeline bundle, where it crosses the channel, is 58.7 feet below the project datum (NOAA MLLW 1983-2001 Epoch).

12.4 WGP-Transco (J, J2 & K)

- Utility J, a 12-inch diameter natural gas pipeline, crosses the Delaware River within the crossing envelope as shown in Figures 4 and 4B. The minimum depth of the top of

Investigation of Utility Crossings in Reach B

pipeline, where it crosses the channel, is 63.8 feet below the project datum (NOAA MLLW 1983-2001 Epoch).

- Utility J2 - WGP-Transco maintains that it owns and operates one 12-inch diameter natural gas pipeline in Reach B. The findings for utilities J and J2 documented in Section 11.4 predominately point to this being utility J. However, the findings also indicate the possibility that the existence of utility J2, another 12-inch diameter natural gas pipeline, cannot be discounted entirely. An approximate location for utility J2 (if it exists) is shown on Figures 4 and 4B. The proposed (and permitted) depth of top of pipeline was “not less than 56 feet below MLW across the ship channel”. MLW is referenced on the permit drawing as being at +0.7 feet U.S. Engineer Datum and is therefore the same as the project datum (NOAA MLLW 1983-2001 Epoch).
- Utility K, consisting of two 20-inch and one 6-inch diameter natural gas pipelines, crosses the Delaware River channel within the crossing envelope as shown in Figures 4 and 4C. The minimum depth of the top of the pipelines, where they cross the channel, is 52.7 feet below the project datum (NOAA MLLW 1983-2001 Epoch).

12.5 Comcast Cable (N)

- Utility N, a fiber optic conduit, crosses the Delaware River within the crossing envelope as shown in Figures 4 and 4C. The minimum depth of the top of the conduit, where it crosses the channel, is 74.1 feet below the Project Datum (NOAA MLLW 1983-2001 Epoch).

13.0 RECOMMENDATIONS FOR FURTHER ACTION

13.1 Colonial Pipeline Company

- Continue to seek completely legible copies of the as-built drawings for utilities F and F2 from Colonial for the purpose of confirming the plan view location of both utility lines.

13.2 WGP-Transco

- Continue to work with WGP-Transco to resolve the issue of one vs. two 12 inch diameter natural gas pipelines (J & J2) crossing the Delaware River in Reach B.

If the information cannot be obtained for the above crossings to properly locate the utility crossings beneath the Delaware River Main Channel, it is suggested that field investigation be undertaken. In addition, coordination with the owner/operators should be undertaken prior to the actual dredging. A meeting should be held with all the owner/operators to go over the Corps dredging plan for sediment and/or rock removal in Reach B.

APPENDIX A
SPECIAL PERMIT CONDITIONS

APPENDIX A

A.1 Relevant Special Permit Conditions for Cables effective September 21, 2006 (extracted from comprehensive list provided by Corps)

CABLE 3

That within 60 days after completion of the work, the permittee shall furnish the Corps and National Oceanic and Atmospheric Administration, Nautical Data Branch, N/CS 26, Station 7230, 1315 East-West Highway, Silver Spring, Maryland 20910-3282, with certification that the cable has been installed in compliance with the approved plans. The certification shall include a survey, conducted by a licensed surveyor, which clearly shows the elevations and alignment of the cable across the waterway. Any discrepancies shall be clearly noted.

CABLE 4

That turbidity controls in the form of silt curtains or similar type material shall be installed downstream from the cable crossings and shall remain in place during all excavation and restoration operations.

CABLE 5

***DELAWARE RIVER AND SCHUYLKILL RIVER *** That the top of cable elevation crossing the Federal project channel shall be located a minimum of 20 feet below the authorized project channel depth and shall be backfilled with suitable heavy materials to the adjacent river bottom elevation. In areas outside the Federal project channel, the top of cable shall be located a minimum of 10 feet below existing river bottom elevation and shall be backfilled with suitable material to the adjacent river bottom elevation.

CABLE 7

That there shall be no stockpiling or double handling of any excavated/dredged materials within any waterway and/or wetland areas.

CABLE 8

That all excess dredged or excavated material not used as backfill shall be disposed at a separately approved disposal site.

CABLE 9

That only clean, inorganic, heavy material shall be used as backfill over the cable. This material shall be of such size that no more than 10% of it shall pass through a #100 sieve.

CABLE 10

That construction of the cable crossing will not interfere with safe navigation in the waterway. All construction work/procedures shall be coordinated with the U.S. Coast Guard and shall be subject of a Notice to Mariners issued by the U.S. Coast Guard. The District Engineer shall be provided with a copy of the construction procedures/schedule for cable crossing construction.

CABLE 11

FEDERAL NAVIGATION PROJECT CHANNELS That material excavated from the cable trench (by bucket method) outside of the Federal project channel shall be either stockpiled on a barge or sidecast next to the trench in such a manner as to not interfere with safe navigation to the area. That material excavated (by bucket method) from the cable trench within the Federal project channel shall be stockpiled on a barge or at a separately approved upland disposal site.

CABLE 12

That all unsuitable/excess dredged and excavated material not used as backfill over the cable shall be removed from the river bottom and disposed of at a separately approved upland disposal site.

CABLE 13

That all dredging/backfilling operations shall be performed in a manner that minimizes turbidity.

A.2. Relevant Special Permit Conditions for Pipelines effective September 21, 2006 (extracted from comprehensive list provided by Corps)

PIPE 1

That only clean, inorganic, heavy material shall be used as backfill over the pipeline. This material shall be of such size that no more than 10% of it shall pass through a #100 sieve.

PIPE 3

That construction of the pipeline will not interfere with safe navigation in the waterway. All construction work/procedures shall be coordinated with the U.S. Coast Guard and shall be subject of a Notice to Mariners issued by the U.S. Coast Guard. The District Engineer shall be provided with a copy of the construction procedures/schedule for pipeline installation.

PIPE 4

DELAWARE AND SCHUYLKILL RIVERS That the top of pipe elevation crossing the Federal project channel shall be located a minimum of 20 feet below authorized project channel depth and shall be backfilled with suitable heavy materials to the adjacent river bottom elevation. In areas outside the Federal project channel, the top of pipe shall be located a minimum of 10 feet below existing river bottom elevation and shall be backfilled with suitable material to the adjacent river bottom elevation.

PIPE 5

FEDERAL NAVIGATION PROJECT CHANNELS That material excavated from the pipeline trench (by bucket method) outside of the Federal project channel shall be either stockpiled on a barge or sidecast next to the trench in such a manner as to not interfere with safe navigation to the area. That material excavated (by bucket method) from the pipeline trench within the Federal project channel shall be stockpiled on a barge or at a separately approved upland disposal site.

PIPE 6

That all unsuitable/excess dredged and excavated material not used as backfill over the pipeline shall be removed from the river bottom and disposed of at a separately approved upland disposal site.

PIPE 7

That all dredging/backfilling operations shall be performed in a manner that minimizes turbidity.

PIPE 9

That there shall be no stockpiling or double handling of any excavated/dredged materials within any waterway and/or wetland areas.

PIPE 10

That all excess dredged or excavated material not used as backfill, shall be disposed at a separately approved disposal site.

PIPE 11

That any material generated during the excavation for the pipe shall be removed from areas adjacent to the river so that it is not eroded into the waterway.

PIPE 12

That operation of equipment shall not occur on wetland vegetation outside of the designated rights-of-way. All excavated material from pipeline trench shall be stockpiled on a non-wetland site. When it is necessary to place excavated material on wetlands, the excavated materials shall be removed subsequent to backfilling of the trench, and the areas restored to pre-construction condition.

PIPE 13

That the permittee shall provide detailed construction methods to be used for installation of the pipeline. This should include equipment to be used, construction sequence, method of excavation, disposal sites, placement of temporary or permanent fill, etc.

PIPE 14

That prior to construction, silt curtains or a similar type turbidity control device shall be placed upstream and downstream of the pipeline construction area.

PIPE/FED

That upon completion of the work, the permittee shall furnish the Corps and National Oceanic and Atmospheric Administration, Nautical Data Branch, N/CS 26, Station 7230, 1315 East-West Highway, Silver Spring, Maryland 20910-3282, with certification that the pipeline has been installed in Compliance with the approved plans. The certification shall include a survey, conducted by a licensed surveyor, which clearly shows the elevation of the top of the pipeline and its alignment across the waterway. Any discrepancies shall be clearly identified/noted.

APPENDIX B

AS BUILT VERTICAL DATUM AND HORIZONTAL GRID REVIEW

APPENDIX B

INTRODUCTION

In order to compare the as-built drawings, the data needs to be referenced to the same vertical datum and horizontal grid. Variations in this information can be attributed to the established datum and grid system at the time that the as-built survey was performed.

The Corps and NOAA currently utilize NOAA MLLW feet as the vertical datum and the NJ State Plane NAD 83 horizontal datum for projects in the Delaware River and Bay.

VERTICAL DATUM CONVERSION

NOAA MLLW has been established as the vertical datum for the Delaware River Main Channel Deepening Project. The as-built surveys for the identified submarine utility crossings used different vertical datums. As such, there was a need to convert the as-built datums to NOAA MLLW.

Figure B-1 depicts the relationships of the various tidal and geodetic datums such as NGVD 29, NAVD 88 and COE DRD to the project datum (NOAA MLLW) in the vicinity of Reach B. These relationships were applied to the available as-built data in order to reference it to the project datum.

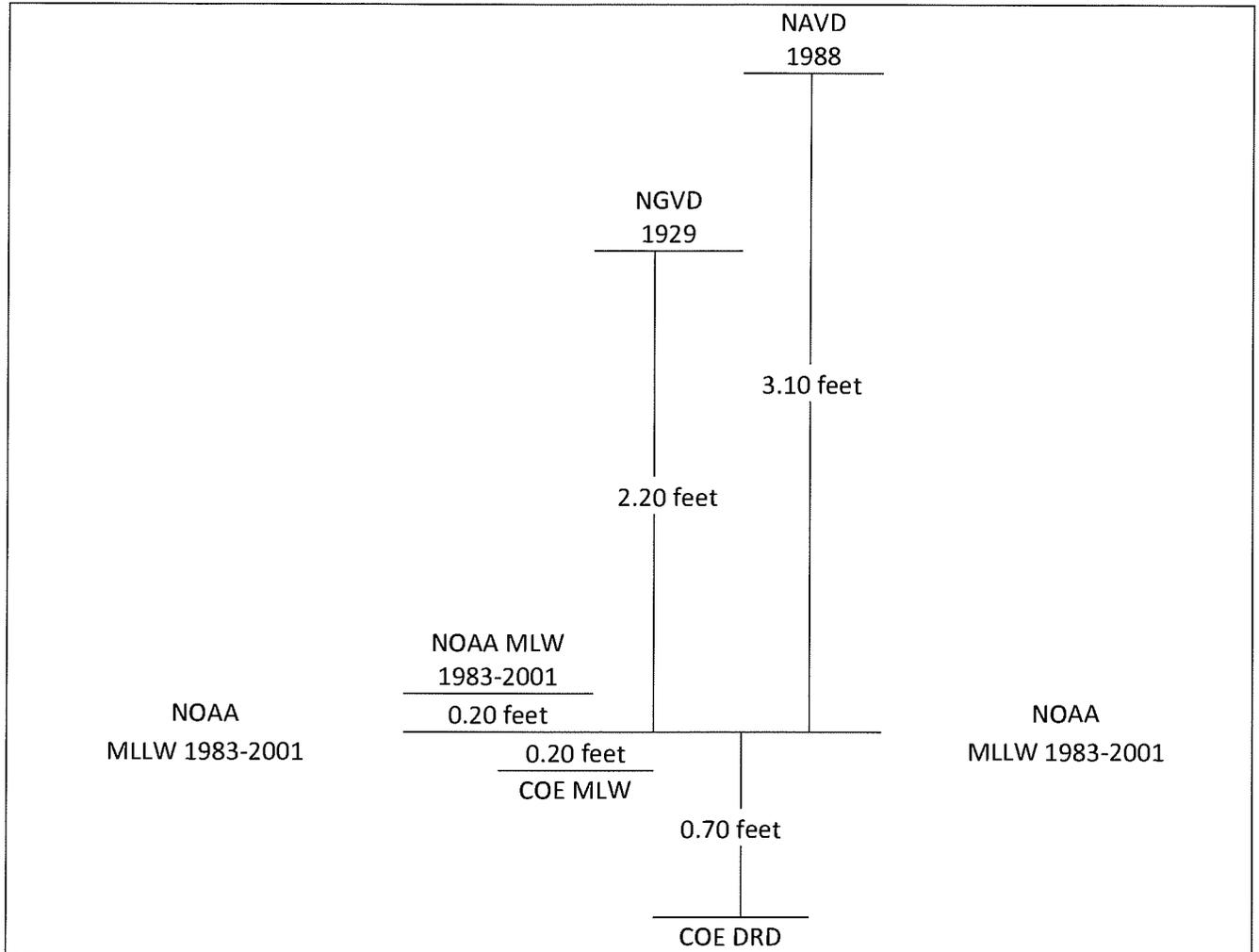


Figure B-1 Vertical Datum Conversions - Marcus Hook Range

- Notes: 1. The above conversions are only applicable in the vicinity of the Marcus Hook Range
 2. The correction factor between NAVD 88 and NOAA MLLW has been recently revised from 3.1' to 3.0', which is not reflected in the datum information presented in this report.

Below is the information that was available from the existing records, coordination with the owners or from the Corps of Engineers on the as built surveys for each of the identified submarine crossings, and the assumptions and conversions that were applied to convert to the NOAA MLLW project datum.

1. Columbia Gas - Utility E

- As-Built Drawing Issued - 20 January 1988
- Referenced Datum - C.O.E. Datum (COE MLW Datum - Marcus Hook Range)

C.O.E. Datum (COE MLW Datum-Marcus Hook Range) was an independent datum utilized by the Corps of Engineers and did not necessarily agree or match the NOAA

MLW based upon the 1960 to 1978 Epoch. It is stated in reference to Colonial Pipeline (utility F2) below, the DRD is 0.5 feet below MLW, which is assumed to be COE MLW. Based upon this information, it was calculated that COE Datum MLW at Marcus Hook is 3.3 feet below NAVD 88, whereas the Project Datum (NOAA MLLW) is 3.10 feet below NAVD 88. As a result, the minimum depth was established at 62.7 feet in reference to the project datum.

2. Colonial Pipeline Active - Utility F2

- As-Built Survey Completed - 26 September 1988
- Referenced Datum - COE DRD

The reference that DRD is 0.5 feet below MLW appears to be correct assuming it was based upon the previous Epoch. Based upon this information, the minimum depth was determined at 59.6 feet in reference to the project datum.

3. Colonial Pipeline Inactive - Utility F

- As-Built Drawing Issued - 31 August 1965
- Referenced Datum - COE DRD

The reference that DRD is 0.5 feet below MLW appears to be correct assuming it was based upon the previous Epoch. Based upon this information, the minimum depth was determined at 58.2 feet in reference to the project datum.

4. Sunoco/Transco/Linde - Utility Bundle G/H/I

- As-Built Drawing Issued - 22 December 1961
- Referenced Datum - COE DRD

The same analogy can be formed on this crossing as on Transco (Utility K), which is also based upon COE DRD. Research of the 1960 to 1978 Epoch agrees that the tidal range from MLW to Mean High Water (MHW) was 5.3 feet, as referenced from 0.7 to 6.0 feet. Based upon this information, the minimum depth was determined at 58.7 feet in reference to the project datum.

5. Transco - Utility J

- As-Built Drawing Issued - 10 September 1964
- Referenced Datum - U.S. Engineers Datum (COE DRD)

The assumption is made, based upon the time reference of 10 September 1964 compared to the date of the previous Transco pipeline (Utility K) being 23 September 1964 and GBA's knowledge of the Delaware River, that U.S. Engineers Datum is the DRD as referenced above. It is not understood why one pipeline is referenced to DRD and this one is referenced to MLW, however it may be explained by the possibility of the

original as-built being prepared shortly after the line was originally constructed in the early 1950s. The MLW referenced when calculated is 3.10 feet below NAVD 88, which is the same as the project datum of NOAA MLLW. Thus, the minimum depth reference of 63.8 feet remains the same.

6. Transco - Utility J2

- As-Built Drawing Unavailable

7. Transco - Utility K

- As-Built Drawing Issued - 23 September 1964
- Referenced Datum - COE DRD

COE DRD is 2.90 feet below the U.S. Coast & Geodetic Survey (USC&GS - a predecessor of NOAA) datum (of NGVD 29) as listed. DRD is 3.8 feet below NAVD 88. The current project datum of MLLW is 3.1 feet below NAVD 88. Based upon this information, the minimum depth is 52.7 feet in reference to the project datum.

8. Comcast Cable - Utility N

- As-Built Drawing Issued - 3 March 1999
- Referenced Datum - NOAA MLW

Local MLW (Mean Low Water) is assumed to be NOAA MLW based upon the 1960 to 1978 Epoch, as it is dated 1999, prior to the update to the current 2001 Epoch. Based upon the 1978 Epoch, MLW was approximately 3.2 feet below NAVD 88. The current project datum of NOAA MLLW, based upon the 2001 Epoch, is 3.1 feet below NAVD 88. There appears to be little or no change to the minimum depth of 74 feet.

RESULTS

Based on the above, a summary table (Table B-1) that shows the datum used for each as-built survey drawing and the minimum depth of the utility crossing in the channel referenced to both the as-built datum used and as adjusted to the project datum is provided below.

TABLE B-1
REACH B SUBMARINE UTILITY CROSSINGS OF THE DELAWARE RIVER
As-Built Survey/Project Vertical Datum Information

Current Owner/Operator	Utility Description	Date of As-Built Survey ²	Minimum Below As-Built Datum In Channel (feet)	As-Built Datum Description	Minimum Below Project Datum In Channel NOAA MLLW (feet)
Columbia Gas (E)	20-inch gas pipeline	01/20/88	62.5	"C.O.E. Datum" (COE MLW Datum - Marcus Hook Range)	62.7
Colonial Pipeline (F2)	30-inch oil pipeline	09/26/88 ³	58.9	"Delaware River Datum" (DRD is 0.54 feet below MLW)	59.6
Colonial Pipeline (F) ¹	30-inch oil pipeline	08/31/65	57.5	"Delaware River Datum" (DRD is 0.54 feet below MLW)	58.2
Linde/Sunoco/Transco (G/H/I)	3-4 inch & 3-6 inch chemical, 1-8 inch nitrogen, 1-16 inch gas pipelines	12/22/61	58	"USCE Delaware River Datum" (High Water and Low Water are 6.0 feet and 0.7 feet above DRD, respectively)	58.7
Transco (J)	1-12 inch gas pipeline	09/10/64	63.8	"MLW" (MLW is 0.7 feet above U.S. Engineers Datum")	63.8
Transco (J2)	1-12 inch gas pipeline	NA	NA	NA	NA
Transco (K)	1-6 inch & 2-20 inch gas pipelines	09/23/64	52	"U.S. Corps of Engineers Delaware River Datum" (that datum being 2.90 feet lower than the USC&GS datum)	52.7
Comcast Cable (N)	Fiber optics cable	03/09/99	74	"Local MLW" (Local MLW is 5.3 feet below Local MHW)	74.1

Notes

¹This as-built shows a pipeline installed in the mid 1960s, now listed as "inactive".

²Date as-built survey drawing issued.

³Date as-built top of pipe survey completed.

HORIZONTAL GRID

The following procedures were utilized to obtain coordinates in the project grid (NJ State Plane NAD 83) for the pipelines located on their respective as built drawings using the DRG:

- Initial computations were performed utilizing the coordinates for the pipeline crossings provided in DRG.
- Additional computations were performed utilizing the bearings and distances provided to check given coordinates and traverse/baseline information.
- Information was obtained from the Corps of Engineers Philadelphia District with channel centerline coordinates for the Delaware River in the vicinity of the pipeline crossings in both the DRG and NJ State Plane NAD 83.
- Coordinates from two specific points located within the project area - centerline 116+000 and centerline 127+000 were utilized to perform the coordinate transformation, as values were available for both points in both grids. This was required as the rotation angle and the scale factor was not known for the DRG.
- These two locations were entered into a coordinate transformation program that compared the values provided for the coordinates of the two points in both grids and then allowed transformation for the remaining points provided and or computed to DRG from the as built information provided for the pipelines.
- As a quality control check, grid deltas were computed for a number of locations within the project area and compared to the values obtained utilizing the coordinate transformation program. The closures ranged from ± 2 to 10 feet in both northings and eastings, which is typical for this type of computation/conversion.
- After the New Jersey State coordinates were obtained in NAD 1983 feet, the Corpscon program (a grid conversion program authored by the Corps) was utilized to convert the State Plane coordinates to NAD 1983 Latitude/Longitude for future purposes.
- The NAD 1983 Latitude/Longitudes were placed on mapping obtained from Google Earth Internet mapping site to provide a general quality control check and ensure that the computed/converted locations appeared to be in the correct general locations.
- The coordinate transformation programs such as utilized for this effort are mathematic in nature and are not intended to replace surveying in the field to define actual locations of field structures.

APPENDIX C
LETTERS & ATTACHMENTS TO OWNER/OPERATORS
WITH
RESPONSES

**COLUMBIA GAS
(E)**

Gahagan & Bryant Associates, Inc.

5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218



October 13, 2010

Columbia Gas Transmission Corporation,

Attention: Mr. Robert W. Schini, Jr.

Via E-Mail: rschini@nisource.com

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Schini:

As you may be aware, the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. The next section of the channel to be dredged is a sub-section of an area known as Reach B, which is located approximately between the Philadelphia International Airport and the Delaware Memorial Bridge (Channel Stations 96+000 to 176+000). It is anticipated that dredging of a portion of this sub-section will begin in December 2010.

Gahagan & Bryant Associates, Inc. (GBA) has been contracted by the Philadelphia Regional Port Authority (PRPA), the non-Federal sponsor of the deepening project, to identify and verify all submarine utility crossings within Reach B prior to the commencement of dredging operations. To that end, GBA conducted a search of the Corps' permit files on utility crossings and that search revealed that a permit was granted by the Corps to Columbia Gas Transmission Corporation for a utility crossing. Attached are copies of the proposed utility installation data from the Corps' permit files (Table 1). Figure 1 shows the approximate location of your submarine utility crossing and Figure 2 shows a profile of the crossing in the navigation channel. The profile of the utility crossing was constructed from the as-built survey data that was submitted to the Corps after the utility line was installed.

GBA is requesting that you examine the attached plan and profile for the above referenced utility crossing and either acknowledge their veracity or provide the necessary corrections. We would also like you to identify any additional crossings, active or inactive, your company may have within Reach B that are not shown on the attached drawings.

If you have any questions on the purpose of this investigation or the deepening project, please contact Mr. Scott Evans, Corps of Engineers Project Manager for the deepening project. He can be reached at 215-656-6680.

I would like to schedule a meeting with your staff to review the attached information. Please call me at (302) 652-4948 or contact me by e-mail at rdhenry@gba-inc.com to set up this meeting or to discuss any questions you may have on this matter.

We appreciate your assistance in this verification process.

Sincerely,

Robert D. Henry
Associate

PHILADELPHIA, PA
(215) 425-6283

BALTIMORE, MD
(410) 682-5595

HOUSTON, TX
(832) 518-2112

LOS ANGELES, CA
(310) 521-8127

NOVATO, CA
(415) 883-7683

TAMPA, FL
(813) 831-4408

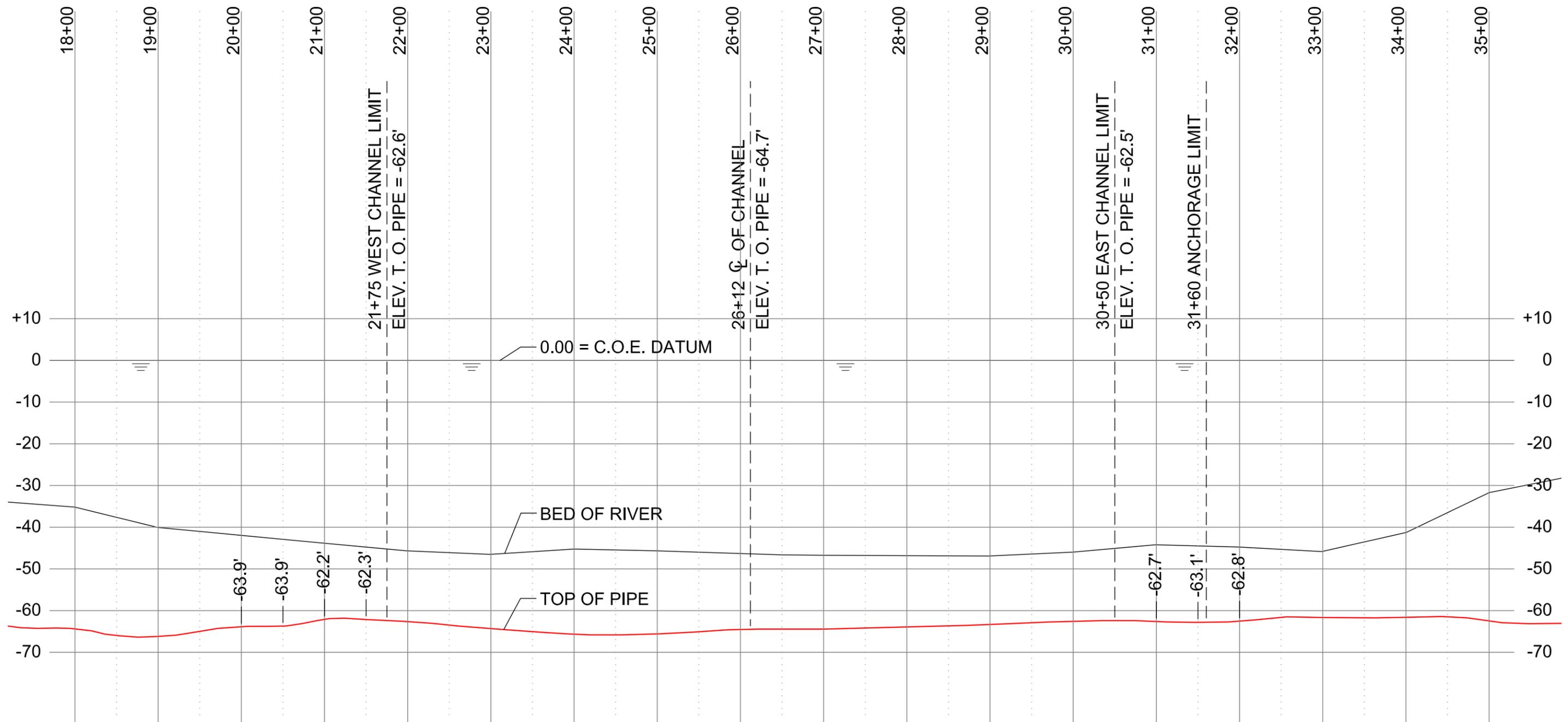
NORTH CAROLINA
(910) 313-3338

TABLE 1

Delaware River Utility Crossings - Permit Information

<i>Owner</i>	<i>Permit Information</i>	<i>Utility Description</i>	<i>Proposed Location</i>	<i>Proposed Depth</i>	<i>Notes/Comments</i>
Columbia Gas Transmission Corp.	Application Submitted: NA Permit Issued: 06/27/87 Permit #: CENAP-OP-R-87-0239-12	One 20-inch submarine gas pipeline	Channel C/L Sta.: 133+000	Minimum depth 60 feet below MLW	-

DETAIL: AS-BUILT TOP OF PIPE PROFILE



GAHAGAN & BRYANT ASSOCIATES, INC.
 5803 KENNETT PIKE, SUITE D
 CENTREVILLE SQUARE
 WILMINGTON, DELAWARE 19807-1195
 TEL. (302) 652-4948
 FAX (302) 655-9218
 GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: COLUMBIA GAS TRANSMISSION CORPORATION
 20" GAS PIPELINE
 DRAWING NO.: H-26859
 DRAWING DATE: JANUARY 20, 1988

FIGURE 2



1470 Poorhouse Road
Downtown, PA 19335
610-518-3547

November 23, 2010

Mr. Robert D. Henry
Gahagan & Bryant Associates
5803 Kennett Pike
Centerville Square
Wilmington, DE 19807-1195

Re: Delaware River Submarine Utility Crossings

Dear Bob:

Our Engineering staff has looked at the drawings you've prepared based on our as-builts. With the knowledge that the Army Corps datum and ours are related so that we can depend on the depth of dredging over our Pipeline 10345, we will not object to the project.

Our remaining concern is the nature of the bottom near our facilities. If blasting or other rock removal will take place in the vicinity of our line, please provide more information. Further investigation may have to take place prior to dredging.

Please let me know if you have additional questions. Otherwise, we'd like a couple days' notice before the work takes place over our line.

Sincerely,

A handwritten signature in blue ink, appearing to read "RSJ", written over a light blue circular stamp.

Robert W. Schini, Jr., Land Agent

cc: Stanley K. Parrish, Principal Engineer
Michael W. Roberts, Manager, Operations
Rodney N. Weitzel, Team Leader, Operations
Stephen E. Gray, Transmission Mechanic

**COLONIAL PIPELINE
(F, F2)**

Gahagan & Bryant Associates, Inc.

5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218



October 4, 2010

Colonial Pipeline Company

Attention: Mr. Timothy Gross
Via E-Mail: tgross@colpipe.com

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Gross:

As you may be aware, the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. The next section of the channel to be dredged is a sub-section of an area known as Reach B, which is located approximately between the Philadelphia International Airport and the Delaware Memorial Bridge (Channel Stations 96+000 to 176+000). It is anticipated that dredging of a portion of this sub-section will begin in December 2010.

Gahagan & Bryant Associates, Inc. (GBA) has been contracted by the Philadelphia Regional Port Authority (PRPA), the non-Federal sponsor of the deepening project, to identify and verify all submarine utility crossings within Reach B prior to the commencement of dredging operations. To that end, GBA conducted a search of the Corps' permit files on utility crossings and that search revealed that two (2) permits were granted by the Corps to Colonial Pipeline Company for utility crossings. Attached are copies of the proposed utility installation data from the Corps' permit files (Table 1). Figure 1 shows the approximate location of your submarine utility crossings and Figures 2 and 3 show profiles of the crossings in the navigation channel. The profiles of the utility crossings were constructed from the as-built survey data that was submitted to the Corps after the utility lines were installed.

GBA is requesting that you examine the attached plan and profiles for the above referenced utility crossings and either acknowledge their veracity or provide the necessary corrections. We would also like you to identify any additional crossings, active or inactive, your company may have within Reach B that are not shown on the attached drawings.

If you have any questions on the purpose of this investigation or the deepening project, please contact Mr. Scott Evans, Corps of Engineers Project Manager for the deepening project. He can be reached at 215-656-6680.

I would like to schedule a meeting with you or your staff to review the attached information. Please call me at (302) 652-4948 or contact me by e-mail at rdhenry@gba-inc.com to set up this meeting or to discuss any questions you may have on this matter.

We appreciate your assistance in this verification process.

Sincerely,

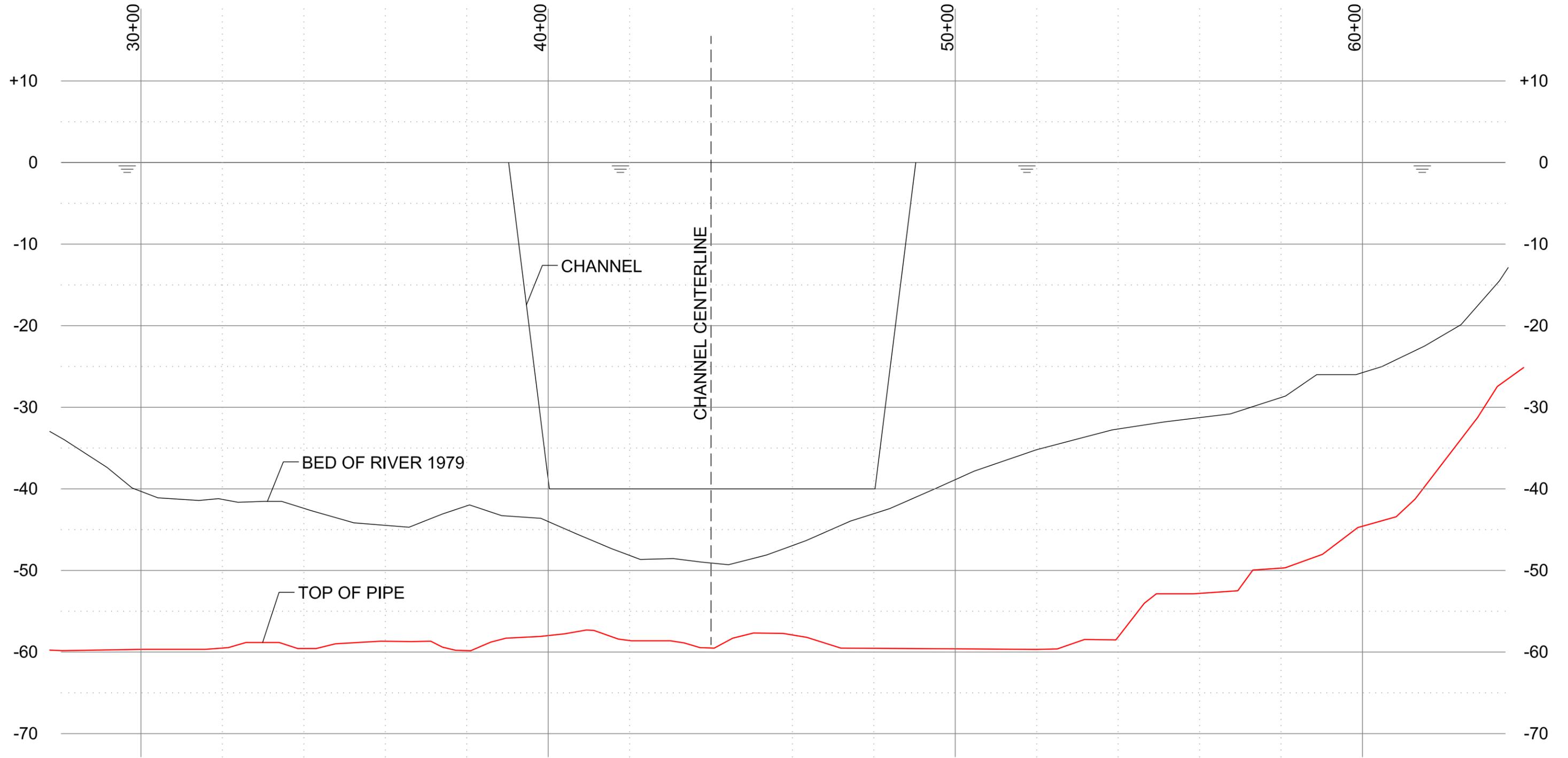
Robert D. Henry
Associate

TABLE 1

Delaware River Utility Crossings - Permit Information

<i>Owner</i>	<i>Permit Information</i>	<i>Utility Description</i>	<i>Proposed Location</i>	<i>Proposed Depth</i>	<i>Notes/Comments</i>
Colonial Pipeline Co.	Application Submitted: 05/28/63 Permit Issued: 10/11/63 Permit #: NAPOP-N	One 30-inch submarine oil pipeline	Channel C/L Sta.: 131+589.2	Minimum depth 58 feet below COE Delaware River Datum	Inactive (per 3/24/10 e-mail)
Colonial Pipeline Co.	Application Submitted: 04/21/87 Permit Issued: 08/03/87 Permit #: CENAP-OP-R-87-0123-12	One 30-inch submarine oil pipeline	Channel C/L Sta.: 131+793.09	Minimum depth 58 feet below COE Delaware River Datum	

DETAIL: AS-BUILT TOP OF PIPE PROFILE

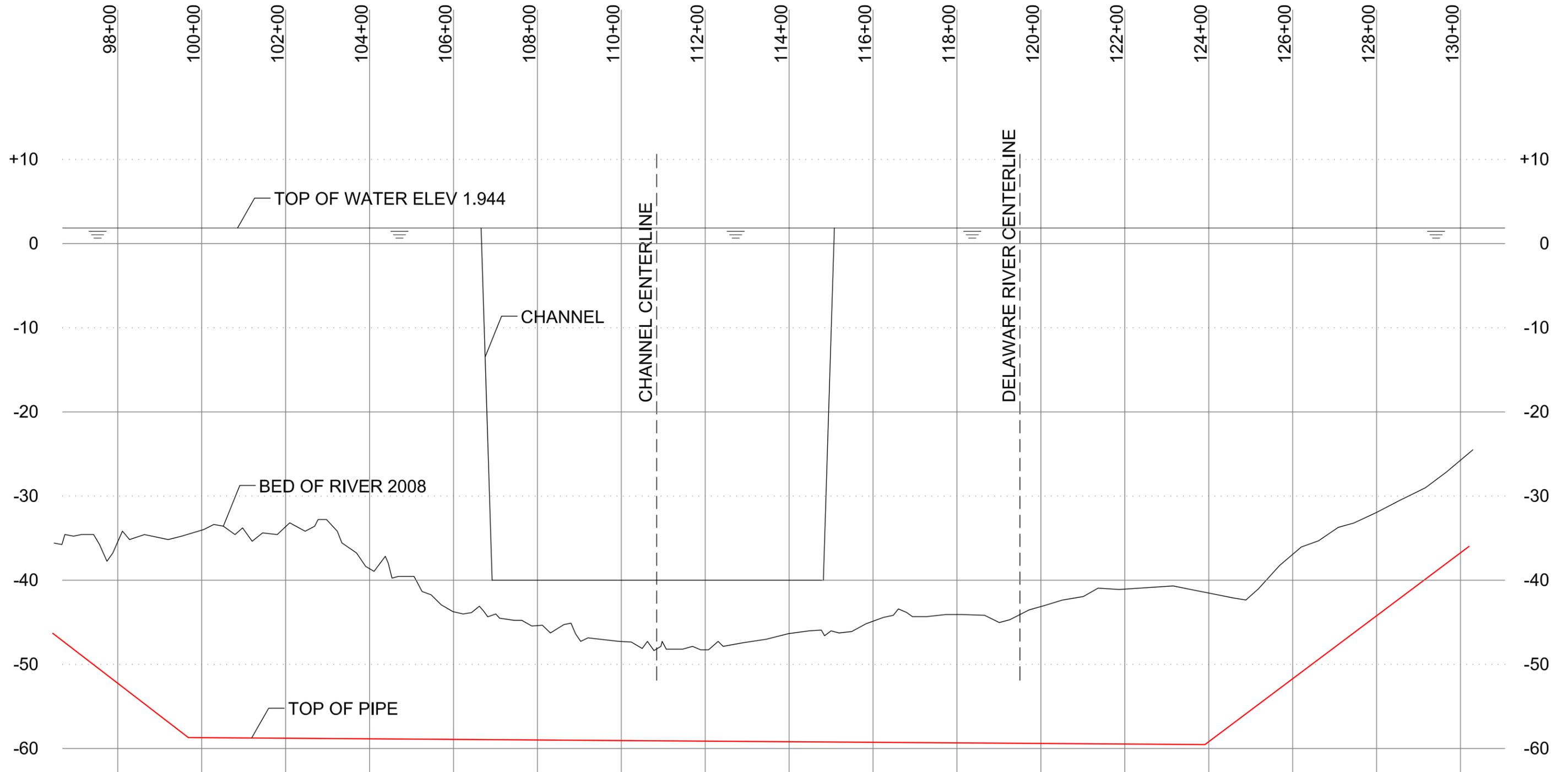


GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807-1195
TEL. (302) 652-4948
FAX (302) 655-9218
GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: COLONIAL PIPELINE COMPANY
30" PRODUCTS PIPELINE
FILE NO.: C53-400 128
DRAWING DATE: AUGUST 31, 1965

FIGURE 2

DETAIL: AS-BUILT TOP OF PIPE PROFILE



GAHAGAN & BRYANT ASSOCIATES, INC.
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 WILMINGTON, DELAWARE 19807-1195
 TEL. (302) 652-4948
 FAX (302) 655-9218
 GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: COLONIAL PIPELINE COMPANY
 30" O.D. PIPELINE (LINE 3)
 DRAWING NO.: 5.1203.4
 DRAWING DATE: JUNE 6, 2008

FIGURE 3



Colonial Pipeline Company

TIMOTHY GROSS
DISTRICT RIGHT-OF-WAY MANAGER

TELEPHONE: 804-672-3077
E-MAIL: tgross@colpipe.com

October 15, 2010

Robert D. Henry
Gahagan & Bryant Associates
5803 Kennett Pike
Centreville Square
Wilmington, DE 19807-1195

Dear Mr. Henry,

We have reviewed the data you supplied and agree that it accurately represents our facilities in the river. Based on your description of the project and this data, they do not appear to be in conflict.

Sincerely,

Timothy Gross
District ROW Manager
2607 Willard Road
Richmond, VA 23294

**SUNOCO LOGISTICS
(G)**

Gahagan & Bryant Associates, Inc.

5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218



October 13, 2010

Sunoco Corporation,

Attention: Mr. Gregory S. Mesthos
Via E-Mail: gsmesthos@sunocologistics.com

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Mesthos:

As you may be aware, the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. The next section of the channel to be dredged is a sub-section of an area known as Reach B, which is located approximately between the Philadelphia International Airport and the Delaware Memorial Bridge (Channel Stations 96+000 to 176+000). It is anticipated that dredging of a portion of this sub-section will begin in December 2010.

Gahagan & Bryant Associates, Inc. (GBA) has been contracted by the Philadelphia Regional Port Authority (PRPA), the non-Federal sponsor of the deepening project, to identify and verify all submarine utility crossings within Reach B prior to the commencement of dredging operations. To that end, GBA conducted a search of the Corps' permit files on utility crossings and that search revealed that a permit was granted by the Corps to SunOlin Chemical Company for a utility bundle crossing. Attached are copies of the proposed utility installation data from the Corps' permit files (Table 1). Figure 1 shows the approximate location of your submarine utility bundle crossing and Figure 2 shows a profile of the crossing in the navigation channel. The profile of the utility bundle crossing was constructed from the as-built survey data that was submitted to the Corps after the utility lines were installed.

GBA is requesting that you examine the attached plan and profile for the above referenced utility crossing and either acknowledge their veracity or provide the necessary corrections. We would also like you to identify any additional crossings, active or inactive, your company may have within Reach B that are not shown on the attached drawings.

If you have any questions on the purpose of this investigation or the deepening project, please contact Mr. Scott Evans, Corps of Engineers Project Manager for the deepening project. He can be reached at 215-656-6680.

I would like to schedule a meeting with your staff to review the attached information. Please call me at (302) 652-4948 or contact me by e-mail at rdhenry@gba-inc.com to set up this meeting or to discuss any questions you may have on this matter.

We appreciate your assistance in this verification process.

Sincerely,

A handwritten signature in blue ink that reads "Robert D. Henry". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Robert D. Henry
Associate

PHILADELPHIA, PA
(215) 425-6283

BALTIMORE, MD
(410) 682-5595

HOUSTON, TX
(832) 518-2112

LOS ANGELES, CA
(310) 521-8127

NOVATO, CA
(415) 883-7683

TAMPA, FL
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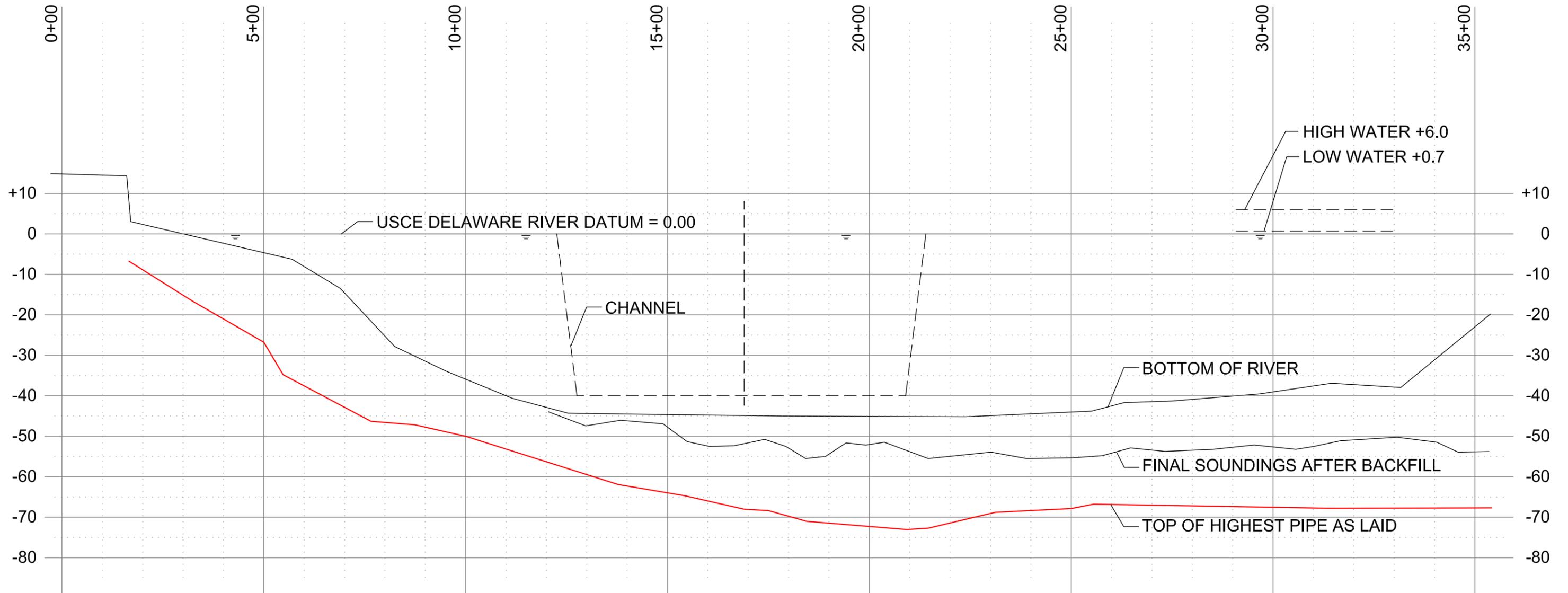
NORTH CAROLINA
(910) 313-3338

TABLE 1

Delaware River Utility Crossings - Permit Information

<i>Owner</i>	<i>Permit Information</i>	<i>Utility Description</i>	<i>Proposed Location</i>	<i>Proposed Depth</i>	<i>Notes/Comments</i>
Sunoco Inc.	Application: 11/04/60, rev. 07/20/61 Permit Issued: 05/22/61, rev. 08/02/61 Permit #: NAPOP-N	3 - 4" lines, 3 - 6" lines, 1 - 8" line, 1 - 16' line (CO, H & Ethylene)	Initial Channel C/L Sta.: 129+540 Final Channel C/L Sta.: 129+172.7	60 feet below MLW, 60 to 55 feet below MLW in western 150' of channel	8" line operated by Linde Corp. 16" line operated by TRANSCO

DETAIL: AS-BUILT TOP OF PIPE PROFILE



GAHAGAN & BRYANT ASSOCIATES, INC.
 5803 KENNETT PIKE, SUITE D
 CENTREVILLE SQUARE
 WILMINGTON, DELAWARE 19807-1195
 TEL. (302) 652-4948
 FAX (302) 655-9218
 GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: SUNOLIN CHEMICAL COMPANY
 MULTIPLE PIPELINE CROSSING
 DRAWING NO.: SCR-502-6
 DRAWING DATE: DECEMBER 22, 1961

FIGURE 2



Sunoco Logistics



Sunoco Pipeline L.P.
Eastern Area Headquarters
525 Fritztown Road
Sinking Spring, PA 19608

May 23, 2011

Mr. Robert D. Henry
Gahagan & Bryant Associates
5803 Kennett Pike, Suite D
Centerville Square
Wilmington, DE 19807-1195

Subject: Delaware River Deepening Project – Reach B Station 90+00 to 176+00
Utility Crossing Investigation – Delaware River Federal Navigation Channel
6” MHRF-PH4T-6A/ID# 11006, R/W File No. SC-2
6” MHRF-PH4T-6B/ID# 11007, R/W File No. SC-2
4” MHRF-PH4T-4/ID# 11156, R/W File No. SC-2
6” MHEC-DPWR-6/ID# 11008, R/W File No. SC-2
4” MHEC-DPWR-4A/ID# 11157, R/W File No. SC-2
4” MHEC-DPWR-4B/ID# 11158, R/W File No. SC-2
SPLP File No. 2011-0216

Dear Mr. Henry:

Reference is made to your letter dated October 13, 2010, in reference to the identification of all submarine utility crossings within Reach B of the subject project being approximately between the Philadelphia International Airport and the Delaware Memorial Bridge (Channel Stations 96+000 to 176+000 and the submittal of Table 1 – Delaware River Utility Crossing – Permit Information and Figure 1 – Delaware River Deepening Estimated River Utility River Crossings and Figure 2 – Detail: As-built Top of Pipe Profile of the Sunolin Chemical Company utility bundle.

As you are aware, Sunoco Pipeline L.P. (“SPLP”) operates and maintains two 6-inch and one 4-inch pipeline within the SunOlin Chemical Company bundle. In addition, SPLP manages the assets for Sun Pipe Line Company (“SPL”), which own one 6-inch and two 4-inch pipelines within the former Sunolin Chemical Company bundle, all located within the proposed project area.

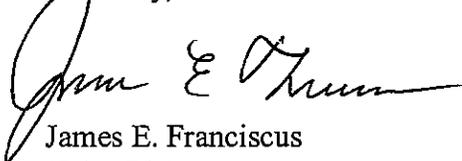
Sunoco Pipeline L.P. (“SPLP”) has reviewed your As-built Top of Pipe Profile drawing for the Sunolin Chemical Company bundle and have the following comments concerning potential impact to SPLP’s and SPL’s pipelines:

Mr. Robert D. Henry
Gahagan & Bryant Associates
May 23, 2011
Page 2

1. The location and profile information shown on your submitted drawing (Figure 2) of SPLP's and SPL's high pressure petroleum product pipelines across the Delaware River are consistent with SPLP's as-built information shown on drawing No. SCR-502-6 dated December 22, 1961 and last revised on February, 24 1986 which was submitted to the U.S. Army Corps of Engineers (USACE).
2. The top of pipe elevation of the highest pipe within the channel is approximately 58 feet. Your proposed dredging depth of the channel is 45 feet; however, SPLP would like to meet with USACE to discuss the details in reference to the planned equipment and means for removing the sediments from the channel before providing its approval.
3. In addition, SPLP requests that all information in relation to any planned dredging of the anchorage area be forwarded to SPLP for its review and approval.
4. No blasting should be conducted in or around our pipelines without the prior written approval of SPLP. A copy of SPLP's blasting restrictions is enclosed with this letter.
5. SPLP's emergency number 1-800-786-7440 and SPLP's local Fort Mifflin Office number (215) 365-6501 should also be incorporated onto any drawing or plans of the project for reference by any and all contractors that will be performing work on the project.
6. **No dredging activities should be permitted over or adjacent to our pipeline without the presence of a SPLP representative.**
7. Please be advised that SPLP does operate five (5) additional pipelines crossing the Delaware River in the area of the Philadelphia International Airport however, these pipelines seem to be north of Reach B as shown in USACE Figure 1 being station 96+000 to 138+000.

Should you have any questions, please do not hesitate to contact me at (610) 670-3309 or you can email me at je franciscus@sunocologistics.com.

Sincerely,



James E. Franciscus
Chief Right of Way Agent

cc: David Haygood, SPLP/Fort Mifflin
Steve Scotto, SPLP/Montello
Walt Skorupsky, SPLP/Montello
Kim Legge, SPLP/Fort Mifflin
Greg Mesthos, SPLP/Fort Mifflin

Mr. Robert D. Henry
Gahagan & Bryant Associates
May 23, 2011
Page 3

Denise Boyle, SPLP/Montello

Scott Evans
US Army Corps of Engineers
Wanamaker Building
100 Penn Square
Philadelphia, PA 19107

Richard Ricketts
Division Engineer
Williams Gas Pipeline Transco
99 Faber Road
Princeton, NJ 08540

C. Todd Quintard
Supply Area Manager
The Linde Group
P.O. Box 590
6000 Philadelphia Pike
Claymont Delaware 19703

**LINDE
(H)**

Gahagan & Bryant Associates, Inc.

5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218



October 11, 2010

Linde Corporation

Attention: Mr. Todd Quintard
Via E-Mail: todd.quintard@linde.com

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Quintard:

As you may be aware, the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. The next section of the channel to be dredged is a sub-section of an area known as Reach B, which is located approximately between the Philadelphia International Airport and the Delaware Memorial Bridge (Channel Stations 96+000 to 176+000). It is anticipated that dredging of a portion of this sub-section will begin in December 2010.

Gahagan & Bryant Associates, Inc. (GBA) has been contracted by the Philadelphia Regional Port Authority (PRPA), the non-Federal sponsor of the deepening project, to identify and verify all submarine utility crossings within Reach B prior to the commencement of dredging operations. To that end, GBA conducted a search of the Corps' permit files on utility crossings and that search revealed that a permit was granted by the Corps to SunOlin Chemical Company for a utility bundle crossing. Attached are copies of the proposed utility installation data from the Corps' permit files (Table 1). Figure 1 shows the approximate location of your submarine utility crossing and Figure 2 shows a profile of the crossing in the navigation channel. The profile of the utility crossing was constructed from the as-built survey data that was submitted to the Corps after the utility line was installed.

GBA is requesting that you examine the attached plan and profile for the above referenced utility crossing and either acknowledge their veracity or provide the necessary corrections. We would also like you to identify any additional crossings, active or inactive, your company may have within Reach B that are not shown on the attached drawings.

If you have any questions on the purpose of this investigation or the deepening project, please contact Mr. Scott Evans, Corps of Engineers Project Manager for the deepening project. He can be reached at 215-656-6680.

I would like to schedule a meeting with your staff to review the attached information. Please call me at (302) 652-4948 or contact me by e-mail at rdhenry@gba-inc.com to set up this meeting or to discuss any questions you may have on this matter.

We appreciate your assistance in this verification process.

Sincerely,

Robert D. Henry
Associate

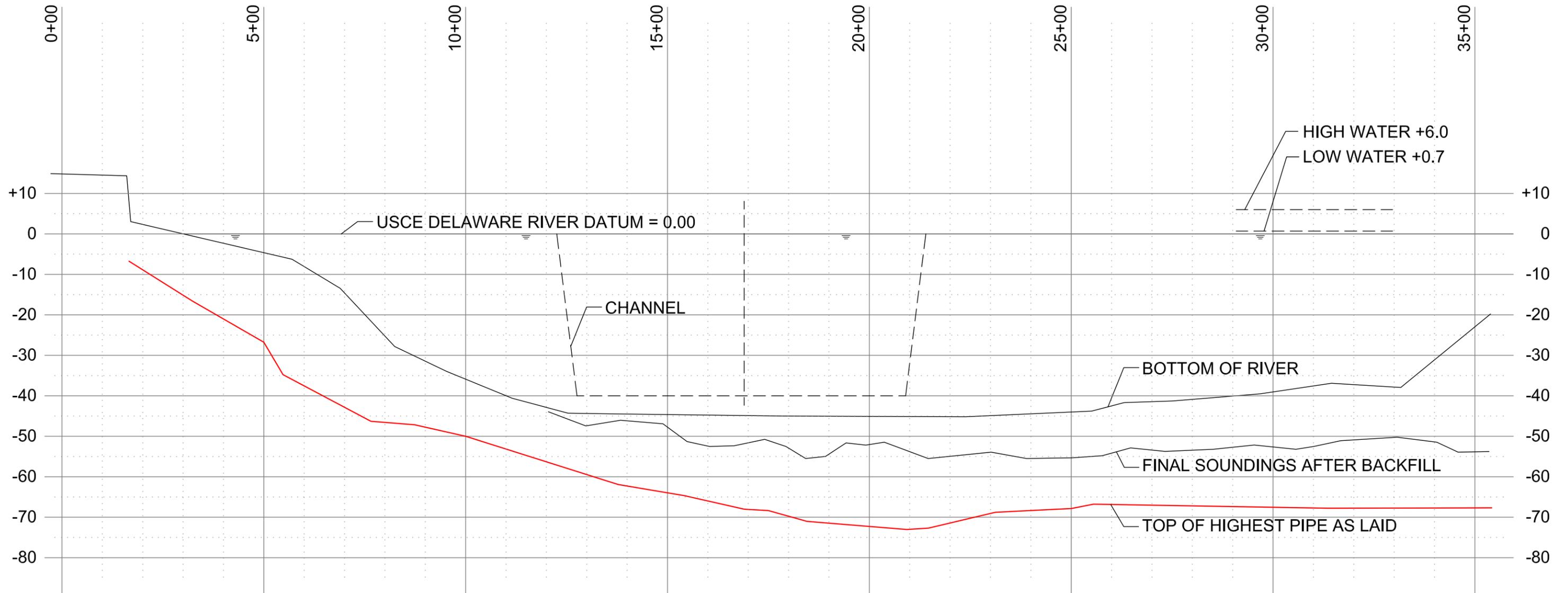
PHILADELPHIA, PA (215) 425-6283	BALTIMORE, MD (410) 682-5595	HOUSTON, TX (832) 518-2112	LOS ANGELES, CA (310) 521-8127	NOVATO, CA (415) 883-7683	TAMPA, FL (813) 831-4408	NORTH CAROLINA (910) 313-3338
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TABLE 1

Delaware River Utility Crossings - Permit Information

<i>Owner</i>	<i>Permit Information</i>	<i>Utility Description</i>	<i>Proposed Location</i>	<i>Proposed Depth</i>	<i>Notes/Comments</i>
Linde Corp.	Application: 11/04/60, rev. 07/20/61 Permit Issued: 05/22/61, rev. 08/02/61 Permit #: NAPOP-N	One 8-inch nitrogen submarine pipeline	Initial Channel C/L Sta.: 129+540 Final Channel C/L Sta.: 129+172.7	60 feet below MLW, 60 to 55 feet below MLW in western 150' of channel	Contained within Sunoco conduit bundle.

DETAIL: AS-BUILT TOP OF PIPE PROFILE



GAHAGAN & BRYANT ASSOCIATES, INC.
 5803 KENNETT PIKE, SUITE D
 CENTREVILLE SQUARE
 WILMINGTON, DELAWARE 19807-1195
 TEL. (302) 652-4948
 FAX (302) 655-9218
 GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: SUNOLIN CHEMICAL COMPANY
 MULTIPLE PIPELINE CROSSING
 DRAWING NO.: SCR-502-6
 DRAWING DATE: DECEMBER 22, 1961

FIGURE 2

November 22, 2010

Claymont Production & Distribution Facility
P.O. Box 590
6000 Philadelphia Pike
Claymont, Delaware 19703

Gahagan & Bryant Associates, Inc.
Attn: Robert Henry
5803 Kennett Pike, Suite D
Centerville Square
Wilmington, DE 19807-1195

Dear Mr. Henry,

In response to your inquiry regarding the submarine location of Linde owned and operated pipelines, we have developed the following responses and questions/concerns:

You indicate that the channel will be deepened to 45 feet below mean low-low water (MLLW). I am assuming that this is the same datum as the USCE Delaware River Datum reflected on your drawing. You do not indicate how much over dredge will be performed, or what the tolerances will be. As dredgers are often paid by the volume of material removed, they typically have an incentive to excavate additional material.

The information that you provided from the permit conditions appears to be consistent with the information from our as built drawings. To the best of our knowledge the accuracy of this information has not been verified since its original installation in 1961. It is currently unknown what methods were used to determine the as built locations and what accuracy those measurements have.

From your drawing, it appears that there will be 10 feet of material between where the as built drawings show our pipe and the proposed new bottom of the channel. This is typically adequate cover for our pipeline, however given the potential inaccuracies in the as built information, and the possible inaccuracies in the final dredge depth, we have concern that our pipeline could become damaged during the execution of this work.

In a situation like this on shore we would normally require that our pipe location be verified using soft dig or hand dig methods by the contractor performing the work. We therefore recommend that your firm properly and definitively locate our pipeline prior to performing the work. Naturally, Linde will be happy to provide whatever guidance or information we may have with respect to the pipeline and its location.

Please contact me with responses to these questions, and as well if I can provide further clarification/assistance during this process.

Sincerely,



C. Todd Quintard
Supply Area Manager
Claymont Production & Distribution Facility

cc: **Mike Brigante – Operations Support**
Pete Garra – Real Estate

**WILLIAMS GAS PIPELINE – TRANSCO
(I, J, J2, K)**

Gahagan & Bryant Associates, Inc.

5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218



October 6, 2010

Williams/Transco

Attention: Mr. Richard Ricketts
Via E-Mail: richard.r.ricketts@williams.com

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Ricketts:

As you may be aware, the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. The next section of the channel to be dredged is a sub-section of an area known as Reach B, which is located approximately between the Philadelphia International Airport and the Delaware Memorial Bridge (Channel Stations 96+000 to 176+000). It is anticipated that dredging of a portion of this sub-section will begin in December 2010.

Gahagan & Bryant Associates, Inc. (GBA) has been contracted by the Philadelphia Regional Port Authority (PRPA), the non-Federal sponsor of the deepening project, to identify and verify all submarine utility crossings within Reach B prior to the commencement of dredging operations. To that end, GBA conducted a search of the Corps' permit files on utility crossings and that search revealed that two (2) permits were granted by the Corps to Transcontinental Gas Pipe Line Corporation for utility crossings and one (1) permit to the SunOlin Chemical Company for a utility bundle crossing. Attached are copies of the proposed utility installation data from the Corps' permit files (Table 1). Figure 1 shows the approximate location of your submarine utility crossings and Figures 2, 3 and 4 show profiles of the crossings in the navigation channel. The profiles of the utility crossings were constructed from the as-built survey data that was submitted to the Corps after the utility lines were installed.

GBA is requesting that you examine the attached plan and profiles for the above referenced utility crossings and either acknowledge their veracity or provide the necessary corrections. We would also like you to identify any additional crossings, active or inactive, your company may have within Reach B that are not shown on the attached drawings.

If you have any questions on the purpose of this investigation or the deepening project, please contact Mr. Scott Evans, Corps of Engineers Project Manager for the deepening project. He can be reached at 215-656-6680.

I would like to schedule a meeting with you or your staff to review the attached information. Please call me at (302) 652-4948 or contact me by e-mail at rdhenry@gba-inc.com to set up this meeting or to discuss any questions you may have on this matter.

We appreciate your assistance in this verification process.

Sincerely,

Robert D. Henry
Associate

PHILADELPHIA, PA
(215) 425-6283

BALTIMORE, MD
(410) 662-5595

HOUSTON, TX
(832) 518-2112

LOS ANGELES, CA
(310) 521-8127

NOVATO, CA
(415) 883-7683

TAMPA, FL
(813) 831-4408

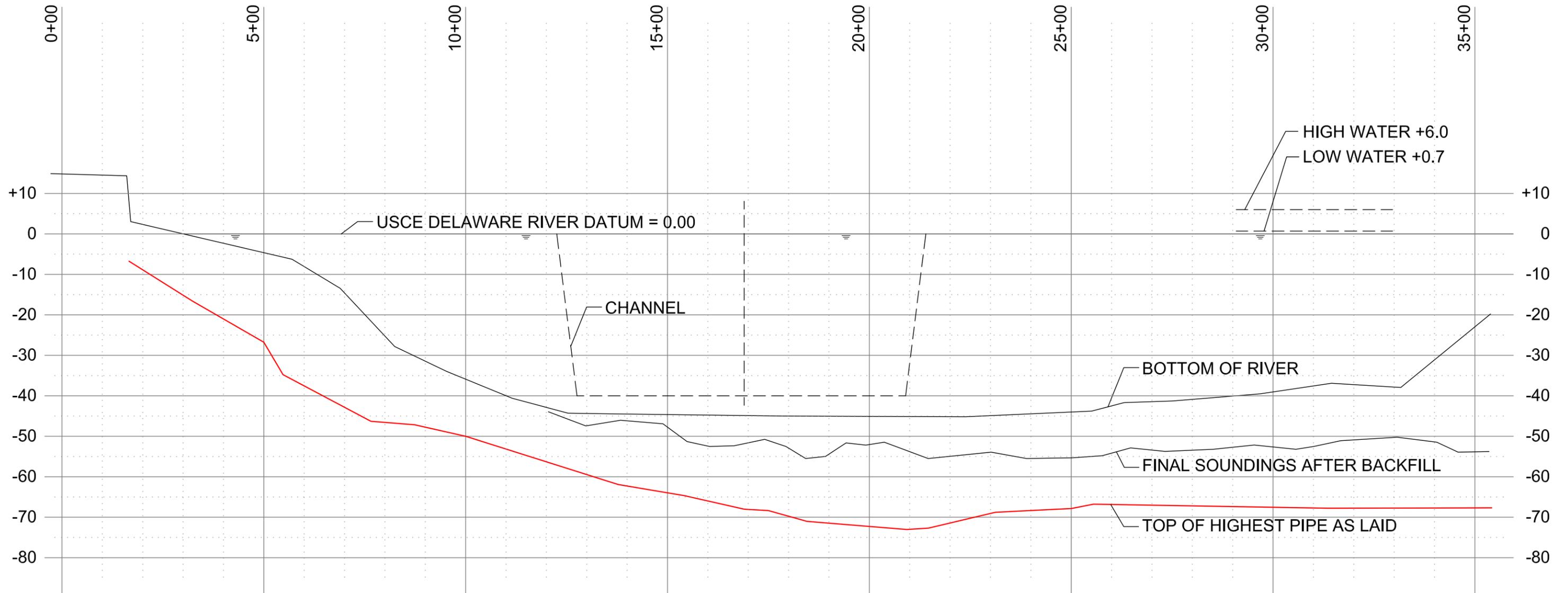
NORTH CAROLINA
(910) 313-3338

TABLE 1

Delaware River Utility Crossings - Permit Information

<i>Owner</i>	<i>Permit Information</i>	<i>Utility Description</i>	<i>Proposed Location</i>	<i>Proposed Depth</i>	<i>Notes/Comments</i>
TRANSCO Gas Pipeline Corp.	Application: 11/04/60, rev. 07/20/61 Permit Issued: 05/22/61, rev. 08/02/61 Permit #: NAPOP-N	One 16-inch gas pipeline	Initial Channel C/L Sta.: 129+540 Final Channel C/L Sta.: 129+172.7	60 feet below MLW, 60 to 55 feet below MLW in western 150' of channel	Contained within Sunoco conduit bundle.
TRANSCO Gas Pipeline Corp.	Application: 12/01/49, rev. 06/05/50 & 10/03/50 Permit Issued: 08/04/50, rev. 10/09/50 Permit #: NAPKP	One 12-inch natural gas pipeline	Station number not identified	56 feet below MLW	No as-built found. Status unknown.
TRANSCO Gas Pipeline Corp.	Application: 04/25/51, rev. 06/22/51 Permit Issued: 06/28/51 Permit #: NAPKP	2nd 12-inch natural gas pipeline	<200' downstream from existing natural gas pipeline (above)	65 feet below MLW	
TRANSCO Gas Pipeline Corp.	No permit information found.	Two 20" and one 6" gas pipelines	No permit information found.	No permit information found.	

DETAIL: AS-BUILT TOP OF PIPE PROFILE

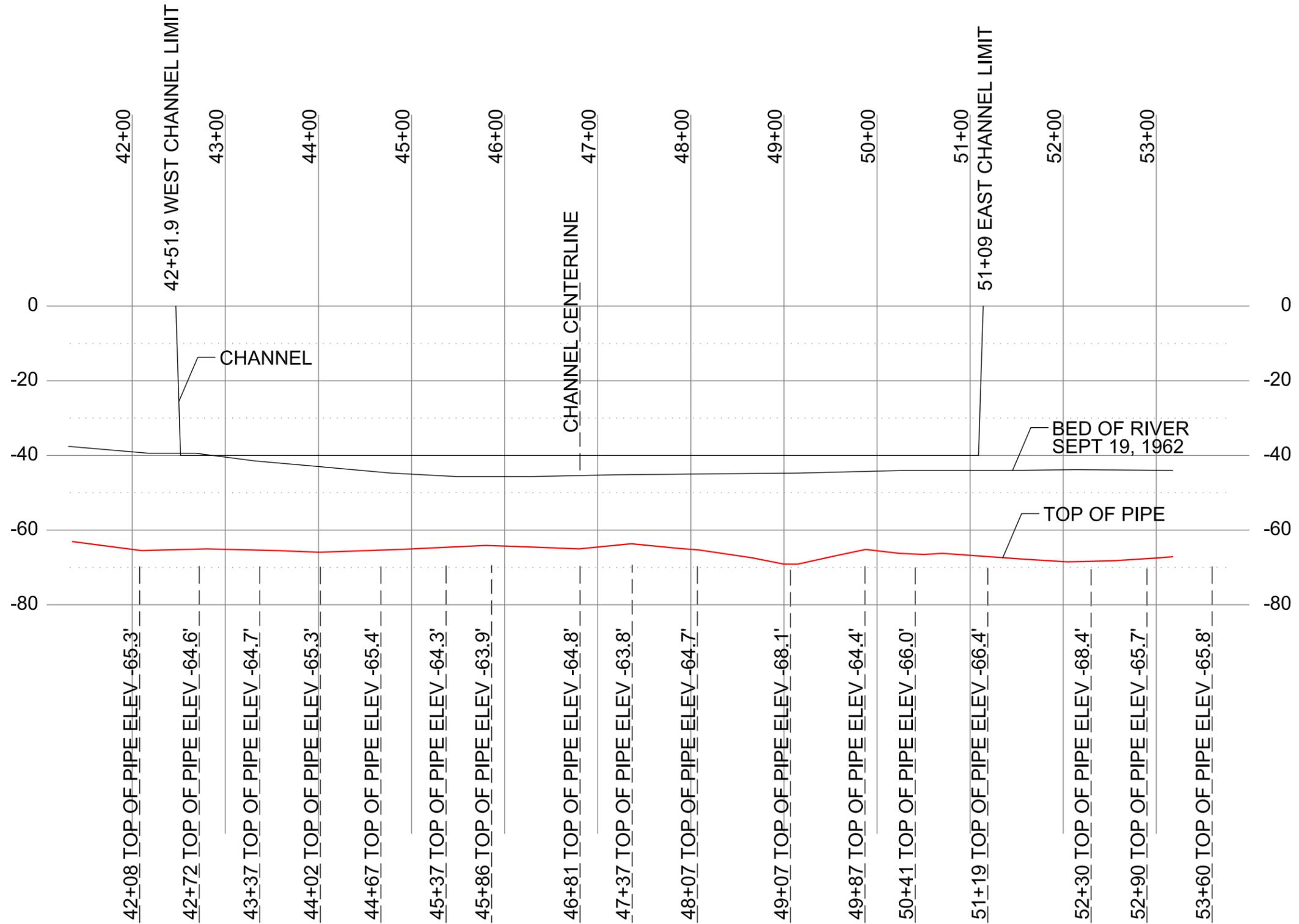


GAHAGAN & BRYANT ASSOCIATES, INC.
 5803 KENNETT PIKE, SUITE D
 CENTREVILLE SQUARE
 WILMINGTON, DELAWARE 19807-1195
 TEL. (302) 652-4948
 FAX (302) 655-9218
 GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: SUNOLIN CHEMICAL COMPANY
 MULTIPLE PIPELINE CROSSING
 DRAWING NO.: SCR-502-6
 DRAWING DATE: DECEMBER 22, 1961

FIGURE 2

DETAIL: AS-BUILT TOP OF PIPE PROFILE

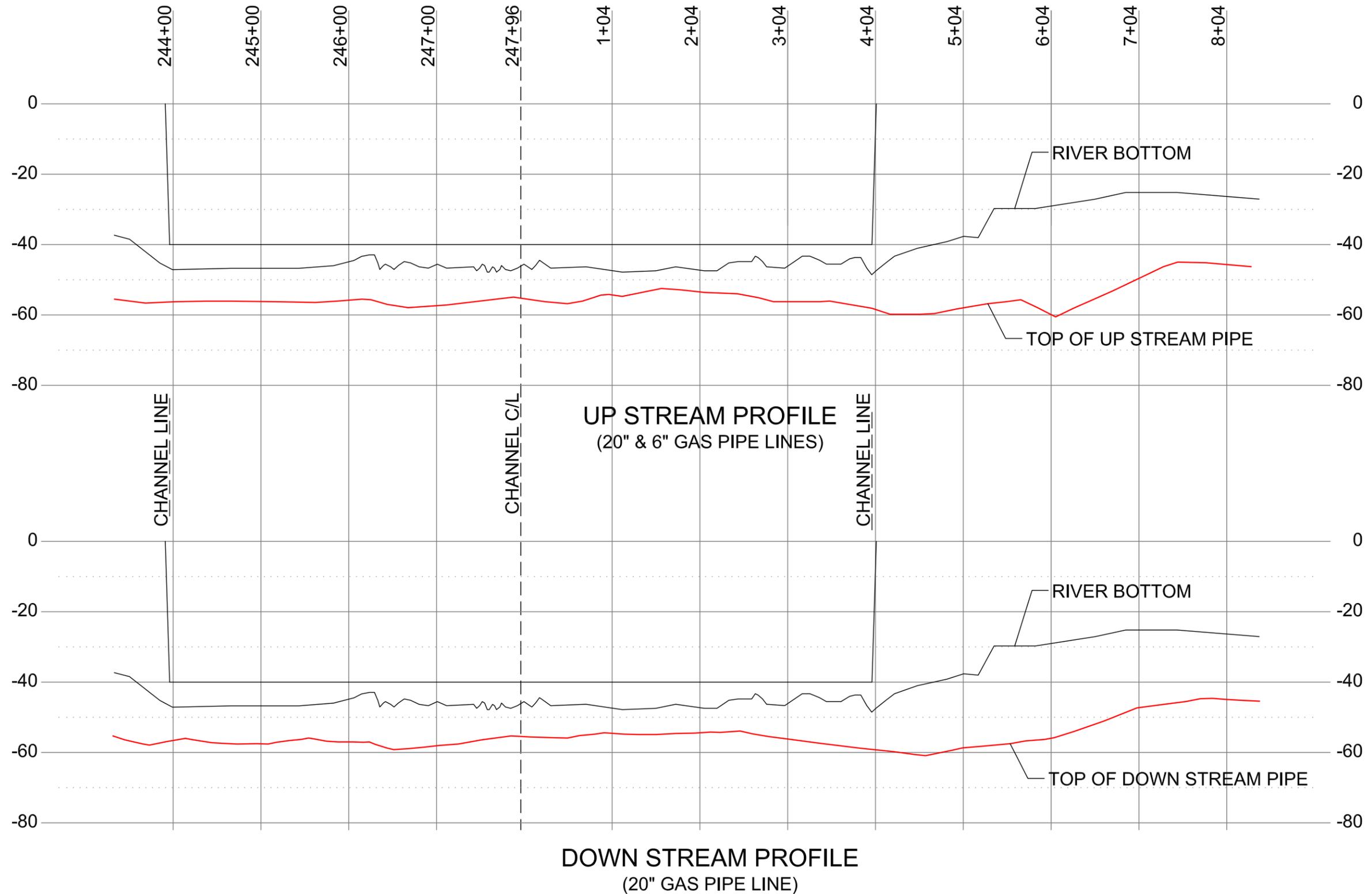


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 CENTREVILLE SQUARE
 WILMINGTON, DELAWARE 19807-1195
 TEL. (302) 652-4948
 FAX (302) 655-9218
 GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: TRANSCONTINENTAL GAS PIPE LINE CORP.
 12" PIPELINE
 DRAWING NO.: G-2223
 DRAWING DATE: SEPTEMBER 4, 1964

FIGURE 3

DETAIL: AS-BUILT TOP OF PIPE PROFILE



GAHAGAN & BRYANT ASSOCIATES, INC.
 5803 KENNETT PIKE, SUITE D
 CENTREVILLE SQUARE
 WILMINGTON, DELAWARE 19807-1195
 TEL. (302) 652-4948
 FAX (302) 655-9218
 GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: TRANSCONTINENTAL GAS PIPE LINE CORP.
 ONE 6" & TWO 20" PIPELINES
 DRAWING NO.: G-2128
 DRAWING DATE: SEPTEMBER 23, 1964

FIGURE 4



GAS PIPELINE TRANSCO

99 Farber Road
Princeton, NJ 08540
(609) 936-2400
Fax: (609) 936-2430

February 10, 2011

Attn: Robert D. Henry
Gahagan & Bryant Associates
5803 Kennett Pike
Wilmington, DE 19807-1195

**RE: Delaware River Deepening Project
Delaware River Submarine Utility Crossings
24-1902, NJ-3-2, LL #7, 16" Sunolin Lateral
24-1900, P-4-1, LL #WL1-1, 12" Woodbury Lateral
24-1899, P-4-5, LL #74, 2-20" MHWD Lateral**

Dear Mr. Henry,

We are in receipt of and have reviewed your boring location plan and channel profile drawing dated 8/09/10 and 1/12/11 respectively.

The crossing locations of Williams Gas Pipeline – Transco's high-pressure natural gas pipelines across the Delaware River as shown on the Boring Location Plan are consistent with that of WGP – Transco's as-built drawings. Per WGP – Transco's as-built drawings, the top of pipe elevations for the 12" and 16" are approximately -64' and -60' respectively, across the channel. Since the proposed dredging depth for the channel is -45', no conflict is anticipated at these crossings.

The top of pipe elevations for the 2-20" and 1-6" pipelines are approximately -52.6' across the channel. The current channel profile drawing (dated 1/12/11) shows the bottom of the channel at or below the proposed dredging depth of -45'. In an effort to avoid any potential conflicts, WGP – Transco is requesting that a no-dredging zone of 75feet from the outer pipelines be established for this crossing location.

Once the dredging equipment and means for removing sediments (if required) from within the vicinity of WGP – Transco's crossing locations becomes known, please forward information for our review.

As for the existence of the second permitted 12" pipeline, WGP – Transco operates and maintains 1-12" pipeline across the Delaware River. An excerpt from a Transcontinental Gas Pipe Line Corporation letter dated February 12, 1952 states that "... it has been decided to defer the installation of the second crossing."

Your assistance in designing the proposed Delaware River Deeping Project to meet both our requirements is greatly appreciated. Should you have any questions or need any additional information, please feel free to contact me at (609) 936-2413.

Sincerely,

Mario DiCocco
Director Princeton Division

By: 
Richard Ricketts
Division Engineer

Cc:

Brian Rich

Michael Hart
US Army Corps Of Engineer
Wanamaker Building
100 Penn Square
East Philadelphia, PA 19107-3390

Charles F. Sutphen, P.G.
US Army Corps Of Engineer
Wanamaker Building
100 Penn Square
East Philadelphia, PA 19107-3390

**COMCAST CABLE
(N)**

Gahagan & Bryant Associates, Inc.

5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218



October 6, 2010

Comcast Cable Company,

Attention: Mr. Richard Kain
Via E-Mail: richard_kain@cable.comcast.com

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Kain:

As you may be aware, the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. The next section of the channel to be dredged is a sub-section of an area known as Reach B, which is located approximately between the Philadelphia International Airport and the Delaware Memorial Bridge (Channel Stations 96+000 to 176+000). It is anticipated that dredging of a portion of this sub-section will begin in December 2010.

Gahagan & Bryant Associates, Inc. (GBA) has been contracted by the Philadelphia Regional Port Authority (PRPA), the non-Federal sponsor of the deepening project, to identify and verify all submarine utility crossings within Reach B prior to the commencement of dredging operations. To that end, GBA conducted a search of the Corps' permit files on utility crossings and that search revealed that a permit was granted by the Corps to Suburban Cable for a utility crossing. Attached are copies of the proposed utility installation data from the Corps' permit files (Table 1). Figure 1 shows the approximate location of your submarine utility crossing and Figure 2 shows a profile of the crossing in the navigation channel. The profile of the utility crossing was constructed from the as-built survey data that was submitted to the Corps after the utility line was installed.

GBA is requesting that you examine the attached plan and profile for the above referenced utility crossing and either acknowledge their veracity or provide the necessary corrections. We would also like you to identify any additional crossings, active or inactive, your company may have within Reach B that are not shown on the attached drawings.

If you have any questions on the purpose of this investigation or the deepening project, please contact Mr. Scott Evans, Corps of Engineers Project Manager for the deepening project. He can be reached at 215-656-6680.

I would like to schedule a meeting with you or your staff to review the attached information. Please call me at (302) 652-4948 or contact me by e-mail at rdhenry@gba-inc.com to set up this meeting or to discuss any questions you may have on this matter.

We appreciate your assistance in this verification process.

Sincerely,

Robert D. Henry
Associate

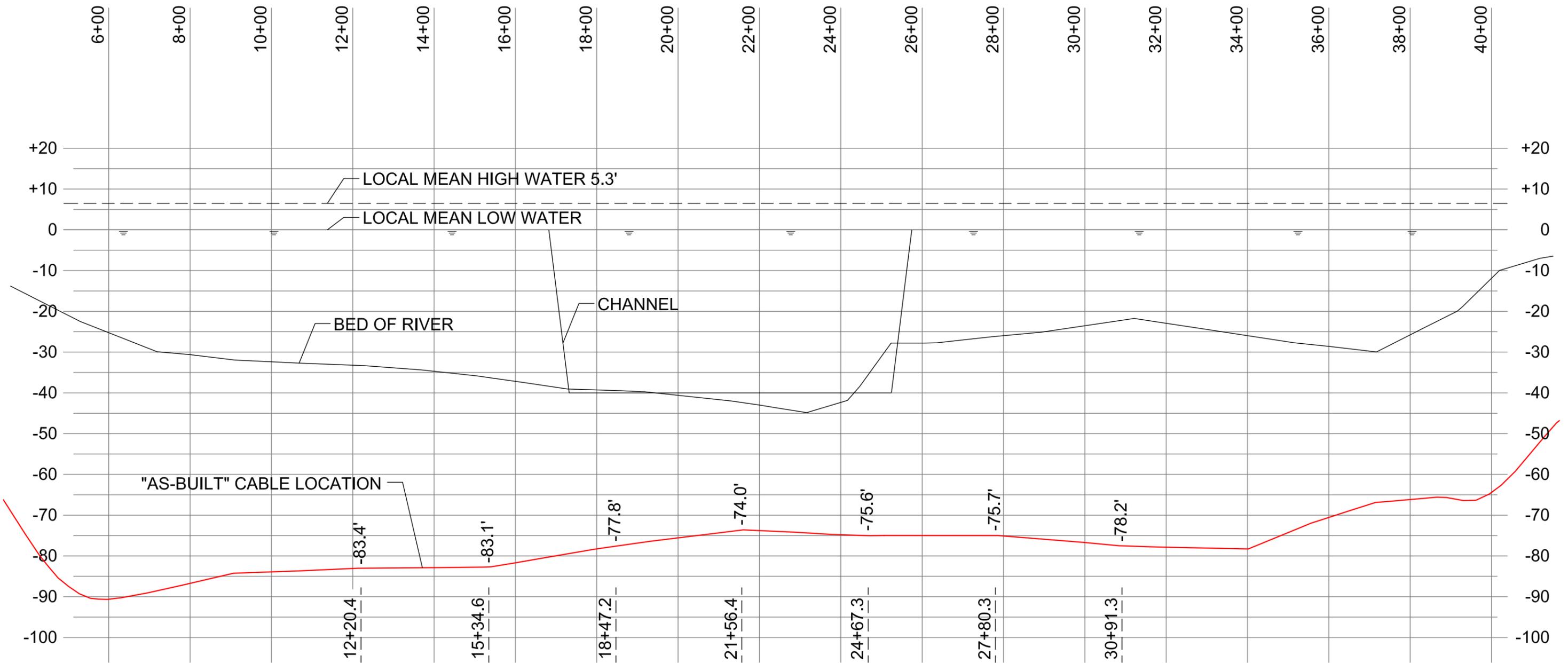
PHILADELPHIA, PA (215) 425-6283	BALTIMORE, MD (410) 682-5595	HOUSTON, TX (832) 518-2112	LOS ANGELES, CA (310) 521-6127	NOVATO, CA (415) 883-7683	TAMPA, FL (813) 831-4408	NORTH CAROLINA (910) 313-3338
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TABLE 1

Delaware River Utility Crossings - Permit Information

<i>Owner</i>	<i>Permit Information</i>	<i>Utility Description</i>	<i>Proposed Location</i>	<i>Proposed Depth</i>	<i>Notes/Comments</i>
Comcast Cable Co.	Application: 09/10/97 Permit Issued: 10/31/97 Permit #: CENAP-OP-R-199701939-15	Submerged fiber optics cable	Station number not identified	65 feet below MLW	

DETAIL: AS-BUILT TOP OF PIPE PROFILE



GAHAGAN & BRYANT ASSOCIATES, INC.
 5803 KENNETT PIKE, SUITE D
 CENTREVILLE SQUARE
 WILMINGTON, DELAWARE 19807-1195
 TEL. (302) 652-4948
 FAX (302) 655-9218
 GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: GEORGE W. HENN, INC. (FOR SUBURBAN CABLE)
 "AS-BUILT" CABLE LOCATION
 FILE NO.: 97-156.3
 DRAWING DATE: MARCH 9, 1999

FIGURE 2



Comcast Cable
110 Springbrooke Blvd.
Aston, PA 19014

November 3, 2010

Robert D. Henry
Gahagan & Bryant Associates
5803 Kennett Pike
Centreville Square
Wilmington, DE 19807-1195

Dear Mr. Henry:

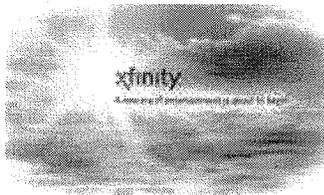
Per our Construction Coordinator Rich Kain and our Construction Manager Paul DaBaldo, the proposed utility crossing and its coordinates in comparison to our river crossing location look good and we would like to confirm the plan as is.

If you have any questions or need any additional information, please contact Rich Kain at 610-633-1268 or Paul DaBaldo at 302-420-0494.

Thank you!

Lisa Jeffries

Construction Coordinator



110 Springbrooke Blvd.
Aston, PA 19014
610-499-2273 Desk

610-633-0613 Cell
610-497-7726 Fax

APPENDIX D
LANDSIDE SURVEY REPORT

APPENDIX D

INTRODUCTION

On December 14, 2010 and December 17, 2010, Gahagan & Bryant Associates, Inc. (GBA) performed a field survey location of the east and west end of several utility crossings located from Station 96+000 to 176+000 in the Reach B portion of the Delaware River Deepening Project. The east ends of crossing are located in the State of New Jersey. The west end locations are situated in either the State of Delaware or Commonwealth of Pennsylvania.

FIELD SURVEY

Horizontal location was performed utilizing a Trimble Geo XH GIS grade GPS system, with an application of a Zephyr Antenna and a 2 meter pole. Field positions were observed for approximately a minute and the data accumulated was post-processed utilizing data from a Continuously Operating Reference Station (CORS) situated in West Chester, Pennsylvania. The post-processed data noted herein is referenced to the North American Datum of 1983 (NAD 83) and listed in latitudes and longitudes, as well as the state plane coordinates of New Jersey.

Horizontal position accuracy ranges are as follows:

Observations (%)	Accuracy (Inches)
75	1 to 6
6	6 to 12
14	12 to 20
4	20 to 40
0.3	40 to 80

The above table illustrates that the horizontal positioning of the field locations taken had an accuracy of 1 to 6 inches 75 per cent of the time. Those observations ranging higher than 12 inches in positional accuracy are explained by environmental conditions, such as tree cover and satellite signal obstruction from nearby billboards (see photographs attached to each utility landing).

The positional data noted herein was post-processed by personnel at Keystone Precision Instrument, Inc., a local vendor for Trimble Survey Equipment and software.

The owners of utilities and utilities located are listed in table below.

Company	Contact Person	Description
Columbia Gas	Steve Gray	1-20 inch gas pipeline
Colonial Gas	NA	2-30 inch gas pipelines
Sunoco Logistics	Gregory Methos	8-Bundle 1-16 inch, 1-8 inch, 3-6 inch, 3-4 inch
Linde	N/A	8-inch nitrogen (within Sunoco bundle)
Williams (Transco)	Mike Aversa Rick Horner	16-inch gas (within Sunoco bundle)
Williams (Transco)	Mike Aversa Rick Horner	12-inch gas
Williams (Transco)	Mike Aversa Rick Horner	2-20 inch gas (with 6-inch attached to one)
Comcast	Richard Kain (PA side)	Fiber optics cable

The Columbia Gas pipeline was located at a standpipe on the State of Delaware side, but the New Jersey side was only pointed out by their company representative.

The Colonial Gas pipeline was marked by standpipes on the State of New Jersey side and two signs attached on a chain link fence on the State of Delaware side. The physical location of the pipes could not be confirmed but appear to exist between the two signs on the State of Delaware side.

The Sunoco pipelines were located at control monuments set by others on both sides of the river, and they were pointed out by a Sunoco logistics representative as the controlling positions for their bundle.

The Linde pipeline is between the six Sunoco pipelines and the 16-inch Williams (Transco) pipe. Pipes were visually noted on the Delaware side and a marker was located on the New Jersey side. The Linde pipe, like the Colonial pipeline, could not be confirmed in the field by a company representative.

The Williams (Transco) 16-inch gas pipeline is located adjacent to the Linde pipeline. The Delaware side was pointed out by their representative as located utilizing a subsurface utility detector. The State of New Jersey side is marked by a survey disk stamped "80 04 02".

The Williams (Transco) 12-inch gas pipeline was located at the standpipes. A second 12 inch pipeline **was not confirmed by their company representative**. This line appears to have an angle break near the State of New Jersey side, and its location was not confirmed by this survey.

The Williams (Transco) 20-inch gas pipelines were located at the valve heads. A 6-inch pipe is attached to the northernmost line, as confirmed by their company representative.

The Comcast fiber optics cable was pointed out by company representatives on the Pennsylvania side. No representative could mark the location on the New Jersey side.

"E" - COLUMBIA GAS PIPELINE (1-20-INCH GAS PIPELINE*)

West Location

N 353457.59 Latitude N 39°49'33.50"
E 227899.02 Longitude W 075°23'10.18"

Standpipe located on the property of Evraz Claymont Steel Corporation.



Columbia Gas-West location (looking west)

Columbia Gas-West location (looking east)

East Location

N 349525.76 Latitude N 39°48'00.03"
E 233746.49 Longitude W 075°26'25.67"

Point located on ground as pointed out by Columbia Gas representative (Steve Gray).



Columbia Gas-East Location (looking east)

*** Pipe size not confirmed**

"F & F2" - COLONIAL PIPELINE CO. (2-30 INCH GAS PIPELINES*)

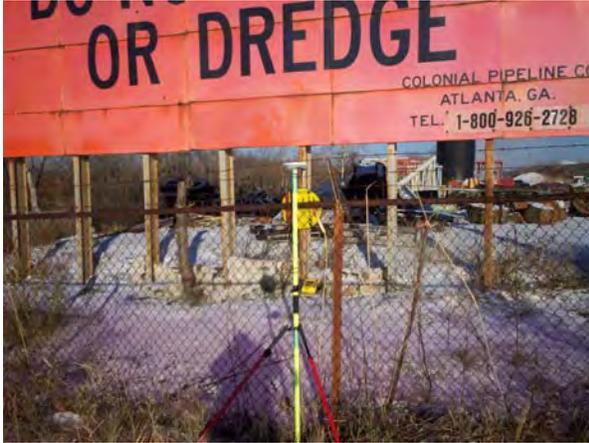
"F" - West Location (north)

N 354800.21 Latitude N 39°48'13.42"
E 229074.58 Longitude W 075°26'10.79"

"F2" - West Location (south)

N 354794.24 Latitude N 39°48'13.36"
E 229057.95 Longitude W 075°26'11.00"

Fence and signs marking area of pipelines.



Colonial Gas marker–west side (north)



Colonial Gas marker–west side (south)

"F & F2" - East Location

N 349610.41 Latitude N 39°47'22.62"
E 233815.59 Longitude W 075°25'09.36"

Standpipe Marker #392



Colonial Gas standpipe (looking southeast)



Colonial Gas standpipe (looking west)

*** Pipe sizes and actual location not confirmed**

**"H" - SUNOCO LOGISTICS (BUNDLE)
(3-6 INCH GAS PIPELINES & 3-4 INCH GAS PIPELINES)**

West Location

N 355570.92 Latitude N 39°48'21.36"
E 232265.23 Longitude W 075°25'30.01"

Nail in concrete marker (as pointed out by Sunoco representative)



Sunoco Gas (nail in concrete marker)



Sunoco Gas marker (looking west)

East Location

N 349989.44 Latitude N 39°47'26.44"
E 234573.08 Longitude W 075°24'59.71"

Nail in concrete marker (as pointed out by Sunoco representative)



Sunoco Gas (nail in marker)



Sunoco Gas marker (looking east)

**"G" - LINDE CO.
(1-8 INCH NITROGEN PIPELINE*)**

West Location

N 355662.82 Latitude N 39°48'22.27"
E 232205.39 Longitude W 075°25'30.79"

8-inch pipe entering ground (no markings)



East Location

N 349976.06 Latitude N 39°47'26.31"
E 234576.50 Longitude W 075°24'59.66"

Nitrogen pipeline marker (looking east)



***Pipe sizes and locations were not confirmed by company representative**

**"I" - TRANSCO GAS PIPELINE (WILLIAMS)
(1-16 INCH GAS PIPELINE)**

West Location

N 355578.90 Latitude N 39°48'21.44"
E 232281.09 Longitude W 075°25'29.81"

Spot as pointed out by Williams' representative



Transco Gas (Williams)-spot on top of berm



Transco Gas (Williams) spot-looking west

East Location

N 349990.31 Latitude N 39°47'26.45"
E 234577.88 Longitude W 075°24'59.65"



Transco Survey Disk # 80 04 02 (near Sunoco and Linde bundles)

**"J" - TRANSCO GAS PIPELINE (WILLIAMS)
(1-12 INCH GAS PIPELINE)**

West Location (top of hill)

N 355899.48 Latitude N 39°48'24.66"
E 232742.32 Longitude W 075°25'23.94"

West Location (near river)

N 355862.22 Latitude N 39°48'24.30"
E 232785.82 Longitude W 075°25'23.38"

Transco Gas Pipeline West Side



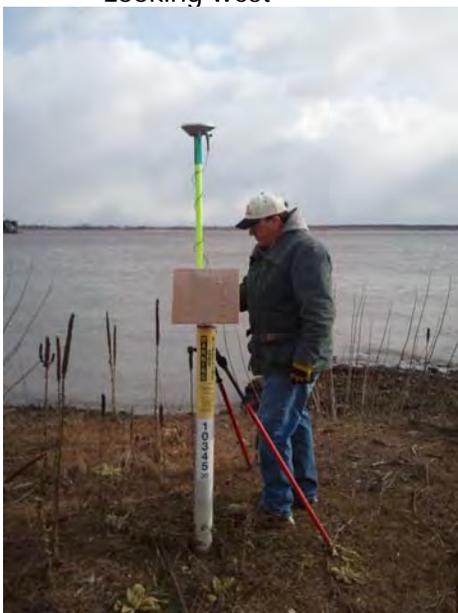
Standpipe on top of hill (west side)

Standpipe near river (west side)

East Location

N 352225.55 Latitude N 39°47'48.92"
E 238339.12 Longitude W 075°24'11.75"

Transco Gas Pipeline (standpipe)
Looking west



Transco Gas (standpipe)
Looking east



**"K" - TRANSCO GAS PIPELINE (WILLIAMS)
(2-20 INCH and 1-6 INCH GAS PIPELINES)**

West Location (north)

N 362758.95 Latitude N 39°49'33.50"
E 243249.79 Longitude W 075°23'10.18"

West Location (south)

N 362753.67 Latitude N 39°49'33.44"
E 243241.23 Longitude W 075°23'10.28"

Transco Gas Pipeline West Side



Transco 20-inch with 6-inch attached (valve-north)

Transco 20-inch (valve-south)

East Location (north)

N 359051.53 Latitude N 39°48'57.10"
E 245711.91 Longitude W 075°22'38.15"

East Location (south)

N 359042.37 Latitude N 39°48'57.01"
E 245707.09 Longitude W 075°22'38.21"

Transco Gas Pipeline East Side



Transco 20-inch Pipeline with 6-inch attached (valve-north)

Transco 20-inch (valve-south)

**"N" - COMCAST COMPANY
(1 FIBER OPTIC CABLE)**

West Location (manhole)

N 363017.59 Latitude N 39°49'36.07"
E 243440.04 Longitude W 075°23'07.77"

West Location (paint mark)

N 362957.40 Latitude N 39°49'35.48"
E 243461.14 Longitude W 075°23'07.49"

Comcast west side location as pointed out by Comcast representatives



Comcast west side (manhole)



Comcast paint mark (at bend point in line)

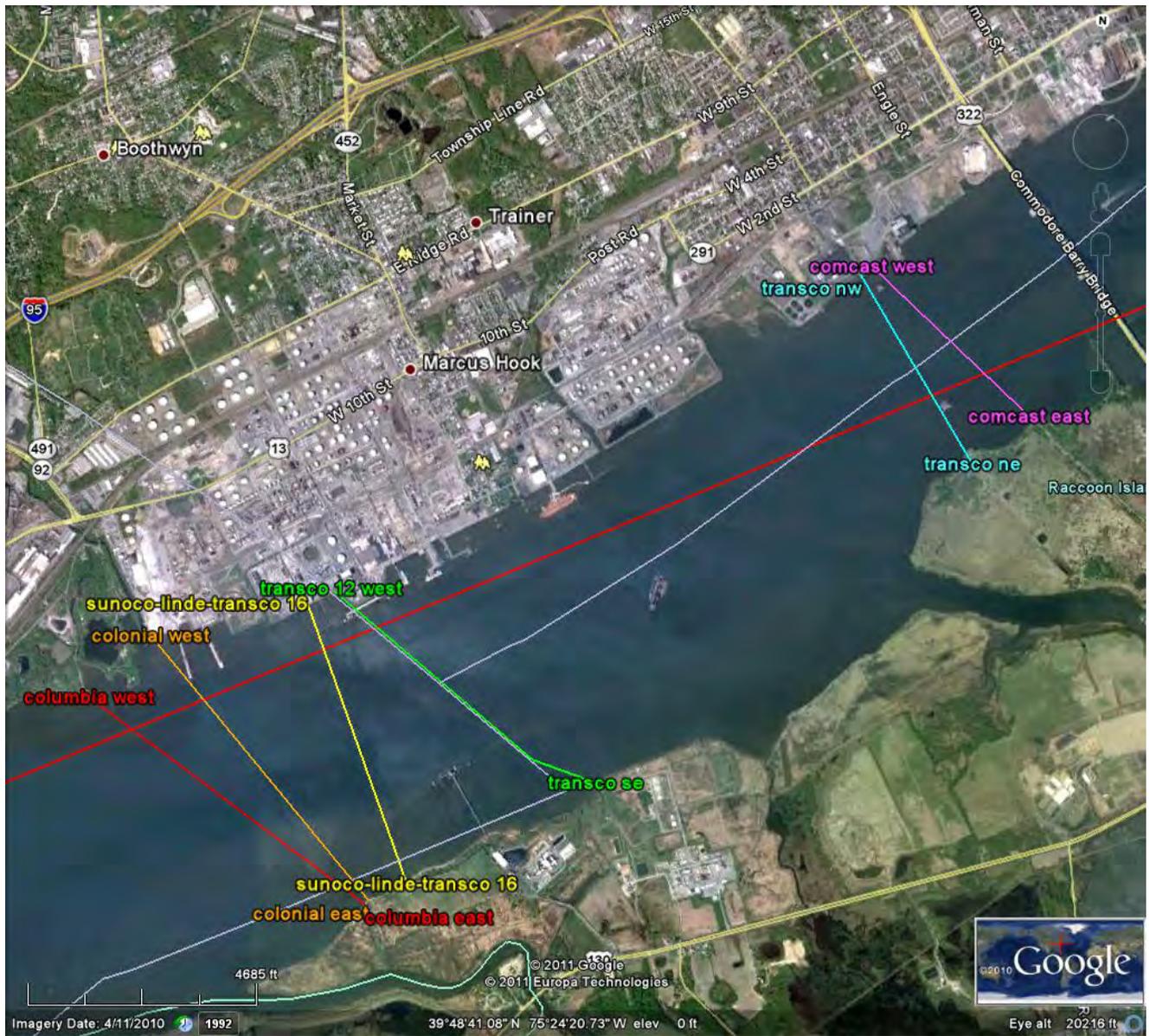
East Location (possible)

N 360121.48 Latitude N 39°49'07.79"
E 246910.03 Longitude W 075°22'22.93"

Comcast east side location is at old Ferry Landing, but was not identified by a Comcast representatives



Comcast said a vault is situated on the east side of the river. This location has a hole in the ground (similar to a cave-in at an underground vault) nearby. No other evidence was found.





OFFICE LOCATIONS

GBA Houston

9330 Kirby Drive
Suite 100
Houston, TX 77054-2515
(832) 377-4800 Fax (832) 377-4802

GBA Tampa

3802 West Bay to Bay Boulevard
Suite B-22
Tampa, FL 33629-6826
(813) 831-4408 Fax (813) 831-4216

GBA Wilmington

5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 Fax (302) 655-9218

GBA Baltimore

9008-O Yellow Brick Road
Baltimore, MD 21237-5608
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GBA Los Angeles

263 Wharf Street
Terminal Island
San Pedro, CA 90731
(310) 521-8127 Fax (310) 521-8235

GBA San Francisco

600 Martin Avenue
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Rohnert Park, CA 94928
(707) 595-3492 Fax (707) 595-3520

GBA Philadelphia

3460 North Delaware Ave
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GBA North Carolina

295-A North Green Meadows Drive
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Wilmington, NC 28405
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