Cultural Resources Investigations for the Oncor Electric Delivery Company Proposed West Levee to Norwood Transmission Line Dallas County, Texas

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CULTURAL RESOURCES INVESTIGATIONS FOR THE ONCOR ELECTRIC DELIVERY COMPANY PROPOSED WEST LEVEE TO NORWOOD TRANSMISSION LINE DALLAS COUNTY, TEXAS

TEXAS ANTIQUITIES PERMIT NO. 5208

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Management Summary

Atkins North America, Inc. (Atkins),formerly PBS&J, provided cultural resources services at the request of Oncor Electric Delivery Company for the proposed construction of a new 345 kilovolt (kV) double-circuit 11.7-kilometer (7.3-mile) transmission line connecting the existing West Levee Switching Station located on Beckley Avenue/Canada Drive just south of Continental Street, to the existing Norwood Switching Station located east of Loop 12 and north of the Trinity Railway Express commuter railroad line in the City of Dallas, Dallas County, Texas. As a result of the original Alternative Route Analysis and a review of the final route, it was concluded that (1) the likelihood of adverse impacts to historic archeological resources was low due to urban development and landform modification; (2) the likelihood of any impacts to prehistoric archeological resources was nonexistent for all of the portions of the final route outside of the levee system along the Trinity River and the Elm Fork for the same reasons; and (3) there was good potential for buried prehistoric remains within the floodplains of the Trinity River and the Elm Fork, inside of the Trinity River levees.

Following consultation with the Texas Historical Commission, it was recommended that a qualified archeologist conduct monitoring of the foundation augering for the transmission structures to be erected within the floodplains of the Trinity River and the Elm Fork, inside the Dallas Floodway, an area owned by the City of Dallas. Dr. Maynard Cliff served as Principal Investigator for the project and conducted the monitoring. The investigations were conducted under Texas Antiquities Permit No. 5208.

Monitoring of foundation augering for five structures within the floodplain of the Trinity River and of two structures within the floodplain of the Elm Fork was conducted between October 1, 2009, and May 11, 2010. The five foundation holes for the structures within the Trinity River floodplain measured between 1.5 and 2.6 meters (60 and 102 inches) in diameter and were between 7.6 and 9.1 meters (25 and 30 feet) deep, while the two foundation holes for the structures within the Elm Fork floodplain measured 1.5 and 3.4 meters (60 and 132 inches) in diameter and were 9.1 and 18 meters (30 and 59 feet) deep, respectively. No significant cultural remains were identified in any of the monitored foundation holes.

No artifacts were recovered during fieldwork. Final project records and photographs will be curated at the Texas Archeological Research Laboratory of The University of Texas at Austin.

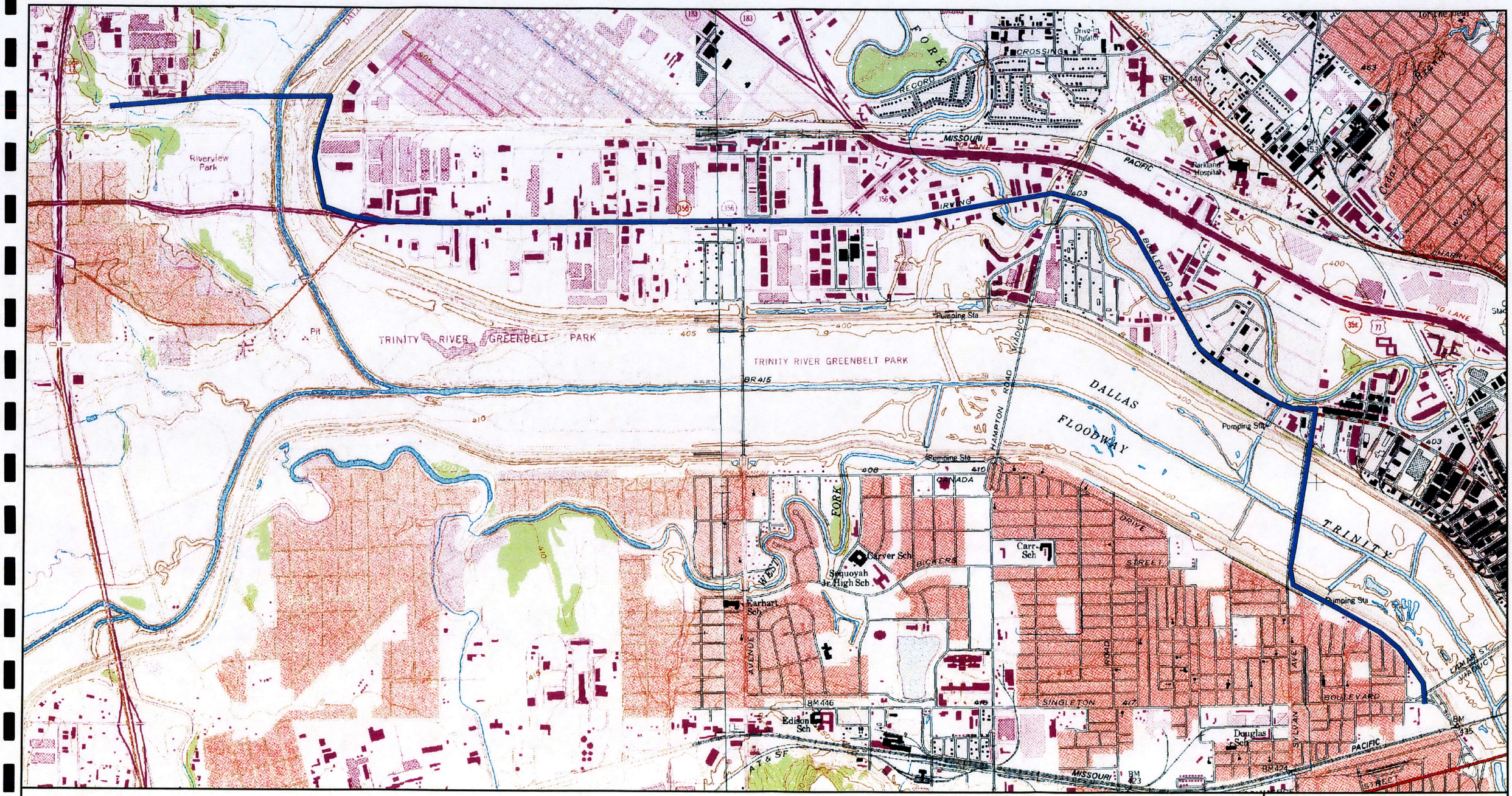
I. INTRODUCTION

Atkins North America, Inc. (Atkins), formerly PBS&J, was contracted by Oncor Electric Delivery Company (Oncor) to provide cultural resources services for the proposed construction of a new 345-kilovolt (kV) double-circuit 11.7-kilometer (7.3-mile) transmission line connecting the existing West Levee Switching Station located on Beckley Avenue/Canada Drive just south of Continental Street, to the existing Norwood Switching Station located east of Loop 12 and north of the Trinity Railway Express commuter railroad line in the City of Dallas, Dallas County, Texas (Figure 1). The final route was chosen by the Public Utility Commission based on an Alternative Route Analysis completed by PBS&J in 2005 (PBS&J 2005). The proposed transmission line was to cross the Trinity River along Sylvan Avenue (Figure 2) and the Elm Fork just north of the Trinity Railway Express commuter railroad line (Figure 3). Both of these areas are within the Dallas Floodway, owned by the City of Dallas, and come under the jurisdiction of the Antiquities Code of Texas. The Texas Historical Commission (THC) was notified of Oncor's Intent to Proceed with this project in a letter dated February 19, 2009.

For the West Levee–Norwood 345-kV Transmission Line Project, Oncor used a self-supporting, double-circuit single-steel-pole design with davit arms. The right of way (ROW) for this project was approximately 30.5 meters (m) (100 feet [ft]) wide. Prior to the assembly and erection of the structures, a hole was augered in the ground for each structure foundation. Once the hole was augered, a steel-reinforced concrete foundation was prepared to support each structure. The structure foundations generally impacted depths of 3 to 7.5 m (10 to 25 ft) within a 0.5- to 1.5-m (2- to 5-ft)-diameter area for the single-pole structures.

As a result of the Alternative Route Analysis (PBS&J 2005), it was determined that the likelihood of adverse impacts to significant archeological resources was relatively low for all alternative routes examined by the study because urban development and landform modification had extensively altered the locations where such resources normally occur. As a result of a more recent review of the final route for the Proposed West Levee–Norwood 345-kV Transmission Line, it was concluded that (1) the likelihood of adverse impacts to historic archeological resources was low; (2) the likelihood of any impacts to prehistoric archeological resources was nonexistent for all of the portions of the final route outside of the levee system along the Trinity River and the Elm Fork; and (3) there was good potential for buried prehistoric remains within the floodplains of the Trinity River and the Elm Fork, inside of the Trinity River levees.

As a result, it was recommended that there was no need for an archeological pedestrian survey of the final proposed route, but that the foundation augering for the transmission structures to be erected within the floodplains of the Trinity River and the Elm Fork, between the levees, be monitored by a qualified archeologist, in accord with the THC-approved Generic Research Design for Oncor Electric Delivery transmission line projects in Texas (PBS&J 2008). These



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Base Map: USGS 7.5' Quadrangles, Irving and Dallas, Texas.

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Project Alignment

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FIGURE 1
MAP SHOWING THE LOCATION OF THE ONCOR WEST LEVEE–NORWOOD 345 KV ELECTRIC TRANSMISSION LINE PROJECT, DALLAS COUNTY.

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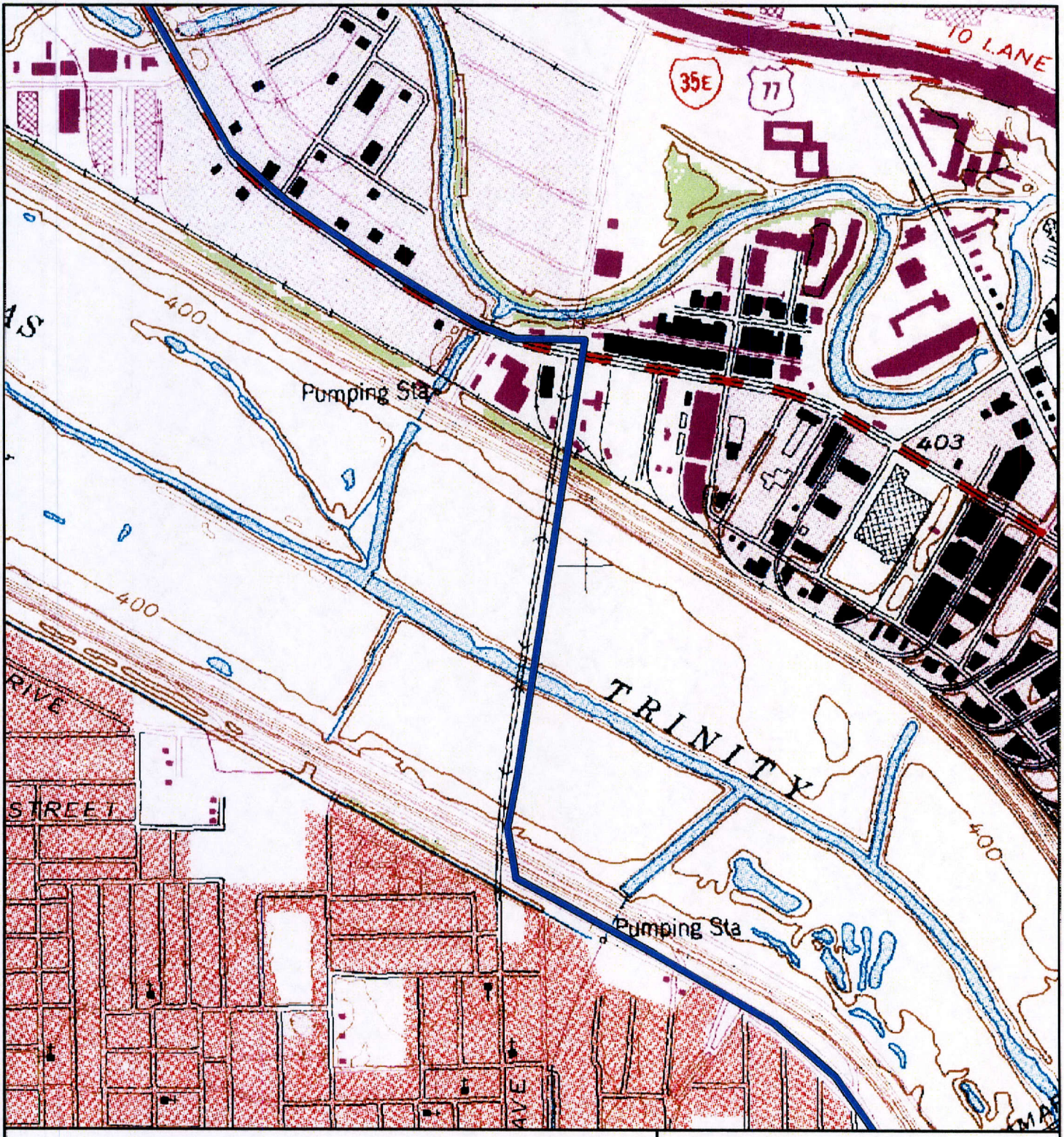

Base Map: USGS 7.5' Quadrangles; Irving and Dallas, Texas.

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FIGURE 2

MAP DETAIL SHOWING THE SYLVAN AVENUE CROSSING OF THE ONCOR WEST LEVEE–NORWOOD 345 KV ELECTRIC TRANSMISSION LINE PROJECT, DALLAS COUNTY.

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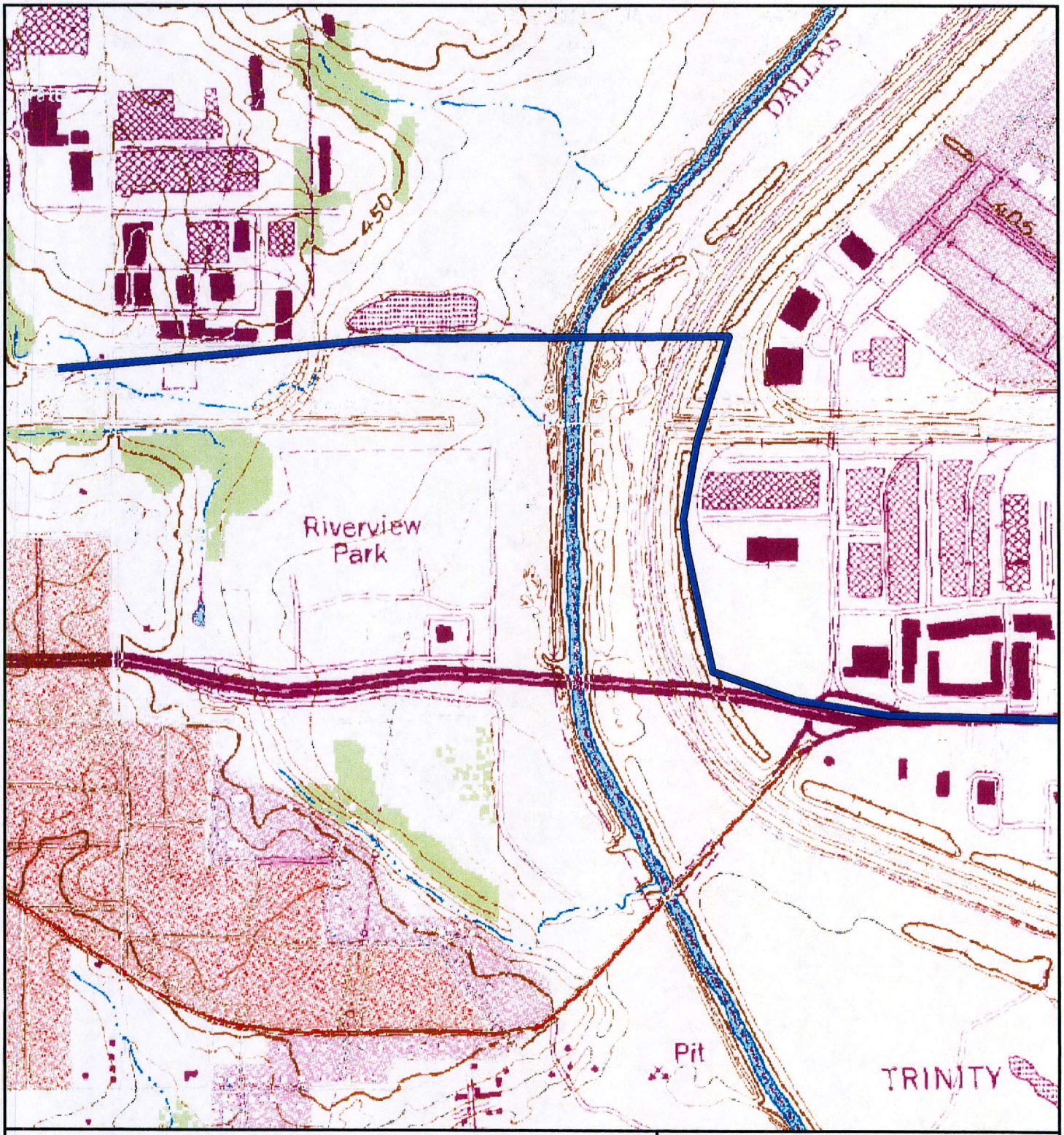

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Project Alignment

Base Map: USGS 7.5' Quadrangles, Irving and Dallas, Texas.

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FIGURE 3

MAP DETAIL SHOWING THE ELM FORK CROSSING OF THE ONCOR WEST LEVEE–NORWOOD 345 KV ELECTRIC TRANSMISSION LINE PROJECT, DALLAS COUNTY.

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recommendations were presented to the THC in a research design accompanying an application for a Texas Antiquities Permit to cover monitoring for the Proposed West Levee–Norwood 345-kV Transmission Line. Texas Antiquities Permit No. 5280 was granted on March 24, 2009.

These investigations were performed in compliance with the Texas Antiquities Code of 1977, as revised through 1995 (Texas Natural Resource Code: Title 9, Chapter 191); the National Historic Preservation Act of 1966 (PL 89-665), as amended in 1974, 1976, 1980, and 1992; the National Environmental Policy Act of 1969 (PL 91-190, 83 Stat. 915 USC 4231, 1970); the Procedures for the Protection of Historic and Cultural Properties (36 CFR 800); the Archaeological Resources Protection Act of 1979; as well as the guidelines set forth by the Council of Texas Archeologists (CTA) and the Register of Professional Archaeologists.

Monitoring was conducted for the foundation augering for two structures in the floodplain of the Elm Fork of the Trinity River and for five structures in the floodplain of the Trinity River. No cultural remains were identified in any of the monitored foundation holes. Because the project involved less than one person-week of field time, the investigations are presented using the suggested format of a short report as outlined by the Council of Texas Archeologists (CTA 1995).

II. RESEARCH DESIGN AND METHODOLOGY

BACKGROUND RESEARCH AND RECORDS CHECK

The new transmission line ROW is located within the City of Dallas, in central Dallas County, Texas. Physiographically, the area lies within the Blackland Prairies region of Texas, which is characterized by rolling to nearly level plains and black, calcareous, heavy clay soils (Bureau of Economic Geology [BEG] 1996). Geologically, the project area is underlain by Pleistocene fluviatile terrace deposits and Holocene alluvium (BEG 1972). The small area of Pleistocene fluviatile terrace is located at the extreme western end of the new transmission line, in the immediate vicinity of the Norwood Switching Station (see Figure 1). The rest of the project area is located on Holocene alluvial deposits of the Trinity River and the Elm Fork, although most of these deposits have been adversely impacted by urban development and landform modification. The only areas that were believed to have any potential at all left for containing preserved buried archeological deposits were inside of the levees along the Trinity River and the Elm Fork (see Figure 1). The Holocene alluvium consists of gravel, sand, silt, silty clay, and organic matter (BEG 1972). The floodplain geology of the upper Trinity River basin has been intensively studied, especially in regard to the potential for buried prehistoric archeological sites (Ferring 1986, 1990; Ferring and Yates 1997). Several studies within the past several decades have focused specifically on the Dallas Floodway (Cliff et al. 1998, 1999).

The project area inside of the levees along the Elm Fork is mapped as Trinity clay, frequently flooded, while the area along the Trinity River is mapped as Trinity-Urban land complex (United States Department of Agriculture, Soil Conservation Service [USDA, SCS] 1980). The Trinity series consists of deep, somewhat poorly drained soils formed in recent alluvium. Typically, Trinity series soils are characterized by an upper layer of dark gray to very dark gray clay, about 51 centimeters (cm) (20 inches) thick, overlying a very dark gray to black clay to about 115 cm below the surface (ca. 45 inches), over a dark grayish brown to very dark grayish brown clay to about 173 cm below the surface (ca. 68 inches) (USDA, SCS 1980:68).

The project area is mapped as being urban today, but formerly it probably consisted of Native Grassland on the uplands with a Water Oak, Elm, Hackberry Forest along the river bottoms (Texas Parks and Wildlife Department 1984). Characteristic native grasses that may have occurred on the uplands in the vicinity of the project area include little bluestem, Indiangrass, Virginia wildrye, Florida paspalum, sideoats grama, silver bluestem, paspalum, and big bluestem (USDA, SCS 1980:87–92). Plants commonly associated with the Water Oak, Elm, Hackberry Forest reportedly include cedar elm, American willow, southern red oak, white oak, black willow, cottonwood, red ash, sycamore, pecan, bois d'arc, flowering dogwood, dewberry, coral-berry, dallisgrass, switchgrass, rescuegrass, bermudagrass, eastern gamagrass, Virginia wildrye, Johnsongrass, giant ragweed, yankeeweed, and Leavenworth eryngo (McMahan et al. 1984:22).

Central Dallas County lies near the eastern margin of the Prairie Savanna Archeological Study Region of the Eastern Planning Area (Kenmotsu and Perttula 1993:Figure 1.1.2). Based on previous research, the general cultural history of this area can be divided into four primary chronological and developmental periods—Paleoindian, Archaic, Late Prehistoric, and Historic (Prikryl 1993:199–203).

The archeological records of the Texas Archeological Sites Atlas Online of the THC and the files at the Texas Archeological Research Laboratory of the University of Texas at Austin revealed five previously recorded archeological sites within 1,000 m (3,280 ft) of the West Levee–Norwood 345-kV Transmission Line Project. These were 41DL53, 41DL54, 41DL59, 41DL64, and 41DL324. Sites 41DL53 and 51DL54 were located north of the former channel of the Trinity River, north of the eastern end of the project area. Both 41DL53 and 41DL54 were prehistoric lithic sites on the surface of hills east of the Trinity River. Both were recorded in 1941 and both have probably been destroyed by subsequent urban development. Site 41DL324 is located immediately adjacent to the former channel of the Elm Fork, north of the east-central portion of the project area. It is a historic steel-and-concrete caisson on an old crossing of the Elm Fork. It was recorded in 1991 and was recommended to be ineligible for the National Register of Historic Places (NRHP) at that time. Site 41DL59 is north of the western portion of the project area. This was another prehistoric lithic surface site that was originally recorded in 1941 and has since been destroyed. Site 41DL64 is within the Dallas Floodway, near the western terminus of the project area. No information was available on this site, but in light of its low number, it was probably originally recorded in 1941 and has since been destroyed. Sites 41DL53 and 41DL54 were probably originally located on slopes at the edge of the Trinity River floodplain. Sites 41DL324, 41DL59, and 41DL64 were all apparently originally located within the floodplain proper. None of the sites appear to have been buried at the time of recording.

As previously noted, it was recommended to Oncor that there was no need for an archeological pedestrian survey of the final route for the proposed West Levee–Norwood 345-kV Transmission Line, but that the foundation augering for the transmission structures to be erected within the floodplains of the Trinity River and the Elm Fork, between the levees, be monitored by a qualified archeologist, in accord with the THC-approved Generic Research Design for Oncor Electric Delivery transmission line projects in Texas (PBS&J 2008).

MONITORING

Based on these recommendations, monitoring of the foundation augering for the transmission structures to be erected within the floodplains of the Trinity River and the Elm Fork, between the levees, was conducted by a single archeologist over a number of days between October 1, 2009, and May 11, 2010. Foundation augering for five structures was monitored in the floodplain of the Trinity River, while foundation augering for two structures was monitored in the floodplain of the Elm Fork (Table 1). Generally, the structure foundations consisted of a single hole, the diameter of

which varied from 1.5 to 2.6 m (60 to 102 inches), and the depth of which varied from 7.6 to 9.1 m (25 to 30 ft). The only exception to this was the foundation for Structure 7/5A, in the floodplain of the Elm Fork, which went to 18 m (59 ft) deep and was 3.4 m (132 inches) in diameter.

Table 1. Monitored Structures for the West Levee–Norwood Transmission Line

Structure	Drainage	Coordinates (NAD 27)	Diameter	Depth
2/1	Trinity River	14S E702757 N3629525	2.6 m	ca. 9.1 m
2/2	Trinity River	14S E702777 N3629645	1.5 m	9.1 m
2/3	Trinity River	14S E702795 N3629776	1.8 m	7.6 m
3/4	Trinity River	14S E702823 N3629957	1.8 m	8.8 m
2/5	Trinity River	14S E702842 N3630105	2 m	8.5 m
7/4	Elm Fork	14S E696206 N3632615	ca. 1.5 m	9.1 m
7/5A	Elm fork	14S E696228 N3632646	3.4 m	18 m

Geoarcheological monitoring of the foundation augering for the transmission structures involved examination of the soil as it was removed from the auger holes of each structure in order to identify any cultural remains that might have been disturbed by the augering. The location of each foundation hole was recorded using a GPS receiver and noted on a U.S. Geological Survey (USGS) 7.5-minute quadrangle map. The augering proceeded relatively slowly, and generally in increments of about 60 to 100 cm (2 to 3 ft), depending on the density of the sediment. The auger was watched closely when in operation, and when it was extracted from the hole, much of the fill was removed with it. The fill was visually examined, within the limitations of safety, to identify strata with a high probability for containing cultural resources. Since the soil matrix was dominated by clay, it was not screened. Sediments were described following the guidelines and terminology established by the National Soil Survey Center (Schoeneberger et al. 2002) and using the U.S. Department of Agriculture, Natural Resource Conservation Service Pedon Description Form. Soil colors were recorded using a Munsell Soil Color Chart while samples were moist, if possible. Profiles were initially described in "zones" without differentiating between lithologic or pedologic features and were later given soil horizon designations. All depths were measured from the ground surface.

In some instances, when the subsurface sediments were saturated and unstable, the foundation holes were slurry augered, or processed, in order to prevent slumping. This involved pumping water into the foundation hole while it was being augered. A drilling agent, such as EZ-Mud, was added to the water, and the resulting slurry was extracted from the hole with the auger. When the hole was completed, a cylindrical rebar cage was lowered into it and cement piped down the shaft to finalize the footing. Slurry-augered holes are cemented from the base up, with the rising slurry mixture pumped out.

III. RESULTS

MONITORING

As noted above, foundation augering for five structures located within the floodplain of the Trinity River and two structures located in the floodplain of the Elm Fork was monitored by a qualified archeologist. The five structures within the floodplain of the Trinity River, designated structures 2/1, 2/2, 2/3, 2/4, and 2/5, were located near the eastern terminus of the transmission line, east of Sylvan Avenue (Figure 4). The two structures within the floodplain of the Elm Fork, designated structures 7/4 and 7/5A, were located near the western terminus of the transmission line, north of the Trinity Railway Express line (Figure 5).

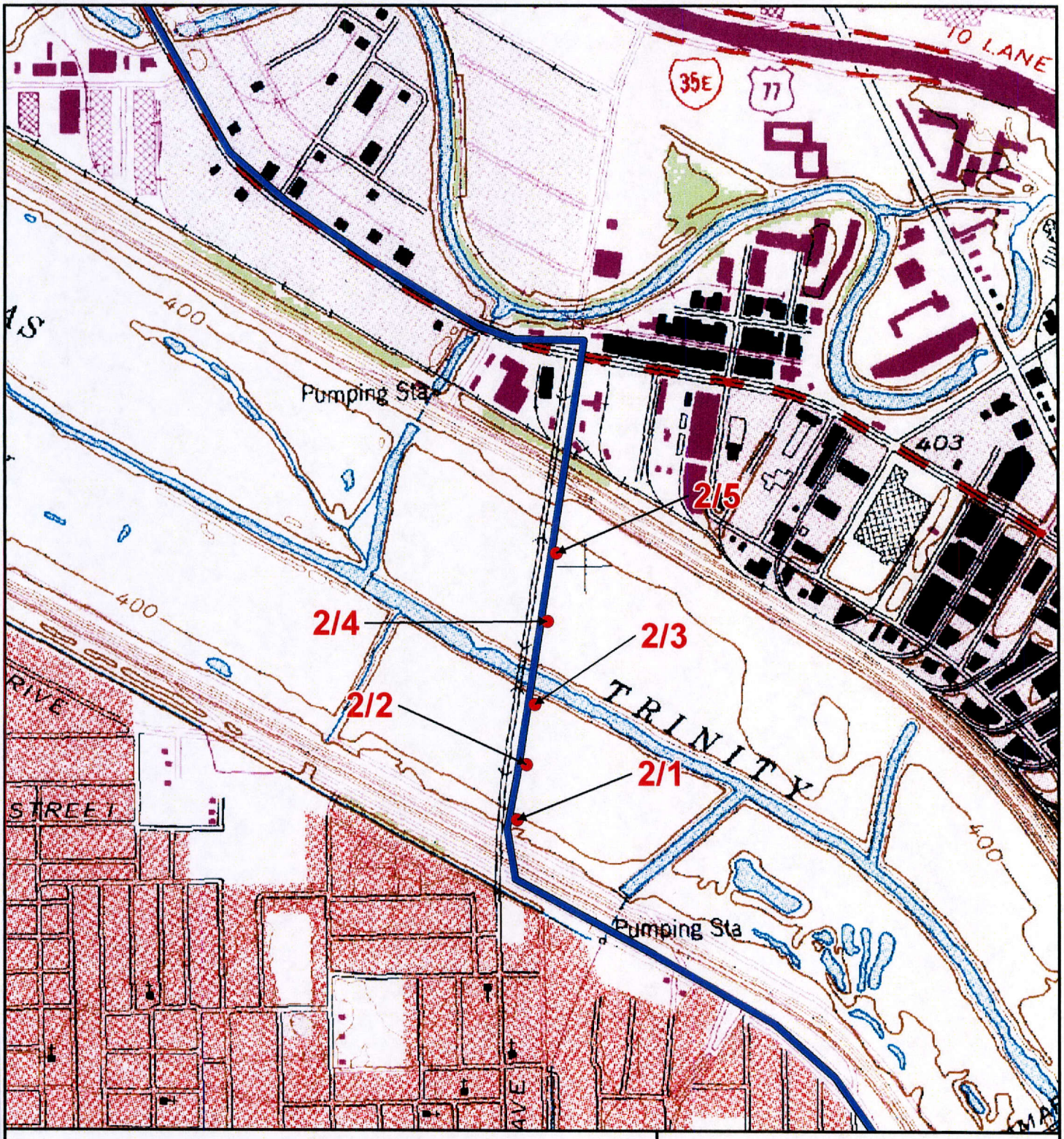
The Elm Fork of the Trinity River joins together with the West Fork to form the main branch of the Trinity River in west central Dallas County. The final branch of the Trinity River, the East Fork, joins the main branch east of Dallas County. As previously noted, the floodplain soils along the Elm Fork at the location of the transmission line crossing are mapped as Trinity clay, frequently flooded, while those at the crossing of the Trinity River are mapped as Trinity-Urban land complex (USDA, SCS 1980). Taxonomically, Trinity series soils are classified as very fine, montmorillonitic, thermic Typic Pelluderts, a type of Vertisol (USDA, SCS 1980:153). A typical pedon of Trinity clay consists of:

A11 0 to 18 cm (0 to 7 inches); dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky structure; very hard, very firm; few fine siliceous pebbles; calcareous; moderately alkaline; clear smooth boundary.

A12 18 to 51 cm (7 to 20 inches); dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate fine and medium blocky structure; few slickensides in lower part; extremely hard, very firm; calcareous; moderately alkaline; diffuse smooth boundary.

A13 51 to 115 cm (20 to 45 inches); very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium blocky structure; common intersecting slickensides throughout; extremely hard, very firm; calcareous; moderately alkaline; diffuse smooth boundary.

A14 115 to 173 cm (45 to 68 inches); dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak coarse blocky structure; extremely hard, very firm; calcareous; moderately alkaline.



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Project Alignment

Structure Locations

Base Map: USGS 7.5' Quadrangles, Irving and Dallas, Texas.

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FIGURE 4

MAP SHOWING LOCATION OF MONITORED STRUCTURES ALONG THE SYLVAN AVENUE CROSSING OF THE ONCOR WEST LEVEE–NORWOOD 345 KV ELECTRIC TRANSMISSION LINE PROJECT, DALLAS COUNTY.

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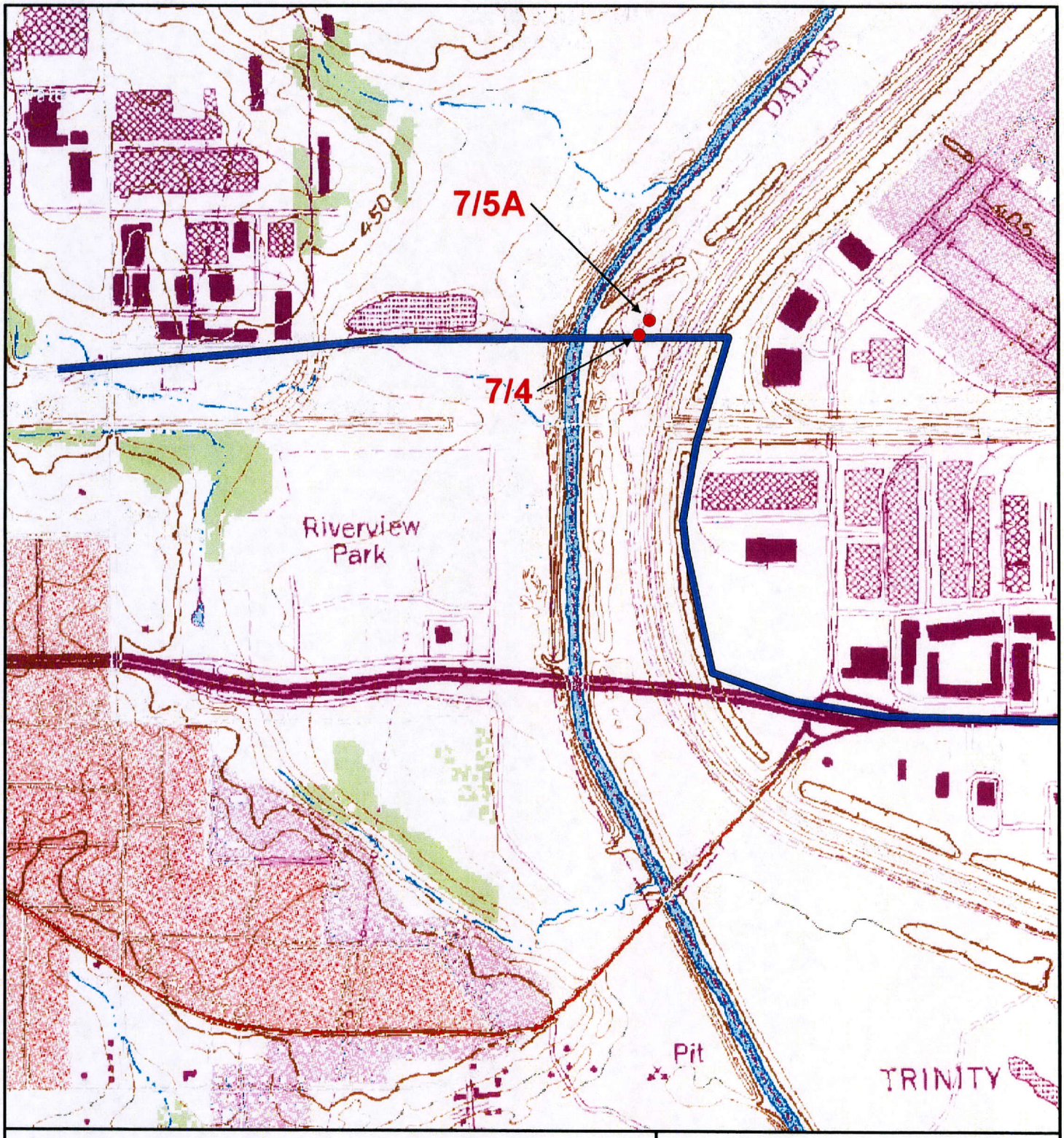

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Project Alignment

Structure Locations

Base Map: USGS 7.5' Quadrangles; Irving and Dallas, Texas.

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FIGURE 5

MAP SHOWING LOCATION OF MONITORED STRUCTURES AT THE ELM FORK CROSSING OF THE ONCOR WEST LEVEE-NORWOOD 345 KV ELECTRIC TRANSMISSION LINE PROJECT, DALLAS COUNTY.

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The Trinity clay, frequently flooded, map unit reportedly includes small areas of Ovan and Seagoville soils and isolated areas of Trinity soils that are occasionally flooded (USDA, SCS 1980:36).

The Trinity-Urban land complex is made up of deep, nearly level, somewhat poorly drained soils and areas of Urban land on flood plains (USDA, SCS 1980:36). Trinity soils make up about 60 percent of this complex (see above). Urban land, which consists of areas covered with pavement and buildings, makes up 20 percent, and minor soils make up the rest.

As noted above, the five structures that were monitored within the floodplain of the Trinity River were all located near the eastern terminus of the transmission line, east of Sylvan Avenue (see Figure 4). From south to north, these were designated structures 2/1, 2/2, 2/3, 2/4, and 2/5. Structures 2/1, 2/2, and 2/3 were south of the current river channel, while structures 2/4 and 2/5 were north of it.

Based on previous studies of the Dallas Floodway, it appears that three alluvial units were present in the foundation holes augered along Sylvan Avenue (tables 2, 3, 4, 5, and 6). The upper unit consisted of a brown to dark grayish brown clay loam, silty clay, or in the case of Structure 2/5, silty loam over clay (Figure 6). This unit varied from 0.5 to 1 m (1.6 to 3.3 ft) thick, and is believed to be a recent AC horizon, probably dating to within the last 200 years based on comparative data from elsewhere in the upper Trinity River basin (Cliff et al. 1998, 1999). Plastic and other recent material were found in this unit in the foundation hole for Structure 2/1, Styrofoam fragments were found in the foundation for Structure 2/3, and a screw-type bottle top was found in the foundation for Structure 2/4. These finds indicated a very recent date for this unit.

Below this recent material is older alluvium, believed to consist of a series of stacked alluvial units, capped by a dark, cumulic buried soil (2Ab). This buried soil was present in the foundation holes for structures 2/4 and 2/5 and consisted of a black to very dark brown clay, varying from 0.5 to 1 m (1.6 to 3.3 ft) thick (see tables 5 and 6). It is believed to be analogous to the West Fork soil identified elsewhere in the upper Trinity River basin. An old buried PVC pipe (no longer in use) was encountered between 0.5 m (1.6 ft) and 1.5 m (4.9 ft) down in the foundation for Structure 2/4, but no other cultural remains were found in this buried soil (Figure 7).

The West Fork soil formed on top of what Ferring has named the Pilot Point alluvium, the deposition of which may have begun around the beginning of the late Holocene, approximately 4,500 years ago (Cliff et al. 1998, 1999; Ferring 1990). Ferring describes the Pilot Point alluvium as being composed of "extensive flood basin clays" with lateral accretion deposits located within present and older meander belts (Ferring 1990:33). Below the Dallas Floodway, the Pilot Point alluvium has been characterized as a black to dark gray (10YR 4/1 to 5/2) silty clay loam to silt loam (Cliff et al. 1999:28). Based on texture and color, the Pilot Point alluvium appears to be present as a very dark gray, dark gray, or dark grayish brown clay or clay loam (Figure 8). The

Table 2. Profile Description, Structure 2/1, Trinity River

Zone	Depth of Observation	Sediment Description
1	0–1 m (0–3.3 ft)	Dark grayish brown (10YR 4/2) clay loam; subangular blocky structure; very hard, extremely firm; slightly sticky, slightly plastic; few small limestone gravel; AC horizon.
		Plastic and recent material within upper 1 m below surface.
2	1–2 m (3.3–6.6 ft)	Very dark gray (10YR 3/1) clay; abundant large brownish yellow (10YR 6/6) mottles; subangular blocky structure; moderately hard, firm; slightly sticky, slightly plastic; common medium to large gravel; 2C1 horizon.
3	2–3 m (6.6–9.8 ft)	Brownish yellow (10YR 6/6) sandy clay; common small to medium (10YR 5/2) mottles; subangular blocky structure; slightly hard, friable; slightly sticky, nonplastic; common small gravel; 3C2 horizon.
4	3–4.5 m (9.8–14.8 ft)	Grayish brown (10YR 5/2) silty clay; subangular blocky structure; slightly hard, friable; very sticky, very plastic; 3C3 horizon.
5	4.5–9.1 m (14.8–30 ft)	Water encountered at 4.5 m (14.8 ft) and fill processed from this point onward. No further observations possible. Base of foundation approximate.

Table 3. Profile Description, Structure 2/2, Trinity River

Zone	Depth of Observation	Description
1	0–0.5 m (0–1.6 ft)	Dark grayish brown (10YR 4/2) silty clay; subangular blocky structure; soft, very friable; moderately sticky, slightly plastic; AC horizon.
2	0.5–1 m (1.6–3.3 ft)	Very dark gray (10YR 3/1) clay loam; common yellowish brown (10YR 5/8) mottles; subangular blocky structure; hard, very firm; slightly sticky, nonplastic; common limestone gravel; 2C1 horizon.
3	1–3 m (3.3–9.8 ft)	Yellow (10YR 7/8) sandy clay to sand; massive structure; soft, very friable; moderately sticky, nonplastic; 3C2 horizon.
4	3–4 m (9.8–13.1 ft)	Light yellowish brown (10YR 6/4) sandy clay; massive structure; slightly hard, friable; moderately sticky, nonplastic; 3C3 horizon.
5	4 m (13.1 ft)	Yellow (10YR 7/8) sandy clay; massive structure; soft, very friable; moderately sticky, nonplastic; 3C4 horizon.
6	4–9.1 m (13.1–30 ft)	Fill processed below 4 m (13.1 ft). No further observations possible.

Table 4. Profile Description, Structure 2/3, Trinity River

Zoe	Depth of Observation	Description
1	0–1 m (0–3.3 ft)	Dark grayish brown (10YR 4/2) clay loam; few very coarse dark yellowish brown to brownish yellow (10YR 4/6–5/6) mottles; subangular blocky structure; soft, very friable; slightly sticky, slightly nonplastic; AC horizon.
		Styrofoam fragments present
2	1–1.5 m (3.3–4.9 ft)	Very dark gray (10YR 3/1) clay; common coarse dark yellowish brown to brownish yellow (10YR 4/6–5/6) mottles; subangular blocky structure; slightly hard, friable; nonsticky, nonplastic; common coarse gravel; 2C1 horizon.
3	1.5–6.5 m (4.9–21.3 ft)	Dark gray (10YR 4/1) clay; subangular blocky structure; hard, very firm; slightly sticky, slightly plastic; many medium gravel; 2C2 horizon.
		Struck water at ca. 6.1 m (20 ft) but fill was not processed.
4	6.5–7.6 m (21.3–25 ft)	Brownish yellow (10YR 6/6) clay; common medium grayish brown (20YR 5/2) mottles; subangular blocky structure; slightly hard, friable; slightly sticky, slightly plastic; few fine gravel; 3C3 horizon.

Table 5. Profile Description, Structure 2/4, Trinity River

Zone	Depth of Observation	Description
1	0–0.5 m (0–1.6 ft)	Brown (10YR 4/3) clay loam; few coarse brownish yellow (10YR 6/6) mottles; subangular blocky structure; slightly hard, friable; slightly sticky, slightly, slightly plastic; common small gravel; AC horizon.
		Screw-type bottle top present.
2	0.5–1.5 m (1.6–4.9 ft)	Very dark brown (10YR 2/2) clay; subangular blocky structure; moderately hard, firm; slightly sticky, slightly plastic; common large rocks; 2Ab horizon.
		In situ buried PVC pipe at about 1 m (3.3 ft) below surface.
3	1.5–3.5 m (4.9–11.5 ft)	Dark grayish brown (10YR 4/2) clay; subangular blocky structure; moderately hard, firm; slightly sticky, slightly plastic; many fine gravel; 2C1 horizon.
4	3.5–4 m (11.5–13.1 ft)	Dark yellowish brown (10YR 4/4) clay; subangular blocky structure; moderately hard, firm; slightly sticky, slightly plastic; common small gravel; 2C2 horizon.
5	4–5.5 m (13.1–18 ft)	Brownish yellow (10YR 6/6) silty clay; subangular blocky structure; soft, very friable; nonsticky, nonplastic; common small to coarse gravel; 3C3 horizon.
6	5.5–6 m (18–19.7 ft)	Yellowish brown (10YR 5/8) sand; common coarse gray (N 6/0) mottles; massive; loose, loose; nonsticky, nonplastic; 3C4 horizon.
7	6–6.5 m (19.7–21.3 ft)	Yellowish brown (10YR 5/8) sand; massive; channel gravel; 3C5 horizon.
8	6.5–8.8 m (21.3–29 ft)	Eagle Ford Shale; R horizon.

Table 6. Profile Description, Structure 2/5, Trinity River

Zone	Depth of Observation	Description
1	0–0.1 m (0–0.3 ft)	Brown (10YR 5/3) silty loam; single grain; loose, loose; nonsticky, nonplastic; A horizon.
2	0.1–.5 m (0.3–1.6 ft)	Very dark grayish brown (10YR 3/2) clay; subangular blocky structure; moderately hard, firm; slightly sticky, slightly plastic; common medium limestone in upper 10 cm; C horizon.
3	0.5–1 m (1.6–3.3 ft)	Black (10YR 2/1) clay; subangular blocky structure; very hard, extremely firm; moderately sticky, slightly plastic; few fine limestone; 2Ab horizon.
4	1–5 m (1.6–16.4 ft)	Very dark gray (10YR 3/1) clay; subangular blocky structure; moderately hard, firm; moderately sticky, moderately plastic; few fine limestone; 2C1 horizon.
5	5–7 m (16.4–23 ft)	Dark yellowish brown (10YR 4/6) clay; many medium gray (10YR 5/1) mottles; subangular blocky structure; moderately hard, firm; moderately sticky, moderately plastic; common fine limestone; 3C2 horizon. Struck water at ca. 7 m (23 ft) but fill not processed.
6	7–8.5 m (23–28 ft)	Brownish yellow (10YR 6/8) sand; few medium gray (10YR 6/1) mottles; massive; soft, very friable; nonsticky, slightly plastic; 3C3 horizon.

thickness, and presumably the degree of preservation, of this alluvial unit varied considerably across the Dallas Floodway in this area (see tables 2, 3, 4, 5, and 6). Including the West Fork soil, it was thickest in the area of structures 2/3, 2/4, and 2/5 (5.5 m [18 ft], 3 m [9.8 ft], and 4.5 m [14.8 ft], respectively) and thinnest in the area of structures 2/1 and 2/2 (1 m [3.3 ft] and 0.5 m [1.6 ft], respectively).

Below the late Holocene Pilot Point alluvium is an earlier alluvial unit that generally appears to be composed of coarser material, including clay, silty clay, sandy clay, and sand (Figure 9). In several locations, this unit appears as a well-defined, fining-upward sequence. In the foundation hole for Structure 2/4, for example, this unit grades from sand with channel gravels at the bottom to sand to silty clay to clay at the top, while in the area of Structure 2/5 it grades from sand to clay (see tables 5 and 6). In regard to color, this unit is lighter than the Pilot Point alluvium above it, grading from dark yellowish brown to grayish brown to yellow (see tables 2, 3, 4, 5, and 6). Based on a series of electrical resistivity profiles recorded along Sylvan Avenue by a previous study of the Trinity Floodway, it was proposed that this earlier alluvial unit may consist of the late Pleistocene Carrollton alluvium, dating to more than 20,000 to 25,000 years ago, or the terminal Pleistocene Aubrey alluvium, dating prior to 14,000 to 15,000 years ago (Cliff et al. 1999:51–52:Figure 10).

Figure 6. Structure 2/4 foundation hole showing upper alluvial unit, facing northwest.

Figure 7. Structure 2/4 foundation hole showing buried West Fork soil (PVC pipe may be seen in the right side of the foundation hole), facing northwest.

Figure 8. Structure 2/3 foundation hole showing removal of Pilot Point alluvium, facing west.

Figure 9. Structure 2/3 foundation hole showing removal of earlier alluvial unit, facing northwest.

Based on comparisons with type sections of the Carrollton alluvium from along the Elm Fork of the Trinity River near Farmers Branch and near Coppell, it seems most likely that this older alluvial unit consists of the late Pleistocene Carrollton alluvium (Ferring 1990:figures 14a, 14b).

This earlier alluvial unit was found to lie directly on bedrock, consisting of the Eagle Ford shale, in the foundation hole for Structure 2/4 (see Table 5). The Eagle Ford shale was encountered at about 6.5 m down (21.3 ft) in this area, and was penetrated to a depth of about 8.8 m (29 ft). Previous electrical resistivity profiles along Sylvan Avenue indicate that the Eagle Ford shale should have been encountered at about 5 m (16.4 ft) down in the area of Structure 2/1, about 5.5 m (18 ft) down in the area of Structure 2/2, and about 8 m (26.2 ft) down in the areas of structures 2/3 and 2/5 (Cliff et al. 1999:Figure 10). Unfortunately, the presence of the Eagle Ford shale at these depths in these locations could not be confirmed. Since the foundation for Structure 2/1 penetrated to a depth of 9.1 m (30 ft), it should have encountered bedrock; but the auger hit water at 4.5 m (14.8 ft) down and the fill was processed from that point to the base of the foundation. The same situation was found at the location of Structure 2/2, where the foundation went to 9.1 m (30 ft) but the fill was processed below 4 m (13.1 ft). The foundation for Structure 2/3 did not go to the predicted depth of bedrock, but did encounter water at a depth of 6.1 m (20 ft), although processing was not required. Finally, the foundation for Structure 2/5 also went deeper than the predicted depth of bedrock, but it encountered water at 7 m (23 ft), although processing was not required in this case either.

The only cultural remains identified during the monitoring of the foundation holes for the five transmission structures along Sylvan Avenue were the modern trash found in the most recent alluvial unit at the locations of structures 2/1, 2/3, and 2/4, and the buried PVC pipe found in the putative West Fork soil at the location of Structure 2/4. No prehistoric remains were encountered in any of these structure foundations.

In addition to the five structures that were monitored along Sylvan Avenue on the Trinity River, two structures were monitored within the floodplain of the Elm Fork, near the western end of the West Levee–Norwood transmission line (see Figure 5). These two structures, Structure 7/4 and Structure 7/5A, were relatively close together and were both east of the current river channel, in the Dallas Floodway.

The foundation holes for both of these structures showed deep deposits of alluvial clay and silty clay, believed to represent three alluvial units (tables 7 and 8). As was the case in the foundation holes along Sylvan Avenue, the upper unit is believed to consist of recent alluvial clay, dating to within the last several hundred years (Figure 10). It is believed to consist of a single AC horizon, about 0.5 m thick (1.6 ft), in the area of Structure 7/4 and an A–C sequence, totaling 2.1 m (7 ft) thick in the area of Structure 7/5A. The second alluvial unit consists of a very dark gray clay soil (2Ab) on top of grayish brown to yellowish brown clay alluvium (2C1-2C2) (Figure 11). The buried soil varies from 0.5 m thick (1.6 ft) in the area of Structure 7/4 to 0.9 m thick (3 ft) in the area of

Table 7. Profile Description, Structure 7/4, Elm Fork

Zone	Depth of Observation	Description
1	0–0.5 m (0–1.6 ft)	Very dark gray (10YR 3/1) clay; common coarse yellowish brown (10YR 5/4) mottles; fine subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; few fine calcrete gravel; AC horizon.
2	0.5–1 m (1.6–3.3 ft)	Very dark gray (10YR 3/1) clay; weak fine subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; common fine calcrete gravel; 2Ab horizon.
3	1–2.5 m (3.3–8.2 ft)	Grayish brown (10YR 5/2) clay; weak fine subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; common fine calcrete gravel; 2C1 horizon.
4	2.5–7.5 m (8.2–24.6 ft)	Yellowish brown (10YR 5/4) clay; moderate medium subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; common fine calcrete gravel; 2C2 horizon.
5	7.5–9.1 m (24.6–30 ft)	Dark gray (10YR 4/1) clay; weak fine subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; few fine calcrete gravel; 3AC horizon.

Table 8. Profile Description, Structure 7/5A, Elm Fork

Zone	Depth of Observation	Description
1	0–0.3 m (0–1 ft)	Very dark grayish brown (10YR 3/2) clay; subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; few limestone fragments; A horizon.
2	0.3–2.1 m (1–7 ft)	Yellowish brown (10YR 5/4) clay; medium to large very dark grayish brown (10YR 3/2) mottles; subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; common limestone fragments; C horizon.
3	2.1–3 m (7–10 ft)	Very dark gray (10YR 3/1) clay; subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; 2Ab horizon.
4	3–9.1 m (10–30 ft)	Grayish brown (10YR 5/2) clay; yellowish brown (10YR 5/4), very dark grayish brown (10YR 3/2), and gray (N5/) mottles; subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; 2C1 horizon.
5	9.1–11.6 m (30–38 ft)	Gray (10YR 5/1) clay; few grayish brown (10YR 5/2) mottles; subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; 3AC horizon.
6	11.6–13.1 m (38–43 ft)	Light olive brown (2.5Y 5/4) wet clay; gray (N6/) mottles; subangular blocky structure; hard, very firm, moderately sticky, moderately plastic; 3C2 horizon.
7	13.1–14.3 m (43–47 ft)	Gray (5Y 5/1) saturated silty clay; subangular blocky structure; soft, very friable; nonsticky, nonplastic; 3C3 horizon.
8	14.3–18 m (47–59 ft)	Fill processed below 14.3 m (47 ft). No further observations possible.

Figure 10. Structure 7/5A showing augering of recent alluvial clay underway, facing southeast.

Figure 11. Structure 7/4 showing second alluvial unit, facing southeast.

Figure 12. Structure 7/4 showing removal of third alluvial unit, facing south.

Structure 7/5A, while the underlying alluvium varied from 6.1 to 6.5 m thick (19.7 to 21.3 ft). The third alluvial unit consisted of a dark gray to gray clay, possibly a buried soil (3AC), over light olive brown clay and gray silty clay (3C3-3C4) (Figure 12). The foundation for Structure 7/4 was terminated at about 9.2 m (30 ft), about 1.7 m (5.6 ft) into the 3AC horizon. In contrast, the foundation for Structure 7/5A went to 18 m (59 ft), with the 3AC-3C3-3C4 sequence being at least 5.2 m thick (17.1 ft). Below 14.3 m (37 ft), the sediment became unstable and the foundation hole had to be processed, with no further observations possible. The bedrock, identified as Eagle Ford shale, was not reached in either of the two foundation holes, but coring done in connection with the construction of the bridge for Carpenter Freeway, about 2 kilometers (1.2 miles) to the northeast of the current project area, showed that there may be as much as 23 m (75.5 ft) of alluvium in this portion of the Elm Fork floodplain (Cliff et al. 1999:51). No cultural remains of any kind were identified in either of the two structure foundations in this portion of the West Levee–Norwood transmission line.

During a previous study of the archeological potential of the Dallas Floodway, a single resistivity profile was recorded approximately 91 m (300 ft) south-southwest of the location of Structure 7/4 (Cliff et al. 1999). This profile appeared to show a series of stacked alluvial units down to about 8 m (ca. 26.2 ft) below surface. Based on sediment samples taken from the probe hole and on comparisons with a dated sediment series from the West Fork, it was suggested that five alluvial units were present in this area. From top to bottom, these were (1) recent alluvium, down to about 0.25 m (0.8 ft); (2) the late Holocene Pilot Point alluvium capped by the West Fork soil (the latter

ca. 0.25–1.75 m [0.8–5.7 ft]), down to about 2.9 m (9.5 ft); (3) the early Holocene Sanger alluvium, down to about 4.6 m (15.1 ft); (4) the terminal Pleistocene Aubrey alluvium, down to about 6 m (19.7 ft); and the late Pleistocene Carrollton alluvium, below 6 m (19.7 ft) (Cliff et al. 1999:Figure 11).

Despite the resistivity data, the stratigraphic superpositioning and the lithology of the foundation holes for structures 7/4 and 7/5A suggests that the buried soil (2Ab) at 0.5 to 2.1 m down is analogous to the West Fork soil. The alluvial unit below the West Fork soil (2C1-2C2) is the late Holocene Pilot Point alluvium, while the lowest identified alluvial unit (3AC-3C3-3C4) is probably the early Holocene Sanger alluvium. The contact between the Pilot Point alluvium and the Sanger alluvium may be marked by a weakly developed or eroded soil (3AC), which Ferring has named the Arlington soil (Ferring 1990).

IV. RECOMMENDATIONS

No archeological sites were identified as a result of the cultural resource investigations conducted for the Oncor West Levee–Norwood transmission line construction in spite of careful monitoring of structure foundation augering in the Dallas Floodway, where the line crosses the Trinity River and the Elm Fork in Dallas. Based on these results, it is recommended that the consultation process for the Oncor West Levee–Norwood transmission line be considered to be completed. No artifacts were collected by the project, but final project records and photographs will be curated at the Texas Archeological Research Laboratory of The University of Texas at Austin.

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