WETLAND DELINEATION REPORT

HOLLISTER ROAD PAVING AND DRAINAGE

FROM NORTH OF WHITE OAK BAYOU TO WEST GULF BANK ROAD

WBS NO. N-000704-0001-3; CONTRACT NO.: 4600011956

PREPARED FOR:

CITY OF HOUSTON

DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING AND CONSTRUCTION DIVISION

APRIL 2015
(REVISED APRIL 27, 2015)

PREPARED BY:

PARSONS BRINCKERHOFF

PB NO. 31228A

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APPENDICES

1 INTRODUCTION

Parsons Brinckerhoff, Inc. (PB) has conducted a wetland delineation for a section of Hollister Road from West Gulf Bank Road to White Oak Bayou in the City of Houston, Texas. The existing roadway is a two lane concrete curb and gutter facility with storm sewer from West Gulf Bank Rd to White Oak Bayou. The proposed project involves constructing a 4-lane, concrete curb and gutter boulevard section, with storm sewer, on asphalt transition from four lanes to two lanes, and necessary appurtenances . It is anticipated that the project will be constructed within the existing 100 foot right-of-way (ROW). The scope of this report is to identify and delineate all potential jurisdictional and non-jurisdictional wetlands.

On August 8, 2014 PB personnel conducted wetland delineations of the project area in accordance with procedures set forth in the *1987 Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1)* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual; Atlantic & Gulf Coast Plains Region*.

2 DESCRIPTION OF THE PROJECT AREA

The proposed project is located in northwest Houston, City Council District A (Key Map Pages 410R and 410 V). The project area considered primarily residential. The land use in the surrounding areas is also mostly residential. White Oak Bayou is located at the southern portion of the project area.

Aerial photography shows no distinct evidence of pimple mounds. The latest Federal Emergency Management Agency (FEMA) floodplain data shows that the entire project alignment is located within the 100-year floodplain of White Oak Bayou. The project alignment north of Mosewood to White Oak Bayou is located within the White Oak Bayou Floodway. The National Wetlands Inventory (NWI) mapping for the Houston quadrangle identifies wetland areas to the southeast and to the northwest of the project area. The elevation of the project area is approximately 90 feet above sea level. The project area consists of two different soil types; Clodine Loam and Nahatche Loam. An aerial map of the project location is included in Appendix “A”.

3 ENVIRONMENTAL SETTINGS

3.1 Soils

The proposed project location is in an area noted by the United States Department of Agriculture (USDA), Soil Survey of Harris County, Texas (2013) as consisting of the Clodine Loam (Cd), and Nahatche Loam (Na) which are described below. The Soils Map is included in Appendix B.

- Clodine Loam (Cd): parent material is Loamy fluviomarine deposits of early Pleistocene age. The Clodine Loam has moderate high to high capability to transmit water and is nonsaline to slightly saline. The complex is poorly drained and the slope is 0 to 1 percent.
- Nahatche Loam (Na): parent material is Loamy alluvium of Holocene age. The Nahatche Loam has moderate high to high capability to transmit water and is nonsaline. The complex is somewhat poorly drained and the slope is 0 to 1 percent.

3.2 Topographical and Surface Water Characteristics

The proposed project area is located within the SATSUMA Topographical Quadrangle, Houston, Texas. The most notable topographic feature within the area is White Oak Bayou that is located south of the project area. Another notable area of hydric feature includes Rolling Fork, which is located northwest of the project area. The elevation of the project area is approximately 90 feet above sea level. The slope of the land is towards the southeast and is categorized at a slight and gentle slope. The topographic map is included in Appendix C.

3.3 Geological Characteristics

According to the Geologic Atlas of Texas, Houston Sheet (1983), published by the Bureau of Economic Geology at the Balcones Research Center in Austin, Texas, the project area is located within the boundaries of two formations, the Beaumont Formation and the Lissie Formation. The Beaumont Formation has deposits from the geologic ages Phanerozoic, Cenozoic, Quaternary, and Pleistocene-Late. This formation consists predominantly of clays and mud with low permeability, a high water-holding capacity, high compressibility, high to very high shrink-swell potential, poor drainage, level to depressed relief, low shear strength, and high plasticity. The Lissie Formation has deposits from the geologic ages Phanerozoic, Cenozoic, Quaternary, and Pleistocene-Middle. This formation consists of sand, silt, clay, and minor amounts of gravel. The surface is fairly flat and featureless except for many shallow depressions and pimple mounds. It is locally calcareous and has concentrations of calcium carbonate, iron oxide, and iron-manganese oxides common in zone of weathering. The Geological Atlas is located in Appendix D.

3.4 Floodplain Data

The latest FEMA floodplain data shows that the entire project alignment is located within the 100-year floodplain of White Oak Bayou. The project alignment north of Mosewood to White Oak Bayou is located within the White Oak Bayou Floodway. FEMA floodplain data is located in Appendix E.

4 HISTORICAL REVIEW

4.1 Historical Topographic Maps

Historical topographic maps from the United States Geological Survey (USGS) 7.5 Minute Topographic Maps (TX Satsuma and Addicks Quadrangles) were reviewed to determine historical land use, identify

evidence of surface features/characteristics, and describe general land changes. The historic topographic maps are included in Appendix G.

4.1.1 1916 Houston, TX SATSUMA Topographic Map

The 1916 topographic map depicts the area as a rural/undeveloped area. The general slope of the land is from the northwest to the southeast. The highest elevations (119 ft. above sea level) are seen in the northwest and the lowest elevations (90 ft. above sea level) are seen in the southeast portion of the area. Fairbanks Road is noted as a paved facility west of the project alignment. Minimal development is noted west of Fairbanks Road. Rolling Fork and White Oak Bayou are easily observed west and south of the proposed project alignment with riparian areas present. A railroad can be seen northeast of the project area. An unpaved road can be seen near the present day Hollister Road alignment. The historical topographic maps are included in Appendix G.

4.1.2 1919 Houston, TX ADDICKS Topographic Map

The 1919 topographic map shows development southwest of the project alignment (Fairbanks). White Oak Bayou is visible bordering the southern portion of the project alignment. Development is also seen north of the project area (North Houston). Hempstead Road is visible southwest of the project alignment as a major thoroughfare. The Central Railroad is seen along side of Hempstead Road. Unpaved roads can be seen near the project alignment. Development is seen northwest of the project alignment along Hempstead Road (Satsuma).

4.1.3 1920 Houston, TX SATSUMA Topographic Map

The 1920 topographic map is similar to the 1916 topographic map. Unpaved roads can be seen southwest of the project alignment. The elevation is now in the ranges from 120 to 86 feet above sea level. The unpaved road near the present day Hollister Road alignment is still present. No other significant changes are noted on the map.

4.1.4 1955 Houston, TX ADDICKS Topographic Map

The 1955 topographic map depicts several changes. Development can now be seen in the project area. Several paved arterial streets are near and around the project areas. Satsuma and Fairbanks continue to grow. Pipelines can be seen southwest and north of the project area. White Oak Bayou is present with riparian areas. Drainage ditches can be seen north of White Oak Bayou. South Fork White Oak Bayou can be seen south of White Oak Bayou. Residential and commercial development is present along Hempstead Road.

4.1.5 1970 Houston, TX SATSUMA Topographic Map

The 1970 topographic map depicts several changes. The riparian areas along White Oak Bayou are now smaller. Wetlands can be seen north and west of the project area. A pipeline is now visible north of the project alignment. Several paved streets are north and west of the project area such as Breen Road, Windfern Road, Taub Road and Philippine Road. The proposed project alignment is southeast of the Fairbanks Oil Fields. The unpaved road that was near the present day Hollister Road alignment has shifted to the west slightly and is now more defined. The elevation is now in the ranges from 115 to 90 feet above sea level.

4.1.6 1982 Houston, TX SATSUMA Topographic Map

The 1982 topographic map depicts several changes from the 1970 map. A larger residential development is now located at the eastern border of the project alignment with several side streets and cul-de-sacs east of the project area. The City of Houston corporate limits are now visible along the project alignment at Hollister Road. Hollister Road is now a paved road at its present day location. West Gulf Bank Road is now visible. Oil Wells and pipelines are visible north of the project alignment. Several unpaved roads are now present along the western portion of the project alignment. The riparian areas along White Oak Bayou have now shrunk. The topography has continued to level off in the area with the elevation now ranging from 115 feet northwest of the project area to 95 feet in the southwest portion of the quadrangle map. Wetland are still present north and west of the project area, but they are becoming smaller and less numerous. A sewage disposal plant is now present west of the project alignment along with a water tank.

4.1.7 1995 Houston, TX SATSUMA Topographic Map

The 1995 topographic map depicts several changes from the 1982 map. Residential development can now be seen along the western border of the project alignment with side streets and cul-de-sacs. The residential areas have expanded in the region and most the surrounding area is developed. Small areas of wetlands are still present to the north, but they are become smaller and less numerous. The wetlands to the west are no longer present (with the exception of one isolated area). The riparian areas of White Oak Bayou are now almost non-existent. A man-made detention facility can be seen west of the project area. Beltway 8 is now present in the western portion of the quadrangle map.

4.2 Aerial Photograph Review

Historical aerial photographs were reviewed to determine historical land use, identify evidence of surface anomalies and/or disturbances, and describe general land changes. Historical aerial photographs were obtained for the years 1938, 1944, 1953, 1966, 1973, 1979, 1983, 1989, 1995, 2004, 2005, 2006, 2010, and 2012. The historic aerial photographs are included in Appendix F.

4.2.1 1938 Photograph

The 1938 aerial shows very little by way of disturbance or development in the project area. There appears to be noticeable riparian area along White Oak Bayou. North of the project area, north of the project area, pimple mounds are visible. The area is primarily undisturbed. A single residence can be seen east of the project alignment.

4.2.2 1944 Photograph

The 1944 photograph shows several small residences in the areas surrounding the project alignment. These residences are connected by unpaved roads. The riparian zone along White Oak Bayou is still present along with the pimple mounds to the north of the project alignment.

4.2.3 1953 Photograph

The 1953 photograph is very similar to the 1944 photograph. No significant changes are noted on the map.

4.2.4 1966 Photograph

The 1966 photograph shows White Oak Bayou has been modified and is now more defined. The channel was now excavated and levees were added around the bayou. The riparian areas have grown slightly; however the pimple mounds that were formerly present have now disappeared. A small detention pond can now be seen west of the project alignment.

4.2.5 1973 Photograph

The 1973 photograph shows significant changes. A residential area on the eastern border of the project alignment is now present. Hollister Road is also visible and paved. West Gulf Bank Road is also present. The former single residences in the eastern portion of the project are no longer present and single family residential developments are in their place. Arterial streets and cul-de-sacs are now visible east of the project alignment. The riparian areas along White Oak Bayou to the east are now minimal.

4.2.6 1979 Photograph

The 1979 photograph shows that the area continues having residential development. The western border of the project alignment shows a residential development with arterial streets and cul-de-sacs. The riparian areas along White Oak Bayou have disappeared throughout the project. The area is now predominately residential. A Harris County Flood Control ditch is now present west of the project area and north of White Oak Bayou. A water treatment plant with water storage and above ground tanks is visible west of the project alignment.

4.2.7 1983 Photograph

The 1989 photograph shows that the area has had few changes since the 1979 photograph. To the southeast of the project area, a wooded area has now grown. Also a neighborhood southwest of the project alignment is present just south of White Oak Bayou. Residential development has grown and is still present to the north of the project area. One area in the northwest portion of the project alignment is still undeveloped.

4.2.8 1989 Photograph

The 1989 photograph is very similar to the 1983 photograph. No significant changes are noted on the map.

4.2.9 1995 Photograph

The 1995 photograph is very similar to the 1989 photograph. No significant changes are noted on the map.

4.2.10 2004 Photograph

The 2004 infrared aerial shows the wooded area southeast of the project alignment being transformed into a large detention facility. Several residence in the development southwest of the project alignment (south of White Oak Bayou) have disappeared leaving small empty tracts of land.

4.2.11 2005 Photograph

The 2005 photograph is very similar to the 2004 photograph. No significant changes are noted on the map.

4.2.12 2006 Photograph

The 2006 photograph is very similar to the 2005 photograph. A few more residences in the development southwest of the project alignment (south of White Oak Bayou) have disappeared leaving small empty tracts of land.

4.2.13 2010 Photograph

The 2010 infrared aerial shows the large detention facility with water now present in the pond area and spillway connecting White Oak Bayou and the detention facility. Most residence in the development southwest of the project alignment (south of White Oak Bayou) have disappeared leaving more small empty tracts of land.

4.2.14 2012 Photograph

The 2012 aerial shows the large detention facility with more water now present in the pond area. The residential area southwest of the project alignment is now abandoned with the exception of a few properties. An aerial waterline is now seen crossing White Oak Bayou south of the project alignment.

5 WETLAND DELINEATION

The wetland delineation was conducted within the project ROW in August, 2014. The wetland delineation was performed in accordance with the guidelines listed in the 1987 Army Corps of Engineers Wetlands Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region. Data points were sampled in areas that exhibited topographic depressions, wetland hydrology or changes in the vegetative community. The soils were characterized based on those listed in the Soil Survey of Harris County, Texas. A Munsell Soil Color book was used to determine soil colors. The dominant vegetation for each stratum was determined at each data point location using the 50/20 rule. The plant indicator status of each species was determined using the *National List of Plant Species That Occur in Wetlands: Texas*. Wetland hydrology was determined by the presence of primary and secondary field indicators. Wetland data forms were completed for each data point location (see Appendix I). All data points and delineated areas were recorded using a TRIMBLE GEO EXPLORER 2008/3000 SERIES global positioning system. A summary of the data recorded in the field are included in Appendix K.

Available data resources were also reviewed for indicators depicting the possible presence of waters of the U.S., including wetlands. A National Wetlands Inventory (NWI) map was reviewed in conjunction with the USGS topographic maps for Satsuma, TX and Addicks, TX (Appendix C), the Soil Survey of Harris County map (Appendix B) and aerial photographs (Appendix F). Supportive data and a map of the sampling locations are included in Appendix J and site photography taken during the site visit is included in Appendix H.

A wetland delineation was conducted along Hollister Road from West Gulf Bank Road to White Oak Bayou. The project ROW consists of maintained herbaceous vegetation, paved residential and

commercial driveways, and upland drainage ditches. It was determined that conditions were normal at the site.

One upland data point and one wetland data point were surveyed to confirm the presence of wetland conditions at the site. One wetland area was identified and delineated. An upland data point (Up1) was taken to determine the wetland boundaries at the area that exhibited little or no hydrology indicators. No hydrologic indicators were observed at the upland point (Up1). The upland vegetation was predominantly Bermuda grass (*Cynodon dactylon)* and Vasey's grass *(Paspalum urvillei)*. This point did not exhibit all three criteria required for wetland conditions The soil observed at data point Up1 consisted of a medium chroma color (10YR 5/4) Loamy Sand per the Munsell Soil Color Book.

A wetland data point (Wet1) was taken inside the wetland area showing hydrology indicators. Data point Wet 1 exhibited three primary hydrology indicators (water marks, drift deposits and iron deposits) and two secondary indicators (drainage patterns and crawfish burrows. The vegetation observed at the wetland point (Wet1) consisted primarily of alligatorweed (*Alternanthera philoxeroides*), and Green flatsedge *(Cyperus virens).* The the first inch of soils observed at data point Wet1 consisted of a medium chroma color (10YR 5/4) Loamy Sand and from depth 2 inch – 16 inch the soils corresponded to low chroma color (10 YR 3/1) Sandy Loam with a reduced matrix and some redox features. Wetland Data Sheets are located in Appendix I.

Several delineation points were taken along the wetland boundary to define the wetland area (GPS data is shown in Appendix K). Wetland 1 covers an area of approximately 0.1882 acres located inside the ROW limits and within the 100 year floodplain. Wetland 1 is connected to a culvert that flows to a storm sewer along Hollister Road which outfalls into White Oak Bayou.

6 SUMMARY

Wetland Area Status Table

Site	Acreage	Potential Jurisdictional Status
West Side Roadside Drainage Ditch	0.1882	Yes

A total of one wetland area was identified within the project ROW. The wetland area met the criteria for hydrophytic vegetation, wetland hydrology and hydric soils. The total area of the delineated wetland is 0.1882 acres. The wetland is connected to White Oak Bayou, which is a Water of the U.S. and is also located within the 100-year floodplain. It is likely that the United States Army Corps of Engineers (USACE) will consider the wetland jurisdictional and require permitting for any construction resulting in the placement of dredged or fill material within the delineated area boundaries. The USACE-Galveston District has the final authority to determine which areas are considered jurisdictional. It is recommended that this wetland delineation report be submitted to the USACE for further coordination concerning applicable permitting and jurisdictional determination for the described wetland site.

7 QUALIFICATIONS AND SIGNATURE

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in §312.10. I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

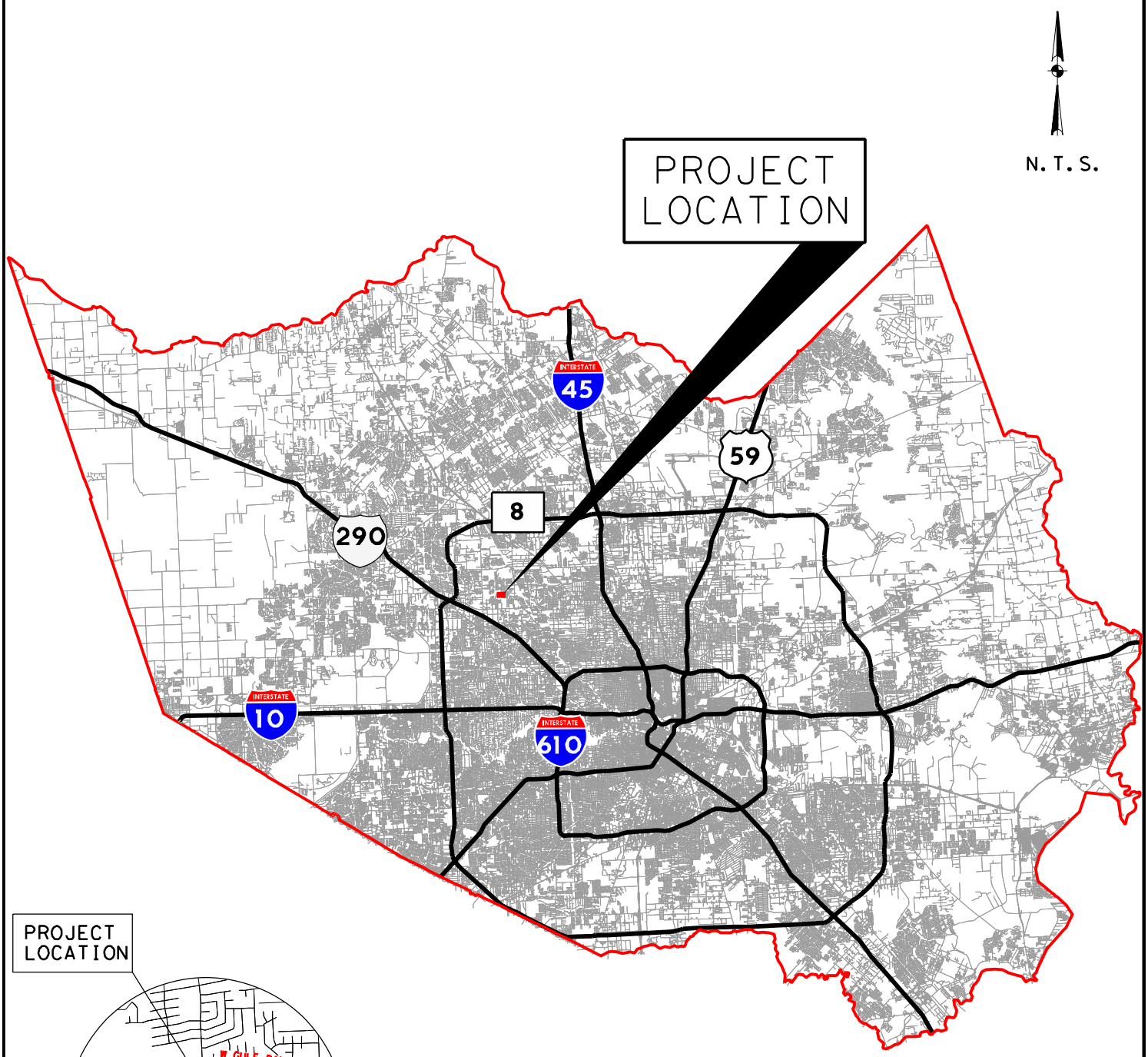
DAVID ATKIN, PH.D.

PRINCIPAL PROFESSIONAL ASSOCIATE/CERTIFIED SENIOR PROJECT MANAGER

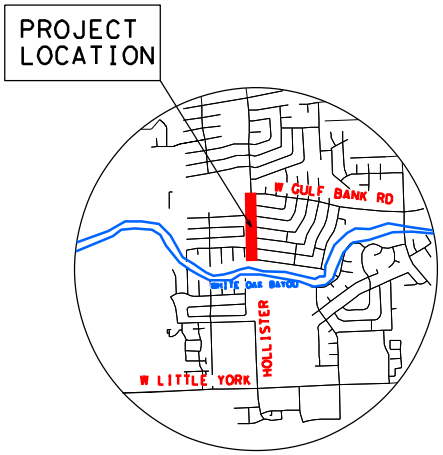
PARSONS BRINCKERHOFF

APPENDIX A

AERIAL LOCATION MAP



HARRIS COUNTY VICINTY MAP



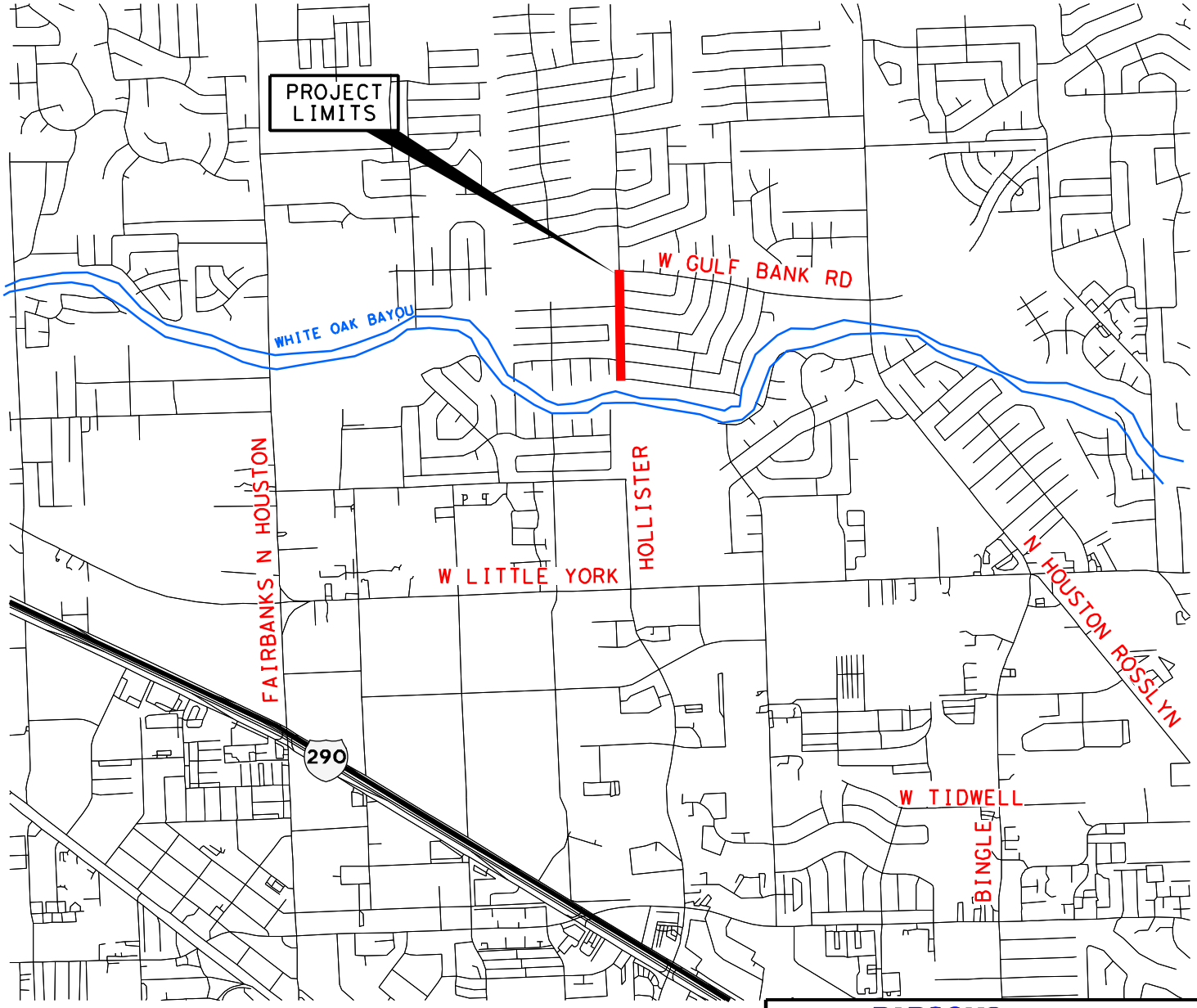
DETAIL OF PROJECT LOCATION

PARSONS BRINCKERHOFF
16285 Park Ten Place, Suite 400
Houston, TX 77084 TBPE # 2263

HOLLISTER ROAD
FROM W GULF BANK
TO NORTH OF WHITE OAK BAYOU

PROJECT VICINITY MAP

JANUARY 2015



0 1,250 2,500

COUNCIL DISTRICT A
KEY MAP NO. 410 R,V
WBS NO. N-000-704-0001-3

PARSONS BRINCKERHOFF
16285 Park Ten Place, Suite 400
Houston, TX 77084 TBPE * 2263

HOLLISTER ROAD FROM W GULF BANK TO NORTH OF WHITE OAK BAYOU

PROJECT LOCATION MAP

JANUARY 2015

APPENDIX B

SOILS MAP


95° 30' 36" W
95° 30' 13" W
257600
257700
257800
257900
258000
258100
258200
29° 52' 51" N
29° 52' 23" N
3308200
3308100
3308000
3307900
3307800
3307700
3307600
3307500
3307400
Hollister St
Gulf Bank
Hannon Dr
Garsee Dr
Kellwood Dr
Cd
Vernwood St
Mosewood St
Abba Wood
Breezeway St
Loren Ln
Na
Williams St
Whiteoak Bayou
Map Scale: 1:4,130 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 50 100 200 300
Feet
0 200 400 800 1200
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Harris County, Texas
Survey Area Data: Version 11, Sep 20, 2012

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 26, 2011—Mar 6, 2011

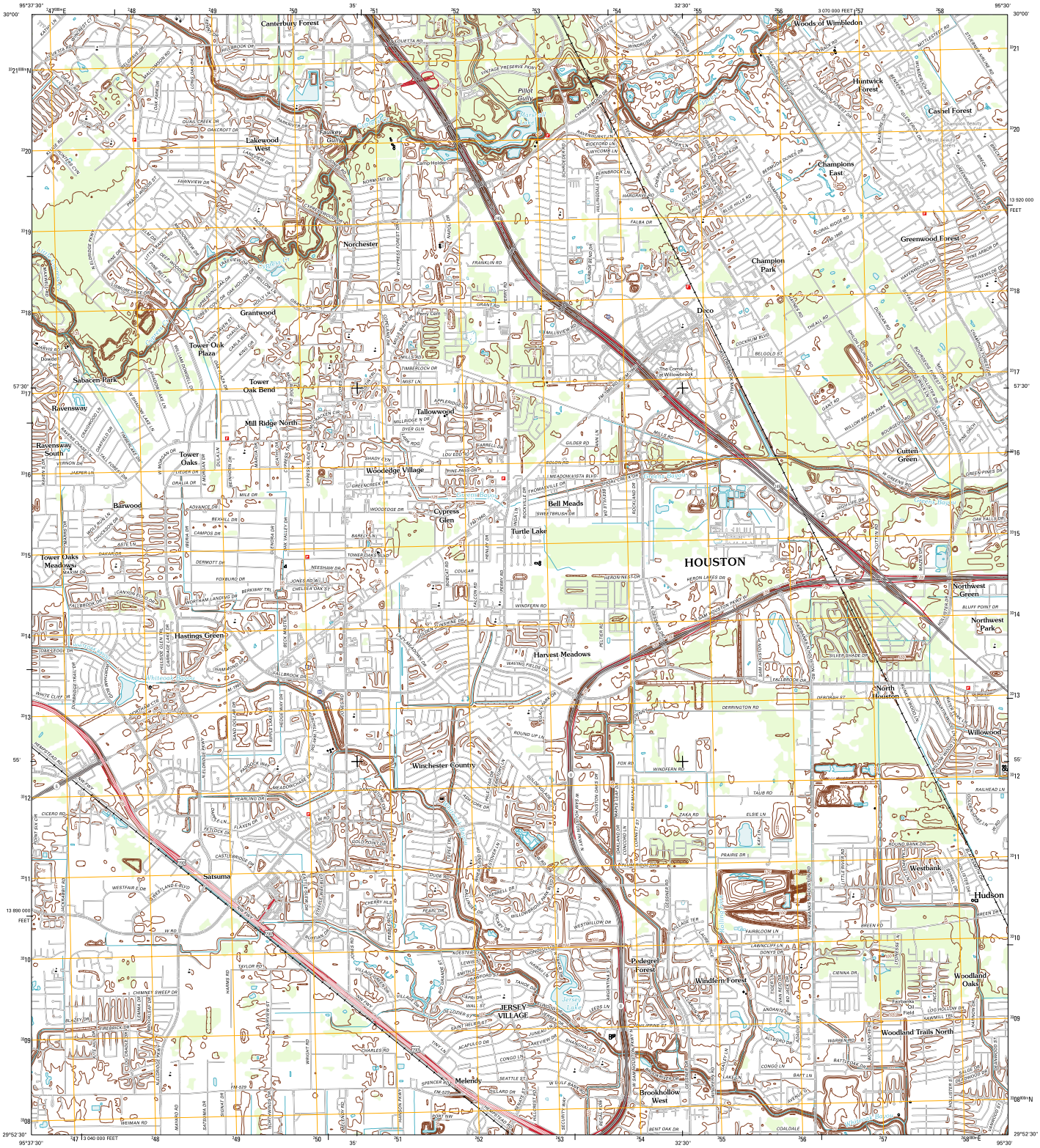
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Harris County, Texas (TX201)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Cd	Clodine loam	14.5	75.3%
Na	Nahatche loam	4.7	24.7%
Totals for Area of Interest		**19.2**	**100.0%**

APPENDIX C

TOPOGRAPHIC MAP



U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

USGS science for a changing world

The National Map US Topo

SATSUMA QUADRANGLE
TEXAS-HARRIS CO.
7.5-MINUTE SERIES

Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 15R
10 000-foot ticks: Texas Coordinate System of 1983 (south central zone)

Imagery.....NAIP, May 2010
Roads.....©2005–2012 TomTom
Names.....GNIS, 2012
Hydrography.....National Hydrography Dataset, 2010
Contours.....National Elevation Dataset, 2010
Boundaries.....Census, BWC, IBC, USGS, 1972 - 2012

UTM GRID AND 2013 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
TP
Grid Zone Designation
15R

SCALE 1:24 000

1 0.5 0 1 2 KILOMETERS
1000 500 0 METERS 1000 2000
1 0.5 0 1 MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

CONTOUR INTERVAL 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.7

TEXAS
QUADRANGLE LOCATION

Rose Hill	Tomball	Spring
Cypress	Satsuma	Aldine
Addicks	Hedwig Village	Houston Heights

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

Interstate Route	State Route
US Route	Local Road
Ramp	4WD

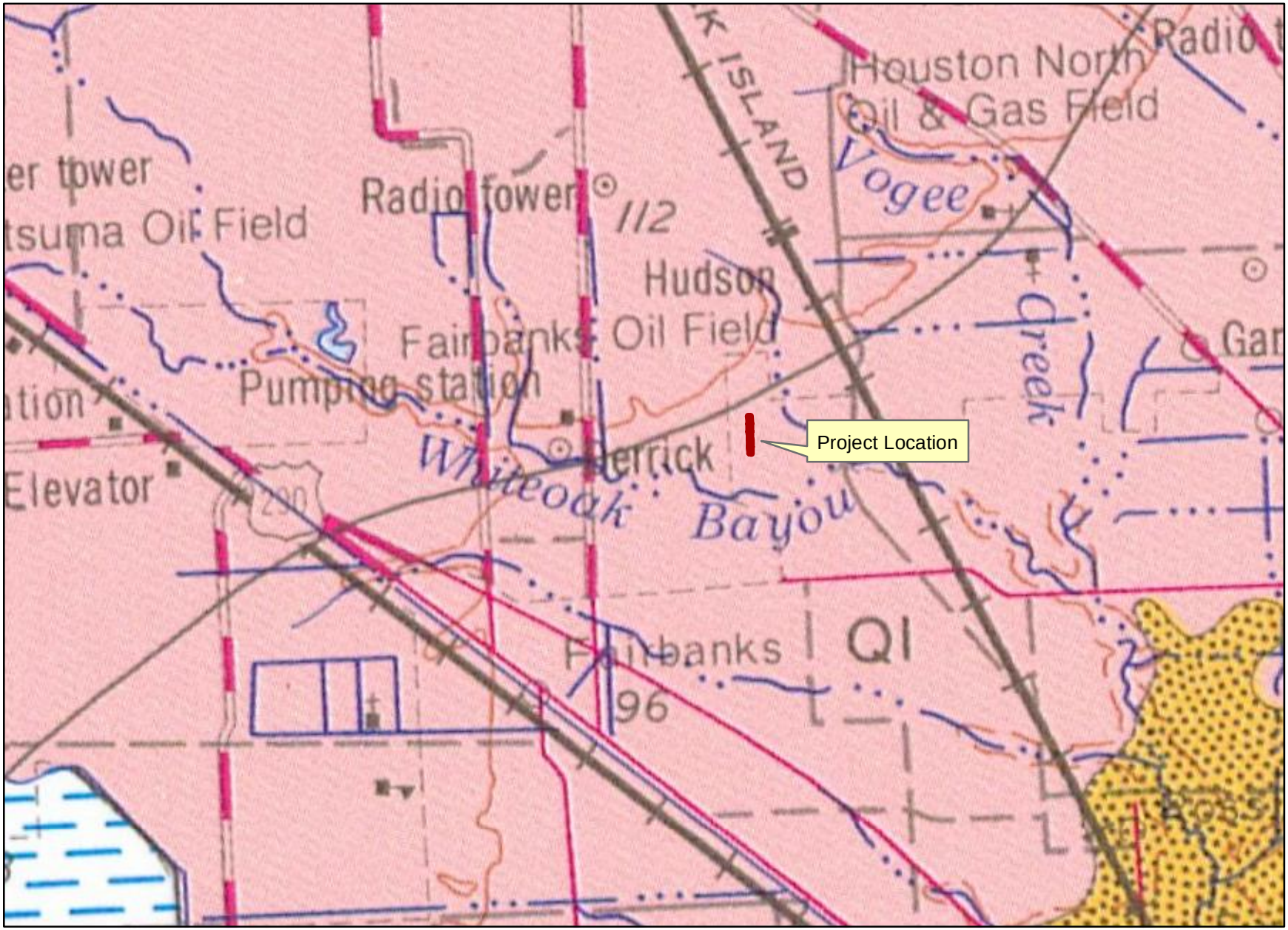
Interstate Route US Route State Route

SATSUMA, TX
2013

APPENDIX D

GEOLOGIC ATLAS

GEOLOGIC ATLAS



PARSONS BRINCKERHOFF

0 0.5 1 2 Miles

Source: Geologic Atlas of Texas
Houston Sheet, Rev 1982

See legend in following page.

EXPLANATION

Fill and spoil

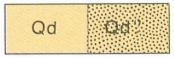
Fill, F, material dredged for raising land surface above alluvium and barrier-island deposits and for creating land. Spoil, S, dredged material along waterways

Alluvium

Clay, silt, and sand, organic matter abundant locally; includes point-bar, natural levee, stream channel, backswamp, coastal marsh, mud-flat, and narrow beach deposits that are shown by line symbol

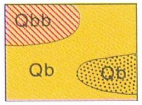
Barrier-island deposits

Sand, silt, and clay; mostly sand, well-sorted, fine-grained, abundant shells and shell fragments; interfingers with clay and silt in landward direction; includes beach ridge, spit, tidal channel, tidal-delta, and sand dune deposits



Deweyville Formation

Sand, silt, and clay, some gravel; includes point-bar, natural levee, stream channel, and backswamp deposits at a level only slightly above that of the present floodplain; sand coarser than that in alluvium; surface characterized by relict meanders of much larger radius of curvature than those of present streams, some scattered pimple mounds; thickness locally more than 50 feet. High-level Deweyville, Qd?, surfaces cut into the Beaumont Formation, and high-level Deweyville deposits along Trinity River are intermediate in position between the surface of the Beaumont and the level of most Deweyville deposits



Beaumont Formation

Beaumont Formation, Qb, with barrier-island and beach deposits, Qbb, mapped separately. Beaumont Formation, Qb, mostly clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud-flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of low, relatively smooth, featureless backswamp deposits without pimple mounds; thickness ± 100 feet. The stippled overprint (source shown in Index to Geologic Mapping) shows areas that are "Dominantly clay and mud of low permeability, high water-holding capacity, high compressibility, high to very high shrink-swell potential, poor drainage, level to depressed relief, low shear strength, and high plasticity; geologic units include interdistributary muds, abandoned channel-fill muds, and overbank fluvial muds." The nonstippled areas are "Dominantly clayey sand and silt of moderate permeability and drainage, low to moderate compressibility and shrink-swell potential, level relief with local mounds and ridges, and high shear strength; geologic units include meanderbelt, levee, crevasse splay, and distributary sands"

Holocene

Holocene or late (?) Pleistocene

Pleistocene

QUATERNARY

Barrier-island and beach deposits, Qbb, mostly fine grained sand normally without shell material; surface slightly higher than that of surrounding deposits, characterized by numerous pimple mounds and rounded depressions; probably part of "Ingleside" barrier-island system; thickness less than 30 feet
Physical properties: "Dominantly sand, high to very high permeability, low water-holding capacity, low compressibility, low shrink-swell potential, good drainage, low ridge and depressed relief, high shear strength, and low plasticity. Geologic units include beach, foredunes, barrier-strandplain-chenier vegetated flats, Pleistocene barrier and strandplain sands"

Lissie Formation

Upper part, clay, silt, sand, and very minor siliceous gravel of granule and small pebble size, gravel more abundant northwestward, locally calcareous, concretions of calcium carbonate, iron oxide, and iron-manganese oxides common in zone of weathering; fluviatile; surface fairly flat and featureless except for numerous rounded shallow depressions and pimple mounds. Lower part, clay, silt, sand, and minor amount of gravel; gravel slightly coarser than in upper part, noncalcareous, iron oxide concretions more abundant than in upper part; fluviatile; very gently rolling; thickness ± 200 feet

Willis Formation

Clay, silt, sand, and minor siliceous gravel of granule to pebble size including some petrified wood; sand coarser than in younger units. Deeply weathered and lateritic, indurated by clay and cemented by iron oxide locally, concretions of iron oxide numerous, noncalcareous; fluviatile; maximum thickness 75 feet

Tertiary rocks on Hockley salt dome

Sandstone, very fine grained, hard, abundant porcelaneous to opaline cement, poorly bedded, jointed, grayish white; possibly Catahoula Formation (Stenzel, 1946) (See Index of Geologic Mapping for reference.)

Pleistocene

Miocene

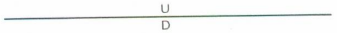
QUATERNARY

TERTIARY

CR

Outcrop of caprock reported on Damon Mound

Not found. Reportedly used for building stone (Bevier, 1925)



Fault

U, upthrown; D, downthrown side

10,000-meter Universal Transverse Mercator grid ticks, shown in blue

Partially funded by Texas Department of Water Resources

APPENDIX E

WATER RESOURCES MAP

U.S. Fish and Wildlife Service

National Wetlands Inventory

Hollister Road

Oct 23, 2013

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

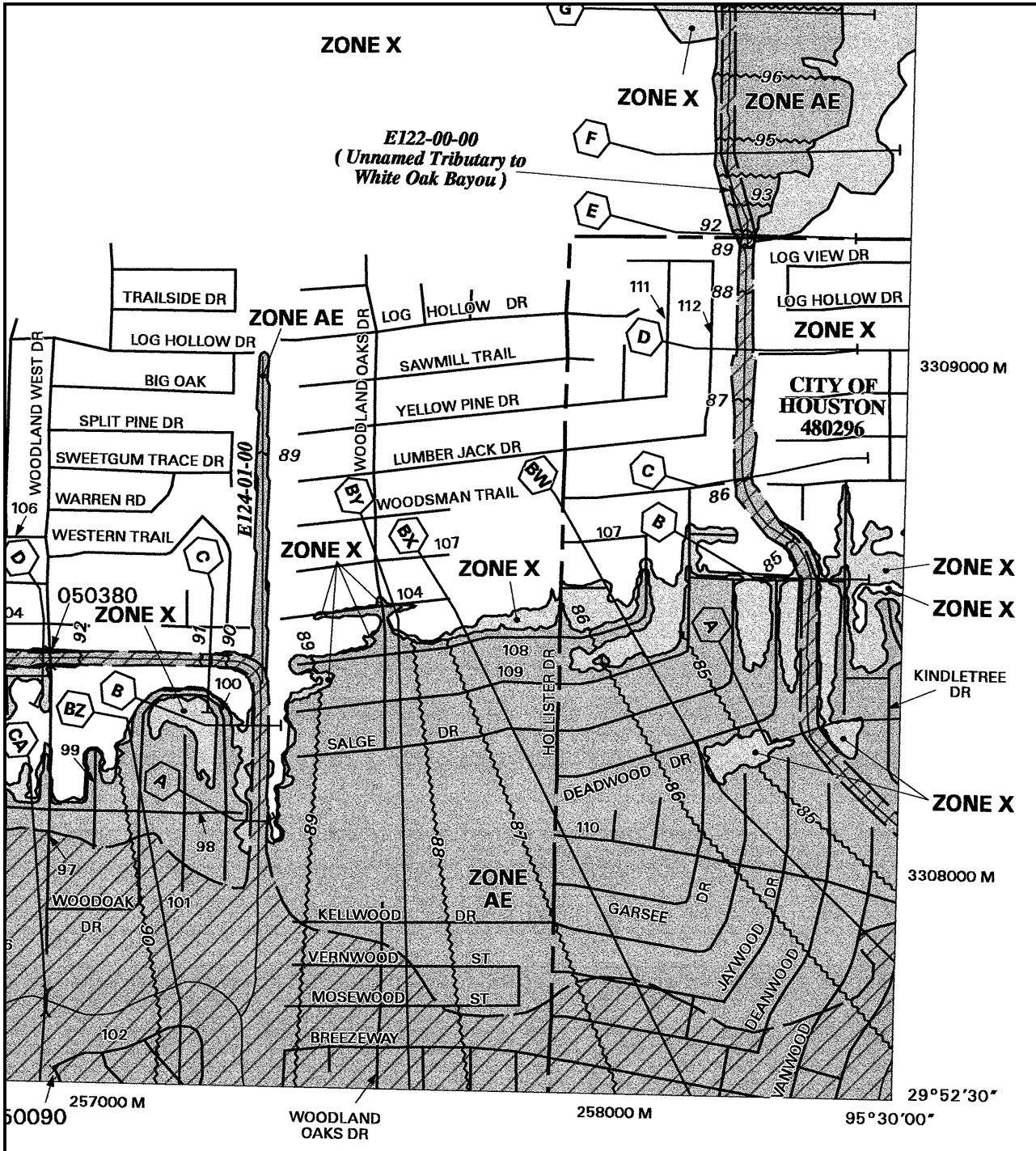
Riparian

- Herbaceous
- Forested/Shrub

Riparian Status

- Digital Data

User Remarks:



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

ME

PANEL 0445L

FIRM

FLOOD INSURANCE RATE MAP

HARRIS COUNTY,
TEXAS
AND INCORPORATED AREAS

PANEL 445 OF 1150

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

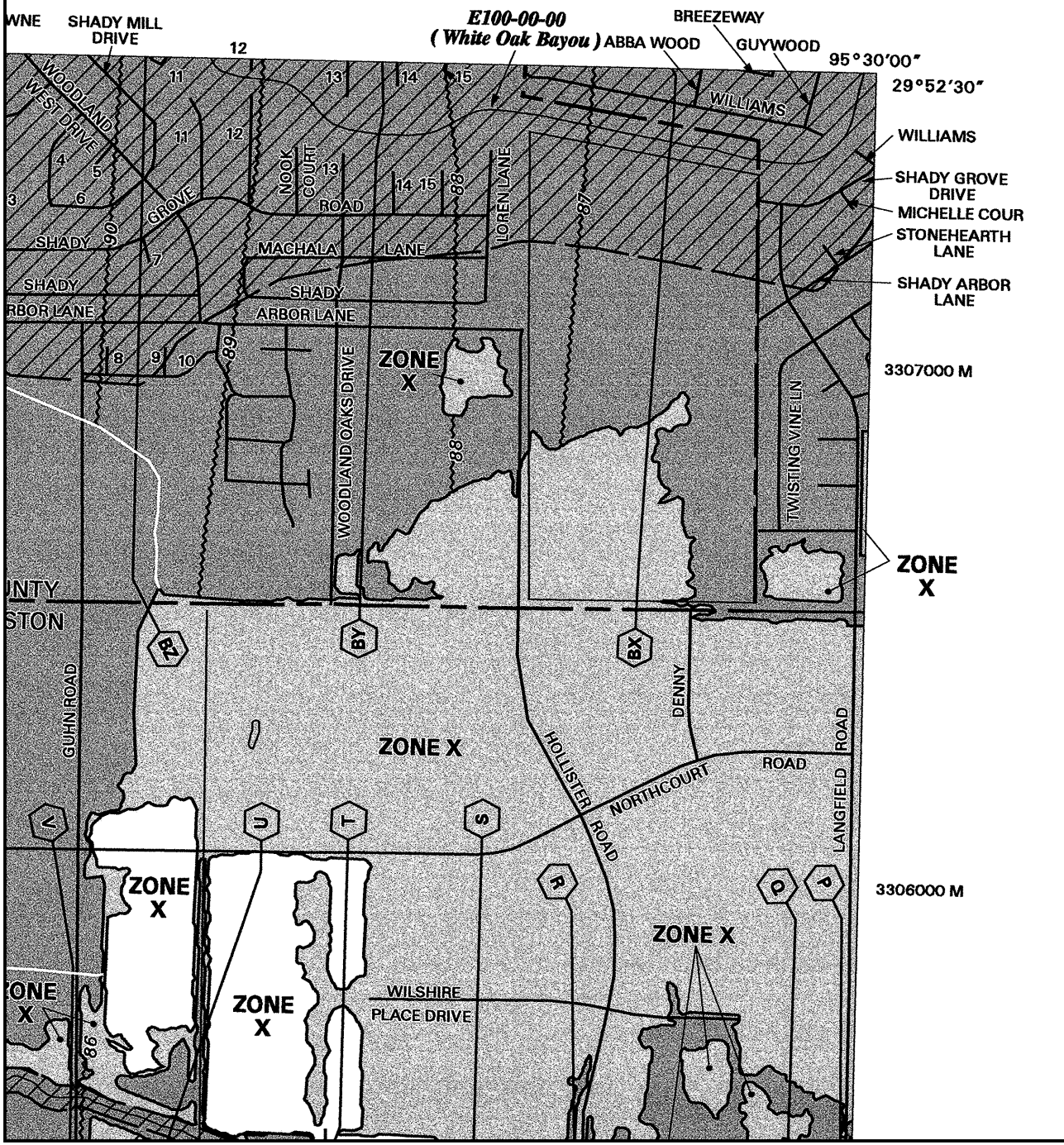
COMMUNITY	NUMBER	PANEL	SUFFIX
HARRIS COUNTY, UNINCORPORATED AREAS	480287	0445	L
JERSEY VILLAGE, CITY OF	480300	0445	L
HOUSTON, CITY OF	480296	0445	L

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48201C0445L

MAP REVISED:
JUNE 18, 2007

Federal Emergency Management Agency



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

MET

NFIP

PANEL 0635L

FIRM

FLOOD INSURANCE RATE MAP

HARRIS COUNTY, TEXAS AND INCORPORATED AREAS

PANEL 635 OF 1150

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
JERSEY VILLAGE, CITY OF	480300	0635	L
HARRIS COUNTY, UNINCORPORATED AREAS	480287	0635	L
HOUSTON, CITY OF	480296	0635	L

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

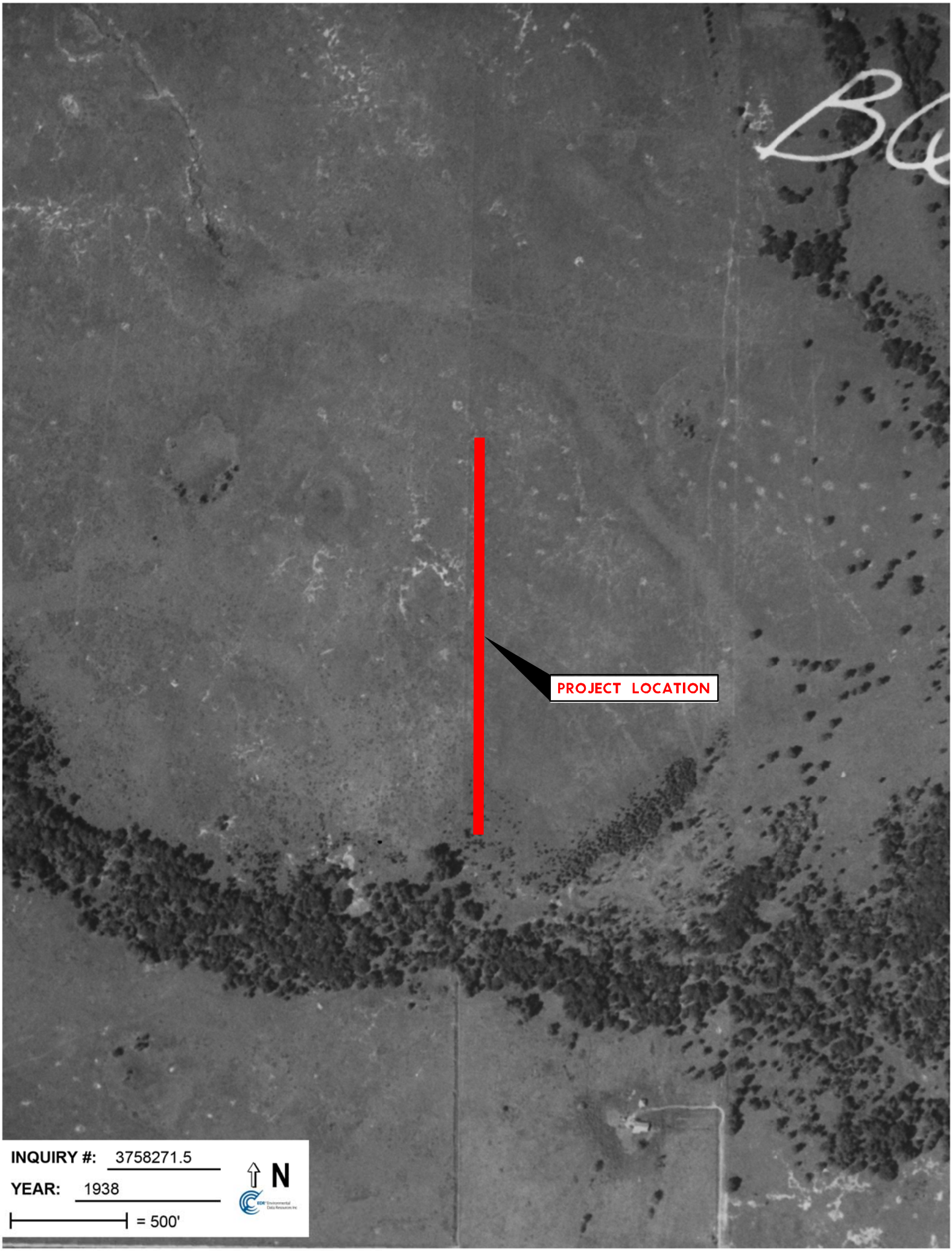
MAP NUMBER 48201C0635L

MAP REVISED: JUNE 18, 2007

Federal Emergency Management Agency

APPENDIX F

HISTORIC AERIAL PHOTOGRAPHS


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 1938
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 1944
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 1953
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 1966
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 1973
= 500'
N

INQUIRY #: 3758271.5

YEAR: 1979

= 500'

N


PROJECT LOCATION
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YEAR: 1983
= 500'
N


PROJECT LOCATION
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YEAR: 1989
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 1995
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 2004
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 2005
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 2006
= 500'
N

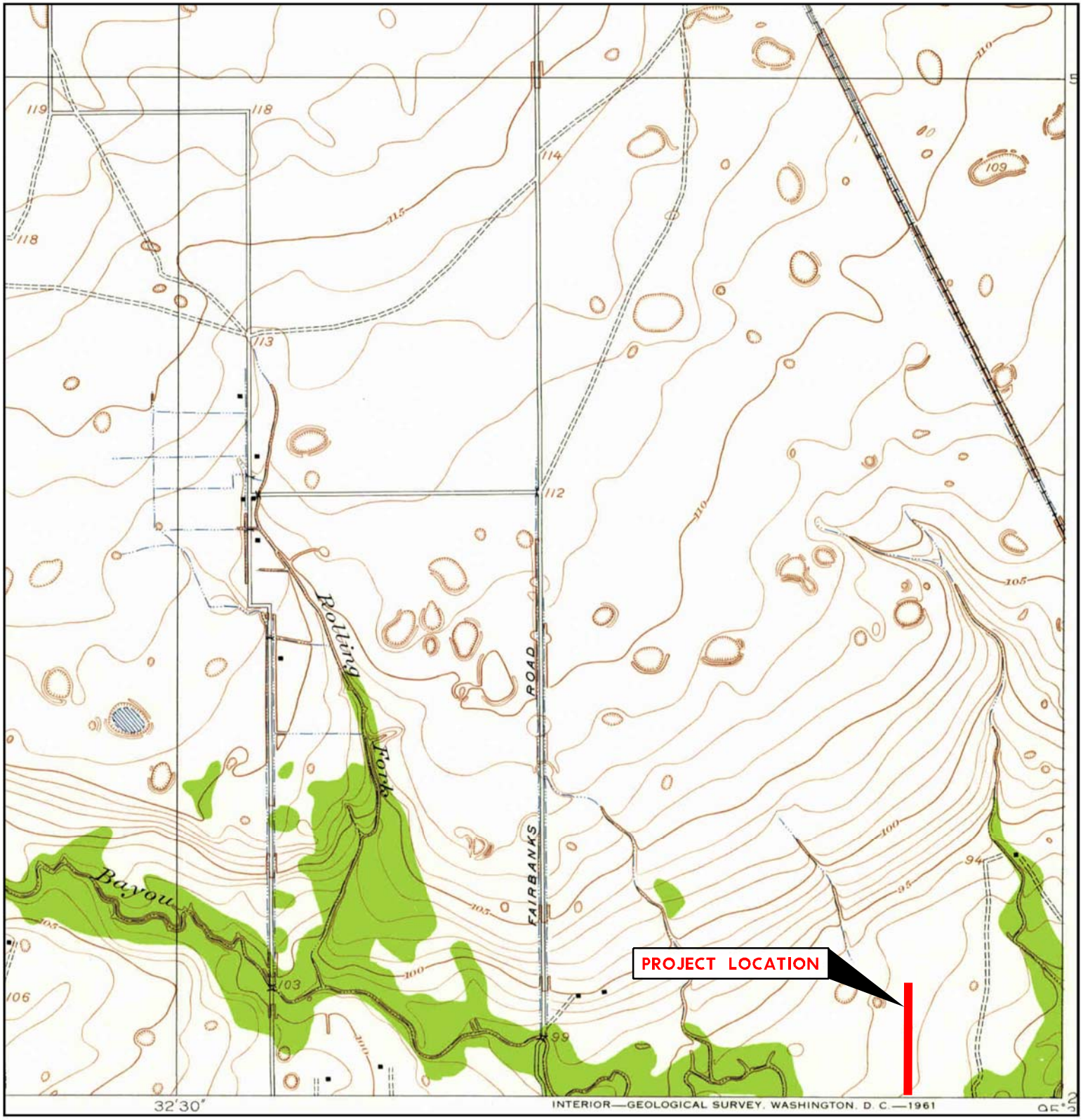

PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 2010
= 500'
N


PROJECT LOCATION
INQUIRY #: 3758271.5
YEAR: 2012
= 500'
N

APPENDIX G

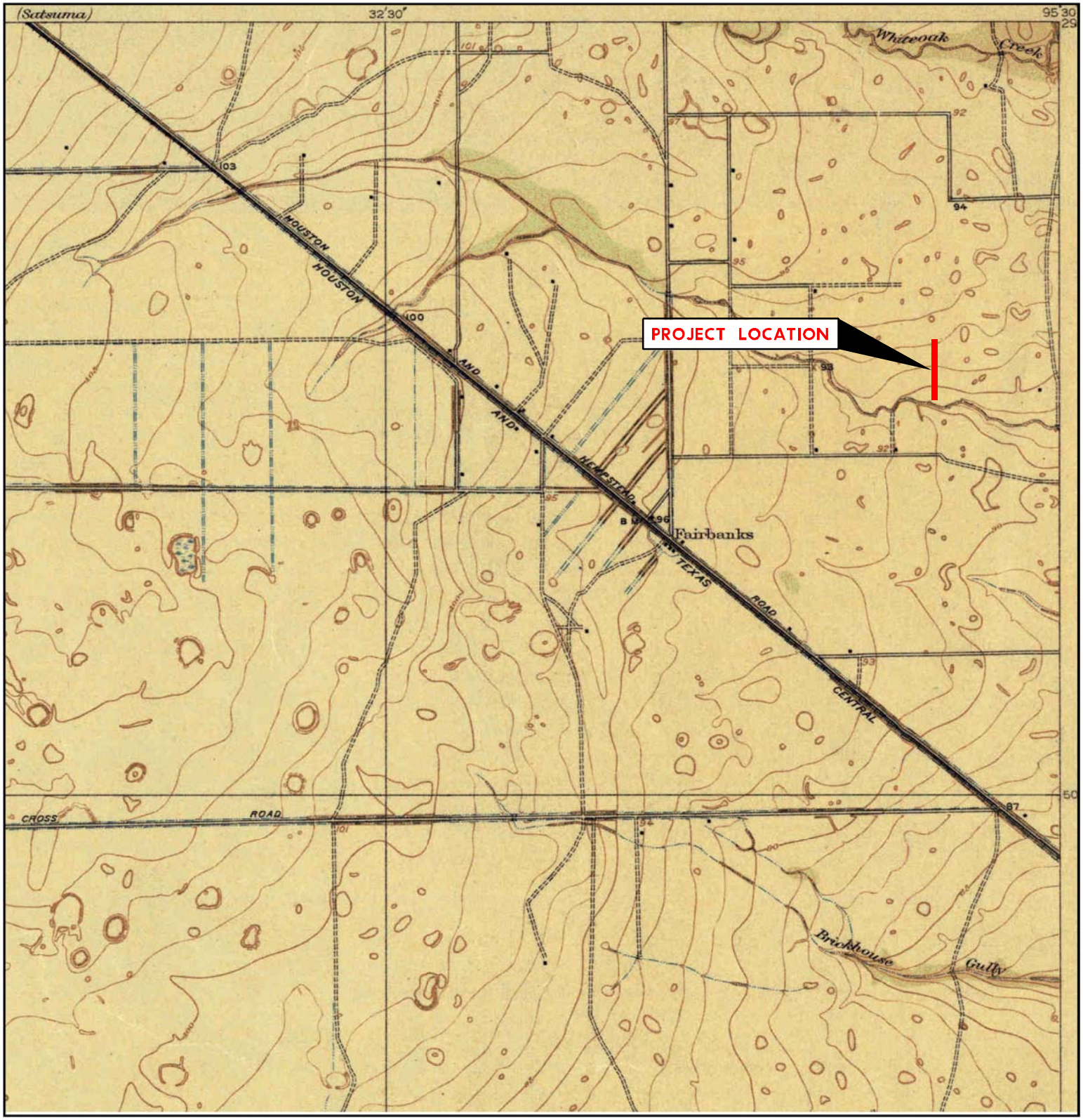
HISTORIC TOPOGRAPHIC MAPS

Historical Topographic Map



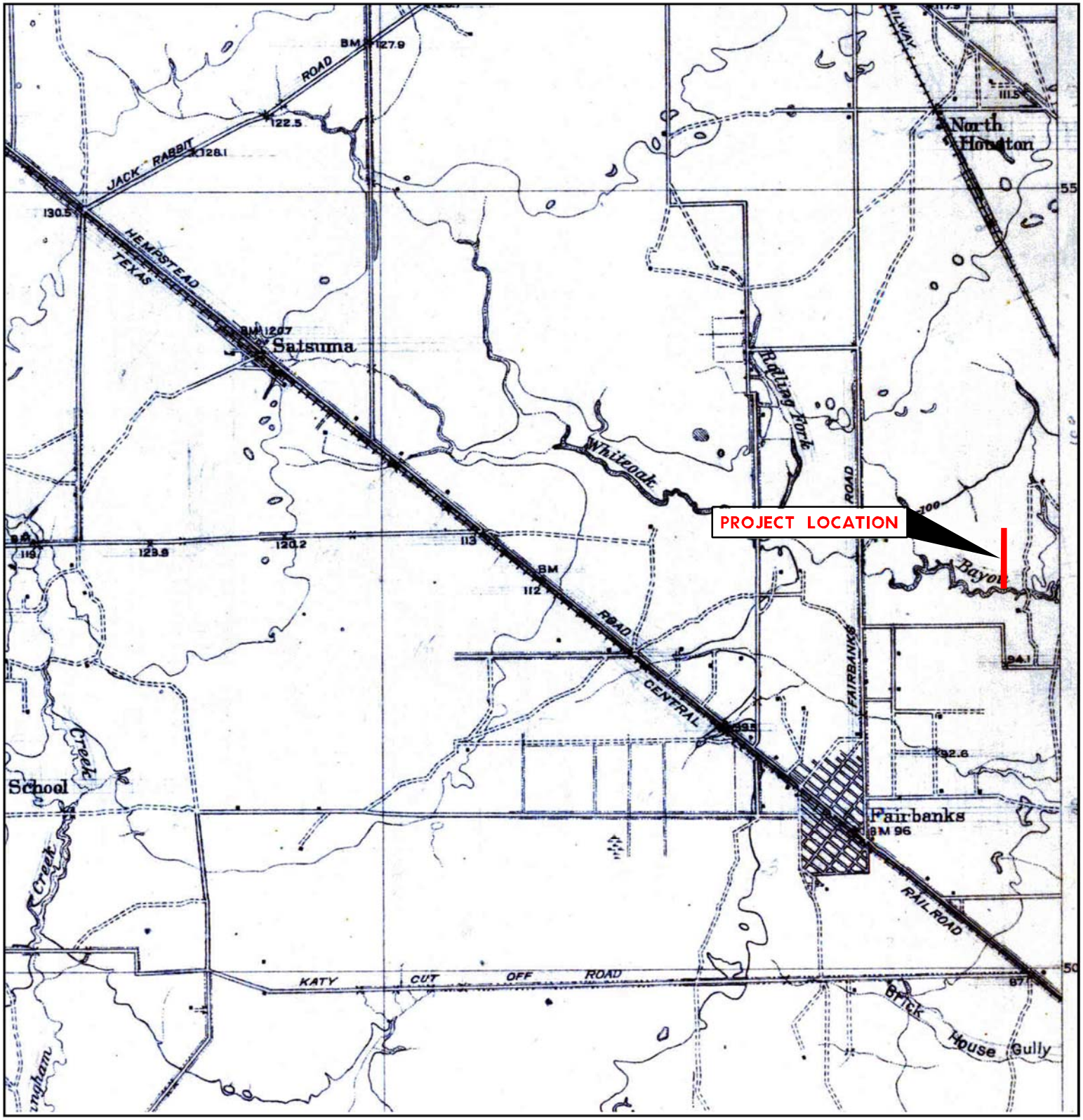
N	TARGET QUAD		SITE NAME:	Hollister Road	CLIENT:	Parsons Brinckerhoff
	NAME:	SATSUMA	ADDRESS:	9900 Hollister Road	CONTACT:	Aaron Roberts, P.E. (for Benjamin L. King, P.E.)
	MAP YEAR:	1916		Houston, TX 77040	INQUIRY#:	3758271.4
●			LAT/LONG:	29.8777 / -95.507	RESEARCH DATE:	10/15/2013
	SERIES:	7.5				
	SCALE:	1:24000				

Historical Topographic Map



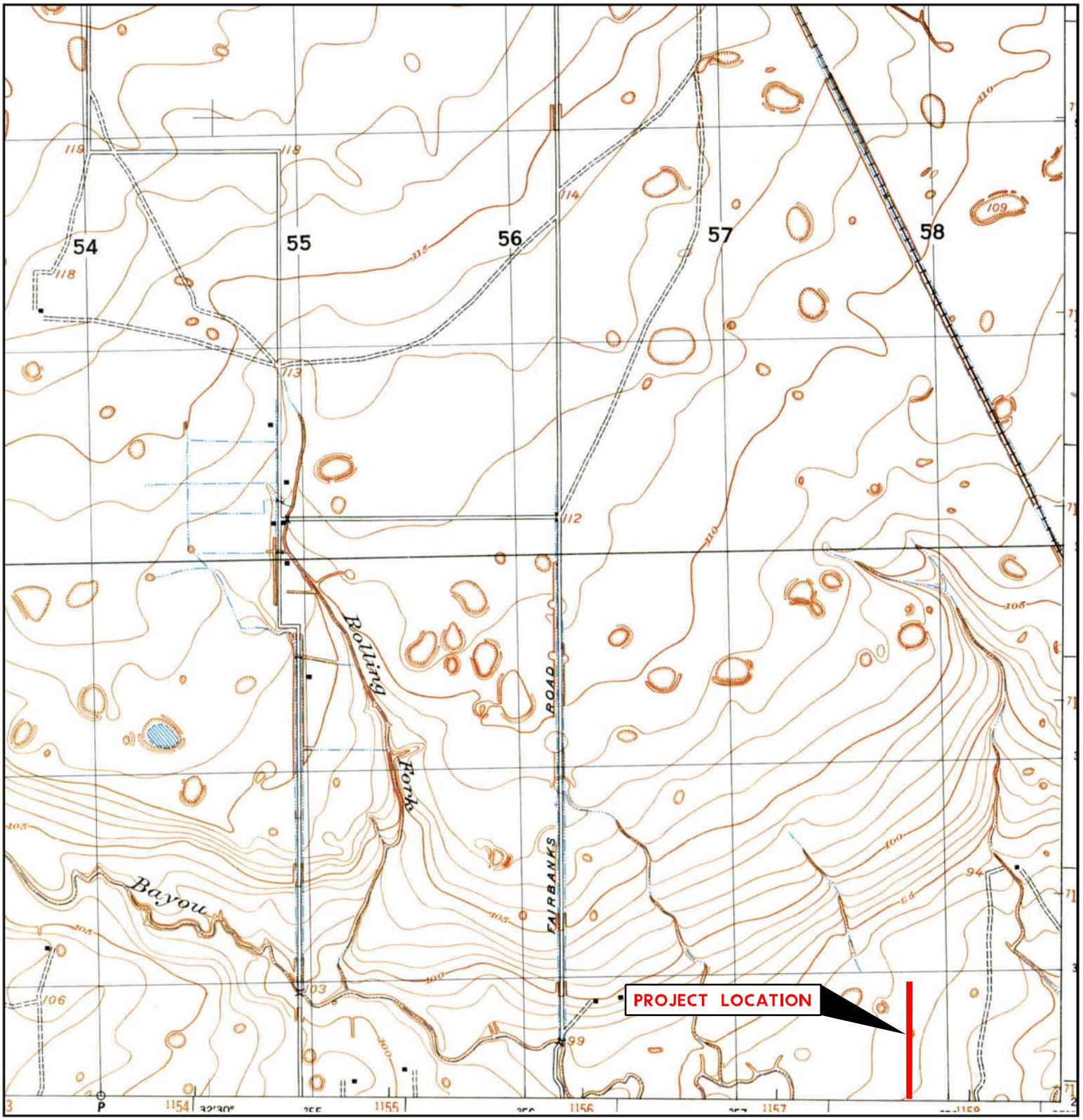
N	ADJOINING QUAD NAME: HILLENDAHL MAP YEAR: 1918	SITE NAME: Hollister Road ADDRESS: 9900 Hollister Road Houston, TX 77040	CLIENT: Parsons Brinckerhoff CONTACT: Aaron Roberts, P.E. (for Benjamin L. King, P.E.)
●	SERIES: 7.5 SCALE: 1:31680	LAT/LONG: 29.8777 / -95.507	INQUIRY#: 3758271.4 RESEARCH DATE: 10/15/2013

Historical Topographic Map



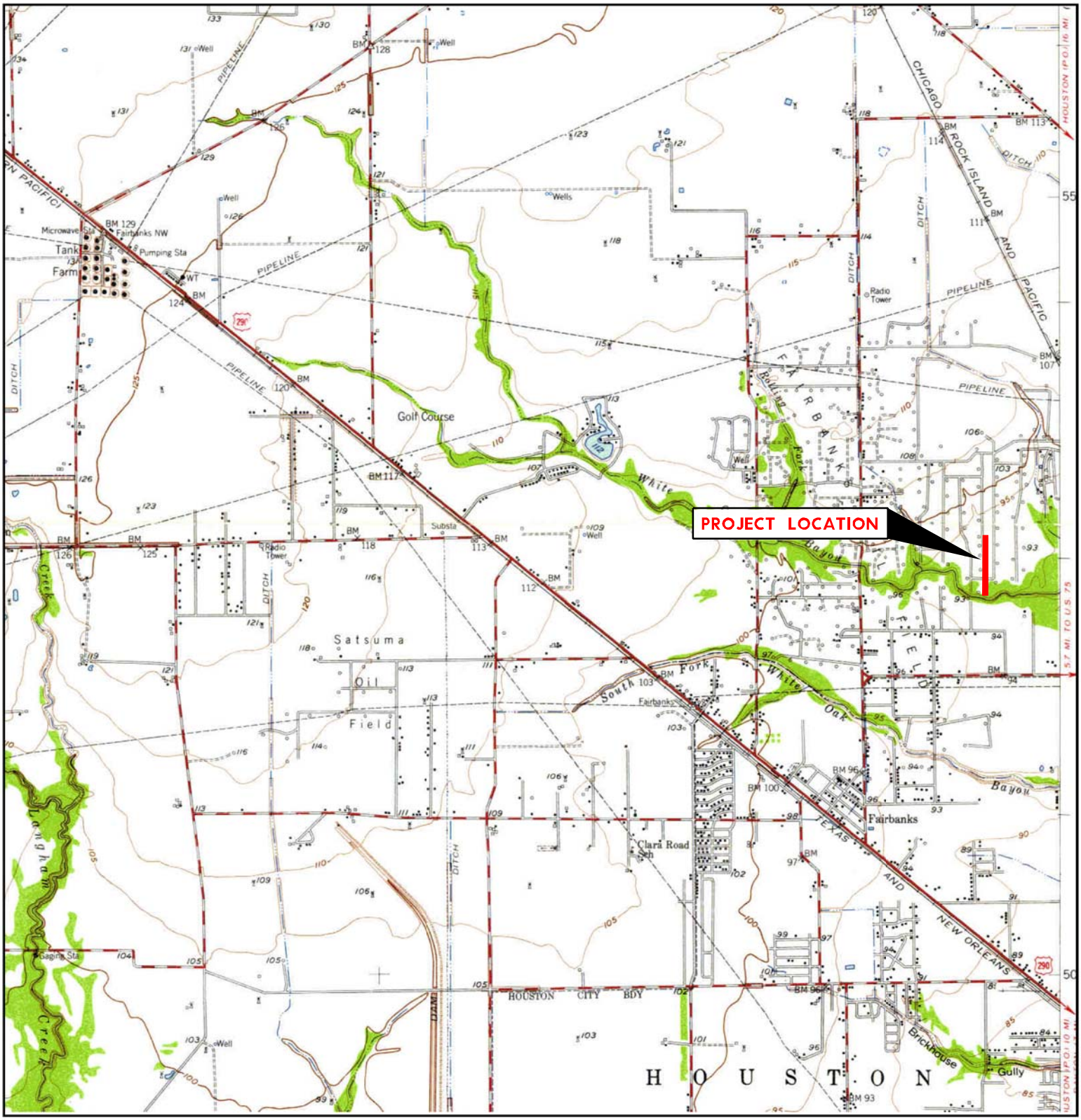
N	TARGET QUAD	SITE NAME: Hollister Road	CLIENT: Parsons Brinckerhoff
●	NAME: ADDICKS	ADDRESS: 9900 Hollister Road	CONTACT: Aaron Roberts, P.E. (for Benjamin L. King, P.E.)
	MAP YEAR: 1919	Houston, TX 77040	INQUIRY#: 3758271.4
	SERIES: 15	LAT/LONG: 29.8777 / -95.507	RESEARCH DATE: 10/15/2013
	SCALE: 1:62500		

Historical Topographic Map



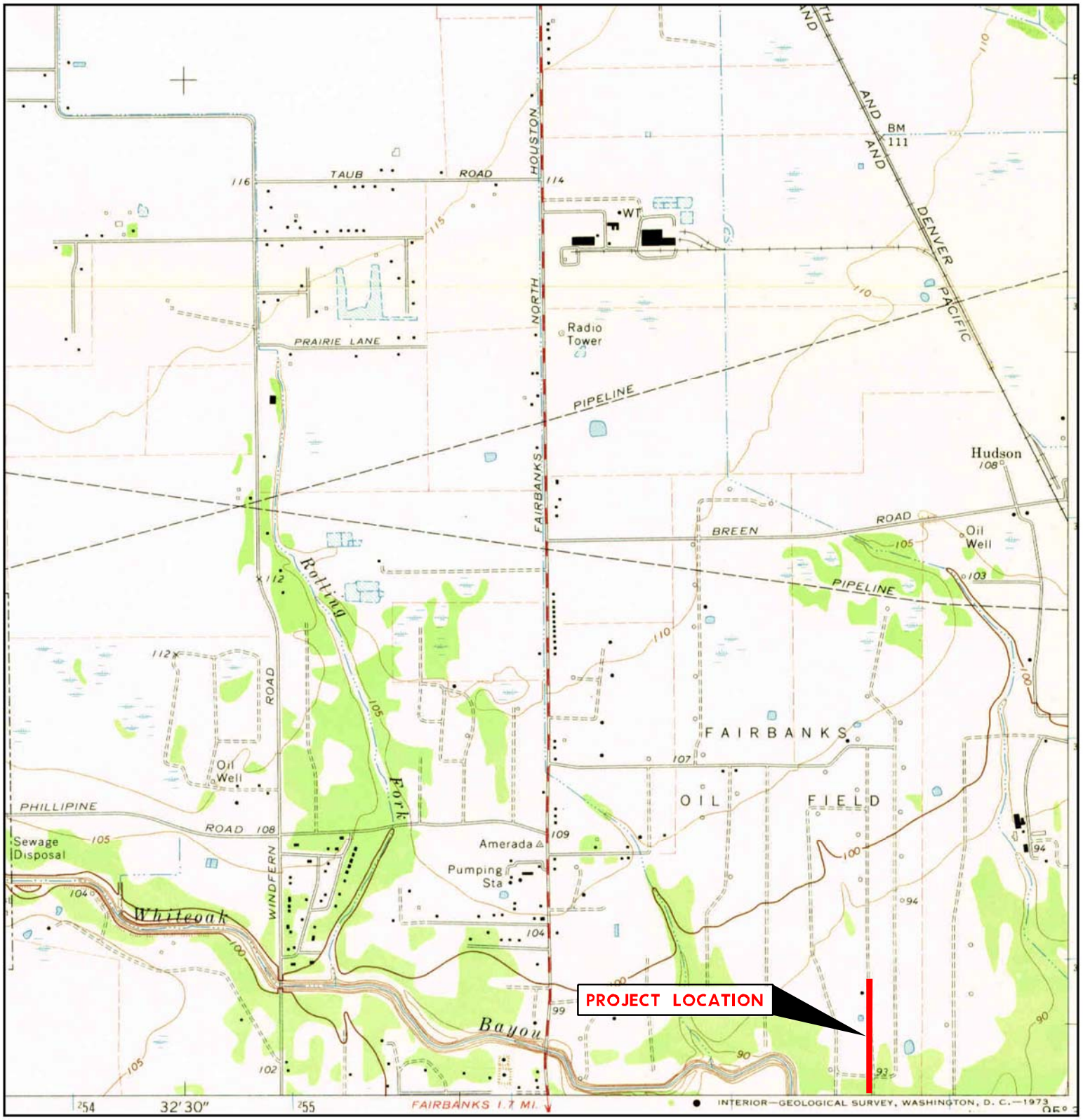
N	TARGET QUAD NAME: SATSUMA MAP YEAR: 1920 SERIES: 7.5 SCALE: 1:25000	SITE NAME: Hollister Road ADDRESS: 9900 Hollister Road Houston, TX 77040 LAT/LONG: 29.8777 / -95.507	CLIENT: Parsons Brinckerhoff CONTACT: Aaron Roberts, P.E. (for Benjamin L. King, P.E.) INQUIRY#: 3758271.4 RESEARCH DATE: 10/15/2013

Historical Topographic Map



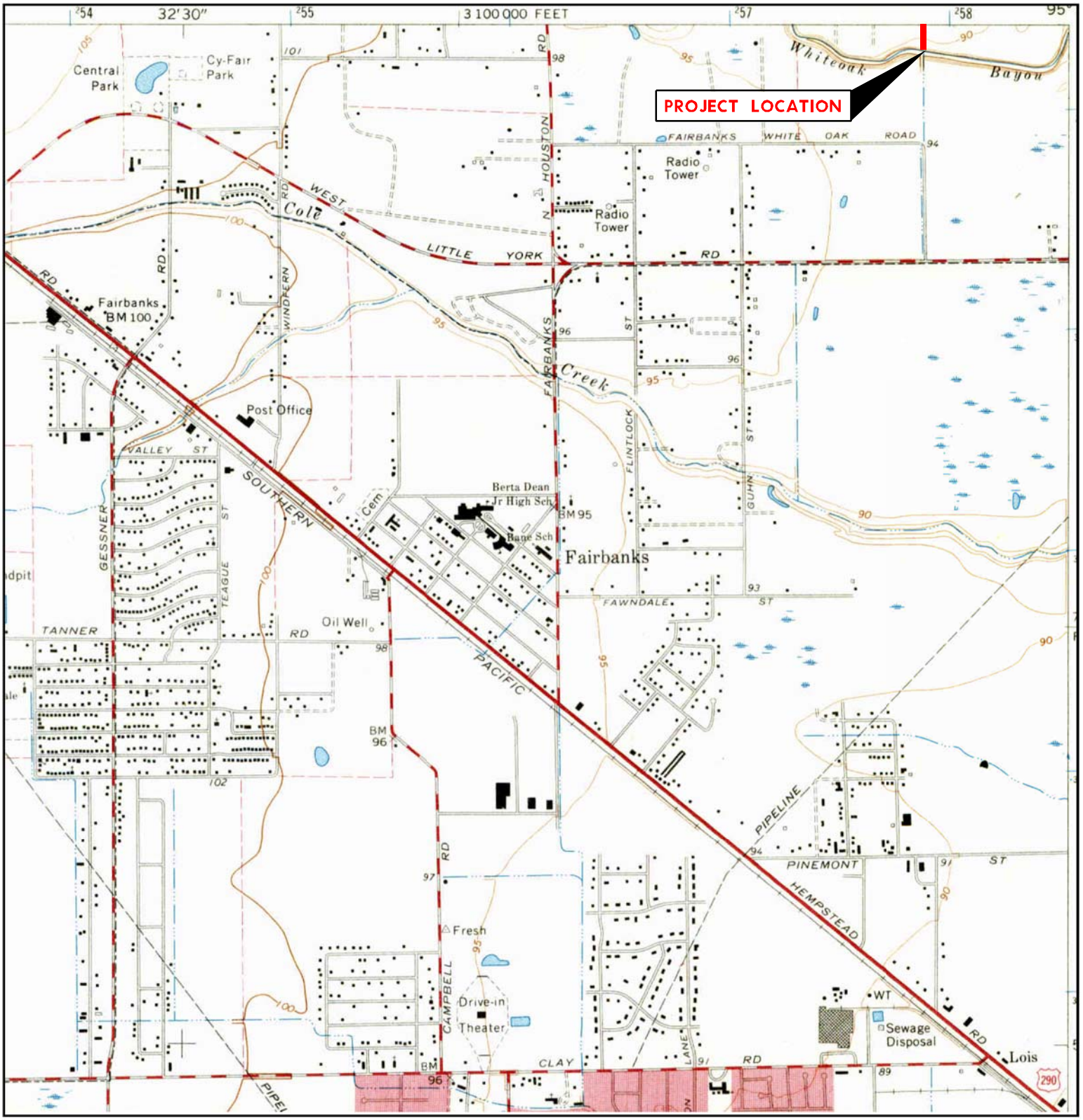
N	TARGET QUAD		SITE NAME:	Hollister Road	CLIENT:	Parsons Brinckerhoff
	NAME:	ADDICKS	ADDRESS:	9900 Hollister Road	CONTACT:	Aaron Roberts, P.E. (for Benjamin L. King, P.E.)
	MAP YEAR:	1955		Houston, TX 77040	INQUIRY#:	3758271.4
●			LAT/LONG:	29.8777 / -95.507	RESEARCH DATE:	10/15/2013
	SERIES:	15				
	SCALE:	1:62500				

Historical Topographic Map



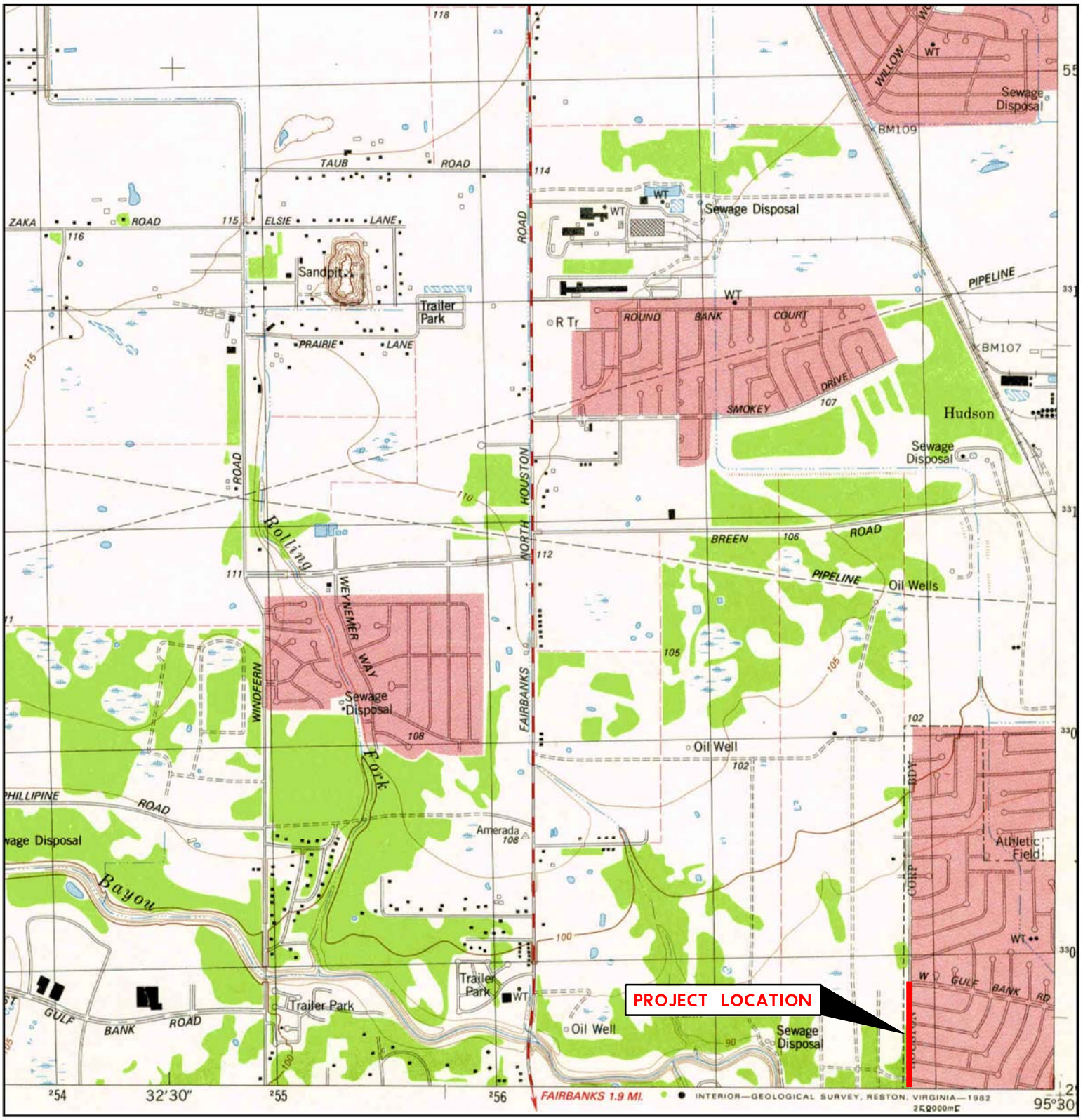
N	TARGET QUAD NAME: SATSUMA MAP YEAR: 1970 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Hollister Road ADDRESS: 9900 Hollister Road Houston, TX 77040 LAT/LONG: 29.8777 / -95.507	CLIENT: Parsons Brinckerhoff CONTACT: Aaron Roberts, P.E. (for Benjamin L. King, P.E.) INQUIRY#: 3758271.4 RESEARCH DATE: 10/15/2013

Historical Topographic Map



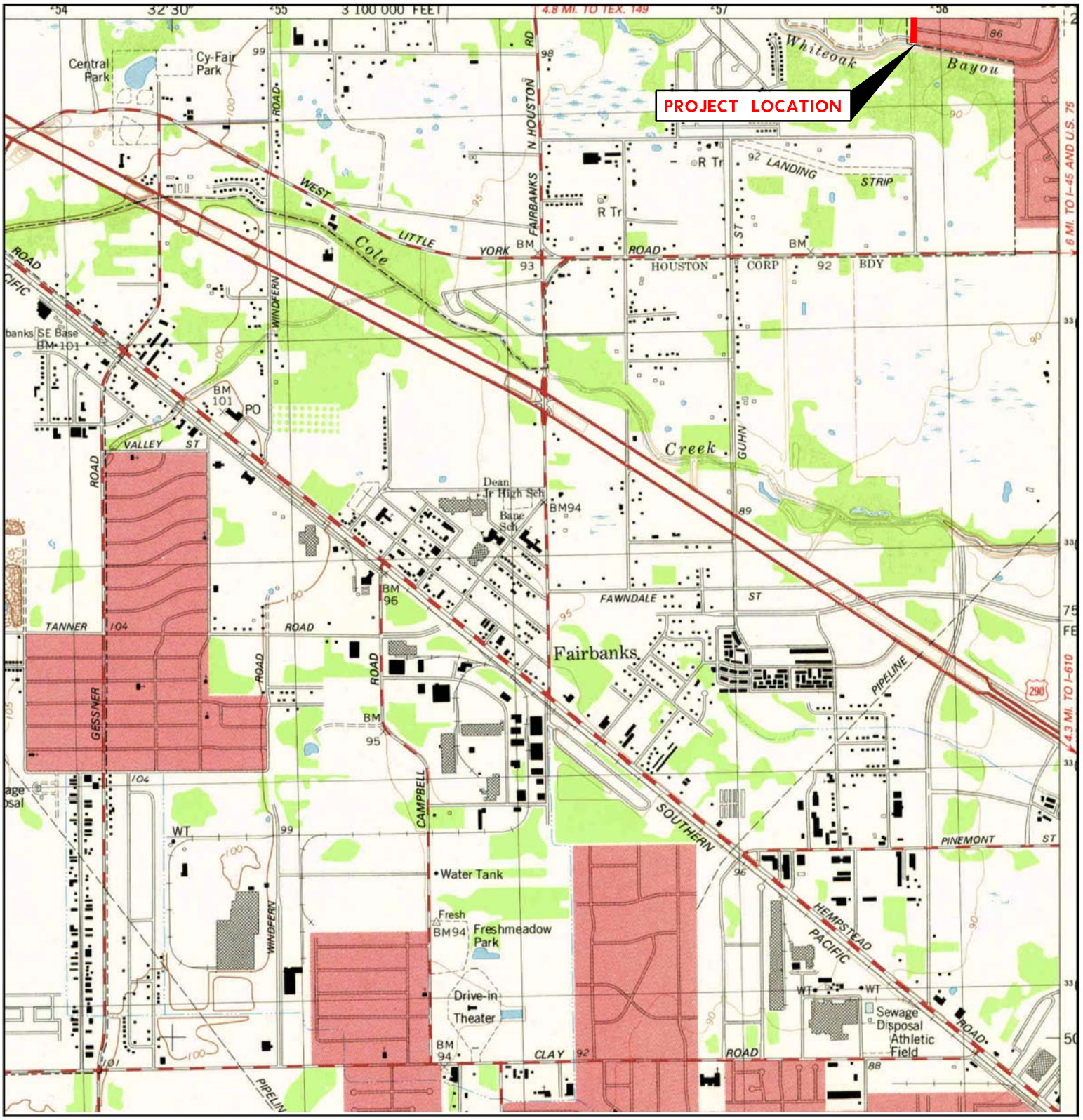
N	ADJOINING QUAD NAME: HEDWIG VILLAGE MAP YEAR: 1970	SITE NAME: Hollister Road ADDRESS: 9900 Hollister Road Houston, TX 77040	CLIENT: Parsons Brinckerhoff CONTACT: Aaron Roberts (for Benjamin L. King, P.E.)
●	SERIES: 7.5 SCALE: 1:24000	LAT/LONG: 29.8777 / -95.507	INQUIRY#: 3758271.4 RESEARCH DATE: 10/15/2013

Historical Topographic Map



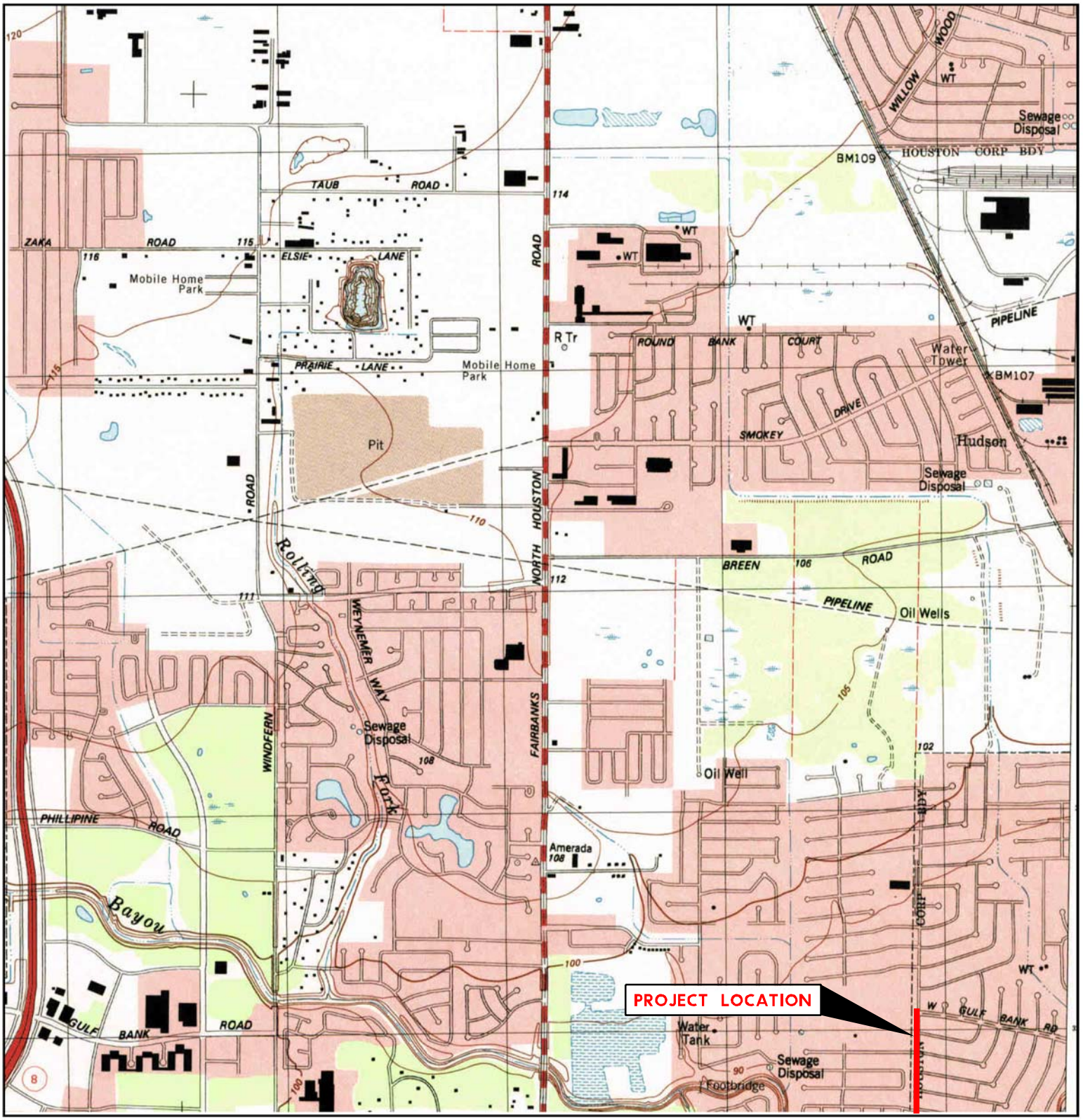
N	TARGET QUAD		SITE NAME:	Hollister Road	CLIENT:	Parsons Brinckerhoff
	NAME:	SATSUMA	ADDRESS:	9900 Hollister Road	CONTACT:	Aaron Roberts, P.E. (for Benjamin L. King, P.E.)
●	MAP YEAR:	1982		Houston, TX 77040	INQUIRY#:	3758271.4
			LAT/LONG:	29.8777 / -95.507	RESEARCH DATE:	10/15/2013
	SERIES:	7.5				
	SCALE:	1:24000				

Historical Topographic Map



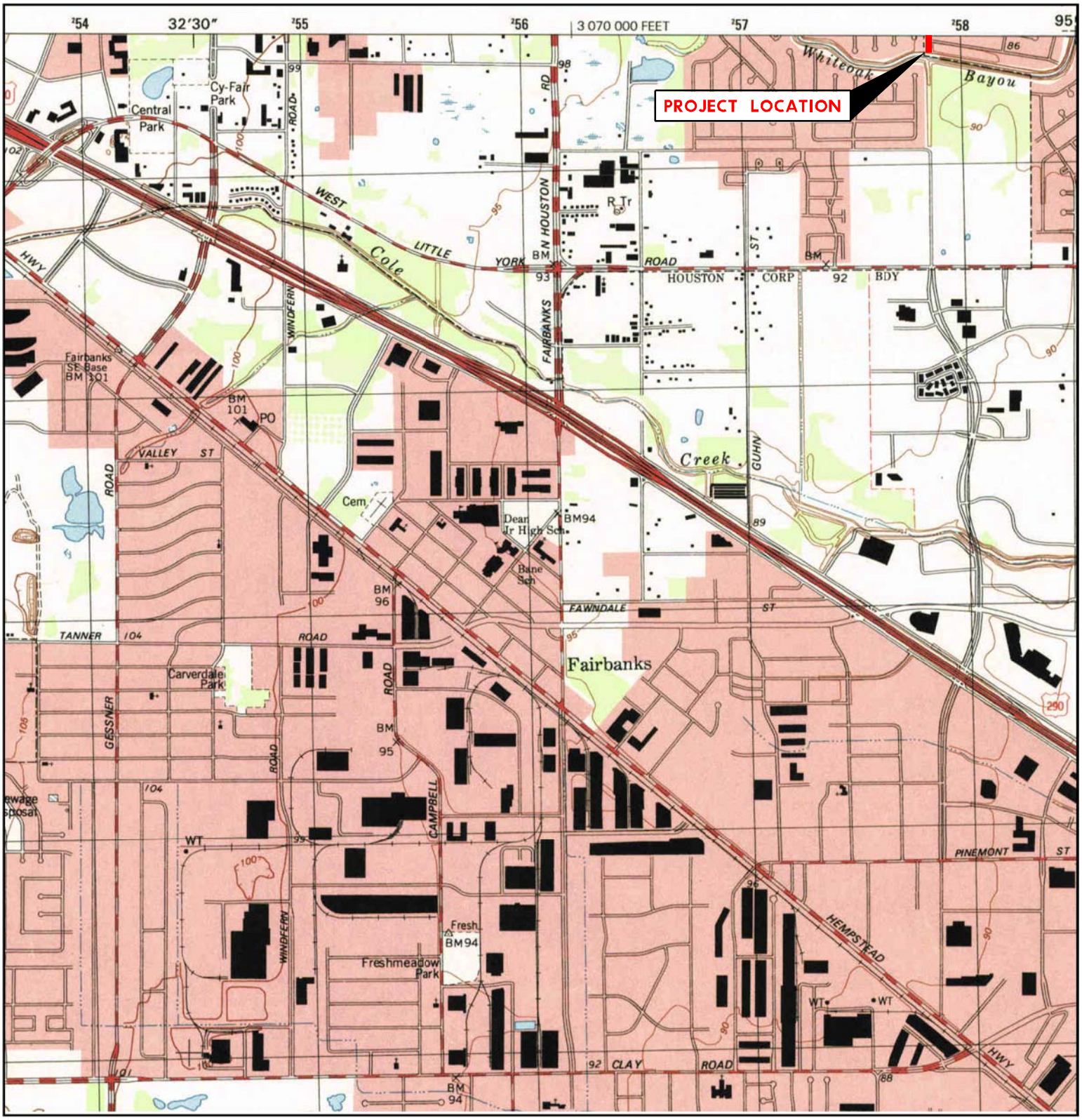
N	ADJOINING QUAD NAME: HEDWIG VILLAGE MAP YEAR: 1982 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Hollister Road ADDRESS: 9900 Hollister Road Houston, TX 77040 LAT/LONG: 29.8777 / -95.507	CLIENT: Parsons Brinckerhoff CONTACT: Aaron Roberts, P.E. (for Benjamin L. King, P.E.) INQUIRY#: 3758271.4 RESEARCH DATE: 10/15/2013

Historical Topographic Map



N	TARGET QUAD		SITE NAME:	Hollister Road	CLIENT:	Parsons Brinckerhoff
	NAME:	SATSUMA	ADDRESS:	9900 Hollister Road	CONTACT:	Aaron Roberts, P.E. (for Benjamin L. King, P.E.)
	MAP YEAR:	1995		Houston, TX 77040	INQUIRY#:	3758271.4
●			LAT/LONG:	29.8777 / -95.507	RESEARCH DATE:	10/15/2013
	SERIES:	7.5				
	SCALE:	1:24000				

Historical Topographic Map



N	ADJOINING QUAD NAME: HEDWIG VILLAGE MAP YEAR: 1995	SITE NAME: Hollister Road ADDRESS: 9900 Hollister Road Houston, TX 77040	CLIENT: Parsons Brinckerhoff CONTACT: Aaron Roberts, P.E. (for Benjamin L. King, P.E.)
●	SERIES: 7.5 SCALE: 1:24000	LAT/LONG: 29.8777 / -95.507	INQUIRY#: 3758271.4 RESEARCH DATE: 10/15/2013

APPENDIX H

SITE PHOTOGRAPHS

White Oak Bayou Outfall Looking North at Hollister Road

White Oak Bayou Outfall

Spillway Southwest of Hollister Road facing East

Detention Facility Southeast of Hollister Road Facing Southeast

Hollister Road Facing North at White Oak Bayou

Hollister Road Facing North at Breezeway Street

Hollister Road Facing South at Breezeway Street

Hollister Road Facing East at Breezeway Street

Hollister Road Facing North at Kellwood Drive

Hollister Road Facing South at Kellwood Drive

Hollister Road Facing East at Kellwood Drive

Hollister Road Facing West at Kellwood Drive

Hollister Road Facing North at Garsee Drive

Hollister Road facing South at Garsee Drive

Hollister Road facing East at Garsee Drive

Hollister Road facing West at Garsee Drive

Minit Shop at Southeastern intersection of West Gulf Bank Road and Hollister Road

Hollister Road facing East at West Gulf Bank Road

Depressed Area West of Hollister Road with Wetland Vegetation

Culvert Draining Depressed Area West of Hollister Road

APPENDIX I

WETLAND DETERMINATION DATA FORM

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Hollister Road City/County: Houston Sampling Date: 08/08/14

Applicant/Owner: City of Houston State: Texas Sampling Point: Up1

Investigator(s): A. Roberts Section, Township, Range: Satsuma

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR or MLRA): LRR T Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Clodine Loam NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil X, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

It is believed that the location of the point is within fill material from the previous construction of the roadway.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: Up1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size:)			
1. Paspalum notatum	45	Yes	FACU
2. Cynodon dactylon	40	Yes	FACU+
3. Stenotaphrum secundatum	5	No	FAC
4. Lolium perenne	5	No	FACU
5. Paspalum urvellei	5	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		

50% of total cover: _____ 20% of total cover: _____

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	90	x 4 =	360
UPL species	0	x 5 =	0
Column Totals:	100 (A)		390 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	10YR5/4	100					Loamy Sand	Root Mat, Compact
2-16	10YR5/4	100					Loamy Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

The soil looked to be made up of fill material.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Hollister Road City/County: Houston Sampling Date: 08/08/14

Applicant/Owner: City of Houston State: Texas Sampling Point: Wet1

Investigator(s): A. Roberts Section, Township, Range: Satsuma

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR or MLRA): LRR T Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Clodine Loam NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: Wet1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size:)			
1. Alfernanthera philoxeroides	35	Yes	OBL
2. Cyperus virens	35	Yes	FACW
3. Leersia hexandra	10	No	OBL
4. Stenotaphrum secundatum	10	No	FAC
5. Paspalum urvellei	5	No	FAC
6. Ipomoea sagittata	5	No	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		

50% of total cover: _____ 20% of total cover: _____

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	45	x 1 =	45
FACW species	40	x 2 =	80
FAC species	15	x 3 =	45
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		170 (B)

Prevalence Index = B/A = 1.7

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR5/4	100					Loamy Sand	
2-16	10YR3/1	80	10YR5/2	10	RM	M	Sandy Loam	
			10YR7/2	10	D	M	Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
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- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

APPENDIX J

WETLAND LOCATION MAP

0 25 50 100

SCALE: 1"=100'

PARSONS BRINCKERHOFF

16285 Park Ten Place, Suite 400
Houston, TX 77084 TBPE # 2263

HOLLISTER ROAD
FROM W GULF BANK
TO NORTH OF WHITE OAK BAYOU

APPENDIX J
WETLAND 1 DELINEATION MAP

JANUARY 2015

LEGEND

- GPS DATA POINTS
- WETLAND 1 (0.1882 ACRES)
- ROW

APPENDIX K

FIELD DATA

GPS DATA LOG

POINT ID	POINT DESCRIPTION	EASTING	NORTHING
del1	Wetland Delineation	3075284.009	13883495.19
del2	Wetland Delineation	3075269.647	13883517.16
del3	Wetland Delineation	3075270.872	13883549.13
del4	Wetland Delineation	3075269.998	13883584.94
del6	Wetland Delineation	3075269.891	13883631.61
del7	Wetland Delineation	3075267.66	13883684.01
del8	Wetland Delineation	3075266.801	13883741.83
del10	Wetland Delineation	3075265.135	13883792.85
del11	Wetland Delineation	3075264.375	13883858.18
del12	Wetland Delineation	3075262.169	13883931.77
del13	Wetland Delineation	3075263.208	13883989.59
del15	Wetland Delineation	3075260.261	13884036.79
del16	Wetland Delineation	3075258.496	13884087.63
del17	Wetland Delineation	3075252.134	13884106.47
del19	Wetland Delineation	3075243.277	13884102.09
del21	Wetland Delineation	3075242.920	13884047.61
del23	Wetland Delineation	3075245.052	13883997.97
del30	Wetland Delineation	3075247.525	13883927.07
del31	Wetland Delineation	3075248.853	13883861.53
del31	Wetland Delineation	3075251.175	13883821.61
del33	Wetland Delineation	3075254.848	13883757.9
del35	Wetland Delineation	3075257.224	13883683.97
del36	Wetland Delineation	3075258.844	13883616.82
del38	Wetland Delineation	3075261.018	13883550.43
del39	Wetland Delineation	3075266.657	13883492.47
del40culv	Culvert	3075285.779	13883482.18
Up1	Upland Point	3075277.047	13883762.94
Wet1	Wetland Point	3075262.945	13883762.34

APPENDIX L

STATEMENT OF QUALIFICATIONS

DAVID ATKIN, PH.D.

Principal Professional Associate/Certified Senior Project Manager

Years of Experience
33 (25 with PB; 8 with others)

Education
Ph.D., Biology (Ecology), Princeton University
B.S., Biology (Marine), Stanford University

Professional and Community Certifications and Affiliations
Texas DOT Pre-Certifications: 2.4.1 Corps of Engineers Nationwide Permit; 2.4.2 Corps of Engineers Individual Permits; and 2.14.1, Environmental Document Preparation
Women's Transportation Seminar, Heart of Texas Chapter, Professional Development Subcommittee
Central Texas Association of Environmental Professionals

Selected Project Experience

Environmental Permitting/Compliance/Studies – Surface Transportation

- Dallas/Fort Worth Core Express Service: Dr. Atkin is the deputy environmental lead on this TxDOT/Federal Railroad Administration project. The assignment is to prepare and process the EIS for express passenger rail service between Dallas and Fort Worth. This segment will connect on the east to the Houston-Dallas High Speed Rail now advancing by a private rail developer, and on the west to High Speed Rail from Oklahoma City to South Texas. Key issues include impacts on the Trinity River, wetlands, land use impacts, noise and vibration, siting of the maintenance facility, grade conflicts, hazardous waste sites, and impacts on existing Dallas and Fort Worth train stations.
- US 181 Harbor Bridge Replacement Project: Dr. Atkin is the environmental lead for the designer on one of three Design/Build teams proposing to replace this signature bridge in Corpus Christi, Texas. Applicable environmental commitments and laws were identified based on environmental reference documents provided by TxDOT and site visits, and compiled for cost estimation and impact on construction and maintenance. Key issues include development of the approach to establishing the environmental compliance and permitting plan, and assessment of environmental permits being procured by TxDOT's General Engineering Consultant (GEC).
- Grand Parkway, Segments H, I-1 and I-2: Dr. Atkin is the environmental lead for the designer on one of three Design/Build teams proposing to construct 55 miles of toll road on the east side of Houston. This project crosses a large number of surface water bodies and multiple types of marine and freshwater wetlands. Mitigation banking is a key element of the mitigation strategy. Applicable environmental commitments and laws were identified based on environmental reference documents provided by TxDOT, and compiled for cost estimation and impact on construction and maintenance. Key issues include coordinating the terms of environmental permits being procured by TxDOT's General Engineering Consultant (GEC) with the design team.
- Guam Program Management: FHWA was responsible for providing substantial roadway improvements on Guam to support the Department of Defence's redeployment of marines from Okinawa, a new aircraft carrier-capable berth at the naval base, and a new missile testing facility, Dr. Atkin was the environmental task lead on PB's General Engineering Consultant (GEC) assignment with the FHWA and Guam Department of Public Works (DPW). On behalf of FHWA and DPW, Dr. Atkin's team obtained Corps permits, NPDES approvals, CZM approvals, Section 106 approvals, Section 401 WQC's, and other permits for over 50 distinct road projects delivered primary by design build. The projects included bridges, slope stabilization, realignment, intersection improvements and signalization, and new construction. On behalf of FHWA, Dr. Atkin's team performed QC reviews of permit applications prepared by local consultants, coordinated with agencies, maintained permit status

tracking on active projects and produced NEPA clearance documents (over 25 Categorical Exclusions and one Environmental Assessment),

- Honolulu Rapid Transit Project: Dr. Atkin was seconded for 14 months to the Honolulu Authority for Rapid Transportation to represent the Owner's interest on a $5.4 billion, 20-mile elevated guide way metro rail system. He developed procedures, work flows, and training to implement environmental compliance deriving from permits and the project's EIS across six design/build construction contracts. He developed the schedule and strategy for acquiring all needed environmental permits and approvals. During his assignment, the project transitioned from active construction to shut down to restart of construction. At the completion of his assignment, over 130 environmental permits were force, under agency review, in preparation or being renewed, including Clean Water Act approvals (401 (WQC), 402 (NPDES: construction storm water, dewatering effluent and hydrotest effluent), 404 (ACOE), MS4 discharges), noise variances, excavated material stockpiling and disposal, regulatory floodways (FEMA), Essential Fish Habitat (EFH), Fish and Wildlife Coordination Act, Stream Channel Alteration Permits and Endangered Species Act requirements. Low Impact Design (storm water retention) was also being implemented where feasible. He negotiated, coordinated, managed and collaborated with contractors, environmental agencies, planners, engineers, designers and the public to maintain the construction schedule.
- Interstate Route H-3, Oahu, Hawaii: managed the preparation of U.S. Army Corps of Engineers and associated state environmental permit applications addressing wetlands, fill, water quality, and storm water discharges. David oversaw the preparation of a comprehensive environmental commitment and compliance tracking system for use by contractors and construction managers, and assisted construction management staff in troubleshooting and responding to a range of unanticipated environmental contingencies.
- Wetlands Mitigation Planning, Interstate Route H-3, Oahu, Hawaii: Task leader responsible for developing and negotiating an after-the-fact compensatory mitigation plan for wetland fills associated with construction of this major highway on Oahu. The original compensatory mitigation plan became infeasible, necessitating the need to develop a new mitigation concept. Issues included site selection, construction and maintenance costs, balancing the functions and values of the originally-approved mitigation concept against alternative substitute mitigation concepts, and various out-of-kind concepts.
- Kaumualii Highway Widening, Kauai County, Hawaii: Project manager for the preparation of the Environmental Assessment for the widening of a seven mile segment of the arterial heading west from Lihue, Kauai. Key issues included wetland and floodplain impacts, and construction-phase storm water impacts. This $140 million project cleared the environmental review process without the need for a full EIS. Under separate contract, the work was extended to include environmental permitting and public involvement during the initial construction phases. Major permits included NPDES and Stream Channel Alteration Permit.
- Honoapiilani Highway Widening/Realignment, Maui, Hawaii: Project manager for the federal/State EIS addressing improvements to an 11 mile coastal arterial linking Lahaina and central Maui. Major issues include endangered species, wetlands, hydrology, shoreline processes, and marine life.
- Nimitz Highway Capacity Expansion, Honolulu, Hawaii: managed the preparation of a federal and state environmental impact statement (EIS) that addressed various alternatives for increasing the capacity of a 2.8-mile segment of Nimitz Highway, a major thoroughfare running along the Honolulu waterfront. Alternatives included widening, viaduct, grade separation, and transportation system management (TSM) measures. Significant issues included visual, community, noise, and construction-phase impacts. A wetland functions and values assessment using the WET II methodology was also performed. The work was expanded to include a feasibility study of funding construction through tolling schemes and public-private partnerships (PPP).
- County Roadway Storm Water Runoff Best Management Practices Manual Assessment: Project manager of a review of the mechanisms employed by each of Hawaii's counties for controlling roadway storm water runoff during roadway construction and maintenance. On behalf of the Hawaii Coastal Zone Management Program, interviews were conducted with the head of each county's roadway agency to discuss the use of standard specifications, guidelines and county regulatory authority to

control roadway storm water. County approaches were compared against each other and the approaches followed by the Hawaii Department of Transportation. Recommendations were developed to strengthen each county's ability to control roadway storm water runoff. A report was prepared for submission to the US Environmental Protection Agency that summarized county-level controls on roadway storm water runoff.

- Route 64, North Carolina: task leader for the natural resources portion of the environmental assessment for the widening of a 22-mile rural highway in the Piedmont region, including four major river crossings. The project was environmentally sensitive because of farmland, wetland, water quality, and floodplain impacts.
- Kihei-Upcountry Highway, Maui, Hawaii: project manager for preparation of the federal and state environmental impact statement (EIS) for a proposed 10-mile highway across a predominantly agricultural area between the coastal area of Kihei and the rural Upcountry area of Maui, on the slope of Haleakala Mountain. Ten alignment alternatives were developed in the project's environmental assessment. Significant issues included social and community impacts to the rural Upcountry area, traffic impacts, conversion of significant farmlands and soils to a transportation use, and potential impacts on threatened and endangered species and historical and archeological resources. The project also included a substantial public involvement component including a series of informational meetings and collaboration with a citizens' group. Under a separate contract, environmental support was provided during the design effort to ensure that environmental commitments developed during planning were implemented as appropriate.
- North-South Road, Oahu, Hawaii: task leader for the preparation of the joint federal and State Environmental Assessment for this now-constructed roadway terminating at Oahu's "Interstate" H-1 highway. Major issues included impacts on endangered species, including preparation and approval of a Biological Assessment and Habitat Conservation Plan, impacts on a designated sole-source aquifer, impacts on flood hazard zones, and the conversion of agricultural lands.
- Central Artery/Third Harbor Tunnel, Boston, Massachusetts: responsible for the development of the detailed permit acquisition strategy and work plan for this $6 billion project, since constructed, to build a four-lane immersed tube tunnel under Boston Harbor. The project involved dredging 2.6 million cubic yards of material and disposal planning of 13.5 million cubic yards of dredged and excavated materials.