

PECAN CREEK, GAINESVILLE, TEXAS DETAILED PROJECT REPORT AND INTEGRATED ENVIRONMENTAL ASSESSMENT

APPENDIX C.2 GEOTECHNICAL

The purpose of this report is to provide existing geotechnical site conditions in support of the recommended plan for flood damage reduction along Pecan Creek in Gainesville, Texas. Pecan Creek originates approximately six miles north of the city of Gainesville and flows south through the central portion of the city to its confluence with Wheeler Creek, Redmond Branch, and the Elm Fork of the Trinity River.

Existing Geological Investigations. The U.S. Army Corps of Engineers performed a geotechnical field investigation along Pecan Creek in September of 1984. Three borings were drilled at the approximate locations of the Anthony Street, Gordon Street, and Belcher Street crossings. The test holes were advanced and samples recovered using short flight continuous augers, core barrel samplers, and rockbits. The borings were drilled to total depths of 14.5 feet and 20.0 feet below ground surface at the time of the field investigation. Soil and rock samples collected were sealed in airtight containers and shipped to the Corps of Engineers' Southwestern Division Laboratory (Dallas, Texas) for testing. In the laboratory, the samples were subjected to testing for classification, grain-size distribution, moisture content, Atterberg limits, bar linear shrinkage, and unconfined compressive strength. Additional subsurface information is available from borings drilled by the Texas Department of Highways and Public Transportation. The data includes two (2) borings that were drilled along the alignment of the Anthony Street Bridge where it crosses Pecan Creek. The above geotechnical information is presented in the publication entitled "Detailed Project Report Pecan Creek, Gainesville, Texas, August 1986".

General Geological Features. Pecan Creek watershed above U.S. Highway 82 is covered with clayey and loamy soils that are deep, and nearly level to sloping on uplands and terraces. The lower portion of the watershed is a mixture of clayey and loamy soils and the sandy soil of the savannahs according to the Soil Conservation Service's "Soil Survey of Cooke County, Texas (1979)". The topography of the area is characterized by mild rolling hills.

Overburden mantling of the bedrock along Pecan Creek between U.S. Highway 82 on the north and Anthony Street on the south consists principally of sandy clay. The bedrock dips eastwardly in this reach of the creek, which flows southward along the strike of the bedrock strata. The creek channel has been eroded into the Denton Clay Formation of the Cretaceous age. The Weno Limestone Formation, which overlies the Denton Clay, crops out a short distance to the east of the creek. The Fort Worth Limestone Formation, which underlies the Denton Clay, crops out a short distance to the west of this reach of Pecan Creek and locally in the bottom of the creek channel. The Denton Clay, whose total thickness is approximately 45 feet, is described in

the “Geologic Atlas of Texas” as consisting mostly of calcareous shaly clay. The underlying Fort Worth Limestone consists of beds of very fine crystalline limestone 6 to 12 inches thick, which are interbedded with marl beds 2 feet or less in thickness. The upper 8 to 10 feet of the Fort Worth Limestone is comprised mostly of limestone beds.

Morphology Pecan Creek is a well-defined channel that averages 30 to 40 feet in width, 10 feet in depth, and has 1.0V:1.5H side slopes. The channel sides are vegetated by grass and sloped back on a flatter grade to higher ground and street level. The grassed-lined portion of the slope appears to be relatively stable. Pecan Creek has a total length of approximately 10.6 miles. The creek has an elevation of 880 feet (NGVD) at the upper end and 660 feet (NGVD) at its lower end. Within the city limits of Gainesville, Pecan Creek has an elevation of 740 feet (NGVD) at the upper end and 703 feet (NGVD) at its lower end. The middle portion of the drainage area is within the city limits of Gainesville. The creek runs through the downtown area just 4 blocks east of the Cooke County Courthouse. Pecan Creek was channelized through the downtown area of the city of Gainesville during the 1930’s by the Government sponsored Works Project Administration (WPA) program.

The channel below Garnett Street is unimproved. A concrete and flagstone lined channel has been built between Garnett Street and Scott Avenue. Upstream from Scott Avenue, the channel is unlined and has been partially straightened between Scott Avenue and Belcher, and just upstream from Belcher. Along this reach there are areas where the banks have little or no vegetative cover and have either eroded or sloughed off to a near vertical slope. There is some vegetation growing along the toe of the bank.

Upstream where the creek flows through a wooded area, the banks show a similar condition with vegetation growing along the top and the toe of a steep eroded or sloughed-off bank three to four feet high. The bank material consists of sandy to silty clay mixtures. The bottom is interbedded shale and limestone.

Subsurface Conditions Overburden materials encountered within the test holes range in thickness from approximately 4 to 15 feet and consist of sands, clays, and gravels. Sands and gravels range in grain size from coarse to fine and are loose to dense. Clay consistencies range from soft to medium stiff. Primary materials encountered during the field investigations consist of interbedded limestone and clay shale. The primary is described as hard (Rock Classification) and thick bedded.

Groundwater conditions were monitored during the field investigations and approximately 24 hours after completion of the test holes. The borings were noted as being dry to the top of primary, although water readings were recorded in two of the test holes. The source of water was considered to be drilling fluids used to core the primary.

Excavation of Subsurface Materials. Previous borings indicates, generally, for the area, that overburden materials range in thickness from approximately 4 to 15 feet and consist of sands, clays, and gravels. Sands and gravels range in grain size from coarse to fine and are loose to dense. Clay consistencies range from soft to medium stiff. Primary materials encountered during the field investigations consist of interbedded limestone and clay shale. The primary is described as hard (Rock Classification) and thick bedded. A review of existing information indicates the primary material is likely to be near the channel invert elevation. The following is the observed depths of the primary materials along the existing channel.

1984 Boring Logs:

Belcher St. - Limestone at 15 feet below the bank.
Gordon St. – Limestone at 4 feet below the bank.
Anthony St. – Limestone at 5.5 feet below the bank.

June 2002 Site Visit:

Schopmeyer – Limestone outcropping at the bottom of the channel.
Moss St. - Limestone outcropping at the bottom of the channel.
Anthony St. - Limestone outcropping at the bottom of the channel.

A channel survey for rock outcropping may be conducted for the project at the next phase to estimate the quantity of rock removal that may be needed for the construction of the proposed channel.

Geotechnical Studies Depending on the project features developed, additional geotechnical investigations will have to be performed in the study area to support the proposed alternatives. A survey locating the extent of rock out crops along the channel bottom should be conducted where channel deepening is required for the project, as this may have significant impact on project costs. The geotechnical investigations would include performing subsurface explorations and obtaining representative soil and rock samples for laboratory testing. Results of the field and laboratory testing programs will be used to characterize the existing foundation conditions with respect to the competency of the soils used for construction. Using the aforementioned test data, engineering analyses will be performed and the findings utilized for the design and construction of project features.

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