Appendix B

Technical Memoranda and Reports

Disclaimer:

Technical memoranda and reports were prepared as independent documents to support the preparation of the Final Environmental Impact Statement (FEIS) for the Dallas CBD Second Light Rail Alignment (D2 Subway). Information from these documents was incorporated into the FEIS to provide information on existing conditions, and in some cases, assess potential impacts to the resources. Information contained in the FEIS is the most current and supersedes information in the technical memoranda and reports.

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Geology and Soils Existing Conditions Technical Memorandum

Technical Memorandum

Date:	Friday, August 10, 2018
Project:	Task Order 39 - Subway
To:	Ernie Martinez, Project Manager, DART Capital Planning Kay Shelton, EIS Task Manager, DART Capital Planning
From:	Tom Shelton, GPC6 Program Manager Kristine Lloyd, GPC6 EIS Task Manager
Subject:	DART GPC VI; Contract Number: C-2012668; DART D2 Corridor Geology and Soils Existing Conditions Technical Memorandum; HDR PN: 10024656

Introduction

This technical memorandum has been developed to support preparation of the Supplemental Draft Environmental Impact Statement (SDEIS) for the Dallas Area Rapid Transit (DART) D2 Subway Project. This technical memorandum addresses geology and soils found within the D2 Subway Project area. The project study area used for the assessment of potential geological or soil impacts includes a one-quarter-mile corridor positioned on the project centerline of the D2 Corridor right-of-way (ROW).

Methodology

Existing literature and maps in addition to Geographic Information Systems (GIS) resources were used to evaluate the geology and soils of the study area. Non-digital maps examined include the Geologic Atlas of Texas Dallas Sheet (UT-GEB, 1987), and the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS) Soil Survey for Dallas County (NRCS, 1980).

Description of Existing Conditions

This section describes the existing conditions with respect to geology and soils within the study area.

Geology

Three geologic rock units underlie the project area – alluvium, fluviatile terrace deposits, and Austin Chalk. Each of these units are discussed below.

Alluvium consists of sand, silt, clay and gravel of variable thickness and recent origin. This geologic feature is generally associated with major streams. Within the project area, alluvium is found in the vicinity of the Elm Fork of the Trinity River and its tributaries (UT-BEG, 1987). Alluvial deposits result in rich soils, and sand and gravel deposits which contribute to the areas economic value (Shuler, 1918). Fossils are commonly found in these deposits (Shuler, 1918).

Fluviatile terrace deposits include sand, gravel, silt, clay, or mud of recent origin. Generally associated with remnants of ancient floodplains, this rock unit is found on terraces. A small area containing these deposits is found in the central portion of the project area, in association with alluvium (UT-BEG, 1987). Sand deposits in terrace areas have economic value, and fossils are commonly found in them (Shuler, 1987).

Austin Chalk, of late Cretaceous origin, is comprised of chalk (microgranular calcite) with some interbedded calcareous clay and hard lime mudstone. It underlies approximately the eastern one half of the project area (UT-BEG, 1987). Austin Chalk often overlies the Eagle Ford Formation (The Dallas Geological Society, 1965). This formation is an average of 500-feet thick, and includes alternating beds of chalk, shaly limestone, and marls. These beds have a blue color when saturated with underground water, but are cream or white after exposed to weathering (Shuler, 1918). The formation includes approximately 85 percent limestone (calcium carbonate) with lesser amounts of silica, zinc oxide, aluminia, and magnesia; iron pyrite concretions are common in the lower layers (Shuler, 1918). Small-scale faulting is a characteristic feature of Austin Chalk; during faulting, the chalk breaks into irregular blocks by fissure planes along which slight movements have taken place (Shuler, 1918).

Soils

Three soil associates are found within the study area. These include:

- *Houston Black-Heiden association* – deep, nearly level to strongly sloping, clayey soils of uplands that are generally used for pasture or cropland (NRCS, 1980);
- *Trinity-Frio association* – deep, nearly level, clayey soils of floodplains that are poorly drained (NRCS, 1980); and,
- *Silawa-Silstid-Bastsil* – deep, nearly level to sloping, loamy and sandy soils on stream terraces (NRCS, 1980).

Ttwo different soil map units are found within the study area in addition to Urban Land Complex. Descriptions of each soil map unit are included below (NRCS, 1980).

- Houston Black-Urban land complex, 0 to 4 percent slopes— In Dallas County, this complex is made up of approximately 40 percent Houston Black soil, 35 percent urban land, and 25 percent minor soils. This soil is not classified as prime farmland (NRCS, 1980, NRCS, 2018).
- Trinity-Urban land complex – This complex is made up of deep, nearly level, somewhat poorly drained soils and areas of urban land on floodplains. It is comprised of approximately 60 percent Trinity soil, 20 percent urban land, and 20 percent minor soil. This soil is found in Dallas County and is not classified as prime farmland (NRCS, 1980; NCRS, 2018).

Discussion of Potential Impacts and Regulatory Framework

This section addresses potential impacts to geology and soils.

Geology

No substantial impacts are anticipated to the geology within the project area.

Soils

The Farmland Protection Policy Act (FPPA), as detailed in Subtitle I of Title XV of the Agricultural and Food Act of 1981, provides protection to the following: 1) prime farmland; 2) unique farmland; and 3) farmland of local or statewide importance. FPPA defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (not urban built-up land or water). According to acceptable farming methods, prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management (irrigation). Unique farmland is farmland that is used for production of specific high value food, feed, and fiber crops. Farmland of local or statewide importance is determined by the appropriate state or local government agency or agencies.

The project study area does not contain any soil types that are designated as prime farmland soils. The project study area is primarily committed to urban use. The FPPA exempts from consideration those lands "committed to urban use" (within city limits or zoning boundaries). Thus, NRCS, FPPA coordination would not be required for project development within the study area.

Potential soil erosion and sedimentation during construction will be addressed in a Stormwater Pollution Prevention Plan (SWPPP) that will be prepared prior to beginning construction activities. The SWPPP will detail best management practices (BMPs) to be incorporated into the project design related to erosion control, sedimentation control, and post-construction total suspended solids (TSS) removal.

Table 1 lists individual soil types, including shrink-swell potential, risk of erosion, risk of corrosion, and constraints related to construction/excavation. Detailed geotechnical borings would be completed prior to the final design stage in order to identify and avoid any potential structural stability issues.

Table 1. Soil Characteristics Related to Construction

General Soil Type	Shrink-Swell Potential	Risk of Erosion	Risk of Corrosion		Construction/Excavation constraints
			Uncoated Steel	Concrete	
Houston Black	Very high	Slight-moderate	High	Low	Shrink-swell, low strength, corrosively, cut banks cave, very plastic material
Trinity	Very high	Slight	High	Low	Low strength, wetness, floods, shrink-swell, cutbanks cave, corrosively

Source: NRCS, 1980.

References

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Shuler, E.W. 1918. The Geology of Dallas County. University of Texas Bulletin No. 1818: March 25, 1918.Bureau of Economic Geology and Technology, Division of Economic Geology.

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