NORTH DESOTO FEASABILITY STUDY

DESOTO COUNTY, MISSISSIPPI

GENERAL RECOMMENDATIONS REPORT

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Geotechnical Branch

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Introduction

This study is being conducted due to flood damages experienced in Desoto County, MS. The flooding issues are occurring in short durations due to inadequate channel capacity throughout the town and the overtopping of top banks. It has been documented that the overtopping of the top banks of the drainage channels throughout Desoto County is causing damage to private homes and municipality properties. Physical indications of these damages can be seen from the water marks left on homes and buildings in areas of relatively proximity to these drainage channels. The purpose of this study is to identify the remediation needs of this area and then to conduct an economic study to determine the Benefit to Cost ratio to see if it is reasonable to perform design and construction work for these areas and to identify risks and construction considerations for the design phases of this project.

Historical Borings

Due to this being a study and not a design build project, there were no borings drilled, as the alternatives proposed here are for feasibility purposes. Two different sources were used to try and determine general geologic information in the areas of proposed construction for this project. The first is to use the NRCS web-soil survey. This information is presented in Appendix A for each site. The second source is historic boring information that came from previous channel cleanouts and borings found near bridges in the cow pen detention area. The Historical borings that were found in the cow pen detention area and along Horn Lake Creek were taken between 1975 and 1979. Refer to Figures 1 and 2 below to see the approximate locations of historic borings we have in these areas.

Figure 1 cow pen Creek Historical Boring Locations

The historical borings found in the cow pen Creek indicated that lean clays can be expected to be encountered along with some silts. This tends to have some conflict as the NRCS web-soil survey indicates silty loams to be mostly present in these areas. Based on the provided information, it is possible that the excavated material from the cow pen detention sites can serve as the fill material for the proposed levee section in this project. However, a full geotechnical investigation needs to be performed to verify the materials, and it is possible the sponsor will have to provide a borrow pit for the levee if the materials found in this area do not meet the material requirements for the levee. Refer to Appendix A for more detailed figures and information regarding the historical boring logs and NRCS maps.

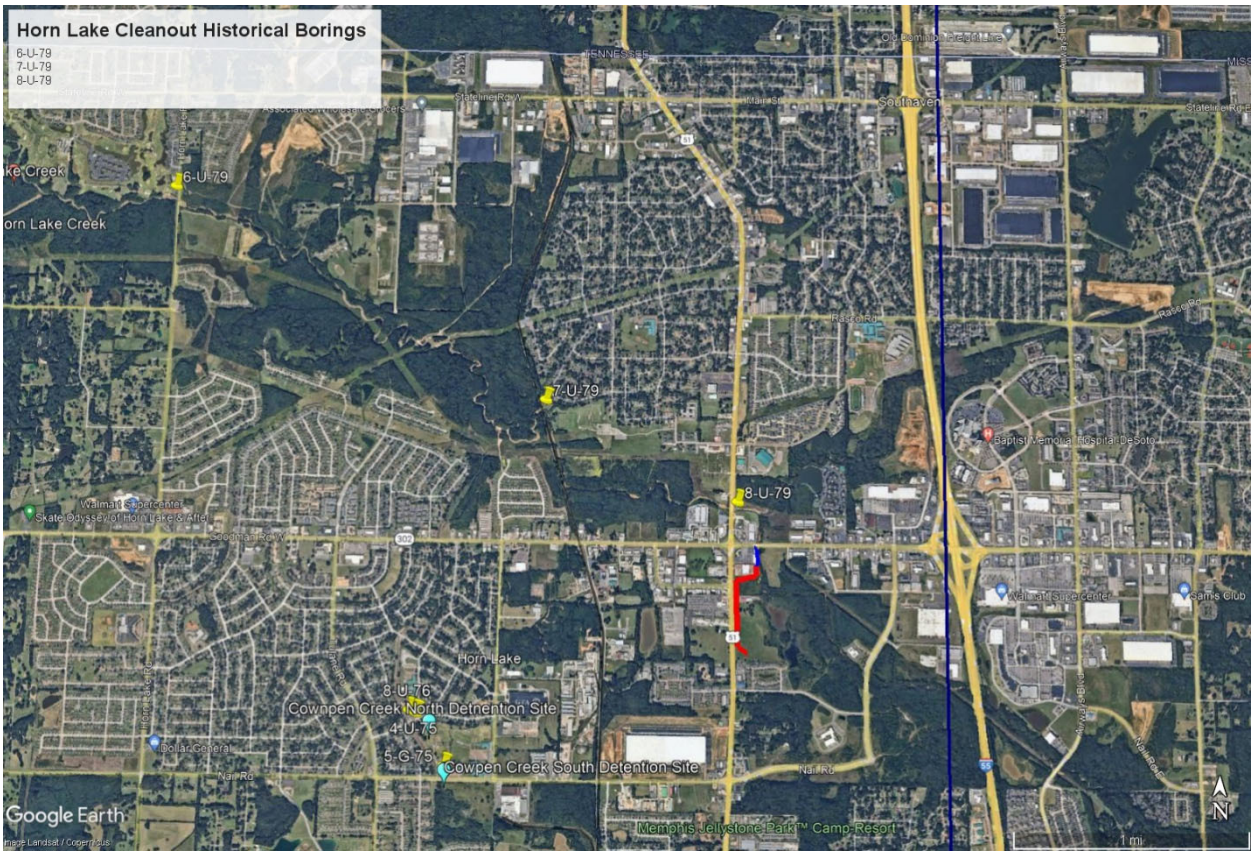


Figure 2 Horn Lake Creek Historic Borings

The Horn Lake Creek historical borings indicate upper bank silts underlain by interbedded clays and coarse-grained soils. The NRCS web-soil survey indicates the area below boring 8-U-79 which is proposed floodwall and levee to be predominately silty loams, which seems to be in relative agreeance with boring 8-U-79 itself. Refer to Geotechnical Appendix A to see these historical borings and the NRCS web-soil survey map for these areas.

No historical boring logs were found for the Lateral D and Rocky Creek detention sites, however the NRCS web-soil surveys for both sites are included in Appendix A.

Design and Design Recommendations

No official Geotechnical design recommendations were able to be provided as current borings were not taken. However, some general “minimally acceptable” recommendations have been provided in areas in which work is being proposed. These recommendations are to determine a relative feasibility level of this project. Additionally, based on the historic borings for areas of work where channel widening and/or detention basin excavation is being performed, it is estimated there will be some appropriate fine-grained materials excavated that could be used to perform a considerable amount of the new levee construction, however if upon further geotechnical investigation it is discovered that the excavated material is unsuitable, a borrow source will need to be identified to complete this project.

Proposed Construction

The PDT is proposing construction at a few different areas for this feasibility study, for which a description of each is provided below.

- 4,500 linear feet of channel widening which includes increasing the bottom width of the channel, grading the side slopes to a minimum 3H:1V, and placing approximately 21,200 tons of riprap on the toe and five feet up the bank of the channel. See Figure 3 below to see a typical section of the proposed channel widening and improvement.

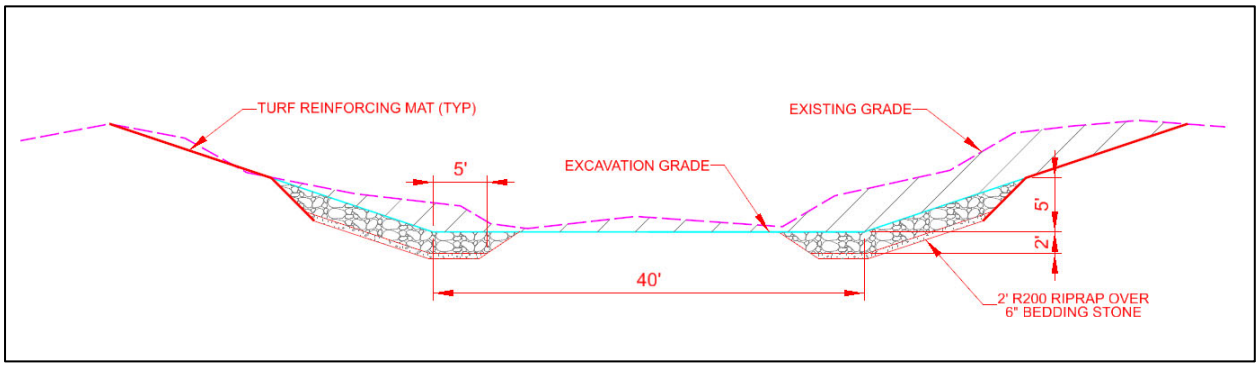


Figure 3 Typical Channel Improvement Section

- In 4 locations (cow pen Creek North, cow pen Creek South, Lateral D Detention, and Rocky Creek Detention) it is being recommend that detention basins be dug out to reduce the peak flows that are causing flood damages in specific areas. Each detention basin is recommended to meet a minimum 3H:1V side slope recommendation. Refer to sections 2.6.2 through 2.6.5 in Appendix I for typical sections and full descriptions of these detention features.

- Constructing a 3,000 linear foot levee and floodwall system designed to protect structures on the left bank of Horn Lake Creek up-stream of Goodman Rd. Refer to Figure 4 below for an overview of this Levee-Floodwall system.

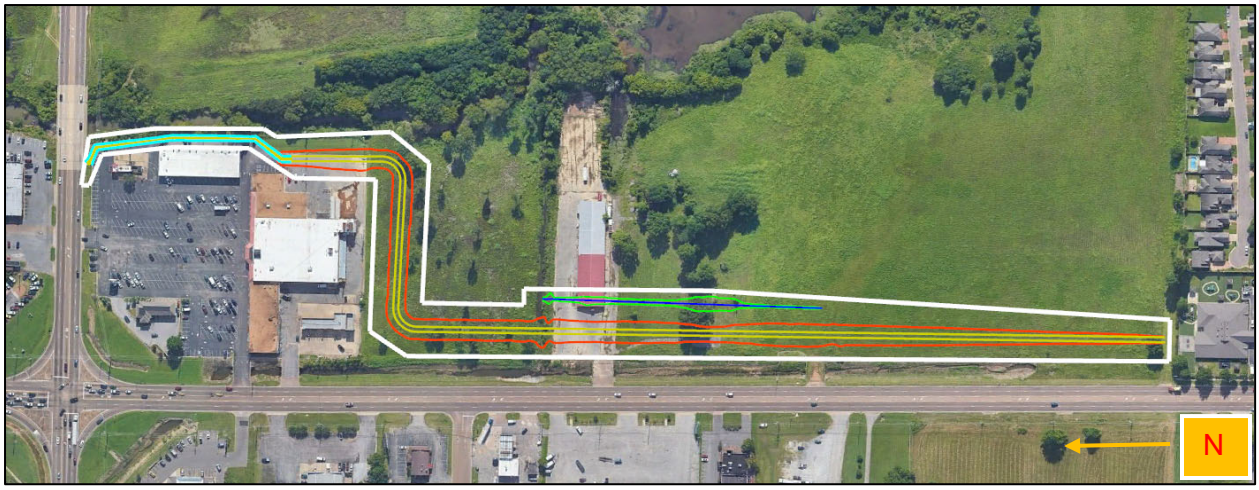


Figure 4 Floodwall and Levee Layout

The levee will range in height between 5'-7' on average, require minimum 3H:1V side slopes, have a 12-foot crown and require approximately 14,000 cy of fill for construction. Refer to Figure 5 below to see a typical detail of the proposed levee section.

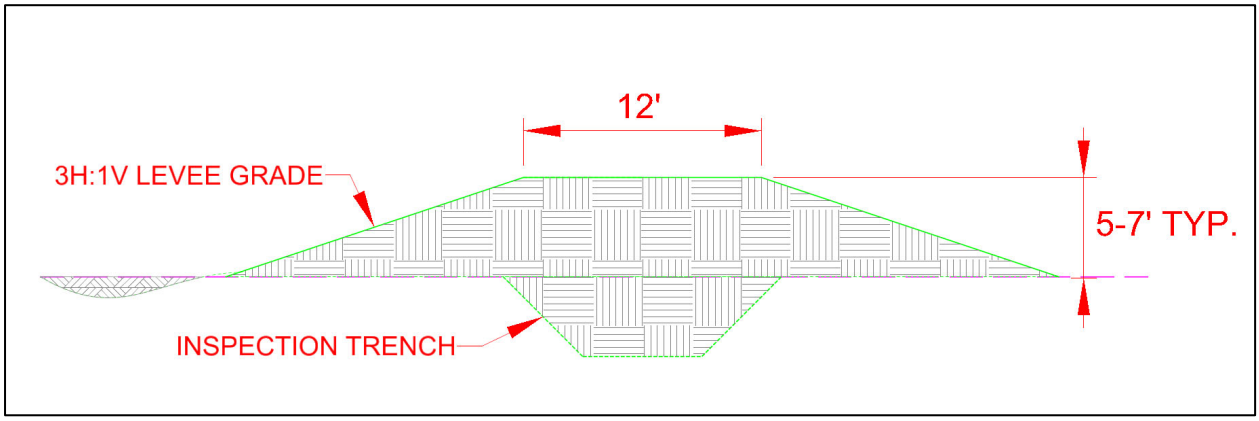


Figure 5 Proposed Levee Typical Section

The proposed floodwall will have a stem thickness of 18", have a total height of 5' tall (3.5' of which extends above ground), and rest on an 8' wide foundation. The floodwall is expected to be 525' in length and require 300 cubic yards of concrete to be constructed. Refer to Figure 6 below to see a typical section of the floodwall.

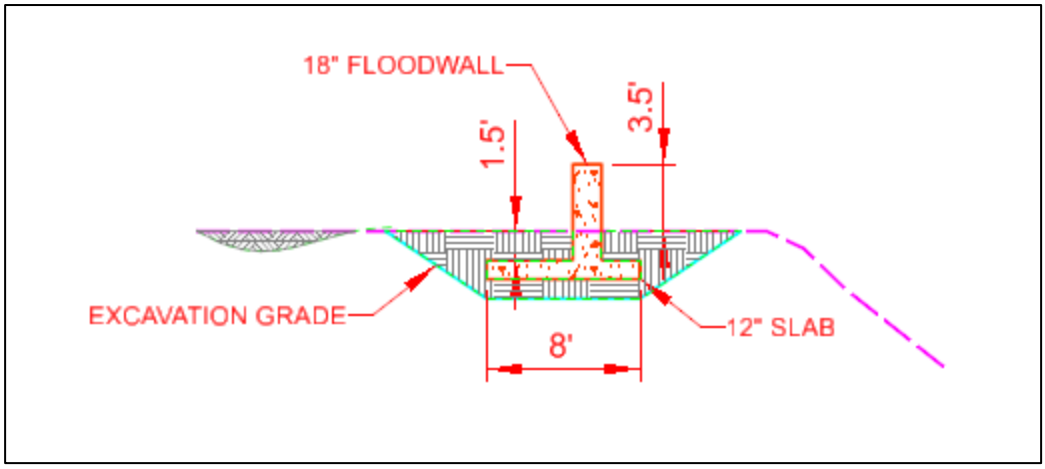


Figure 6 Proposed Floodwall Typical Section

Geotechnical Design Recommendations

All preliminary design recommendations for each proposed measure of this project are based on available historical information and past design experiences. All design recommendations should only be used at a feasibility level and a full geotechnical investigation and design procedure needs to occur before any construction occurs on this project.

Channel Widening Design and Construction Considerations

Future design phases of this project as it pertains to slope stability evaluations of the channel widening portion of this project need to follow the design procedures outlined in EM 1110-2-1902 subsection 1-6 at a minimum. These design procedures are shown below (steps a-k).

a. Explore and sample foundation and borrow sources. EM 1110-1-1804 provides methods and procedures that address these issues.

b. Characterize the soil strength (see Appendix D). This usually involves testing representative samples as described in EM 1110-2-1906. The selection of representative samples for testing requires much care.

c. Establish the 2-D idealization of the cross section, including the surface geometry and the subsurface boundaries between the various materials.

d. Establish the seepage and groundwater conditions in the cross section as measured or as predicted

for the design load conditions. EM 1110-2-1901 describes methods to establishing seepage conditions

through analysis and field measurements.

e. Select loading conditions for analysis (see Chapter 2).

f. Select trial slip surfaces and compute factors of safety using Spencer's method. In some cases, it may

be adequate to compute factors of safety using the Simplified Bishop Method or the force equilibrium method

(Including the Modified Swedish Method) with a constant side force (Appendix C). Appendix F provides

example problems and calculations for the simplified Bishop and Modified Swedish Procedures.

g. Repeat step f above until the "critical" slip surface has been located. The critical slip surface is the

one that has the lowest factor of safety and which, therefore, represents the most likely failure mechanism.

Steps f and g are automated in most slope stability computer programs, but several different starting points

and search criteria should be used to ensure that the critical slip surface has been located accurately.

h. Compare the computed factor of safety with experienced-based criteria (see Chapter 3).

Return to any of the items above, and repeat the process through step h, until a satisfactory design has been achieved. When the analysis has been completed, the following steps (not part of this manual) complete the design process:

i. The specifications should be written consistent with the design assumptions.

j. The design assumptions should be verified during construction. This may require repeating steps b, c,

d, f, g, and h and modifying the design if conditions are found that do not match the design assumptions.

k. Following construction, the performance of the completed structure should be monitored. Actual

piezometric surfaces based on pore water pressure measurements should be compared with those assumed

during design (part d above) to determine if the embankment meets safe stability standards.

The main point of concern that stands out regarding the current channel widening recommendations is the existing materials which appear to line the upper 5-10' of the channel banks. These silty materials could pose challenges during the engineering design phase, in terms of meeting corps factor of safety standards. However, as this design is generally increasing the factor of safety within the channels by laying the side banks back on a gentler slope than is existing and using rip rap and turf reinforcing mat for stabilization, the risk of increased design cost for this project can be assumed to be low.

Detention Basin Design and Construction Considerations

Future design phases of this project as it pertains to slope stability evaluations of the channel widening portion of this project need to follow the design procedures outlined in EM 1110-2-1902 subsection 1-6 at a minimum. These detailed design procedures can be found under the Channel Widening and Construction Considerations of this report. Additional construction considerations that need to be considered for the

detention basin construction phase of this project is the potential need for repeated unwatering while excavating the detention basin, as well as the projected potential of having to increase the side slopes of the detention basins based on the expected subsurface materials that the PDT has found.

Levee Design and Construction Considerations

Future design phases of this project as it pertains to levee design and construction will need to follow at minimum the requirements listed in Table 1-1 of EM 1110-2-1913. Refer to Figure 7 below to see Table 1-1 from EM 1110-2-1913.

Table 1-1
Major and Minimum Requirements

Step	Procedure
1	Conduct geological study based on a thorough review of available data including analysis of aerial photographs. Initiate preliminary subsurface explorations.
2	Analyze preliminary exploration data and from this analysis establish preliminary soil profiles, borrow locations, and embankment sections.
3	Initiate final exploration to provide: a. Additional information on soil profiles. b. Undisturbed strengths of foundation materials. c. More detailed information on borrow areas and other required excavations.
4	Using the information obtained in Step 3: a. Determine both embankment and foundation soil parameters and refine preliminary sections where needed, noting all possible problem areas. b. Compute rough quantities of suitable material and refine borrow area locations.
5	Divide the entire levee into reaches of similar foundation conditions, embankment height, and fill material and assign a typical trial section to each reach.
6	Analyze each trial section as needed for: a. Underseepage and through seepage. b. Slope stability. c. Settlement. d. Trafficability of the levee surface.
7	Design special treatment to preclude any problems as determined from Step 6. Determine surfacing requirements for the levee based on its expected future use.
8	Based on the results of Step 7, establish final sections for each reach.
9	Compute final quantities needed; determine final borrow area locations.
10	Design embankment slope protection.

Figure 7 EM 1110-2-1913 Table 1-1

Due to the low height of the levee to be built, the 3H:1V recommendation comes from the practical considerations outlined in EM 1110-2-1913 under chapter 6 section 6-1 subsections (a) and (3). Additionally, it is recommended that this new levee be comprised of compacted clay materials.

Settlement- While settlement has not been fully analyzed, based on boring subsurface conditions approximately 1,000 linear feet north of the floodwall and the proposed height of the levee, the expected settlement of the levee is likely less than 6 inches. It should be noted that this number could increase if

worse than expected sub-surface conditions are found during the sub-surface investigation phase of this project.

Under seepage- Based on the few historical borings available in this area, the likelihood of under-seepage being a major factor in the final design is considered relatively low. However, it is impossible to guess the soil conditions under the proposed levee alignment, and a thorough under-seepage evaluation should be performed as part of the design.

Erosion Protection -Due to the low velocities of the out of bank flows that the levee is expected to experience and the short durations of the floods in this area, erosion problems are not a concern for the levee portion project.

Materials- Verifying adequate suitable levee building materials from the excavated detention sites is one of the biggest risks for this portion of the project. The NRCS web soil survey indicates predominately silty materials existing throughout all areas of the projects; however, we have borings which suggest adequate lean clay materials might be available from the cow pen Creek detention area. This will need to be verified during the subsurface investigation phase of this project, and if it is found to not have adequate levee construction materials, a borrow source with appropriate materials will have to be identified.

Floodwall Design and Construction Considerations

Future design phases of this project as it pertains to Geotechnical design of the floodwall portion of this project need to follow the design procedures outlined in EC 1110-2-6066. This EC details load conditions for which the water needs to be evaluated and all the stability cases for which the wall needs to be evaluated at for each loading conditions. These loading conditions included usual, unusual, and extreme flood cases and the stability failure modes include (section 6-2 Failure modes) general failure, deep-seated (global) failure, rotational failure, and seepage. Due to the nature of how small the proposed T-wall is, there appears to be little risk in (assuming appropriate erosion protection and foundation material) the general, rotational, or global failure stability analysis of the floodwall. Additionally, the risk of seepage issues should be minimal over the floodwall section of this project as there is a small hydraulic head present at the floodwall as well as there is a substantial expanse of concrete on the backside of the floodwall which greatly reduces the risk of developing seepage problems regardless of the subsurface.

The two main design risk considerations are the suitability of the foundation the floodwall will be constructed on (inadequate bearing capacity) and the erosion potential of the channel bank which can impact the stability of the floodwall if eroded to the toe of the floodwall. Based on the nearest boring from the historical Horn Lake Cleanout plans (8-U-79) it is expected for the upper bank where the floodwall will be constructed to consist of 5-8’ of silt underlain by 10 plus feet of lean clay. No strength data for the silt material is available, however the lean clay material is shown to have an average shear strength in the medium to stiff range. The foundation material will need to be classified and lab tested to verify its suitability during the design phase of this project.

General Report Summary

The table below contains general future design guidance project risks and concerns from a geotechnical standpoint that were highlighted throughout this report.

Table 1 General Report Summary

Project Element	EM/EC for Design Phase Reference	Risks/Concerns based on available information
Channel Widening	EM 1110-2-1902	1. Upper bank stability
Detention Basin Excavation	EM 1110-2-1902	1. Side slope stability 2. Accounting for potential continuous unwatering depending on weather and groundwater conditions.
Levee Construction	EM 1110-2-1913	1. Expected low excessive settlement risk 2. Expected low seepage issue risks 3. Expected low erosion potential concerns 4. Moderate concern for suitable borrow materials to construct levee without borrow pit.
Floodwall Construction	EC 1110-2-6066	1. Erosion potential on stream bank could impact stability of floodwall long term if no erosion protection buffers are put in place due to location of floodwall in proximity to edge of channel bank. 2. Risk of having to replace foundation material with suitable material.

Appendix A : Geotechnical Appendix

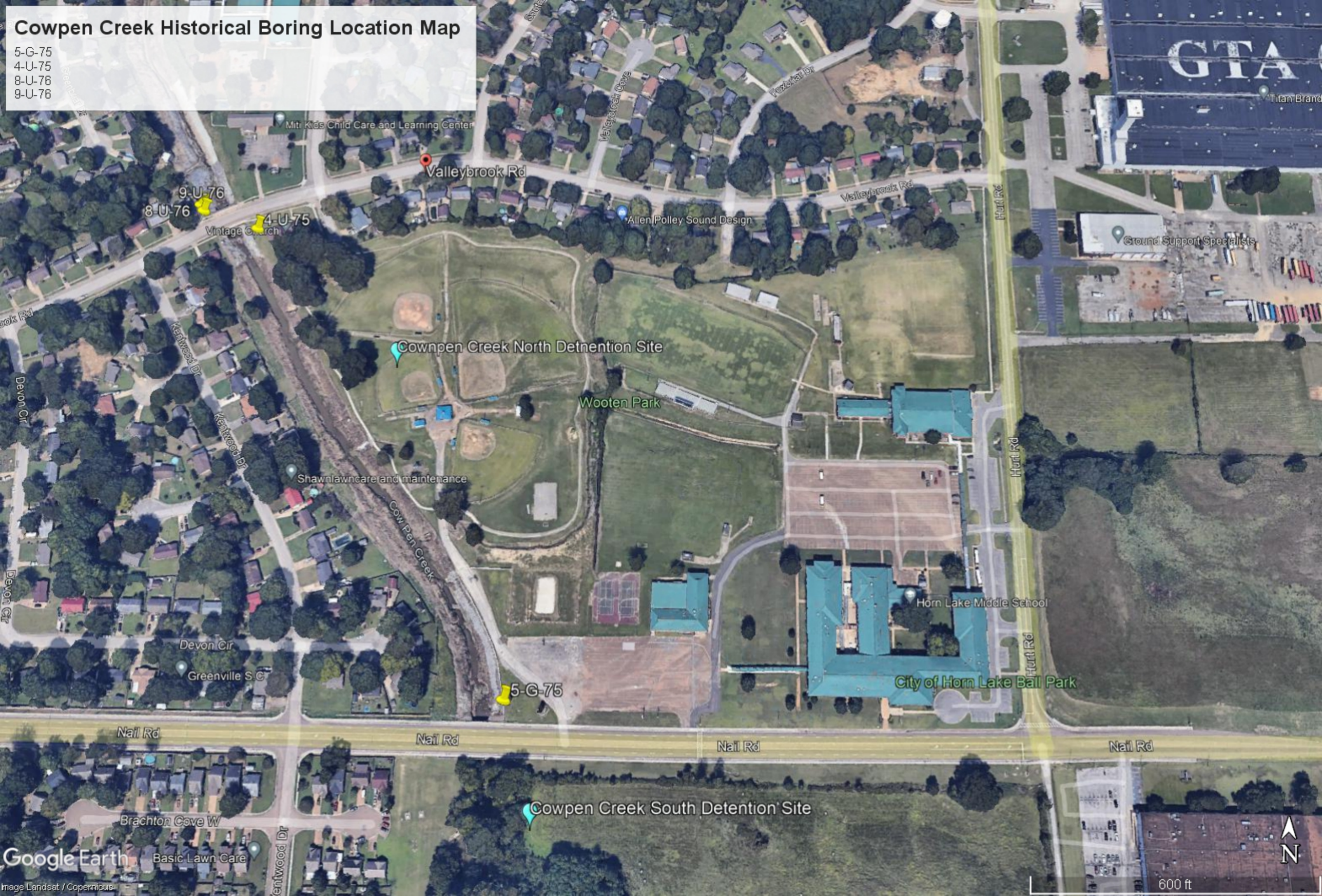
North Desoto Feasibility Study

Cowpen Creek Detention

Historical Borings &NRCS Web-soil information

Cowpen Creek Historical Boring Location Map

5-G-75
4-U-75
8-U-76
9-U-76



the locations or within the vertical reaches of such borings.

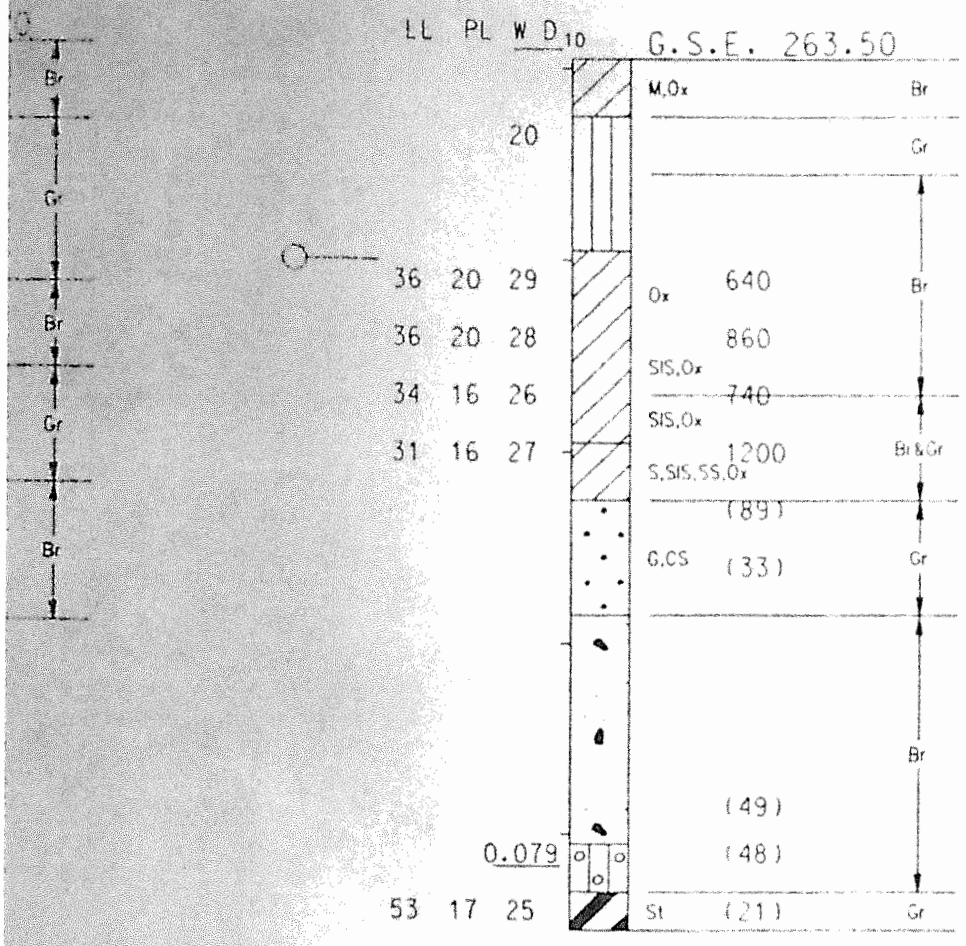
ve soils shown on the boring logs is based on driller's log and visual
ate, except within those vertical reaches of the borings where shear
compression tests are shown.

-75

M BANK
AD BRIDGE
TUBE & SS
5

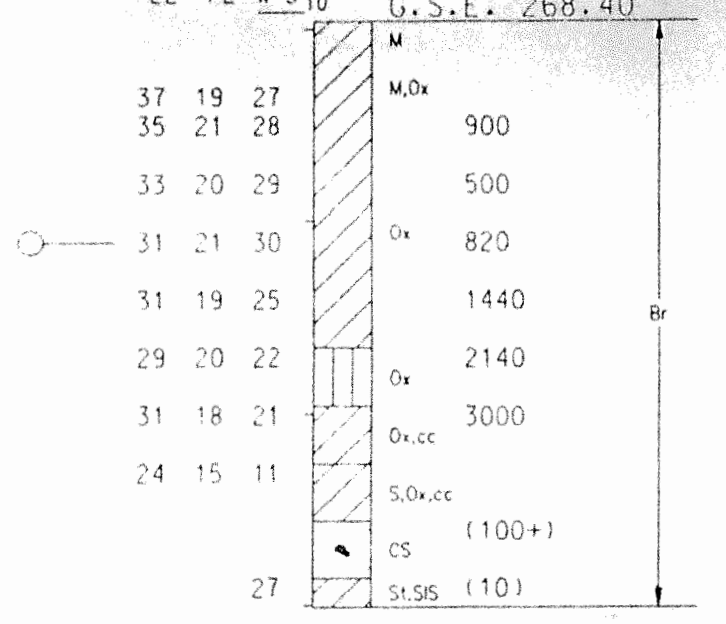
BOR. 8-U-76

LEFT DOWNSTREAM BANK
AT MEADOWBROOK ROAD BRIDGE
BOR. TYPE-AUG, 5" TUBE & SS
GROUND WATER EL. 256.7
23 JAN 76



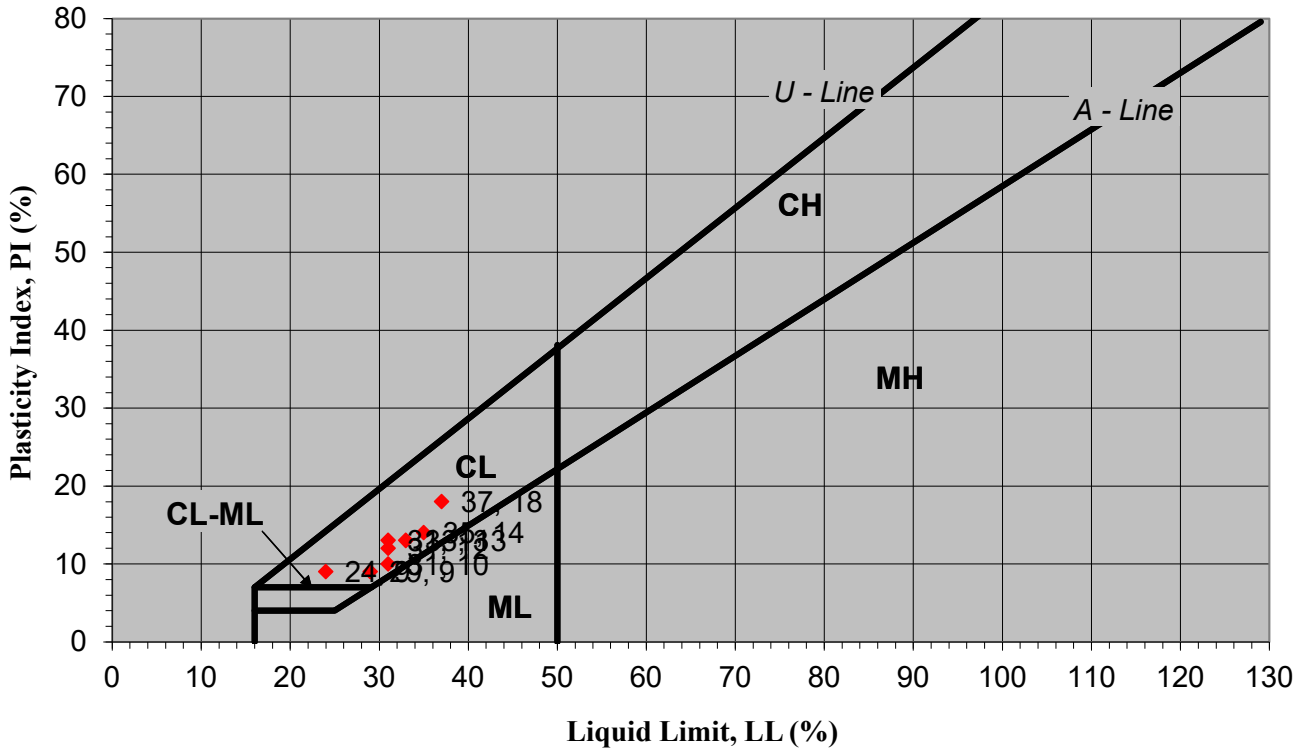
BOR. 4-U-75

RIGHT UPSTREAM BANK
AT VALLEYBROOK ROAD BRIDGE
BOR. TYPE-AUG, 5" TUBE & SS
30 APR 75



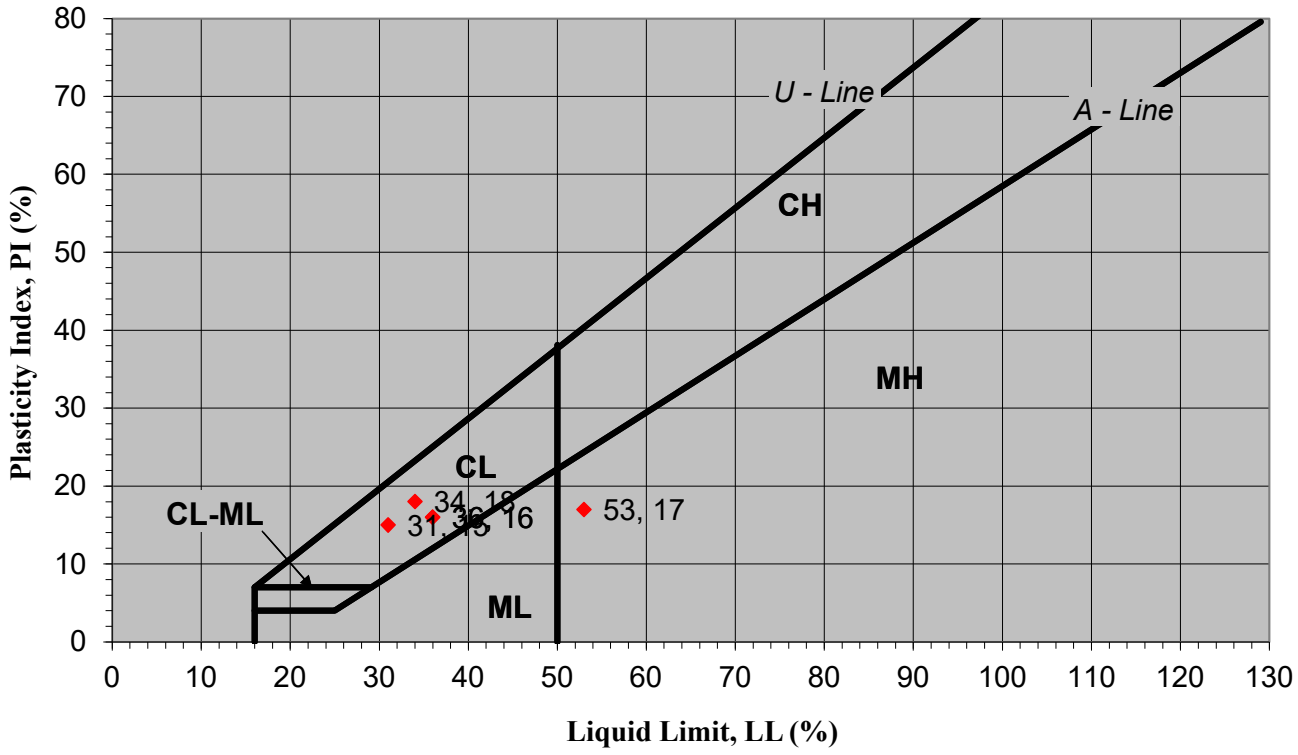
USCS Plasticity Chart

4-U-75



USCS Plasticity Chart

8-U-76



channel grade

FIGURES TO THE RIGHT OF BORING

Are values of cohesion in lbs/sq. ft. from unconfined compression tests

In parentheses are driving resistances in blows per foot determined with a standard split spoon sampler (1 $\frac{3}{8}$" I.D. 2" O.D.) and a 140 lb. driving hammer with a 30" drop

Where underlined with a solid line denotes laboratory permeability in centimeters per second of undisturbed sample

Where underlined with a dashed line denotes laboratory permeability in centimeters per second of sample remoulded to the estimated natural void ratio

BORING TYPE

SS - Split Spoon Sampler
AUG - Auger
TUBE - 3" or 5" Thin Wall Tube

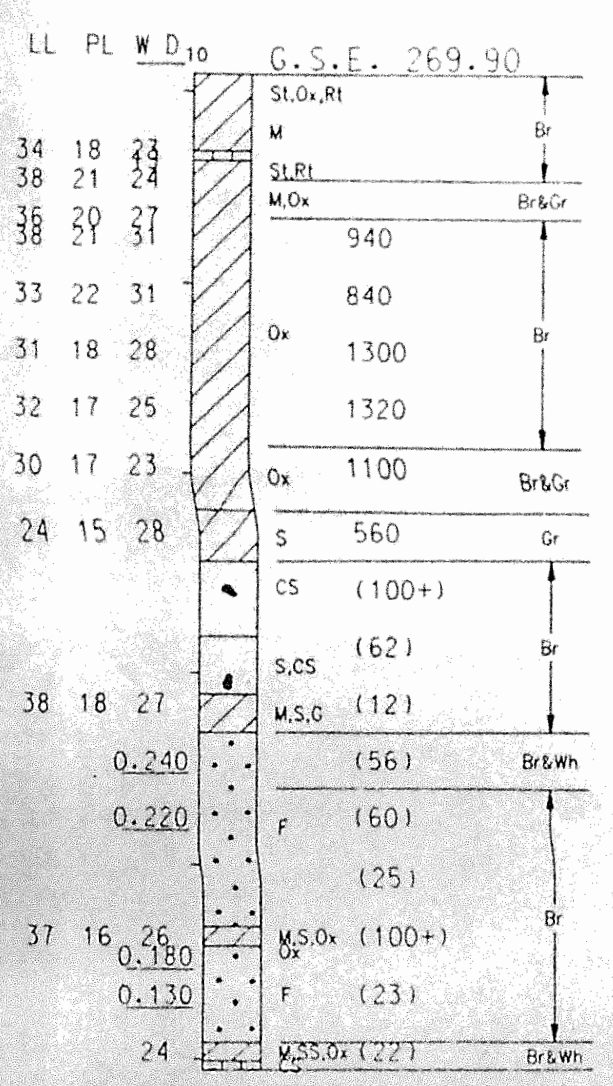
• The D_{10} size of a soil is the grain diameter in millimeters of which 10% of the soil is finer, and 90% coarser than size D_{10}.

• • Results of these tests are available for inspection in the U.S. Army Engineer District Of if these symbols appear beside the boring logs on the drawings.

-75
BANK
ROAD BRIDGE
TUBE & SS
75

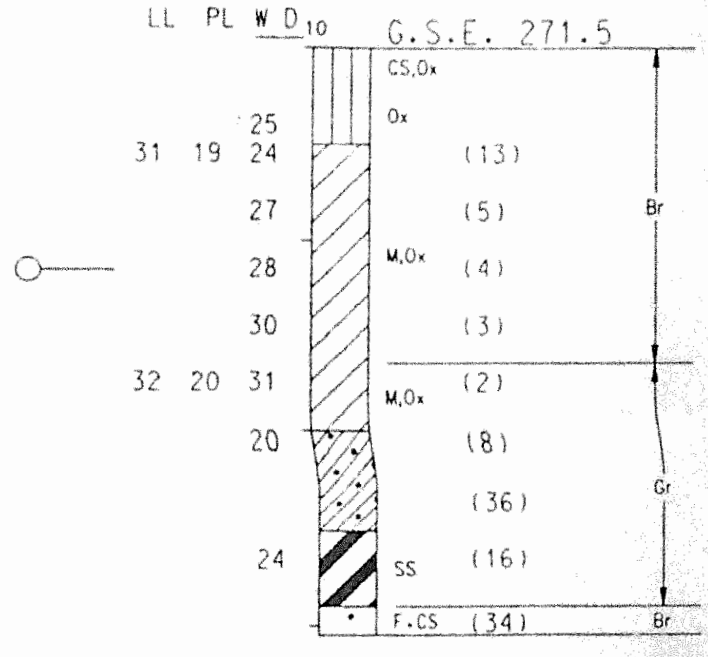
BOR. 9-U-76

LEFT DOWNSTREAM BANK
AT VALLEYBRIDGE ROAD BRIDGE
BOR. TYPE-AUG, 5" TUBE & SS
GROUND WATER EL. 265.1
27 JAN 76



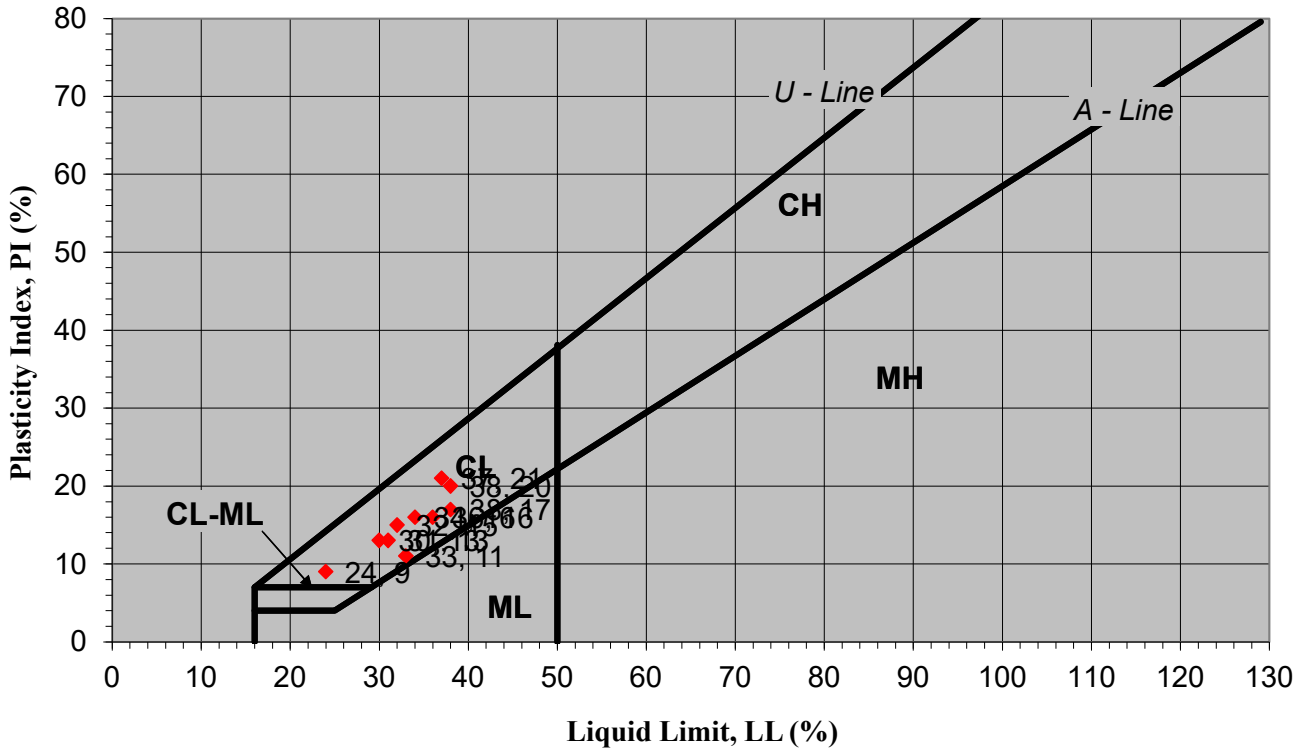
BOR. 5-G-75

RIGHT DOWNSTREAM BANK
AT NAIL ROAD BRIDGE
BOR. TYPE-AUGER & SS
GROUND WATER EL. 264.8
30 APR 75



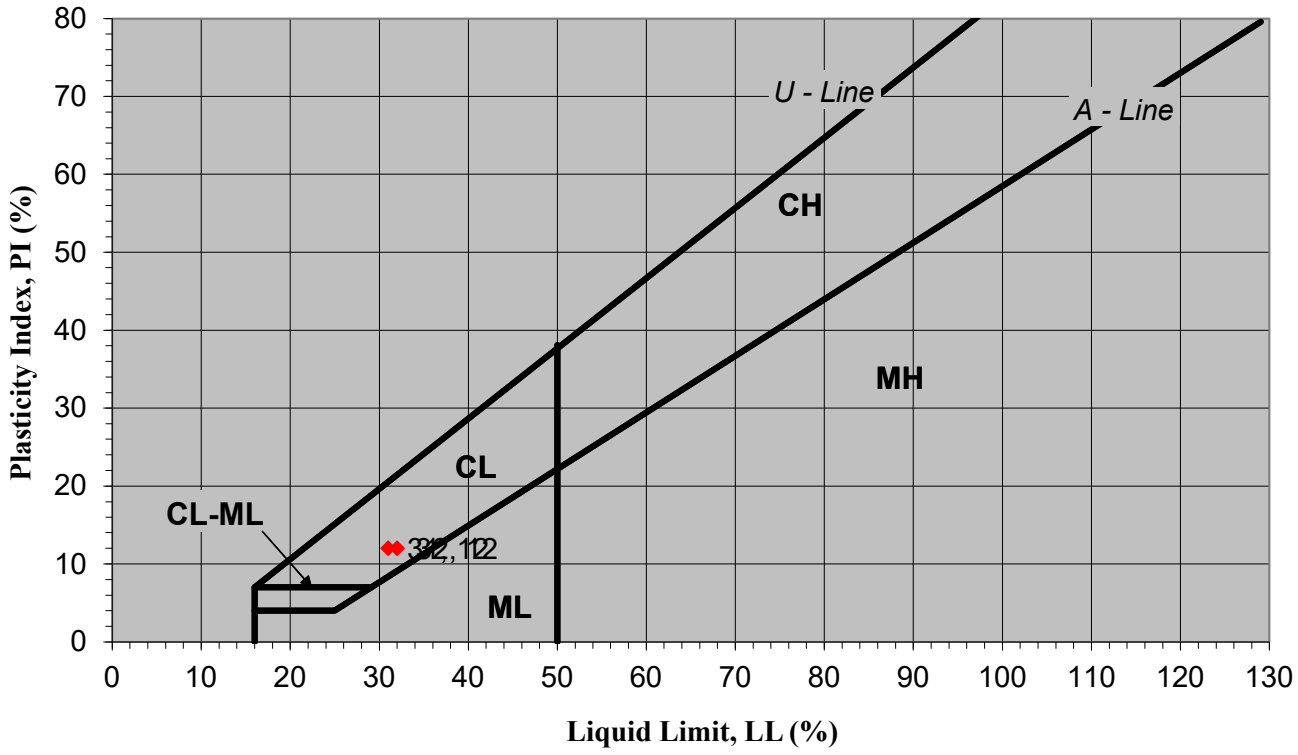
USCS Plasticity Chart

9-U-76

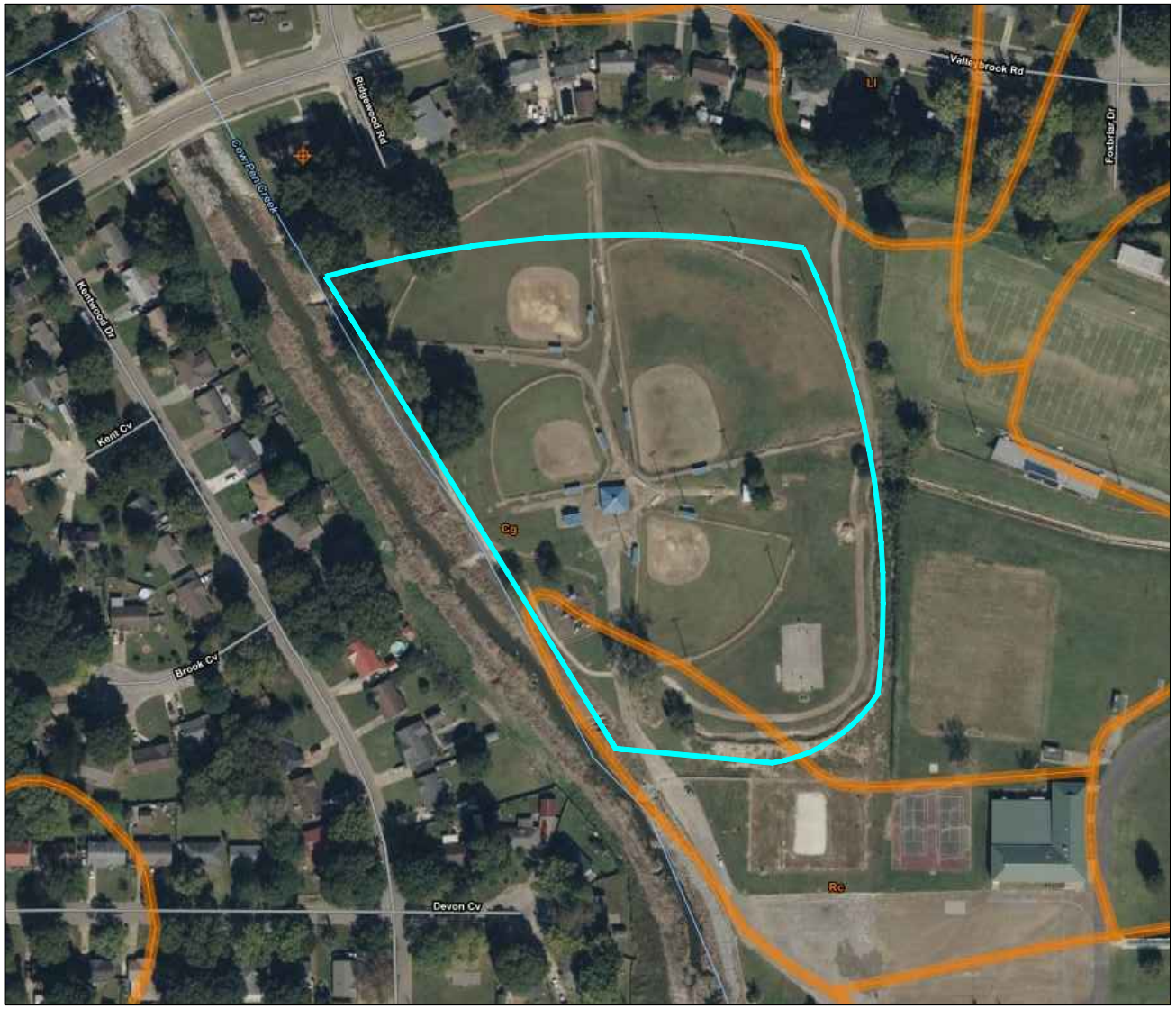


USCS Plasticity Chart

5-G-75



COWPEN CREEK NORTH DETENTION



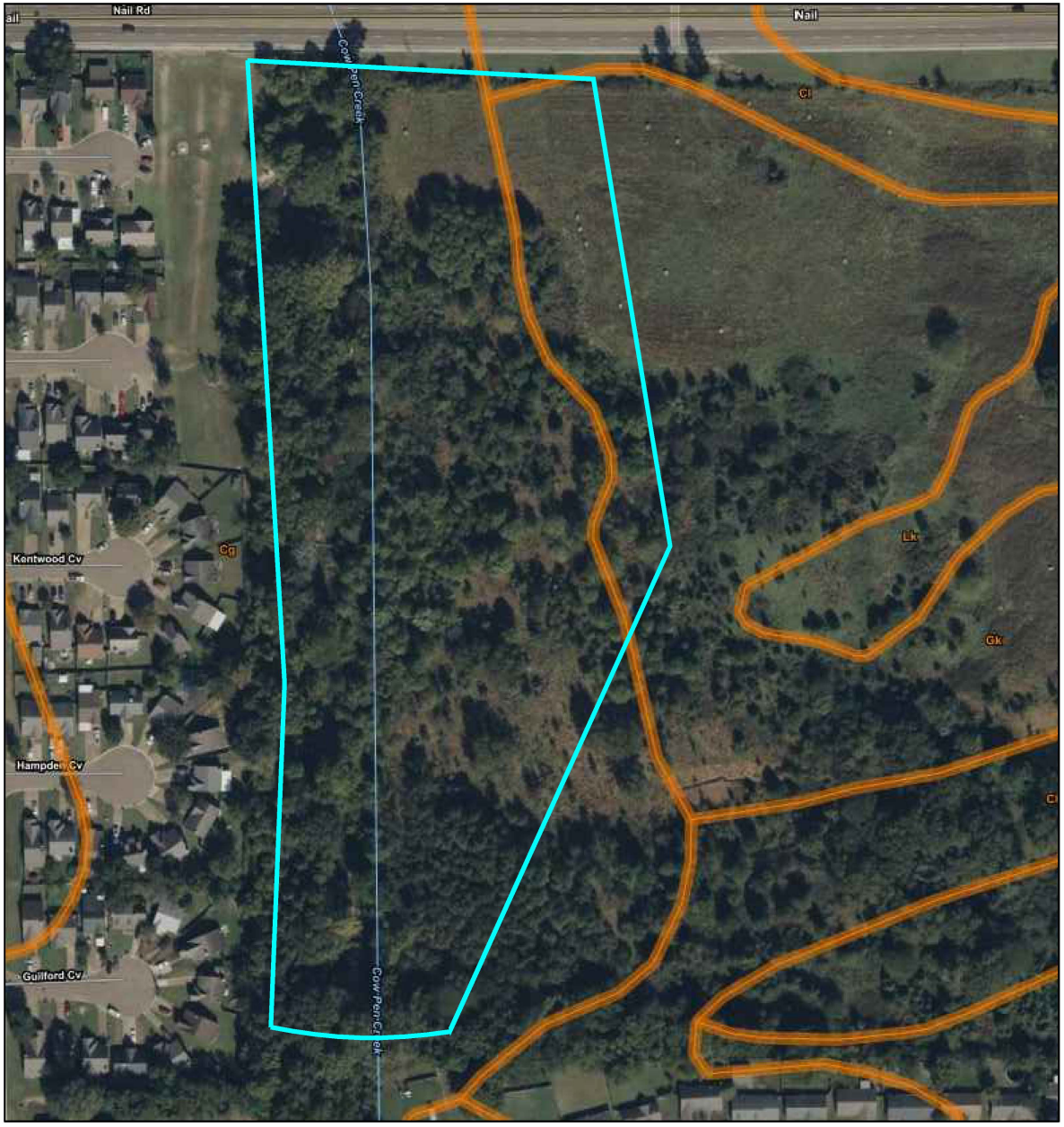
Legend

APPROXIMATE EXCAVATION AREA

PREDOMINATE EXCAVATION MATTERIAL: CG (COLLIN SILT LOAM (ADLER)):
RC (RICHLAND SILT LOAM, SEVERELY ERODED VERY GENTLY SLOPING PHASE (LORING)

EXCAVATION QUANTITY : 175,000 CY
BOTTOM EXCAVATION ELEVATION : 272.0

COWPEN CREEK SOUTH DETENTION



Legend

APPROXIMATE EXCAVATION AREA

PREDOMINATE EXCAVATION MATTERIAL: CG (COLLIN SILT LOAM (ADLER)):
GK (GULLIED LAND, LORING SOIL MATERIAL)

EXCAVATION QUANTITY : 115,000 CY
BOTTOM EXCAVATION ELEVATION : 258.0

North Desoto Feasibility Study

Horn Lake Creek Cleanout & Proposed Floodwall and Levee Segment

Historical Borings &NRCS Web-soil information

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION		TYPE	LETTER SYMBOL	SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS — More than half of material is larger than No. 200 sieve size	GRAVEL — More than half of coarse fraction is larger than No. 4 sieve size	CLEAN GRAVEL (Little or No Fines)	GW		GRAVEL, Well Graded, gravel-sand mixtures, little or no fines
			GP		GRAVEL, Poorly Graded, gravel-sand mixtures, little or no fines
		GRAVEL WITH FINES (Appreciable Amount of Fines)	GM		SILTY GRAVEL, gravel-sand-silt mixtures
			GC		CLAYEY GRAVEL, gravel-sand-clay mixtures
	SAND — More than half of coarse fraction is smaller than No. 4 sieve size	CLEAN SAND (Little or No Fines)	SW		SAND, Well Graded, gravelly sands
			SP		SAND, Poorly Graded, gravelly sands
		SAND WITH FINES (Appreciable Amount of Fines)	SM		SILTY SAND, sand-silt mixtures
			SC		CLAYEY SAND, sand-clay mixtures
FINE GRAINED SOILS — More than half the material is smaller than No. 200 sieve size		SILTS AND CLAYS (Liquid Limit <50)	ML		SILT & very fine sand, silty or clayey fine sand or clayey silt with slight plasticity
			CL		LEAN CLAY; Sandy Clay; Silty Clay; of low to medium plasticity
			OL		ORGANIC SILTS, and organic silty clays of low plasticity
		SILTS AND CLAYS (Liquid Limit >50)	MH		SILT, fine sandy or silty soil with high plasticity
			CH		FAT CLAY, inorganic clay of high plasticity
			OH		ORGANIC CLAYS of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt		PEAT, and other highly organic soil
WOOD			Wd		WOOD
MIXED SAMPLE			VM		Variable mixed silts, clays and sands
NO SAMPLE					

NOTE: Soils possessing characteristics of two groups are designated by combinations of group symbols.

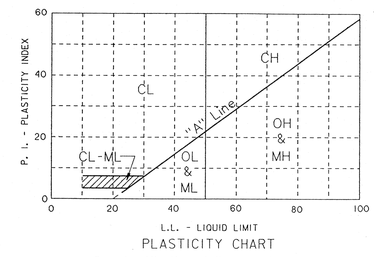
DESCRIPTIVE SYMBOLS

COLOR

COLOR	SYMBOL
TAN	T
YELLOW	Y
RED	R
BLACK	BK
GRAY	GR
LIGHT GRAY	LGR
DARK GRAY	DGR
BROWN	BR
LIGHT BROWN	LBR
DARK BROWN	DBR
BROWNISH - GRAY	BRGR
GRAYISH - BROWN	GRBR
GREENISH - GRAY	GNGR
GRAYISH - GREEN	GRGN
GREEN	GN
BLUE	BL
BLUE - GREEN	BLGN
WHITE	WH
MOTTLED	MOT

CONSISTENCY FOR COHESIVE SOILS

CONSISTENCY	COHESION IN LBS./SQ. FT. FROM UNCONFINED COMPRESSION TEST	SYMBOL
VERY SOFT	< 250	VSO
SOFT	250 - 500	SO
MEDIUM	500 - 1000	M
STIFF	1000 - 2000	ST
VERY STIFF	2000 - 4000	VST
HARD	> 4000	H



PLASTICITY CHART
For classification of fine - grained soils

MODIFICATIONS

MODIFICATION	SYMBOL
Traces	TR -
Fine	F
Medium	M
Coarse	C
Concretions	CC
Rootlets	RT
Lignite fragments	LG
Shale fragments	SH
Sandstone fragments	SDS
Shell fragments	SLF
Organic matter	O
Clay strata or lenses	CS
Silt strata or lenses	SIS
Sand strata or lenses	SS
Sandy	S
Gravelly	G
Boulders	B
Slickensides	SL
Wood	WD
Oxidized	OX
Saturated	SAT
Lumps of Clay	CLP

NOTES:

FIGURES TO THE LEFT OF BORING UNDER COLUMN "W OR D_{10} "

Are natural water contents in percent dry weight

When underlined denotes D_{10} size in mm •

FIGURES TO THE LEFT OF BORING UNDER COLUMNS "LL" AND "PL"

Are liquid and plastic limits, respectively

SYMBOLS TO THE LEFT OF BORING

▽	Ground water surface and date observed
(C)	Denotes location of consolidation test • •
(S)	Denotes location of consolidation - drained direct shear test • •
(R)	Denotes location of consolidation - undrained triaxial compression test • •
(Q)	Denotes location of unconsolidated - undrained traxial compression test • •
(T)	Denotes location of sample subjected to consolidation test and each of the above three types of shear tests • •
FW	Denotes free water encountered in boring or sample
o—	Denotes channel grade

FIGURES TO THE RIGHT OF BORING

Are values of cohesion in lbs/sq. ft. from unconfined compression tests

In parenthesis are driving resistances in blows per foot determined with a standard split spoon sampler (I $\frac{3}{8}$" I.D. 2" O.D.) and a 140 lb. driving hammer with a 30" drop

Where underlined with a solid line denotes laboratory permeability in centimeters per second of undisturbed sample

Where underlined with a dashed line denotes laboratory permeability in centimeters per second of sample remoulded to the estimated natural void ratio

BORING TYPE

SS - Split Spoon Sampler
AUG - Auger
TUBE - 3" or 5" Thin Wall Tube

• The D_{10} size of a soil is the grain diameter in millimeters of which 10% of the soil is finer, and 90% coarser than size D_{10}.

• • Results of these tests are available for inspection in the U.S. Army Engineer District Office if these symbols appear beside the boring logs on the drawings.

GENERAL NOTES:

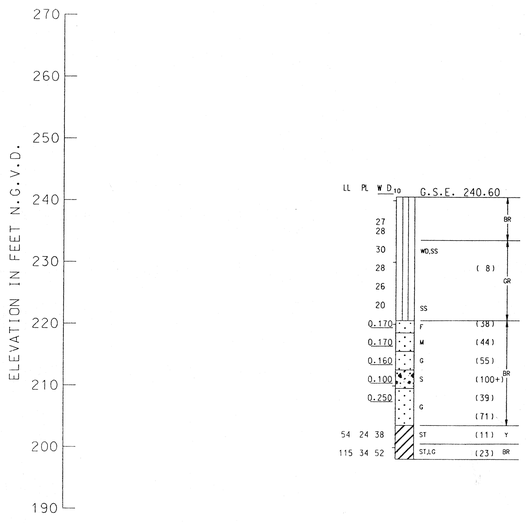
While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of subsurface materials of the region are anticipated and, if encountered, such variations will not be considered as differing materially within the purview of the contract clause entitled, "Differing Site Conditions".

Ground water elevations shown on the borings logs represent ground water surfaces encountered in such borings on the dates shown. Absence of water surface data on certain borings indicates that no ground water data are available from the boring but does not necessarily mean that ground water will not be encountered at the locations or within the vertical reaches of such borings.

Consistency of cohesive soils shown on the boring logs is based on driller's log and visual examination and is approximate, except within those vertical reaches of the borings where shear strengths from unconfined compression tests are shown.

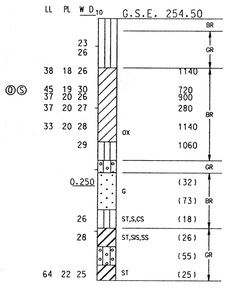
BOR. 6-U-79

DOWNSTREAM RIGHT BANK OF HORN LAKE ROAD
BOR. TYPE- AUG, 5" TUBE & SS
GROUND WATER EL. 232.6
8 AUG 79



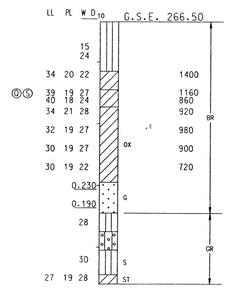
BOR. 7-U-79

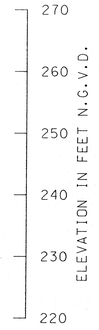
UPSTREAM RIGHT BANK OF ICRR BRIDGE
BOR. TYPE-AUG, 5" TUBE & SS
GROUND WATER EL. 243.5
9 AUG 79



BOR. 8-U-79

UPSTREAM LEFT BANK OF HIGHWAY 51 BRIDGE
BOR. TYPE-AUG, 5" TUBE & SS
GROUND WATER EL. 249.5
13 AUG 79



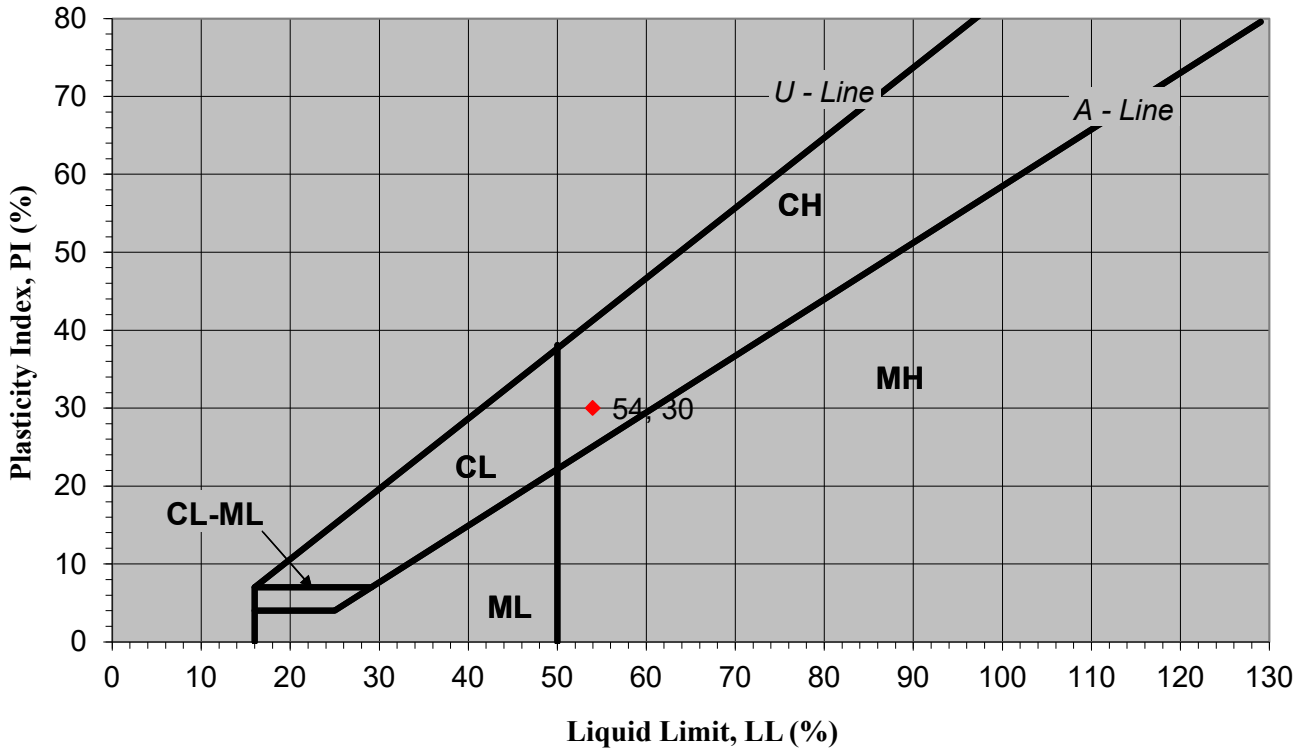


SYM	ZONE	REVISIONS	DATE	APPROVED

DESIGN	DESIGNED BY W.J.S.	DEPARTMENT OF THE ARMY MEMPHIS DISTRICT, CORPS OF ENGINEERS MEMPHIS, TENNESSEE
	CHECKED BY R.O.S.	
DRAWING	DRAWN BY D.D.G	FLOOD CONTROL HORN LAKE CREEK & TRIBS.
	CHECKED BY W.J.S.	MISS. RIVER AND TRIBS. CHANNEL IMPROVEMENTS
DATE JANUARY 1993		HORN LAKE CREEK ITEM-1 CHANNEL CLEARING BORING LOGS AND LEGEND
SUBMITTED BY Ronald O Smith CHIEF, GEOTECHNICAL DESIGN SEC.		HORN LAKE CREEK WATERSHED D.D.
APPROVAL RECOMMENDED Ronald O Smith CHIEF, GEOTECH ENG. & SURVEY BR.		SIZE F; CODE IDENT NO. DACW 66; SERIAL 23336; FILE 162A/1(5); TAPES; DRAWING NO. 5 SCALE: AS SHOWN; INV. NO. DACW 66 DATED; SHEET 5 OF 5

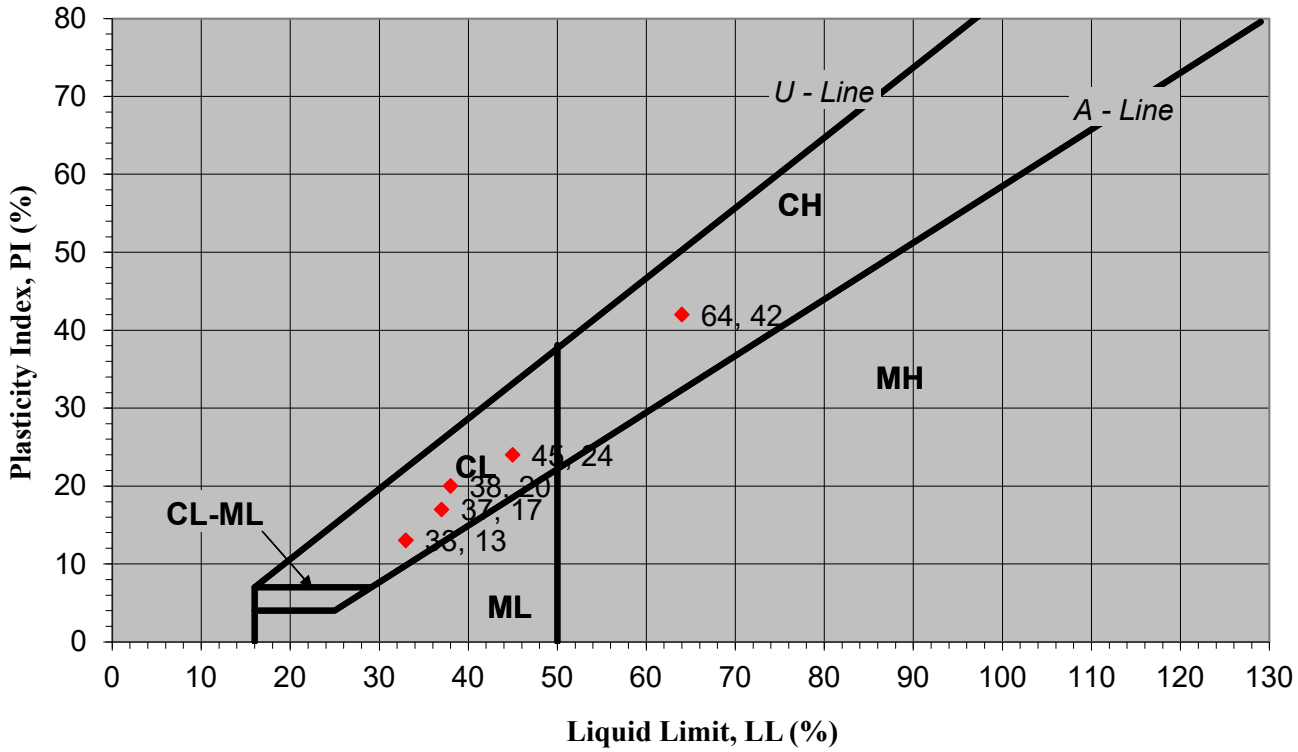
USCS Plasticity Chart

6-U-79



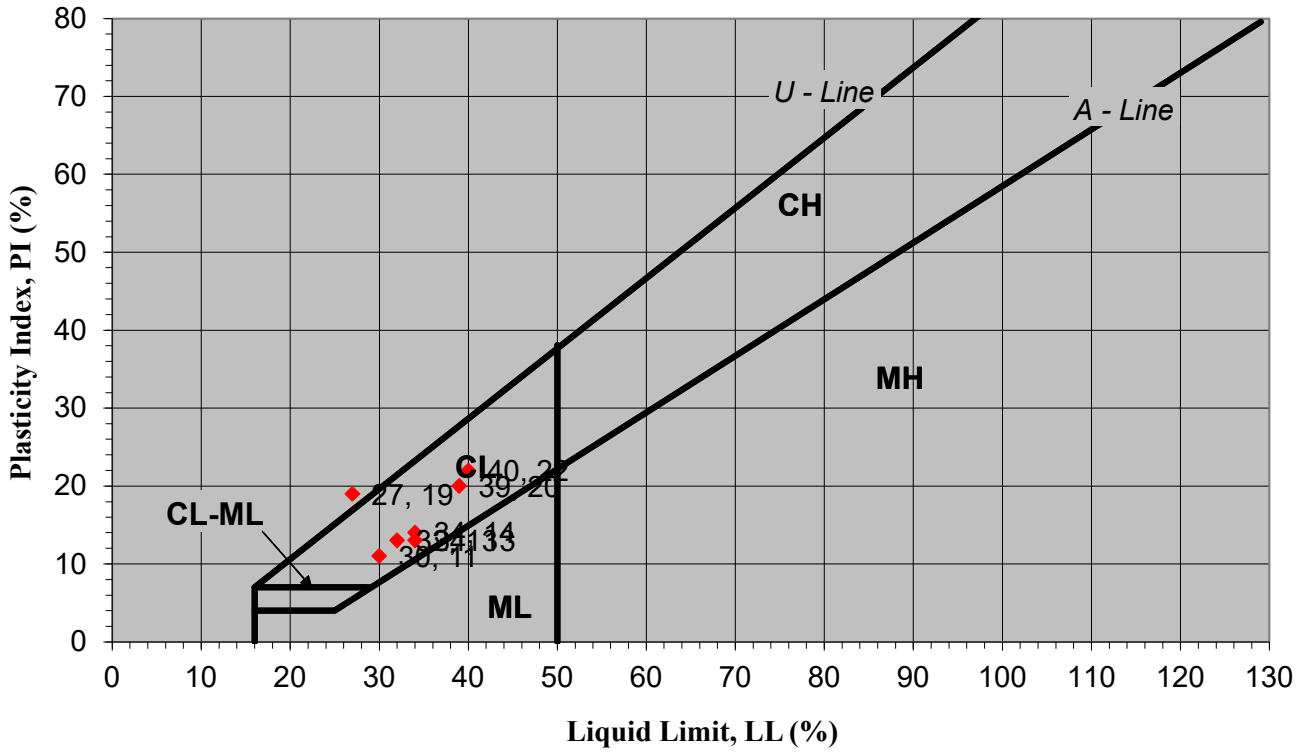
USCS Plasticity Chart

7-U-79



USCS Plasticity Chart

8-U-79



FLOODWALL AND LEVEE CONSTRUCTION AREA

Legend

FLOODWALL CL ——— LEVEE CL ———

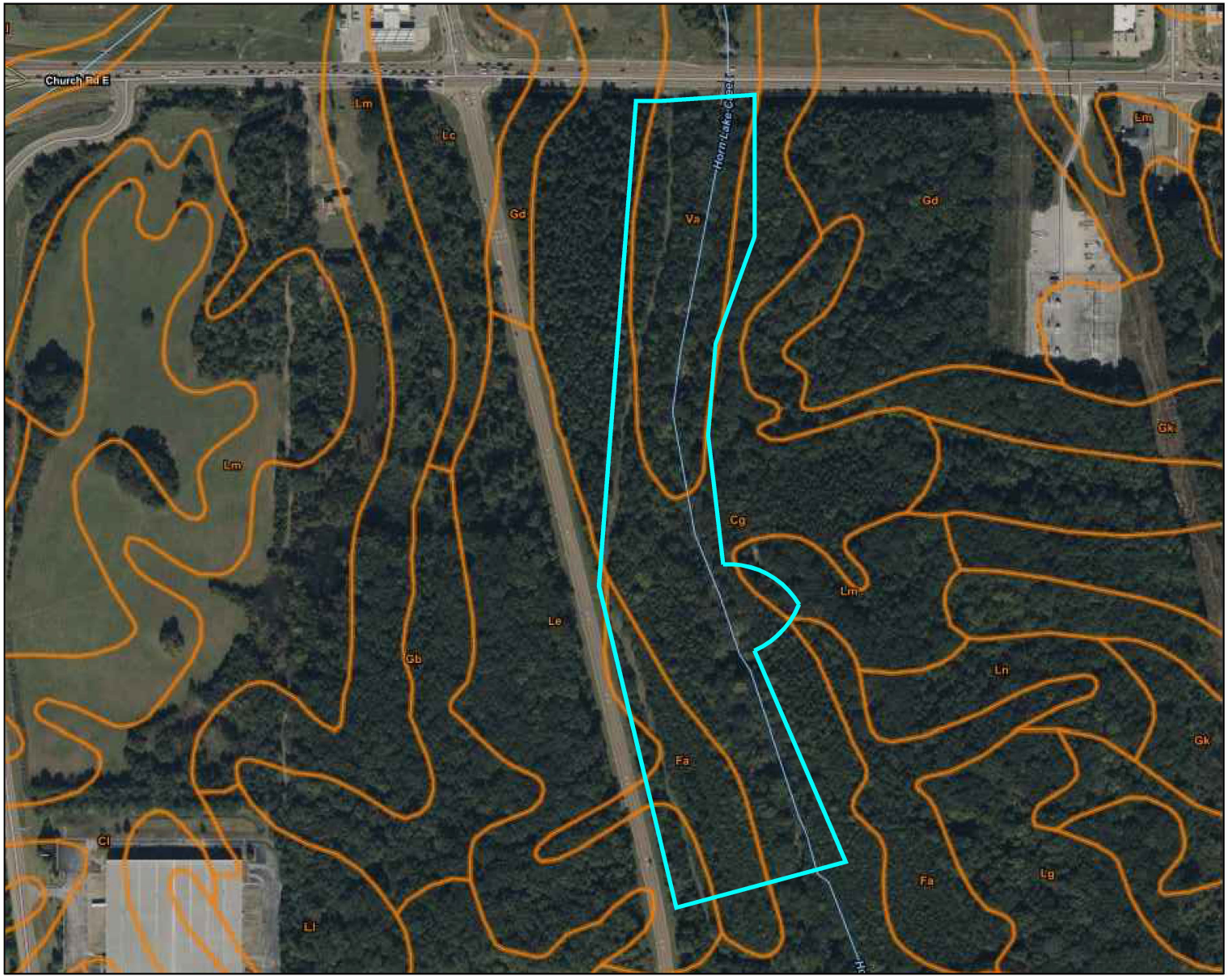
PREDOMINATE FOUDNATION MATTERIAL: CG (COLLIN SILT LOAM (ADLER)): VA (VICKSBURG SILT LOAM) :
CL (COLLINS AND FALAYA SILT LOAMS, LOCAL ALLUVIUM PHASES)

North Desoto Feasibility Study

Lateral D Detention

Historical Borings &NRCS Web-soil information

LATERAL D DETENTION



EXCAVATION QUANTITY : 350,000 CY
BOTTOM EXCAVATION ELEVATION : 290.0

Legend

APPROXIMATE EXCAVATION AREA

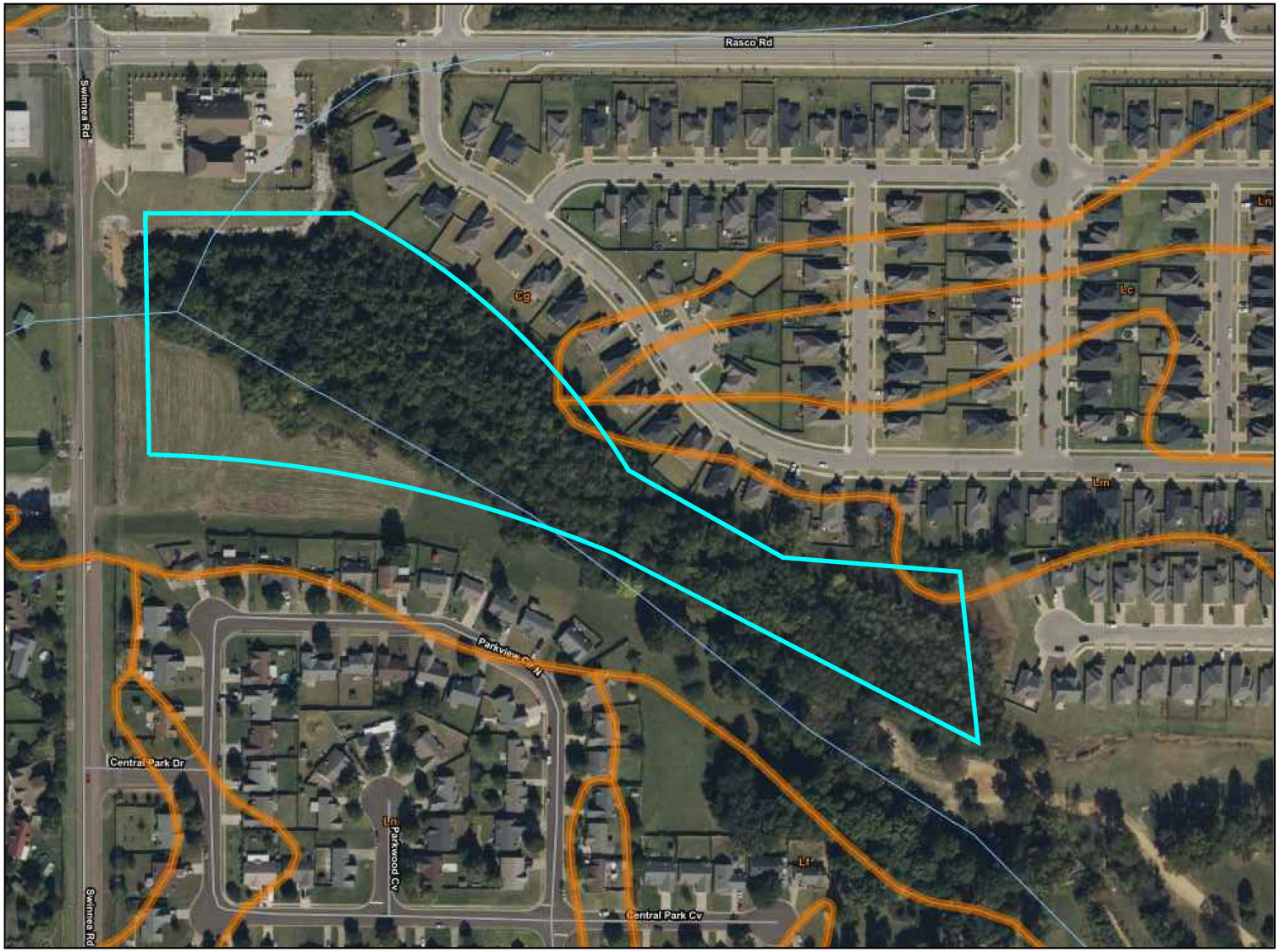
PREDOMINATE EXCAVATION MATTERIAL: CG (COLLIN SILT LOAM (ADLER)):FA (FALAYA SILT LOAM (ARKABUTLA)) :
VA (VICKSBURG SILT LOAM)

North Desoto Feasibility Study

Rocky Creek Detention

Historical Borings &NRCS Web-soil information

ROCKY CREEK DETENTION



Legend

APPROXIMATE EXCAVATION AREA

PREDOMINATE EXCAVATION MATTERIAL: CG (COLLIN SILT LOAM (ADLER))

EXCAVATION QUANTITY : 115,000 CY

BOTTOM EXCAVATION ELEVATION : 302.0