# Supplement: Sample Research Plan

*Note: The sample tasks that follow may not be the same used to illustrate the project costs and schedules elsewhere in the MDOT Research Consultant Manual.*

Task C1. The Consultant shall:

* 1. Compile publications and documentation (literature search) applicable to characterizing expansive clays
	2. Copy Yazoo Clay data from existing computer files and documents

Task M1. The MDOT Materials Division will make available to the Consultant archived MDOT database and spreadsheet files containing approximately 800 borehole test data for researching soil and mineralogy property indicator correlations.

Task C2. The Consultant shall categorize available MDOT Yazoo Clay data (past studies and experiments) archived in MDOT computer files, published reports, and unpublished documents. Perform statistical analyses of the data searching for applicable soil and mineralogy property indicator correlations.

Task C3. The Consultant shall:

* 1. Observe Yazoo Clay soil sampling, testing, and characterization procedures performed by MDOT
	2. Mobilize testing setup and initiate testing procedures

Task M2. The MDOT Materials Division will:

Perform rotary drilling and undisturbed sampling in Yazoo Clay at two immediately adjacent locations designated herein as boreholes ‘A’ and ‘B’. In-situ soil strata permitting, continuous undisturbed Shelby-tube samples will be obtained from each location to a depth of thirty (30) feet below the ground surface. Sampling intervals will correspond between the two boreholes; i.e., sample interval 0-1 ft. in borehole ‘A’ will have the same corresponding elevations to borehole ‘B’ sample interval 0-1 ft.

* 1. Collect additional data for each location including lat-long data, ground surface elevation, depth, and descriptive stratigraphy shown on each borehole log.
	2. Seal and tag samples by location, depth, and vertical orientation
	3. Deliver borehole ‘A’ samples to the MDOT Central Laboratory and provide borehole ‘B’ samples to the Consultant for laboratory testing.

Task M3. The MDOT Materials Division will:

* 1. Perform each of the following tests in accordance with the standard MDOT procedures (TMD-20-14-00-000 and others as appropriate) for each one-foot sample interval in borehole ‘A’:
* Natural water content
* Shear strength (unconfined compressive strength or hand-held penetrometer and/or Torvane
* In-situ density
* Atterberg limits (LL and PL)
* Volume change and shrinkage limit
* Grain size distribution
* Percent clay
* USCS/AASHTO classification
	1. All surplus and remolded soil from each sample interval of borehole ‘A’ will be recompiled into one sample for the given sample interval; i.e., remaining soil from different sample increments will not be combined. Each recombined sample will be seal-bagged and tagged for location and sample interval identification. The MDOT Materials Division will provide these bags of remaining soil to the Consultant for further testing.
	2. Provide all test data from testing borehole ‘A’ samples to the Consultant.

Task C4. The Consultant shall perform the following tests on adjacent borehole ‘B’ undisturbed sample 1-ft intervals and remaining borehole ‘A’ bagged (disturbed) soil (as described elsewhere herein):

* 1. Shrink-swell tests including oedometer, free swell, FHA PVC, expansion index, Australian, and innovative methods;
	2. Suction tests including filter paper, chilled mirror, psychrometer, and alternative methods; and,
	3. Physio-chemical tests including specific surface, cation exchange, and soil chemistry methods.

Each borehole ‘B’ sample interval will correspond to each borehole ‘A’ sample interval for experimental and/or standardized testing procedures. Surplus and remaining soil will be remolded at differing water contents for additional experimental and/or standardized tests.

Task C5. The Consultant shall analyze test results for correlations to indicators, engineering properties including published empirical correlations, and soil depth profiles. Correlations of results will assume negligible lateral variability between boreholes ‘A’ and ‘B’ at each sample interval. Evaluate test equipment, methods, procedures, and results.

Task C6. The Consultant shall provide the following Project Management deliverables in accordance with the appropriate sections/subsections and appendices of the current version of the *MDOT Research Consultant Manual*:

* 1. Minutes for all Technical Advisory Committee meetings
	2. Quarterly Progress Reports (QPRs)
	3. Annual Progress Reports (APRs)
	4. Supporting documentation with submission of invoices

Task C7. The Consultant shall provide a final report that includes compiled and documented test results, findings, correlations, evaluations, and conclusions as well as a Technical Report Documentation Page and study deliverables per the requirements of the current version of the *MDOT Research Consultant Manual*

The Consultant shall provide a one or two-page technical brief as a separate document from the final report as a project deliverable.

Task M4. The MDOT Materials Division will review both the draft and final versions of the final report and provide feedback to the Consultant and the MDOT Research Division TAC member.