ADVERTISEMENT FOR ENGINEERING AND RELATED SERVICES
February 20, 2020

CONTRACT NOS. 4400019011, 4400019012, 4400019013, 4400019014, 4400019015, 4400019016, AND 4400019017
IDIQ CONTRACTS FOR PROFESSIONAL GEOTECHNICAL SERVICES
STATEWIDE

Under the authority granted by Title 48 of Louisiana Revised Statutes, the Louisiana Department of Transportation and Development (DOTD) hereby issues this advertisement for consulting firms to provide engineering and related services. **Consultants who are a Louisiana or foreign LLC or corporation should be appropriately registered with the Louisiana Secretary of State, as contemplated by Title 12 of the Louisiana Revised Statutes, and with the Louisiana Professional Engineering and Land Surveying (LAPELS) Board under its rules for firms. If a consultant is not in good standing in accordance with those provisions, it may be subject to consequences contemplated in Title 12 and/or the LAPELS rules. All requirements of LAPELS must be met at the time the proposal is submitted**. **Prime consultants must be registered with the Federal Government using SAM.gov prior to contract execution.**

All prime and sub-consultants submitting proposals for this advertisement must have an Annual Personnel List (APL) on file with DOTD.

One (1) proposal will be selected for each contract solicited per this advertisement. Only one (1) DOTD Form 24-102 proposal is required for this advertisement, and it represents the prime consultant's qualifications and those of any and all sub-consultants proposed to be used for the referenced contract(s). All identifying contract number(s) should be listed in Section 2 of the DOTD Form 24-102.

Any questions concerning this advertisement must be sent in writing to DOTDConsultantAds80@la.gov no less than 48 hours (excluding weekends and holidays) prior to the proposal deadline.

SCOPE OF SERVICES

The general tasks that the consultant may be required to perform are described more specifically in Attachment A, which is incorporated herein by reference. The selected consultant will perform the specific services covered in an Indefinite Delivery/Indefinite Quantity (IDIQ) contract as detailed in individual Task Orders (TOs), which will specify TO-specific scope of services, contract time, and compensation.

The consultant shall perform the work in accordance with the requirements of this advertisement, the resulting contract, and any TOs issued thereunder. Deliverables shall be in such format as required in Attachment A, unless otherwise specified in an individual TO. The work performed by the consultant shall be performed in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession currently practicing under similar circumstances.

MINIMUM PERSONNEL REQUIREMENTS (MPRs)

The requirements set forth in Attachment B must be met at the time the proposal is submitted.

EVALUATION CRITERIA

The criteria to be used by DOTD in evaluating responses for the selection of a consultant to perform these services are listed below:

1. consultant's firm experience on similar projects, weighting factor of three (3);
2. consultant's staff experience on similar projects, weighting factor of four (4);
3. consultant's firm size as related to the Project Magnitude, weighting factor of two (2);
4. consultant's past performance on similar DOTD projects, weighting factor of six (6)*****; and
5. consultant's current work load with DOTD, weighting factor of three (3).

*Past performance rating categories listed in the table below will be used for performance ratings for this contract.

Project Category Weighting - Typical

The project complexity is **simple**.
The project time is **typical**.
The contract amount is **$250,000-$2,500,000**.
The route classification is **NHS**.
Therefore, the Project Magnitude for this advertisement is **SMALL**.

If any sub-consultants are proposed to be used for the referenced contract(s), then Section 11 must represent the percentage of overall work that will be done by each firm.

THE FOLLOWING TABLE MUST BE COMPLETED AND INCLUDED IN SECTION 11 OF THE PRIME CONSULTANT'S DOTD FORM 24-102 PROPOSAL.

Prime consultants who perform 100% of the work may state so in lieu of including this table. In all other cases, the prime consultant shall fill in the table by entering the name of each firm that is part of the proposal and the percentage of work in each past performance rating category to be performed by that firm. Consultants shall not add past performance rating categories. The percentage estimated for each past performance rating category is for grading purposes only, and will not control the actual performance or payment of the work.							
Past Performance Rating Categories**	% of Overall Contract	Prime	Firm B	Firm C	Firm D	Firm E	Firm F
Geotechnical Explorations (GE)	80%						
Geotechnical Design (GD)	5%						
Geotechnical Construction (GC)	5%						
Contract Management (CM)	10%	100%	n/a	n/a	n/a	n/a	n/a
Identify the percentage of work for the **overall contract** to be performed by the prime consultant and each sub-consultant.							
Percent of Contract	100%						

**Consultants with no past performance rating in a given category will be assigned the average rating of the firms submitting for that category, the statewide average rating for that category, or three (3.0), whichever is lowest as of the date the advertisement was posted.

If sub-consultants are used, the prime consultant must perform a minimum of 51% of the work for the overall contract. The prime consultant and each sub-consultant will be evaluated on their part of the contract. The individual prime consultant and sub-consultant ratings, proportional to the amount of their work, will then be added to arrive at the total consultant rating.

DOTD's Project Evaluation Team will be responsible for performing the above described evaluation, and will present a shortlist of the nine (9) (if nine are qualified), highest rated consultants to the Secretary of DOTD. The Secretary will make the final selection.

RULES OF CONTACT

These rules are designed to promote a fair and unbiased selection process. DOTD is the single source of information regarding the contract selection. Any official correspondence will be in writing, and any official information regarding the contract will be disseminated by DOTD's designated representative via the DOTD website. The following rules of contact will apply during the contract selection process, commencing on the advertisement posting date and ceasing at the time of final

contract selection. Contact includes face-to-face communication, the use of a telephone, facsimile, electronic mail (email), or formal or informal written communications with DOTD. Any contact determined to be improper, at the sole discretion of DOTD, may result in the rejection of the proposal (i.e., DOTD Form 24-102).

Consultants and consultant organizations shall correspond with DOTD regarding this advertisement only through the email address designated herein; DOTDConsultantAds80@la.gov and during DOTD sponsored one-on-one meetings.

No consultant, or any other party on behalf of a consultant, shall contact any DOTD employee, other than as specified herein. This prohibition includes, but is not limited to, the contacting of: department heads, members of the evaluation teams, and any official who may participate in the decision to award the contract resulting from this advertisement.

DOTD will not be responsible for any information or exchange that occurs outside the official process specified above.

By submission of a proposal to perform services pursuant to this advertisement, the consultant agrees to the communication protocol herein.

No protest or appeal will be entertained unless made in accordance with the procedures found on DOTD's website, which are incorporated herein by reference and can be accessed at: http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/CCS/Pages/Process_Procedures.aspx.

CONTRACT TIME

This IDIQ contract shall be in effect for **five (5) years**. **All TOs must be completed by the termination date of the IDIQ contract.** No TO will be initiated unless sufficient contract time remains to complete the TO.

COMPENSATION

The maximum compensation payable to the consultant under each IDIQ contract shall not exceed $**2,500,000**. Compensation to the consultant for services rendered in connection with each TO may be made on the basis of lump sum, actual cost plus a fixed fee, specific rates of compensation, or cost per unit of work (See Table 1), as specified in each TO, subject to the limitation set forth in the IDIQ contract.

Compensation may be either negotiated or non-negotiated as determined by DOTD for each individual TO. When the compensation is negotiated, it will be determined by DOTD based on work hours negotiated between DOTD and the consultant. After notification of selection, a kick-off meeting will be held with the selected consultant and appropriate DOTD personnel. The selected consultant will be required to submit a work hour proposal. All negotiations must be completed within the timeframe set forth in the Consultant Contract Services Manual, unless an abbreviated timeframe is specified in writing by the PM.

Table 1: Statewide Geotechnical Rates

	UNITS	RATE
FIELD FUNCTIONS		
MOBILIZATION/DEMOBILIZATION, DRILLING EQUIPMENT	mi	Negotiated
DRILL CREW TRAVEL TIME	hr	$150.00
SUPPORT TRUCK	mi	PPM
DRILLING & SAMPLING (ASTM D1586, D1587,D3441)		
5ft. On Center		
100ft or less	ft	$18.00
101ft to 150ft	ft	$25.00
151ft to 200ft	ft	$30.00
Continuous Sampling		
100ft or less	ft	$30.00
Water Buggy	day	$188.00
ATV Rates	day	$200.00
Cone Penetrometer Testing		
100ft or less, including grouting	ft	$13.00
101ft to 150ft	ft	$15.00
AUGER DRILLING	ft	$12.00
DIFFICULT BORING ACCESS	hr	$215.00
SETTING CASING	ft	$10.00
SEALING BOREHOLES, 4"	ft	$6.00
CORING OF PORTLAND CEMENT CONCRETE FOR BORINGS	in	$16.75
DIFFERENTIAL GLOBAL POSITIONING	ea.	$28.75
LABORATORY TESTING		
STRENGTH TESTING		
ASTM D2850: TRIAXIAL - UNCONSOLIDATED UNDRAINED	ea.	$65.00
ASTM D7181: TRIAXIAL - CONSOLIDATED DRAINED 3 PT.	ea.	$700.00
ASTM D4767: TRIAXIAL - CONSOLIDATED UNDRAINED w/Pore Water Pressures	ea.	$640.00
ASTM D3880: DIRECT SHEAR TEST	ea.	$700.00
INDEX TESTING		
ASTM D4318: ATTERBERG LIMITS - METHOD A (MULTIPOINT LL)	ea.	$95.00
ASTM D4318: ATTERBERG LIMITS - METHOD B (ONE-POINT LL)	ea.	$62.00
ASTM D422: PARTICLE SIZE ANALYSIS (1/4" through 200 Sieve)	ea.	$56.00
ASTM D422: PARTICLE SIZE ANALYSIS WITH HYDROMETER	ea.	$100.00
ASTM D2216: MOISTURE CONTENT	ea.	$10.50
ASTM D1140: PERCENT PASSING No. 200 SIEVE (WET)	ea.	$40.00
CONSOLIDATION TESTING		
ASTM D2435: CONSOLIDATION TESTS WITH REBOUND	ea.	$525.00
MISCELLANEOUS TESTING		
ASTM D2976: pH DETERMINATION	ea.	$27.00
ASTM D4943: ORGANIC CONTENT	ea.	$60.00
ASTM G187: RESISTIVITY	ea.	$200.00
ASTM D854: SPECIFIC GRAVITY	ea.	$102.00
SHELBY TUBE SAMPLE EXTRACTION – IN LAB	ea.	$25.00
DRY PREPARATION OF SUBGRADE SOIL SAMPLES	ea.	$50.00
UNIT WEIGHT OF UNDISTURBED SAMPLES (w/out Strength Testing)	ea.	$25.00

Louisiana State Travel Regulations shall be used to determine reimbursement for meals, lodging rates, and mileage.
DOTD Traffic Control Manual shall be used to define procedures to be used for traffic control. Police Officers used for public safety shall be in accordance with DOTD's *Policy for Use of Police Officers in Construction/Maintenance Work Zones.*
Supplies (consumables such as gloves, cement, etc.) shall be no more than 10% of the drilling costs, with receipts required.
In the event of lost or damaged equipment, including but not limited to: cone penetrometers, drilling bits and rods, tools, etc. DOTD shall not be liable to absorb the cost of replacement.
All requests for additional administrative or other (not listed) compensation must be pre-approved by DOTD's Pavement & Geotechnical Services Section prior to submittal to the Consultant Contract Services Section.
Any Metric projects assigned to the Consultant will be required to be reported in Metric units except for invoices, which will use English unit equivalents.
Additional test procedures not listed above will be negotiated on a per Task Order basis as required.

DIRECT EXPENSES

To the extent that the consultant is allowed to claim reimbursement for direct expenses, all direct expense items which are not paid for in the firm's indirect cost rate and which are needed and will be consumed during the life of the contract must be identified by the consultant during contract development. Standard equipment or resources to be used in the provision of services rendered for this contract will not be considered for payment under direct expenses.

The consultant should own most of the equipment required to provide the work and services. The cost of this equipment should be included in the consultant's indirect cost rate. Equipment may be considered "specialized" if it cannot be considered standard equipment for that particular consultant's normal operating business needs. If a consultant believes special equipment is needed for the contract, the consultant must inquire through the Question and Answer process, as provided herein, whether the identified item will be considered specialized equipment for the individual contract.

To the extent that direct expenses are authorized to be compensated pursuant to a particular TO, all travel related expenses will be compensated under direct expenses, and will be in accordance with the most current Louisiana Office of State Travel regulations as promulgated in the Louisiana Administrative Code under the caption "PPM No. 49", with the exception that compensation for vehicle usage will be based on actual miles traveled directly and exclusively related to project needs. Vehicle rental rates will require prior approval from the PM.

QUALITY ASSURANCE/QUALITY CONTROL

DOTD requires the selected consultant and all sub-consultants to develop a Quality Assurance/Quality Control (QA/QC) program in order to provide a mechanism by which all deliverables will be subject to a systematic and consistent review. The selected consultant shall address in its plan the review of all sub-consultant work and deliverables. The selected consultant

must submit their QA/QC plan to the DOTD PM within 10 business days of the award notification to the consultant. Consultants must ensure quality and adhere to established DOTD policies, procedures, standards and guidelines in the preparation and review of all deliverables. DOTD may provide limited input and technical assistance to the consultant. Any deliverables to be transmitted by the consultant shall be transmitted with a DOTD Quality Assurance/Quality Control Checklist, and a certification that the deliverables meet DOTD's quality standards.

If Attachment A includes specific QA/QC requirements that contradict those set forth above, the requirements in Attachment A control.

TRAFFIC ENGINEERING PROCESS AND REPORT TRAINING REQUIREMENTS

As part of DOTD's on-going commitment to high quality traffic engineering reports, a traffic engineering training course must be taken by traffic engineering PEs and EIs in order to be eligible to work on DOTD projects. For consultants performing traffic engineering services (i.e., traffic analysis throughout all DOTD project stages), appropriate personnel must successfully complete the three (3) modules of the Traffic Engineering Process and Report Course offered by Louisiana Transportation Research Center (LTRC) . This Course must be completed no later than the time the proposal is submitted. Copies of training certificates are to be included in the proposal. It will be the prime consultant's responsibility to ensure their staff and sub-consultants complete the training. Copies of training records may be obtained from the LTRC website https://registration.ltrc.lsu.edu/login.

WORK ZONE TRAINING REQUIREMENTS

As part of DOTD's on-going commitment to work zone safety, required work zone training courses must now be taken every four (4) years in order for personnel to remain eligible to work on DOTD projects. For consultants performing preconstruction services (*i.e.*, design, survey, subsurface utility, geotechnical, traffic, bridge inspection, environmental services), appropriate personnel must successfully complete these courses. In general, the person in responsible charge of traffic control plans shall be required to have Traffic Control Supervisor training. For preconstruction field services performed within the clear zone, at least one (1) member of the field crew shall have Traffic Control Supervisor or Traffic Control Technician training. The consultant should identify all personnel listed in the staffing plan for the contract who have completed the appropriate work zone training courses. **The consultant shall explain in Section 16 of DOTD Form 24-102 how they plan to meet the work zone requirements.** All preconstruction work zone training requirements shall be met **prior to contract execution**. It will be the prime consultant's responsibility to ensure their staff and sub-consultants have the appropriate work zone training.

In addition to the above requirements, if the Scope of Services set forth in Attachment A includes Construction Engineering and Inspection (CE&I), the following training requirements shall be met **at the time the proposal is submitted**:

Field Engineers:	Traffic Control Technician Traffic Control Supervisor Flagger

Field Engineer Interns:	Traffic Control Technician Traffic Control Supervisor Flagger
Field Senior Technicians, Survey Party Chiefs, and SUE Worksite Traffic Supervisors*:	Traffic Control Technician Traffic Control Supervisor Flagger
Other Field Personnel*:	Traffic Control Technician Flagger

* excluding Asphalt Plant Inspector, Paint Managers, and Paint Inspectors

Approved courses are offered by ATSSA and AGC. Substitutes for these courses must be approved by the DOTD Work Zone Task Force. For more information, please contact Barry Lacy at 225-379-1584. Specific training course requirements are:

Flagger: Successful completion every four (4) years of a work zone flagger course approved by the Department. The "DOTD Maintenance Basic Flagging Procedures Workshop" is not an acceptable substitute for the ATSSA and AGC flagging courses.

Traffic Control Technician (TCT): Successful completion every four (4) years of a work zone traffic control technician course approved the Department. After initial successful completion, it is not necessary to retake this course every four (4) years if Traffic Control Supervisor training is completed every four (4) years.

Traffic Control Supervisor (TCS): Successful completion of a work zone traffic control supervisor course approved by the Department. Following an initial completion, traffic control supervisors must either complete a one (1)-day TCS refresher course or retake the original two (2)-day TCS course every four (4) years.

ATSSA contact information: (877) 642-4637

REFERENCES

All services and documents will meet the standard requirements as to format and content of DOTD and will be prepared in accordance with the latest applicable editions, supplements, and revisions of the following:

1. AASHTO Standards – https://www.transportation.org/
2. ASTM Standards – https://www.astm.org/BOOKSTORE/BOS/index.html

3. DOTD Test Procedures – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Materials_Lab/Pages/Menu_TPM.aspx
4. DOTD Location and Survey Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/LocationSurvey/Manuals%20and%20Forms/Location_and_Survey_Manual.pdf
5. Addendum "A" to the Location & Survey Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/LocationSurvey/Manuals%20and%20Forms/Location%20and%20Survey%20Manual%20-%20Addendum%20A.pdf
6. DOTD Roadway Design Procedures and Details – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Road_Design/Pages/Road-Design-Manual.aspx
7. DOTD Design Guidelines – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Road_Design/Memoranda/Minimum%20Design%20Guidelines.pdf
8. DOTD Hydraulics Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Public_Works/Hydraulics/Documents/Hydraulics%20Manual.pdf
9. Louisiana Standard Specifications for Roads and Bridges – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Standard_Specifications/Pages/Standard%20Specifications.aspx
10. Manual on Uniform Traffic Control Devices (Non-DOTD Link) – http://mutcd.fhwa.dot.gov/
11. DOTD Traffic Signal Design Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Traffic_Engineering/Traffic%20Control/Traffic%20Signal%20Manual%20V2.0%205-28-2015.pdf
12. National Environmental Policy Act (NEPA)
13. DOTD Stage 1 Planning/Environmental Manual of Standard Practice – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Environmental/Pages/Stage_1.aspx
14. National Electrical Safety Code
15. National Electrical Code (NFPA 70)
16. A Policy on Geometric Design of Highways and Streets (AASHTO) – https://bookstore.transportation.org/collection_detail.aspx?ID=110
17. DOTD Construction Contract Administration Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Pages/Engineering_Docs.aspx
18. DOTD Materials Sampling Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Materials_Lab/Pages/Menu_MSM.aspx

19. DOTD Bridge Design Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Bridge_Design/Pages/BDEM.aspx
20. Consultant Contract Services Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/CCS/Manuals/CCS%20Manual%202017.pdf
21. Bridge Inspector's Training Manual – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Operations/BridgeMaintenance/Pages/Documents-and-Manuals.aspx
22. Federal Aid Off-System Highway Bridge Program Guidelines – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Bridge_Design/Manuals/Other%20Manuals%20-%20Guidelines/Federal%20Aid%20Off-System%20Highway%20Bridge%20Program%20Guidelines.pdf
23. Code of Federal Regulations 29 CFR 1926 (OSHA)
24. Complete Streets – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Complete_Streets/Pages/default.aspx
25. Traffic Engineering Manual - http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Traffic_Engineering/Misc%20Documents/Traffic%20Engineering%20Manual.pdf
26. Traffic Engineering Process and Report – http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Traffic_Engineering/Publications/Pages/Process%20and%20Report.aspx

CONTRACT EXECUTION REQUIREMENTS

The selected consultant will be required to execute the contract within ten (10) days after receipt of the contract.

A sample of the contract provisions can be found at the following link: http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/CCS/Pages/Advertisements.aspx.

SECONDARY SELECTION PROCESS

When multiple IDIQ contracts with similar scopes of service are available within a DOTD Section that is prepared to issue a TO, the TO selection procedures set forth in Attachment C shall be used to award that TO. Documentation of the selection process shall be retained by DOTD.

REVISIONS TO THE ADVERTISEMENT

DOTD reserves the right to revise any part of the advertisement by issuing addenda to the advertisement at any time. Issuance of this advertisement in no way constitutes a commitment by DOTD to award a contract. DOTD reserves the right to accept or reject, in whole or part, all DOTD

Form 24-102s submitted, and/or cancel this consultant services procurement if it is determined to be in DOTD's best interest. All materials submitted in response to this advertisement become the property of DOTD, and selection or rejection of a proposal does not affect this right. DOTD also reserves the right, at its sole discretion, to waive administrative informalities contained in the advertisement.

CLARIFICATIONS

DOTD reserves the right to request clarification of ambiguities or apparent inconsistencies found within any proposal, if it is determined to be in DOTD's best interest.

PROPOSAL REQUIREMENTS

One (1) original (**stamped "original"**) and **five (5)** copies of the consultant's response to this advertisement must be submitted to DOTD on the most current version of the DOTD Form 24-102 (available at http://bit.ly/CCS_ManualsFormsAgreements) along with an electronic copy (USB flash drive only) in a searchable Portable Document Format (PDF). All proposals must be in accordance with the requirements of this advertisement, and the Consultant Contract Services Manual. Unless otherwise stated in this advertisement, copies of licenses and certificates are not required to be submitted with the proposal.

If more than one (1) contract is to be selected based on this advertisement, no prime consultant is allowed to be a sub-consultant on any other consultant's 24-102. If a prime consultant is submitted as a sub-consultant on another consultant's 24-102, its proposal as a prime consultant may be deemed non-responsive.

Any consultant failing to submit any of the information required on the DOTD Form 24-102, or providing inaccurate information on the DOTD Form 24-102, may be considered non-responsive.

DOTD employees may not submit a proposal, nor be included as part of a consultant's proposal.

Any sub-consultants to be used in performance of this contract, must also submit a DOTD Form 24-102, which is completely filled out and contains all information pertinent to the work to be performed. The sub-consultant's DOTD Form 24-102 must be firmly bound to the prime consultant's DOTD Form 24-102.

Contract and/or part-time employees are allowed. Such employees should be shown in Section 12 of the DOTD Form 24-102 with an asterisk denoting their employment status.

The DOTD Form 24-102 should be identified with **contract number 4400019011, 4400019012, 4400019013, 4400019014, 4400019015, 4400019016, and 4400019017** and shall be submitted **prior to 3:00 p.m. CST** on **Tuesday, March 10, 2020**, by hand delivery or mail, addressed to:

Department of Transportation and Development
Attn.: Darhlene Major
Consultant Contract Services Administrator
1201 Capitol Access Road, **Room 405-E**
Baton Rouge, LA 70802

Phone: (225) 379-1025

ATTACHMENT A – SCOPE OF SERVICES

1.0 GEOTECHNICAL INVESTIGATION

The consultant shall perform a geotechnical investigation consisting of soil borings, laboratory testing, optional cone penetrometer test (CPT) soundings, soil classification, site characterization, and soil boring logs. In addition to the referenced ASTM designations, refer to *FHWA Geotechnical Engineering Circular No. 5* (GEC 5) for best practices pertaining to geotechnical site characterization.

The geotechnical explorations, sampling and testing services to be provided shall include, but are not limited to:

- Field reconnaissance (***including rights of entry, utility locations, access, etc.***)
- Mobilization/demobilization
- Deep and shallow soil borings
- CPT soundings
- Water table readings
- GPS latitude and longitude and natural ground elevation of boring locations surveyed by a Professional Land Surveyor licensed in Louisiana
- Sealing boreholes in accordance with Louisiana Water Well and DEQ Regulations
- Standard Penetration Tests and Split-Barrel Sampling of Soils (ASTM D1586)
- Thin-Walled Tube Sampling of Soils (ASTM D1587)
- Specified lab testing (See Section 1.2)
    - Classification of soils per Visual Manual Method on extrusion/field logs
    - USCS for deep borings
    - AASHTO classification for shallow pavement borings
- Drafting of boring logs to 8.5”x11” sheets to be included in bid documents and/or soil survey logs to DOTD standards. Boring logs shall also be included in the plans as signed and sealed full-size sheets (22”x34”) submitted in .pdf format.
- Geotechnical data shall be furnished to DOTD adhering to the DOTD’s standard gINT schema, either as a .gpj file, or as an Excel spreadsheet capable of being imported into gINT.
- Traffic Control

1.1 Field Investigation

The field investigation may consist of traditional soil borings with laboratory testing, or a combination of that along with Cone Penetrometer Testing (ASTM D3441, ASTM D5778). Cone Penetrometer Testing may be used in lieu of additional borings, but shall not be utilized where the geology does not permit the CPT rig to acquire data to the depth needed to perform foundation design for the bridge. It is the consultant’s responsibility to conduct a desk study prior to commencing fieldwork in order to determine the adequacy of the proposed fieldwork for that particular site.

Water level readings shall be made in all soil borings. If the field investigation requires multiple days to complete, at least one 24-hour water level observation shall be made.

1.1.1 Sampling

Soil borings shall be made using wet/mud rotary methods below the water table, with solid-stem augering (ASTM D1452) permissible above the water table. Sampling shall consist of pushing thin-walled Shelby tubes in cohesive soils (ASTM D1587) and Standard Penetration Testing (SPT) in cohesionless soils (ASTM D1586). Continuous sampling shall be performed within the upper 10 feet, followed by either:

- Sampling at 5-foot centers in cohesive soils, or
- Sampling at 3-foot centers in cohesionless soils.

Shelby tube sampling in cohesionless soils and SPT sampling in cohesive soils will not be allowed, except on a case-by-case basis where Shelby tubes cannot be pushed into very hard cohesive soils. When a Shelby tube is retrieved with no recovery, the hole shall be cleaned out and a SPT shall be performed directly below the previous sampling interval.

1.1.2 Borehole Abandonment

Boreholes and CPT soundings shall be backfilled in accordance with all local, State, and Federal regulations. Refer to the *Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook* for State regulations in the making of boreholes.

1.1.3 Sample Storage and Transport

The following practices shall be observed during transport and storage of the samples:

- Samples shall be extruded in the field or the laboratory;
- Samples shall be extruded using a continuous pressure hydraulic ram. Extrusion by any other method, such as water pressure, is prohibited;
- Samples shall be extruded directly onto a sample trough, not caught by the hand; and
- Samples shall be stored/transported vertically in the same orientation that they were sampled.

1.1.4 Field Logs

Soil borings shall be logged in the field or in the laboratory and shall use the visual-manual method for classification (ASTM D2488). Pocket penetrometer readings shall be made on representative portions of the samples.

1.2 Laboratory Testing

All laboratory testing shall conform to applicable ASTM test designations. The following laboratory tests shall be performed, at a minimum:

- Moisture content (ASTM D2216) – all samples;
- Unconsolidated-undrained Triaxial compressive strength (ASTM D2850) – 75% of all cohesive samples;
- Atterberg Limits (ASTM D4318) – 75% of all cohesive samples; and
- Grain size testing (ASTM D1140 and ASTM D6913) – 50% of all samples or more as needed.

Dry preparation methods shall only be used when performing tests for shallow pavement borings or when requested by DOTD.

1.3 Site Characterization & Boring Logs

The consultant shall use the field and laboratory data to classify the soils according to the Unified Soil Classification System (USCS) (ASTM D2487). The results shall be presented on signed and sealed soil boring logs adhering to the standard DOTD boring log format. In addition to the USCS classification, the soil descriptions shall include soil consistency/strength, color, and other details or inclusions such as seams, nodules, organics, etc.

Cone penetrometer test soundings shall be presented on signed and sealed logs adhering to the standard DOTD CPT log format. This standard format presents tip resistance, side friction, pore water pressure, and classification based on the Zhang and Tumay method. Examples of boring logs and CPT logs can be furnished upon request.

2.0 GEOTECHNICAL ENGINEERING ANALYSIS AND DESIGN

Requirements for this contract are described in the following sections. All geotechnical engineering shall be performed in accordance with present design requirements and standard engineering practice. These services include, but are not limited to:

1. Slope stability (embankment & excavation);
2. Embankment settlement;
3. Pile foundations;
4. Drilled shaft foundations;
5. Other foundations;
6. Pile-supported approach slab design data;
7. Bridge foundation static and dynamic load test program;

8. Earth retaining structures;
9. Culverts;
10. Geotechnical analysis & design recommendations report;
11. Construction monitoring;
12. Geotechnical instrumentation;
13. Other geotechnical features; and

These items are described in more detail below:

2.1 SLOPE STABILITY (Embankment & Excavation):

End slopes steeper than 3(H):1(V) shall be analyzed for slope stability using the Spencer method. A maximum resistance factor of 0.75 (equivalent minimum FoS ≈ 1.3) shall be used for typical conditions. A maximum resistance factor of 0.85 (equivalent minimum FoS ≈ 1.2) is adequate for rapid drawdown conditions. All potentially critical geometry, groundwater, surface water, and other loading conditions shall be considered.

2.1.1 Standard Procedure

The embankment/excavation slope stability analysis shall consist of:

1. Modeling the appropriate boring logs to define the critical embankment/excavation geometry (cross-section) with subsurface soils;
2. Interpreting the laboratory test data to determine drained and/or un-drained shear strength design parameters;
3. Performing the stability analysis utilizing the Bishop, Spencer, and/or sliding block method deemed appropriate by the engineer. PCSTABL 4.0 or SLIDE 6.0 (or newer version) is recommended for analysis;
4. Determining the maximum resistance factors for both long- and short-term conditions at the critical fill heights at each bridge end, along the approach embankment (intermediate fill height) and in critical cut sections. Maximum resistance factor should also be taken into consideration for rapid drawdown conditions when applicable;
5. Analyzing different methods for mitigating possible stability problems and, if necessary, making recommendations for geotechnical instrumentation to monitor stability performance;
6. Defining areas of highly erodible materials and analyzing erosion control measures;
7. Preparing a report with all the above information and engineering recommendations; and
8. Interpreting slope stability data from all geotechnical instrumentation monitoring devices and making appropriate recommendations during construction.

2.1.2 Deliverables

Deliverables for slope stability analyses shall include:

1. Printout of critical stability circle and/or block for each design case;
2. Geotechnical models (cross-sections) and design input parameters;
3. Summary table with critical fill heights and resistance factors, or critical excavation cross-sections with resistance factors;
4. Certification that the modeled embankments meet the required long and short-term resistance factors;
5. Summary of alternatives for mitigating possible stability problems with resistance factors and estimated costs;
6. Specifications for slope stability mitigation measures;
7. Geotechnical Instrumentation Plan (if recommended);
8. Recommended erosion control measures;
9. Construction Slope Stability notes for the Bridge General Notes Sheet; and
10. Graphical presentation of lateral movements obtained from Geotechnical Instrumentation data during construction monitoring.

2.2 EMBANKMENT SETTLEMENT

The Objective of a Consolidation/Settlement Analysis is to determine the amount of settlement in inches/feet, to estimate the time required for settlement to take place in days/months/years when the proposed embankment is constructed on the project subsurface soils, and to make appropriate Engineering Design Recommendations relative to consolidation settlement.

2.2.1 Standard Procedure

The embankment settlement analysis shall consist of:

1. Modeling the appropriate boring logs to define the critical embankment geometry (cross-section) with subsurface soils;
2. Interpreting the consolidation test data to determine design consolidation soil parameters;
3. Performing a settlement analysis for the critical bridge end fill heights and for intermediate fill heights (as needed);
4. Determining the predicted total consolidation settlement, the predicted 90% consolidation settlement and the time periods for the predicted settlement to occur;
5. Making recommendations to reduce the amount of consolidation settlement and/or to accelerate the settlement through the use of lightweight fills, surcharge placement, wick

drains or other methods determined by the engineer if the predicted time for 90% of the settlement to occur is excessive (greater than 5 months);

6. Providing all analyses and information including special provisions relating to surcharge quantities and limits, wick drain information and layouts and settlement monitoring instrumentation details if mitigation is required;
7. Assessing the impact of predicted settlement and recommended mitigation on pavement, culverts, retaining walls and bridge abutments;
8. Preparing a report with all the above information and engineering recommendations; and
9. Interpreting settlement data from all geotechnical instrumentation devices and make recommendations for surcharge removal or other geotechnical related construction activity during construction.

2.2.2 Deliverables

Deliverables for settlement analyses shall include:

1. Geotechnical models (cross-sections) with design input parameters;
2. Printout of settlement analysis for each design case;
3. Presentation of settlement analysis in graphical form (Settlement vs. Time of Consolidation curves) with clear indications of total predicted settlement, 90% predicted settlement, and the effect of surcharging and/or placing wick drains (Hand calculations should be included);
4. Assessment of the potential impact of predicted settlement and any recommended mitigation on pavement, culverts, retaining walls, and bridge abutments;
5. Wick drain design sheets;
6. Specifications for recommended settlement mitigation measures (surcharge, wick drains, etc.);
7. Geotechnical Instrumentation Plan with Drawings and Specifications, if recommended;
8. Graphical output of actual field settlement data obtained from Geotechnical Instrumentation during construction monitoring; and
9. Construction Settlement notes for the Bridge General Notes Sheet.

2.3 PILE FOUNDATIONS

Driven pile foundations shall be used to support proposed bridge structures. Pile tip elevations shall be designed using the static equilibrium methods presented in FHWA Geotechnical Engineering Circular No. 12 (GEC 12). Specifically, the Nordlund and α methods shall be used in cohesionless and cohesive soils, respectively.

If CPT soundings are made, pile design shall also be evaluated by the Schmertmann, LCPC, and DeRuiter & Beringen Methods, which are presented in the final report for LTRC Project 98-3GT, *Evaluation of Bearing Capacity of Piles from Cone Penetration Test Data* (Hani and Abu-Farsakh, 1999). The computations can be automated using the Louisiana Pile Design by Cone Penetration Test software, published by LTRC and located at http://www.ltrc.lsu.edu/downloads.html. In general, the most conservative pile capacity curves generated from the GEC 12 and CPT direct methods should be used in design.

2.3.1 LRFD Design

The load and resistance factor design (LRFD) method shall be used to set pile lengths.

- DOTD Geotechnical Section uses slightly different resistance factors for pile design than those listed in the document:
    - ϕ = 0.80, static load test pile with dynamic testing of 2% (or a minimum of 2) production piles
    - ϕ = 0.65, indicator pile (including initial drive, short-term restrike, and long-term restrike) with dynamic testing of 2% (or a minimum of 2) production piles
    - ϕ = 0.50, static equilibrium design using alpha/Nordlund methods with no field testing
- The resistance factor and associated field verification are at the discretion of the consultant. These should be selected practically, considering cost of the field testing and the value of the testing relative to the engineering uncertainty of the subsoil parameters. There will need to be money available to pay the consultant to perform the field testing (PDA, static load testing, etc.) if he elects to use test piles or indicator piles. Our section does not perform construction phase testing for projects designed by others.

2.3.2 Scour

Pile design shall consider scour in accordance with *Bridge Design Technical Memorandum 21* (BDTM.21). Per *Bridge Design Technical Memorandum 32, Rev. 3* (BDTM.32.3), required nominal resistances shall be computed for two cases and presented on the Pile Data Tables:

- The case where the pile is driven to the required tip elevation without the benefit of predrilling, and thus developing full side friction along its entire embedment length; and
- The case where the contractor performs predrilling to the scour elevation in order to advance the pile; thus eliminating side friction within the predrill/scour zone.

Note that the Louisiana Pile Design by Cone Penetration Test software does not take scour into account; therefore, for sites with a significant overburden effect (sand profiles), pile design using CPT may not be appropriate.

2.3.3 Other Considerations

Additional design considerations such as lateral loading, uplift, group effect, downdrag, etc. shall be addressed in accordance with GEC 12.

2.3.4 Standard Procedure

The pile foundation analysis shall consist of:

1. Modeling the appropriate deep boring logs and/or cone penetration test (CPT) sounding data to define the project subsurface soil profile;
2. Obtaining Standard Penetration Test (SPT) N-values and interpreting the laboratory test data to determine pile design soil parameters;
3. Performing pile static analyses to determine pile type, pile capacity, and plan pile tip elevation or length;
4. Estimating foundation settlement and "downdrag" loads;
5. Performing lateral load analyses;
6. Estimating scour depths;
7. Performing wave equation analyses to determine pile drivability and evaluate hammer suitability;
8. Assessing constructability issues such as installation sequencing, heave and/or lateral pile movement, installation aids (jetting or augering), etc.; and
9. Furnishing test pile recommendations (feasibility, location, test pile tip elevation, etc.) and pile driving analyzer (PDA) recommendations.

2.3.5 Deliverables

Deliverables for pile foundation analyses shall include:

1. Design spreadsheets or calculations indicating the geotechnical design parameters utilized for each boring log, including scour elevations if applicable, for the pile type selected;
2. Graphical or tabulated representation of the pile capacity vs. tip elevation (not depth of penetration);
3. If the FHWA software Driven 1.2 is used, include an electronic copy of the data file generated along with a hard copy of the input and output;
4. Lateral load analyses;
5. Recommended plan pile tip elevations for all bents (shown in the Pile Data Table);
6. Feasibility study for utilizing a test pile or other field verification methods (comparison of various resistance factors associated with different field verification methods);

7. Drivability recommendations;
8. Pile installation criteria with discussion of potential installation issues;
9. Pile Driving Analyzer (PDA) or other field monitoring recommendations;
10. Hammer approval method recommendations;
11. Necessary pay items and corresponding quantities for test piles, indicator piles, and monitor piles;
12. Special Provisions for Dynamic Monitoring and Dynamic Analysis, if recommended for project;
13. Special Provision for Static Load Test, if recommended for project;
14. Considerations for "downdrag" effects on piles;
15. Considerations for pile "setup";
16. Uplift capacity of group piles if required by project conditions; and
17. Pile notes for the Bridge General Notes Sheet.

2.4 DRILLED SHAFT FOUNDATIONS

The Objective of a Drilled Shaft Analysis Design is to determine the diameter, tip elevation and installation procedure for the project subsurface soil conditions.

2.4.1 Standard Procedure

The drilled shaft foundation analysis shall consist of:

1. Modeling the appropriate deep boring logs and/or cone penetration test (CPT) sounding data to define the project subsurface soil profile;
2. Obtaining Standard Penetration Test (SPT) N-values and interpreting the laboratory test data to determine drilled shaft design soil parameters;
3. Selecting appropriate design equations for the project soil types to determine ultimate base and side resistance and selecting appropriate resistance factors;
4. Performing axial and lateral load analyses to determine drilled shaft diameter and tip elevation; and
5. Performing analyses to determine appropriate construction methods for project soil conditions.

2.4.2 Deliverables

Deliverables for drilled shaft foundation analyses shall include:

1. Design spreadsheets or calculations indicating the geotechnical design parameters utilized for each boring log or reach, including scour elevations if applicable;
2. Graphical or tabulated representation of the drilled shaft capacity vs. tip elevation for each shaft diameter;
3. Lateral load analyses;
4. Considerations for "downdrag";
5. Recommended plan drilled shaft diameters and tip elevations for all bents (shown in the Drilled Shaft Data Table);
6. Recommended construction methods with discussion of potential installation issues;
7. Recommendations for construction quality control;
8. Drilled shaft notes for the Bridge General Notes Sheet;
9. Special Provision for Integrity Testing, if required for project; and
10. Special Provision for drilled shaft Load Test, if required for project.

2.5 OTHER FOUNDATIONS

If other types of foundation are recommended for the specific project conditions, the standard procedure format and the deliverables format outlined for piles and drilled shafts shall be followed with specific design details for the type of foundation recommended.

2.6 BRIDGE FOUNDATION LOAD TEST PROGRAM

If the project subsurface conditions are difficult, significant uncertainties exist in the foundation design, and cost savings can be predicted, a load test program may be appropriate. Depending on project conditions, a load test program may be included either in the Design or in the Construction phase.

2.6.1 Deliverables

Deliverables for the load test program shall include:

1. Location and Type of proposed load test;
2. Design of test foundation (pile, drilled shaft, or other);
3. Dynamic test procedures and schedules;
4. Load increment requirements;
5. Maximum test load;

6. Instrumentation requirements;
7. Load test Layout and Design Sheets for plans;
8. Special Provisions for construction of test foundation and load test methodology;
9. Interpretation of load test results and recommendations; and
10. Foundation load test report.

2.7 EARTH RETAINING STRUCTURES

A Retaining Wall is normally required if adequate space (right-of-way) is not available for a slope. The DOTD has used Mechanically Stabilized Earth (MSE) Walls, Gravity Concrete Walls, Sheet Pile Walls, plus other types for transportation projects. The selection of the most appropriate retaining wall type for the specific project requirements and site and subsurface conditions can have profound effects on the project cost and constructability.

Every retaining wall type has a unique design procedure and generally requires the services and coordination of a Geotechnical Engineer and a Structural Engineer. The following criteria are generally required for analysis and design of all Retaining Wall types:

2.7.1 Deliverables

Deliverables for all earth retaining structures shall include:

1. Earth pressure distributions;
2. Bearing capacity of the foundation soil or rock;
3. Analyses for sliding and overturning and mitigation recommendations;
4. Settlement and rotation analyses and mitigation recommendations;
5. Drainage recommendations;
6. Global stability analyses and mitigation recommendations;
7. Backfill properties;
8. Wall components/materials;
9. Wall construction procedures;
10. Wall layout with plan view, elevation view, typical sections, and details;
11. Quantities table with applicable General Notes;
12. Design life considerations; and
13. Special Provisions.

2.8 Mechanically Stabilized Earth (MSE) Walls

The AASHTO LRFD Bridge Specifications, latest edition as well as all supplements shall be followed for analysis and design of all MSE Walls. The DOTD developed "MSEW Design Guide, G.E.D.G. No. 8", latest edition may be used as a reference. Only DOTD approved wall systems will be allowed.

Additional Deliverables for MSE Walls shall be as outlined in the DOTD MSEW Design Guide and as required to identify the MSE specific design and construction requirements:

1. Type and size of facing element;
2. Type, size, and design length of reinforcement elements;
3. Type of connections;
4. Minimum embedment requirements;
5. Backfill material requirements; and
6. Specific requirements associated with a temporary wall, if applicable.

2.8.1 Concrete Walls

Cast-In-Place concrete gravity or cantilever walls are generally limited to small applications or specialized situations because of the development of more economical wall types. Standard design and construction procedures are well documented in many geotechnical books and other publications.

Deliverables for concrete walls are same as outlined under General Deliverables above.

2.8.2 Sheet Pile Walls

The resistance factors from the AASHTO Bridge Design Specifications, latest edition, shall be used to design sheet pile walls. The DOTD's "Preliminary" Design Guide titled "DOTD CANTILEVER SHEET PILE DESIGN GUIDELINES" may be used as a reference.

Additional deliverables for sheet pile walls shall be as outlined in the DOTD Guidelines:

1. Sheet pile section and type;
2. Minimum section modulus;
3. Minimum depth of penetration;
4. Moment of inertia requirements;
5. Estimated long- and short-term deflections;
6. Anchor/tieback loads;

7. Long- and short-term stability including drawdown and liquefaction considerations;
8. Complete design details of sheet piling, backfill, drainage, and connections;
9. Corrosion protection measures; and
10. Construction constraints.

2.8.3 Other Retaining Wall Types

Other types of retaining walls that may be appropriate for DOTD transportation projects are drilled shaft walls, soldier pile & lagging walls, slurry walls, anchored (tied-back) walls, soil nailed walls, reticulated micro pile walls, jet-grouted walls, and deep soil mixing walls. These walls shall be designed using generally recognized design procedures applicable to the specific type of wall used.

Note that reinforced soil slopes may, in some cases, be an economical alternative to a retaining wall.

2.9 CULVERTS

The geotechnical design review of the culvert locations shown in the plans shall consist of earth pressure calculations, bearing capacity analyses, settlement analyses and a constructability review of the culvert. Recommendations for bedding material, foundation supported options, insitu bearing improvements and construction procedures should be addressed.

2.9.1 Deliverables

Deliverables for culverts shall include:

1. Earth pressure calculations and recommendations;
2. Bearing capacity calculations and recommendations;
3. Settlement and differential settlement estimates with design parameters;
4. Recommendations for bedding material and/or other foundation support options; and
5. Any specialized construction procedures and recommendations.

2.10 Geotechnical Deliverables

The following items shall be submitted upon completion of the project:

2.10.1 Geotechnical Data Report

For each site with only subsurface investigation being completed, the consultant shall furnish a final Geotechnical Data Report (GDR) detailing the investigations performed, field investigation logs, and results of laboratory and field test measurements. The GDR shall include only factual data and should not include interpretations derived from reported measurements. The GDR may become a

legally binding contract document. The report shall be signed and sealed by a Professional Civil Engineer registered in the State of Louisiana, and shall include the following items, at a minimum:

1) Cover letter with executive summary
2) Table of contents
3) Report Body containing the following sections, at a minimum:
    a. Project Description
        i. Summary of subsurface investigation
        ii. Summary of laboratory testing performed
    b. Subsurface Conditions
        i. Generalized subsurface profile
        ii. Summary of groundwater conditions
4) Appendix containing the following items, at a minimum:
    a. Boring plan
    b. General bridge plan & profile sheet
    c. Half-size soil boring logs
    d. Laboratory test data sheets, including extrusion logs, stress vs. strain plots for triaxial testing, consolidation test deformation vs. time plots (when applicable), Atterberg Limit worksheets, etc.

2.10.2 Geotechnical Interpretation Report (Geotechnical Design Report)

For each site where design is performed, the consultant shall furnish a final Geotechnical Interpretation Report (GIR) detailing assumptions, design methodologies, and final recommendations. The report shall be signed and sealed by a Professional Civil Engineer registered in the State of Louisiana, and shall include the following items, at a minimum:

5) Cover letter with executive summary describing the structure type, loads, and foundation lengths
6) Table of contents
7) Report Body containing the following sections, at a minimum:
    a. Project Description
        i. Summary of structure type
        ii. Summary of subsurface investigation
        iii. Summary of laboratory testing performed

b. Subsurface Conditions
    i. Generalized subsurface profile
    ii. Summary of groundwater conditions
c. Design Analyses
    i. Summary of design codes and specifications followed
    ii. Description of analysis method(s) used
    iii. Design Recommendations
    iv. Brief construction recommendations, identification of potential difficult construction conditions, etc.

8) Appendix containing the following items, at a minimum:
    a. Boring plan
    b. General bridge plan & profile sheet
    c. Half-size soil boring logs
    d. Interpreted soil profile used for design
    e. Design plots
    f. Laboratory test data sheets, including extrusion/field logs, stress vs. strain plots for triaxial testing, consolidation test deformation vs. time plots (when applicable), Atterberg Limit worksheets, etc.

2.10.3 Report Format

Each report shall be submitted in electronic format as a searchable .pdf file with bookmarks denoting the various sections of the report. Report body, charts, and figures shall be generated directly from the source applications in order to minimize file size. Documents scanned as raster images shall only be used when no other option exists for their inclusion into the report. All pages shall print to either 8.5" x 11" or 11" x 17" without scaling or adjustment.

2.10.4 Geotechnical Data

All geotechnical data shall be furnished to DOTD adhering to the DOTD's standard gINT schema, either as a .gpj file, or as an Excel spreadsheet capable of being imported into gINT.

2.10.5 Soil Boring Logs

In addition to including boring logs (8.5"x11" or 11"x17") in the GDR and GIR, the logs shall also be included in the plans as signed and sealed full-size sheets (22"x34") submitted in .pdf format.

2.11 CONSTRUCTION MONITORING

The following sections describe the various types of construction monitoring that can be expected on DOTD projects.

2.11.1 Pile Foundations

The pile foundation construction scope of work shall consist of providing the following geotechnical services during the construction phase of the project:

1. Hammer approval utilizing the Wave Equation analyses (if alternate hammer approval method is not specified);
2. Dynamic monitoring the installation of test piles, monitor piles, indicator piles and/or production piles with the Pile Driving Analyzer (PDA);
3. Analysis of PDA data utilizing CAPWAP AND GRLWEAP;
4. Generating bearing capacity graphs (Inspector's Charts);
5. Recommending pile driving criteria; and
6. Recommending final pile tip elevations based on the results of load tests and/or dynamic analyses.

The dynamic pile monitoring includes supplying all equipment, strain gages, and accelerometers to collect data. The data collected for potential pile damages and providing pile driving assistance shall be analyzed and interpreted to determine the pile resistance.

The deliverables for construction monitoring of pile foundations shall include the following:

1. Hammer approval documentation;
2. PDA testing and analysis report with (1) PDA plots of pile capacity, driving stresses and energy transfer; (2) CAPWAP pile capacity summary table; and (3) Inspector's charts;
3. All electronic files related to PDA testing and CAPWAP analyses; and

   final pile tip elevations and order length recommendations.

2.11.2 Drilled Shaft Foundations

The drilled shaft foundation construction scope of work shall include the construction monitoring items outlined in the DOTD Guide titled "Drilled Shaft Foundation Construction Inspectors Manual" plus any special considerations specified in the Plan Notes and Section 803 of the *Louisiana Standard Specifications for Roads and Bridges*.

The Deliverables for construction monitoring of drilled shafts shall include those required in the guide manual and the following:

1. Comments/recommendations on Contractor's "Drilled Shaft Installation Plan";
2. Drilled shaft soil/rock excavation logs;
3. Drilled shaft slurry logs;
4. Drilled shaft concrete placement logs;
5. Theoretical concrete volume vs. actual concrete volume graph;
6. Interpreted shaft diameter vs. depths (elevations);
7. Excavation rate and concrete placement rate vs. depths (elevations);
8. Inspection report with (1) Description of drilling method, clean-out methods, bottom inspection methods and findings and concrete placement and effectiveness; (2) Record of slurry properties (if applicable); and (3) description of difficulties encountered; and
9. Integrity testing (cross-hole sonic logging or other) interpretation and recommendations.

2.11.3 Other Foundations

The scope of work for other foundations and the deliverables shall be as recommended in the geotechnical analysis & design recommendations report.

2.12 GEOTECHNICAL INSTRUMENTATION

The objective of geotechnical instrumentation in construction monitoring is to record and interpret the Instrumentation data and compare actual soil behavior to that predicted by design. Each type of Instrumentation has an intended purpose and allows major decisions to be made by Construction Managers that affect construction safety (prevent major failures), scheduling, and construction costs. No instrumentation shall alter the performance of the geotechnical design. The usual Instrumentation specified to monitor foundation performance on projects where stability and settlement are critical are slope inclinometers, piezometers, and settlement devices. The geotechnical analysis & design recommendations report should recommend an instrumentation layout and the frequency of readings.

2.12.1 Deliverables

The deliverables for geotechnical instrumentation shall include:

1. Plan and elevation location, details, and applicable notes for all instrumentation;
2. Specifications for furnishing, installation, monitoring, and reporting for all instrumentation;
3. Graphical presentation of lateral movement data and action recommendations;
4. Graphical presentation of actual field settlement data and action recommendations; and

5. Interpretation of other instrumentation data as recommended in the geotechnical analysis & design recommendations report and action recommendations.

2.13 Other Geotechnical Features

Construction Monitoring and Construction Inspection of other geotechnical features such as Embankments and Excavation Earthwork, Drilled Shafts, Earth Retaining Structures, Soil Stabilization, etc. in the project shall be as required by the DOTD Standard Specifications. If special Construction Inspection and/or Monitoring are required for special Geotechnical features, they will be as recommended in the "Geotechnical Analysis & Design Recommendations Report," Construction "Plan Notes," and "Special Provisions."

3.0 LIST OF PUBLISHED GEOTECHNICAL DOTD REPORTS AND FORMS PLUS OTHER TECHNICAL REFERENCES

Most of the following can be obtained at the DOTD web site (www.dotd.state.la.us) or at the FHWA Bridge/Geotechnical web site (www.fhwa.dot.gov/bridge).

3.1 DOTD Reports and Forms "Latest Editions"

DOTD references include, but are not limited to, the following:

1. AASHTO LRFD Bridge Design Specifications, latest edition and supplements;
2. Standard Specifications;
3. Bridge Design Manual;
4. Road Design Manual;
5. Hydraulics Manual;
6. Drilled Shaft Foundation Construction Inspection Manual;
7. Drilled Shaft Construction Logs;
8. MSEW Design Guide, Geotechnical Engineering Design Guide (G.E.D.G.) No. 8;
9. LTRC "PILECPT" Software;
10. Pile and Driving Equipment Data Form;
11. LADOTD Geotechnical Design Manual (In Progress)

3.2 Other Technical References:

The DOTD has used the following as technical references and guidelines in the design and construction monitoring of Geotechnical features for DOTD projects in the past and are recommended for use by the Geotechnical Engineering consultant community. This list is not all encompassing and other publications may be used and referenced. Additions will be made as this Document is updated.

1. FHWA. (1997). *Soils and Foundations Reference Manual Vol I and Vol II.* Washington, D.C.: Federal Highway Adminstration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default
2. FHWA. (1998). *Geosynthetic Design and Construction Guidelines Manual.* Washington, D.C.: Federal Highway Adminstration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default
3. FHWA. (1998). *Geotechnical Instrumentation Manual.* Washington, D.C.: Federal Highway Adminstration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default
4. FHWA. (2001). *Subsurface Investigations - Geotechnical Site Characterization Reference Manual for NHI 132031* . Washington, D.C.: Federal Highway Adminstration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default
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6. FHWA. (2016). *Geotechnical Engineering Circular 5 (GEC 5) - Evaluation of Soil and Rock Properties.* Washington, D.C.: Federal Highway Adminstration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/pubs/nhi16072.pdf
7. FHWA. (2002). *Geotechnical Engineering Circular 6 (GEC 6) – Shallow Foundations.* Washington, D.C.: Federal Highway Adminstration, U.S. Dept. of Transportation. Retrieved https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default
8. FHWA. (2015). *Geotechnical Engineering Circular 7 (GEC 7) – Soil Nail Walls.* Washington, D.C.: Federal Highway Administration, U.S. Dept. of Transportation. https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default
9. FHWA. (2018). *Geotechnical Engineering Circular 10 (GEC 10) – Drilled Shafts: Construction Procedures and LRFD Design Methods.* Washington, D.C.: Federal Highway Administration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default
10. FHWA. (2016). *Geotechnical Engineering Circular 11 (GEC 11) - Design and Construction of Mechanically Stabilized Earth Walls- Vol. I and Vol. II.* Washington, D.C.: Federal Highway Administration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/pubs/nhi10024/
11. FHWA. (2016). *Geotechnical Engineering Circular 12 (GEC 12) - Design and Construction of Driven Pile Foundations.* Washington, D.C.: Federal Highway Administration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/pubs/gec12/index.cfm
12. FHWA. (2018). *Geotechnical Engineering Circular 13 (GEC 13) - Ground Modification Methods Reference Manual - Vol. I and Vol. II.* Washington, D.C.: Federal Highway Administration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default

13. FHWA. (2016). *Geotechnical Engineering Circular 14 (GEC 14) – Assuring Quality in Geotechnical Engineering Documents.* Washington, D.C.: Federal Highway Adminstration, U.S. Dept. of Transportation. Retrieved from https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm?sort=default
14. Soil Slope and Embankment Design, Reference Manual, FHWA-NHI, 2003;
15. EM 1110-2-2504 Design of Sheet Pile Walls US Army Corps, 1994;
16. NAVFAC Design Manuals, DM 7.1, DM 7.2 and DM7.3, May 1982; and
17. USS Steel Sheet Pile Design Manual.
18. AASHTO. (2017). *AASHTO LRFD Bridge Design Specifications, Eighth Edition.* Washington, D.C.: American Association of State Highway and Transportation Officials.
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ELECTRONIC DELIVERABLES

Consultant hereby agrees to produce electronic deliverables in conformance with DOTD Software and Deliverable Standards for Electronic Plans document in effect as of the effective date of the most recent contract action or modification, unless exempted in writing by the Project Manager. Consultant is also responsible for ensuring that sub-consultants submit their electronic deliverables in conformance with the same standards. DOTD Software and Deliverable Standards for Electronic Plans document and DOTD CAD Standards Downloads are available via links on the DOTD web site.

Consultant shall apply patches to CAD Standard Resources and install incremental updates of software as needed or required. Consultant hereby agrees to install major updates to software versions and CAD Standard Resources in a timely manner. Major updates of CAD standards and software versions shall be applied per directive or approval of the DOTD Design Automation Manager. Such updates will not have a significant impact on the plan development time or project delivery date, nor will they require Consultant to purchase additional software. Prior to proceeding with plan development, Consultant shall contact the Project Manager for any special instructions regarding project-specific requirements.

In the event that any Digital Plan Delivery Standard conflicts with written documentation, including DOTD plan-development Manuals, the Digital Plan Delivery Standard governs. Consultant is responsible for contacting the Project Manager should questions arise.

Consultant shall upload (or check in) electronic deliverables directly into the DOTD ProjectWise repository at each plan delivery milestone. Consultants are responsible for performing certain operations at each milestone including, but not limited to, the following:

- Upload (or check in) CAD plan deliverables to the discipline “Plans” folder
- Apply and maintain indexing attributes to CAD plans (and other deliverables as needed)
- Publish PDF format plan submittals in ProjectWise using automated publishing tools
- Digitally sign PDF format plan submittals in ProjectWise according to DOTD standards and procedures (Final Plans, Revisions and Change Orders). Signatures shall be applied in signature blocks provided with electronic seals and Title Sheets.

Additionally, after reviewing deliverables for each submittal milestone, the Project Manager shall notify Consultant regarding the availability of two automatically-generated informational reports in ProjectWise. These reports document the completion status and other information regarding indexing attributes and CAD standards. Consultants shall take these reports into account and make any necessary adjustments to plans before the next submittal milestone; or sooner, if directed by the Project Manager.

ATTACHMENT B – MINIMUM PERSONNEL REQUIREMENTS (MPRs)

The following requirements must be met at the time the proposal is submitted:

1. At least one (1) principal of the prime consultant shall be a registered professional engineer in the state of Louisiana.
2. At least one (1) principal or other responsible member of the prime consultant shall be currently registered in Louisiana as a professional engineer in civil engineering.
3. At least one (1) principal or responsible member of the prime consultant shall be a professional engineer, registered in the state of Louisiana, with at least ten (10) years of experience in responsible charge of geotechnical engineering projects.
4. At least two (2) professional engineers, registered in the state of Louisiana, with a minimum of five (5) years of experience in geotechnical engineering.
5. At least one (1) laboratory manager with a minimum of five (5) years of experience in geotechnical laboratory testing.
6. At least one (1) field crew driller/supervisor with a minimum of ten (10) years of experience; with at least five (5) years demonstrated within the state of Louisiana.
7. At least one (1) professional land surveyor, registered in the state of Louisiana, with three (3) years of experience in conducting topographic surveys, property surveys, and preparing right-of-way maps.

MPRS ARE TO BE MET BY SEPARATE INDIVIDUALS, UNLESS STATED OTHERWISE BELOW.

MPR Nos. 1 through 3 may be met by the same person.

MPR Nos. 6 and 7 may be satisfied through the use of a sub-consultant(s).

NOTE: WHEN SATISFYING A MINIMUM PERSONNEL REQUIREMENT, PLEASE ENSURE THE RÉSUMÉ REFLECTS REQUIRED EXPERIENCE AS REQUESTED.

- Please note the number of MPRs are minimal; however, all relevant personnel necessary to perform the Scope of Services must be identified in the prime consultant's DOTD Form 24-102.

- The Prime Consultant shall use Section No. 12 and Section No. 16 of the DOTD Form 24-102 to convey the organizational structure and plan on how to timely deliver all the requirements and deliverables identified in the Scope of Services and allow DOTD to assess the consultant's ability to successfully complete this project.

- All relevant personnel and support staff necessary to perform the Scope of Services, shall be identified in Section No. 12 and their resumes included in Section 14 of the DOTD Form 24-102. This includes both individuals designated as satisfying MPRs and individuals not designated as satisfying MPRs but relevant to the contract.

GEOTECHNICAL EXPLORATION AND LABORATORY REQUIREMENTS

1. The prime consultant should provide a summary of any relevant laboratory accreditations and qualifications that may be pertinent for this contract. At a minimum, the team should maintain AASHTO accreditations for the test methods listed in the table below. Any additional accreditations may prove advantageous in the scoring of the PROPOSAL. The prime consultant shall maintain the geotechnical laboratory and shall identify in the Form 24-102 Section 16 the office to perform work. The laboratory accreditation certificate must be submitted with DOTD Form 24-102 for the following test methods:

ASTM	Description
D 4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D 2435	Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading
D 2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
D 2850	Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils
D 1140	Standard Test Methods for Determining the Amount of Material Finer than 75-m (No. 200) Sieve in Soils by Washing

2. The consultant or consultant's sub shall be a licensed water well driller in the State of Louisiana. Water well license certificate shall be submitted with DOTD Form 24-102.

Consultant shall address in Section 16 of DOTD Form 24-102 how they plan to meet the minimum accreditation requirements. All requirements shall be verified prior to Task Order execution unless prior approval is obtained from the Pavement & Geotechnical Design Administrator.

ATTACHMENT C – SECONDARY SELECTIONS FOR TASK ORDERS

Procedures for selecting among IDIQ contracts for issuance of Task Orders - Section 67

If proposed new TO is to be issued for the purpose of extending services related to services performed under a previously issued TO by a particular consultant with whom DOTD has an existing IDIQ contract containing the appropriate scope of services and with time and funding capacity available sufficient to support the issuance of the new TO under said contract, then that consultant's contract will be tasked.

Otherwise, when more than one IDIQ is available for the provision of the services required, the following procedure will be employed to determine which of the IDIQ contracts will be tasked.

1. Identify all IDIQ contracts that apply – type/scope of work in contract
    a. If applies, move to next step
    b. If does not apply, then cannot use the contract

2. Determine if there is sufficient time remaining on the contract to complete the work
    a. If yes, proceed to next step
    b. If no, then cannot use the contract

3. Determine if there is sufficient compensation remaining on contract to complete the work
    a. If yes, proceed to next step
    b. If no, cannot use the contract

4. Determine if specialty tasks and /or special equipment/assets are required or if timing of performance is critical
    a. If specialty equipment is required, rate the consultants based on their equipment capabilities as follows:

        i. Rating = 2: If the specialty equipment is possessed in-house and in-state;

        ii. Rating = 1: If the specialty equipment must be obtained from a third party or another state; or

        iii. Rating = 0: If the specialty equipment is unavailable.

        If equipment is unavailable, the consultant should not or is not able to perform the work, as needed, do not use the contract. Document the reasons, *e.g.*, the consultant is less experienced with the type of task(s), does not have assets on hand available to dedicate to the task(s), past performance indicates that the consultant may have difficulty with pertinent task(s), the consultant has multiple jobs ongoing for DOTD such that timeliness may be an issue, etc.

    b. If no specialty tasks or timeliness issues are present, then proceed to the next step.

5. Determine if specialized expertise is critical
    a. If specialized expertise is required, rate the consultants based on their capabilities as follows:

        i. Rating = 2: If the expertise is in-house and in-state;

        ii. Rating = 1: If the specialty equipment must be obtained from a third party or another state; or

        iii. Rating = 0: If the specialty equipment is unavailable.

        If expertise in unavailable, the consultant should not or is not able to perform the work, as needed, do not use the contract. Document the reasons, *e.g.*, the consultant is less experienced with the type of task(s), does not have expertise on hand available to dedicate to the task(s), past performance indicates that the consultant may have difficulty with pertinent task(s), the consultant has multiple jobs ongoing for DOTD such that timeliness may be an issue, etc.

    b. If no specialized expertise is needed, then proceed to the next step.

6. Does the Consultant have familiarity with the specific project?
        i. Rating = 3: If the Consultant has worked on the project.

        ii. Rating = 0: If the Consultant has not worked on the project.

7. How is the Consultant currently performing on existing Task Orders?
        i. Rating = 3: Consistently exceed expectations.

        ii. Rating = 2: Meets and often exceeds performance expectations.

        iii. Rating = 1: Meets expectations, but with needed improvements.

        iv. Rating = 0: Significant improvements needed.

8. If the consultants are equal on all other criteria, then select the contract with the most available compensation, with due consideration given to the risks involved and the needs of the project.

9. Once a selection for a TO is made, a spreadsheet will be prepared by the Project Manager justifying the selection of a particular consultant for an individual TO. The memo will be signed by the appropriate Section Head, approving the selection.