

Pre-Drilled Shaft Conference

2019 NMDOT Standard Specifications for Highway and Bridge Construction

State Materials Bureau Geotechnical Engineering/Exploration Section

Pile Driving Submittals and Design Documents:

- Approved Drilled Shaft Submittal (Geotechnical Foundation Design Engineer)
- Foundation Design Report and/or Geotechnical Design Report (BidX)

Other submittals:

Material Certifications (PM + Optional Structural Engineer)
Class G Concrete Mix Design with Slump Loss Test Results (PM)

Recommended List of Attendees:

- NMDOT Project Manager
- NMDOT Certified Drilled Shaft Inspector(s)
- Prime Contractor
- Drilled Shaft Superintendent
- Geotechnical Foundation Engineer of Record (NMDOT or Consultant)
 - If Consultant EOR, then include the NMDOT Geotechnical Engineer
- Integrity Testing Personnel (Department or Consultant)





Date:		Control Number:	
Project Name:		Bridge Number(s):	
Project Location:			

I. Meeting Objectives

- Review specifications and project specific plan requirements.
- Review Foundation and/or Geotechnical Design Reports.
- Review Contractor's construction sequence, work schedule and equipment for drilled shaft construction.
- Discuss drilled shaft construction requirements as outlined in the NMDOT Specifications.
- Discuss inspection procedures and acceptance criteria.
- Review *Drilled Shaft Inspection Report* form.
- Discuss Crosshole Sonic Logging (CSL) and Low Strain Integrity (LSI) Testing requirements.
- Other items:

NOTE: NONE OF THE FOLLOWING DISCUSSIONS SHALL BE CONSTRUED AS ADDITIONAL REQUIREMENTS OR CHANGES IN THE PLANS OR SPECIFICATIONS.



II. Roles and Responsibilities

- ❖ NMDOT Project Manager is responsible for interpretation and administration of the Contract. Other Authority and Duties are included in Section 106.8 of the NMDOT Standard Specifications.
- ❖ Drilled Shaft Superintendent is responsible for providing oversight of all aspects of drilled shaft construction covered in Section 502. The contractor's drilled shaft superintendent will also be responsible for signing the *NMDOT Drilled Shaft Inspection Reports*.
- ❖ Contractor's Certified Drilled Shaft Inspector is responsible for Quality Control (QC) inspection and is responsible for overseeing, testing, and inspecting all aspects (slurry control tests, bottom hole tests, shaft excavation inspections, obstructions, deviations from the approved plan, etc.) of the drilled shaft construction. The Contractor's drilled shaft inspector will also be responsible for completing and signing the *NMDOT Drilled Shaft Inspection Reports*. The superintendent cannot fulfill the role of the certified drilled shaft inspector.

List other duties assigned to the Contractor's Certified Drilled Shaft Inspector:

- ❖ NMDOT Certified Drilled Shaft Inspector is responsible for Quality Assurance (QA) and monitoring the Contractor's drilled shaft inspector to ensure construction, testing, and inspection procedures are performed in accordance with the NMDOT specifications.
- ❖ Engineer of Record (EOR) will provide final acceptance of the drilled shafts based on a review of the *NMDOT Drilled Shaft Inspection Reports* and results of the integrity tests. The EOR may either be the NMDOT State Geotechnical Engineer or a consultant hired through Phase III services.
- ❖ NMDOT Geotechnical Engineer or Section Personnel will represent the State Geotechnical Engineer and is available to provide technical assistance to the NMDOT Project Manager.
- ❖ New Mexico Training Technician and Certification Program (TTCP) is responsible for state certification of drilled shaft inspectors.



III. Startup and General Plan Review			
<input type="checkbox"/> Drilled Shaft submittal has been approved by the State Geotechnical Engineer. _____ <i>(Date Approved)</i>			
<input type="checkbox"/> Class G Concrete Mix Design has been approved by the State Concrete Engineer (including slump loss test results) and Project Manager. _____ <i>(Date Approved)</i>			
Anticipated Work Schedule (Days, Hours):		Mobilization Date:	
Drilled Shaft Construction Start date and duration:			
Drilled Shaft Table <i>(Plan Review)</i>			
IV. Proposed Construction Sequence			
<input type="checkbox"/> Have written construction procedures been approved by the State Geotechnical Engineer. _____ <i>(Date Approved)</i>			
Discuss drilled shaft construction sequence:			
<p>Do not place adjacent casings or excavate shafts within 4 shaft diameters measure center-to-center until 48 hours after pour completion of the adjacent shaft, or when concrete from the adjacent shaft pour breaks at least 2,000 psi, whichever comes first. (Section 502.3.5.2)</p>			



V. Construction of Drilled Shafts:	
<input type="checkbox"/> Review Drilled Shaft Inspection form and required signatures.	
<ul style="list-style-type: none"> ➤ Dry Construction Method (502.3.5.1.1) ➤ Casing Construction Method (502.3.5.1.2) ➤ Slurry Displacement Construction Method (502.3.5.1.3) <p>The Contractor shall use the slurry displacement construction method or the casing construction method for shafts that do not meet the <i>Dry Construction Method</i> criteria.</p> <p>Do not place concrete until the Project Manager has approved the shaft excavation and bottom hole test results.</p>	
Dry Construction Method Detail: <i>Describe proposed installation method:</i>	
Casing Construction Method Details: <i>Describe proposed installation method:</i>	
Slurry Displacement Construction Method Details: <i>Describe proposed installation method:</i>	
Shaft Excavation Inspection (Section 502.3.5.2.4) <ul style="list-style-type: none"> ➤ The Contractor shall ensure that at 50% of each shaft base has less than one (1.0) inches of sediment when placing the concrete. ➤ For dry hole, the Contractor shall ensure that the water depth does not exceed three (3.0) inches before placing concrete. ➤ Inspection procedures are provided in Section 502.3.5.2.4.1 	



VI. Concrete Placement (502.3.5.4)

- Place concrete in accordance with Section 511, “Concrete Structures.”
- **Do not vibrate Class G concrete.**

Ensure that the time from when the concrete is batched at the plant to placement does not exceed 2 hours for Class G concrete. The Project Manager may approve a longer time if the concrete mixture remains workable and plastic.

Concrete Placement by Free Fall (502.3.5.4.1)

- Use free fall placement in a stable shaft where the maximum water depth does not exceed three (3) inches.
- The Contractor shall ensure that the concrete falls directly to the base without contacting either the rebar cage or hole sidewall.
- The Contractor shall ensure that free fall placement does not exceed 60 ft. below the bottom of hopper or the rigid pipe extensions.
- Free fall placement shall not be used in slurry displacement shafts.

Concrete Placement with Tremie or by Pumping (502.3.5.4.2)

- Use rigid tremie pipe or concrete pumps for concrete placement in either dry or slurry displacement shafts.
- Do not begin underwater placement before placing the tremie or **pump line within one tremie or pump line diameter of the shaft base elevation.**
- Keep the discharge end continually **immersed at least 5 ft in concrete after starting** the flow of concrete. Lines can be marked on the tremie pipe at convenient intervals to help the operator determine when the pipe needs to be raised.
- **Keep the concrete flow continuous.**
- Maintain the concrete in tremies or pump lines continuously at a positive pressure differential to prevent water or slurry intrusion into the shaft concrete.
- **If at any time during the concrete pour, the orifice is removed from the fluid concrete column and discharges concrete above the rising concrete level, the Department will consider the shaft defective.**

VII. Acceptance (502.3.8 and 505.3.4)

- CSL/LSI Department Testing
- CSL/LSI Consultant Testing

Concrete Strength (502.3.8.1)

- Department will accept drilled shafts in accordance with Section 510.3.5 “Acceptance”.



Location and Alignment Tolerances (502.3.8.2)

- Department will accept drilled shafts if the construction tolerances are satisfied in accordance with **Section 502.3.6 Location and Alignment Tolerances**.

Shaft Integrity (502.3.8.3 and Section 505 Integrity Testing)

- Department will accept shafts when the pile integrity testing reports verify the structural integrity of the piles.
- CSL Testing shall be completed from 2 days to 10 days after completing concrete or grout placement. Test methods and testing personnel qualifications are outlined in **Section 505.1.2**.
- CSL Testing Requirements are outlined in **Section 505.3.2**.
- Fasten the tubes to the exterior reinforcement cage (in a plumb position with equal offsets to adjacent tubes) so the tube bottoms are 3 inches above the shaft bottom and the tube tops are 12 inches above the top of shaft. The tubes should be water tight and the insides of the tubes should be clean and free of oil, shavings or cuttings, and debris. *Tube material and fastening locations may vary by project and will be shown on the plans.*
- **Immediately after concrete or grout placement, the Contractor shall fill the tubes with clean water and cap (505.3.2.1).**
- LSI Testing Requirements are outlined in **Section 505.3.3**.

VIII. Correction of Defective Shafts (Section 502.3.9)

- If the Department determines that a shaft is unacceptable, the contractor shall submit a plan for remedial action to the Project Manager for approval. The contractor shall provide calculations and Working Drawings, stamped by a New Mexico Registered professional engineer for all foundation elements affected by the proposed correction. The plan and corrective actions are performed at no additional cost to the Department.



IX. Index of Applicable Specifications	
<p><u>Section 502 Drilled Shafts</u></p> <ul style="list-style-type: none">➤ Geotechnical Data Information (502.1.2)➤ Submittals (502.1.3)<ul style="list-style-type: none">➤ Work Experience (502.1.1, 502.3.3.1)➤ Proposed Construction Procedures➤ Review and Approval (30 days)➤ Equipment (502.3.2)<ul style="list-style-type: none">➤ Excavation and Drilling Equipment➤ Slurry Equipment➤ Concrete Placement Equipment➤ Tremies➤ Concrete Pumps and Lines➤ Drop Chutes➤ Construction Preparations (502.3.4)<ul style="list-style-type: none">➤ Site and Subsurface Conditions➤ Protection of Existing Structures➤ Site Preparation➤ Proof Drilled Shafts➤ Safety➤ Construction of Drilled Shafts (502.3.5)<ul style="list-style-type: none">➤ Construction Methods➤ Dry Construction Method➤ Casing Construction Method➤ Temporary Casing➤ Permanent Casing➤ Slurry Displacement Construction Method➤ Polymer Slurry Requirements➤ Mineral Slurry Requirements➤ Slurry Control Tests➤ Pre-Entry Tests➤ Bottom Hole Test➤ Shaft Excavation➤ Underream and Overream➤ Obstructions and Unanticipated Obstruction Removal (502.4.3)➤ Soil Samples and Rock Cores➤ Shaft Excavation Inspection➤ Inspection Procedures➤ Remedial work for substandard excavation➤ Reinforcing Steel Unit Placement➤ Concrete Placement➤ Concrete Placement by Freefall	<ul style="list-style-type: none">➤ Concrete Placement with Tremie or by Pumping➤ Location and Alignment Tolerances (502.3.6)➤ Load Testing (502.3.7)➤ Acceptance (502.3.8)<ul style="list-style-type: none">➤ Concrete Strength➤ Location and Alignment Tolerances➤ Shaft Integrity➤ Correction of Defective Drilled Shafts➤ Method of Measure➤ Drilled Shafts (502.4.1)➤ Soil Borings and Rock Cores (502.4.2)➤ Unanticipated Obstruction Removal (502.4.3)➤ Certified Drilled Shaft Inspector (502.4.4) <p><u>Section 505 Pile Integrity Testing</u></p> <ul style="list-style-type: none">➤ Description (505.1)<ul style="list-style-type: none">➤ Test Methods➤ Consultant Integrity Testing➤ Department Integrity Testing➤ Assistance➤ Materials (505.2)➤ Construction Requirements (505.3)<ul style="list-style-type: none">➤ CSL Testing Equipment➤ LSI Testing Equipment➤ CSL Testing Requirements (505.3.2)<ul style="list-style-type: none">➤ Preparation of CSL Access Tubes➤ CSL Testing Procedures➤ CSL Testing Results➤ LSI Testing Requirements (505.3.3)<ul style="list-style-type: none">➤ Pile Head Preparation➤ LSI Testing Procedure➤ LSI Testing Results➤ Acceptance and Rejection of Piles (505.3.4)