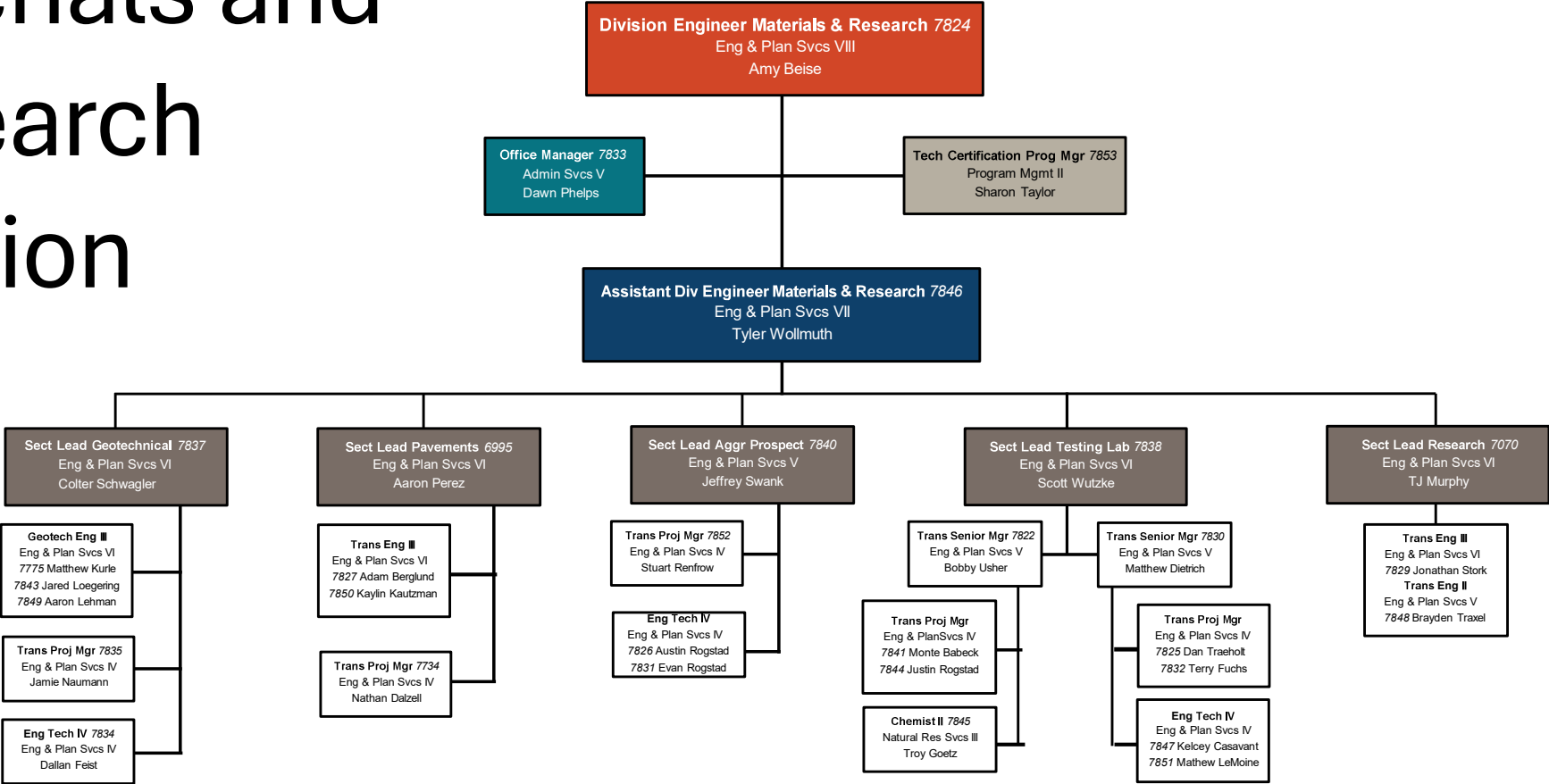


Materials and Research Division



Prestressed & Precast Concrete Products

Quality Assurance Program for Prestressed and Precast Concrete Products

- This guidance document was originally updated and implemented in July of 2024.
- Several small changes were made in 2025 to sync up to the most current Standard Specifications. The newest document was made available in August 2025.
- <https://www.dot.nd.gov>

QUALITY ASSURANCE PROGRAM FOR PRESTRESSED AND PRECAST CONCRETE PRODUCTS



Prepared by

MATERIALS AND RESEARCH DIVISION

August 2025

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

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Prestressed & Precast Concrete Products

Quality Assurance Program for Prestressed and Precast Concrete Products

- Responsibility
 - Districts, Materials and Research Division, Bridge Division
 - District Materials and Construction Team – Pipe and Box Culverts
 - Materials and Research Division – Prestressed I-Beam and Box Beams
 - Bridge Division – Are responsible for final approvals of all precast products

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Prestressed & Precast Concrete Products

Quality Assurance Program for Prestressed and Precast Concrete Products

- Plant Review
 - Annual Plant review. Having a third-party plant certification can satisfies this requirement.
- Quality Control Evaluation
 - Annual evaluation of each plant's Quality Control (QC) policies and procedures.
 - Each QC is reviewed for completeness by Materials, Bridge or the District.

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Prestressed & Precast Concrete Products

Quality Assurance Program for Prestressed and Precast Concrete Products

- Quality Control Plan
 - Plant management and personnel.
 - Materials Control.
 - Concrete batching, testing and handling.
 - Production items.
 - From forming to placing reinforcement.
 - Curing, de-tensioning and stripping forms.
 - Repairing minor or major defects. Including a process to self-reject.
 - Storage and internal plant inspection.

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Prestressed Concrete Beams

- Annual plant review happens, unless a third-party certification exists, which reviews the batch plant and calibrations.
- Calibration documentation is required for prestressing jacks. Plant is required to maintain all records pertaining to the entire tensioning system.
- Quality Control Plan is reviewed annually and Maintained by the Materials and Research Division.
- Mix design is submitted to the Materials and Research Division for review and approval. A new mix design is required for any source change.

Prestressed Concrete Beams

Production Observation – 25-50% of Project quantity

- Bed and forms are evaluated
- Initial Tensioning
- Steel Inventory and Placement: Cable, bar, inserts and lift hooks, are reviewed that placement agrees with Work Drawings.
- Concrete placement. Weather conditions are recorded as well as pertinent concrete mix qualities.
- De-tensioning is observed once design strengths are obtained.
- Beams are measured once they have been placed at their final plant storage location. Length, height, sweep, camber and flange widths are measured. If deemed acceptable at the plant, they are stamped for approval.
- Final approval is conducted by the project engineer, when delivered to the project.

Prestressed Concrete Beams

Material Testing

- One (1) random aggregate tests are performed per project or when a source changes.
- Three (3) random cement samples are tested.
- Steel reinforcement is accepted by certification.
- Concrete admixtures are accepted by certification.
- Concrete strength data is required for all segments and are provided to the project administration.
 - Three (3) sets of verification cylinders are cast each and compared to the fabricator data.

Precast Box Culverts

- Plants are required to be certified by either ACPA or NPCA.
- Quality Control Plan is provided to the District office along with all material certifications on a project-by-project basis.
- A copy of the Quality Control Plan is also provided to the Materials and Research Division.
- This needs to be in place prior to production.

Precast Box Culverts

Material Testing

- Three (3) random aggregate tests are performed each year and when a source changes.
- Three (3) random cement samples are tested.
- Steel reinforcement is typically accepted by certification.
- Concrete admixtures are accepted by certification.
- Concrete strength data is required for all segments and are provided to the project administration.

Precast Box Culverts

Product Observation

- NDDOT designated representative, typically District Materials Coordinator, will be on-site to inspect the first section box section. This is a minimum requirement.
 - Forms are inspected for damage or warping
 - Reinforcement steel is verified as to grade, quantity and size.
 - Placement of steel is verified to agree with Work Drawings.
 - The Bridge engineer is contacted to evaluate. If there is any deviations, or repairs required to any of the completed box segments.
 - Final approval is conducted by the project engineer, when delivered to the project.

Precast Concrete Pipe

- Plants are required to be certified by either ACPA or NPCA.
- Quality control plan is generally approved along with the box culverts, as they are normally the same plant.

Precast Concrete Pipe

- Materials testing requirements are the as box culverts:
 - Two (2) samples per year from the pipe for absorption testing. These are submitted to Materials and Research.
 - Three edge bearing test results are also reviewed by the Materials Coordinator. 60” or larger pipe utilizes molded cylinder testing for strength testing.

If all the requirements are met, then pipe can be accepted by certification.
On site inspection is not required.

Prestressed & Precast Concrete Products

Quality Assurance Program for Prestressed and Precast Concrete Products

- Out of state fabrication.
- If production is greater than 60 miles from our state border, Material and Research will set up inspection with another State DOT or consultant.

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Prestressed & Precast Concrete Products

Quality Assurance Program for Prestressed and Precast Concrete Products

- For Local Public Agency or LPA projects, the owner of the project is responsible for carrying out the Quality Assurance process.
- The LPA or a consultant representing the LPA would be designated as the Engineer or Materials Coordinator in this manual and is responsible for the inspection of prestressed and precast concrete products.
- If the project is located on or within the state highway system, that responsibility will fall back on the NDDOT as the owner.

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Reference Information

- NDDOT Field Sampling and Testing Manual
- NDDOT Quality Assurance Program for Prestressed and Precast Concrete Products