Summary of NRCS Engineering Policy & Technical References

3/21/2023

Engineering Policy

The NRCS in North Dakota operates under 6 disciplines; 1) Administration, 2) Engineering, 3) Programs, 4) Public Affairs, 5) Soils, and 6) Technology. All disciplines must adhere to national policy established in the General Manual found at http://directives.sc.egov.usda.gov/ under the browser search "General Manual." The General Manual is indexed by Titles and Parts. In addition, each state can publish state-specific policy as a General Manual State Supplement (shown at the bottom). Those are sometimes filed electronically under the edirectives system, and sometimes filed in other hardcopy or electronic formats, at the discretion of the state.

National policy with regard to Professional Engineering Practice is found under the General Manual, Title 210 - Engineering - Part 402.

- 402.0 - Purpose
- 402.1 – Professional Practice of Engineering in the Construction Arts
- 402.2 – Conservation Practices Requiring a PE in NRCS
- 402.3 – PE Practice by NRCS Engineers
- 402.4 – PE Practice by Non-NRCS Employees Retained or Cooperating with NRCS
- 402.5 – Employee Responsibility as a Practicing PE

Summary of NRCS Engineering Policy & Technical References

General Manual Title 210 - Parts 500-544 are grouped together to form the National Engineering Manual (NEM). These Parts are found at a different location: http://directives.sc.egov.usda.gov/ under the browser search column as "Manuals – Title 210 Engineering". All engineering work performed by or for the NRCS must conform to the national policy requirements stated in the NEM.

500 - Introduction
501 - Authorizations (Job Approval Authority)
503 - Safety
504 - Special Investigations, Studies, and Reports
505 - Non-NRCS Engineering and Services
506 - Technical Materials
510 - Planning
511 - Design
512 - Construction
520 - Soil and Water Resource Development
521 - Pollution Abatement and Water Quality Improvement
522 - Snow Survey and Water Supply Forecasting
523 - Irrigation
524 - Drainage
529 - Pollution Abatement and Air Quality Improvement
530 - Engineering
531 - Hydrology
533 - Soil Engineering
535 - Landscape Architecture
536 - Structural Engineering
540 - Field Surveys
541 - Drafting and Drawings
542 - Specifications
543 - Materials
544 - Equipment

The NRCS in North Dakota has issued state-specific policy supplements to several Parts of the NEM. The supplements can be found on the North Dakota Engineering website at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/nd/technical/engineering/. The State Conservation Engineer maintains an updated hard copies of the NEM.

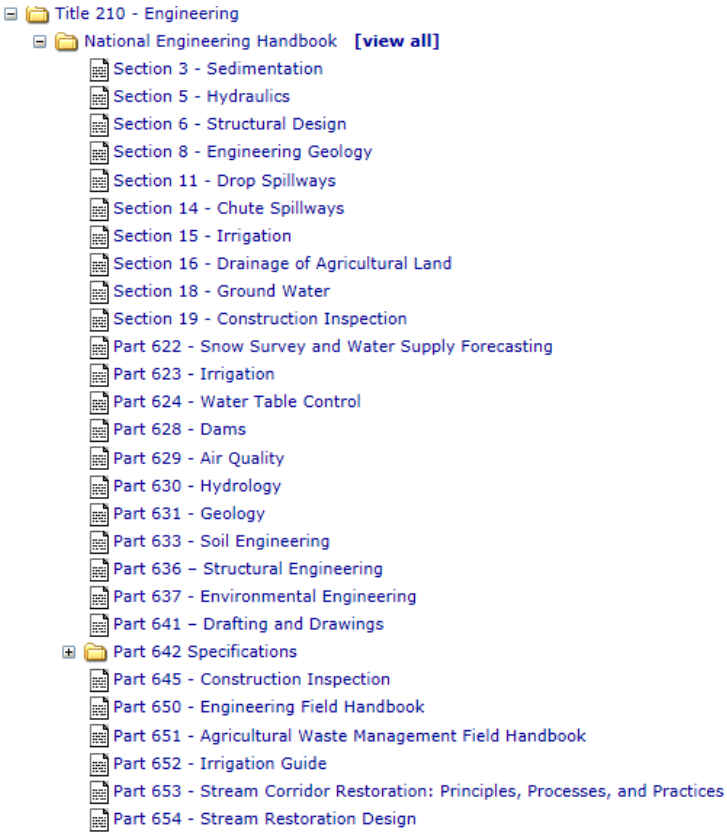
Technical References

Many technical references are available to help NRCS engineers prepare conservation designs, e.g. industry design references, professional publications, academic textbooks, and market literature. NRCS design engineers with accumulated empirical experience have worked with academia, industry, and other government agencies to develop technical references and procedures that are specific to conservation work. This knowledge base is housed in the National Engineering Handbook Series, Technical Releases, and Technical Notes:

General Manual, Title 210 - Engineering, Parts 600-659 are grouped together to form the National Engineering Handbook (NEH) Series. These Parts can be found at http://directives.sc.egov.usda.gov/ under the browser search column as "Handbooks - Title 210 Engineering."

The filing system for National Engineering Handbook Series was updated in 1998. As a result, old NEH Sections are posted with the new NEH Parts. As the old NEH Sections are updated, they will be filed as Parts under the new NEH Series.

Summary of NRCS Engineering Policy & Technical References



Part 650, the Engineering Field Handbook, was specifically written to compile information typically utilized by field technicians.

650 – Engineering Field Handbook (formerly Engineering Field Manual)
- Chpt 1 – Engineering Surveys
- Chpt 2 – Estimating Runoff
- Chpt 3 – Hydraulics
- Chpt 4 – Elementary Soils Engineering
- Chpt 5 – Preparation of Engineering Plans
- Chpt 6 – Structures
- Chpt 7 – Grassed Waterways and Outlets
- Chtp 8 – Terraces
- Chpt 9 – Diversions
- Chpt 10 – Gully Treatment
- Chpt 11 – Ponds and Reservoirs
- Chpt 12 – Springs and Wells
- Chpt 13 – Dikes and Levees
- Chpt 14 – Water Management (Drainage)
- Chpt 15 – Irrigation
- Chpt 16 – Streambank and Shoreline Protection
- Chpt 18 – Soil Bioengineering for Upland Slope Protection and Erosion Reduction
- Chpt 19 – Hydrology Tools for Wetland Determinations

Summary of NRCS Engineering Policy & Technical References

North Dakota has state-specific supplements to NEH Parts 630, 650, 651, and 652 on their website at:
NRCS Engineering Manuals and Handbooks | Natural Resources Conservation Service (usda.gov)
National Engineering Handbook (NEH) – North Dakota Supplements

NEH Part 650 - Engineering Field Handbook

- Chapter 19, Hydrology Tools for Wetland Determination
- Chapter 50 Construction and Material Specifications
- Chapter 51 Planning and Design Guides
- Chapter 53 Engineering Worksheets

Detailed design procedures are organized under the old filing system as Engineering Technical Releases (TR) and Technical Notes (TN) at: http://directives.sc.egov.usda.gov/ under the browser search column as "Technical Releases" and "Technical Notes." As Technical Releases and Notes are updated, they will be filed as Chapters under corresponding Parts of the National Engineering Handbook Series. For example, TR-77 "Design and Installation of Flexible Conduits" was updated and filed (moved) under NEH Part 636, Chpt 52 "Structural Design of Flexible Conduits."

TR-210 - Engineering Technical Releases

- TR-210-01 - Routing Through Tide Gates (7/1955)
- TR-210-03 - Hood Inlets for Culvert Spillways (6/1956)
- TR-210-05 - Structural Design of Underground Conduits (11/1958)
- TR-210-17 - Geologic Investigation for Watershed Planning (3/1966)
- TR-210-18 - Computation of Joint Extensibility Requirements (8/1969)
- TR-210-19 - Determination of Storage Requirements to Meet Supply Demand Relationships (3/1962)
- TR-210-19-A - Revision of Reservoir Operations Study Computer Program and User Manual, Appendix A (3/1988)
- TR-210-24 - Investigating Structural Problems (Second Edition) (2/1983)
- TR-210-25 - Design of Open Channels (9/1977)
- TR-210-25-A - Design of Open Channels, Appendix A, Stream Armor Design Concepts (10/1977)
- TR-210-26 - The Use of Soils Containing More Than 5% Rock Larger Than the No.4 Sieve (12/1964)
- TR-210-27 - Laboratory and Field Test Procedures for Control of Density and Moisture of Compacted Earth Embankment (including Notice) (2/1965)
- TR-210-29 - Hydraulics of Two-Way Covered Risers (6/1965)
- TR-210-30 - Structural Design of Standard Covered Risers (including Notice TR 30-1) (4/1965)
- TR-210-31 - Structural Analysis and Design at Low Stage Inlets (6/1966)
- TR-210-33 - Simplified Method for Determining Floodwater Storage (4/1978)
- TR-210-37 - Structural Analysis and Design at Base of Riser With Conduit Openings in Both Endwalls (12/1967)
- TR-210-39 - Hydraulics of Broad-Crested Spillways (5/1968)
- TR-210-42 - Single Cell Rectangular Conduits Criteria and Procedures for Structural Design (12/1969)
- TR-210-43 - Single Cell Rectangular Conduits Catalog of Standard Designs (1/1970)
- TR-210-45 - Twin Cell Rectangular Conduits-Criteria and Procedures for Structural Design (9/1970)
- TR-210-46 - Gated Outlet Appurtenances, Earth Dams (12/1982)
- TR-210-46-1 - Gated Outlet Appurtenances, Earth Dams, Amendment 1 (8/1984)
- TR-210-47 - Classification System for Varied Flow in Prismatic Channels (2/1971)
- TR-210-48 - SITES Water Resource Site Analysis Computer Program User's Guide (11/2005)
- TR-210-49 - Impact Basins Associated With Full Flow in Pipe Conduits (3/1971)
- TR-210-50 - Design of Rectangular Structural Channels (Revision 1) (7/1977)
- TR-210-54 - Structural Design of SAF Stilling Basins (10/1974)

TR-210 - Engineering Technical Releases Continued

- TR-210-54-1 - Structural Design of SAF Stilling Basins, revised wingwall design, Amendment 1 (9/1981)
- TR-210-56 - A Guide for Design and Layout of Vegetative Wave Protection for Earth Dam Embankments (12/1974)
- TR-210-57 - Flood Proofing (1/1975)
- TR-210-59 - Hydraulic Design of Riprap Gradient Control Structures (1/1976)
- TR-210-59-1 - Graphical Solution for the Hydraulic Design of Riprap Gradient Control Structures, Amendment 1 (7/1976)
- TR-210-59-2 - Water Surface Profiles and Tractive Stresses for Riprap Grade Control Structures, Supplement 1 (2/1978)
- TR-210-59-3 - Water Surface Profiles and Tractive Stresses for Riprap Grade Control Structures, Revised Pages, Supplement 2 (3/1986)
- TR-210-60 - Earth Dams and Reservoirs (Revised July 2005) (7/2005)
- TR-210-63 - Structural Design of Monolithic Straight Drop Spillways (2/1977)
- TR-210-65 - Procedures to Establish Priorities in Landscape Architecture (10/1978)
- TR-210-66 - Simplified Dam-Breach Routing Procedure (third edition) (9/1985)
- TR-210-67 - Reinforced Concrete Strength Design (8/1980)
- TR-210-68 - Seismic Analysis of Risers (4/1982)
- TR-210-69 - Riprap for Slope Protection Against Wave Action (2/1983)
- TR-210-70 - Hydraulic Proportioning of Two-Way Covered Baffle Inlet Riser (9/1983)
- TR-210-74 - Lateral Earth Pressures (7/1989)
- TR-210-75 - Reservoir Storage Volume Planning (7/1991)
- TR-210-78 - The Characterization of Rock for Hydraulic Erodibility (6/1991)

Summary of NRCS Engineering Policy & Technical References

Technical Notes are abbreviated design procedures organized by subject class, e.g. Geology, Hydrology, Design, or Soil Mechanics.

The following series opens up under Technical Notes - Title 210 – Engineering - Design Engineering

- TN_210_DN_16 - Probability of Occurrence for Certain Design Events (12/1976)
- TN_210_DN_19 - Input Data for Design Unit Programs (4/1980)

A state occasionally develops state Technical Notes and the National Technical Support Center (NTSC) occasionally develops regional Technical Notes which are housed on their respective websites. North Dakota has no Technical Notes at this point in time under Title 210.

Engineers also reference other NRCS Manuals to stay consistent with national and state policies and procedures. These are "stand-alone" documents that are not filed in a reference series.

- North Dakota NRCS Hydrology Manual
- North Dakota Livestock Watering Systems
- North Dakota Livestock Shelter Structure Planning Guide
- North Dakota Grassed Waterways Planning Guide
- North Dakota Mircroirrigation Systems Planning Guide
- North Dakota Vegetated Treatment Area Planning Guide
- North Dakota Sprinkler System Irrigation Planning Guide
- National Handbook of Conservation Practices
- National Operations and Maintenance (O&M) Manual
- National Conservation Planning Manual
- National Contracts, Grants, and Cooperative Agreements Manual
- National Watershed Manual
- National Planning Procedures Handbook
- National Emergency Watershed Protection (EWP) Manual

As described in the General Manual, Title 402, NRCS employees who are practicing Professional Engineers are expected to exercise reasonable ordinary care and diligence in the application of professional knowledge and skill. Negligence resulting in personal liability may arise when work performed is not consistent with current standards of practice in the agency or profession. It is the responsibility of individual ND NRCS PE's, which includes most positions at the GS-12 level, to stay up to date on current engineering standards of practice in their field regardless of whether agency references are kept up to date.