

Summary of NRCS Engineering Policy & Technical References

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.

General Manual

- ☞ [Title 110 - Management \[view all\]](#)
- ☞ [Title 120 - Administrative Services \[view all\]](#)
- ☞ [Title 130 - Agency General \[view all\]](#)
- ☞ [Title 150 - Basin and Area Planning \[view all\]](#)
- ☞ [Title 170 - Cartography and Geographic Information Systems \[view all\]](#)
- ☞ [Title 180 - Conservation Planning and Application \[view all\]](#)
- ☞ [Title 190 - Ecological Sciences \[view all\]](#)
- ☞ [Title 200 - Economics \[view all\]](#)
- ☞ [Title 210 - Engineering \[view all\]](#)
- ☞ [Title 220 - Environmental Coordination \[view all\]](#)
- ☞ [Title 230 - Equal Opportunity \[view all\]](#)
- ☞ [Title 250 - Financial Management \[view all\]](#)
- ☞ [Title 260 - Public Information \[view all\]](#)
- ☞ [Title 270 - Information Resources Management \[view all\]](#)
- ☞ [Title 280 - International Conservation \[view all\]](#)
- ☞ [Title 290 - Resources Inventory \[view all\]](#)
- ☞ [Title 300 - Land Treatment Programs](#)
- ☞ [Title 310 - Land Use \[view all\]](#)
- ☞ [Title 330 - Operations Management \[view all\]](#)
- ☞ [Title 340 - Strategic Planning and Accountability](#)
- ☞ [Title 360 - Human Resources \[view all\]](#)
- ☞ [Title 400 - Public Participation Coordination](#)
- ☞ [Title 410 - Rural Development \[view all\]](#)
- ☞ [Title 420 - Social Sciences \[view all\]](#)
- ☞ [Title 430 - Soil Survey \[view all\]](#)
- ☞ [Title 440 - Programs \[view all\]](#)
- ☞ [Title 450 - Technology \[view all\]](#)
- ☞ [Title 460 - Water Quality Project Implementation \[view all\]](#)
- ☞ [General Manual State Supplements](#)

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

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

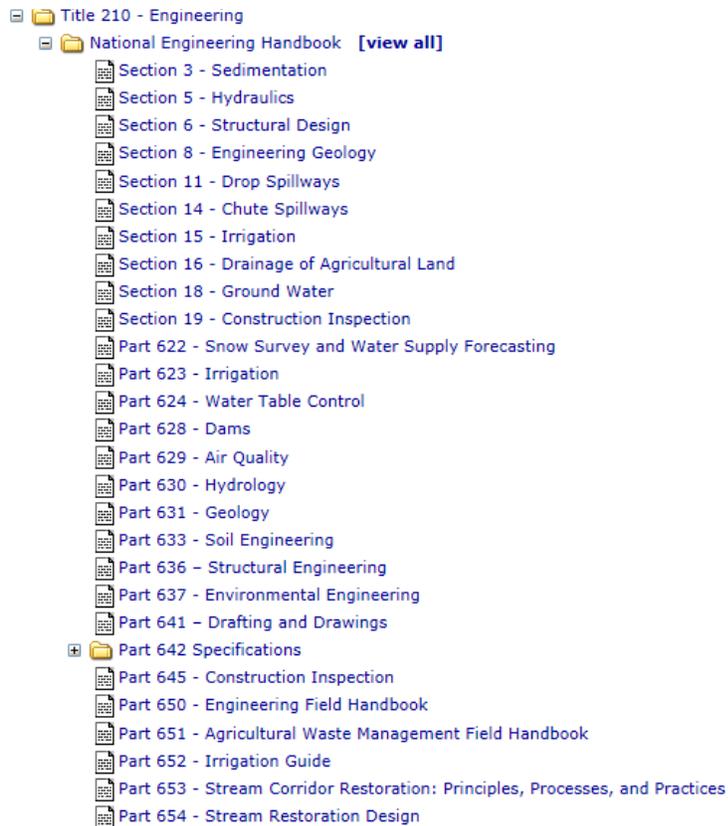
The NRCS in North Dakota has issued state-specific policy supplements to several Parts of the NEM. The supplements can be found on the North Dakota Engineering website at: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/nd/technical/engineering/> or, in the case of older supplements, should be found filed hardcopy in the NEM. The State Conservation Engineer and each Area Engineer maintains updated 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.



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
- Chpt 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

North Dakota has state-specific supplements to NEH Parts 630, 650, 651, and 652 on their website at: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/nd/technical/engineering/>

National Engineering Handbook (NEH) – North Dakota Supplements

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- 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

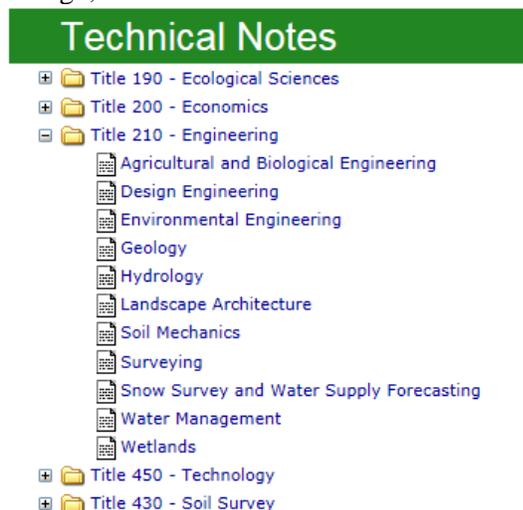
Detailed design procedures are organized under the old filing system as Engineering Technical Releases (TR) and Technical Notes (TN) at: <http://directives.sc.egov.usda.gov/> under the browser search column as “Technical Releases” and “Technical Notes.” As Technical Releases and Notes are updated, they 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-210-04 - Height of Water Column Supported by Atmospheric Pressure (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-210-35 - Method of Reservoir Flood Routing (2/1967)
- 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-210-54-1 - 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-210-62 - Engineering Layout, Notes, Staking, and Calculations (1/1979)
- 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)

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_01 - Scour Protection at Base of Risers to Drop Inlet Spillways (8/1967)
- TN_210_DN_02 - Required 3-Edge Bearing Strength for Rigid Pipe (12/1967)
- TN_210_DN_03 - Detail of Riprap Above Berm on Earth Dam (7/1968)
- TN_210_DN_04 - Cradle Modification Where a Rock Foundation Hiatus Exists (8/1968)
- TN_210_DN_05 - Some Comments on Flexural and Anchorage Bond Stresses (11/1968)
- TN_210_DN_06 - Riprap Lined Plunge Pool for Cantilever Outlet (Second Edition) (1/1986)
- TN_210_DN_07 - Variation in Joint Extensibility (8/1969)
- TN_210_DN_08 - Drop Inlet Entrance Losses (8/1969)
- TN_210_DN_09 - Use of AWWA C302 Pipe for Principal Spillway Conduits (1/1970)
- TN_210_DN_10 - Special Designs of Single Cell Rectangular Conduits (6/1970)
- TN_210_DN_11 - Welding Reinforcing Steel for Reinforced Concrete (1/1971)
- TN_210_DN_12 - Control of Underground Corrosion (2/1971)
- TN_210_DN_14 - Cavitation Potential at an Irregularity (1/1973)

- TN_210_DN_15 - Submerged Weir Flow (5/1973)
- TN_210_DN_16 - Probability of Occurrence for Certain Design Events (12/1976)
- TN_210_DN_17 - Some Comments on the Location of Riser Conduit Articulation Joints (4/1977)
- TN_210_DN_18 - Unattached Engineering Standard Drawings (4/1981)
- TN_210_DN_18_A - Unattached Engineering Standard Drawings, DN-18A, Revised Pages (6/1986)
- TN_210_DN_18_B - Unattached Engineering Standard Drawings, DN-18B, Revised Pages
- TN_210_DN_19 - Input Data for Design Unit Programs (4/1980)
- TN_210_DN_20 - Guide to Organization and Operation of Independent Review Boards (4/1980)
- TN_210_DN_24 - Guide for the Use of Geotextiles (11/1991)

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 NRCS Irrigation 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.