USDA-Natural Resources Conservation Service

Engineering Technical Note SD-2016-1 April 2016

CONSTRUCTION TOLERANCE GUIDE

This Technical Note is being issued to provide guidelines for acceptable construction and construction quantity tolerances. Technical Note - Construction-SD-1 (Rev. 3) dated January 14, 1988, is canceled.

Construction tolerances in this guide are intended for use by designers and inspectors of the Natural Resources Conservation Service (NRCS) approved work in South Dakota. Quantity tolerances are included for use in spot-checking this work. The tolerances specified are not intended to be mandatory. They are intended only to supplement experience and good judgment on the part of the NRCS employee exercising Job Approval Authority for the project.

Deviations from design line and grade, and small errors in quantity computations can be expected to occur, but should be regarded as a departure from what is desired, and no extensive deviations, or pattern of deviations should be allowed. The goal of construction must be to meet the lines and grades specified. Quantities should be computed very carefully and accurately.

In addition to being within the tolerances shown, completed structures are expected to function as intended, and to present a neat, high quality appearance. Unacceptable appearances may result from excessive variations within the tolerances shown. This may cause poor vegetation, cracking, sliding, water flow concentrations, difficulty in mowing, and many other problems. Therefore, it may be necessary to hold some work to a stricter standard.

CONSTRUCTION TOLERANCES

Earthwork, Foundation Excavations - (Drains, core trench, pipe trenches, foundations prep, etc.)

Bottom elevations	- above grade	+ 0.0'
	- below grade	- 0.5'
Side slopes	- above grade	+ 0.0' vertical
	- below grade	- 0.5' vertical
Bottom width		- 0.0'
		+ 1.0'

Excavation - Auxiliary Spillway

Crest section elevation		± 0.1'
Other spillway bottom elevations		+ 0.1'
		- 0.2'
Bottom width		- 0.0'
		+ 1.0'
Side slopes	- above grade	+ 0.0'
	- below grade	- 0.5' vertical

Excavation - Other (dugouts, etc.)

Bottom elevations	- above grade	+ 0.0'
	- below grade	- 0.5' no negative grade
Sides slopes	- above grade	+ 0.0'
	- below grade	- 0.8'
Bottom width		- 0.0'
		+ 2.0'

CONSTRUCTION TOLERANCES (continued)

Earth Fill - Class I, II, Dikes, Dams Requiring South Dakota State Approval

Top surface	- above grade	+ 0.3'
	- below grade	- 0.0'
Top width		± 0.5'
Side slopes	- above grade	+ 0.5' vertical
	- below grade	- 0.2' vertical

Earth Fill - Other Earth Fills

Top surface	- above grade fills over 4'	+ 0.7'
	- above grade fills 4' or less	+ 0.4'
	- below grade	- 0.1'
Top width		+ 1.0'
		- 0.5'
Side slopes	- above grade	+ 1.0' vertical
	- below grade	- 0.2' vertical

Principal Spillway Conduit - Concrete - Other Rigid Pipe

Grade, elevations	± 0.1' (no reverse grade)
Horizontal line (overall)	± 0.2'
Horizontal line (per joint)	± 0.1'

Principal Spillway Conduit - Flexible (CMP, plastic, etc.)

Grade	± 0.2' (no reverse grade)
Inlet crest elevation	± 0.1'
Horizontal alignment over 18" diameter	± 0.5'
Horizontal alignment 18" diameter or less	± 1.0'

CONSTRUCTION TOLERANCES (continued)

Other Pipelines - (water supply, irrigation, drain)

Flowline grade	± 0.2' no reverse grade
Horizontal alignment	± 1.0'

Loose Rock Riprap - (equipment placed)

Variation in finish line and grade

- above grade	+ 50% Dmax rock
- below grade	- 25% Dmax rock

Minus tolerance shall not extend continuously over more than 200 square feet

Waterways, Irrigation, or Drainage Ditches

1 percent (%) or flatter bottom slope	- above grade	+ 0.1' no reverse grade
	- below grade - dry	- 0.3' no reverse grade
	- below grade - wet	- 0.5' no reverse grade
Bottom slope 1.1% to 3%	- above grade	+ 0.3' no reverse grade
	- below grade	- 0.5' no reverse grade
Bottom steeper than 3%		± 0.5' no reverse grade
Bottom width 10' or less		+ 1.0'
		- 0.0'
Bottom width over 10'		+ 2.0'
		- 0.0'
Side slope	above grade	+ 0.1' vertical
	below grade	- 1.0' vertical

CONSTRUCTION TOLERANCES (continued)

Concrete - Less Than 5.0 Cubic Yards and Wall Height 4' or Less

Wall thickness	+ 2"
	- 1/2"
Floor, crest elevations	± 3/4"

Concrete - More Than 5.0 Cubic Yards, or Wall Height Over 4'

Wall thickness	± 1/2"
Floor, crest elevations	± 1/2"
Variation in structure lines in 10 feet	± 1/2"
Variation in structure lines in 20 feet	± 1"
Variation in size, location of openings	± 3/4"

Reinforcing Steel - Less Than 5 c.y. Concrete and Wall Height 4' or Less

Variation from specified bar location	± 1"
Minimum concrete cover over steel	1 1/2"

Reinforcing Steel - More Than 5 c.y. Concrete or Wall Height Over 4'

Variation from specified bar location	± 1"
Variation from specified clear distances	± 1/2"
Minimum concrete cover over steel	1 1/2"

Filter and Bedding Sand and Gravel

Trench width or blanket thickness	+ 25%
	- 5%
Finished surface elevations	± 0.2'

CONSTRUCTION TOLERANCES (continued)

Channel Canal and Ditch Linings

Bottom grade lining top	± 0.1'
Horizontal alignment	± 0.2'
Concrete thickness	+ 1.0"
	- 0.0"

Irrigation Land Leveling

For design grade 0.0 - 0.4%	± 0.1' no reverse grade
For design grade over 0.4%	± 0.2' no reverse grade

Terraces, Diversions

Ridge	Above grade + 0.4'
	Below grade - 0.0'
Channel	Above grade + 0.0'
	Below grade - 0.4'
Horizontal alignment	± 4.0'

QUANTITIES
SPOT-CHECKING TOLERANCES

Excavation or fill - cubic yards	± 2%
Drain fill, bedding, riprap - cubic yards	± 2%
Concrete - cubic yards	± 2%
Reinforcing steel - pounds	± 5%
Seeding - acres	± 1%
Fence - feet	± 1.5%
Diversion, terraces - feet	± 1.5%
Waterways - feet	± 1.5%
Pipe laid length - feet	± 1.5%