

National Engineering Manual

Part 511 - Design Subpart A - Procedures

KS511.4 Design Analysis

C. Engineering Software

(1) The list of software that has been approved for use on Common Computing Environment (CCE) computers can be found on a spreadsheet titled "Software Certification Listing" on the following SharePoint web site:

<https://itsalerts.sc.egov.usda.gov/End%20User%20Documents/Forms/AllItems.aspx>

(2) Information Technology Services (ITS) personnel will only assist in installing engineering software that is approved on this list. Other programs may be used as documentation only if approved by the state conservation engineer (SCE) on a case-by-case basis. Additional spreadsheets and design aids are available on the [Kansas Web site > Technical Resources](#), on the [Kansas Web site > Kansas Forms](#), and in Section IV of the [electronic Field Office Technical Guide](#).

KS511.7 Design Criteria

E. The following are criteria to evaluate or design dams for Public Law 566 (P.L. 566) funding using [Conservation Practice Standard 378, Pond](#).

- (1) The structure must be listed in an approved P.L. 566 work plan (with a 50-year evaluated life).
- (2) All structures shall be low hazard dams.
- (3) The Division of Water Resources (DWR) regulations must be satisfied.
- (4) [Conservation Practice Standard 378](#) must be met for all design parameters not specifically addressed in the following criteria:
 - (i) Sediment Storage
 - (a) The structure will provide sediment storage for the 50-year evaluated life. A minimum of 90 percent of the storage will be below the principal spillway crest elevation (submerged).
 - (b) Storage will be based on the procedures in "Sediment Yields from Small Drainage Areas in Kansas" (Bulletin Number 16 of the Kansas Water Resources Board) or similar procedures.
 - (ii) Detention Storage
 - (a) The runoff from a 10-year, 24-hour, Type II storm event will not result in auxiliary spillway flow.
 - (b) 85 percent of the detention storage will be drawn down in 10 days or less.
 - (c) Floodrouting by SITES is permissible in accordance with [Conservation Practice Standard 378](#) and DWR regulations.
 - (iii) Principal Spillway
 - (a) A 10-inch minimum diameter pipe with a properly proportioned and fabricated drop inlet, canopy inlet, or head inlet must be used.
 - (b) Polyvinyl chloride (PVC), polyethylene (PE), or steel pipe must be used.
 - 1) The design must meet the requirements for plastic pipe in [Conservation Practice Standard 378](#).
 - 2) Steel pipe must be new, Grade B, Type E or S, standard weight pipe as defined in American Society for Testing and Materials (ASTM) A 53.
 - i) The pipe must be butt-welded and hydrostatically tested.
 - ii) Approved mechanical couplings must be used when pipe length exceeds 100 feet.
 - (c) A 4-inch minimum diameter PVC pipe may be installed as a separate drawdown pipe. Install a gate valve near the discharge end (at frost-free depth) and locate it as near to the streambed elevation as possible.
 - (d) Encasement of all exposed plastic pipe with corrugated metal pipe (CMP) is recommended to protect against fire or ultraviolet damage.
 - (e) Install a pipe support 8 feet from the end of the pipe.
 - (f) A filter diaphragm shall be designed for seepage control on the principal spillway and drawdown pipe.
 - (iv) Auxiliary Spillway
 - (a) A 25-year, 24-hour storm (as a minimum) must be passed without overtopping the dam or as required by DWR regulations.
 - (b) The minimum width must be 20 feet.
 - (c) The crest elevation must be at least 3 feet below the top of the dam.
 - (d) A totally level crest is allowed.

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KS511.7 Design Criteria (continued)

- (e) All excavation shall be undercut 6 inches (minimum) and backfilled with suitable topsoil.
- (f) Exit Channel
 - 1) Excavation is not required. Sponsors may require total grading to the stream channel.
 - 2) Existing sod or vegetated surfaces must remain stable after discharge.
 - 3) The back toe of the dam must be protected.
- (v) Template of Dam
 - (a) There must be a minimum top width of 12 feet.
 - (b) There must be a 2.5 horizontal to 1 vertical (2.5:1) back slope with a minimum 12-foot wide crossing back berm that is 3 feet above the pipe.
 - (c) A front slope of 3:1 is required. Use the procedure in [Section KS650.1180 in National Engineering Handbook Part 650 \(NEH 650\), Engineering Field Handbook](#), to determine the need for additional front slope changes.
 - 1) If required, use a 10-foot berm at the riser crest elevation.
 - 2) If required, use a 12:1 slope from 2 feet above to 1 foot below the riser crest elevation.
 - 3) Topsoil the surface of the dam to a minimum depth of 12 inches, measured normal to slopes. Do not topsoil below the berm elevations on the front slope.
 - (d) Slopes will be true slopes from the constructed top of the dam to the toe.
- (vi) Seed and fence—Fence as necessary to exclude livestock and unauthorized traffic on the dam site and the auxiliary spillway.
- (vii) Geology and soil mechanics needs must be determined for all dams.
- (viii) Construction specifications and drawings following existing standards will be used as much as possible.

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Part 511 - Design
Subpart C - Instrumentation

KS511.25 Instrumentation Monitoring and Reporting

E. Survey books and other material necessary for monitoring instrumentation will be retained in the field or area office for the field work and, at the termination of the field work, will be forwarded to the state office for inclusion in the structure records.

F. Each field office having structures with instrumentation or cathodic protection shall maintain a list of installations (by owner and legal description) to provide assistance to the local sponsor or owners in their operation and maintenance (O&M) program.

G. Cathodic protection on project measures will be checked once in the first year after installation and then once every 5 years thereafter in accordance with the O&M agreement and plan. It should be checked by someone qualified to evaluate the system. On non-project measures, the Natural Resources Conservation Service (NRCS) will provide assistance upon request and as time allows.