NATURAL RESOURCES CONSERVATION SERVICE

DOCUMENTATION REQUIREMENTS FOR

DIVERSION

CODE 362

Design Criteria

Design in accordance with the criteria listed in Conservation Practice Standard 362, Diversion, and Chapter 9 of National Engineering Handbook Part 650 (NEH 650), *Engineering Field Handbook*. The diversion should be installed at the location shown on the conservation plan map and location map.

Surveys

Record standard engineering notes on loose-leaf field notebook sheets (Forms NRCS-ENG-28 and NRCS-ENG-29), field note sheets (Forms KS-ENG-37 and KS-ENG-37a), or equivalent. Take and record ground elevation shots at 100-foot intervals (stations), at all significant breaks in grade that occur between the regular stations, and at the location of blocks and outlets.

Place flags at each station and at the location of blocks and outlets. The survey line is normally the no-cut, no-fill line but can be at the downstream edge of the channel or the center of the channel as desired. When connecting to an existing diversion, take ground elevation shots along the existing diversion to establish the proper grade rod to continue the diversion line.

Determine the land slope in percent above each diversion reach for a gradient diversion and each diversion for a level diversion. A reach has the same grade and cross section. An additional reach is required when a significant change in the grade of the drainage will require a change in the channel design grade and cross section or when the drainage area and resulting discharge has a significant increase. Determine the length of each diversion reach for a gradient diversion, the length of each diversion for a level diversion, and the length of any blocks.

It is recommended to set at least one temporary bench mark as needed.

Locate and identify special conditions that may affect the design and installation of the diversion. Safety procedures listed in National Engineering Manual (NEM) Part 503 should be strictly followed.

Layout

Generally, sufficient stations, alignment, flags, and grade stakes will be set when the design survey is made to establish the location of the diversion. In some cases, it will be necessary to set special reference stakes along the line after design and prior to diversion installation. These should be described in the survey notes.

Record information obtained from the surveys for design and layout on Form KS-ENG-8 for a gradient diversion and Form KS-ENG-36 for a level diversion and/or attach the survey notes as appropriate.

Complete the Layout by and Date blocks.

Design and Plans

Develop the design in accordance with the above “Design Criteria” Section. The design should not exceed the maximum allowable stress or the maximum allowable velocity for the soils in the diversion channel, as described in the practice standard.

The Hydrologic Summary Sheet and the Acres and Curve Number Sheet in the spreadsheets below can be used to determine the peak discharge for a gradient diversion or runoff for a level diversion. Tables in Chapter 2 of NEH 650 and Form KS-ENG-137a can be completed manually for the same information.

Engineering Field Tools, the Gradient Diversion Spreadsheet, and the Level Diversion Spreadsheet (the spreadsheets are located in the Kansas electronic Field Office Technical Guide (eFOTG) > Section IV > Diversion > Job Sheet) can be used to assist in the design and completion of the form. Both spreadsheets use

a cut/fill ratio of 1.35:1 to calculate the fill volume.

Record design information on Form KS-ENG-8 for a gradient diversion and Form KS-ENG-36 for a level diversion and include the following:

- Name of the owner and/or operator and location information
- The location map showing the plan view of the proposed diversion - An attached map may be needed for more details.
- Any special instructions needed for installation of the diversion in the Location Map area or attached on a separate sheet
- Sign the Designed by, Approved by, and Checked by blocks, and complete the Date blocks.

Storage Terrace Spreadsheet located in Kansas eFOTG > Section IV > Diversion > Job Sheet can be used to design diversions with underground outlets or level diversions where more detailed survey information is used.

Checkout

Complete Form KS-ENG-8 or KS-ENG-36 by recording the following:

- Channel and Ridge Profiles with readings at 100-foot intervals or more frequently, if necessary - For channels 15 feet wide or less, take at least 1 channel reading on the centerline. For channel widths from 15 to 30 feet, take at least 2 readings in the channel (near the outer edges of the bottom). For channels over 30 feet wide, take at least a centerline reading and readings near each of the outer edges. For gradient diversions, record the difference of the Channel Reading from the Ridge Reading in the Height column. For level diversions, the Height is the difference between the Average Channel Reading and the Ridge Reading.
- Cross Sections - Record readings as needed for ridge and channel. Show distances between readings. Use a minimum of 1 cross section for each diversion reach for a gradient diversion and each diversion for a level diversion.
- Length (in feet) of each diversion and each block installed
- Volume (in cubic yards) of fill for the installed diversion and blocks
- Record any observations in the Remarks block
- Sign the Checkout by block and complete the Date block
- Sign the Audited by block and complete the Date block