



Design and Implementation Activity

Improved Management of Drainage Water Design

DIA 164

Definition

Design the drainage volume and water table elevation by regulating the flow from a surface or subsurface agricultural drainage system. This activity includes one or more conservation practices that manage the drainage volume and water table elevation by regulating the flow from a surface or subsurface agricultural drainage system. Implementation requirements for CPS 554 Drainage Water Management along with other supporting conservation practices are developed.

REQUIREMENTS

General Requirements

A Design and Implementation Activity (DIA) assists a participant with implementing their conservation plan by providing site-specific instructions, requirements, plans, or specifications for putting conservation practices and enhancements on the land.

A DIA may involve providing assistance for a single conservation practice or a combination of structural, vegetative, or land management conservation practices, enhancements, and management activities to treat one or more resource concerns.

Prior to initiation of the DIA, the Technical Service Provider (TSP) will schedule a conference with the participant and Natural Resources Conservation Service (NRCS) field office staff to ensure an understanding of the participant objectives (including practices to be covered by the DIA), required deliverables, and characteristics of the DIA tasks. The meeting between all parties may take place in person or electronically.

The participant and conservation planner have determined which practices a TSP will provide DIA assistance for. The TSP must have certification in NRCS Registry for each practice they will provide assistance for through this DIA. If not certified for a practice(s), a TSP can use a subcontractor who is a certified TSP for the practice(s). If there are no available certified TSPs, then that practice shall be removed from the scope of the participant's DIA.

DIA assistance is based on the participant's conservation plan and applicable conservation practice standards and related technical guidance provided in the NRCS Field Office Technical Guide (FOTG). Each NRCS State Office publishes appropriate technical guidance and reference information in the state's version of the FOTG. DIA assistance must conform with the conservation practice standards included in FOTG, Section 4 for the state where the practice(s) are to be implemented. A TSP may use conservation practice supporting documents found in the applicable state's FOTG, Section 4 to facilitate delivery of appropriate information to the participant.

Examples of conservation practice supporting documents include statements of work (SOW), implementation requirements (IR), practice specifications (PS), standard drawings (SD), General Specifications (GS), Construction Specifications (CS), Material Specifications (MS), and design support tools. The FOTG homepage hyperlink is: <https://efotg.sc.egov.usda.gov/#/>.

Technical Requirements

TSP must complete Preliminary and Final Designs for structural practices as outlined in each state adopted CPS, SOW, and the NRCS National Engineering Manual (NEM). The steps in the NEM include:

- 1) Preliminary engineering work, site investigations, data collection, and documentation
- 2) Adherence to CPS criteria, cost estimates, preliminary alternatives
- 3) Participant's selection
- 4) Preparation of final plans and specifications based on participant's selections
- 5) Design report and engineer's cost estimate
- 6) Operation and maintenance plan
- 7) Quality assurance plan.

This DIA will meet the state adopted NRCS Conservation Practice Standards (CPS) and Statements of Work (SOW) included in the participant's conservation plan or EQIP Contract and include at least one of following:

- Drainage Water Management (Code 554)
- Saturated Buffer (Code 604)
- Denitrifying Bioreactor (Code 605)
- Subsurface Drain (Code 606)
- Surface Drain, Field Ditch (Code 607)
- Surface Drain, Main or Lateral (Code 608)

DELIVERABLES

The TSP must provide documentation showing all the tasks indicated in the **Technical Requirements** section and the following sections:

Cover Page

The cover page must include the following:

- 1) DIA name and number.
- 2) Participant information: Name, farm bill program name, contract number (TSP obtains contract number from participant), land identification (e.g., state, county, farm, and tract number).
- 3) TSP name, TSP number, TSP expiration date, mailing address, phone number, email address.
- 4) Farm identification:
 - a) Farm name, owner name, street address, and county/state.
 - b) Primary phone number of the participant.
 - c) List of all practice and/or scenario designs included in this plan.
- 5) A statement by the TSP that services meet the DIA requirements, such as:

I certify the work completed and delivered for this DIA:

- *Complies with all applicable Federal, State, Tribal, and local laws and regulations.*

- *Meets the General and Technical Requirements for this DIA.*
- *The planned practices are based on NRCS Conservation Practice Standards in the state Field Office Technical Guide where the practices are to be implemented.*
- *Is consistent with and meets the conservation goals and objectives for which the program contract was entered into by the participant.*
- *Incorporates alternatives that are both cost effective and appropriate to address the resource issue(s) and participant's objective(s).*

TSP Signature _____ Date _____

6) Participant's acceptance statement indicating:

- *The plans and specifications adequately represent existing conditions and the selected preliminary design alternatives. I understand and will abide with the operation and maintenance plans.*
- *I accept the completed DIA deliverables as thorough and satisfying my objectives.*

Participant Signature _____ Date _____

7) A designated space for an NRCS reviewer to certify the agency's acceptance of the completed DIA.

NRCS administrative review completion by:

Signature _____ Title _____ Date _____

Conservation Assistance Notes and Correspondence

- 1) Provide notes, in date-order that:
 - a) Document each interaction with the participant, results of that interaction, and the date of the interaction.
 - b) Document each site visit, its participants, the activity completed in the field, and results of each site visit.
 - c) Provide initials of the note-maker, if more than one person provides the assistance.
- 2) Provide copies of any correspondence between the TSP and the participant relating to decision-making and completion of this DIA. For example, description of alternatives presented for evaluation and decision-making.

Implementation Maps

Maps for this DIA must include these features:

- a) Map title.
- b) Participant's name.
- c) Assisted By [TSP planner's name].
- d) Name of applicable conservation district, county, and State.
- e) Date prepared.
- f) Map scale.

- g) Information needed to locate the planning area, such as geographic coordinates, public land survey coordinates, etc.
- h) North arrow.
- i) Appropriate map symbols and a map symbol legend on the map or as an attachment.

Planning

- 1) Include and update, when needed, results from the NRCS approved assessment or tool used to evaluate drainage water conservation opportunities and the participant's conservation plan.
 - a) Location, condition, and approximate size of existing systems. Document reasons for any failures or inadequacy (e.g., broken or collapsed sections).
 - b) Inventory of soils, crops, yields, land capabilities, topography, wetlands, ecologically sensitive areas, existing physical features, and irrigation systems within area being considered for drainage (e.g., soils on-site, crops grown, field high and low points, source water location, above-ground and buried utilities, existing structures for water control, and existing power equipment).
 - c) Areas in which crops show damage or area of surface ponding or saturation, high-water marks or damaging floods and dates of floods.
 - d) Size, extent, and ownership of the area being considered for drainage as well as potential impacts outside the area being evaluated.
 - e) Sources of excess water from upslope land or channel overflow.
 - f) Documentation of past drainage water management by crop and/or land use.
 - g) Basis of existing drainage water management performance data (e.g., field measurement, original equipment manufacturer (OEM) specification, etc.) and report any differences between reported and expected performance attributed to age, operation, maintenance of equipment or similar factors.
 - h) Rationale for drainage water management changes, if any, based on either:
 - i) Participant's needs (e.g., reduce nutrients, pathogens, and pesticide loading from drainage systems into downstream receiving waters); or
 - ii) to comply with CPS criteria.
 - i) Drainage water conservation recommendations that can meet CPS criteria and will improve water quality degradation, plant vigor, oxidation of organic matter in soils, and/or address the drainage water management concerns of the participant's operation.
- 2) Using the criteria in the applicable state adopted CPS and the participant's needs, develop preliminary design alternatives for each practice and/or scenario contracted in this DIA.
 - a) If applicable, provide a variety of different conditions for the same recommendation. For example:
 - i) Operation and maintenance changes of the existing drainage system(s).
 - ii) Adding technologies to improve surface, subsurface, interception, water table, or pumping drainage management (e.g., automated structure for water control).
 - b) Estimate installation cost, in dollars, of each preliminary design alternative. Work includes developing preliminary layouts, determining feasibility of current

infrastructure, determining performance specifications of proposed equipment, computing approximate quantities of all components, and estimating costs of equipment, materials, labor, permits, certifications, and related items required for installation and start-up of the system.

- c) All preliminary design alternatives must be linked to improved management of drainage volume and water table elevation by regulating the flow from a surface or subsurface agriculture drainage system.
 - d) Determine the applicable NRCS financial assistance payment schedule scenario, quantity and payment rates for the implementation of each preliminary design.
- 3) Present each preliminary design alternative to the participant and obtain the participant's selections. Document the selections and date received.

Design or Implementation Details

- 1) Develop site-specific written instructions for implementing each planned conservation practice or activity included in the participant's DIA. Those instructions must:
 - a) Include, as a minimum, all items listed in each CPS "Plans and Specifications" section, the Statement of Work (SOW) "Design" section and the applicable Practice Specification (PS).
 - b) Include both graphical and narrative descriptions of the work. Provide descriptive information on the quality of the completed work and the quantities of all materials required for completion of the work.
 - c) A location map, plan view and written information are required. These items may be included in a single document where all specification information is included on the plans, or in multiple documents where the specifications are independent of the plans.
 - d) Include the following certification on the plans, along with the seal and/or signature of the TSP: "To the best of my professional knowledge, judgment, and belief, these plans meet applicable NRCS standards." (Title 210, NEM, Part 505, "Non-NRCS Engineering Services", Subpart B, Section 505.10(3)).
- 2) Prepare an operation and maintenance plan for each design that the participant will use after implementation of the practices are complete.
 - a) Include, as a minimum, all items listed in each CPS "Operation and Maintenance" section and the SOW "Design" section and the applicable PS.
 - b) Include requirements to obtain all applicable manufacturer installation guides, user manuals and warranty information.
 - c) The time after harvest to replace boards and the designated outlet elevation during the winter months (or fallow season).
 - d) The time in the spring to release water.
 - e) Guidelines for the control of drainage and the management of the water table during the growing season.

Supporting Documentation

Provide results of design tools, resource assessments, or other analyses that are required to meet the Criteria in the state's CPS and PS.

- 1) Provide documentation of the following:

- a) Surveys
 - b) Geological Investigations
 - c) Testing
 - d) Layout of all components
 - e) Material specifications
 - f) Infrastructure and other considerations
 - g) Structural, foundation, hydraulic, and other design computations and analysis
 - h) Design checking and reviews
 - i) Facilitating practices or components that support the drainage system(s) or management modification.
- 2) Computations, analysis, and other items that support and ensure adherence to the CPS criteria and are needed to develop the plans and specifications.
 - 3) Engineer's cost estimate of each final design, including costs of components, materials, equipment, and labor required for demolition, relocation, installation, disposal and start-up; fees for disposal, permits, and certifications; charges for testing and other quality assurance activities; and all other costs associated with the implementation of each design.
 - 4) Quality assurance activities that are required during installation to ensure the equipment, materials, and installations meet the design intent, function properly, provide the computed conservation benefits, and can be certified as meeting the plans and specifications.
 - 5) Other information as required in the CPS Statement of Work, including but not limited to, practice purpose, list of permits, facilitating practices, and state required items that affect safety and other environmental concerns.
 - 6) Computed conservation benefits of each design using the appropriate baseline of constituents leaving the farm field, retained volume of drainage outflow for vegetative use, and thickness of aerated layer of the soil, by crop or land use.
 - 7) Analysis and evaluation of resource inventory conducted during preliminary design phase (e.g., soils tests, to include nutrient levels, organic matter content, soil's mechanical properties, and seasonal high-water table and/or water tests, to include nutrients, pathogens, salinity, pH, and trace elements).
 - 8) Method planned to measure constituents leaving the farm field, retained volume of drainage outflow for vegetative use, and thickness of aerated layer of the soil, by crop or land use.
 - 9) Documentation of the scientific method planned for scheduling the drainage discharge and water levels based on the methods identified in the CPS.
 - 10) A soils map that includes field boundaries, with the predominant soils listed and area quantified.
 - 11) A drainage system map that includes the materials, diameters, dimensions and locations of mains and laterals. Flowline of any tile line leaving the field is labeled. If any changes to an existing drainage system are proposed to facilitate drainage water management, include the proposed configuration as a separate map.
 - 12) Wetland delineation map. If no wetland, a statement to the effect in lieu of map.

- 13) A topographic map that shows elevation contours no greater than 2 feet. The drainage system map and topographic map are to the same scale and be at least 1:1,600 (1 inch = 300 feet) or closer. The topographic map includes, at a minimum, all of the drained area as defined above and at least one point identified at the site (e.g., benchmark) with a known elevation and coordinates to facilitate final design of the DWM system at a later date.
- 14) An overlay of the above maps with location, size, control elevation, and impacted area identified for each planned control structure.
- 15) Document associated conservation practices and components required to comprise a conservation system

Deliver Completed Work

The TSP must:

- 1) Prepare and provide their participant two sets of the items listed in Deliverables.
 - a) One set is for the participant to keep.
 - b) The other set is for sharing with the local NRCS Office.
 - c) The TSP may transmit a set of the Deliverables to the local NRCS Office, if their participant has authorized it. It is recommended to provide NRCS field office an opportunity to review the DIA deliverables, prior to asking for its acceptance.
- 2) Upload electronic copies of all the Deliverables on NRCS Registry.

References

USDA Natural Resources Conservation Service. Field Office Technical Guide.

<https://efotg.sc.egov.usda.gov/#/>

USDA Natural Resources Conservation Service. National TSP Resources.

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1417414>

USDA Natural Resources Conservation Service. National TSP Website.

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/tsp/>