

## GUIDANCE DOCUMENT

### Waste Treatment Lagoon, Code 359

#### I. References

- A. Design Criteria
  - 1. Georgia FOTG Section IV, conservation practice standard, Waste Treatment Lagoon, Code 359.
- B. Design Procedures 1. NEFH, Part 651, AWMFH.
- C. Design/Layout Surveys
  - 1. TR-62 Engineering Layout, Notes, Staking & Calculations.
  - 2. NEFH Part 650, Chapter 1, Engineering Surveys.
- D. Computer Software Design Aids 1. NRCS Computer Program "AWM".

#### II. Documentation

- A. Preliminary Investigation
  - 1. Make a preliminary field reconnaissance to determine the complexity of the problem, availability of land for utilizing the waste and waste water, and to select the type of waste management system component which will best meet the needs of owner to operate of the waste management system. Compute volume of waste that will be produced per day in terms of biochemical oxygen demand (BOD<sub>5</sub>), raw manure, volatile solids (V.S.), nutrients, and water use. Record preliminary information on a copy of the appropriate worksheet (10A-1, 10A-2, 10A-3, 10A-4, 10A-5, or 10A-6) located in Chapter 10 of the AWMFH (AWMFH) or use NRCS-ENG-523A (or equivalent) to record appropriate information.
  - 2. Perform soil borings at the selected site to determine site feasibility. Describe the soils at the site in the engineering field book.
  - 3. Complete a preliminary sizing of the system components for the purpose of determining components, component locations, structure requirements, cost and needed permits.
  - 4. Discuss preliminary plans and cost estimates with the owner. Make sure the owner understands his/her responsibility as to:
    - a. Obtaining permits and approvals from Federal, state and local authorities, where required.
    - b. Constructing the waste management system to meet NRCS plans, standards and specifications.
    - c. Operation and maintenance of the waste management system after construction.
  - 5. Determine the extent of additional surveys needed after discussing the preliminary design, cost and items A.5.a, b., and c. with the landowner and getting his/her decisions.
  - 6. Determine the extent of additional geologic investigations needed. Refer to NEH Part 651, Chapter 7 of the AWMFH for guidance.

## B. Engineering Surveys

The survey must provide all measurements and observations that will be needed to design the waste management system components.

1. Set and describe one permanent bench mark (BM) for future reference. The BM should be placed close to the site of the proposed facility preferably on a concrete foundation of an existing building. The BM should be tied to National Geodetic Vertical Datum (NGVD) when possible.
2. Survey sufficient elevations to determine the drainage area around barns, high intensity area (HIA), and pastures contributing runoff to the proposed facility.
3. Collect adequate topographic information at the proposed location of the waste treatment lagoon in order to determine excavation and/or earth fill requirements. Obtain topographic data within the land disposal area to determine waste distribution system layout, pumping requirements and costs.
4. Record design survey information in the engineering field book or collect data electronically using GPS or other electronic surveying instruments.
5. Note the location of any utilities or utility markers.

## C. Design

The design of a practice is the application of Field Office Technical Guide practice standards, NEH Part 651, AWMFH, using experience and judgment in the development of a solution to the problem or the objective. All computations and decisions made during the design of a practice are to be checked by another qualified individual and appropriate notations made.

1. Complete soils investigation report and obtain laboratory testing as needed to design the lagoon and determine construction methods. See AWMFH, Chapter 7.
2. Obtain soils/geologic investigations sufficient for foundation design.
3. Plot ground profiles at structure site(s) with the elevations of any drains and high intensity areas (HIAs) contributing waste, waste water and storm water runoff into the proposed facility. When possible, divert uncontaminated runoff, especially roof runoff.
4. Size the lagoon using the appropriate engineering practice standard and the AWMFH including Georgia Amendments. Record design computations on appropriate worksheets (10A-1, 10A-2, 10A-3, 10A-4, 10A-5, or 10A-6) located in NEH Part 651, Chapter 10 of the AWMFH or on NRCS-ENG-523A (or equivalent).
5. Develop engineering plans and specifications. Engineering plans and specifications shall be prepared for the practice and shall describe the requirements necessary for proper construction and shall be suitable for the use by the landowner in dealing with contractors. As a minimum plans and specifications shall include:
  - a. Prepare engineering plans and specifications using the appropriate standard engineering drawing sheets SCS-ENG-313A, -315A, -316A, 317A, or use computer aided drafting (CAD) where available. The drawings shall show as a minimum:
    - Site plan layout, cross sections and profiles.
    - Foundation treatment required.
    - Requirements for inlets and overflows.

- Requirements for diverting water, dewatering the site, and waste disposal.
  - Requirements for fencing and rock riprap if needed.
  - Vegetative requirements.
  - Location of utilities and notification requirements.
- b. Prepare a narrative Project Report describing all aspects of the waste management proposal. Complete the necessary waste management information for the permit application forms if applicable.
  - c. Make appropriate earth work computations, concrete computations, pipeline size and length, pumping plant requirements, etc., and cost estimates.
  - d. Furnish to the landowner, or his representative, copies of the following documents for his/her use in obtaining the necessary permits and approvals.
    - Owner's Letter of Transmittal. This letter may contain the owner's notice "Notice of Intent" and "Guarantee of installation to meet practice plans and specifications."
    - Appropriate data sheets in Chapter 10 of the AWMFH or otherwise provided on NRCS computation sheets.
    - Project Report.
    - Engineering Plans and Specifications.
    - Quality Assurance Plan (QAP).
    - Operation and Maintenance Plan.
    - Completed data for permit applications to appropriate agency. *Note: All plans shall be approved in accordance with established job approval authorized prior to providing plans and specifications to owners and prior to construction.*
6. Develop a site specific O&M Plan for the practice.

#### D. Construction Layout

Review the plans and specifications with the landowner and contractor prior to the start of construction. Ensure the landowner/contractor thoroughly understand their responsibilities including obtaining all permits, easements, etc.

Record layout data in the engineering field book.

1. Record needed layout information as illustrated in NEFH Part 650, Chapter 1. Notations may be made on plans, as needed, to describe the method of staking so the cooperators and contractor will know how to reference the plans at the practice site.
2. Stake the waste treatment lagoon. Set and mark a sufficient number of stakes to outline the top dimensions. Set slope stakes, as required, to enable the owner or contractor to excavate the planned facility and place spoil materials to planned lines and grades. Set finish stakes for structures only after the rough grading has been completed. The number of finished stakes needed should be pre-determined with the contractor or owner. Use grade rod to set stakes to facilitate performing construction checks.
3. In the staking of waste treatment lagoon, such as a concrete holding tank, it is essential that all lines and measurements be absolutely correct. All layout notes

should be checked for possible errors. A carefully drawn sketch using identifications such as stationing, letters or other designations to show locations, distances or elevations for the various components will aid in documenting the structure layout.

#### E. Construction

Adequate site visits and checks shall be made during construction to verify that the plans and specifications are followed.

Any changes in the design must be reviewed and concurred by the landowner and shall be approved by the designer and person with appropriate engineering design job approval authority.

#### F. Construction Checkout

1. Construction checks should be performed as the work progresses. The site shall be visited frequently during the installation of the practice. Determine the adequacy of the work by observations, making measurements, and running engineering surveys of the completed components. Construction checks made during construction are considered adequate supporting data and need not be duplicated at the time the facility has been completely installed.
2. Record all survey check data and observations in the engineering field book.
3. Excavated waste treatment lagoon:
  - a. Make a visual inspection of the site and note the physical appearance. Side slopes and shaped spoil should be uniform, relatively smooth, and of neat appearance and be not steeper than the minimum specified.
  - b. Survey at least one longitudinal and one lateral cross section of the excavated waste treatment lagoon. Where the spoil is shaped, extend the cross sections from natural ground beyond the toe of the spoil on one side to natural ground beyond the outside toe of the spoil on the other side.
  - c. Check constructed grades against planned grades and note difference. Draw final constructed dimensions in red on a set of "as built" plans for easy comparison.
  - d. Compute excavation quantities when needed for contracting or cost share purposes.
4. Since it is not practical for earthmoving equipment to excavate to exact elevations and side slopes as specified, excavated lagoons will be acceptable where the following conditions are met:
  - a. The top width and length are  $\pm 5$  percent of the planned dimensions.
  - b. Constructed side slopes are not more than 0.1:1 steeper than the design slope and no steeper than 1 horizontal to 1 vertical.
  - c. The excavated spoil material does not exceed the permissible height and is shaped as specified in the specifications.
  - d. The depth of the lagoon is not more than 0.1 foot shallower than the planned elevation.
  - e. The as-built cross sectional area equals or exceeds the planned cross sectional area.
5. Waste treatment lagoons with embankments:

- a. Profile the center line of the embankment. Extend the profile across the spillway where applicable. Record profile rod readings at all stations established during layout and at all breaks in grade.
  - b. Survey at least one cross section of the embankment at a location that represents the weakest section. Record rod readings at each edge of the crown, at each toe, and at intermediate points between the top and each toe.
  - c. Check constructed grades against planned grades and note difference. Compute constructed side slopes and record in check-out notes.
  - d. Structures will be acceptable where all of the following conditions are met:
    - i. A waste treatment lagoon with embankment will be acceptable with respect to side slopes where:
      - Side slopes as constructed are not more than 0.1:1 steeper than the designed slope plus allowance for shrinkage.
    - ii. Upstream constructed slope shall not be steeper than 2:1.
    - iii. The constructed crosssectional area equals or exceeds the planned crosssectional area and has at least 95% of the embankment width at all elevations with shrinkage added.
  - e. Constructed crown elevations are not more than 0.1 foot below planned elevations, with allowance for settlement added.
  - f. The spillway elevation does not vary from the planned elevation by more than 0.1 foot.
  - g. The minimum required freeboard is not lowered by more than 0.1 foot.
6. Geomembrane lined waste treatment lagoons:
- a. Check and record overall dimensions as mentioned in F.3. above.
  - b. Check quality and thickness of liner, the manufacturer, and note in the engineering field book.
  - c. When required, check for proper joining of the liner.
  - d. When required, check for proper cover over lining.
  - e. Verify gas vents installed as required.
7. Prepare as-built drawings showing final construction dimensions, details, etc.
8. If the practice meets NRCS standards and specifications, then the statement "This practice meets NRCS practice standards and specifications" shall be placed on the checkout document and signed and dated by the responsible person with appropriate level of engineering job approval authority.

#### G. Reporting and/or Certifying

After it has been determined and documented that the practice meets NRCS plans and specifications, it can be reported and certified. The extent of the practice to be reported is the number of systems installed. The extent to be certified is the quantities used as the basis of payment such as cubic yards of earth embankment or excavation, cubic yards of concrete, square yards of geomembrane, etc.