



Ohio Administrative Code

Rule 3745-400-07 Facility design requirements and construction specifications.

Effective: April 17, 2015

(A) The owner or operator shall submit the facility design plan required by this rule as part of the license application. The facility design plan shall contain information in accordance with paragraphs (C) to (E) of this rule and shall be comprised of all the following:

(1) The site characterization report as outlined in paragraph (C) of rule 3745-400-09 of the Administrative Code.

[Comment: The presentation of narrative in the site characterization report is not specified, narrative may be presented on plan sheets or on letter or legal sized paper.]

(2) The facility construction design plan, including the soil liner and leachate collection system plans, as outlined in paragraph (F) of this rule.

(3) The final cap system design plan as outlined in paragraph (G) of this rule.

(4) The ground water monitoring well system plan as outlined in rule 3745-400-10 of the Administrative Code if required by paragraph (B) of rule 3745-400-09 of the Administrative Code.

[Comment: This rule first specifies the design plan contents followed by applicable construction or performance specifications. Those items specified by the plan as for "informational purposes only" are not required to be certified.]

(B) The owner or operator shall comply with all applicable construction specifications and performance standards required in this rule.

[Comment: The owner or operator need not reiterate all the construction specifications and performance standards that are in this rule in the facility design plan. The owner or operator, in accordance with rule 3745-400-11 of the Administrative Code, is required to follow the applicable



specifications as part of facility operations. If the owner or operator does not follow the specifications, a violation of rule 3745-400-11 of the Administrative Code will result.]

(C) The owner or operator of any facility shall meet all the construction and performance specifications of this rule with the following exceptions:

(1) A recompacted soil liner is required except for the following:

(a) When the conditions in paragraph (A) of rule 3745-400-09 of the Administrative Code are met.

(b) Where the limits of debris placement were filled with debris as of September 30, 1996.

(c) Where the limits of debris placement are filled with debris prior to the effective date of an approved modification to laterally extend the limits of debris placement.

(2) A leachate collection system as specified in paragraph (F)(5)(c) of this rule is required for all facilities except in either of the following areas:

(a) Areas containing debris as of September 30, 1996.

(b) Areas containing debris placed without a recompacted soil liner prior to January 1, 1999.

[Comment: All areas for debris placement remaining unfilled as of January 1, 1999, shall have a leachate collection system.]

(D) The owner or operator of a facility shall construct a standard cap system as specified by paragraph (G)(2)(a) of this rule over any area of a facility that receives debris after September 30, 1996.

(E) The requirement and design for a vegetative cap system shall be determined as follows:

(1) The owner or operator of a facility shall be required to construct a vegetative cap system as specified by paragraph (G)(2)(b) of this rule where an area of the facility is filled with debris to final



grade as of September 30, 1996, and where no dense vegetation has been established in the area and the area remains an inactive licensed disposal area for the remaining life of the facility.

(2) The owner or operator of a facility shall not be required to construct any cap system where an area of the facility is filled with debris to final grade but where dense vegetation has been established in the area as of September 30, 1996, and the area remains an inactive licensed disposal area for the remaining life of the facility.

(F) The facility construction design plan. The facility construction design plan, which shall include the liner and leachate collection system designs, shall be signed and sealed by a professional engineer registered in Ohio. Drawings, calculations and narrative shall appear on plan sheets with minimum dimensions of twenty-four inches by thirty-six inches. If narrative is necessary to explain the drawings or calculations, the narrative shall appear with the drawing or calculation on the plan sheet. The facility construction design plan shall consist of the following:

(1) Cover sheet. A detail engineering plan cover sheet, to be numbered sheet 1, containing the following information:

(a) The name of the facility.

(b) The precise geographic location and boundaries of the facility to be shown on a 7-1/2 minute USGS topographic map.

(c) The name and address of the facility operator.

(d) The name and address of the owner of the land to be used for the facility.

(e) The name and address of the professional engineer who prepared the plans.

(2) Facility environs. Plan drawings shall show the following items located within two hundred feet of the limits of debris placement. The items shall be illustrated on a series of plan drawings numbered consecutively: 2A, 2B, 2C, etc. All items specified in an individual subheading shall be shown on the same plan drawing (unless specified otherwise). An individual plan drawing may



contain information specified in more than one individual subheading. A scale of one inch equals no greater than two hundred feet shall be used.

(a) All plan drawings required by paragraph (F)(2) of this rule shall include those items specified as follows:

(i) The facility boundary line of all land owned or leased for the facility as certified by a professional surveyor.

(ii) The limits of debris placement, both proposed and emplaced, if applicable. Emplaced limits of debris placement can be determined by surveys. If a facility does not have survey results, the owner or operator shall provide justification of the limits shown in the facility construction design plan.

(iii) All public roads, railroads, and man-made structures, for informational purposes only.

(iv) Existing topography showing vegetation, streams, swamps, lakes, springs, and other surface waters, with a contour interval no greater than five feet, for informational purposes only.

(v) The north arrow, for informational purposes only.

(b) The location of all existing or proposed maintenance buildings, weighing facilities, storage buildings, and other structures associated with the facility.

(c) All oil wells and gas wells. If any oil wells or gas wells are identified in accordance with this paragraph, a letter from the Ohio department of natural resources or other appropriate agency verifying type, location, depth, and status shall be included. Any oil wells and gas wells within the proposed limits of debris placement shall be properly plugged and abandoned in accordance with Chapter 1509. of the Revised Code.

(3) The facility. Plan drawings for the entire facility showing the grades of the following items shall be on plan drawings numbered consecutively 3a, 3b, 3c, etc. The scale on these drawings shall be one inch equals no greater than two hundred feet and contour intervals shall be no greater than five feet.



- (a) The horizontal and vertical limits of excavation.
- (b) The horizontal limits and top and bottom elevations of the recompacted soil liner.
- (c) The top elevation of the drainage layer, and if a pipe network is proposed, the pipe inverts and layout of the leachate collection system.
- (d) The location of any leachate collection system appurtenances outside the limits of debris placement.
- (e) The horizontal limits and bottom elevations of debris placement, both emplaced, if applicable, and proposed.
- (f) The location of all existing or proposed fencing, gates, and natural or other screening on the site (may be shown on an aerial photograph).
- (g) The location of ground water control structures, if any.
- (h) The location of borings used for the site hydrogeology investigation required in paragraph (C)(5) of rule 3745-400-09 of the Administrative Code.
- (i) The location of all permanent survey marks. Construction specifications for survey marks are as follows:
 - (i) The facility shall have at least three permanent survey marks installed on separate sides of the facility within easy access to the limits of debris placement.
 - (ii) Survey marks shall be referenced horizontally to the 1927 "North American Datum," 1983 "North American Datum," or "State Plane Coordinate System" and vertically to the 1929 or 1988 "North American Vertical Sea Level Datum" as identified on the 7-1/2 minute series quadrangle sheets published by the United States geological survey.



(iii) Survey marks shall be at least as stable as a poured concrete monument ten inches in diameter installed to a depth of forty-two inches below the ground surface. Each constructed survey mark shall include a corrosion resistant metallic disk which indicates horizontal and vertical coordinates of the survey mark and shall contain a magnet or ferromagnetic rod to allow identification through magnetic detection methods.

(iv) Survey control standards for the survey marks shall be in accordance with the following:

(a) For the first facility survey mark established from the known control point, minimum horizontal distance accuracy shall be one foot horizontal to two thousand five hundred feet horizontal.

(b) For each facility survey mark established from the first facility survey mark, minimum horizontal distance accuracy shall be one foot horizontal to five thousand feet horizontal.

(c) For the first facility survey mark established from the known control point and for each facility survey mark established from the first facility survey mark, minimum vertical accuracy shall be one inch vertical to five thousand feet horizontal.

(4) Cross sections. Cross sections of the facility at an interval no greater than every three hundred feet of length and width, and clearly showing the horizontal and vertical scales used, shall show the following items on plan drawings numbered consecutively 4a, 4b, 4c, etc.:

(a) Existing topography, for informational purposes only.

(b) The top of the uppermost aquifer system, if the owner or operator meets the criteria of paragraph (C)(1)(a) of this rule or is pursuing compliance with the provisions of paragraph (F)(5)(a) of this rule. The demonstration of the thickness and hydraulic conductivity of the in situ geologic material shall be based on the borings used for the site hydrogeology investigation required by paragraph (C)(5) of rule 3745-400-09 of the Administrative Code, shall be shown on the cross sections, and shall include the following:

(i) Logs of the applicable borings showing the stratigraphic units from the ground surface to ten feet below the bottom of the facility.



- (ii) The thickness and hydraulic conductivity measurements made of the stratigraphic units.

- (iii) The thickness of any geologic material added to establish the isolation distances cited in rule 3745-400-09 of the Administrative Code.

- (c) The horizontal and vertical limits of excavation, for informational purposes only.

- (d) The bottom limits of the liner system, if required.

- (e) The bottom limits of the leachate collection system.

- (f) The horizontal limits and top and bottom elevations of debris placement.

- (g) Final grade including cap system.

- (5) Detail drawings. The following detail drawings shall be on plan drawings numbered consecutively 5a, 5b, 5c, etc.:
 - (a) The recompacted soil liner, if required. The recompacted soil liner shall, at a minimum include the following:
 - (i) Be constructed and compacted to a thickness of twenty-four inches using loose lifts eight inches thick or less.
 - (ii) Achieve a maximum permeability of 1×10^{-6} cm/sec for each lift of the recompacted soil liner.
 - (iii) Not be comprised of solid waste or construction and demolition debris.
 - (iv) Be placed on the bottom and the exterior excavated sides of the limits of debris placement.
 - (v) Be constructed on a prepared smooth surface that shall do the following:



(a) Be able to bear the weight of the facility and its construction and operations without causing or allowing a failure of the liner to occur through settling.

(b) Be free of debris, foreign material, and deleterious material.

(b) Added geologic material, if utilized. The added geologic material used to establish isolation distances cited in rule 3745-400-09 of the Administrative Code shall at a minimum include the following:

(i) Be constructed and compacted using loose lifts eight inches thick or less.

(ii) Achieve a maximum permeability of 1×10^{-6} cm/sec for each lift of geologic material.

(iii) Be able to bear the weight of the facility and its construction and operations without causing or allowing a failure to occur through settling.

(iv) Be free of solid waste, debris, foreign material, and deleterious material.

(c) All leachate collection system elements. The leachate collection system shall at a minimum do the following:

(i) Be designed to collect leachate within the limits of debris placement.

(ii) Be designed to be capable of maintaining less than a one foot depth of leachate over the in situ or added geologic material or constructed liner, excluding the leachate sump collection points.

(iii) Be constructed on a prepared smooth surface that shall include the following:

(a) Have a minimum slope of two per cent.

(b) Be able to bear the weight of the facility and its construction and operations without causing or allowing a failure of the leachate collection system to occur through settling.



[Comment: A recompacted soil liner or compacted isolation material meets this requirement.]

(c) Be free of debris, foreign material, and deleterious material.

(iv) Be constructed of a drainage medium that shall provide a permeability no less than 1×10^{-3} cm/sec. The medium may consist of suitable select debris or other suitable waste materials and shall be at least one foot thick.

[Comment: "Other suitable waste materials" refers to drainage materials such as nontoxic spent foundry sand, nontoxic bottom ash, nontoxic slag, and shredded tires.]

(v) Be designed to prevent crushing of, or damage to, any of its components.

(vi) Be designed to function without clogging.

(vii) If a pipe network is proposed, designed with access for cleaning and inspection devices and with pipe lengths not exceeding the capabilities of the cleaning and inspection devices.

[Comment: For safety reasons, manholes or pipes large enough for human entry are not recommended.]

(viii) Be designed to provide access for obtaining leachate samples for testing of leachate quality and for determining the leachate head.

(ix) Be designed to be capable of conveying leachate outside the limits of debris placement for treatment and discharge in accordance with Chapter 6111. (water pollution control) of the Revised Code.

(x) If storage of leachate outside of the limits of debris placement is proposed, include a storage containment designed to be no less protective of the environment than the facility.

(xi) Be constructed and certified in phases, if necessary, so as to stay immediately ahead of the working face.



[Comment: Leachate recirculation may be an acceptable practice, but specific details for operation of the system must be approved by the licensing authority.]

(d) Any barrier layer located where the geologic material between the uppermost aquifer and the previously placed debris is insufficient to meet the requirements of paragraph (A)(1)(a) of rule 3745-400-09 of the Administrative Code. A soil barrier layer shall be utilized to impede the infiltration of leachate into placed debris and meet the requirements of paragraph (A)(1)(b) of rule 3745-400-09 of the Administrative Code. The soil barrier layer shall at a minimum include the following:

(i) Be constructed on the interior slopes of already placed debris.

[Comment: A cap system is utilized to cover the exterior slopes of placed debris. "Placed debris" includes debris placed during the liner phase-in period for a facility.]

(ii) Be constructed and compacted to a minimum thickness of twenty-four inches using loose lifts eight inches thick or less.

(iii) Achieve a maximum permeability of 1×10^{-6} cm/sec for each lift of geologic material.

(iv) Be free of solid waste, debris, foreign material, and deleterious material.

(v) Be constructed on a subbase that shall include the following:

(a) Be comprised of a cohesive soil.

(b) Be one foot thick if placed on a filter capable of retaining the subbase soil or be two feet thick if not placed on such a filter.

(c) Have a smooth surface and be free of debris and deleterious material.

(d) Be placed on a prepared surface or debris that has been smoothed such that irregularities do not exceed six inches.



(vi) Be sloped such that ponding of leachate on the barrier layer shall not occur.

[Comment: The detail drawings for a barrier layer are part of the facility design plan. However, plan drawings or design drawings for a barrier layer are part of the debris placement plan required by rule 3745-37-02 of the Administrative Code because of the uncertainty of placed debris elevations and barrier layer location until the time of construction. Construction certification is required for the barrier layer in accordance with paragraph (A)(2) of rule 3745-400-08 of the Administrative Code.]

(e) Permanent ground water control structures, if any. Any permanent ground water control structures shall adequately control ground water infiltration through the use of non-mechanical means such as impermeable barriers or permeable drainage structures. However, no permanent ground-water control structures may be used to dewater an aquifer system.

(6) Calculations. A section of the facility construction design plan, on plan drawings numbered consecutively 6a, 6b, 6c, etc., shall include the following design calculations with references to equations used, showing site specific input and assumptions:

(a) The volume of the facility in cubic yards and anticipated life in years, for informational purposes only.

(b) Leachate collection system calculations.

(c) Any other relevant calculations.

(G) The final cap system design plan. The final cap system design plan shall be signed and sealed by a professional engineer registered in Ohio. Drawings, calculations and narrative shall appear on plan sheets with minimum dimensions of twenty-four inches by thirty-six inches. If narrative is necessary to explain the drawings or calculations, the narrative shall appear with the drawing or calculation on the plan sheet. The final cap system design plan shall consist of the following:

(1) The facility. Plan drawings for the entire facility showing the grades of the following items shall



be on plan drawings numbered consecutively 7a, 7b, 7c, etc. The scale on these drawings shall be one inch equals no greater than two hundred feet and contour intervals shall be no greater than five feet. Facility plan drawings shall contain the following information:

- (a) Final grade of the limits of debris placement.
- (b) Final grade including cap system and surface drainage structures.
- (c) Designation of the required cap system types within the limits of debris placement. This designation shall state "standard cap system", in accordance with paragraph (D) of this rule; "vegetative cap system", in accordance with paragraph (E)(1) of this rule; and "no cap system required", in accordance with paragraph (E)(2) of this rule.
- (d) Planned end use, for informational purposes only.

(2) Detail drawings. The following detail drawings shall be on plan drawings numbered consecutively 8a, 8b, 8c, etc.:

- (a) Standard cap system. The construction and performance specifications of a standard cap system are as follows:
 - (i) First, a soil layer of well compacted, cohesive soil with a minimum recompacted thickness of eighteen inches. The soil shall meet the following criteria:
 - (a) The maximum soil particle size shall be six inches.
 - (b) At least ninety five per cent of the soil particles, by volume, shall pass the three inch sieve.
 - (c) At least seventy five per cent of the soil particles, by volume, shall pass the number four sieve.
 - (d) The soil shall meet either of the following specifications:
 - (i) At least fifty per cent of the soil particles, by weight, shall pass the number two hundred sieve.



(ii) Achieve a maximum permeability of 1×10^{-6} cm/sec for each lift of the recompacted soil.

(e) The soil shall meet either of the following specifications:

(i) Possess plasticity properties lying above the A-line in the "Unified Soil Classification System" described in ASTM D-2487.

(ii) Consist of 0.002 inch or finer clay particles as determined in ASTM D-422 such that these clay particles shall comprise at least fifteen per cent of the total soil dry mass.

[The text of the incorporated materials is not included in this rule and are hereby made a part of this rule. Only the specific version specified in this rule is incorporated. Any amendment or revision to a referenced document is not incorporated until this rule has been amended to specify the new version. The materials incorporated by reference are available as follows:

Specifications of the "American Society for Testing and Materials" (ASTM). Information and copies may be obtained by writing to: "ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, Pennsylvania 19428-2959." These documents are available for purchase at <http://www.astm.org>. As used in this rule:

ASTM D2487-11 "Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)," approved 1975, updated 2011.

ASTM D422-63(2007)e1 "Standard Test Method for Particle-Size Analysis of Soils," approved 1998, updated 2007.

(f) The soil may be an alternative soil type acceptable to the licensing authority.

(g) The soil shall not be comprised of solid waste or construction and demolition debris.

(h) The soil shall be compacted using loose lifts twelve inches thick or less and meet a compaction standard described in paragraph (C)(5) of rule 3745-400-08 of the Administrative Code.



(ii) Second, a soil layer with minimum thickness of six inches and of sufficient fertility to support dense vegetation.

(iii) Third, a complete and dense perennial vegetative cover of healthy grasses or other vegetation shall be established and maintained on all exposed final cover.

(iv) The standard cap system shall have a minimum slope of three per cent and a maximum slope of twenty-five per cent and shall be graded to eliminate ponding, promote drainage, and minimize erosion.

(v) Comparable materials or thicknesses for the standard cap system may be utilized by the owner or operator if the final cap system specified in this rule is not compatible with the end use.

(b) Vegetative cap system. Construction of a vegetative cap system shall at a minimum include the following:

(i) Consist of a soil layer with a thickness of six inches and of sufficient fertility to support dense vegetation.

(ii) Consist of a complete and dense perennial vegetative cover of healthy grasses or other vegetation shall be established and maintained on all exposed final cap.

(iii) Be graded to eliminate ponding, promote drainage, and minimize erosion.

(iv) Utilize comparable materials or thicknesses for the vegetative cap system if the final cap system specified in this rule is not compatible with the end use.

(3) Calculations. A section of the final cap system design plan, on plan drawings numbered consecutively 9a, 9b, 9c, etc., shall include the soil erosion calculations for the cap system under closure conditions with references to equations used and showing site specific input and assumptions. The erosion rate is not to exceed five tons per acre per year.