

**SUBCHAPTER B: WASTEWATER TREATMENT FACILITY DESIGN
REQUIREMENTS
§§217.31 - 217.40
Effective December 4, 2015**

§217.31. Applicability.

This subchapter details the design values that an owner shall use when determining the size of any wastewater treatment facility component. This subchapter applies to the treatment design for a new wastewater treatment facility, the alteration of an existing wastewater treatment facility, the re-rating of an existing wastewater treatment facility, and to an existing wastewater treatment facility that is required to apply for a new permit.

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§217.32. Organic Loadings and Flows for New Wastewater Treatment Facilities.

(a) The design of a new wastewater treatment facility must be based on the flows and loadings in paragraphs (1) - (3) of this subsection, unless subsection (b) of this section applies.

(1) Design flow.

(A) If the flow is greater than or equal to 1.0 million gallons per day, as determined by multiplying the per capita flow in Table B.1. in paragraph (3) of this subsection by the number of individuals in the service area, then the design flow is the flow calculated from the table.

(B) If the flow is less than 1.0 million gallons per day as determined by multiplying the per capita flow in Table B.1. in paragraph (3) of this subsection by the number of individuals in the service area, then the design flow is determined by multiplying the average annual flow calculated from the table by a factor of at least 1.5.

(C) The design flow must be based on the flow authorized in the wastewater treatment facility's wastewater permit.

(2) Peak flow. When site-specific data is unavailable, the peak flow must be determined by multiplying the design flow by a factor of at least 4.0. If site-specific data or projections are available, the peak flow must be based on the site-specific data.

(A) If the average daily peaking factor at a wastewater treatment facility exceeds 4.0, the actual daily peaking factor must be used to calculate the peak flow, unless flow equalization is provided.

(B) If a wastewater treatment facility experiences occasional peak events with a peaking factor that exceeds 5.0, the event-based peaking factor must be used to calculate the peak flow, unless flow equalization is provided.

(C) In a wastewater treatment facility with flow equalization, the subsequent treatment units may be designed for a lower estimated peak flow. The engineering report shall include data that supports the lower estimated peak flow.

(D) A treatment unit, pipe, weir, flume, disinfection unit, or any other treatment unit that is flow limited must be sized to transport or treat the peak flow.

(3) Design organic loading. If available, actual organic loading data must be used as the basis for the design of the wastewater treatment facility. If actual organic loading data is not available, the design organic load must be determined by using the following table. The design organic load is determined by multiplying the annual average flow from the projected uses by the corresponding influent concentrations:

Figure: 30 TAC §217.32(a)(3)

Table B.1. - Design Organic Loadings and Flows for a New Wastewater Treatment Facility

Source	Remarks	Daily Wastewater Flow (gallons/person)	Wastewater Strength (mg/l BOD₅)	Wastewater Strength (mg/l NH₃-N)
Municipality	Residential	75-100	250-400	15-75
Subdivision	Residential	75-100	250-400	15-75
Trailer Park (Transient)	2½ Individuals per Trailer	50-60	250-350	15-75
Mobile Home Park	3 Individuals per Trailer	50-75	300	15-75
School	Cafeteria &	20	300	15-75

	Showers Cafeteria/No Showers	15	300	15-75
Recreational Parks	Overnight User	30	200	15-75
	Day User	5	100	15-75
Office Building or Factory	A facility must be designed for the largest shift	20	300	15-75
Hotel/Motel	Per Bed	50-75	300	15-75
Restaurant	Per Meal	7-10	1000*	15-75
Restaurant with bar or cocktail lounge	Per Meal	9-12	1000*	15-75
Hospital	Per Bed	200	300	15-75
Nursing Home	Per Bed	75-100	300	15-75
Alternative Collection Systems (Subchapter D of this chapter)	Per Capita	75	N/A	N/A
*Based on a restaurant with a grease trap				

(b) An owner designing a new wastewater treatment facility that will serve the same service area as an existing wastewater treatment facility must use historical data from the existing wastewater treatment facility to design the new wastewater treatment facility, if there is enough historical data to meet the needs of §217.34 of this title (relating to Organic Loadings and Flows for Existing Wastewater Treatment Facilities, Re-Ratings, and Alterations). The engineering report must justify the design conclusions that are based on existing data.

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§217.33. Flow Measurement.

(a) A wastewater treatment facility must include a means of effluent flow measurement with less than 10% error, or the manufacturer's error tolerance, whichever is less, throughout the expected range of flows.

(b) An effluent flow-measuring device must have an open channel to allow for easy inspection, calibration, and cleaning.

(c) Flow measurement must use a combination of primary and secondary flow measuring devices.

(1) Primary flow measuring devices.

(A) A primary flow measuring device must include a weir or a flume.

(B) A primary flow measuring device must have a non-corrosive ruler (staff gauge) that is graduated in no greater than 1/4 inch increments that are clearly visible.

(C) A primary flow measuring device must allow for manual measurement of water depth.

(2) Weirs.

(A) A channel approach section to a weir must be straight for a length at least 20 times the maximum expected head height on a weir at peak flow. An owner may use manufacturer's recommendations in lieu of this requirement if approved in writing by the executive director.

(B) The minimum distance between a channel bottom and a weir crest must be at least twice the maximum head height on the weir at peak flow, or 1.0 foot, whichever is greater.

(C) The upstream edge of a weir must not be corroded.

(D) The crest of a weir must be exactly level to ensure a uniform depth of flow.

(E) The upstream face of a weir must be smooth and perpendicular to the axis of the channel in both the horizontal and vertical directions.

(F) A secondary flow measuring device must be installed:

(i) upstream of the weir at a distance of three times the maximum head height on a weir at peak flow; or

(ii) at the location and distance recommended by the equipment manufacturer.

(3) Flumes.

(A) A flume must be located in a straight section of an open channel.

(B) A flume must be installed in accordance with the manufacturer's recommendations.

(C) A flume must distribute the approaching flow evenly across a flow channel to preclude turbulence and waves.

(4) Secondary flow measuring devices.

(A) A wastewater treatment facility must use a totalizing meter as a secondary flow measuring device, which must measure the liquid level discharging through the primary flow measuring device and convert this liquid level into a flow rate that is integrated to a totalized flow.

(B) A secondary flow measuring device must be installed in accordance with the manufacturer's recommendations and in a manner that reduces turbulence and promotes laminar flow.

(C) A secondary flow measuring device must include a display of the instantaneous flow rate and a means of reading the totalized flow.

(D) A secondary flow measuring device must be designed to allow recalibration.

(E) A secondary flow measuring device must not interfere with the accuracy of the primary flow measuring device.

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§217.34. Organic Loadings and Flows for Existing Wastewater Treatment Facilities, Re-Ratings, and Alterations.

An owner who proposes to alter, or re-rate an existing wastewater treatment facility, or to obtain approval for an existing wastewater treatment facility after that wastewater treatment facility's permit has expired, is required to use the wastewater treatment facility's current operating data for flow and organic loading (biochemical

oxygen demand or carbonaceous biochemical oxygen demand, total suspended solids, and ammonia nitrogen, as required by the permit) as the design basis. The compiled data must meet the criteria outlined in paragraphs (1) and (2) of this section.

(1) Flows.

(A) When an existing wastewater treatment facility is to be re-rated or altered, the wastewater treatment facility's data for the last five years must be used to determine the annual average flow, the maximum monthly average flow, the peak flow, the ratio of maximum monthly average flow to annual average flow, and the ratio of the peak flow to the annual average flow. All flow data for these analyses must be collected by a totalizing meter. If the wastewater treatment facility is less than five years old, all existing data must be used. All calculations and assumptions must be included in the engineering report.

(B) An analysis of the peak flow must be based on a frequency distribution analysis using flow charts for each individual day.

(C) The projected peak flow must be the result of collection system monitoring or modeling based on a two-year, 24-hour storm event for the service area.

(D) For a wastewater treatment facility that will not be affected by future growth, the design flow for a re-rating or alteration must be calculated using the wastewater treatment facility's average flow plus one standard deviation.

(E) For a wastewater treatment facility that will be affected by future growth, the design flow for a re-rating or alteration must be based on future flow, calculated using anticipated changes from the existing flow. The design analysis may use a linear regression or other appropriate statistical method for predicting the design flow when significant data exists.

(2) Organic loadings.

(A) When an existing wastewater treatment facility is to be re-rated or altered, the design organic loading must be calculated based on the average daily organic loading.

(i) The data used to determine the organic loading must be from the analyses of at least three composite samples of the influent wastewater per week, taken during days with representative flow, for a period of at least one year. If samples are collected at a frequency of less than three times per week or less than a three-part composite sample, the executive director may require an owner to collect and analyze additional samples that are representative of actual conditions at the wastewater

treatment facility. The data must include samples collected during both wet and dry weather conditions.

(ii) If the samples are not 24-hour flow-weighted composite samples, the samples must be representative of the peak loading.

(iii) Sample data must include the following parameters, at a minimum, unless monitoring of the parameter is not required by the wastewater permit:

(I) five-day carbonaceous biochemical oxygen demand or five-day biochemical oxygen demand;

(II) total suspended solids; and

(III) ammonia-nitrogen.

(B) The owner must provide an engineering analysis for the minimum sampling period in the engineering report, which must include:

(i) a summary of the monthly data;

(ii) the average monthly load; and

(iii) the standard deviation of the monthly data.

(C) For a wastewater treatment facility that will not be affected by future growth, the design organic loading for a re-rating or alteration must be calculated using the wastewater treatment facility's average organic loading plus one standard deviation.

(D) For a wastewater treatment facility that will be affected by future growth, the design organic loading for a re-rating or alteration must be based on future loading calculated using anticipated changes from the existing loading. The design analysis may use a linear regression or other appropriate statistical method for predicting the design organic load when significant data exists.

(E) The design organic loading must be used to determine the required size of each treatment unit that provides treatment of organic waste.

§217.35. One Hundred-Year Flood Plain Requirements.

(a) If a 100-year flood plain is located within 1,000 feet of the site of a wastewater treatment facility, the 100-year flood plain must be shown on the site plan. A flood plain determination must be based on a superimposition of the 100-year flood elevation on the most accurate available topography and elevation data for the site.

(1) A 100-year flood plain must be based on the Federal Emergency Management Agency (FEMA) Flood Insurance Study in effect at the time the plans and specifications are submitted to the executive director. FEMA maps are prima facie evidence of flood plain locations.

(2) An appropriate flood insurance rate map or Flood Insurance Study profile, adjusted to the site's vertical data, may be used to determine flood elevations.

(3) If a site is adjacent to a FEMA 100-year flood delineation, but has no flood elevation published, a 100-year flood elevation may be determined by overlaying the effective FEMA delineation over a United States Geological Survey Quadrangle Map and interpolating a flood elevation.

(4) If FEMA flood plain information is not available, the engineering report shall include a 100-year flood elevation based on the best information available.

(b) The 100-year flood plain must be shown on the profile drawings.

(1) The FEMA 100-year water surface elevation must be marked on a hydraulic profile of a wastewater treatment facility in accordance with the vertical scale of the drawing.

(2) If a wastewater treatment facility will occupy less than 1,000 feet of shoreline along a flood plain, the profile must show a single line coincident with the elevation of the centerline of any outfall pipe.

(3) If a wastewater treatment facility will occupy 1,000 feet or more of shoreline along a flood plain, the profile must show the water surface elevation at both the upstream and downstream limits of any protective structure for the wastewater treatment facility.

(c) The executive director will not approve a design of a proposed treatment unit within a 100-year flood plain, unless the design provides protection for all open process tanks and electric units from inundation during a 100-year flood event.

§217.36. Emergency Power Requirements.

(a) A wastewater treatment facility must be designed to prevent the discharge of untreated or partially treated wastewater during electrical power outages.

(b) A wastewater treatment facility must include an audiovisual alarm system. The alarm system must transmit all alarm conditions through the use of an auto-dialer system, a Supervisory Control and Data Acquisition (SCADA) system, or a telemetering system connected to a continuously monitored location. Audiovisual alarms are not required if the SCADA system notifies the operator about communication loss, in addition to all other alarm conditions.

(c) An alarm system must self-activate if:

- (1) the power supply is interrupted;
- (2) a pump fails; or
- (3) a high water level alarm is triggered.

(d) An alarm system must include self-testing capability at the control panel.

(e) An owner shall determine the reliability of the existing commercial power service for a wastewater treatment facility using records from the past 60 consecutive months from the electric utility that serves the wastewater treatment facility. The entire record must be used if 60 months of records are not available. The owner must provide the power outage records and the reliability determination in the engineering report. The records must:

- (1) be in writing;
- (2) be on the electric utility's letterhead and bear a signature of an electric utility employee who has knowledge of data about power outages;
- (3) identify the location of the wastewater treatment facility;
- (4) list the total number of power outages that have occurred during the past 60 consecutive months; and
- (5) indicate the date and duration of each recorded power outage.

(f) The executive director may consider documentation of commercial power system upgrades and their effects on the reliability of commercial power. Documentation of upgrades and their effects on power reliability must be submitted to the executive director in writing on the electric utility's letterhead and must bear the signature of an electric utility employee.

(g) Systems for preventing discharge of untreated or partially treated wastewater must operate for a duration at least equal to the longest power outage on record for the past 60 consecutive months, or at least 20 minutes, whichever is longer. The design must consider the effects of peak flow, inflow, and infiltration. If the longest power outage on record for the past 60 consecutive months is greater than 48 hours and generators will be used to provide backup power, then the owner must have a contract in place that guarantees fuel supply during an emergency. The owner must also have sufficient storage capacity at the wastewater treatment facility for the fuel for the duration of the emergency.

(h) Systems for preventing discharge of untreated or partially treated wastewater at a wastewater treatment facility must either be permanent features of the wastewater treatment facility, or be temporary power systems that are capable of being made operational before an unauthorized discharge occurs during any electrical power outage. The engineer must describe how a temporary power system will be deployed and operated in the engineering report, and must address deployment during all types of weather events that might reasonably cause a power outage at the wastewater treatment facility.

(i) Systems for preventing discharge of untreated or partially treated wastewater may include any combination of alternate power sources, on-site generators, interceptor systems, on-site retention, collection system storage, portable generators, mechanical backup systems, or other similar systems.

(1) Collection system storage may not be used as a sole means of preventing the discharge of untreated or partially treated wastewater during a power outage.

(2) The main power source and an alternate power source may not be provided by the same power plant.

(3) Portable generators and pumps may only be used to guarantee service if:

(A) a tested quick-connect mechanism and a properly sized automatic transfer switch is provided where the generator will be used; and

(B) a licensed operator that is knowledgeable in operation of the portable generators and pumps will be on call 24 hours per day every day.

(j) The engineering report must include a description of emergency operation of the wastewater treatment facility. Treatment units that require continuous operation during a power outage must be identified in the engineering report. The minimum requirements for the systems that must be operational and additional engineering report requirements are listed in paragraphs (1) - (4) of this subsection.

(1) A wastewater treatment facility must be designed to achieve primary treatment and to disinfect the wastewater to ensure compliance with the bacteria limits established in the wastewater treatment facility's wastewater permit during all power outages, including outages that are longer than outage predicted based on the power reliability determination required in subsection (e) of this section.

(2) All components of the disinfection system, including any reclaimed water used to make a chemical solution, must operate at full capacity during all power outages according to the requirements of §217.37 of the title (relating to Disinfection System Power Reliability), including outages that are longer than outage predicted based on the power reliability determination required in subsection (e) of this section.

(3) Return activated sludge pumps must be operational during any power outage.

(4) If portable generators or pumps are used to guarantee service, the engineering report must include:

(A) the storage location of each generator and pump;

(B) the amount of time that will be needed to transport each generator or pump to where it will be used;

(C) the treatment units to which each generator or pump is designated as a backup; and

(D) the routine maintenance and upkeep that will be done for each portable generator and pump to ensure that they will be operational when needed.

§217.37. Disinfection System Power Reliability.

(a) A disinfection system must include a backup power system capable of providing sufficient power to operate continuously during all power outages in accordance with the requirements of §217.36 of this title (relating to Emergency Power Requirements), including outages that are longer than outage predicted based on the power reliability determination required in §217.36(e) of this title.

(b) A backup power system must automatically restart the disinfection system during a power outage.

(c) A backup power system must meet the requirements of §217.36 of this title.

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§217.38. Buffer Zones and Odor Abatement.

(a) The buffer zone requirements in §309.13 of this title (relating to Unsuitable Site Characteristics) apply to all treatment units in a wastewater treatment facility.

(b) The engineering report must include the design of any odor abatement measures intended to comply with §309.13(e) - (g) of this title.

(c) An odor abatement measure that is used in lieu of buffer zones is subject to review in accordance with §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

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§217.39. Wastewater Treatment Facility Use of Reclaimed Water.

(a) A wastewater treatment facility must use reclaimed water in place of potable water in all treatment units, for wash down water, and for irrigating the grounds within the boundaries of the wastewater treatment facility.

(b) A wastewater treatment facility must include a meter to measure reclaimed water use in the wastewater treatment facility.

(c) Reclaimed water may only be used after treatment in a secondary treatment process. Untreated or partially treated wastewater may not be used as reclaimed water. A reclaimed water system must provide for screening or filtration, a backup pump with controls, and a pressure-sustaining device such as a hydro-pneumatic tank.

(d) If disinfection is part of the treatment, reclaimed water may only be used after it has been disinfected.

(e) Reclaimed water may be used within the wastewater treatment facility with no further authorization from the executive director if it is used in accordance with this section and §210.4(c) of this title (relating to Notification).

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§217.40. Signs with Emergency Contact Information.

A sign must be posted at the entrance of a wastewater treatment facility to provide the wastewater treatment facility name and current 24-hour contact information. The sign must be clearly visible and legible, with block lettering that is at least 1.5 inches tall.

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