

Section 7 – Wastewater Flow and Strength

1. Single Family Residential Flows

- a. Design flow per person must be 75 gallons per day (gpd).
- b. The minimum design flow for a new home must be for a two-bedroom house unless otherwise noted in this regulation.
- c. The minimum design flow for the repair or replacement of an OWTS of an existing one-bedroom home must be for one-bedroom unless bedrooms are added.
- d. For homes up to and including three bedrooms, the assumed number of persons per bedroom is two for design purposes.
- e. For homes with more than three bedrooms, the assumed number of persons is six persons (first three bedrooms x two persons per bedroom) plus one additional person for each bedroom more than three bedrooms.
- f. The Department may increase the number of persons per bedroom to two for all bedrooms for design purposes.
- g. Table 7-1 summarizes the design flows for single-family residential homes up to six bedrooms.
- h. Flows estimates will be determined by the number of bedrooms originally present.

Table 7-1 Single Family Residential Design Flows

| # Bedrooms | Occupancy (# of Persons) | Design Flow (gallons/day) |
|------------|-----------------------------|------------------------------|
| 2 | 4 | 300 |
| 3 | 6 | 450 |
| 4 | 7 | 525 |
| 5 | 8 | 600 |
| 6 | 9 | 675 |

2. Auxiliary Buildings

- a. If a single-family home has an auxiliary building, such as a non-commercial shop with plumbing fixtures, the flow may be conveyed to the OWTS of the home, or to a separate OWTS constructed to handle the flow from the auxiliary facility.
- b. If the flow from the auxiliary building is only generated by residents of the home, it will be assumed that the OWTS for the home will be adequately sized to include the auxiliary building if the flows are combined.
- c. If the auxiliary building will have users in addition to residents and the flow from the auxiliary building will flow to the OWTS of the home, the design flow of the home must include the increased use.
- d. If the auxiliary building has a separate OWTS, the facility must be sized on the basis of Table 7-2 and a septic tank detention time of 48 hours.
- e. Any auxiliary building that will be used as an accessory dwelling unit must comply with all requirements as found in the Clear Creek County Zoning Regulations.

3. Multi Family and Commercial Systems

- a. Design flow values and strengths for multi-family and commercial systems must be determined from:
 - i. Table 7-2; or
 - ii. An analysis of flows and strengths from at least three comparable facilities or from the facility, if it is an existing facility, must be submitted to the local public health agency for approval. The analysis must include:
 1. Metered water flows for inside use only for at least a year, or if use is seasonal, for a full season. If metered flows are less than full capacity, they must be paired with actual use in units of persons present or meals served or other units as appropriate so that an actual daily rate per unit can be determined. The daily rate per unit times the number of units at full occupancy will be the design flow.
 2. Total Suspended Solids and BOD₅ or CBOD₅ tests at times of full use. At least three samples taken at least one week apart are required. Sampling that provides equivalent and representative data through “composite sampling” may be allowed.
 3. Explanation and justification for the comparability of the tested facilities with the proposed facility.
- b. An OWTS that will serve a business, commercial, industrial or institutional property, or a multifamily dwelling must:

- i. Receive only such biodegradable wastes for treatment and distribution as are compatible with those biological treatment processes as occur within the septic tank, any additional treatment unit and the soil treatment area; and
 - ii. Receive authorization by rule or a class V underground injection permit from the United States Environmental Protection Agency (EPA) before an application for an OWTS permit is approved if the system may receive non-residential wastewater or is otherwise covered by the EPA underground injection control program. Subsequent to acceptance by the EPA, the local public health agency may choose to also issue a permit for this type of use.
 - c. Flow equalization may be used if a facility has flows that vary from day to day by more than four times the average flow.
 - i. The highest peak assumed must be at least equal to the full capacity of the facility.
 - ii. The stored flow must be distributed to the soil treatment area before the next greater-than-average peak.
 - iii. Flow equalization may be used only if:
 - 1. The facility is non-residential;
 - 2. The facility is only used for one purpose;
 - 3. Flows will follow a predictable pattern; and
 - 4. There is a long-term expectation that size and pattern of the flows will remain the same.
 - iv. Timed dosed pressure distribution or timed dosed NDDS must be used. The soil treatment area reduction for pressure distribution (Table 11-2) must not be used in addition to the flow equalization reduction.
 - v. Contingency plans must be made for expanding the capacity of the OWTS in the event of changed use at the facility.
 - d. Multi-family or commercial properties serviced by an OWTS are required to provide daily metered water use data on a monthly basis, or as otherwise specified in permit conditions, to the Clear Creek Environmental Health Department.

Table 7-2 Estimated Daily Wastewater Flow and BOD5 Load per Person

| RESIDENTIAL WASTEWATER | GPD | BOD 5 IN POUNDS PER DAY |
|---|------------|--------------------------------|
| Single-family dwellings | 75 | .20 |
| Auxiliary buildings (by fixture type) | | |
| Bath/Shower | 14.7 | .014 |
| Dishwasher | 1.8 | .002 |
| Kitchen sink with garbage grinder | 5.8 | .052 |
| Laundry washer | 19.5 | .037 |
| Lavatory | 8.4 | .021 |
| Water closet (toilet) | 24.8 | .029 |
| Hotels and motels per room | 75 | .15 |
| Multiple-family dwellings or apartments | 75 | .20 |
| Boarding and rooming houses (users absent during working hours) | 50 | .15 |
| Tiny Homes ³ , per unit | 150 | .40 |
| Mobile home | 75 | .20 |
| Mobile home park per space | 300 | .80 |
| COMMERCIAL WASTEWATER | GPD | BOD 5 IN POUNDS PER DAY |
| Facilities with short-term or transient visitors (Airports or bus stations per passenger; fairgrounds per person attending; ball parks, race tracks, stadiums, theaters or auditoriums per seat) | 5 | .02 |
| Airport per employee | 10 | .06 |
| Barber and beauty shops per chair | 100 | .70 ¹ |
| Bowling alleys per lane - toilet wastes only | 5 | .03 ¹ |
| Country club per member | 30 | .02 |

| | | |
|--|------------|--------------------------------|
| County club per employee | 20 | .06 |
| Dentist offices per non-wet chair | 50 | .14 ¹ |
| Doctor offices per doctor | 250 | .80 ¹ |
| Factories and plants exclusive of industrial wastewater per employee per eight-hour shift – no showers | 20 | .05 |
| Factories and plants exclusive of industrial wastewater per employee per eight-hour shift - showers provided | 35 | .08 |
| Kennels per dog | 30 | .20 |
| Laundries, self-service per commercial washer | 400 | .75 |
| Office buildings per employee per eight-hour shift | 15 | .06 |
| Service stations per toilet fixture | 250 | .50 ¹ |
| Stores and shopping centers per square foot of retail space | .1 | .01 ¹ |
| Work or construction camps semi-permanent with flush toilets | 50 | .17 |
| Work or construction camps semi-permanent without flush toilets | 35 | .02 |
| FOOD SERVICE ESTABLISHMENT | GPD | BOD 5 IN POUNDS PER DAY |
| Restaurant open 1 or 2 meals per seat | 50 | .06/meal |
| 24-hour restaurant per seat | 75 | .07/meal served |
| Restaurant with paper service only per seat | 25 | .01/meal served |
| Additional for bars and cocktail lounges per seat | 30 | .02 |
| Drive-in restaurant per car space | 50 | .02 |
| INSTITUTIONAL WASTEWATER WITHOUT KITCHENS UNLESS OTHERWISE NOTED | GPD | BOD 5 IN POUNDS PER DAY |
| Churches per seat; without any food service, or other uses | 3.5 | .01 |
| Churches, per seat; warming kitchen only, no major food service | 5 | .01 |
| Churches, per seat; with food service, per meal served ⁴ | 4 | .02 |

| | | |
|--|------------|--|
| Hospitals per bed space | 250 | .20 |
| Nursing homes; Group homes for developmentally disabled, per bed space | 125 | .20 |
| Schools, Boarding per person | 100 | .17 |
| Schools, Day without cafeteria, gym or showers | 15 | .04 |
| Schools, Day with cafeterias, no gym or showers | 20 | .08 |
| Schools, Day with cafeterias, gym and showers | 25 | .10 |
| Schools, Day additional for school workers | 15 | .06 |
| RECREATIONAL AND SEASONAL WASTEWATER USE | GPD | BOD₅ IN POUNDS PER DAY |
| Camps, day, no meals served | 15 | .12 |
| Luxury resort | 125 | .17 |
| Resort night and day | 50 | .12 |
| Campground per campsite ² | 50 | .12 |
| Public park flush toilet per fixture per hour when park is open | 36 | .04 lbs./ fixture |
| Public park urinal per fixture per hour when park is open | 10 | .01 lbs./fixture |
| Public park shower per fixture per hour when park is open | 100 | .10 lbs./ fixture |
| Public park faucet per fixture per hour when park is open | 15 | .04 lbs./ fixture |
| Swimming pools and bathhouses | 10 | .06 |
| Travel trailer parks with individual water and sewage hookup per unit ² | 100 | .24 |
| Travel trailer park without individual water and sewage hookup per unit ₂ | 50 | .12 |

1 BOD levels need further verification depending on the specific use of the facility.

2 Laundry facilities are to be calculated on a per commercial washer basis in accordance with other elements of this table.

3 For the purposes of this Table, a "Tiny home" is a structure (a non-recreational vehicle) that has only one bedroom and has <400 sq.ft. of livable space, including lofts. In this instance, the OWTS may be sized for only one bedroom.

4 For churches with food service, the 4 gal/meal must be added to the 3.5 gal/seat to determine projected design flows.

4. Wastewater Strength

- a. Table 7-3 includes levels of treatment that can be achieved by various OWTS components, excluding the soil treatment area. Systems qualifying for these treatment levels except TL1 produced by a septic tank alone must be approved by the Division.
- b. High strength waste must be reduced to at least Treatment Level TL1 quality or lower before applying to a soil treatment area. Waste strength levels defined in Table 7-3 and 7-4 must be used to determine compliance.

Table 7-3 Treatment Levels

| Treatment Level | BOD ₅ (mg/L) | CBOD ₅ ¹ (mg/L) | TSS (mg/L) | Total Nitrogen (mg/L) |
|------------------|----------------------------|--|---------------|-----------------------------|
| TL1 ² | 180 | - | 80 | 60-80 |
| TL2 | - | 25 | 30 | N/A ³ |
| TL2N | - | 25 | 30 | >50% reduction ⁴ |
| TL3 | - | 10 | 10 | N/A ³ |
| TL3N | - | 10 | 10 | 20 mg/L |

Shading indicates higher treatment levels.

1 Requirements for CBOD₅ are only related to effluent samples from a higher level treatment system.

2 Domestic septic tank effluent prior to soil treatment or higher level treatment has a wide range of concentrations. These values are typical, but values used for design must account for site-specific information.

3 Total Nitrogen does not apply to Treatment Levels TL2 and TL3. Processes intended to reduce total nitrogen are addressed in Treatment Levels TL2N and TL3N. Any total nitrogen reductions that may be observed for TL2 and TL3 are as a result of the treatment process for BOD₅ and TSS reductions.

4 NSF/ANSI Standard 245 – Wastewater Treatment Systems – Nitrogen Reduction requires reduction of 50 percent rather than an absolute value.

Table 7-4 High Strength Wastewater*

| | BOD ₅ (mg/L) | TSS (mg/L) | Fats, Oils, Grease (FOG) (mg/L) |
|-----------------------------|----------------------------|---------------|---------------------------------------|
| Septic Tank Influent | >300 | >200 | >50 |
| Septic Tank Effluent | >180 | >80 | >25 |

* High strength effluent prior to a septic tank has a wide range of concentrations. These values are typical, but values used for design purposes must account for site-specific information.