

**ON-SITE WATER DEMONSTRATION PROJECT**  
**SOUTH FAMILY HOUSING WASTEWATER FLOW ESTIMATION**

Bedrooms	People/ unit	People	# bldgs	# Units
2	3	435	14	145
			4	41.44
			8	82.88

									With Peaking Factor		
Table (2-4)	Unit	Flow rate (L/unit*D)	Total(L/d)	Total for 4 buildings (L/d)	Total for 8 buildings (L/d)	Grand Total (L/d)	Grand Total (L/d) 4 buildings	Grand Total (L/d) 8 buildings	Grand Total (L/d)	Grand Total (L/d) 4 buildings	Grand Total (L/d) 8 buildings
Apartment	person	230	100050	28593.6	57187.2	111215	31784	63569	300837	85977	171954

Table (2-2)	Unit	Flow rate (L/unit*D)	Total(L/d)	Total for 4 buildings (L/d)	Total for 8 buildings (L/d)	Grand Total (L/d)	Grand Total (L/d) 4 buildings	Grand Total (L/d) 8 buildings	Grand Total (L/d)	Grand Total (L/d) 4 buildings	Grand Total (L/d) 8 buildings
Apartment	bedroom	450	130500	37296	74592	141665	40487	80974	383204	109517	219034

With Peaking Factor					
Grand Total (Gal/d)	Grand Total (Gal/d) 4 buildings	Grand Total (Gal/d) 8 buildings	Grand Total (Gal/d)	Grand Total (Gal/d) 4 buildings	Grand Total (Gal/d) 8 buildings
29380	8397	16793	79473	22713	45425

Grand Total (Gal/d)	Grand Total (Gal/d) 4 buildings	Grand Total (Gal/d) 8 buildings	Grand Total (Gal/d)	Grand Total (Gal/d) 4 buildings	Grand Total (Gal/d) 8 buildings
37424	10696	37424	101232	28931	101232

Table (2-5)	Demand	Total (L/d)	Total for 4 buildings (L/d)	Total for 8 buildings (L/d)
Showers	42	6090	1740.5	3481.0
Toilets	35	5075	1450.4	2900.8

**TABLE 2-4**  
**Typical wastewater flow rates from recreational facilities in the United States**

Facility	Unit	Flow rate, L/unit · d	
		Range	Typical
Apartment, resort	Person	190–260	230
Cabin, resort	Person	30–190	150
Colateria	Customer	10–15	10
	Employee	30–45	40
<b>Camp:</b>			
With toilets only	Person	55–110	95
With central toilet and bath facilities	Person	130–90	170
Day	Person	55–75	60
Cottages, (seasonal with private bath)	Person	150–230	190
Country club	Member present	75–150	100
	Employee	40–60	50
Dining hall	Meal served	15–40	25
Dormitory, bunkhouse	Person	75–190	150
Playground	Visitor	5–15	10
Picnic park with flush toilets	Visitor	20–40	20
<b>Recreational vehicle park:</b>			
With individual connection	Vehicle	280–570	380
With comfort station	Vehicle	150–190	170
Roadside rest areas	Person	10–20	15
Swimming pool	Customer	20–45	40
	Employee	30–45	40
Vacation home	Person	90–230	190
Visitor center	Visitor	10–20	15

Adapted from Metcalf and Eddy, 2003.

**TABLE 2-2**  
**Typical wastewater flow rates from commercial sources in the United States**

Source	Unit	Flow rate, L/unit · d	
		Range	Typical
Airport	Passenger	10–20	15
Apartment	Bedroom	380–570	450
Automobile service station	Vehicle	30–60	40
	Employee	35–60	50
Bar/cocktail lounge	Seat	45–95	80
	Employee	40–60	50
Boarding house	Person	95–250	170
Conference center	Person	40–60	30
Department store	Restroom	1,300–2,300	1,500
	Employee	30–60	40
Hotel	Guest	150–230	190
	Employee	30–60	40
Industrial building (sanitary wastewater only)	Employee	60–130	75
Laundry (self-service)	Machine	1,500–2,100	1,700
	Customer	170–210	190
Mobile home park	Mobile home	470–570	530
Motel with kitchen	Guest	210–340	230
Motel without kitchen	Guest	190–290	210
Office	Employee	25–60	50
Public restroom	User	10–20	15
Restaurant without bar	Customer	25–40	35
Restaurant with bar	Customer	35–45	40
Shopping center	Employee	25–50	40
	Parking space	5–10	8
Theater	Seat	10–15	10

Adapted from Metcalf and Eddy, 2003.

**TABLE 2-5**  
**Typical changes in water consumption with use of water saving devices**

Use	Without water conservation, Lpcd	With water conservation, Lpcd
Showers	50	42
Clothes washing	64	45
Toilets	73	35

Source: AWWA, 1998.

### Unit design flow peaking factor

Upstream Population	Dry Weather Peaking Factor
100	3.62
200	3.14
300	2.90
400	2.74
500	2.64
600	2.56
700	2.50
800	2.46
900	2.42
1000	2.38
1001 to 10,000	$PF = (6.330 \times p^{-0.231}) + 1.094$
10,001 to 100,000	$PF = (6.177 \times p^{-0.233}) + 1.128$
More than 100,000	$PF = (4.500 \times p^{-0.174}) + 0.945$
PF = Dry Weather Peaking Factor	
p = Upstream Population	