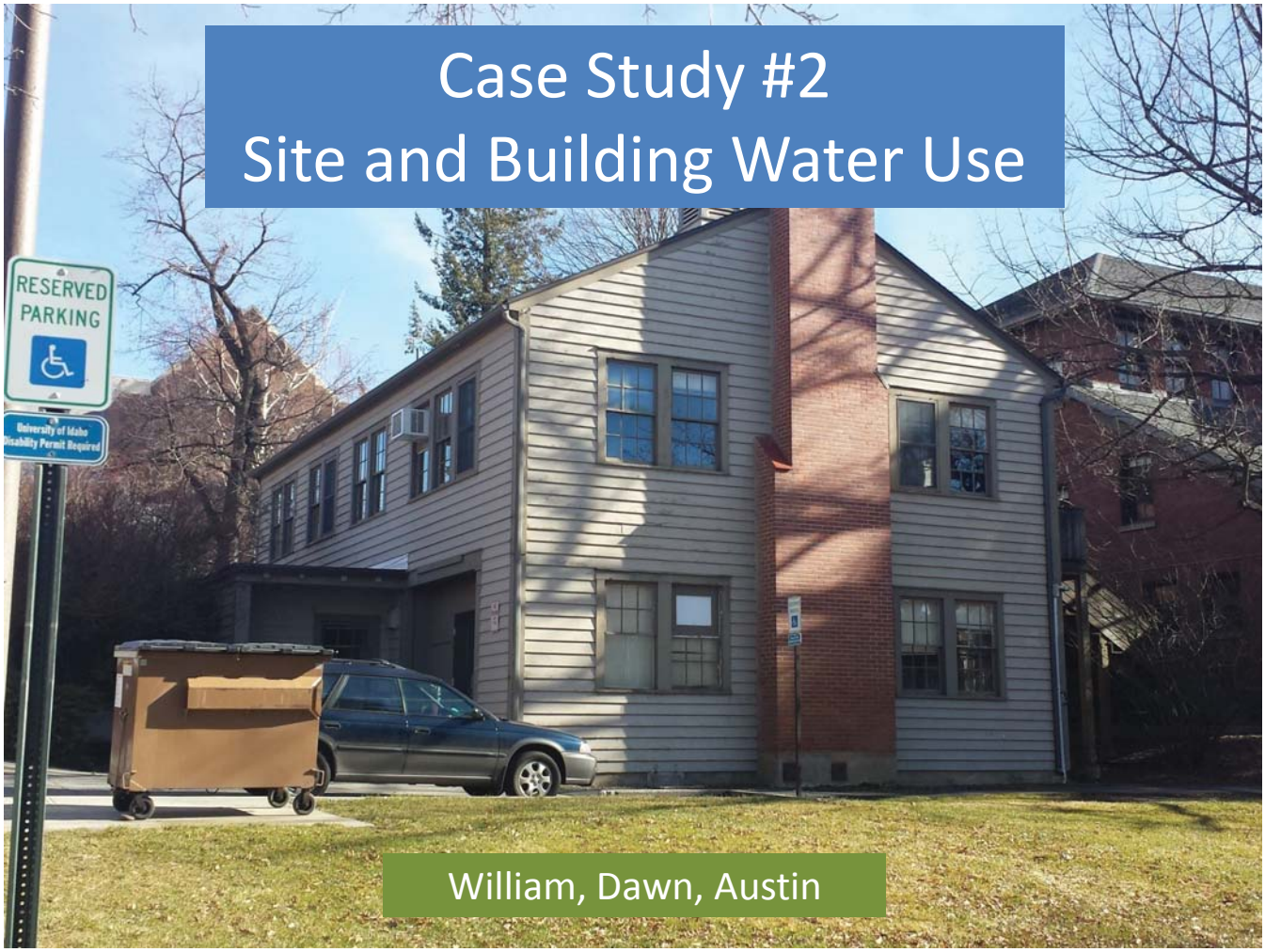
Case Study #2
Site and Building Water Use



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Intro & Building Description

- **Old** ID Building (New Design Build Studio)
- Small paved path along West side, single parking space
- Slight slope down from East to West
- Two story studio/office space with 1(3) bathrooms

Rainfall

Moscow's rainfall per month in inches

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep	Oct.	Nov.	Dec.
3.15	2.36	2.68	2.52	2.52	1.89	0.98	0.98	1.22	2.17	3.62	2.99

- **Annual rainfall: 27.08 inches**
- Seattle rainfall: 38 inches
- Kennewick rainfall: 8 inches
- Boise rainfall: 12 inches
- National average: 37 inches

Water Use Inventory

Fixture	Quantity	Outflow Type
Drinking Fountain	1	Grey Water
Urinal	2	Black Water
Toilet	5	Black Water
Shower	1	Grey Water
Sink	5	Grey Water

- Preliminary Estimate of Gallons of Water Used per day
  - **20 users per day @ 35 gallons per user** (if all fixtures used)
    - Shower the most significant use of water @ **12 gallons per ~5 minute shower** (based off national averages)
  - Building uses **700 gallons** of water per day

Water Supply

Water Supply Fixture Units (WSFU) Fixture Units (FU)

Fixture	Quantity	Cold	Hot	WSFU	Total FU
Drinking Fountain	1	0.25	0	0.25	0.25
Urinal	2	5	0	5	10
Toilet	5	5	0	5	25
Shower	1	3	3	4	4
Sink	5	2.25	2.25	3	15

Total: 54.25 FU

Total Water Supply Estimates

(GPF) = GPFU x FU

GPF = Gallons/day/supply fixture

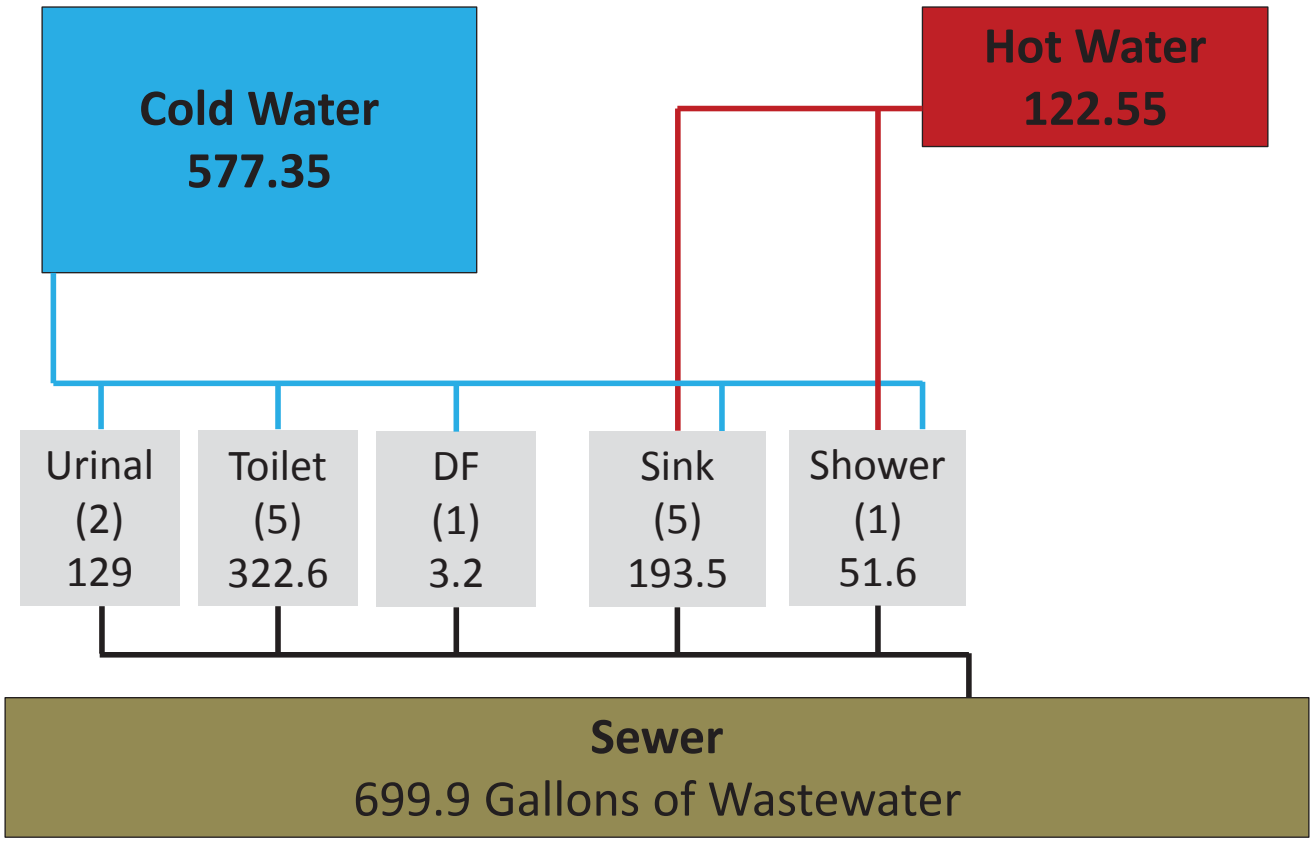
GPFU = gallons/day/supply fixture unit

FU = weight in supply fixture

Fixture	Total FU	GPF
Drinking Fountain	0.25	3.2
Urinal	10	129
Toilet	25	322.6
Shower	4	51.6
Sink	15	193.5

Total: 699.9 GPF

Water Supply Distribution Diagram



Current Scheme Analysis

- Building uses conventional fixtures that do little to conserve water use

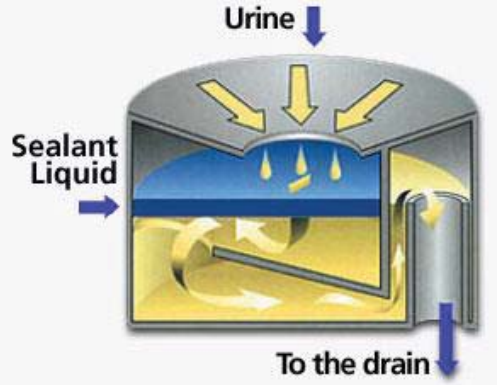
- Toilets and sinks contribute the most (total) to water usage

- Shower contributes the most as an individual water fixture

Water Supply Improvements

- **Super low-flow toilets**
- Mixture of air and water used to pressurize the water
- Suction pulls waste with water at a much higher velocity than a standard toilet, requiring less water

- **Near-waterless urinals**
- Urine goes through sealant liquid that both traps and prevents smell
- Escapes to drain as it fills
- Flush still needed to maintain



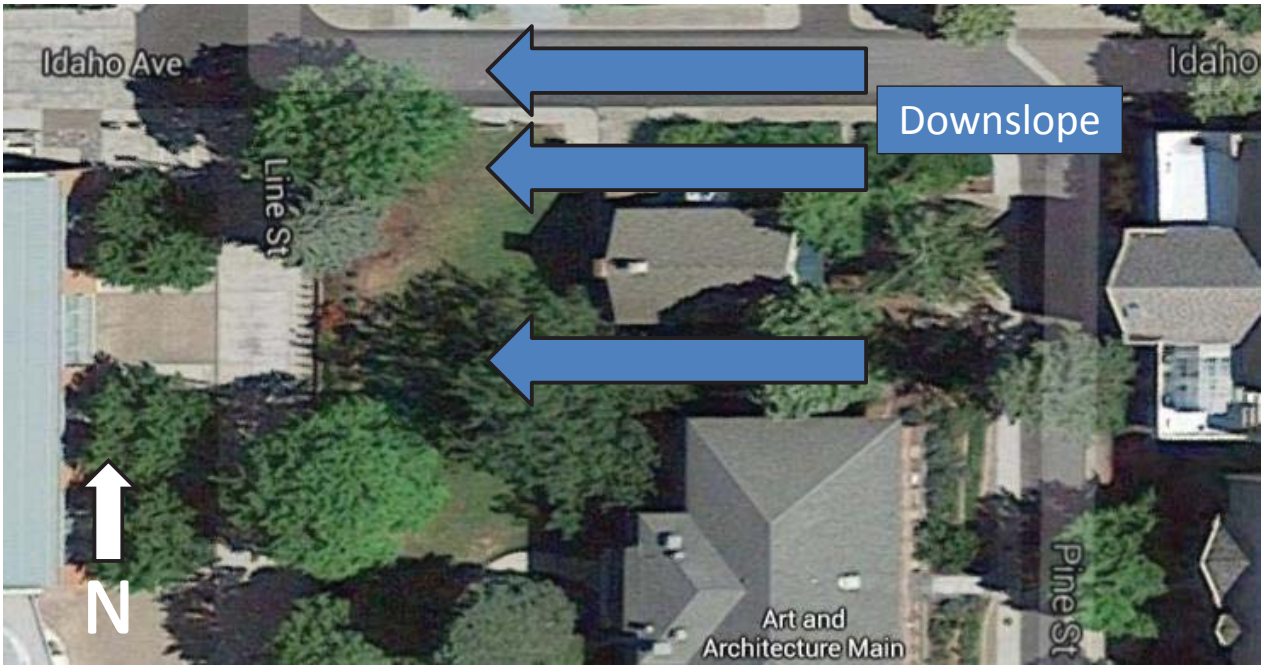
Water Supply Improvements

- **Motion activated sinks**
- Sinks only turn on for specific period of time when motion is detected from one's hand
- Limits amount of time sink is on, saving water

- **Shower that recirculates water**
- Water is sorted into reusable (grey) and non-resuable (black)
- Grey water is filtered and recirculated back through shower, greatly reducing the amount of water used

Storm Water Management

Storm Water Management



- The Site takes no measure at addressing storm water runoff
- The natural East to West downslope directs all storm water runoff towards the street and neighboring lawn

Storm Water Improvements

- Fix the gutters
- Create catchment roof system with retention pond
- Take advantage of naturally sloping site

- Bio-swale
- Porous pavement
- Living machine

- Feed collected storm water to onsite cistern

Water Supply Re-estimate

Water Supply Fixture Units (WSFU) Fixture Units (FU)

Fixture	Quantity	Cold	Hot	WSFU	Total FU
Drinking Fountain	1	0.25	0	0.25	0.25
Urinal	2	0.5	0	0.5	1
Toilet	5	2.5	0	2.5	12.5
Shower	1	1.5	1.5	2	2
Sink	5	1.5	1.5	2.5	12.5

Old Total: 54.25 FU **New Total: 28.25 FU**

Water Supply Re-estimate

(GPF) = GPFU x FU

GPF = Gallons/day/supply fixture

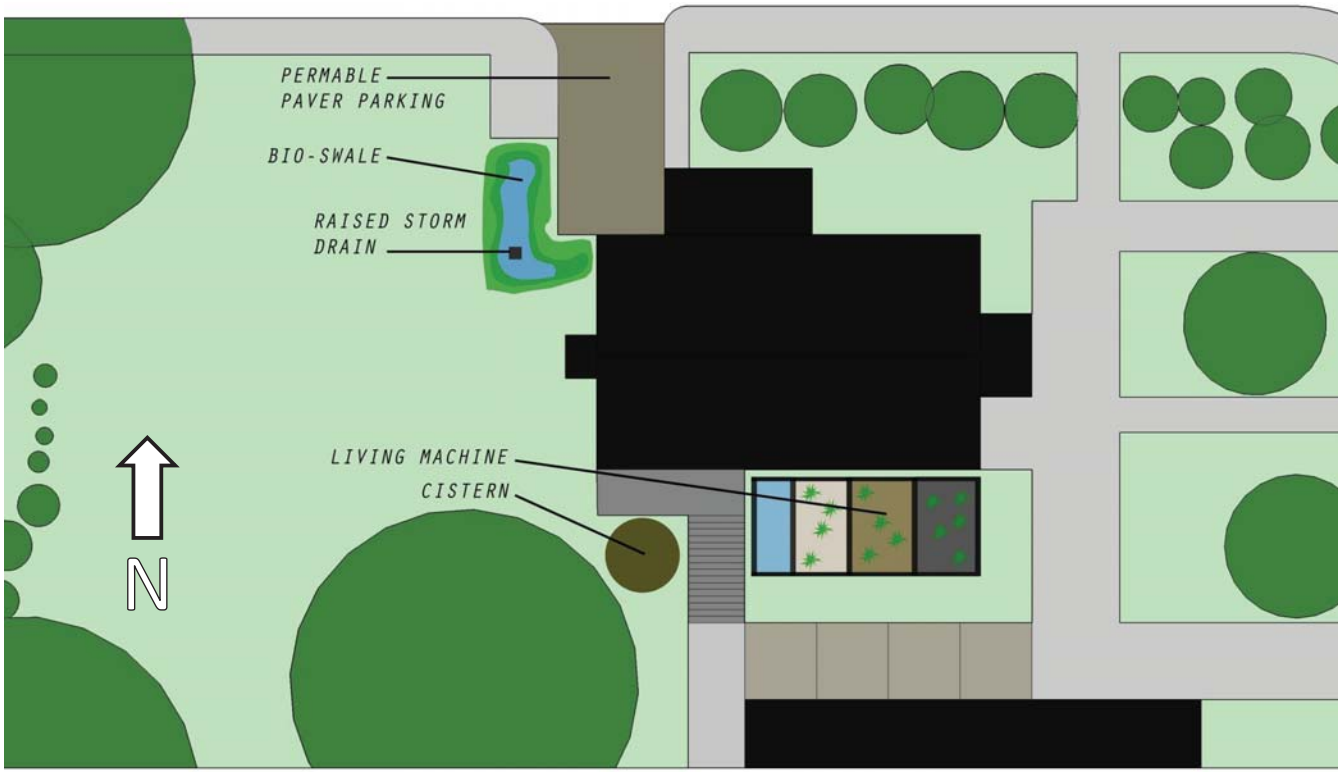
GPFU = gallons/day/supply fixture unit

FU = weight in supply fixture

Fixture	Total FU	GPF
Drinking Fountain	0.25	3.2
Urinal	1	12.9
Toilet	12.5	161.3
Shower	2	25.8
Sink	12.5	161.3

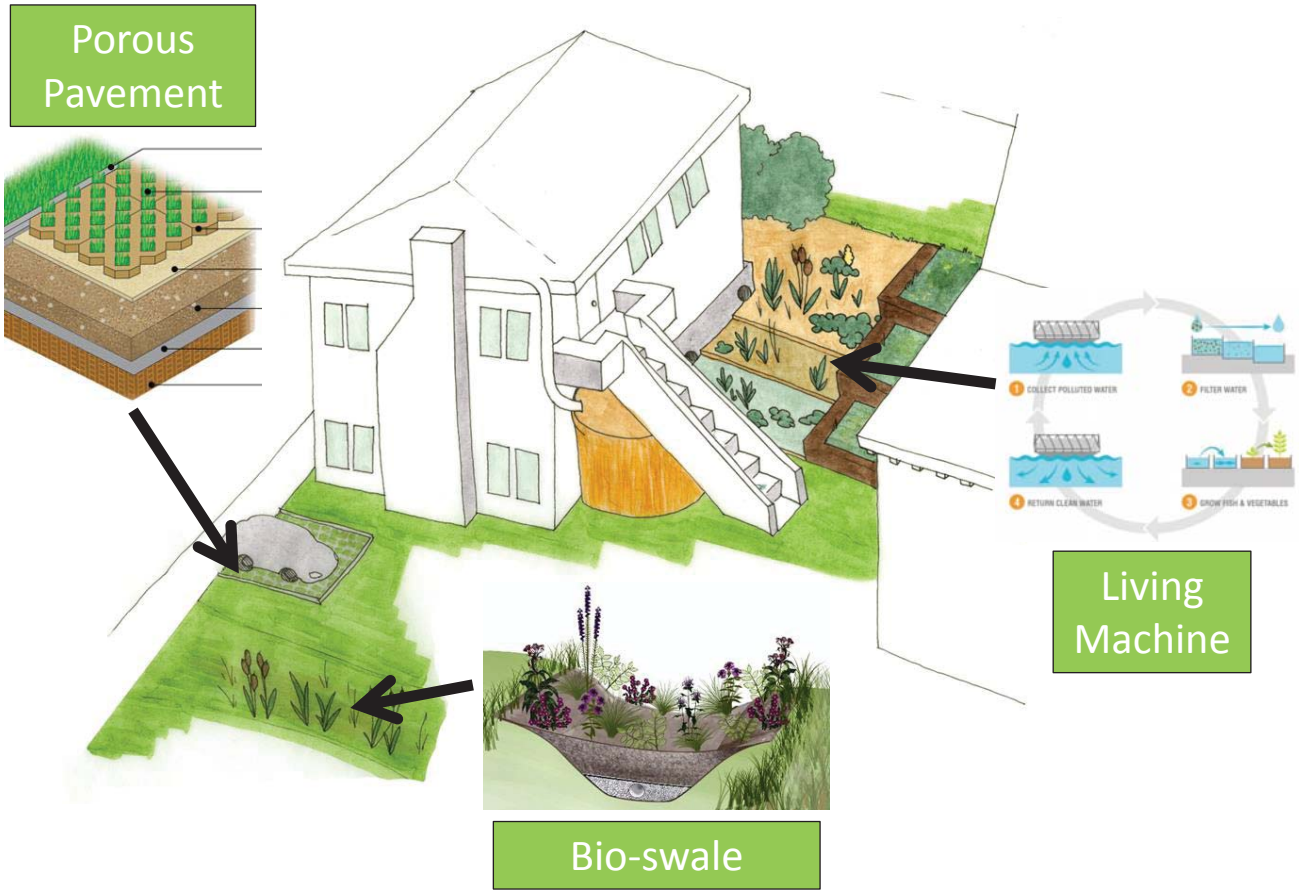
Old Total: 699.9 GPF **New Total: 364.5 GPF**

Storm Water Scheme

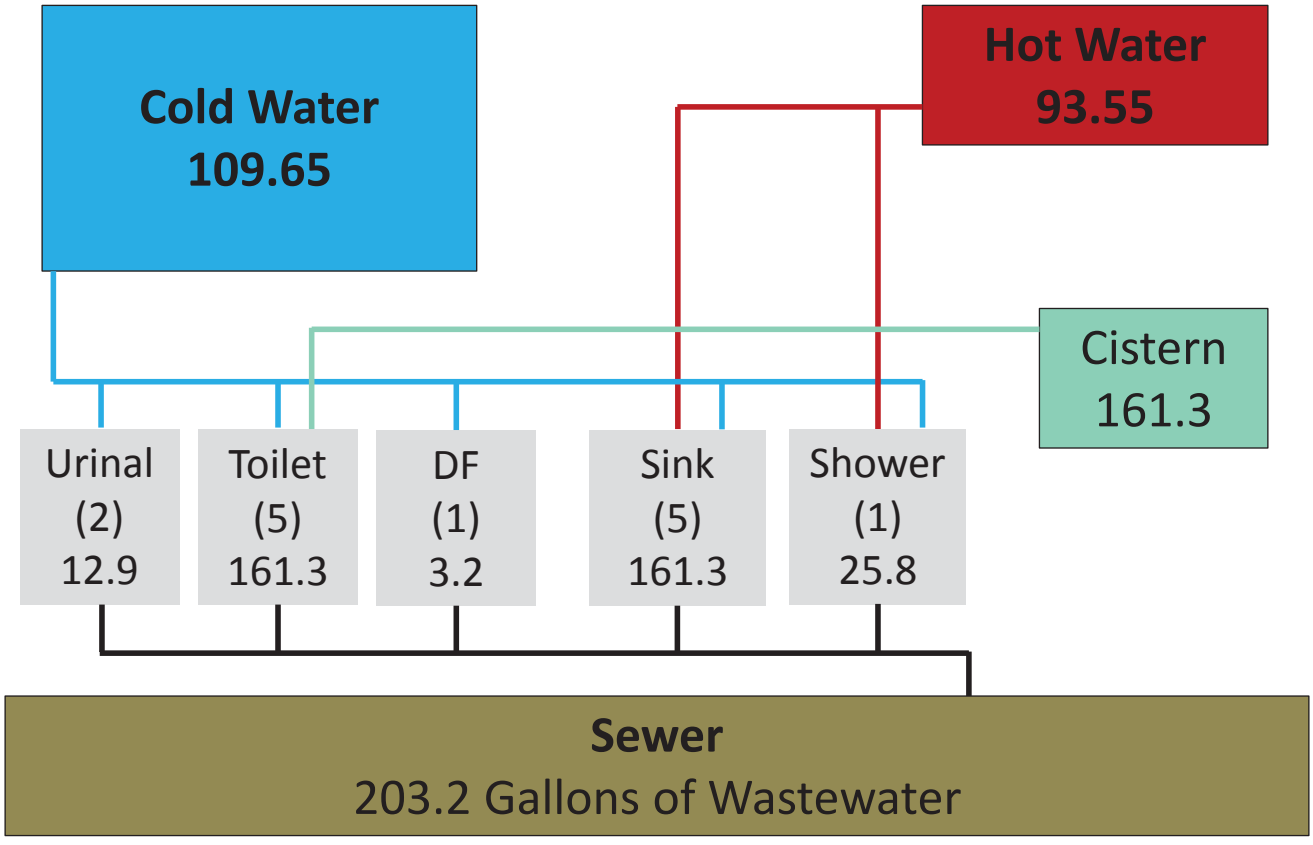


Site Plan

Storm Water Scheme



New Distribution Diagram



Cistern Sizing

- 1,200 sqft catchment area
- 1,200 x .66 gallons = **800 g/sqft** (2/3 accounts for dry years)

- 800 g/sqft x 27.08 (annual rain) **21,664g** annual collection

- 1 cubic foot = 7.48 gallons
- 21,664g/7.48 gallons **2,896.25 cubic feet** needed

- Potential Dimensions:
  - 15x15x13 (2,925)
  - 16x14x13 (2,912)
  - Cylinder cistern with 8.9' radius and 12' tall (2,986.1)

Conclusion

- Wastewater reduced from **699.9 gallons** to **203.2 gallons**
- Fixtures reduced water consumption through various strategies
- Cistern provides all water for toilets
- Cistern also helps manage site storm water collection
- Cistern is relatively large for the size of the building it services