
VANDAL STORE

— "SITE & BUILDING WATER USE" CASE STUDY —

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BUILDING DESCRIPTION | LOCATION

- *Location:* Moscow, Idaho
- *Elevation:* 2,310 to 2,880 feet
- *Size:* 20,037.33 Square-Feet
- *Program:*
 - Retail
 - Offices
 - Conference Room
 - Backroom
 - Loading Dock
- *Occupancy:* 180
- *Operations:*
 - Retail (Buying, Selling, Renting)
 - Starbucks



VandalStore

710 Deakin Ave
Moscow, ID 83843

Moscow Store (208) 885-6469

Mon-Fri: 8:00AM - 6:00PM

Saturday: 9:00AM - 5:00PM

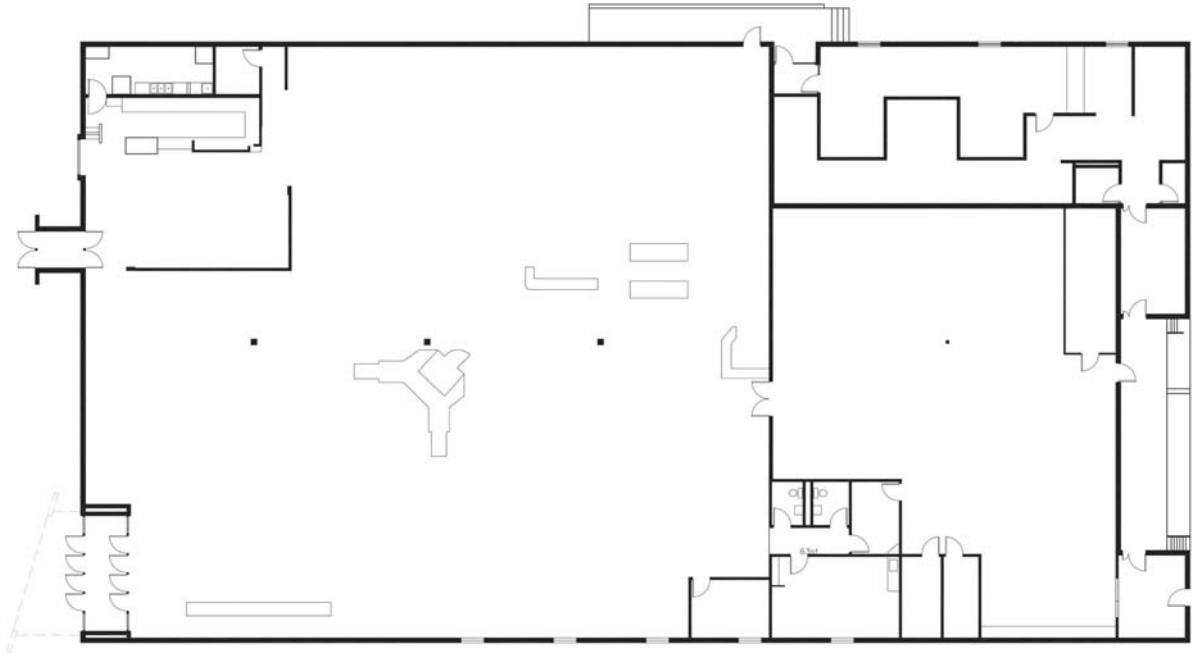
Sunday: 10:00AM - 4:00PM

Free 30 minute parking available in designated spaces.

BUILDING FLOOR PLAN |

Analysis:

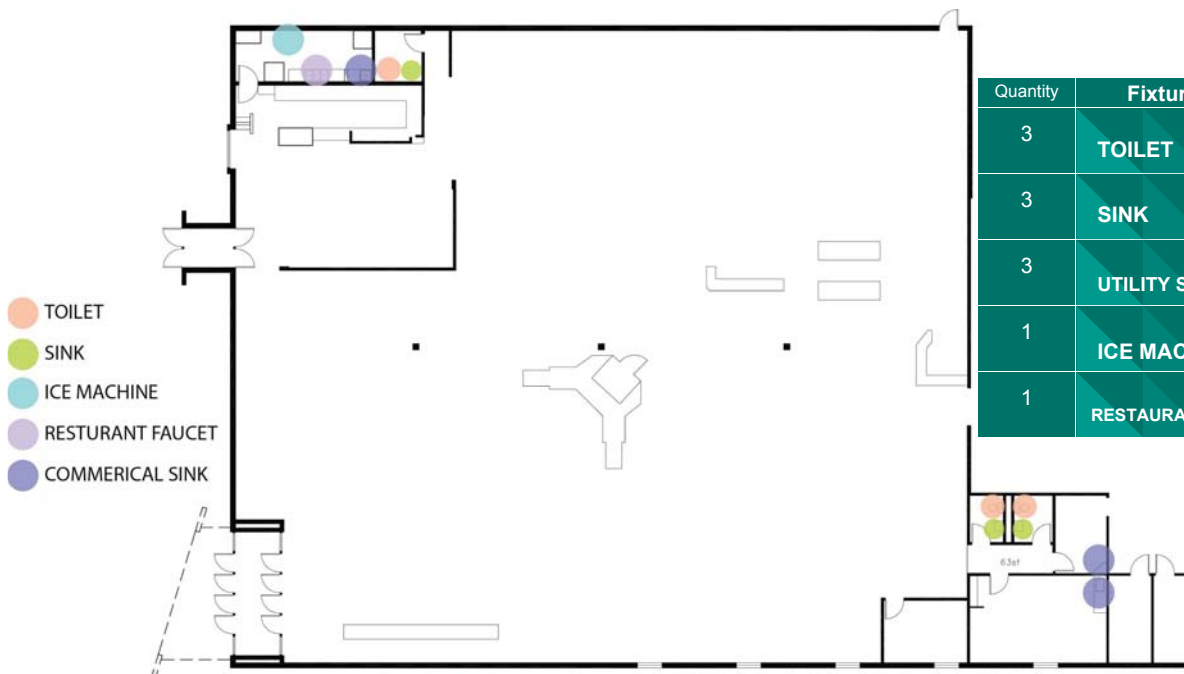
We did a water conservation study on the Vandal Store, which we included starbucks as well. In our analysis we determine the water source the building uses such as fixture and stormwater drainage.



Bookstore & Post Office
First Floor

University of Idaho

WATER FIXTURE INVENTORY | A.1



Quantity	Fixture Type	Water Usage
3	TOILET	1.6 Gallons Per Flush
3	SINK	1.2 Gallons Per Minute
3	UTILITY SINK	2 Gallons Per Minute
1	ICE MACHINE	3 Gallons Per Minute
1	RESTAURANT FAUCET	1.42 Gallons Per Minute

WATER FIXTURE INVENTORY | A.1

Fixture	Men	Women	Either	Recyclable?
Toilet	1	1	1	No (Black Water)
Sink	1	1	1	Yes (Grey Water)
Utility Sink	X	X	3	Yes (Grey Water)
Ice Machine	X	X	1	Yes (Grey Water)
Restaurant Facet	X	X	1	Yes (Grey Water)

Per Capita Use: Typical Retail = 400 Gallons Per Capita Per Restroom

Our Retail= 100 Gallons Per Capita Per Restroom (Estimate Based On Building Size)

Apparel and Accessory Stores = 68 Gallons Per Employee

Restaurants = 2-10 Per Patron

Peak Hourly Occupancy Load: 5 Employee Use A Day - 15 Customer Restroom - 30 Customer Orders

Total Gallons/Day: (WU) (3 x 100) (15) + (68 x 5) + (4 x 30) = **4,960**

(3 Bathrooms x 100 GPCD) (15 Customers) + (68 GEDx 5 Employees) + (4 GPCD x 30 Customers)

CONVENTIONAL WATER SYSTEM | A.2

$GPFU = (WU) / (fu)$

GPFU = gallons/day/supply fixture unit ----- 62 gallons per unit

WU = total conventional water use (gallons/day) [C4.2] ----- **4,960** gallons per day

FU = total number of conventional supply fixture units ----- **80** units

Fixture	# of Fixtures	Gallons/Use	Cold	Hot	WSFU	Total FU
Toilet	3	1.6 per flush	10	0	10	30
Sink	3	1.2 per min.	3	3	6	18
Utility Sink	3	2 per min.	3	3	6	18
Ice Machine	1	3 per min	4	0	4	4
Restaurant Facet	1	1.42 per min	5	5	10	10
Total:	11					80

Fixture	Total FU	GDF
Toilet	30	1,860
Sink	18	1,116
Utility Sink	18	1,116
Ice Machine	4	248
Restaurant Facet	10	620
Total:	80	4,960

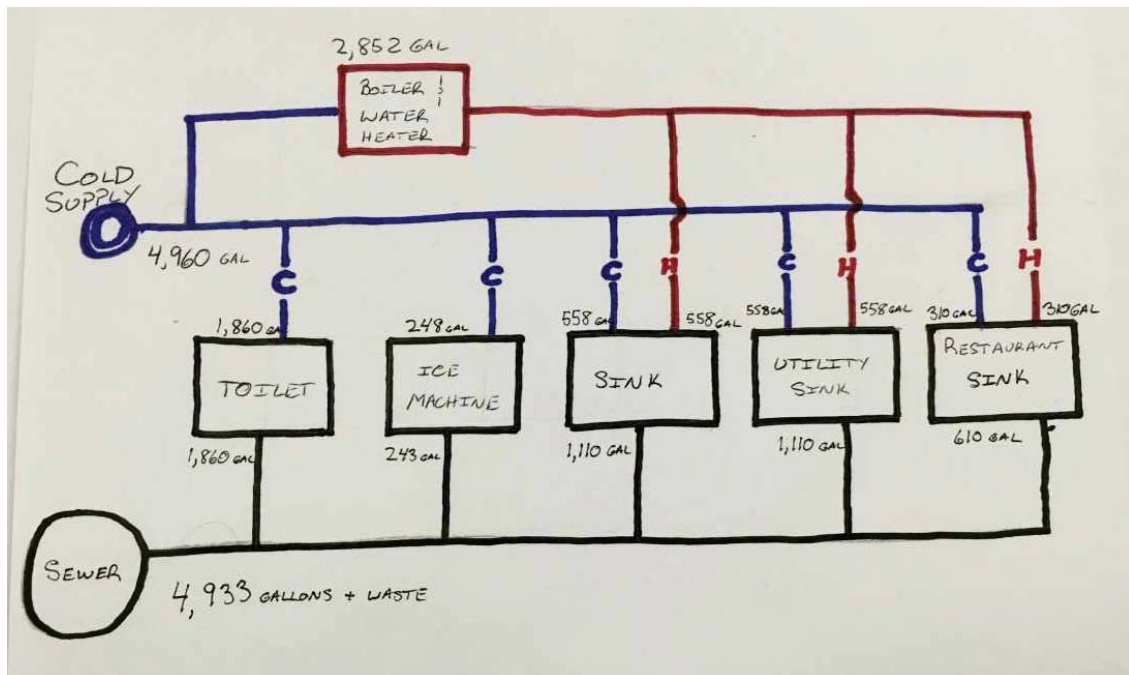
$GPF = (GPFU) (FU)$

GPF = gallons/day/fixture = 4,960

GPFU = gallons/day/supply fixture unit

FU = weight in supply fixture units

CONVENTIONAL WATER SYSTEM | A.2



WATER-CONSERVING SYSTEM | A.3 & A.4

The existing state of the building demonstrates the current standard of water use and does not employ any water-conserving systems beyond the standard.

All water use systems are conventional in the scope of 1994-present standards according to InsideOut D4.2 and D4.3

The building could make use of a handful of water-conserving strategies such as:

- Low flush toilets that use 1.2 gallons per flush compared to the standard 1.6
- Aerators for sink faucets that allow air to be mixed with water for a result of 50% or more reduction of water usage.
- Grey water recycling from sinks and utility sinks to toilets

SITE STORMWATER INVENTORY | B.1



DOWN SPOUTS



BIO-SWALES



WALL SPOUTS



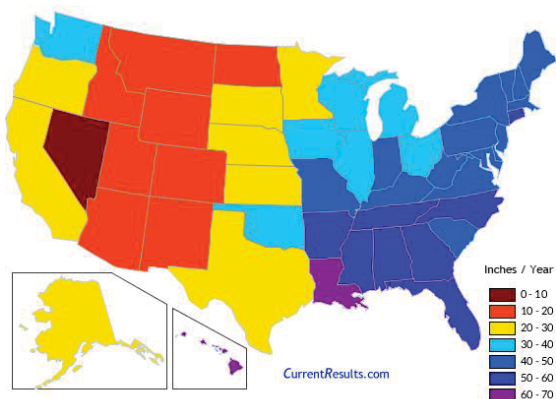
DOWNSPOUTS

RAINFALL ANALYSIS | B.2

Moscow Weather Averages

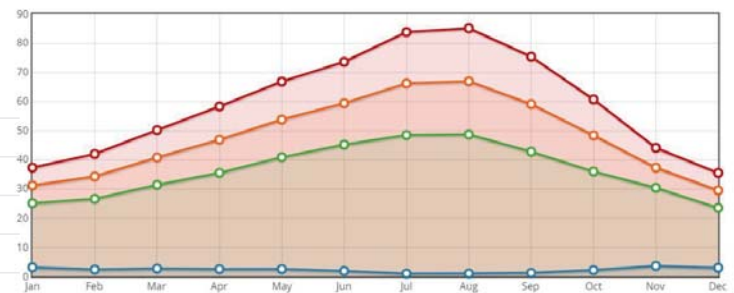
Annual High Temperature:	59.3°F
Annual Low Temperature:	36.3°F
Average Temperature:	47.8°F
Average Annual Precipitation - Rainfall:	27.08 inch
Av. Annual Snowfall:	49 inch

Annual State Precipitation Averages



MOSCOW U OF I, ID US

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MONTH	PRECIP (IN)	MIN TMP (°F)	AVG TMP (°F)	MAX TMP (°F)
01	3.14	25.1	31.2	37.3
02	2.37	26.6	34.3	42.0
03	2.69	31.4	40.8	50.2
04	2.52	35.5	46.9	58.3
05	2.53	40.9	53.8	66.8
06	1.88	45.2	59.4	73.6
07	0.97	48.5	66.2	83.8
08	1.00	48.7	66.9	85.1
09	1.21	42.8	59.1	75.4
10	2.17	36.0	48.4	60.7
11	3.61	30.4	37.3	44.1
12	2.98	23.5	29.5	35.5

STORMWATER MANAGEMENT STRATEGIES | B.3

On-Site Strategies

- Wall and Downspouts
 - Reducing the stormwater on the roof
- Vegetation
 - Absorbing stormwater
- Runoff water bio-swales
 - Captures stormwater on the North & South side



STORMWATER MANAGEMENT STRATEGIES | B.3

Soil Characteristics

Location:
Moscow, ID

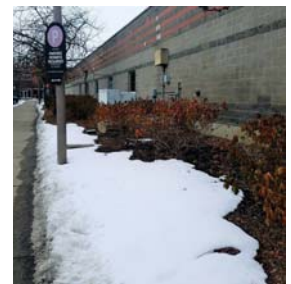
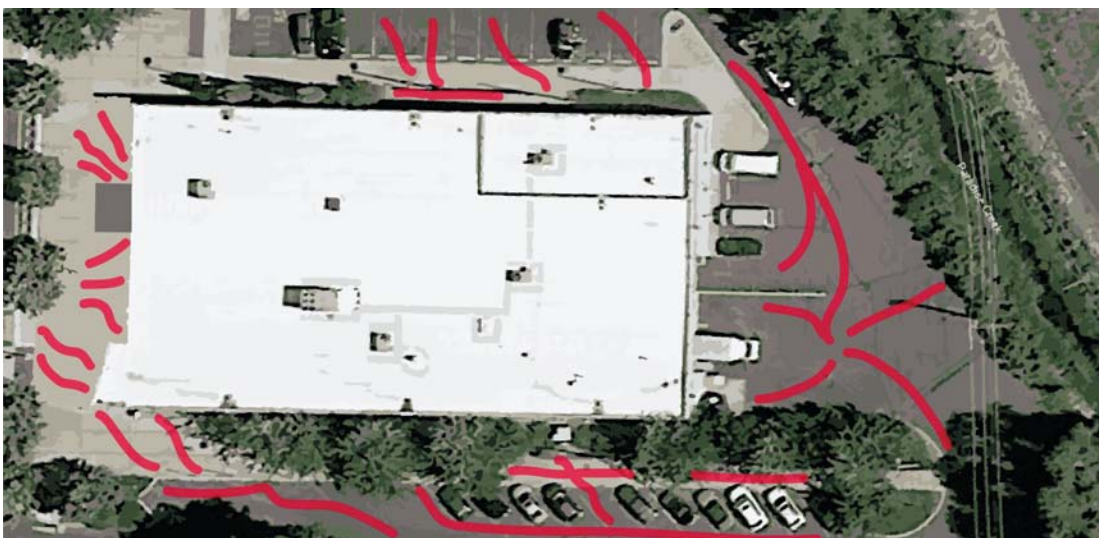
Soil Type:
Silt Loam, Silty Clay Loam

Drainage:
Somewhat Poorly Drained

Soil Types:

- Sandy
- Silty
- Clay
- Peaty
- Saline Soil

The Ideal Soil Type: Loam
The type of soil that gardeners love is loamy soil. It contains a balance of all three soil materials—silt, sand and clay—plus humus

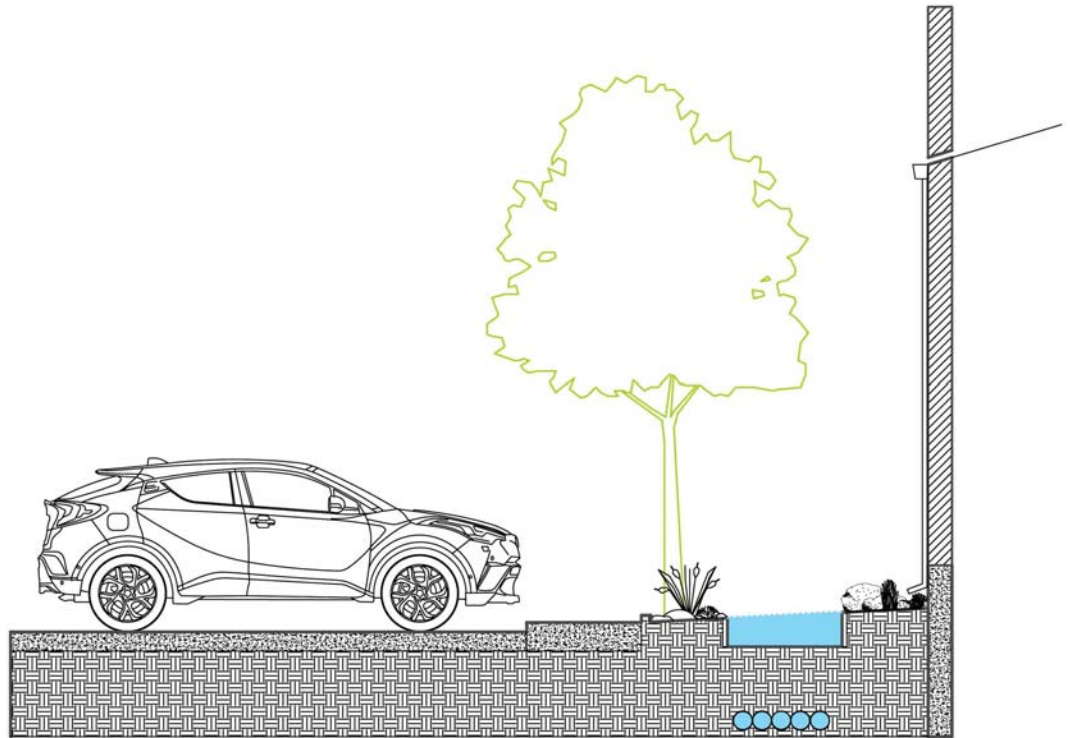


On-Site Problems

- Runoff Stormwater
 - Parking lots
 - Pedestrians Circulation
 - Water Pollution
- Bio-Swales
 - Slopes down into parking area
- Drainage
 - Downspout
 - Bark soil cover
- Vegetations
 - Better water treatment

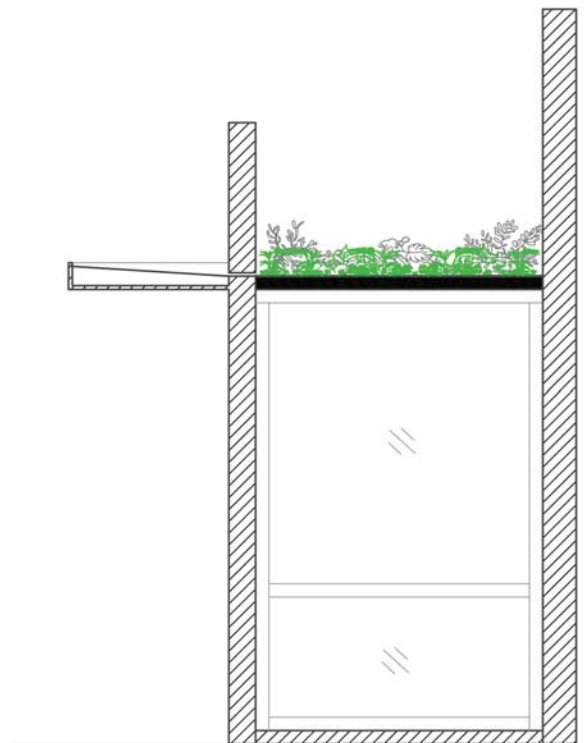
WATER CONSERVATION REDESIGN |

To eliminate issues of overflow on the South side of the building, a retention pond will be implemented throughout the swale.

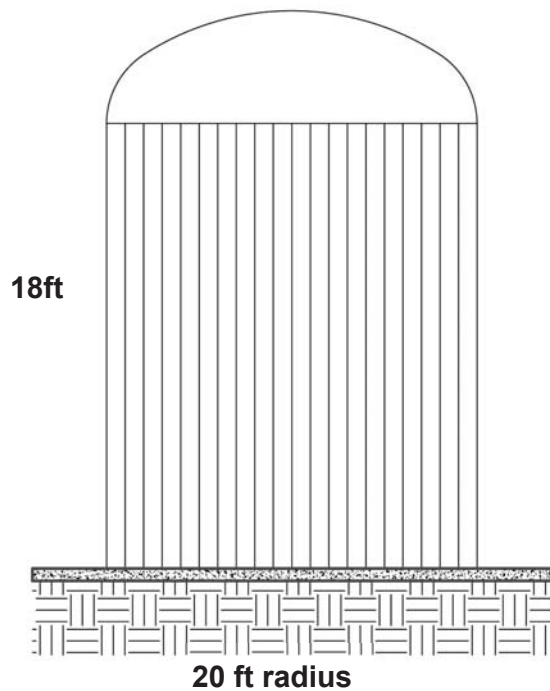


WATER CONSERVATION REDESIGN |

The small, Starbucks vestibule extending from the East side of the vandal store utilizes a single downspout for its drainage. Instead of this, we propose a green roof, water retention strategy that will prevent water overflow at street grade.

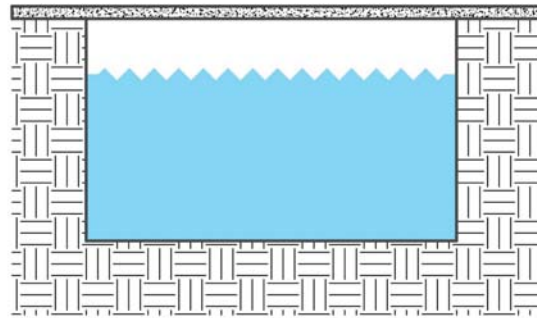


WATER-CONSERVING & CISTERN SIZING REDESIGN | InsideOut D4.5



Average monthly use: 4,960g daily x 31 days
 = **153,760g per month**
 Rainfall collected: (20,037sqft x 27.08in)/(2.15)
 = **252,373g collected annually - 21,031g monthly**

Cistern capacity: $G = 2C$, (2 x 21,031g) = **42,062g**
 Cistern volume: $V = G/7.48$, (42,062g/7.48) = **5,623 cubic ft**



WATER CONSERVATION DATA | C.1 & C.3

Conventional (FU) = 80

Conventional (GDF) = 4,960

Conservational (FU) = 23

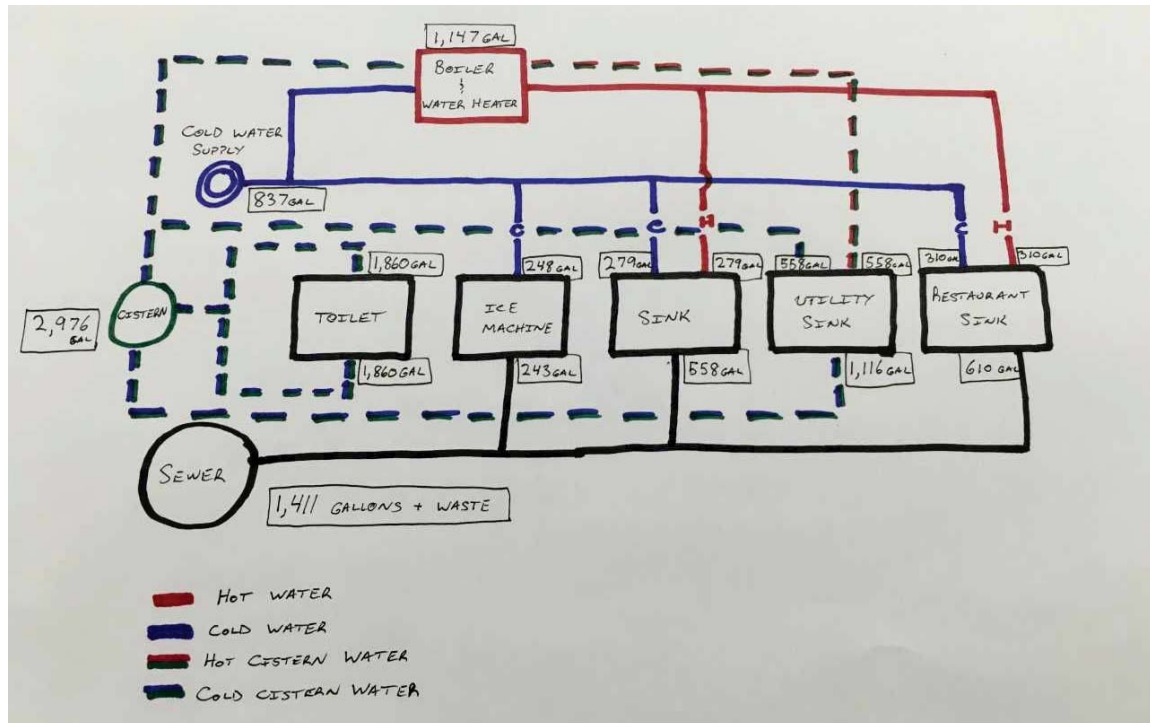
Conservational (GDF) = 1,426

Fixture	# of Fixtures	Gallons/Use	Cold	Hot	WSFU	Total FU
Toilet	3	Cistern	10	0	10	0
Aerated Sink	3	0.6 per min.	1.5	1.5	3	9
Utility Sink	3	Cistern	3	3	6	0
Ice Machine	1	3 per min	4	0	4	4
Restaurant Facet	1	1.42 per min	5	5	10	10
Total:	11					23

Fixture	Total FU	GDF
Toilet	0	0
Aerated Sink	9	558
Utility Sink	0	0
Ice Machine	4	248
Restaurant Facet	10	620
Total:	23	1,426

With the cistern fully providing water to the toilets and utility sinks, and by changing the regular sinks to aerated sinks, we are decreasing our GDF (gallons/day/fixture) down by 71.25%.

REDESIGN PERFORMANCE | C.1 & C.3



CONCLUSION

With the use of water conserving systems such as faucet aerators, low flush toilets, grey water recycling and a precipitation cistern collector, the Vandal Store's high city water usage can be greatly reduced. While the current monthly water usage sits at an enormous one-hundred and fifty-thousand gallons per month, our implemented water conservation strategies will lower that amount to roughly forty-thousand gallons per month - less than one third of the current water usage. As for drainage and overflow around the site, elements like a retention pond, coupled with a water retaining green roof, aid in more consistently diverting excess water from the site.



Thank You!

