

DUTCH BROS COFFEE SHOP

CASE STUDY #2



CARLOS AUCES
GAELLE SAWADOGO



BUILDING DESCRIPTION



- The building is located along North Main street (Highway 95) in Moscow, ID.
- It is a drive-thru chain for specialty coffees that is open 24/7.
- Since the establishment only makes and services drinks the volume of the building is relatively tiny, approximately 250 sq. ft.
- Dutch Bros. property is majority used as a service space for vehicles that is paved with asphalt





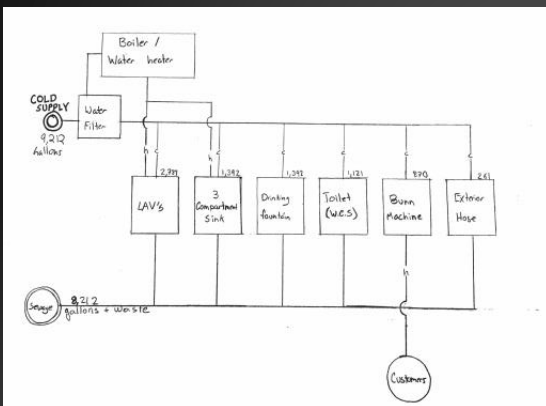
PERFORMANCE ANALYSIS

- Dutch Bros. is categorized under the “Wholesale non-durable goods” therefore GED (gallons per employee per day) = 87 per capita
- Per 16 employees working in a 24 hour period, the GED = 1,392 (total water usage)
- Due to the nature of a coffee shop the volume of water usage is high in comparison to the workspace.
- Average of 16 working employees per 24hrs.
- Ranging from 8-1 employees working at the same time period.

WATER FIXTURE INVENTORY (PEAK HOUR)			
Fixture Type	#	Usage (persons)	Recyclabe
High Flush W/C	1	3	No => Black water
Drinking Fountain	1	3	Yes => Grey water
Sink	2	8	Yes => Grey water
3 Compartment Sink	1	4	No => Black water
Water Filter	1	8	Yes => Grey water
Hose	1	1	No => Black water
Bunn Machine	1	4	Yes => Grey water

WATER FIXTURE INVENTORY (24 HOUR PERIOD)			
Fixture Type	#	Usage (persons)	Recyclabe
High Flush W/C	1	13	No => Black water
Drinking Fountain	1	16	Yes => Grey water
Sink	2	16	Yes => Grey water
3 Compartment Sink	1	16	No => Black water
Water Filter	1	16	Yes => Grey water
Hose	1	3	No => Black water
Bunn Machine	1	10	Yes => Grey water

PERFORMANCE ANALYSIS CONT.



Distribution Diagram

WASTE - WATER PRODUCTION			
Fixture Type	GPFU	WU (Gal/Day)	FU
High Flush W/C	1,121	1,121 Gal/Day	1
Drinking Fountain	1,392	1,392 Gal/Day	1
Sink	2,784	1,392 Gal/Day	2
3 Compartment Sink	1,392	1,392 Gal/Day	1
Water Filter	1,392	1,392 Gal/Day	1
Hose	261	261 Gal/Day	1
Bunn Machine	870	870 Gal/Day	1
Establishment GPFU	9,212		

Waste-Water Production

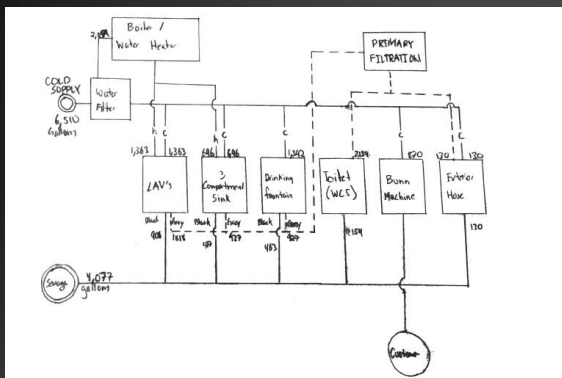


CONSERVATION STRATEGY ESTIMATE

Conservation Supply Fixture		
Fixtures	FU(cons)	Formula
Low Flush W/C	1.65	$(2.2)[(1.2)/(1.6)]$
Dual Flush W/C	1.76	$(2.2)[(1.28)/(1.6)]$
Drinking Fountain	0.44	$(.8)[(2.2)/(2.5)]$
Sink	5	$(5)[(2.2)/(2.2)]$
3 Compartment Sink	13.2	$(15)[(2.2)/(2.5)]$
Water Filter	-	-
Hose	-	-
Bunn Machine	-	-

Conservation Fixture Estimate			
Fixtures	FU(cons)	Occupants	Gal/Day
Toilet	1.65	16	26.4
Drinking Fountain	0.44	16	7.04
Sink	5	16	80
3 Compartment Sink	13.2	16	211.2
Water Filter	-	-	-
Hose	-	-	-
Bunn Machine	-	-	-

WATER CONSERVING SYSTEM STRATEGY



Potential Redesign Distribution Diagram

- Design Changes:
- The one and only high flush toilet will be replaced with either a dual flush or low flush fixture.
- Low flow faucet sinks will replace the current sinks.
- An aerator screen will be added to the 3 compartment sink.
- Grey water treatment filter will be added to recycle sink water into toilet water.

With the design changes listed above, it will allow for a better conservation of energy.



OVERVIEW OF CONVENTIONAL AND CONSERVING SYSTEMS

- From D4.2 and D4.3 of inside out, we can conclude that:
 - Dutch-Bros currently has no conservation system for water use
 - They use standard fixtures for toilets, lavatories and sinks.



STORM-WATER SURVEY/ PRECIPITATION DATA

- Storm water control devices
 - (2) Downspouts
 - (1) Splashguard
 - (1) Drain into ground
 - (1) Parking lot drain

Moscow, Idaho	
Month	Precipitation (in)
January	3.15 in
February	2.36 in
March	2.68 in
April	2.52 in
May	2.52 in
June	1.89 in
July	0.98 in
August	0.98 in
September	1.22 in
October	2.17 in
November	3.62 in
December	2.99 in

Precipitation Data



Storm-Water Survey



BUILDING REDESIGN



- Dual Flush
 - “If its yellow let it mellow if its brown flush it down” – Bruce Haglund



- Aerator
 - Allows air to be mixed with the water therefore providing the same benefits at half the water usage, or more



- Low Flush
 - Uses air to pressurize the water downwards.
 - Uses an average of 1.2 Gallons



CISTERN SIZING



- Average Water Use = Daily use x 31
 - = 1,392 x 31
 - = 43,152 gallons
- Average Annual Rain Fall = 27.08
- Annual Collection = 27.08 x 388 sqft
 - = 10,487.64 cubic feet needed
- Potential Dimensions:
 - 15'x11'x10' = 1,650
 - 12'x13'x10' = 1560
 - Cylinder cistern with 6.5' radius and 12' tall (1,592)





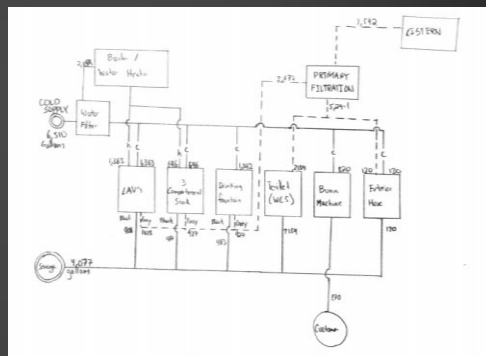
WATER CONSERVATION RE-DESIGN

- With the redesign of the building the amount of water being pulled from the city is 6,510 gallons versus 9,212 which is a saving of 2,702 gallons.
- Water returned to the sewer with the redesign is 4,077 gallons versus 8,212 which is a saving of 4,135 gallons.

WASTE - WATER PRODUCTION			
Fixture Type	GPFU	WU (Gal/Day)	FU
Low Flush W/C	760	760 Gal/Day	1
Drinking Fountain	696	696 Gal/Day	1
Sink	1,363	1,392 Gal/Day	2
3 Compartment Sink	696	696 Gal/Day	1
Water Filter	6,510	6,510 Gal/Day	1
Hose	130	130 Gal/Day	1
Bunn Machine	870	870 Gal/Day	1

REDESIGN PERFORMANCE ANALYSIS

- The cistern and primary filtrations eliminate the amount of water need while resupplying grey water to applicable fixtures.

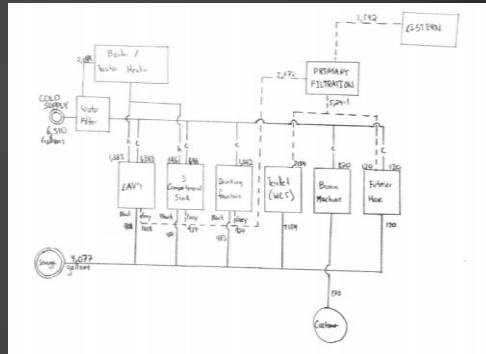


New Redesign Distribution Diagram



REDESIGN PERFORMANCE ANALYSIS

- The cistern and primary filtrations eliminate the amount of water need while resupplying grey water to applicable fixtures.



New Redesign Distribution Diagram



CONCLUSION

- Dutch Bros currently uses standard fixtures and does not save water.
- With the new re-design of low flow fixtures and by adding cisterns we were able to lower some of the water conservation use.
- Intake numbers from the city has been reduced by 1/3.
- Return water to the sewage system has been reduced by 1/2.



CONCLUSION

- SEVERAL DUTCH BROS DRINKS WERE HARMED IN THE MAKING OF THIS LAB PRESENTATION!

