Dell Seton Medical Center at the University of Texas

Water Conservation Design Strategies

Central Texas Water Conservation Symposium
DIVE DEEP INTO WATER CONSERVATION
February 11, 2015

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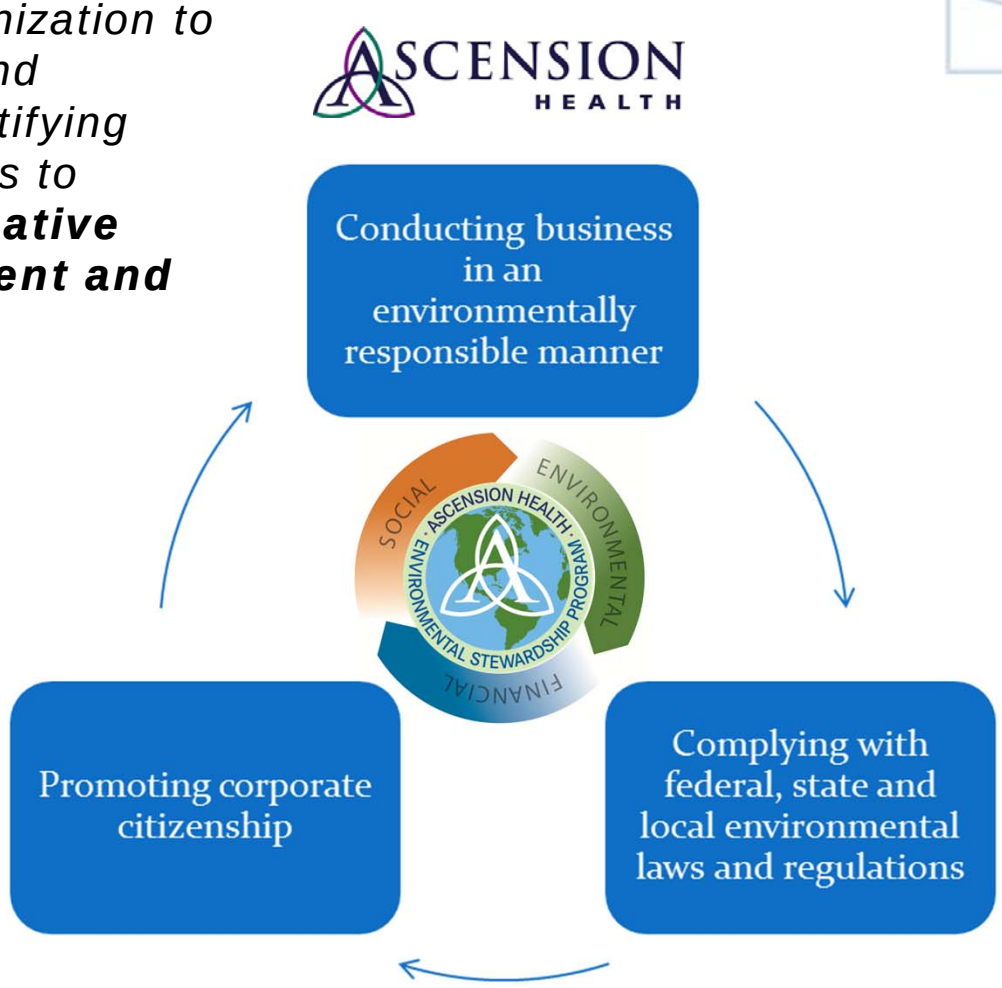
Seton's Commitment to Environmental Stewardship

Ascension Health's Environmental Stewardship Plan

"Provides a framework for the organization to act as stewards of God's creation and operate at our full potential by identifying and implementing practical solutions to ***minimize the organization's negative impact on the natural environment and the communities we serve."***

Categories:

- Leadership and Infrastructure
- Education and Communication
- Energy Efficiency
- Water Conservation
- Waste Management and Reduction
- Environmentally Preferable Purchasing
- Sustainable Site and Transportation
- Chemical Management
- Food Systems



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Seton's Commitment to Environmental Stewardship

Sustainable Design, Construction & Operations

dell children's medical center of central texas
A member of the Seton Healthcare Family

LEED PLATINUM 2013

AUSTIN ENERGY GREEN BUILDING

PRACTICE GREENHEALTH 2013 PARTNER FOR CHANGE AWARD

Community Outreach

CleanMed2013 Creating Healing Environments

GREENBUILD INTERNATIONAL CONFERENCE AND EXPO

The SUSTAINABLE HEALTHCARE Mission
Patients • Planet • Profit

SXSW ECO AUSTIN • TEXAS
AMD
kab KEEP AUSTIN BEAUTIFUL
Lady Bird Johnson Wildflower center

Partnerships / Affiliations

U.S. GREEN BUILDING COUNCIL MEMBER

PRACTICE Greenhealth MEMBER

AUSTIN RESOURCE RECOVERY

AUSTIN ENERGY

ENERGY STAR PARTNER

Better Buildings CHALLENGE
U.S. DEPARTMENT OF ENERGY

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Dell Seton Medical Center at the University of Texas

Four Philosophical Cornerstones will guide its operations:

- Improving medical care
- Respect and dignity for patients and their families
- Educating the next generation of clinicians
- Innovating through both practice and research

Courtesy of HKS Architects

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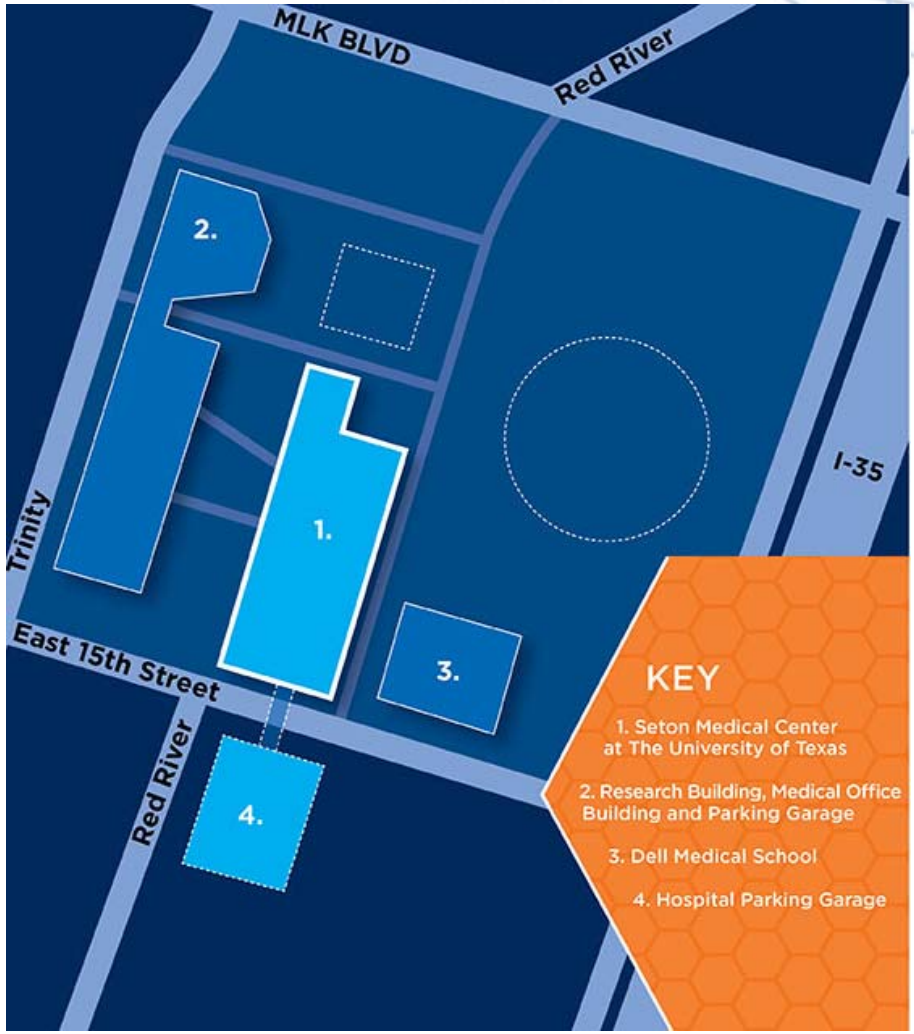
Dell Seton Medical Center at the University of Texas

- Teaching Hospital for the University of Texas' Dell Medical School
- $295 Million Construction Cost
- Completion Early 2017
- 517,247 GSF
- Level 1 Trauma Center
- 13 Operating Rooms, 2 Cath Labs
- 211 Licensed Beds

Professional Consultants

- HKS, Inc.: Architecture, Interiors, Structural Engineers
- CCRD Partners: MEP Engineers
- DWG: Landscape Architects
- Garza Bury: Civil Engineers
- L2M: Food Service Consultant
- HSG: Medical Equipment
- Facility Interiors: Furniture
- CMPBS: Sustainable Design Consultant
- JE Dunn: General Contractor



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Dell Seton Medical Center at the University of Texas

- Seton Healthcare Family You Tube Channel link: https://www.youtube.com/watch?v=T_riRTlh8QU

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Dell Seton Medical Center at the University of Texas

Main Lobby

Chapel

Renderings courtesy of HKS

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Dell Seton Medical Center at the University of Texas

Patient Tower Corridor

Patient Room

Renderings courtesy of HKS

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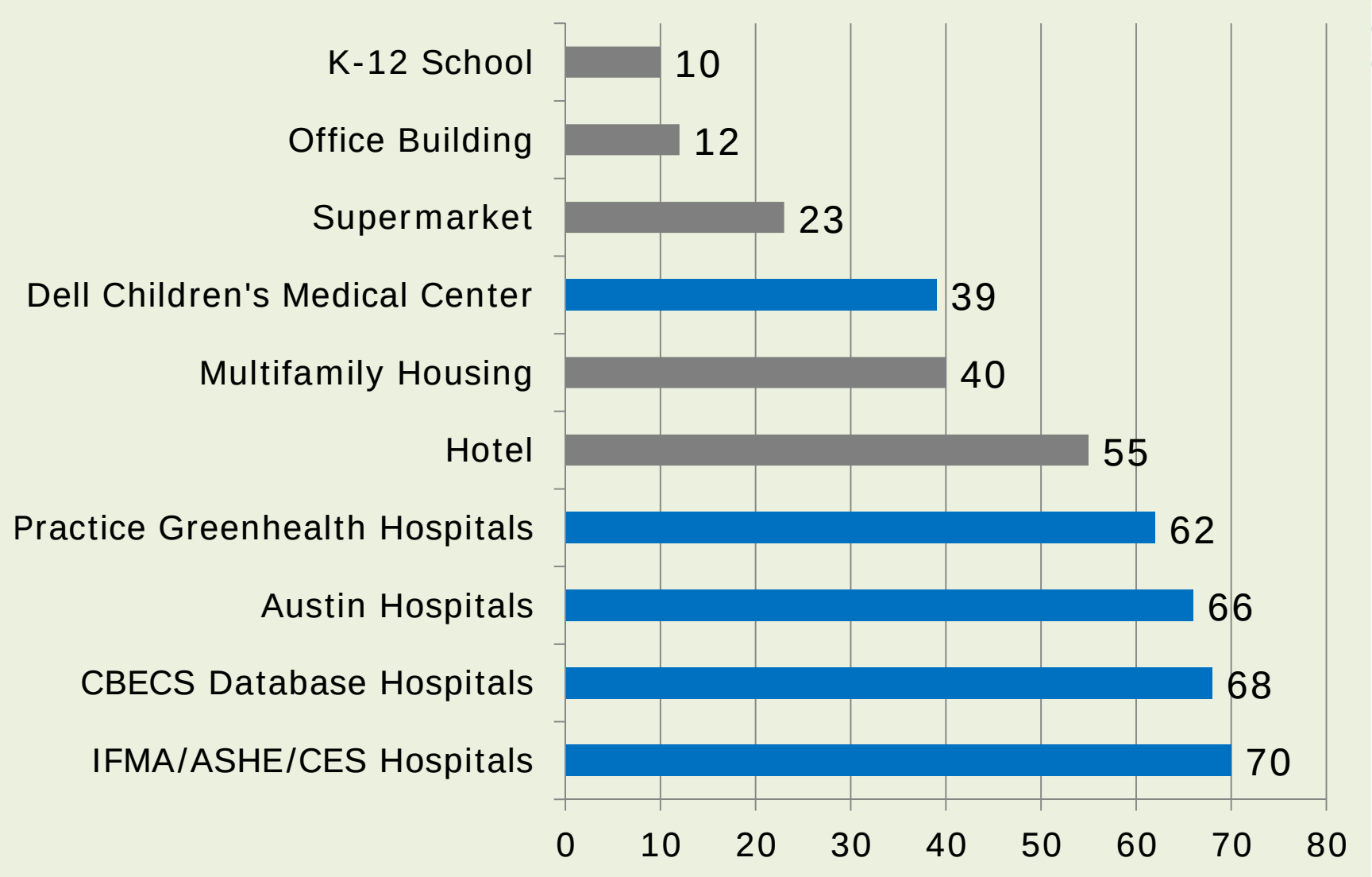
Building Water Use Intensity: Gallons/SF/yr



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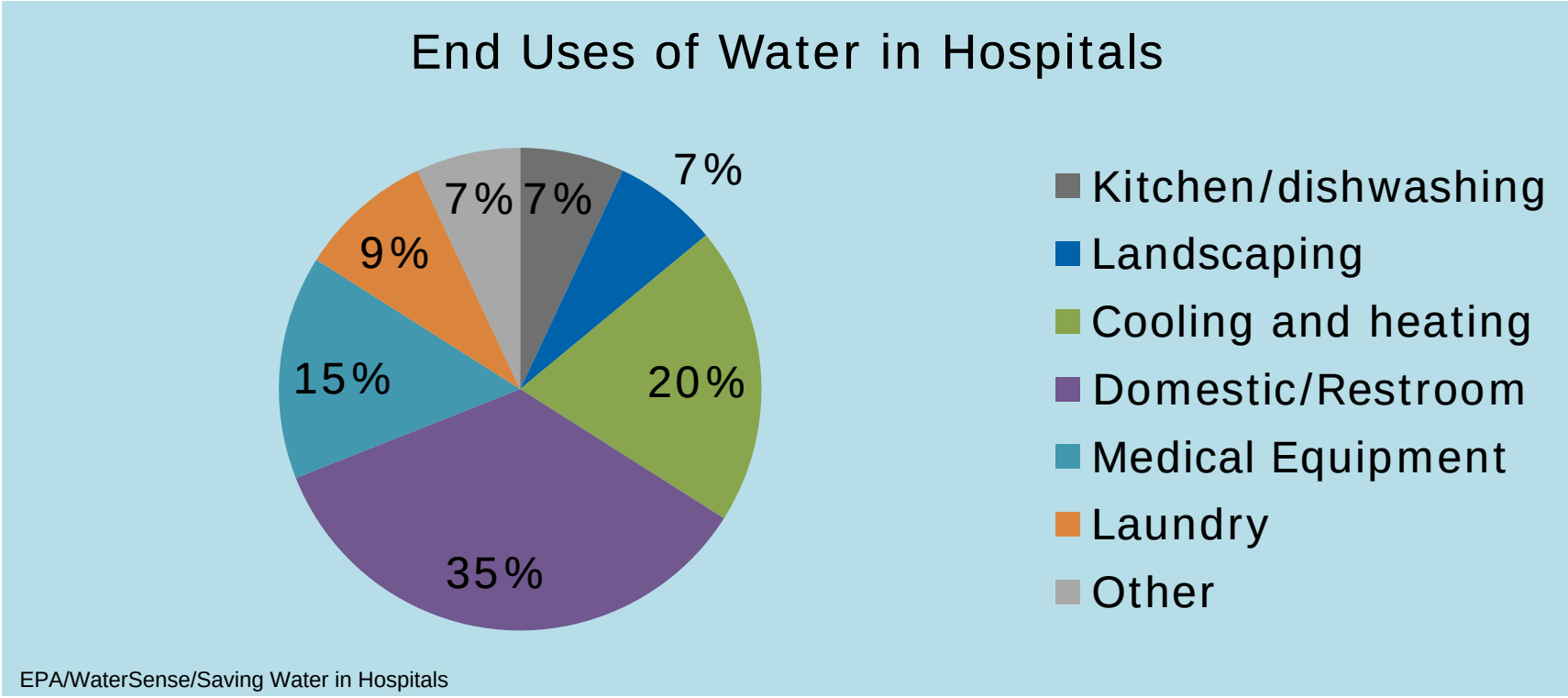
Water Use in Hospitals

- The “water footprint” of a hospital is defined as the total volume of freshwater that is used to run and support the hospital.
- Healthcare facility water use comprises 7% of total water use in commercial and institutional facilities.



EPA/WaterSense/Saving Water in Hospitals

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Water Conservation in Hospitals

- Challenges
  - Infection Control Guidelines
  - Graywater use prohibited
  - Expense of metering
- Best Practices: Existing Facilities
  - Repair leaks, adjust equipment
  - Upgrade to high-efficiency fixtures and equipment
  - Install sub-meters
- Best Practices: New Construction
  - Water-efficient fixtures and equipment
  - Awareness of energy-water nexus
  - Integrated, holistic design of systems
  - Rainwater, condensate capture and re-use

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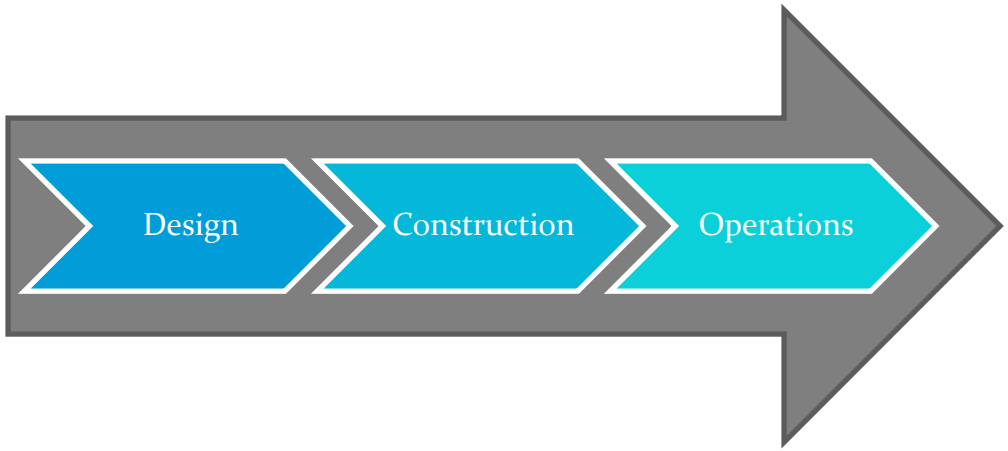
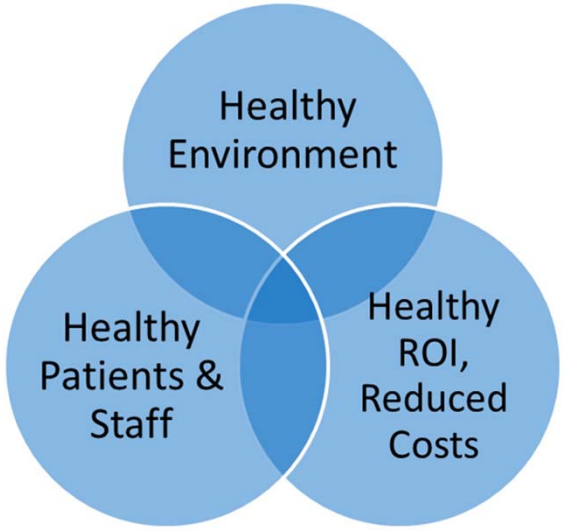
DSMCaUT's Sustainable Design

Health Mission Statement (required for LEED Healthcare):

"Dell Seton Medical Center at The University of Texas will steward the health and well-being of patients, families, associates and the broader community through best practices in sustainable design, construction and operations, honor connections to nature and ecosystem vitality, promote environmental health, facilitate the achievement of the Seton Healthcare Family mission and create an exemplary environment to educate future health care practitioners."





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DSMCaUT's Sustainable Design

ASCENSION HEALTH

ENERGY STAR PARTNER

Better Buildings CHALLENGE U.S. DEPARTMENT OF ENERGY

LEED 2009 FOR HEALTHCARE

THE UNIVERSITY OF TEXAS AT AUSTIN

THE SUSTAINABLE SITES INITIATIVE™

U.S. GREEN BUILDING COUNCIL LEED SILVER USGBC

AUSTIN ENERGY®

AUSTIN ENERGY GREEN BUILDING™

ENERGY & WATER CONSERVATION REBATES

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Water Use Reduction in LEED-Healthcare: Water Efficiency Credit Category

6	2	1	WATER EFFICIENCY		Possible Points:	9
Y			Prereq 1	Water Use Reduction—20% Reduction		
Y			Prereq 2	Minimize Potable Water Use for Medical Equipment Cooling		
1			Credit 1	Water Efficient Landscaping—No Potable Water Use or No Irrig	1	
2			Credit 2	Water Use Reduction: Measurement & Verification	1 to 2	
1	2		Credit 3	Water Use Reduction	1 to 3	
1			Credit 4.1	Water Use Reduction—Building Equipment	1	
		1	Credit 4.2	Water Use Reduction—Cooling Towers	1	
1			Credit 4.3	Water Use Reduction— Food Waste Systems	1	

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DSMCaUT's Water Conservation Strategies

1. Low-flow fixtures: toilets, faucets, showerheads
2. Efficient potable water irrigation systems and native, drought-tolerant, low-water use plants in Patient and Associate Courtyards; Reclaimed AHU condensate water irrigation at Main Entrance Plaza
3. Water-efficient medical equipment
4. Water-efficient kitchen equipment
5. Water meters for monitoring and tracking
6. UT Medical District CHP Plant and heat pump chillers: energy efficiency reduces cooling tower water consumption

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Low-flow Plumbing Fixtures

Prerequisite = 20% reduction; Credit requirements = 30 – 40%

- Showerheads, urinals, private room faucets are low-flow compared to code
- Public faucets and dual flush toilets = code

- Toilets: High-efficiency, dual-flush, 1.6/1.1 gpf = 1.28 gpf
- Urinals: High-efficiency, 0.25 gpf
- Flush Fixtures Total Water Use Reduction = 19.9%

- Public Lavatory Faucets: 0.5 gpm
- Patient Room Lavatory Faucets: 1.0 gpm
- Showerheads: 1.3 gpm
- Flow Fixtures Total Water Use Reduction = 44.75%

- **Total Plumbing Fixture Water Use Reduction = 37.57%**

Table WEp1-5. Flush & Flow Fixtures Summary

Total calculated fixture water use annual volume, baseline case (kGal)	4,231.25
Total calculated fixture water use annual volume, performance case (kGal)	2,641.53
Percent reduction of water use in all fixtures (%) Must be 20% to document ompliance	37.57

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Low-flow Plumbing Fixtures

- LEED – Healthcare Water Use Reduction Calculations

Fixture Groups							Flush Rate (GPF)		Annual Water Consumption (kGal)	
Select	Display	Fixture ID[1]	Fixture Family	Fixture Type	Default	Total Daily Uses [2]	Baseline	Installed[3]	IPC/UPC Baseline	Performance Case
Staff-Weekd	Staff-Weekd	WC-1	Water Closet	HET, Dual Flush	☐	240	1.6	1.28	99.84	79.87
Staff Year Rc	Staff Year Rc	WC-1	Water Closet	HET, Dual Flush	☐	800	1.6	1.28	467.2	373.76
Vistors/Stude	Vistors/Stude	WC-1	Water Closet	HET, Dual Flush	☐	160	1.6	1.28	93.44	74.75
Outpatients	Outpatients	WC-1	Water Closet	HET, Dual Flush	☐	57	1.6	1.28	33.29	26.63
Inpatients - I	Inpatients - I	WC-2	Water Closet	IPC/UPC (Conventional)	☒	120	1.6	1.28	70.08	56.06
Inpatients - U	Inpatients - U	WC-2	Water Closet	IPC/UPC (Conventional)	☒	60	1.6	1.28	35.04	28.03
Inpatients - I	Inpatients - I	WC-2	Water Closet	IPC/UPC (Conventional)		60	1.6	1.28	35.04	28.03
Inpatients -	Inpatients - M	WC-1	Water Closet	IPC/UPC (Conventional)		655	1.6	1.28	382.52	306.02
Inpatients - D	Inpatients - D	WC-4	Water Closet	IPC/UPC (Conventional)		5	1.6	1.6	2.92	2.92
Inpatients - B	Inpatients - B	WC-3	Water Closet	IPC/UPC (Conventional)		5	1.6	1.6	2.92	2.92
			Urinal	IPC/UPC (Conventional)		0	1	1	0	0
Total calculated flush fixture water use annual volume, baseline case (kGal)								1,222.29		
Total calculated flush fixture water use annual volume, performance case (kGal)								978.99		
Percent reduction of water use in flush fixtures (%)								19.91		

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Low-flow Plumbing Fixtures

- Flush and Flow Fixture Annual Cost Savings

Customer Account Charge		Off Peak Volume Charge (Baseline Case)		
Charge ($/month)	Charge ($/year)	Charge ($/1,000 Gal)	Volume (kGal)	Charge ($/year)
$ 613.00	$ 7,356.00	$ 5.98	4,231.25	$ 8,434.29
Charge (Baseline Case) Total Charge ($/year)		Peak Volume Charge (Baseline Case)		
		Charge ($/1,000 Gal)	Volume (kGal)	Charge ($/year)
$ 34,351.38		$ 6.58	4,231.25	$ 18,561.08
Charge (Performance Case) Total Charge ($/year)		Off Peak Volume Charge (Performance Case)		
		Charge ($/1,000 Gal)	Volume (kGal)	Charge ($/year)
$ 24,208.96		$ 5.98	2,641.53	$ 5,265.45
Difference in Total Charge Baseline - Performance ($/year)		Peak Volume Charge (Performance Case)		
		Charge ($/1,000 Gal)	Volume (kGal)	Charge ($/year)
$ 10,142.41		$ 6.58	2,641.53	$ 11,587.51

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Irrigation Systems & Landscaping

Credit requirements = No potable water for irrigation (exception for when health regulations prohibit non-potable water)

Total Planted Landscape Area (green roof): 8,244 SF

- Front Entrance Plaza
- Patient Courtyard
- Associate Courtyard

Water reduction strategies from a landscape perspective:

1. Condensate harvesting for ground level site landscaped areas.
2. All native and adapted plant species selections (trees, shrubs, and groundcovers) to reduce water demand and increase ability to thrive on natural rainfall.
3. Weather based irrigation controller to achieve maximum efficiency of irrigation cycles. (Putting the water where and when it's most needed and most effective based on evapotranspiration, wind, and rainfall.)
4. Drip and bubbler irrigation products to maximize water to soil contact and reduce water loss due to evaporation and overspray.

Potable Water Use	Gals/month	Landscaping Type
Baseline Case	42,806	Turf Grass
Performance Case	11,740	Native Landscaping
Total Reduction	**73% / 100%**	

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Water-efficient Medical Equipment

Prerequisite = 20% reduction; Credit requirements = 30 – 40%

- Ice makers – 2 types
- Dishwasher
- Clothes Washer
- Central Sterile Equipment

1. WATER USE: For water-using equipment, fill-in actual water use; do not exceed maximum water use indicated. Attach documentation verifying water use, ENERGY STAR, etc. ***THE PROJECT GOAL IS TO ACHIEVE 35% - 40% REDUCED WATER USE -- PLEASE SPECIFY LOW WATER USING EQUIPMENT THAT USES LESS WATER THAN THE MAXIMUM ALLOWED.***

Equipment Type	Maximum Allowable Water Use Per Unit / Other Requirements	ACTUAL WATER USE per unit	Number of Units	VERIFY DOCUMENTATION
Commercial Ice Machines				
All water-cooled and air-cooled units:				
Ice Machine	<25 gal/100 lb ice - ENERGY STAR or equiv.	**12 gal/100 lb**		
Countertop Ice Maker	<25 gal/100 lb ice - ENERGY STAR or equiv.	**12.6 gal/100 lb of ice**		
water-cooled ice machine	Closed loop cooling only	**N**		
water-cooled ice machine once through cooling	Not allowed.	**N**		
Residential Dishwashers				
	ENERGY STAR or equiv.	**Energy Star**		
Clothes Washers				
Residential models	ENERGY STAR or equiv.	**Energy Star**		
Central Sterile Equipment				
Steam Sterilizer, 60-inch	6.3 gal/tray - no venturi vacuum; closed loop or air cooled	**5.75 (0.21 w/ CHW Option)**		
Reverse-Osmosis water purifier	75% Recovery			
Other Equipment				
	Performance baseline based on industry standards			

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Water-efficient Kitchen Equipment

Credit requirements: Reduce or eliminate use of potable water for non-potable process use through specific equipment standards. (Also contributes to overall Water Use Reduction credits)

1. WATER USE: For water-using equipment, fill-in actual water use; do not exceed maximum water use indicated. Attach documentation verifying water use, ENERGY STAR, etc. ***THE LEED for Healthcare PROJECT GOAL IS TO ACHIEVE 35% - 40% REDUCED WATER USE -- PLEASE SPECIFY LOW WATER USING EQUIPMENT THAT USES LESS WATER THAN THE MAXIMUM ALLOWED. AEGB requires compliance with maximum water use or other requirements as identified for each fixture.***

Equipment Type	Maximum Allowable Water Use Per Unit / Other Requirements	ACTUAL WATER USE per unit	Number of Units	VERIFY DOCUMENTATION
Commercial Dishwashers				
flight type	180 gal/hr (LEED-HC) AND ENERGY STAR or equiv. (AEGB)	**58 gph**		
Commercial Ice Machines				
all water-cooled and air-cooled units	<25 gal/100 lb ice - ENERGY STAR or equiv.	**12.5 gal per 100 lbs. Energy Star rated**		
water-cooled ice machine	Closed loop cooling only	**None used**		
water-cooled ice machine once through cooling	Not allowed.	**None Used**		
Food Steamers				
boiler type steam cooker - batch cooking	2 gal/hr/pan			
boilerless type steam cooker - high production/cook to order	5 gal/hr/pan	**4 gph Energy Star Rated**		
Combination Ovens				
counter-top, stand or roll-in model	1.5 gal/hr/pan	**.62 gph x (2) units during cooking mode**		
Pre-rinse Spray Valves				
ALL	1.3 gpm	0.65		
Food Waste Systems				
Scrap Collector / Pulper	2 gpm makeup water	**2 gpm**		
Strainer basket	2 gpm - no additional water use			
Electric garbage disposals	NOT ALLOWED	**None used**		
Other Equipment				
	Performance baseline based on industry standards			

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Water Consumption Metering

Credit requirements: Install meters to track various water uses for a period of one year minimum.

Meters will be installed to track the following water uses:

1. Incoming water to the building
2. Purified water systems
   a. Central sterile and processing department water treatment
   b. Laboratory water treatment
   c. Dialysis water treatment
3. Water use in dietary department: Cold water, hot water
4. Outdoor irrigation systems
   a. Retention tank water irrigation
   b. Courtyard irrigation
5. Water use in laboratory: Cold water, hot water
6. Closed-loop hydronic systems makeup water
   a. Heating hot water
   b. Chilled water
7. Cold water makeup for domestic hot water systems

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UT District CHP Plant & Heat Pump Chillers

- UT will construct a new high-efficiency Combined Heat and Power (CHP) plant to serve the new Medical District.
- DSMCaUT will connect to the UT Medical District chilled water and heating water loops to provide air conditioning utilities to the hospital.
  - Two 150 ton heat pump chillers will connect up to both the chilled and heating water loops inside the hospital central plant to enhance the overall energy efficiency of the hospital.
  - Traditional Cooling Towers vs. Heat Pump Chillers: Heat pump chiller technology rejects building heat gains from the fenestration and its occupants by pumping it into the heating hot water system which is used to heat patient care areas and to make domestic hot water.

Water efficiency is achieved by:

- The energy efficiency of the hospital HVAC system is estimated at greater than 25% better than required by LEED referenced standards and City of Austin Energy Code (IECC). Approximate water savings = 60,000 gallons/year.
- The heat pump chillers create chilled water and reject heat into the heating water loop in lieu of using cooling towers and city water as the heat rejecting medium. Approximate water savings = 3,000,000 gallons/year.

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Projected Water Reduction & Operational Cost Savings

Water Conservation Design Strategy	Gallons/ year saved	% reduction	$ Cost savings
Low-flow fixtures: toilets, faucets, showerheads	1,589,000	37%	$10,142.41
Efficient potable water irrigation systems and native, drought-tolerant, low-water use plants in Patient and Associate Courtyards; Reclaimed AHU condensate water irrigation at Main Entrance Plaza	372,792	73%	$2,341.13
Water-efficient medical equipment	1,059,063	35–40%	$6,650.91
Water-efficient kitchen equipment	494,229	35–40%	$3,103.76
Water meters for monitoring and tracking			
UT Medical District CHP Plant and heat pump chillers	3,060,000		$19,216.80
Totals	**6,575,084**		**$41,455.01**

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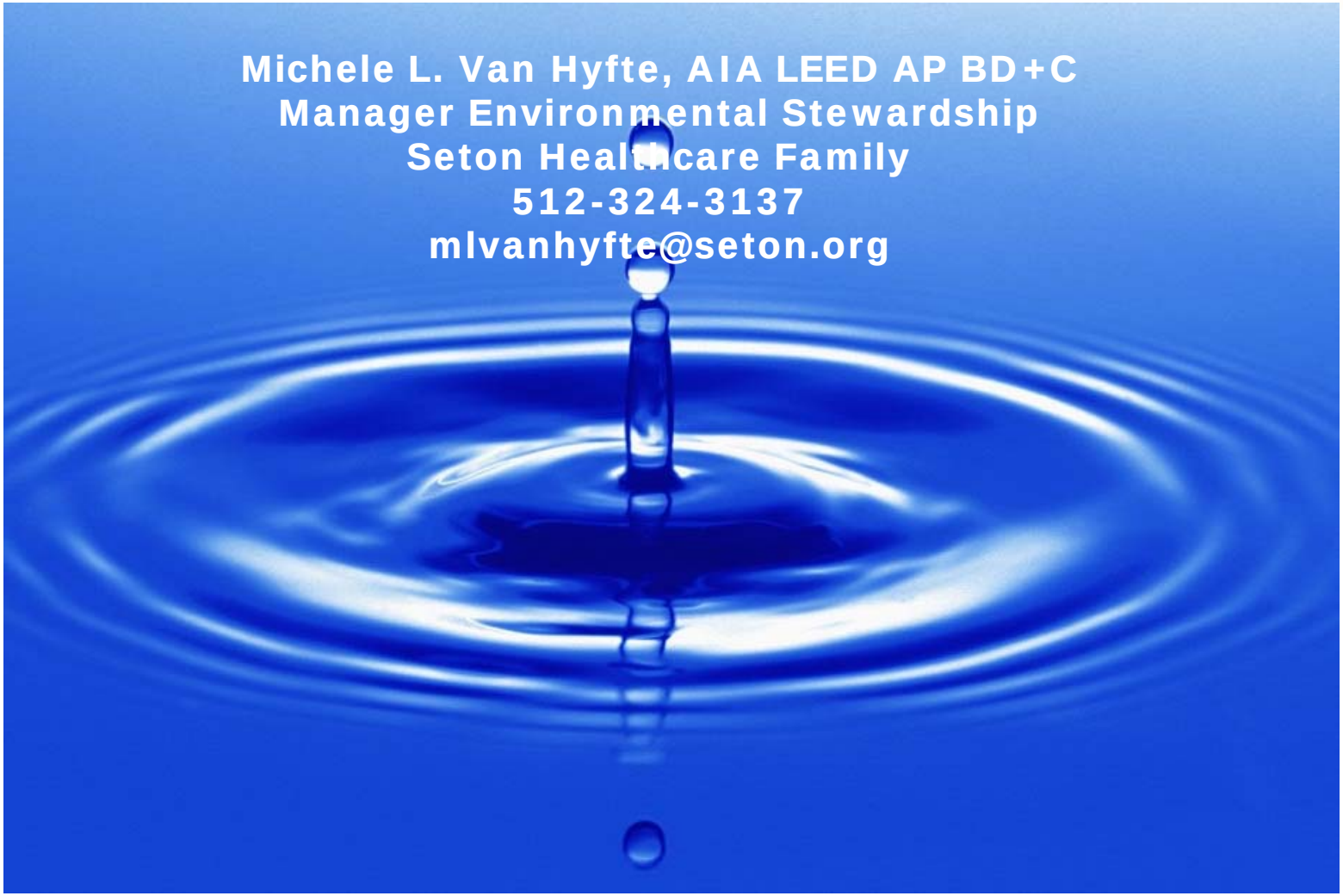
Thank you!



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