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Academy of
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Operating Room (OR) Turnover Time

September 10, 2019

Ionel Petrus and Cindy Beckham



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September 10, 2019

Moderated by: Yvonne Nagy



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Masters Studio

As part of the Academy's multi-channel, on-line approach, these sessions provide emerging and experienced professionals with convenient and economical opportunities to develop their chosen area of interest.

The Masters Studio sessions are tailored to provide healthcare design professionals with sufficient exposure to jump-start interest in wanting to learn more.



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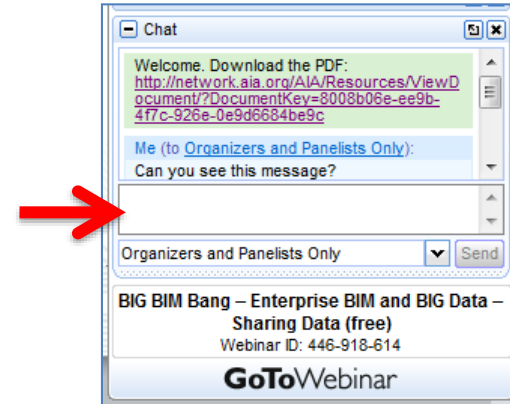
A link will be provided in the chat box and included in a follow-up email one (1) hour after the webinar to the individual who registered your site.

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Submit a question to the moderator via the chat box.

Content-related questions will be answered during the Q&A portion, at the end of the presentation, as time allows. Any questions not answered during Q&A, will be answered and posted online within two (2) weeks.

Tech support questions will be answered by AIA staff promptly.





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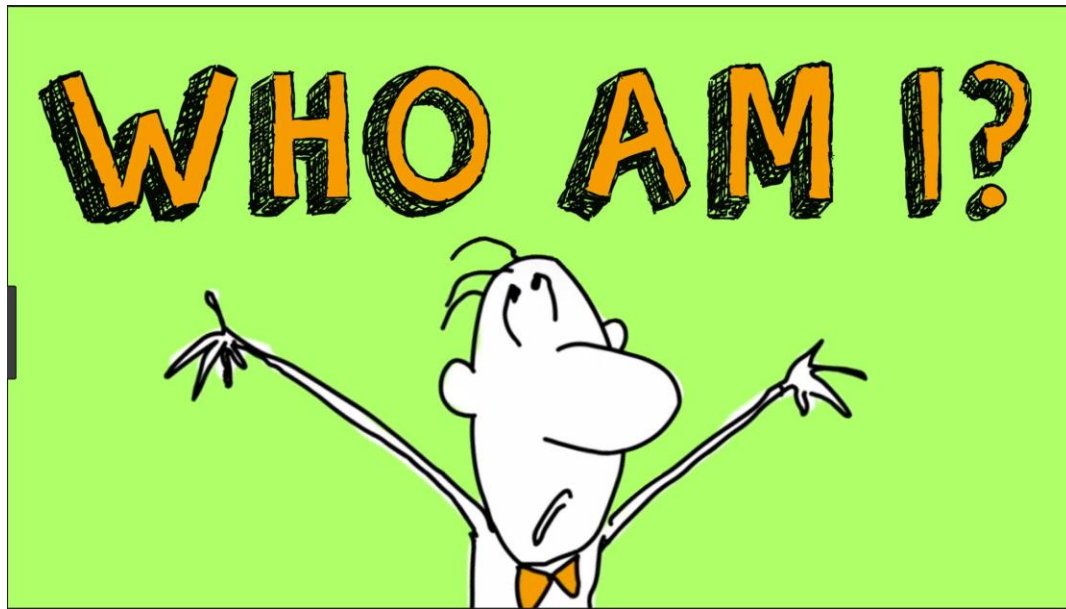




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IT IS **ALL** ABOUT THE PATIENTS





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.... AND STAFF



Quality of care
increased by
up to
20%

Intent to stay
increased
by
29%

Nurse
employment
increased by
25%

HAPPY NURSES LEAD TO HAPPY PATIENTS

According to the National Database of Nursing Quality Indicators, when nurse job employment and intent to stay at the job increase, patient outcomes improve. The following measurements were observed during a 2-year period.



87
percent

Rate of infection
decreased by **87%**



17
percent

Fall-related injuries
decreased by **17%**

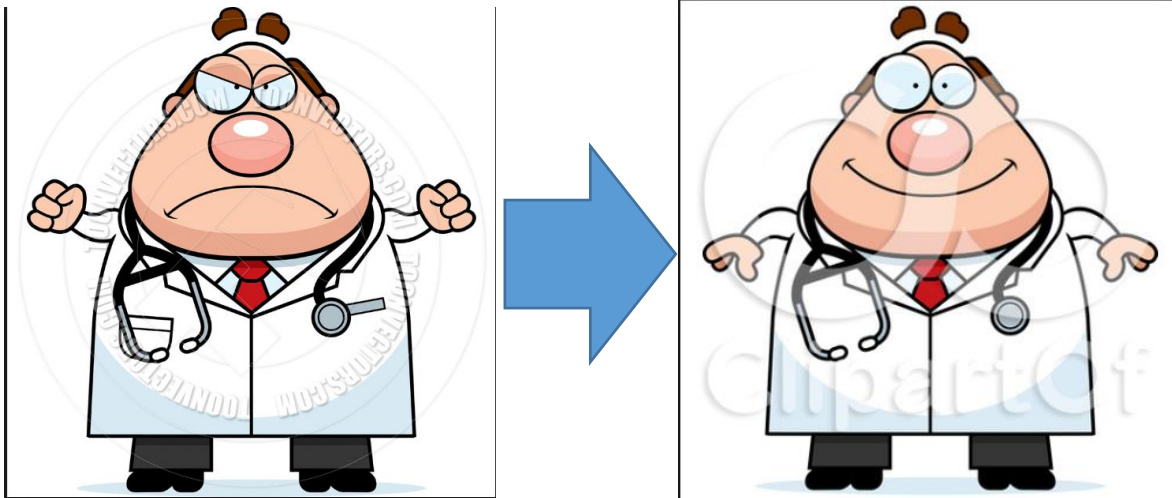


59
percent

Pressure ulcer rates
decreased by up to **59%**



.... AND DOCTORS





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TO GET STARTED....

STANDARD

ANSI/ASHRAE/ASHE Standard 170-2017

(Supersedes ANSI/ASHRAE/ASHE Standard 170-2013)

Includes ANSI/ASHRAE/ASHE addenda listed in Appendix C

Ventilation of Health Care Facilities



ASHRAE 170

eLibrary > ASHRAE Standard 170-2017 - Ventilation of Health Care Facilities (ANSI/ASHRAE/ASHE Approved)

ASHRAE Standard 170-2017 - Ventilation of Health Care Facilities (ANSI/ASHRAE/ASHE

11

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TOC

Table 7.1 Design Parameters—Hospital Spaces

Function of Space	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
SURGERY AND CRITICAL CARE							
Critical and intensive care	NR	2	6	NR	No	30–60	70–75/21–24
Delivery room (Caesarean) (m), (o)	Positive	4	20	NR	No	20–60	68–75/20–24
Emergency department decontamination	Negative	2	12	Yes	No	NR	NR
Emergency department exam/treatment room (p)	NR	2	6	NR	NR	Max 60	70–75/21–24
Emergency department public waiting area	Negative	2	12	Yes (q)	NR	Max 65	70–75/21–24
Intermediate care (s)	NR	2	6	NR	NR	Max 60	70–75/21–24
Laser eye room	Positive	3	15	NR	No	20–60	70–75/21–24
Medical/anesthesia gas storage (r)	Negative	NR	8	Yes	NR	NR	NR
Newborn intensive care	Positive	2	6	NR	No	30–60	72–78/22–26
Operating room (m), (o)	Positive	4	20	NR	No	20–60	68–75/20–24
Operating/surgical cystoscopic rooms (m), (o)	Positive	4	20	NR	No	20–60	68–75/20–24
Procedure room (o), (d)	Positive	3	15	NR	No	20–60	70–75/21–24
Radiology waiting rooms	Negative	2	12	Yes (q), (w)	NR	Max 60	70–75/21–24
Recovery room	NR	2	6	NR	No	20–60	70–75/21–24



ASHRAE 170

- m. National Institute for Occupational Safety and Health (NIOSH) criteria documents⁹ regarding occupational exposure to waste anesthetic gases and vapors and control of occupational exposure to nitrous oxide indicate a need for both local exhaust (scavenging) systems and general ventilation of the areas in which the respective gases are used. Refer to NFPA 99¹⁰ for other requirements.
- o. Surgeons or surgical procedures may require room temperatures, ventilation rates, humidity ranges, and/or air distribution methods that exceed the minimum indicated ranges.



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Joint Interim Guidance: HVAC in the Operating Room and Sterile Processing Department September 21, 2015





Joint Interim Guidance: HVAC in the Operating Room and Sterile Processing Department September 21, 2015

For operating room (OR) and sterile processing department (SPD) HVAC system design and construction, the standard most often cited by surveyors is ANSI/ASHRAE/ASHE Standard 170-2013: *Ventilation of Health Care Facilities*, which establishes minimum HVAC design parameters. ASHRAE/ASHE 170-2013 was incorporated as part of the 2014 FGI *Guidelines for Design and Construction of Hospitals and Outpatient Facilities*. For maintaining temperature and humidity levels once a space has been occupied, the most often cited clinical practice guidelines are the AORN *Guideline for a Safe Environment of Care, Part 2* and AAMI ST79: *Comprehensive Guide to Steam Sterilization and Sterility Assurance in Health Care Facilities*.

Design requirements are NOT the same as clinical practice recommendations. Each has a distinct purpose and intent. The ASHRAE/ASHE standards and FGI guidelines are intended to establish the minimum design requirements and criteria that must be met to construct an HVAC system that will support clinical functions during the life of a building. The AAMI and AORN guidelines are intended to guide the daily operation of the HVAC system and clinical practice once the health care facility is occupied.

Unfortunately, owners, designers, and surveyors often confuse the two types of guidance and use design standards to assess the daily operation in health care facilities. Not only are the design and operational methodologies different, but the temperature and humidity ranges indicated for each vary significantly. There is no single, simple solution that suits both design and operations, and there is very little evidence regarding optimal HVAC operating parameters within an OR or SPD. The effect of the HVAC system parameters falling out of range is variable. A small variance for a short period of time may not be of clinical concern, whereas a large variance for a longer period may have clinical significance. Many variables, with wide-ranging implications for patient and health care worker safety and comfort, have to be taken into account. Prudent, reasonable, achievable, safe, practical, evidence-based guidance that is in alignment across all the standards and guidelines is needed to help designers, owners, and surveyors appropriately regulate ventilation in health care spaces.

Health care associations and the medical device manufacturing community have formed a joint HVAC task force to address these issues. The task force, with representatives from ASHRAE, ASHE, FGI, AORN, the Association for Professionals in Infection Control and Epidemiology (APIC), and AAMI, met in Annapolis, Maryland, on April 29, 2015, to begin to work toward the goal of harmonizing the HVAC guidance in the various standards and guidelines.

One of the first challenges is to agree on terminology. The documents published by ASHRAE/ASHE, FGI, AAMI, and AORN use different terms to describe similar spaces. The task force proposes the following common terms to describe the various spaces located in typical SPD, OR, and endoscopy areas:



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- Design requirements are NOT the same as clinical practice recommendations. Each has a distinct purpose and intent.
- Unfortunately, owners, designers, and surveyors often confuse the two types of guidance and use design standards to assess the daily operation in health care facilities.
- **There is no single, simple solution that suits both design and operations**



WHAT'S NEXT?

- WHAT IS THE DESIRED OR TURNOVER TIME?
- WHAT IS THE MINIMUM ACCEPTABLE OR TEMPERATURE AND ASSOCIATED RH?
- WHAT IS THE MAXIMUM ACCEPTABLE OR TEMPERATURE AND ASSOCIATED RH?



OR TURNOVER TIME

The number in minutes it takes for the patient to leave the OR (documented as **wheels out**) to when the next patient arrives to the same OR (documented as **wheels in**).



OR TURNOVER TIME

Journal of Clinical Anesthesia (2010) 22, 233–236



ELSEVIER

Editorial

What does one minute of operating room time cost?

Cost = the amount of hospital expenditures for resources (ie, buying supplies) to deliver medical care. However, it is very difficult for hospitals to know the true cost attributable to delivering care.

There are no published formal data on true OR costs. Excluding physician costs, OR administrators may use a ballpark number such as **\$15 to \$20 per OR** minute for a basic surgical procedure, with at least half of that figure being fixed overhead costs.

Journal of
Clinical
Anesthesia



COST OF PROCEDURES

statista The Statistics Portal
Statistics and Studies from more than 22,500 Sources

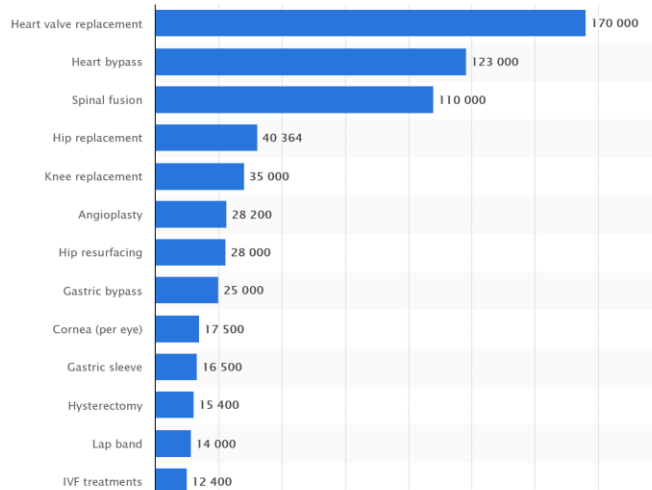
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Health & Pharmaceuticals > Medical Technology > Cost of various surgeries in the U.S. 2016

PREMIUM +

Cost of various surgeries in the United States as of 2016 (in U.S. dollars)



DOWNLOAD SETTINGS SHARE

PNG PDF XLS PPT

DESCRIPTION SOURCE MORE INFORMATION

This statistic depicts costs of selected surgeries/medical procedures in the United States as of 2016. A heart bypass for example cost 123,000 U.S. dollars in that year, and thus was one of the most expensive procedures.





COST OF PROCEDURES

HONORHEALTH™

Shea Medical Center

9003 E. Shea Boulevard
Scottsdale, AZ 85260

Shea Inpatient Services Average Patient Price List

DRG CODE	DRG Type	Procedure Description	Prompt Pay Price ⁽¹⁾	Direct Pay Price ⁽²⁾	Average (Estimated) Total Price ⁽³⁾
177	MS-DRG	RESPIRATORY INFECTIONS & INFLAMMATIONS W MCC	\$32,107	\$41,739	\$64,214
189	MS-DRG	PULMONARY EDEMA & RESPIRATORY FAILURE	\$22,898	\$29,767	\$45,795
190	MS-DRG	CHRONIC OBSTRUCTIVE PULMONARY DISEASE W MCC	\$23,833	\$30,982	\$47,665
193	MS-DRG	SIMPLE PNEUMONIA & PLEURISY W MCC	\$23,297	\$30,286	\$46,594
194	MS-DRG	SIMPLE PNEUMONIA & PLEURISY W CC	\$15,720	\$20,436	\$31,440
195	MS-DRG	SIMPLE PNEUMONIA & PLEURISY W/O CC/MCC	\$10,844	\$14,097	\$21,687
202	MS-DRG	BRONCHITIS & ASTHMA W CC/MCC	\$17,221	\$22,387	\$34,441
203	MS-DRG	BRONCHITIS & ASTHMA W/O CC/MCC	\$6,093	\$7,921	\$12,187
220	MS-DRG	CARDIAC VALVE & OTH MAJ CARDIOTHORACIC PROC W/O CARD CATH W CC	\$150,598	\$195,778	\$301,196
246	MS-DRG	PERCUTANEOUS CARDIOVASCULAR PROCEDURES W	\$65,969	\$85,760	\$131,939

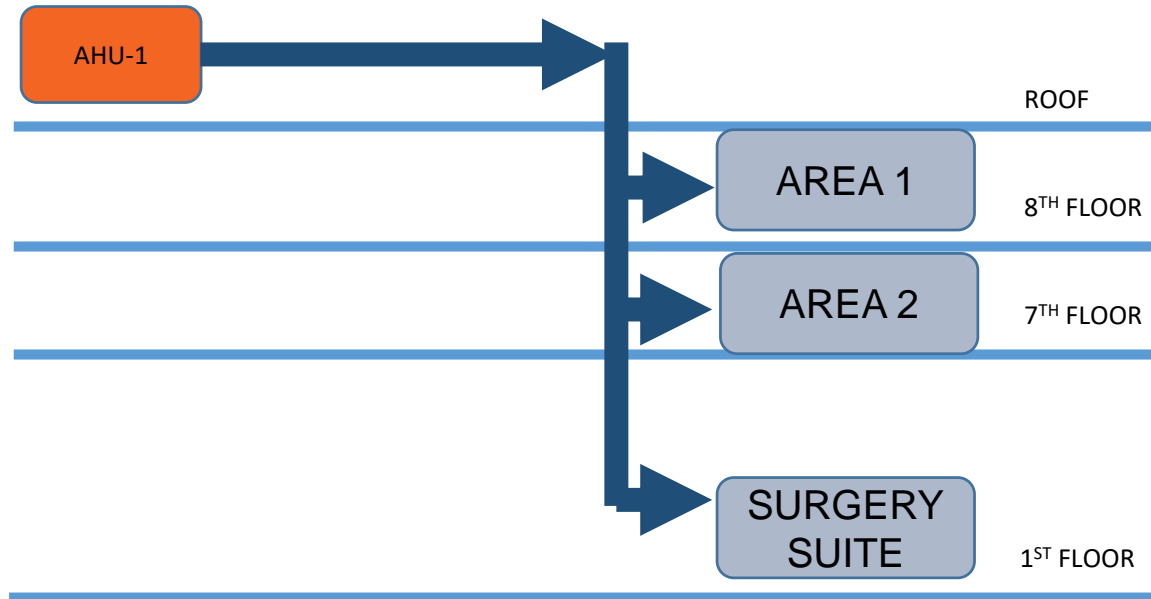


WHAT'S NEXT?

- WHAT IS THE DESIRED OR TURNOVER TIME?
 - **10 MINUTES**
- WHAT IS THE MINIMUM ACCEPTABLE OR TEMPERATURE AND ASSOCIATED RH?
 - **65F AND 40% RH**
- WHAT IS THE MAXIMUM ACCEPTABLE OR TEMPERATURE AND ASSOCIATED RH?
 - **75F AND 50% RH**
 - **(80F AND 45% RH?)**

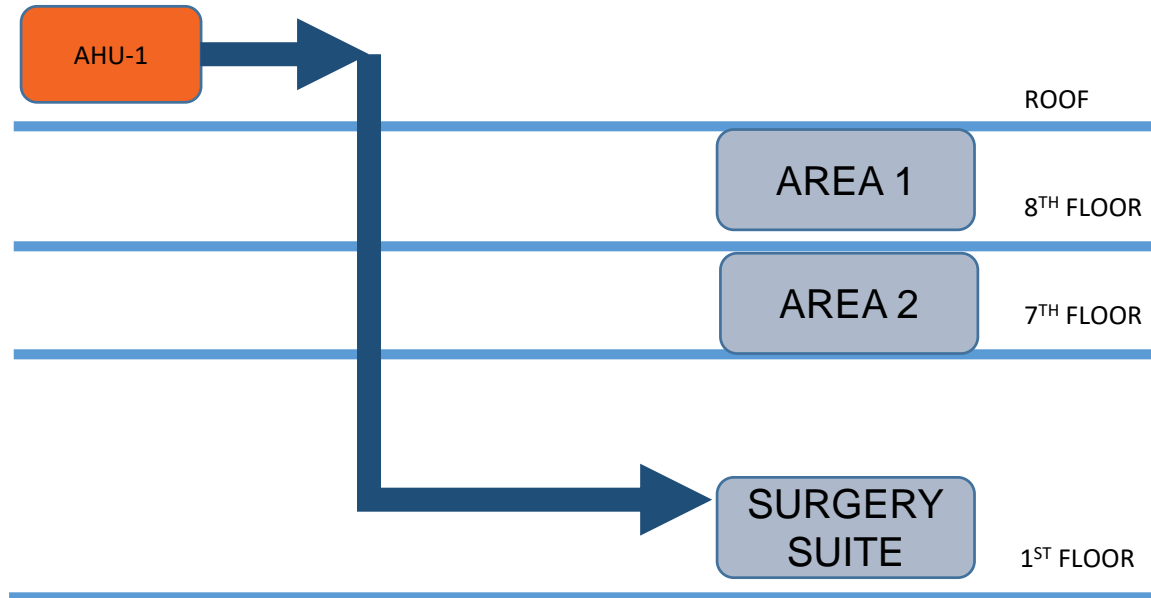


DESIGN PHASE



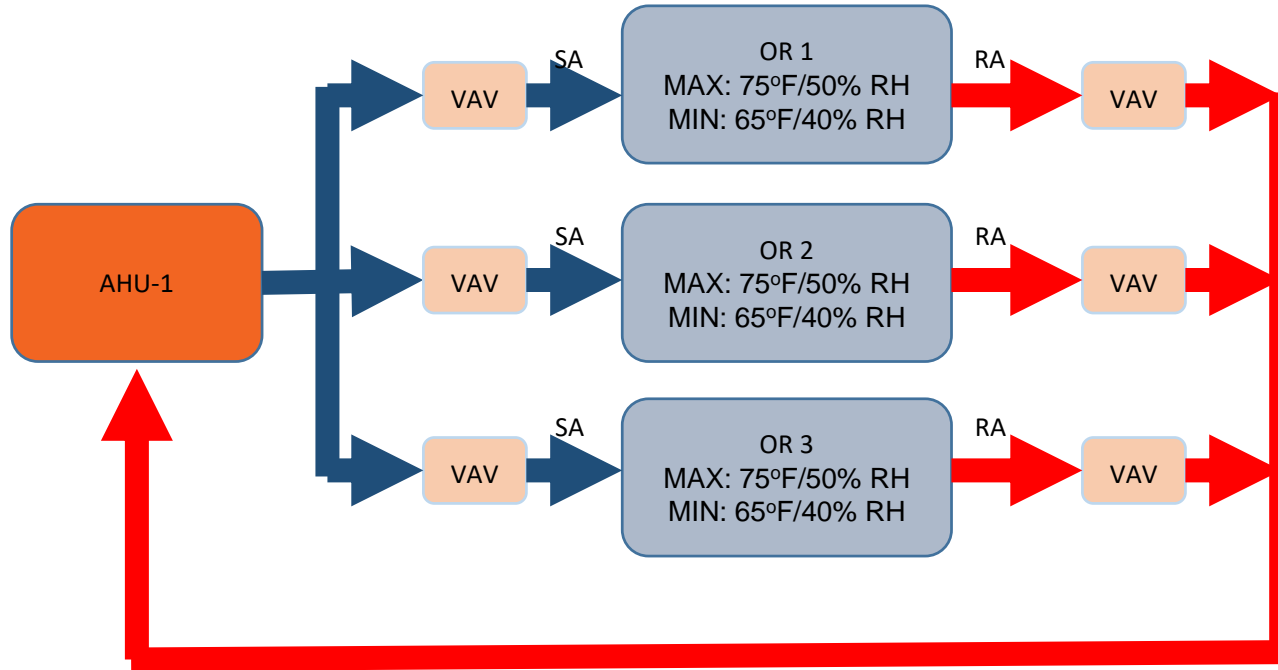


DESIGN PHASE



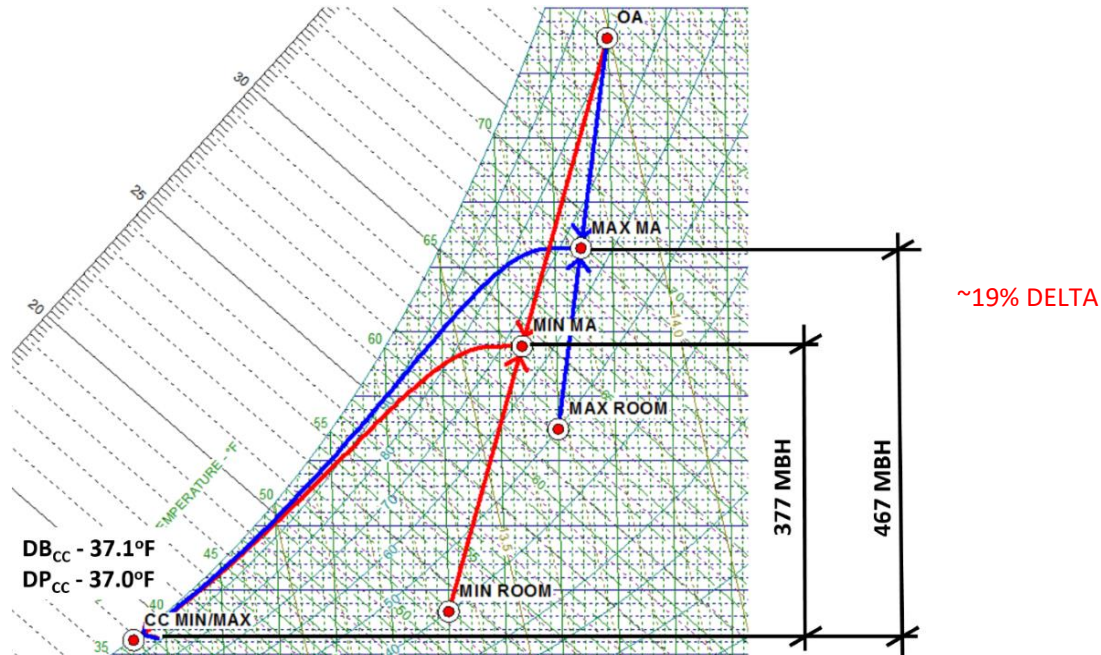


DESIGN PHASE



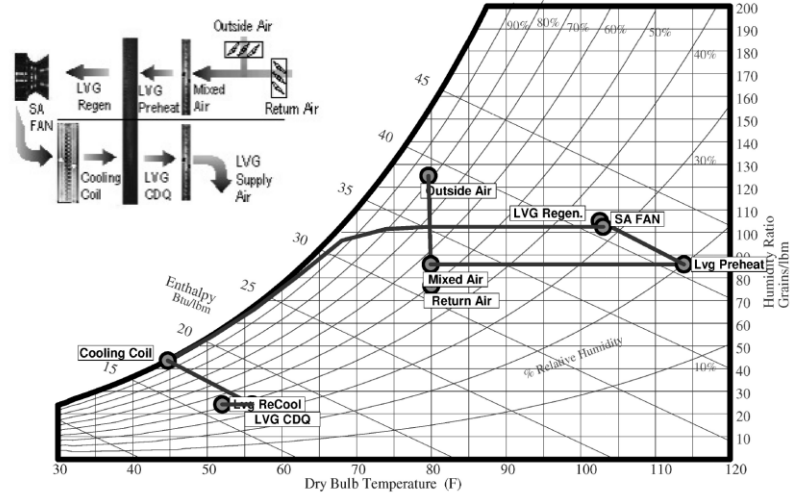


DESIGN PHASE





DESIGN PHASE



Point	Air Flow (SCFM)	Air Flow (ACFM)	Dry Bulb Temp(F)	Humidity (Gr/lbm)	Relative Humidity	Enthalpy (btu/lbm)	Dew Point Temp. (F)
Outside Air	2,500	2,577	79.6	125.0	81.8%	38.7	73.5
Return Air	10,500	10,787	80.0	76.6	50.0%	31.2	59.7
Mixed Air	13,000	13,364	79.9	85.9	56.1%	32.6	62.9
LVG Preheat	13,000	14,203	113.8	85.9	20.0%	41.0	62.9
LVG CDQ Regen	13,036	13,985	102.6	105.1	33.7%	41.2	68.6
SA Fan w/Bypass	13,608	14,607	103.0	102.5	32.5%	40.9	67.9
Cooling Coil	13,493	12,919	44.7	43.5	99.5%	17.4	44.6
LVG CDQ	12,885	12,592	56.0	24.2	36.5%	17.2	30.1
Post Cool Coil /	12,885	12,495	52.0	24.2	42.3%	16.2	30.1

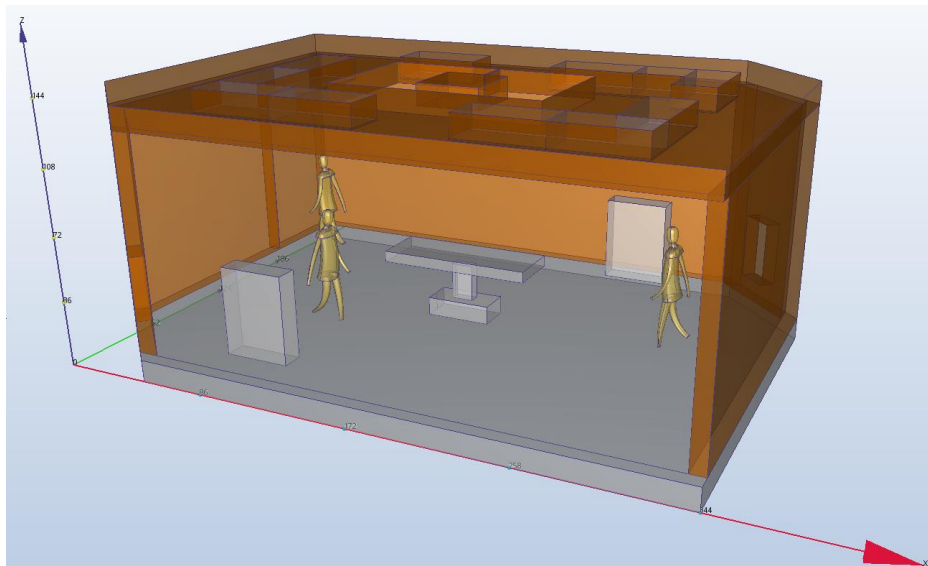


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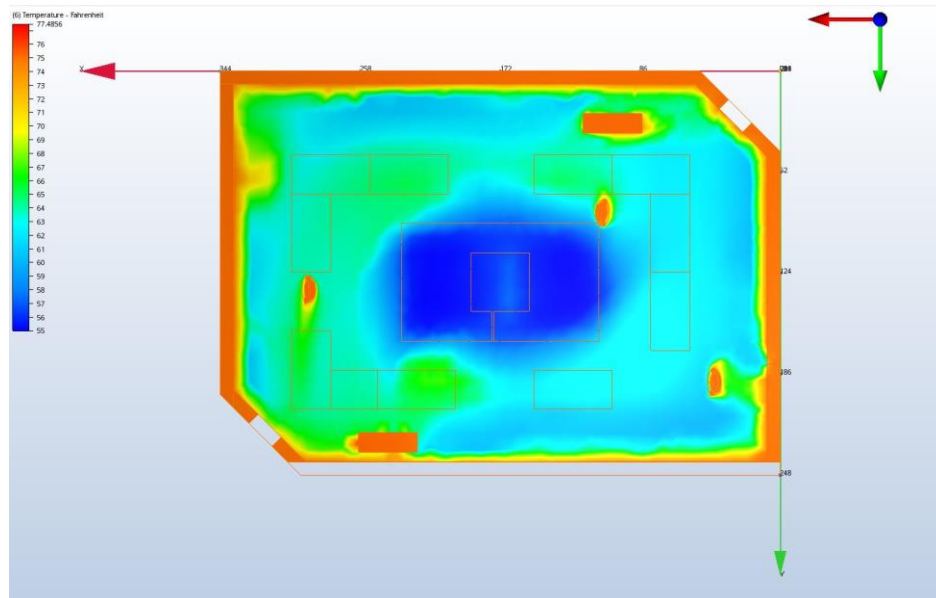
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CFD





CFD





CFD

- WHAT IS THE DESIRED OR TURNOVER TIME?
 - **10 MINUTES**
- COOLING COIL SIZING
 - ~~65F AND 40% RH~~
 - **63F AND 35% RH**
- HEATING COIL AND TRIM HUMIDIFIER SIZING
 - ~~75F AND 50% RH~~
 - **78F AND 55% RH**



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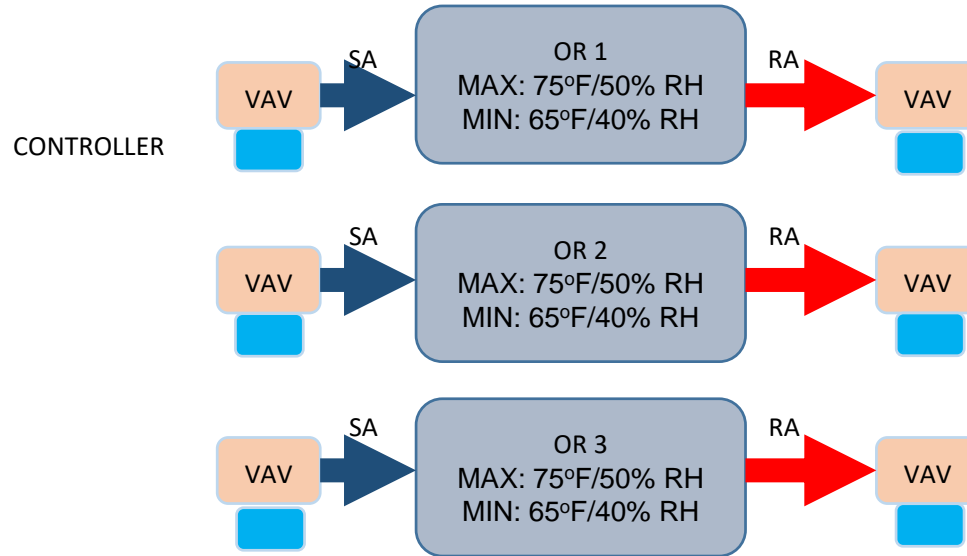
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CFD



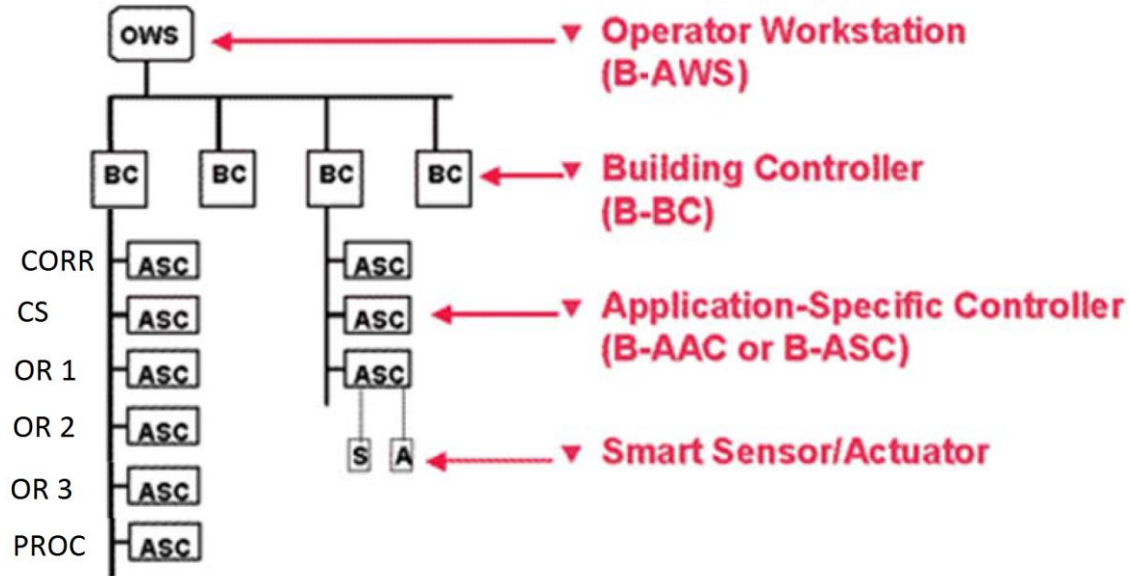


CONTROLS - NETWORK





CONTROLS - NETWORK





CONTROLS - ACTUATORS



Technical Data	
Power Supply	24 VAC \pm 20%, 50/60 Hz, 24 VDC \pm 10%
Power Consumption Running	2.5 W
Power Consumption Holding	1 W
Transformer Sizing	4 VA (class 2 power source)
Shaft Diameter	1/4" to 1/2" round, centers on 1/2"
Electrical Connection	(2) 3 ft, 18 GA appliance cables with 1/2" conduit connectors
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Operating Range Y	2 to 10 VDC, 4 to 20 mA (w/ 500 Ω , 1/2 W resistor) ZG-R01
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA, 1500 Ω for PWM, floating point and On/Off
Feedback Output U	2 to 10 VDC, 0.5 mA max, VDC variable
Angle of Rotation	max. 95°, adjustable with mechanical stop
Direction of Rotation (Motor)	reversible with built-in switch
Direction of Rotation (Fail-Safe)	reversible with CW/CCW mounting
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Manual Override	No
Running Time (Motor)	150 seconds 150 seconds (default), variable (75 to 300 seconds)
Running Time (Fail-Safe)	<25 seconds



Technical Data	
Power Supply	24 VAC, \pm 20%, 50/60 Hz, 24 VDC, \pm 10%
Power Consumption Running	13 W
Power Consumption Holding	1.5 W
Transformer Sizing	23 VA (class 2 power source)
Electrical Connection	18 GA plenum rated cable with 1/2" conduit connector protected NEMA 2 (IP54) 3ft [1m] 10ft [3m] and 16ft [5m]
Overload Protection	electronic throughout 0° to 90° rotation
Electrical Protection	actuators are double insulated
Operating Range Y	2 to 10 VDC (default) VDC variable
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA
Feedback Output U	DC 2...10 V, Max. 0.5 mA, VDC variable
Angle of Rotation	90°
Direction of Rotation (Motor)	reversible with built-in switch
Position Indication	integrated into handle
Manual Override	external push button
Running Time (Motor)	default 4 sec, variable 2.5...10 sec
Ambient Temperature Range	-22...122 °F [-30...50 °C]

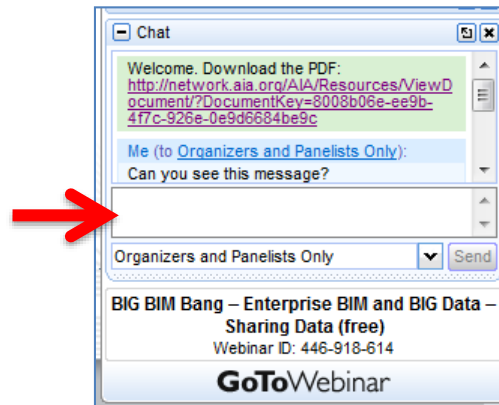


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Question Reminder

Submit your questions and comments
via the chat box.





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WHY?

ATTACHING REVENUE TO CAPITAL PROJECTS





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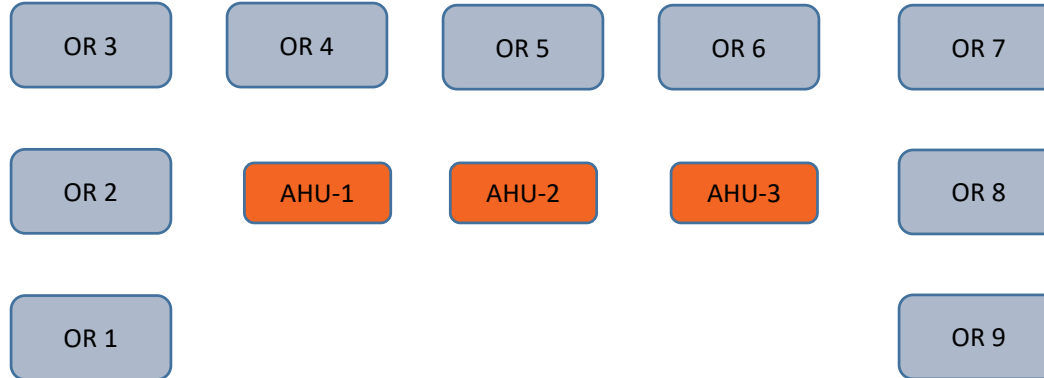
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REVENUE AND CAPITAL PROJECTS





REVENUE AND CAPITAL PROJECTS



**CAPITAL PROJECT COST:
\$5,000,000**



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REVENUE AND CAPITAL PROJECTS

OR 3

OR 4

OR 5

OR 6

OR 7

OR 2

CARDIAC PROCEDURE FROM 11 AM TO 4 PM

OR 8

OR 1

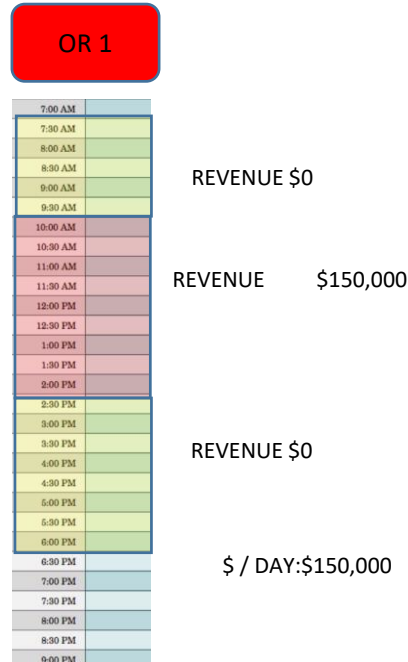
SPINAL PROCEDURE FROM 10 AM TO 2 PM

OR 9

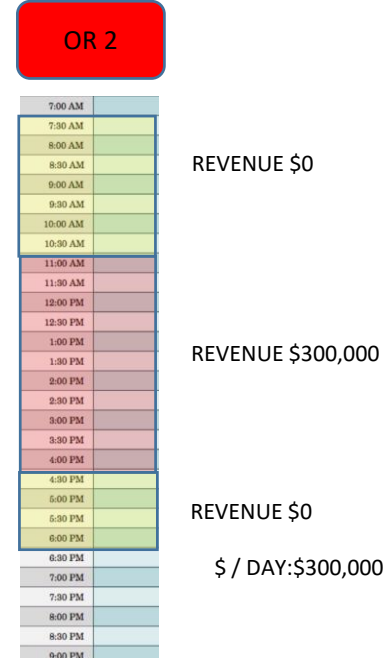


REVENUE AND CAPITAL PROJECTS

SPINAL PROCEDURE
FROM 10 AM TO 2 PM



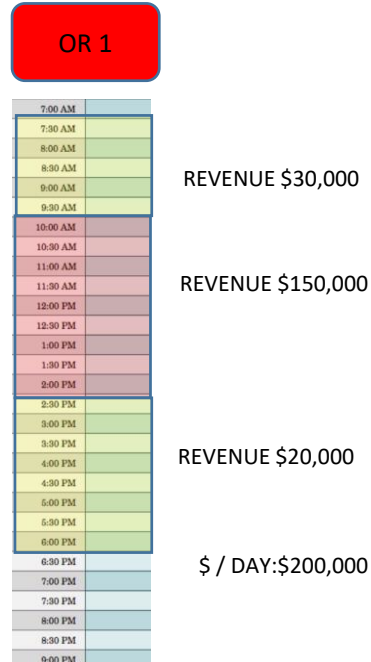
CARDIAC PROCEDURE
FROM 11 AM TO 4 PM



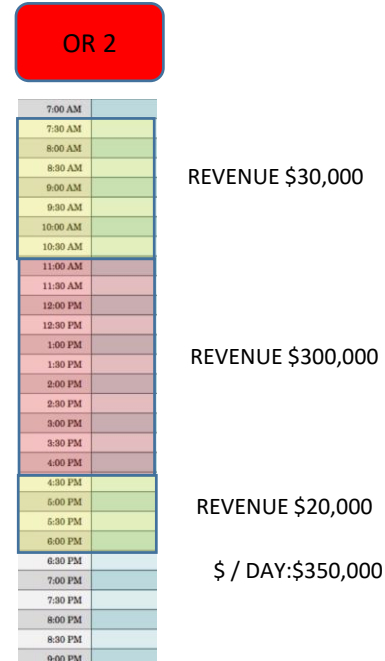


REVENUE AND CAPITAL PROJECTS

SPINAL PROCEDURE
FROM 10 AM TO 2 PM



CARDIAC PROCEDURE
FROM 11 AM TO 4 PM





REVENUE AND CAPITAL PROJECTS

OR 1

\$ / DAY: \$150,000



\$ / DAY: \$200,000

OR 2

\$ / DAY: \$300,000



\$ / DAY: \$350,000

NET INCREASE: \$100,000 / DAY (TWO ORs)



REVENUE AND CAPITAL PROJECTS

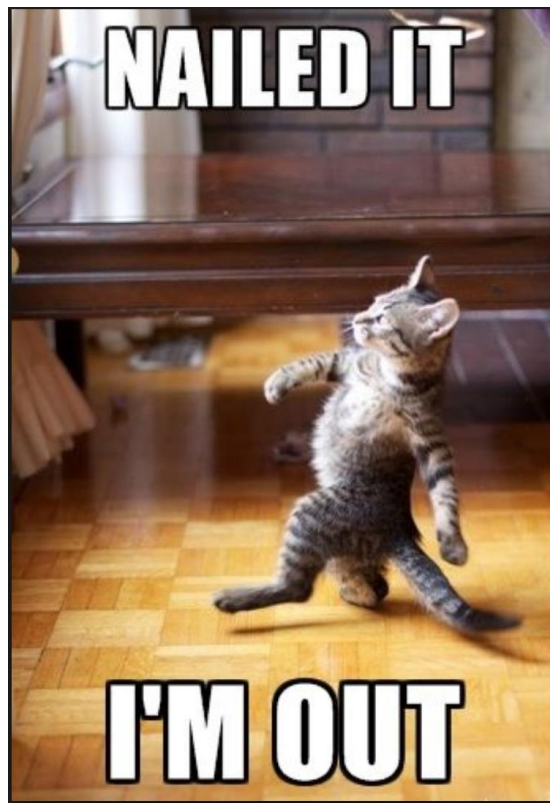




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THANK YOU!



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Time for Questions and Comments





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The survey closes **September 13, 2019** at 12:30am ET.

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Announcements [Add](#)

U40 List: Healthcare Design's Best Under 40 [✓](#) [✕](#) [ⓘ](#)

The U40 List is nomination oriented recognition to celebrate individuals making a significant contribution to the advancement of health facilities design. Each year up to two individuals will be selected to have their names added to the distinguished U40 List. The nominees will receive a travel stipend to attend the Summer Leadership



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Upcoming Webinars

Date	Series	Topic
10.08.19	Out of the Box	The Impact of Art on Wellness
11.12.19	Case Study	<i>"Big Ideas Small Facilities"</i> Critical Access Hospitals
12.10.19	Master's Studio	End-of-Life Care Environments

Dates & topics are subject to change