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PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

Session 4: Panel Discussion

Oklahoma Association of Healthcare Engineers

2019 Summer Regional Event

August 23, 2019

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Session 4: Panel Discussion
Interior Design & FGI: How Good Interior Design Can Support FGI While Enhancing Your Project

Oklahoma Association of Healthcare Engineers

2019 Summer Regional Event

August 23, 2019

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- Director of Interior Design for HFG Architecture's Oklahoma Region
- LEED Accredited
- Associate member of the International Interior Design Association, and member of the Association for Continuing Higher Education

Interior Design & FGI

How Good Interior Design Can Support FGI While Enhancing Your Project

Implementing evidence based interior design practices that are informed by FGI requirements with a focus on:

Mitigating Fall Risk

Acoustics

Infection Control

Primary Causes for Falls in the Built Environment

1. Floor Material/Finish (Slip Resistance)
2. Floor Transitions
3. Poor Visibility
4. Access to Support (grab bars, handrails, etc.)
5. Patient Environment Planning

Types of Falls in the Built Environment

Slips

Occur when there is too little friction of traction between the feet and the walking surface

Trips

Occur when the foot strikes an object (or obstruction), and the momentum throws one off balance

Falls from Elevation

While standing on a chair, from ladders or stairs, from non-moving vehicles, etc.

Same-Level Falls

While walking or working, from a chair while sitting, tripping up stairs, etc.

Nanda, U. Achieving Ebd Goals Through Flooring Selection & Design. The Center for Health Design.

Data on Falls in the Built Environment

11,000

Fatal Falls occur in the Hospital Environment per Year

25%

Of fall injuries are preventable according to CMS estimates

Nanda, U. Achieving Ebd Goals Through Flooring Selection & Design. The Center for Health Design.

MITIGATE FALL RISK

The Joint Commission Requires Healthcare Organizations to Track Patient Falls and Injuries and Devise Programs to Reduce the Number of Occurrences.

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INTERIOR DESIGN & FGI

Mitigate Fall Risk:

FGI Regulates

1. Functional Program Fall Risk Assessment
2. Thresholds & expansion/seismic joints & covers
3. Grab Bars
4. Handrails
5. Flooring & Wall Base

ADA Considers

1. Floor Transitions
2. Floor Incline
3. Floor Stability
4. Floor Firmness
5. Floor Slip Resistance

Interior Design Strategies

1. Light levels
2. Floor Finish Slip Resistance
3. Transitions between materials
4. Padded flooring with weldable top
5. Low contrast between colors of flooring
6. Low Gloss Flooring
7. Contrast of wall base to floors for differentiation
8. Roll-In Showers with Barrier-Free transitions
9. Patient Mobility & Access to Personal Items

Other Organizations & Agencies

1. ANSI - American National Standards Institute
2. ASTM - American Society for Testing and Materials
3. TCNA - Tile Council of North America
4. OSHA – Occupational Safety & Health Administration

MITIGATE FALL RISK

Environmental Factors that Impact Fall Risk:

Flooring Factors

1. Floor Material
2. Floor Pattern
3. Floor Transitions
4. Coefficient of Friction

Slip Resistance Factors

1. Friction between the floor and the shoe
2. Presence of suitable micro-roughness
3. Harness of the floor
4. Applications for sealing floors during installation
5. Later modifications on the floor such as inappropriate varnishing/sealing/polishing

Nanda, U. Achieving Ebd Goals Through Flooring Selection & Design. The Center for Health Design.

MITIGATE FALL RISK

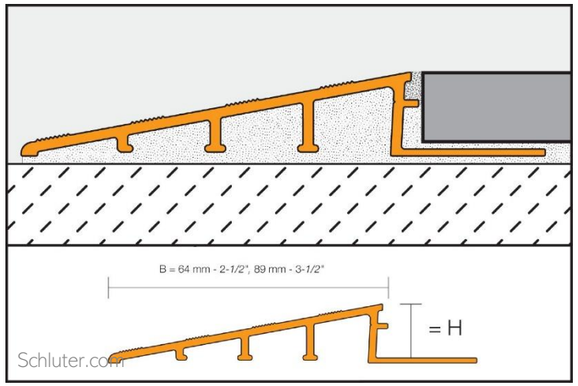
Mitigate Fall Risk:

Floor Finish Selections

1. Vinyl Composition Tile
2. Luxury Vinyl Tile
3. Sheet Vinyl
4. Sheet Carpet
5. Carpet Tile
6. Ceramic Floor Tile

Floor Finish Transitions

1. Same Height Flooring Options
2. Barrier- Free Ramp Transitions
3. Floor Leveling Compound
4. Minimizing Types of Floor Materials



MITIGATE FALL RISK

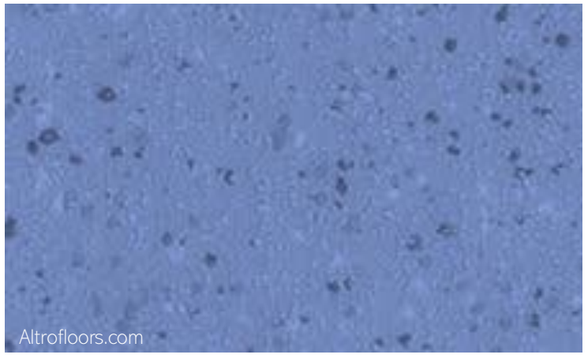
Mitigate Fall Risk:

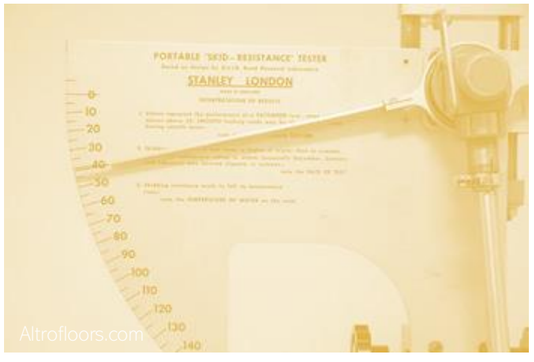
Floor Finish Selections

1. Vinyl Composition Tile
2. Luxury Vinyl Tile
3. Sheet Vinyl
4. Sheet Carpet
5. Carpet Tile
6. Ceramic Floor Tile

Floor Finish Slip Resistance

1. Safety Flooring Wear Layer| Fine Aggregate
2. Tile Flooring| Honed or Unpolished
3. Rubber & Resilient Flooring | Embossing





MITIGATE FALL RISK

INTERIOR DESIGN & FGI

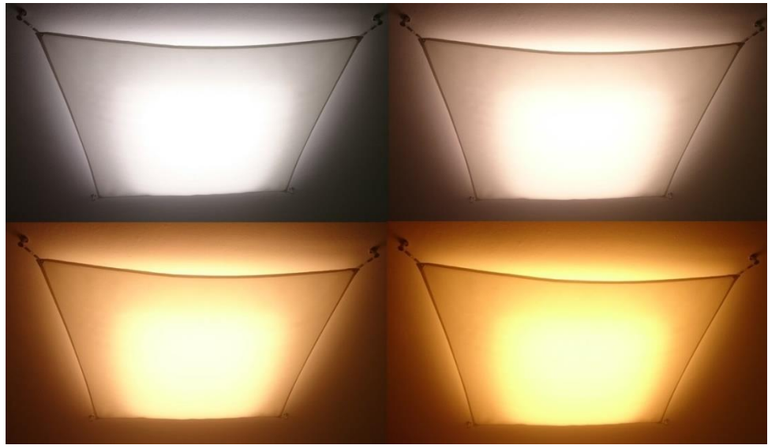
Visibility:

Lighting Considerations

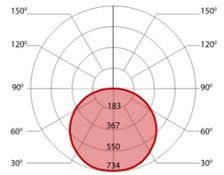
1. Visible Contrast in Floor Material Changes
2. Visibility of Floor Material Patterns & Textures
3. Visibility of Barriers & Obstacles
4. Visibility of Supports/Handrails

Lighting Design Supports

1. Provider Task Performance
2. Telemedicine
3. Fall Risk Mitigation



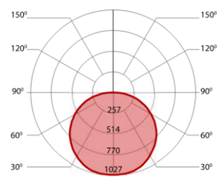
2500 LUMEN AT 80CRI - LOW OUTPUT



PERFORMANCE

LED output	Color Temp	Watts	Nominal Delivered Lumens	Efficacy LPW
low output	2700K	23	2500	108
low output	3000K	22.5	2500	111
low output	3500K	21.5	2500	115
low output	4000K	21	2500	118
low output	6500K	20	2500	125

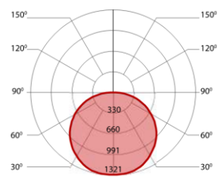
3500 LUMEN AT 80CRI - MEDIUM OUTPUT



PERFORMANCE

LED output	Color Temp	Watts	Nominal Delivered Lumens	Efficacy LPW
medium output	2700K	33.5	3500	104
medium output	3000K	32.5	3500	107
medium output	3500K	32	3500	110
medium output	4000K	30.5	3500	114
medium output	6500K	29	3500	120

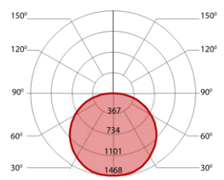
4500 LUMEN AT 80CRI - HIGH OUTPUT



PERFORMANCE

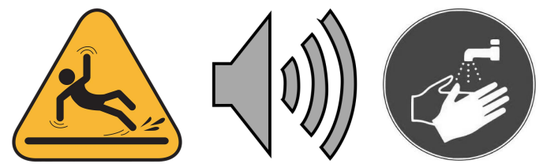
LED output	Color Temp	Watts	Nominal Delivered Lumens	Efficacy LPW
high output	2700K	44.5	4500	101
high output	3000K	43.5	4500	104
high output	3500K	42	4500	107
high output	4000K	41	4500	110
high output	6500K	39	4500	116

5000 LUMEN AT 80CRI - ULTRA HIGH OUTPUT



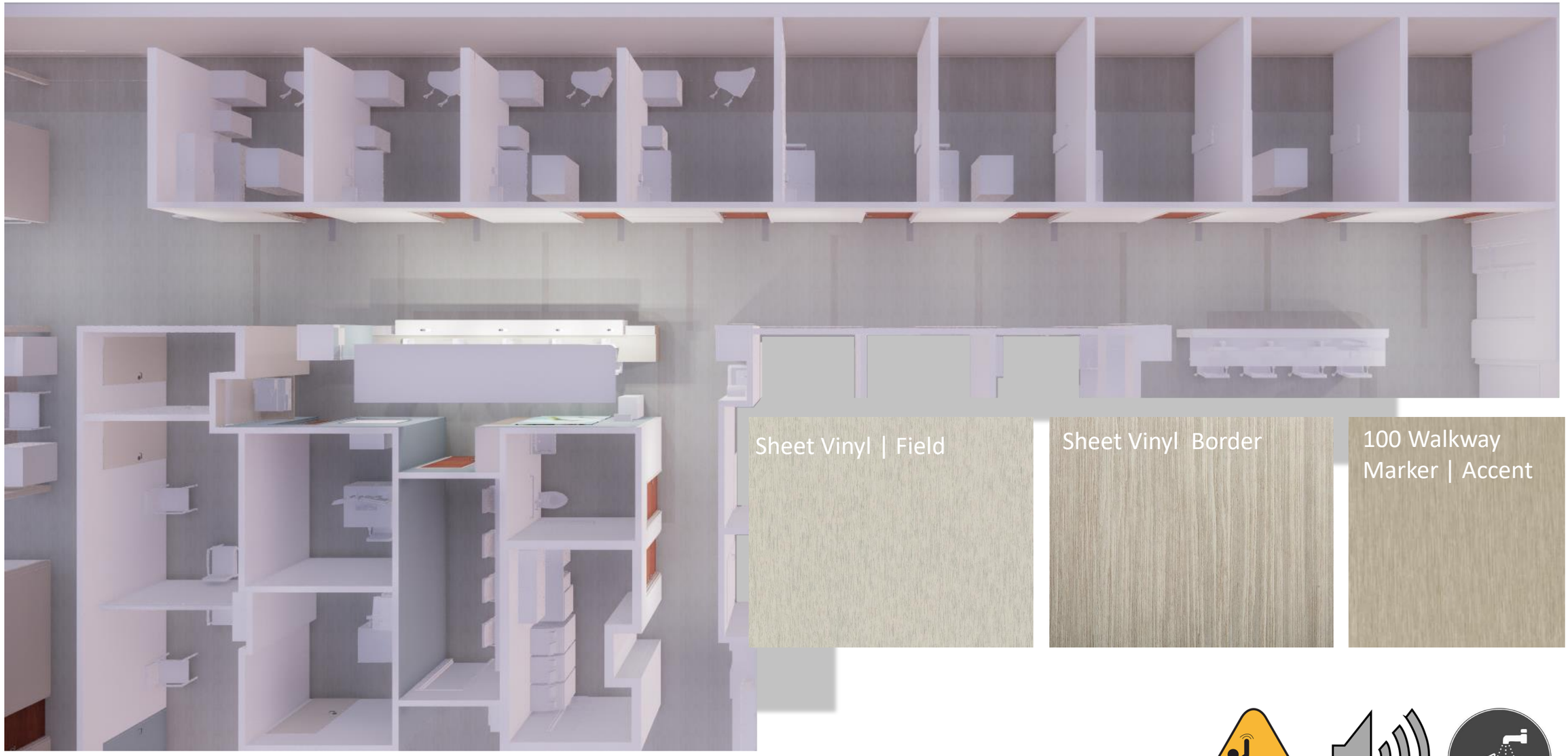
PERFORMANCE

LED output	Color Temp	Watts	Nominal Delivered Lumens	Efficacy LPW
ultra high ouput	2700K	51	5000	98
ultra high ouput	3000K	50	5000	100
ultra high ouput	3500K	48.5	5000	103
ultra high ouput	4000K	46.5	5000	107
ultra high ouput	6500K	44.5	5000	112



MITIGATE FALL RISK

Mitigate Fall Risk: Floor Finish Contrast



Sheet Vinyl | Field

Sheet Vinyl Border

100 Walkway
Marker | Accent

MITIGATE FALL RISK

INTERIOR DESIGN & FGI

Key Fall Risk Mitigation Factors:

1. Floor Finish Selection
2. Floor Transitions
3. Visibility
4. Patient Environment Planning

MITIGATE FALL RISK

Primary Acoustical Concerns

1. Patient Privacy (HIPAA)
2. Alarm Fatigue
3. Provider Distraction
4. Patient Sleep/Rest
5. Medical Errors
6. Telemedicine

INTERIOR DESIGN & FGI

Acoustics in the Built Environment:

FGI Regulates

1. Minimum Design Room Sound Absorption Coefficients
2. Maximum Design Criteria for Noise in Interior Spaces Caused by Building Systems
3. Design Criteria for Minimum Sound Isolation Performance Between Enclosed Rooms
4. Design Criteria for Speech Privacy for Enclosed Rooms & Open-Plan Spaces
5. Maximum Limits on Floor Vibration Caused by Footfalls in Health Care Facilities
6. Interior wall and floor/ceiling construction (Table 1.2-6)
7. Speech privacy (Table 1.2-7)
8. OITC - Outdoor–Indoor Transmission Class
9. STC – Sound Transmission Class

Interior Design Strategies

1. Space Planning, Room & Door Positioning
2. Wall, Ceiling and Floor Finishes
3. Visual Privacy - Sight Lines, Patient Information

ACOUSTICS

Acoustics in the Built Environment:

Center for Health Design– Evidence Based Design Strategies

The Center for Health Design Recommends

"Sound control for improved outcomes in healthcare settings" | The Center for Health Design

1. Use High Performance Sound Absorbing Ceiling Systems
2. Wall Finish Treatments & Panels
3. Plan for private spaces on the unit for family discussion
4. Providing Single Patient Rooms

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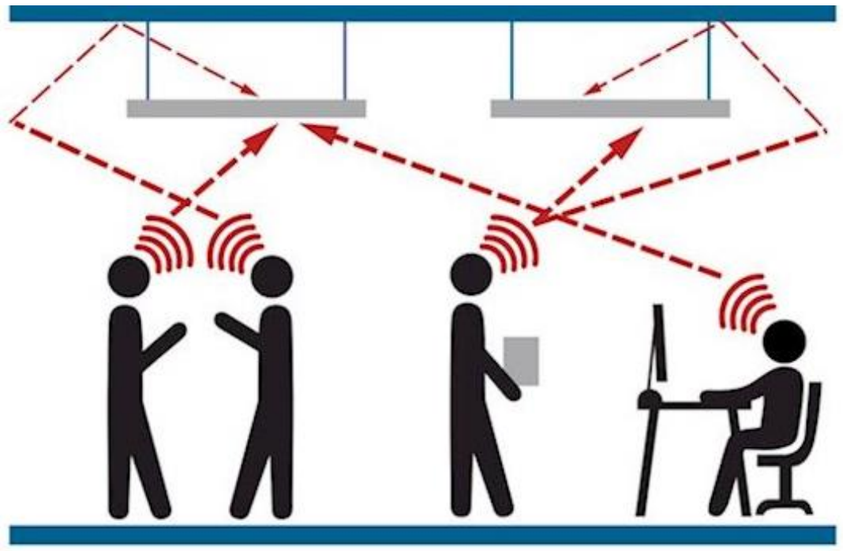
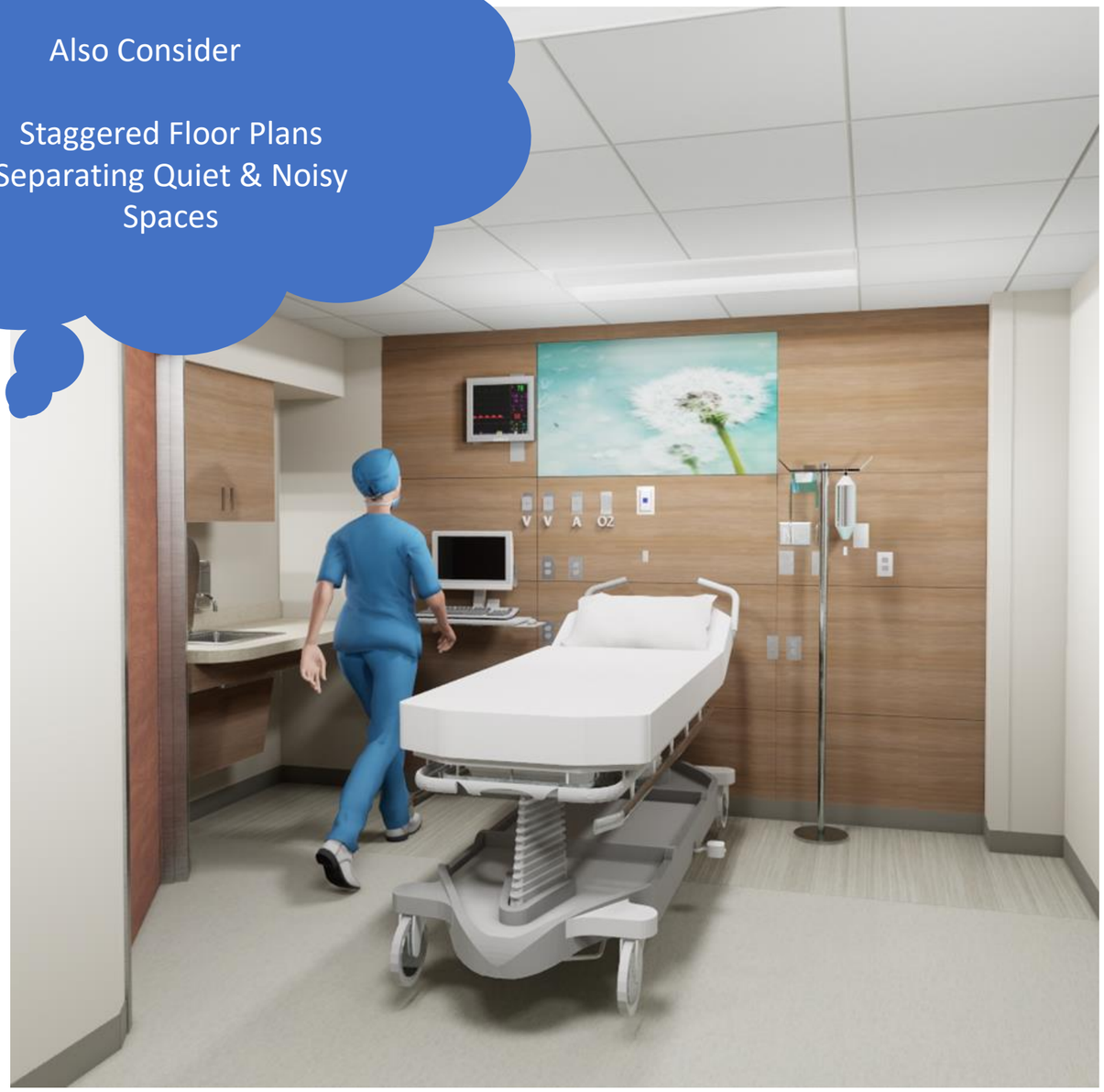


Also Consider

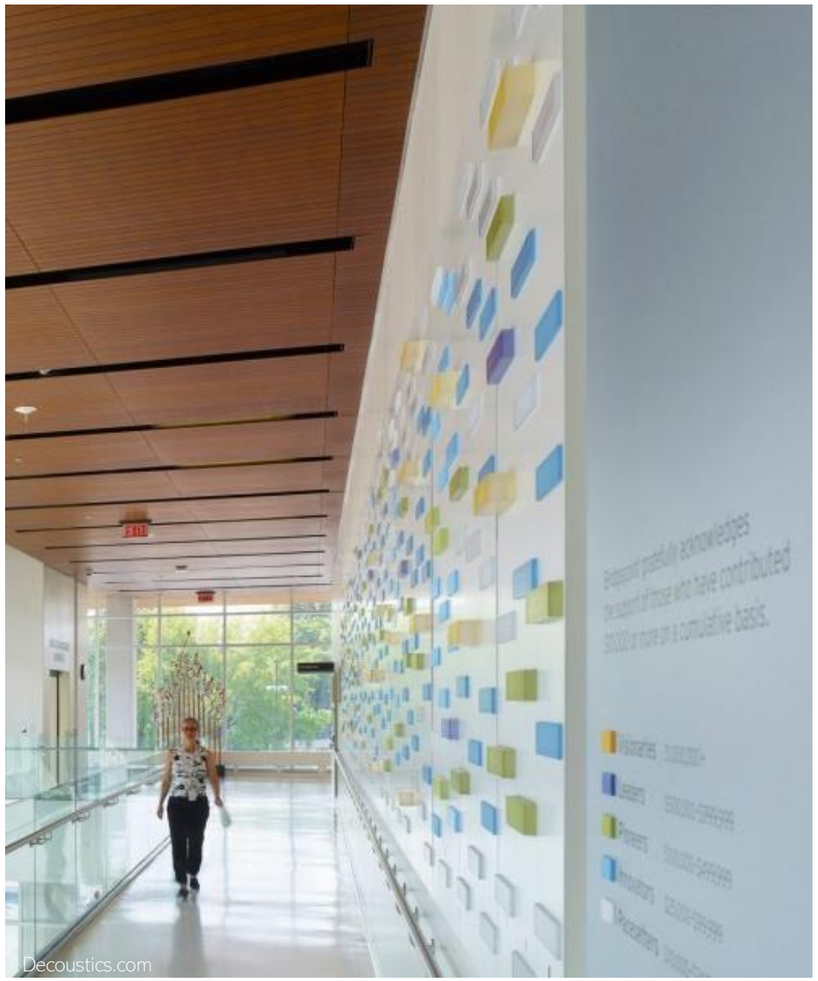
1. Staggered Floor Plans
2. Separating Quiet & Noisy Spaces



INTERIOR DESIGN & FGI

Acoustics in the Built Environment:

Acoustical Clouds and Ceilings



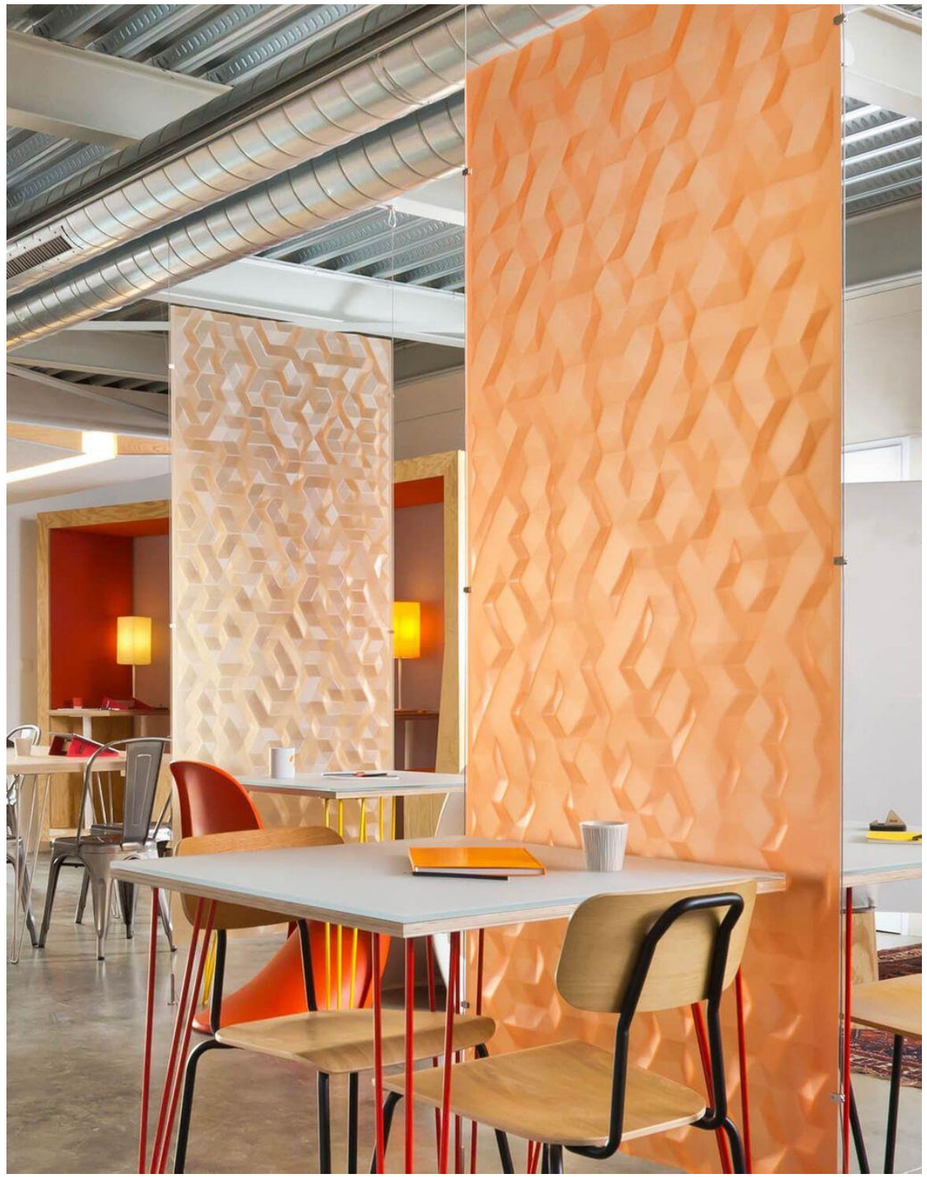
Decoustics.com


Armstrongworldindustries.com

ACOUSTICS

Acoustics in the Built Environment:

Sound Absorbing Wall Finishes



ACOUSTICS

INTERIOR DESIGN & FGI

Acoustics in the Built Environment:

New Sound Absorbing Products on the Market

ACOUSTICS

Consequence of Poor Sleep:

- Impaired Attention and Reaction Times
- Decreased Memory and Concentration
- Worse Mood, Depression
- Impaired Task Completion
- Psychosocial Difficulties

Insufficient or Disordered Sleep

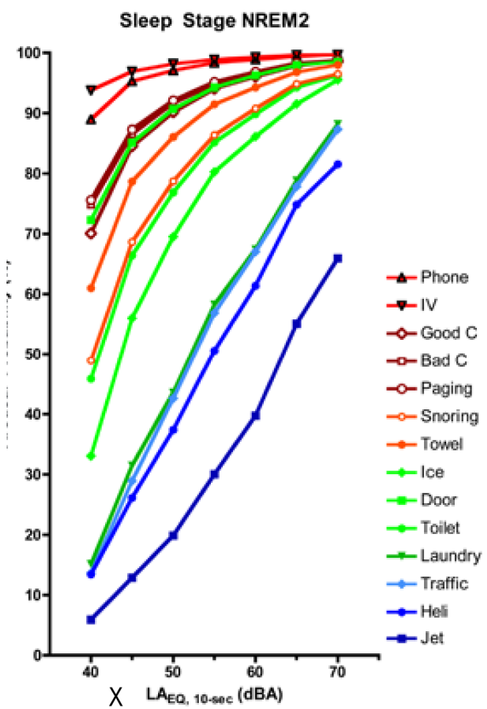
- Increased Consumption of Healthcare Resources
- Risk of Injuries, Falls
- Increased Incidence of Pain
- Weight Gain
- Diabetes Inflamation
- Cardiovascular Disease

Solet, J., Evidence-Based Design Meets Evidence-Based Medicine: The Sound Sleep Study. The Center for Health Design.

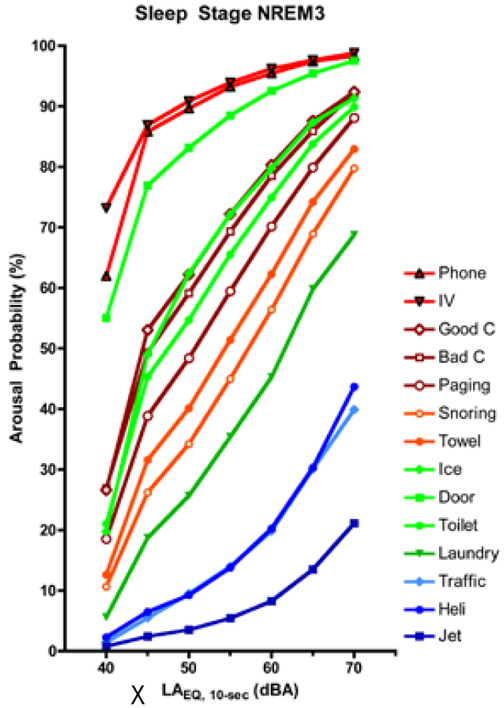
Sources of Noise to Consider

1. Door
2. Helicopter
3. Ice Machine
4. IV Alarm
5. Jet
6. Laundry Cart
7. Phone
8. Snoring
9. Toilet
10. Traffic
11. Towel Dispenser (electric)
12. Bad Conversation
13. Good Conversation
14. Paging

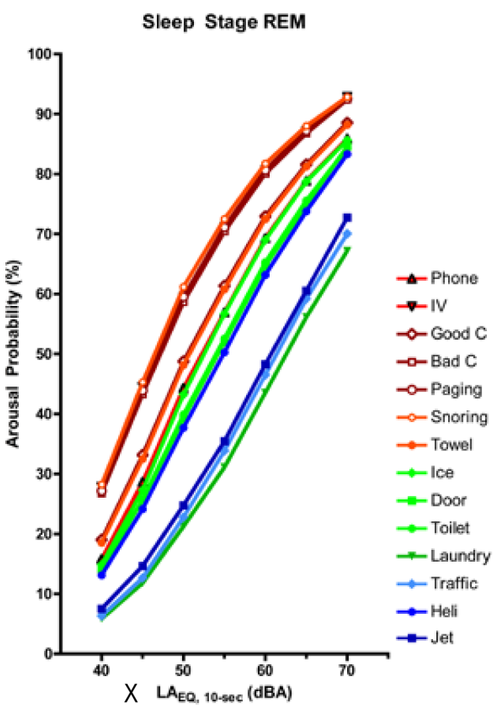
Light Sleep



Deep Sleep



REM Sleep



Solet, J., Evidence-Based Design Meets Evidence-Based Medicine: The Sound Sleep Study. The Center for Health Design.

Sleep Study Findings

1. Phone & IV Alarms Resulted in the Greatest Disruption
    a. Answer Alarms Promptly
    b. Reduce Telephone Volumes to Limit Transmission Distance
    c. Limit Number of Telephone Rings
2. Staff Conversations & Paging Resulted in Hight Disruption
    a. Select Surfaces to Limit Sound Transmission in Staff Areas
    b. Provide Private Spaces for Staff Conversation near Nursing Stations
    c. Implement Visual Indicators as a “Quiet Cue”
3. Stimuli with Shifting Contours (dispensers, doors, toilets, ice machines, etc) were found to be more disruptive than those with Continuous Contours (traffic, carts, etc.)
    a. Locate/Isolate Noisy Equipment from Patient Areas
    b. Install Quite/Low-Tech Dispensers
    c. Install Sound Mitigating Doors & Hardware
    d. Re-Evaluate keeping patient doors open, and associated staffing & patient monitoring systems

Solet, J., Evidence-Based Design Meets Evidence-Based Medicine: The Sound Sleep Study. The Center for Health Design.

"Design and Construction Mandates Related to Acoustics can be Expected to Enhance Performance..."

1. More Accurate Communication
2. Increased Speech Privacy and HIPAA Compliance
3. Lowered Staff Stress Levels
4. Decreased Medical Errors
5. Limited Patient Sleep Disruption

Solet, J., Evidence-Based Design Meets Evidence-Based Medicine: The Sound Sleep Study. The Center for Health Design.

Primary Infection Control Concerns

1. High Touch Areas
2. Highly Durable Finishes
3. Designing Cleanable Millwork
4. Room Design for High Risk Areas

INTERIOR DESIGN & FGI

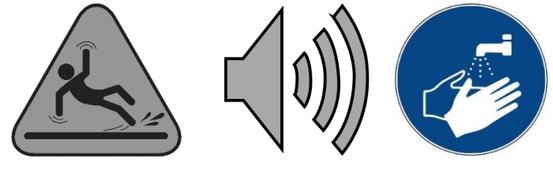
Infection Control in the Built Environment:

FGI Regulates

1. Infection Control Risk Assessment (ICRA)
2. Durable Finish Selections
    a. Floor, Wall, & Ceiling Materials
    b. Wall Base Materials & Heights
3. Cleanable Millwork Design
    a. Casework Materials
    b. Backsplash Heights
4. Room Design for High Risk Areas
    1. Handwash Sink Locations
    2. Hand Sanitizer Locations

Interior Design Best Practices

1. Choosing the Best Monolithic Flooring for Your Project
2. Handwash Sink Positioning | Splash Prevention
3. Considering High Touch Surfaces
4. To Err is Human



INFECTION CONTROL

Infection Control in the Built Environment:

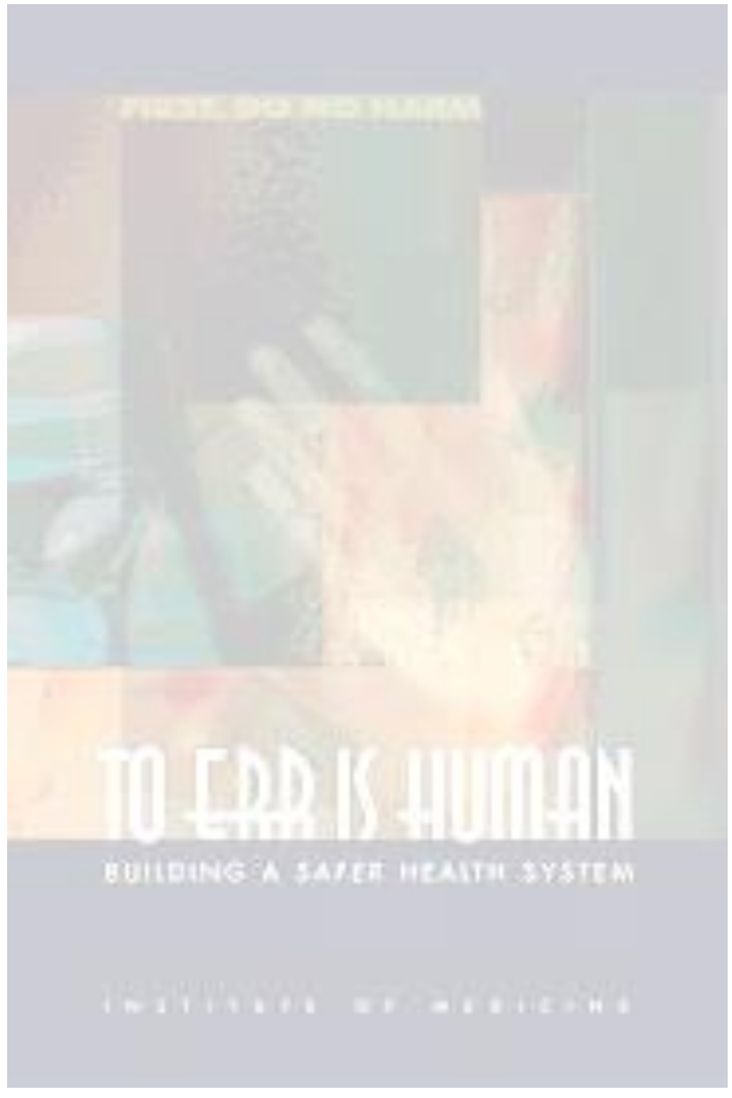
To Err is Human

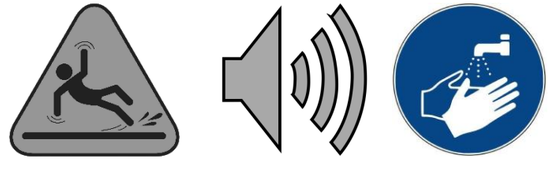
1. We All Make Mistakes!
2. Plans Systems so that it is difficult to do the WRONG thing.
    a. Direction of Staff Flow in Clean and Dirty Areas
    b. Making Handwash Sinks and Soiled Storage Convenient
    c. Separating Handwash Sinks from Available Clean Surfaces

The Institute of Medicine published "To Err Is Human: Building a Safer Health System," in 1999 which highlighted the startling statistic that 98,000 Americans were dying every year due to medical errors. Annual patient mortality due to medical errors has since risen steadily to 440,000 lives, which brings medical errors into the country's third-leading cause of death.

-healthleadersmedia.com, To Err is Human

#1 Heart Disease #2 Cancer #3 Medical Error





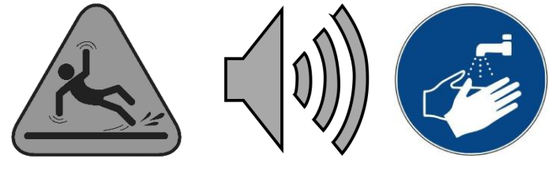
Infection Control in the Built Environment:

Choosing the Best Monolithic Floor Your Project

1. Heterogeneous Sheet Vinyl Vs. Homogeneous.
2. Stain Resistance
3. Puncture Resistance
4. Point and Rolling Load Characteristics
5. Integrated Wall to Floor Transitions

Monolithic Flooring Options

1. Epoxy
2. Sheet Vinyl
3. Terrazzo Tile- Epoxy Sealed
4. Rubber Flooring



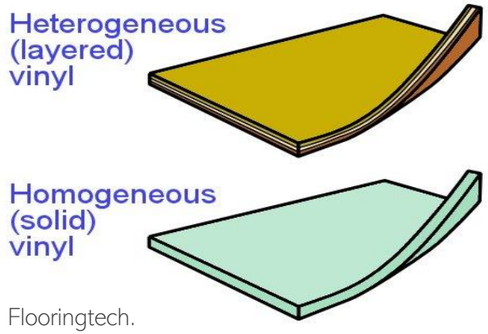
INFECTION CONTROL

Infection Control in the Built Environment:

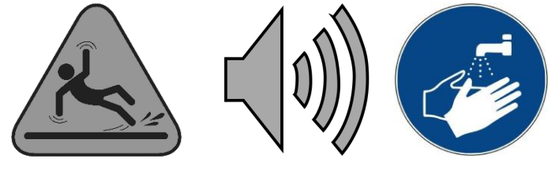
Choosing the Best Monolithic Floor Your Project

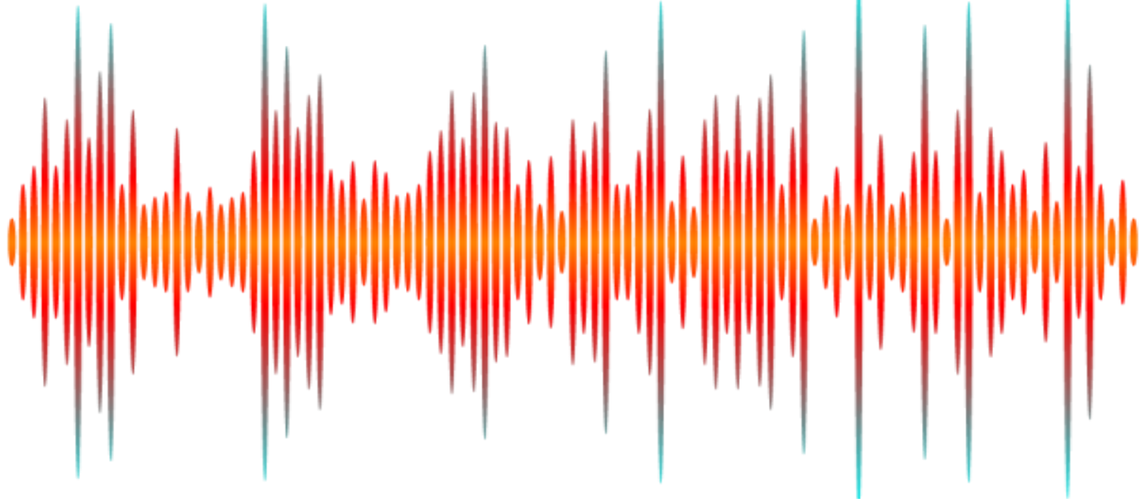
Monolithic Flooring Options

1. Epoxy, Sheet Vinyl



Flooringtech.com/au





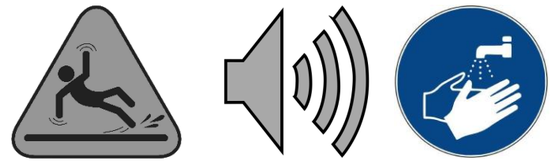
pngtree.com

Infection Control in the Built Environment:

Choosing the Best Monolithic Floor Your Project

Monolithic Flooring Options

1. Terrazzo, Tile- Epoxy Sealed, Rubber Flooring



INFECTION CONTROL

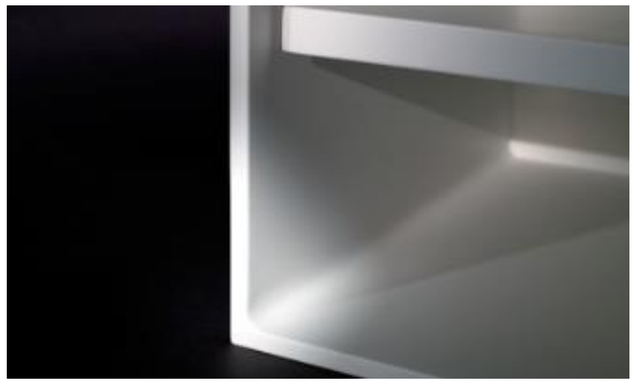
INTERIOR DESIGN & FGI

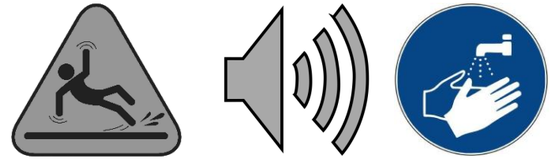
Infection Control in the Built Environment:

High Touch Areas

Antimicrobial & Microbial Resistant Finishes

Do your Research!



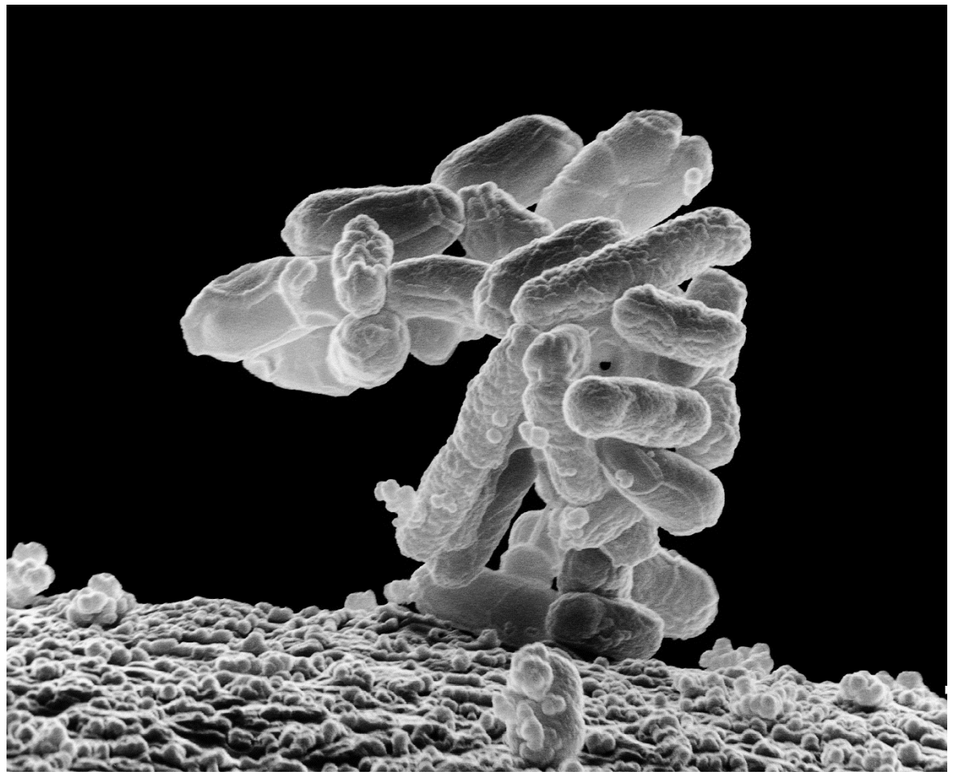


INFECTION CONTROL

Infection Control in High Risk Areas

Klebsiella Oxytoca (Klebsi) ICU Outbreak Assessment

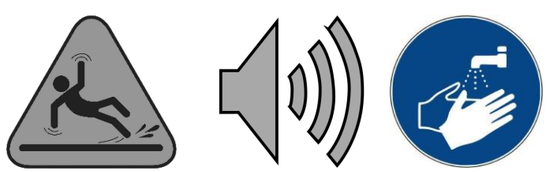
1. Surfaces Initially Tested
    a. Shared Equipment
    b. Solutions used in Bronchoscope Areas
    c. Glucometers
    d. Hand Creams
    e. Lubricating Gels
    f. Disinfectant Swabs



The Outbreak Persisted

2. Sinks & Tap Water were Tested
    a. Disposal of Body Fluids in Handwash Sinks
    b. Sinks were Cleaned & Left Unused for 48 hours with Disinfectant Standing in Traps
    c. Month-long trials of cleaning with bleach and foaming hydrogen peroxide

The Outbreak Persisted



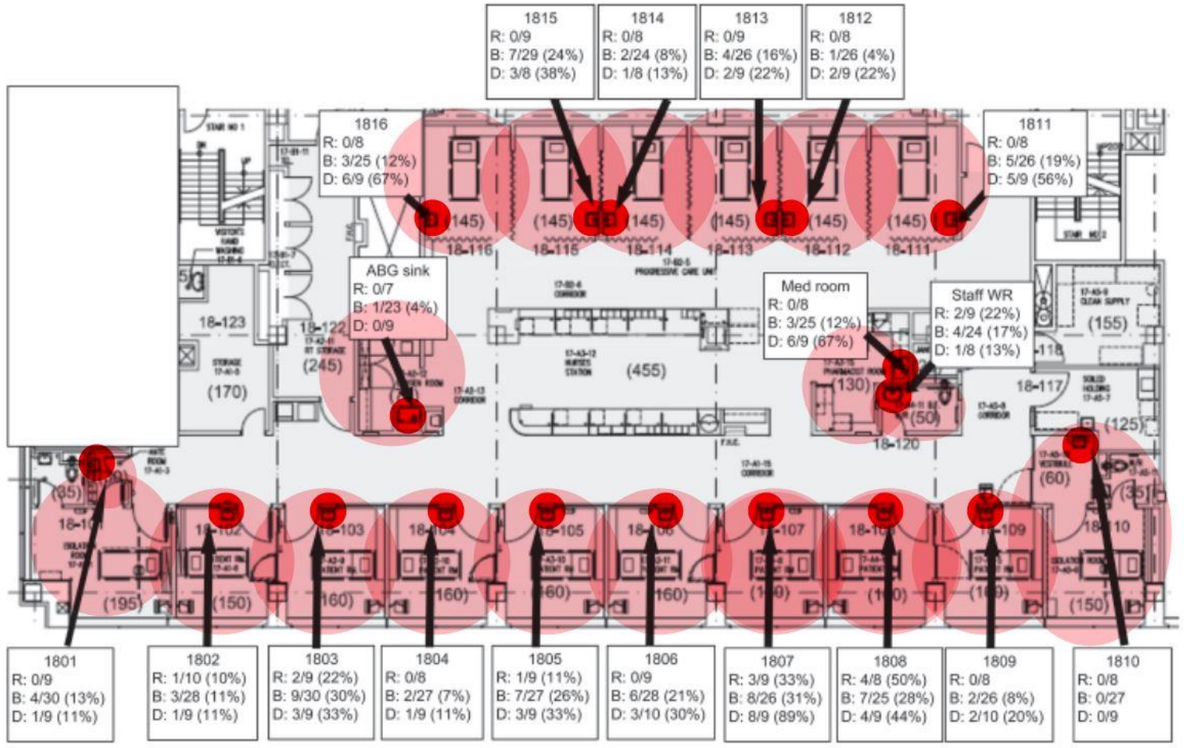
Lowe, C., Outbreak of Extended-Spectrum B-Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks. The Centers for Disease Control and Prevention.

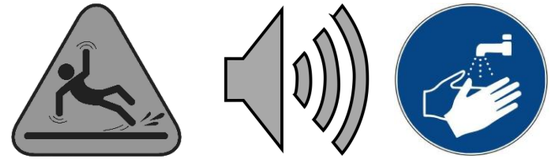
Infection Control in High Risk Areas – Case Study

Klebsiella Oxytoca (Klebsi) ICU Outbreak Assessment

1. Sink Culture Screens Found
    a. Rims Had the Lowest Yield
    b. Basins Had Some Yield
    c. Drains Had the Highest Yield
2. A 3x/day cleaning/disinfecting of sinks was implemented

The Outbreak Decreased



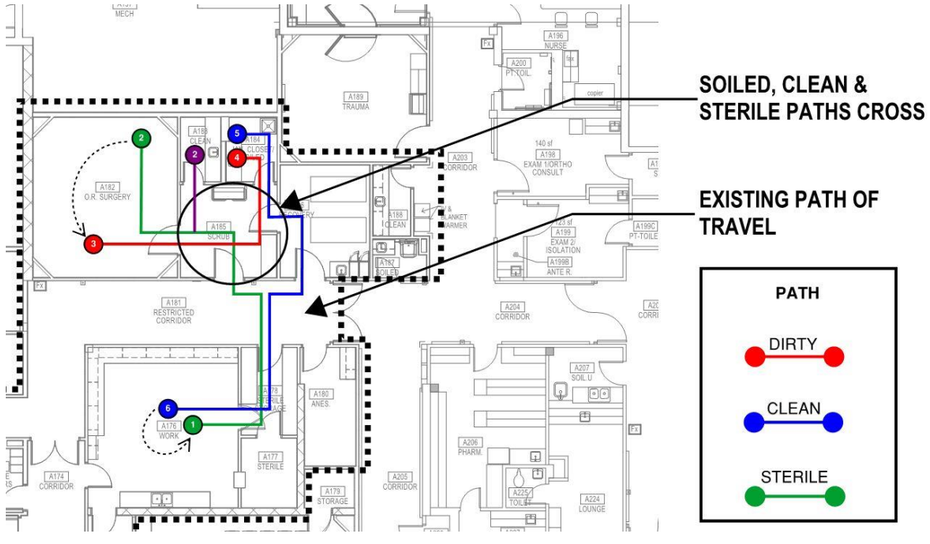


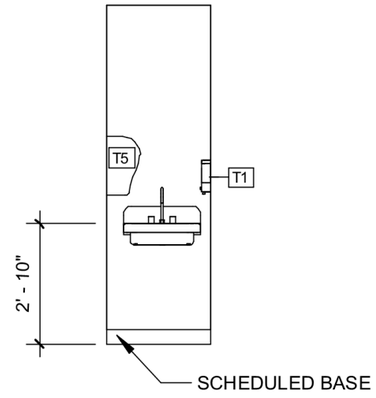
Lowe, C., Outbreak of Extended-Spectrum B-Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks. The Centers for Disease Control and Prevention.

Infection Control in High Risk Areas – Case Study

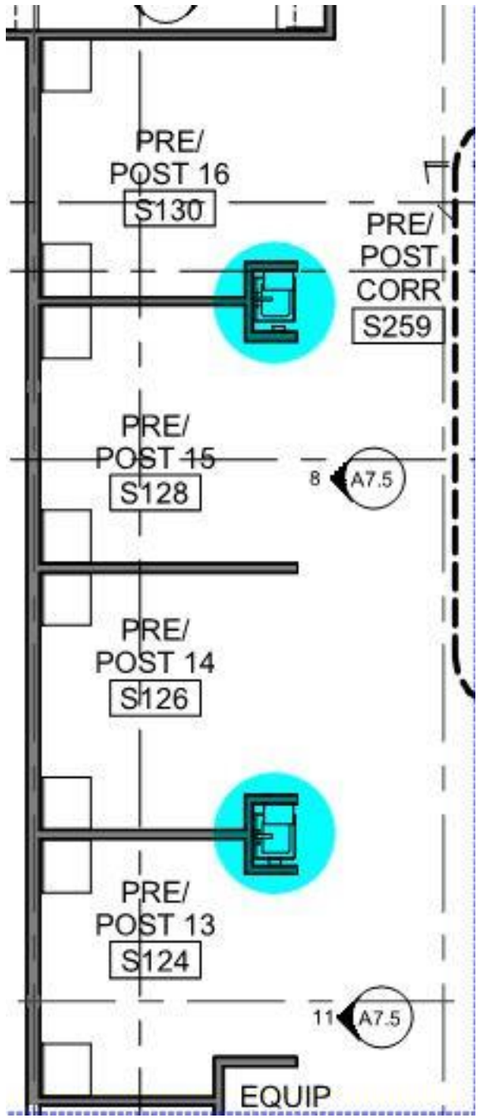
Klebsiella Oxytoca (Klebsi) ICU Outbreak Assessment

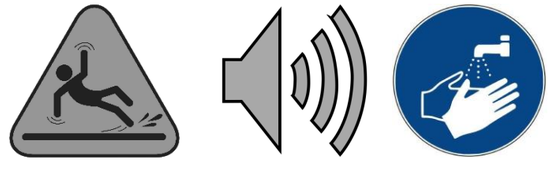
1. Study Findings
    a. Handwashing sinks may act as a reservoir for infection
    b. Person-to-person transmission may occur
    c. Increased sink cleaning reduced clinical isolates
    d. Structural & plumbing changes reduced the outbreak
    e. Biofilm formation may have been a factor in the persistence of the K. oxytoca outbreak
    f. Staff/Patient flow & access to soild/boi-hazard storage areas was a factor in the spread of infection





24 S145- SINK ALCOVE
1/4" = 1'-0"





Lowe, C., Outbreak of Extended-Spectrum B-Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks. The Centers for Disease Control and Prevention.

"Sinks should be considered potential reservoirs when clusters of infection caused by K. oxytoca are investigated." A multifaceted approach to infection control may include:

1. Reinforcement of infection control policies
2. Clear delineation of intended sink use
3. Intensified cleaning of sinks
4. Structural changes to sinks
5. Antimicrobial stewardship

Lowe, C., Outbreak of Extended-Spectrum B-Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks. The Centers for Disease Control and Prevention.

Session 4: Part 2
The Future of Healthcare

HFG architecture

PEC
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

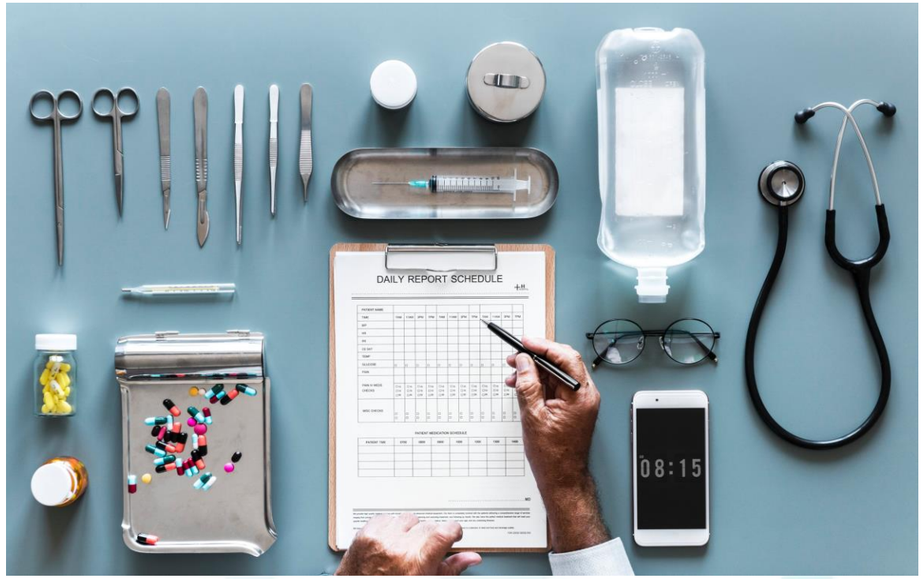
Oklahoma Association of Healthcare Engineers

2019 Summer Regional Event

August 23, 2019

The Future of Healthcare

1. MACRO TRENDS
   - ➢ Virtual Telemedicine
   - ➢ Solving the Problem of Overworked Clinicians
   - ➢ Continued Drive for Value
2. CONSTRUCTION TRENDS
   - ➢ Lack of Skilled Trade Labor
   - ➢ Integrated Design and Construction
3. EVIDENCE-BASED RESEARCH TRENDS
   - ➢ Case Study 1: Clemson Operating Room Simulation Study
   - ➢ Case Study 2: Critical Access Hospital Study by HFG + KU Health and Wellness Program in the School of Architecture
4. WHAT IS THE FUTURE OF HEALTH CARE DESIGN
   - ➢ On-Stage / Off-Stage Design
   - ➢ Patient Centered Care and Other Topics



AGENDA

Macro Trends

Virtual Telemedicine

Virtual Care Center at Mercy

Virtual Telemedicine

Kaiser-Permanente: 50% of patient encounters are virtual

Solving the Problem of Overworked Clinicians

- Electronic Medical Records not always working well
- Shortage of 100,000 physicians
- Loss of autonomy related to the explosion of data

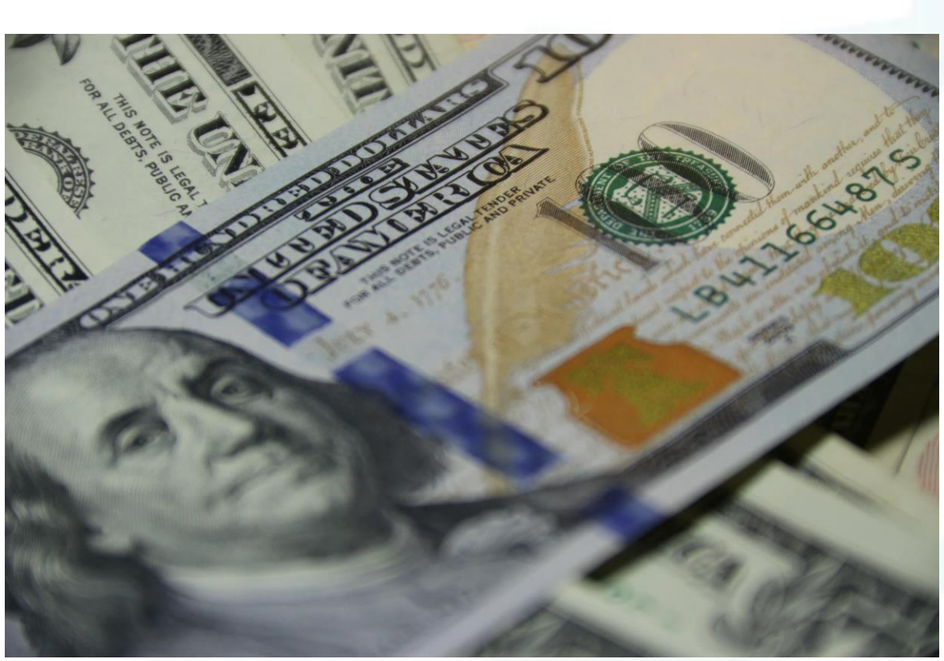
Solving the Problem of Overworked Clinicians

Solving the Problem of Overworked Clinicians

- Electronic Medical Records not always working well
- Shortage of 100,000 physicians
- Potential Solutions:
  - More mid-level providers
  - More virtualization
  - Fewer in-person encounters
  - Spaces designed to give respite and relieve stress and drive for efficiency and collaboration

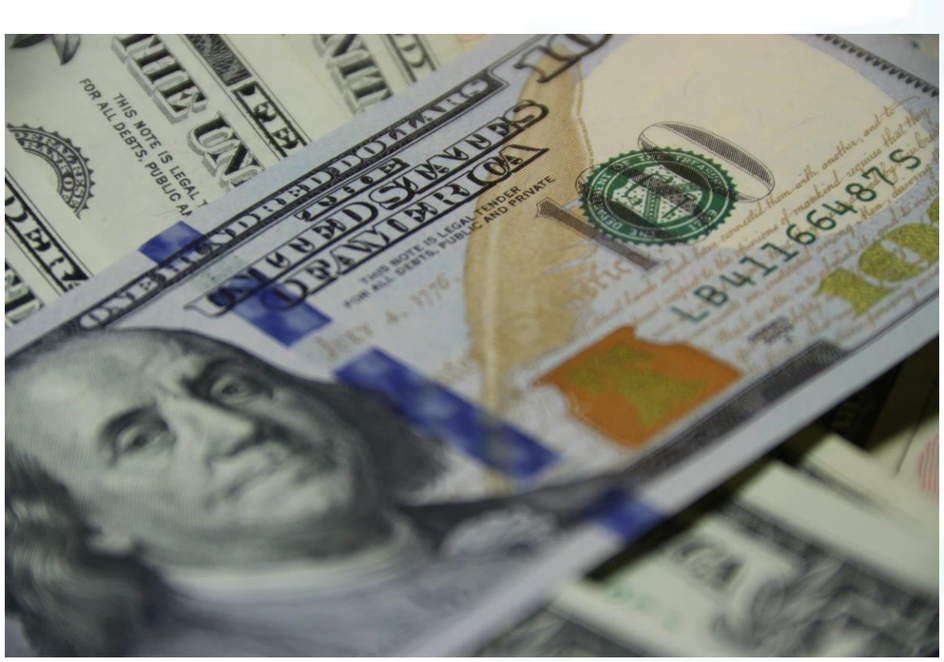
Continued Drive for Value

- The “Drive for Value” as opposed to “Fee for Service” is here to stay
- Healthcare is asking the question, “How do we keep people well?”
- Social Determinants and Health
  - Homelessness leads to more frequent, more expensive healthcare
  - Lower socioeconomic status leads to poorer quality food

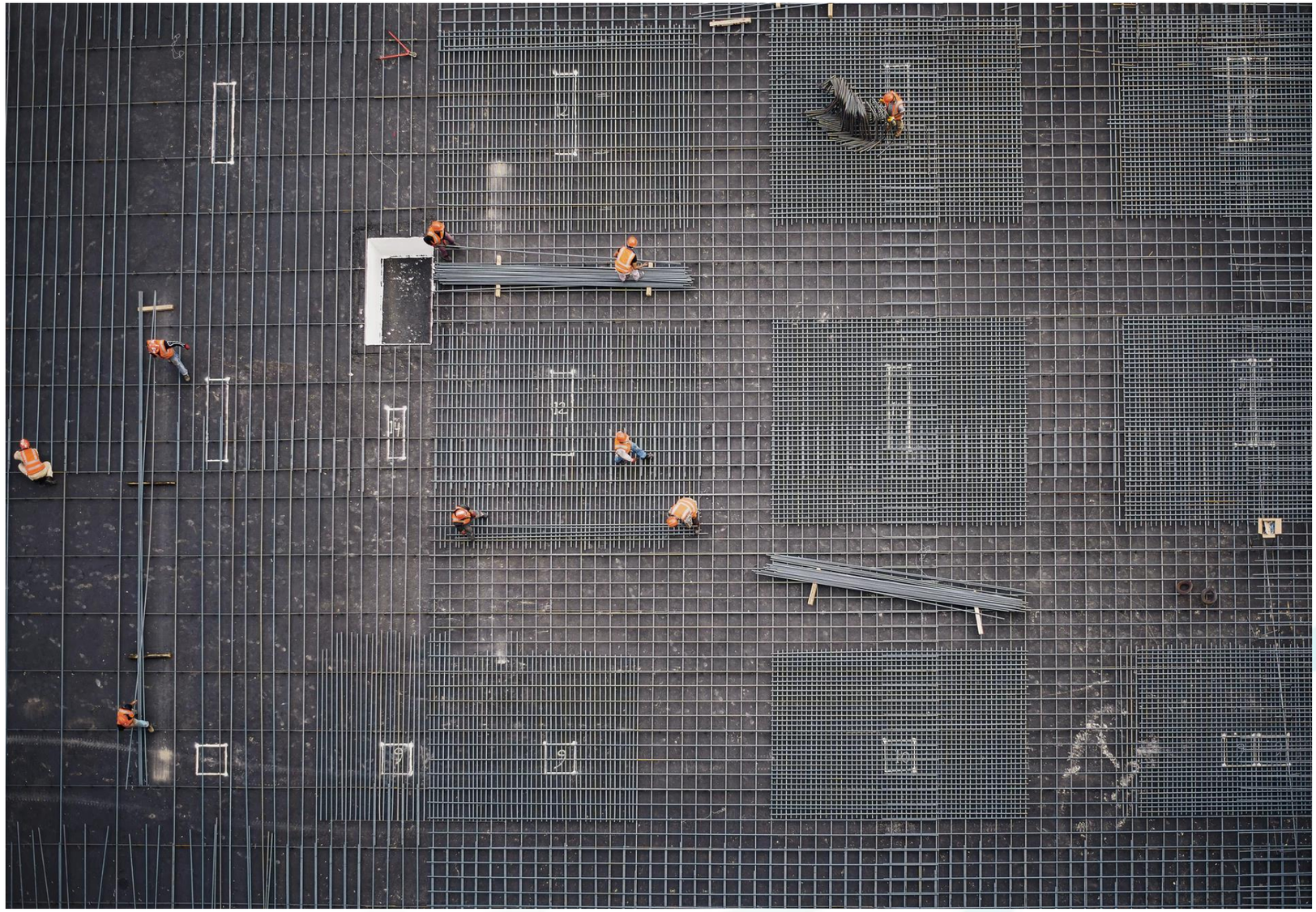


Continued Drive for Value

- Community Partnerships
- Healthcare providers thinking about how to “bend the curve” on homelessness, poverty and food insecurity as a way to reduce healthcare cost.
- Continued push for Wellness
  - We spend just under 20% on healthcare – how are we spending the other 80%?



Construction Trends



Lack of Skilled Trade Labor

- Trends:
  - More integrated approaches to design and construction
  - Drive towards pre-fabrication
  - Quality and control conditions
- Pressures:
  - Pressure to speed product to market
  - Healthcare construction is more complex than ever

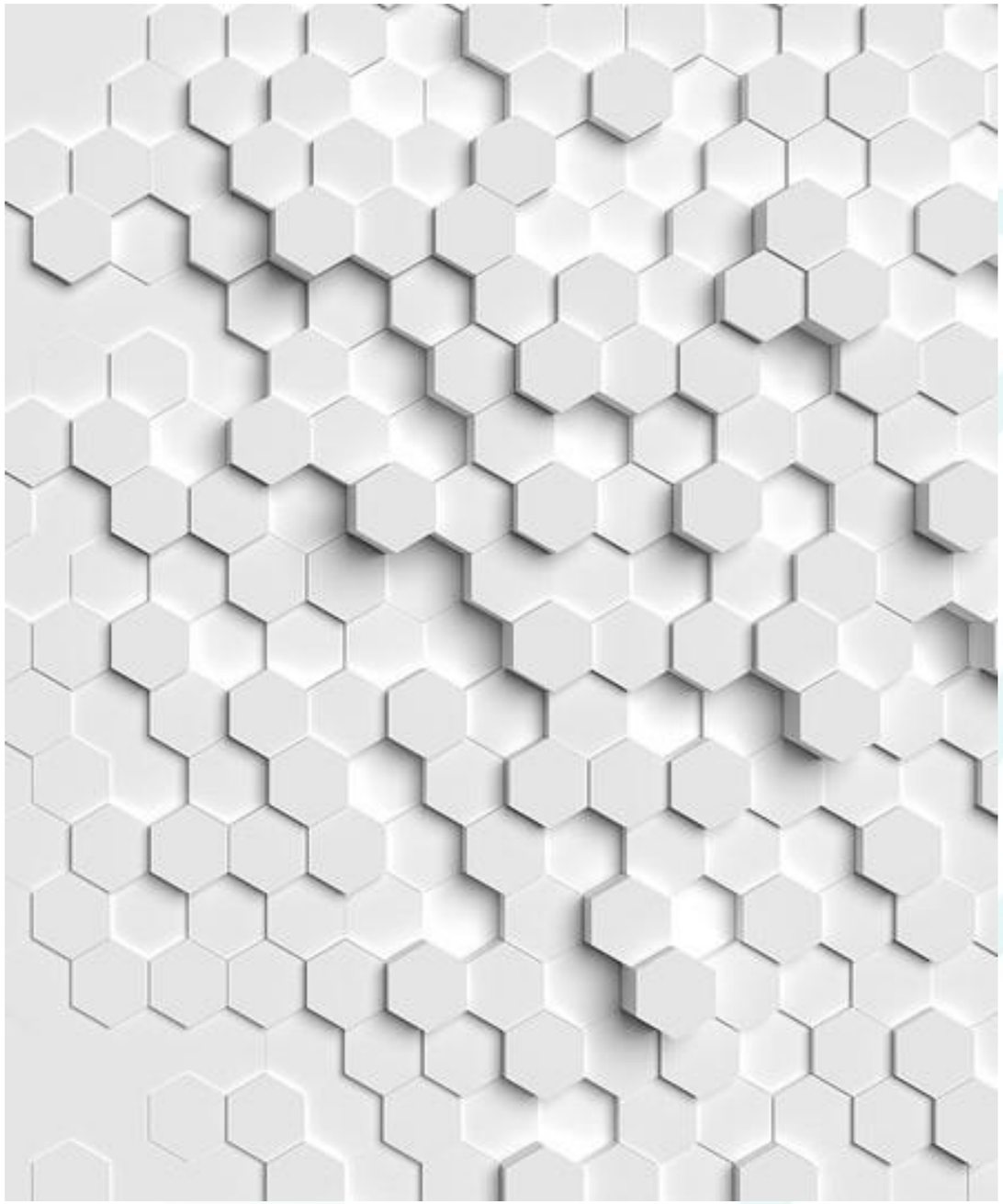
Lack of Skilled Trade Labor

- This is the desire of the market:

Lack of Skilled Trade Labor

- We are still building like it is 1981.
- The time is ripe for transformation.
  - Integrated Building and Design processes – “Design Assist” – “IPD”
  - Pre-fabrication
  - Lean Design and Construction Practices
  - Time to make being a “tradesman” a sought-after vocation

Evidence-Based Research Trends



Case Study 1: Clemson Operating Room Simulation Study

DISRUPTING FROM THE INSIDE OUT TO CREATE DYNAMIC HUMAN-CENTERED OPERATING ROOM ENVIRONMENTS

ANJALI JOSEPH | Ph.D., EDAC
Professor, Spartanburg Regional Healthcare System Endowed Chair in Architecture+Health Design, Director, Center for Health Facilities Design and Testing

ALEXANDER LANGERMAN | MD, SM, FACS
Associate Professor of Otolaryngology Director of Surgical Analytics Lab, Institute for Surgery and Engineering Director of Program in Surgical Ethics, Center for Biomedical Ethics and Society Vanderbilt University Medical Center (VUMC)

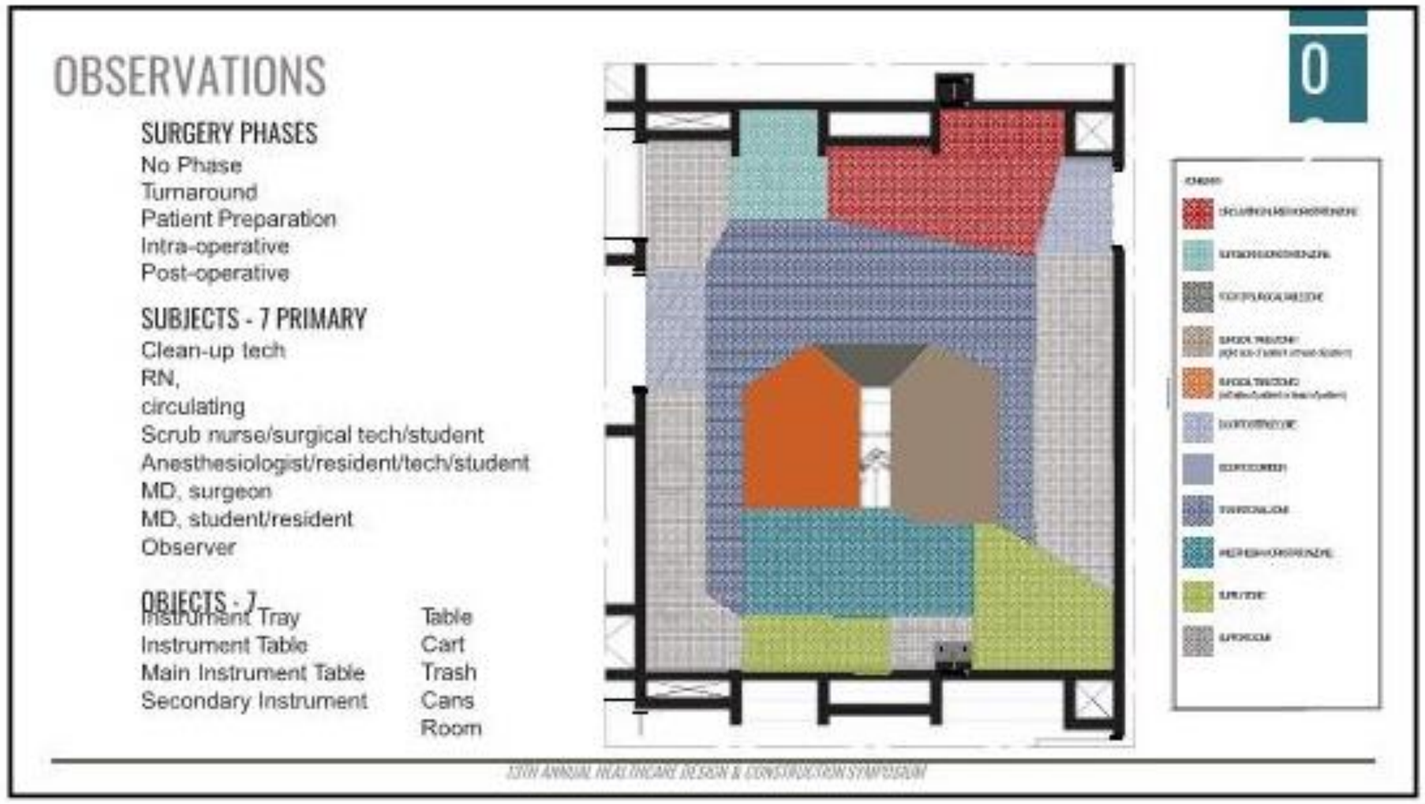
CLEMSON UNIVERSITY

A+H HEALTHFACILITIES DESIGN & TESTING

VANDERBILT UNIVERSITY MEDICAL CENTER

Case Study 1: Clemson Operating Room Simulation Study

- Observation

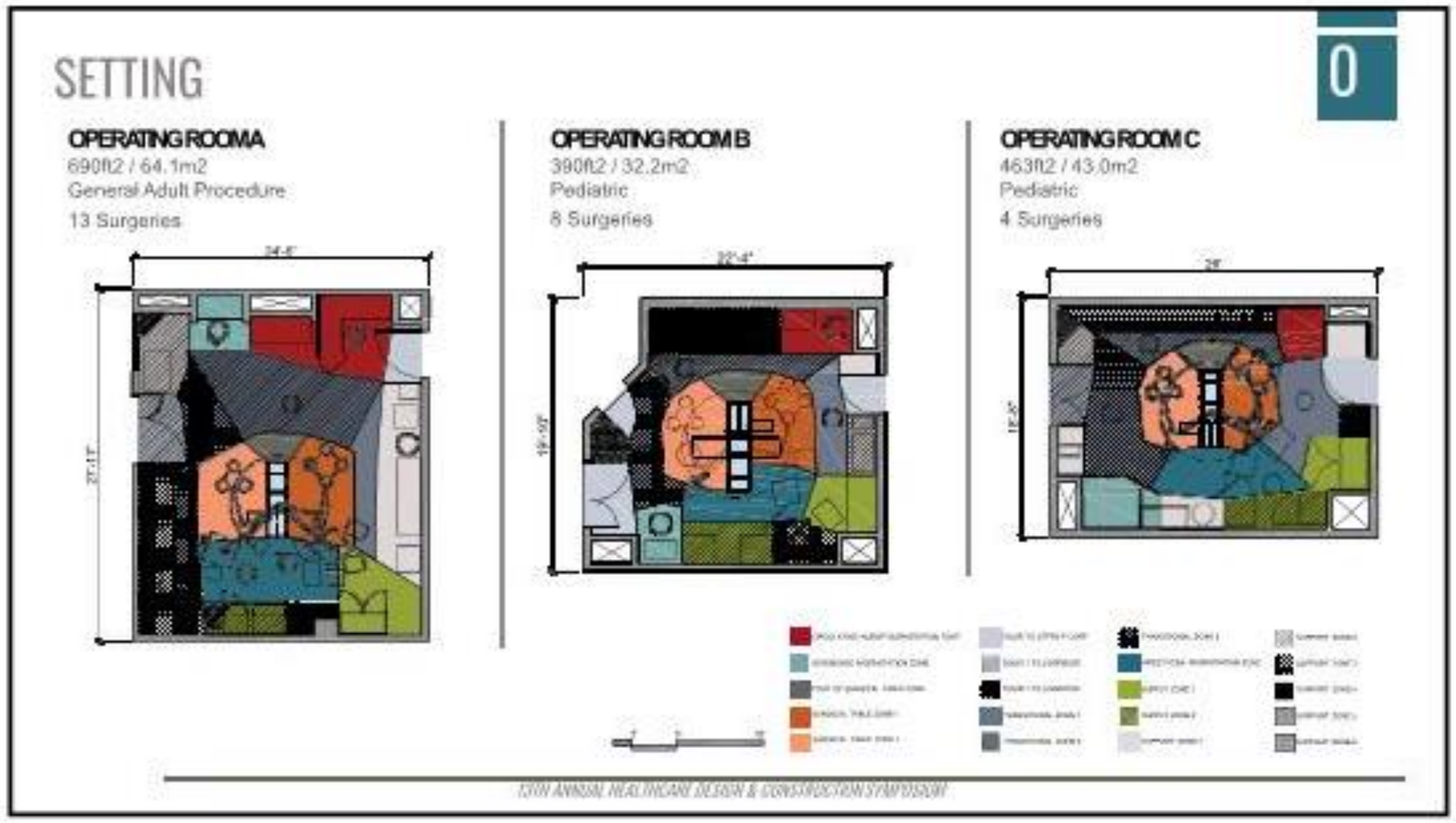


Case Study 1: Clemson Operating Room Simulation Study

- Observation

Case Study 1: Clemson Operating Room Simulation Study

- Testing Sizing and Layout



Case Study 1: Clemson Operating Room Simulation Study

- Work-Flow Analysis

CIRCULATING NURSE WORK PATTERNS

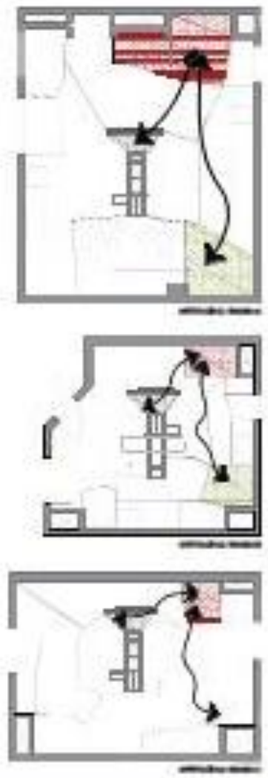
Design Guidelines:
Optimize movement and flow

STUDY AIMS

- To explore how the layout configuration and adjacencies of functionally different areas within the OR
  impacts **movement patterns** of the circulating nurse
- To explore how the layout configuration and adjacencies of functionally different areas within the OR
  impact **disruptions to the workflow** of the circulating nurse

KEY FINDINGS

- Most common travel paths were from the CN workstation to the OR table and storage area.
- The circulating nurse experiences most of the flow disruptions in transitional zones



Bayramzadeh, S., Joseph, A., Sari, D., Khoshkonar, A., Taaffe, K., Jafarifiroozabad, R., Nejore, D. M., & HPACHD, OR Study Group. (2018, January). The Impact of Operating Room Layout on Circulating Nurse's Work Patterns and Flow Disruptions: A Behavioral Mapping Study. HERD: Health Environments Research & Design Journal. DOIhttps://doi. org/10.1177%2F1937586717751124

VANDERBILT UNIVERSITY

15TH ANNUAL HEALTHCARE DESIGN & CONSTRUCTION SYMPOSIUM

Case Study 1: Clemson Operating Room Simulation Study

- Surgical Case Flow Disruptions

SURGICAL FLOW DISRUPTIONS

0

Design Guidelines:
Reduce disruptions
Optimize movement and flow

STUDY AIMS

- Explore how minor and major flow disruptions are related in terms of the people involved, tasks performed and OR traffic, as well as the location of FDs and other environmental characteristics of the OR that may contribute to these disruptions.
- Understand how layout and traffic affects the occurrences of both minor and major flow disruptions during surgery

KEY FINDINGS

- Minor flow disruptions that occurred while performing equipment-related activities were related to increases in major flow disruptions.
- An increase in minor disruptions in the transitional zone that connects the CN workstation zone with the foot of the surgical table was slightly related to an increase in the rate of major flow disruptions.
- The number of transitions between OR zones and the overall density or crowdedness in the OR significantly impacted the occurrence of any type of flow disruption.

Joseph, A., Khoshkenar, A., Taaffe, K., Catchpole, K., Machry, H., & Bayramzadeh, S. (2018, August 29). Minor flow disruptions, traffic-related factors and their effect on major flow disruptions in the operating room. BMJ Quality & Safety, 0, 1-8. http://dx.doi.org/10.1136/bmjqs-2018-007957

VANDERBILT UNIVERSITY

10TH ANNUAL HEALTHCARE DESIGN & CONSTRUCTION SYMPOSIUM

Case Study 1: Clemson Operating Room Simulation Study

- Infection Control Analysis

BACTERIAL LOAD SAMPLING

02

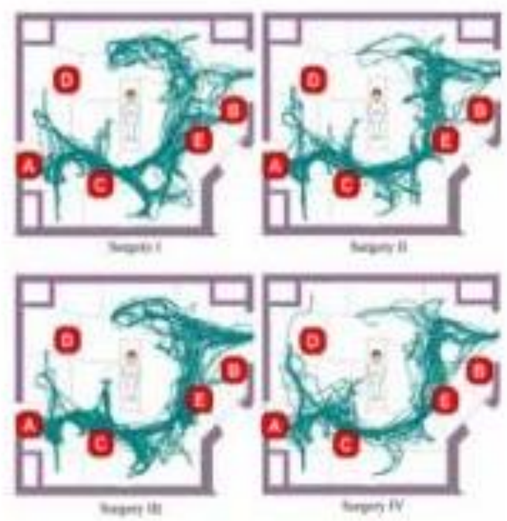
Design Guidelines:
Minimize surface and airborne contamination

STUDY AIMS

- Understand how the movement of the patient, equipment, materials, staff and OR door openings affects OR microbial loads at various locations
- Offer evidence-based guidelines for OR workflow design.

KEY FINDINGS

- Analysis of the air sampling data did not demonstrate differences by location in the bacterial load.
- Higher traffic areas in the OR have a higher microbial load than the lower traffic areas.
- The number of door openings did not have a significant impact.
- All hierarchical regression models of the settle plate CFU identified the sampling timeframe as significant.

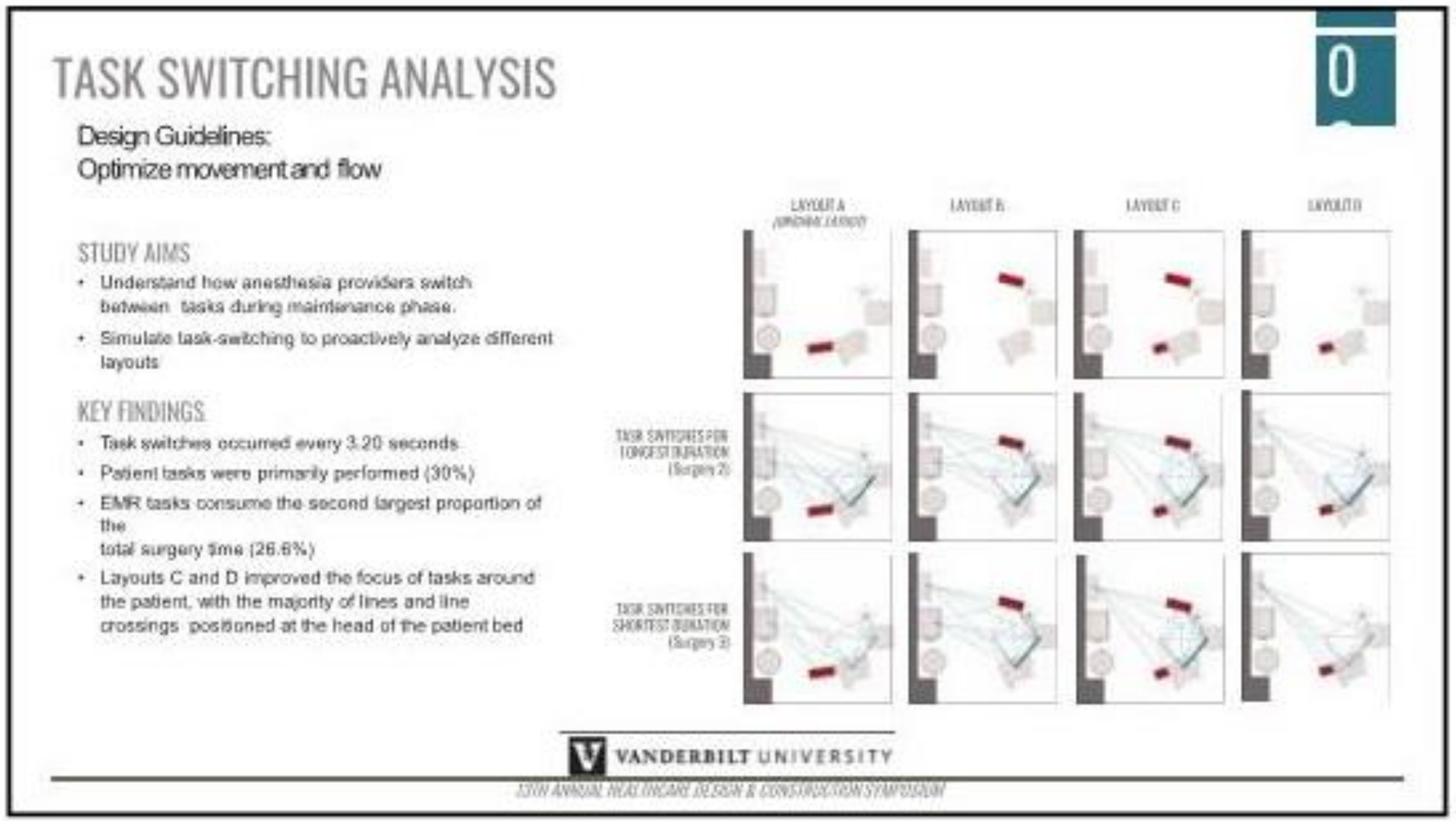


Taaffe, K., B. Lee, Y. Ferrand, L. Fredendall, D. San, C. Salgado, D. Shivers, A. Khoshkenar, and S. Reeves. "The influence of traffic, area location, and other factors on operating room microbial load." In review with Infection Control and Hospital Epidemiology.

VANDERBILT UNIVERSITY

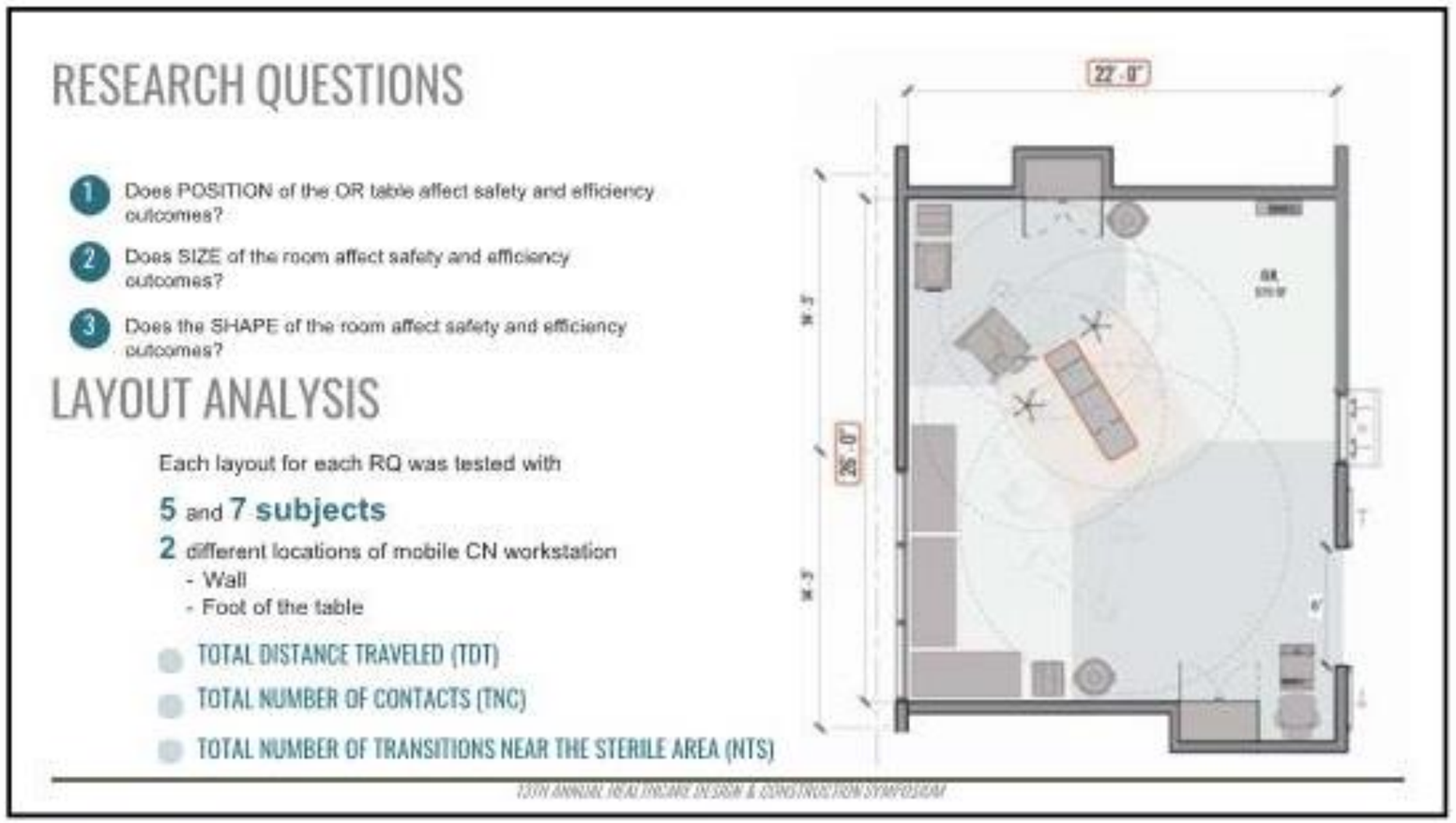
Case Study 1: Clemson Operating Room Simulation Study

- Task Switching Analysis



Case Study 1: Clemson Operating Room Simulation Study

- The Optimal Sizing and Layout of an OR



Case Study 2: Critical Access Hospital Study by HFG + KU School of Architecture Health and Wellness Program

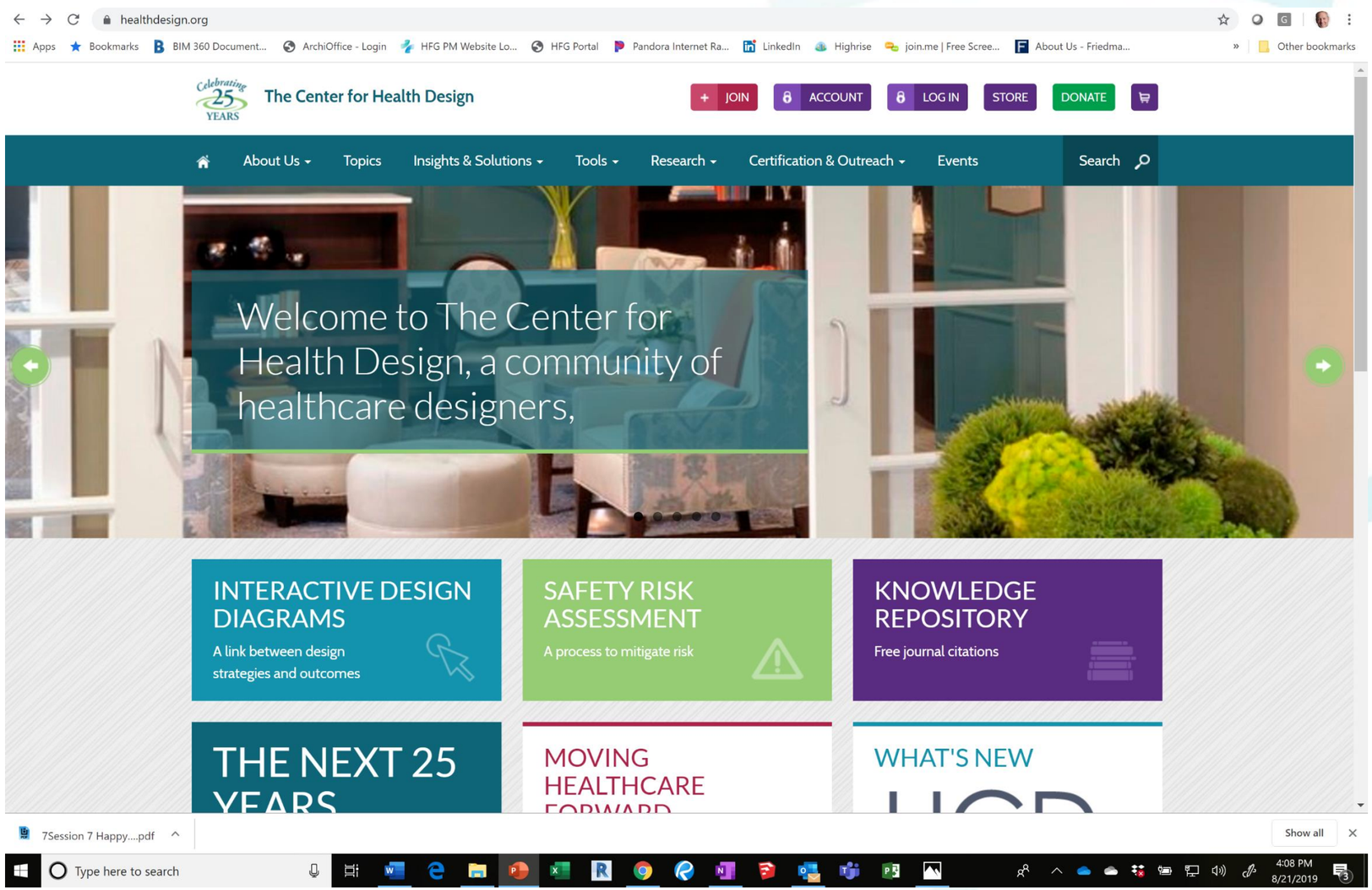
- Current Research looking at areas of recently designed CAH hospitals to study outcomes and for elements of commonality and what has worked and what continues to need to be improved

HFG ARCHITECTURE

EVIDENCE-BASED RESEARCH

Other Resources

- Many sources of good research into elements of healthcare environments
- Healthdesign.org



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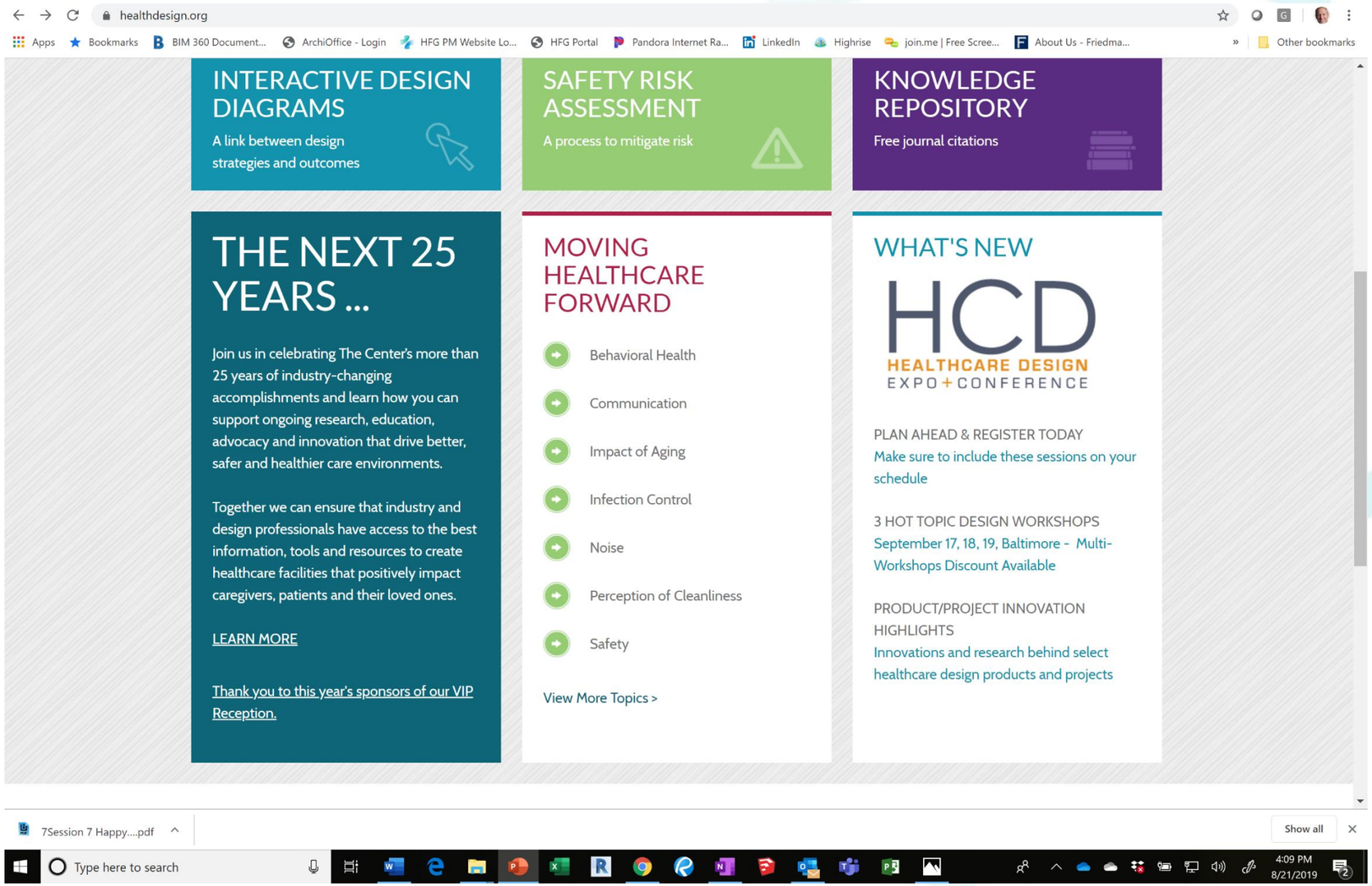
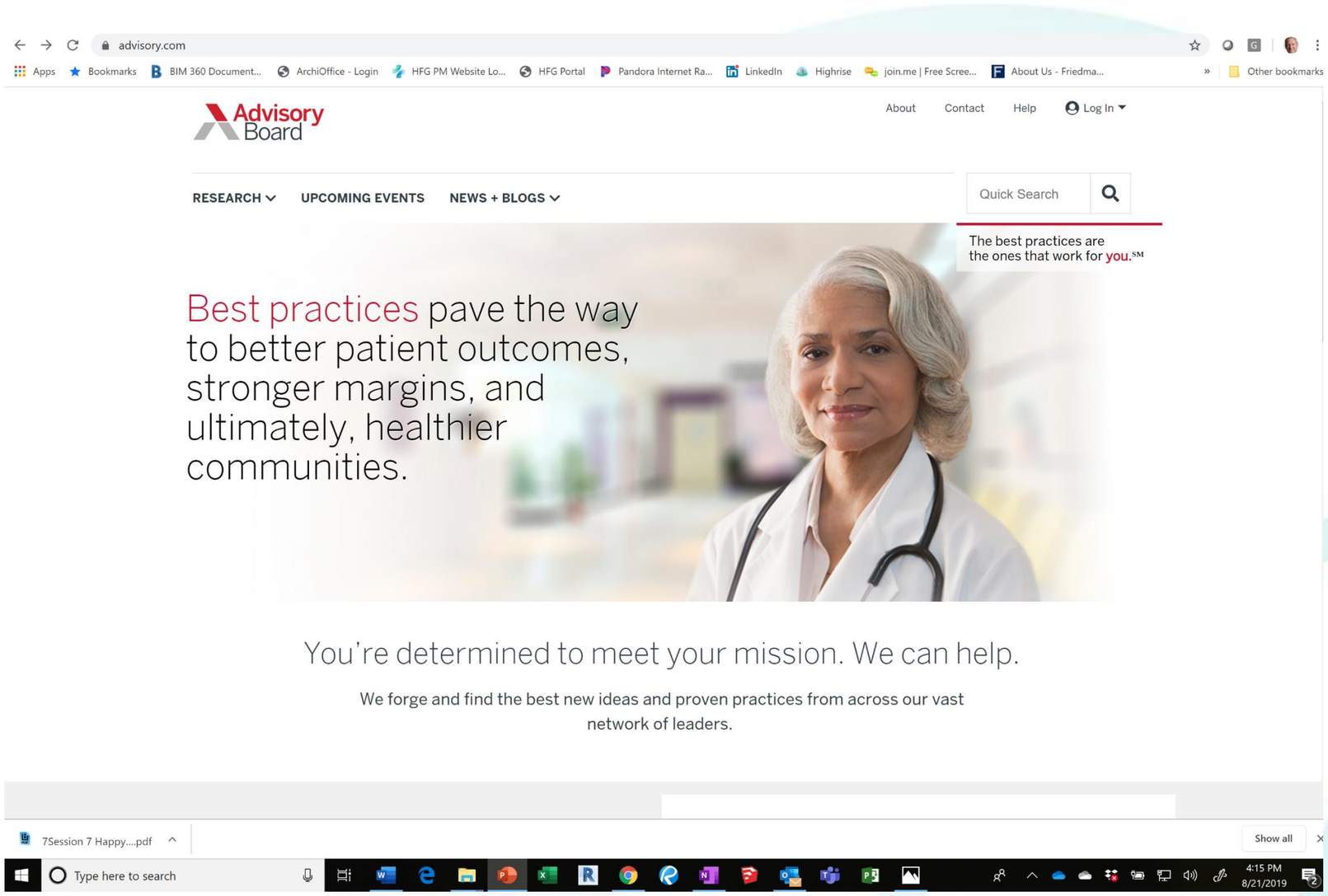
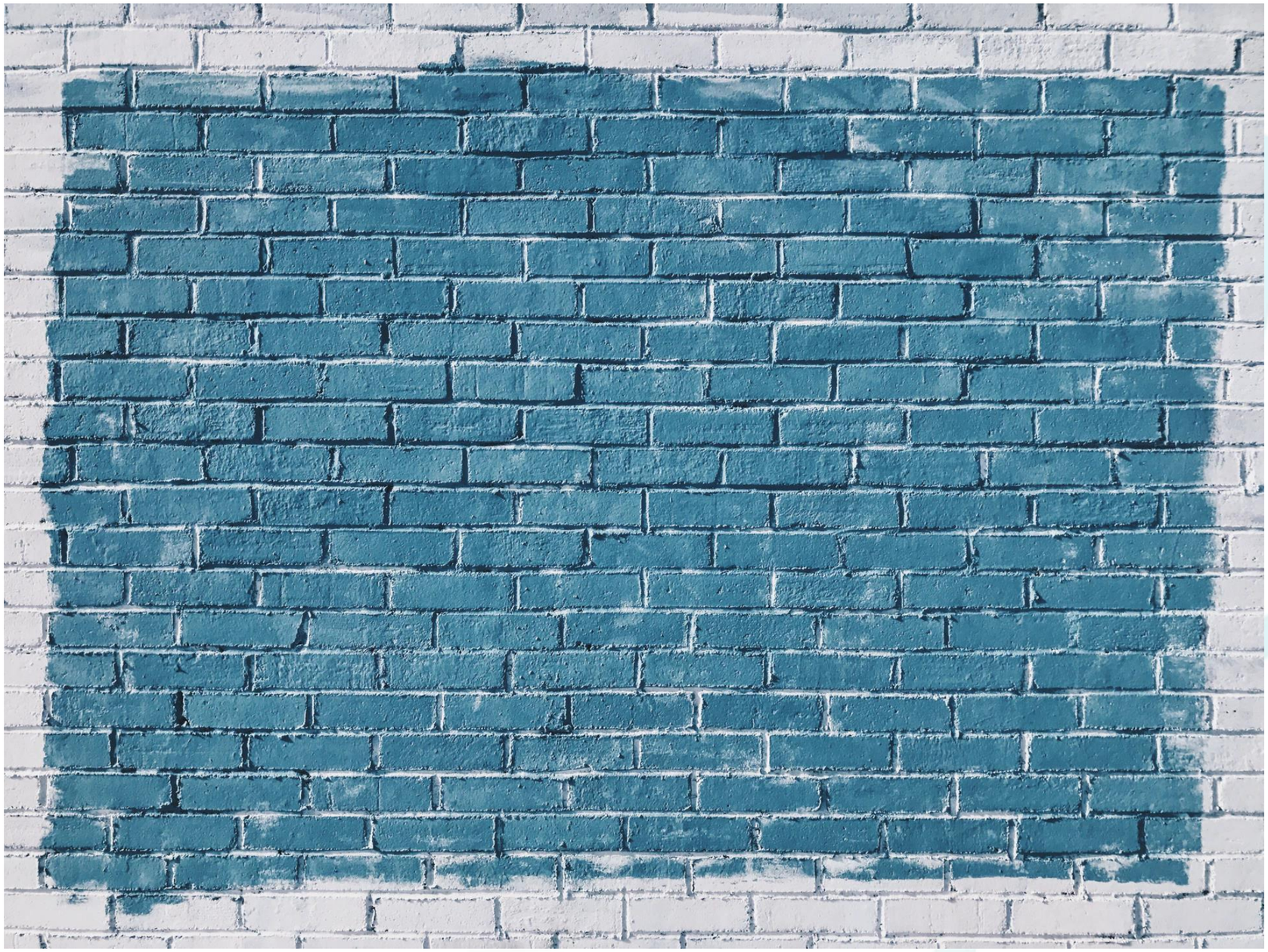


Other Resources

- Many sources of good research into elements of healthcare environments
- Advisory Board at Advisory.com



Design Trends

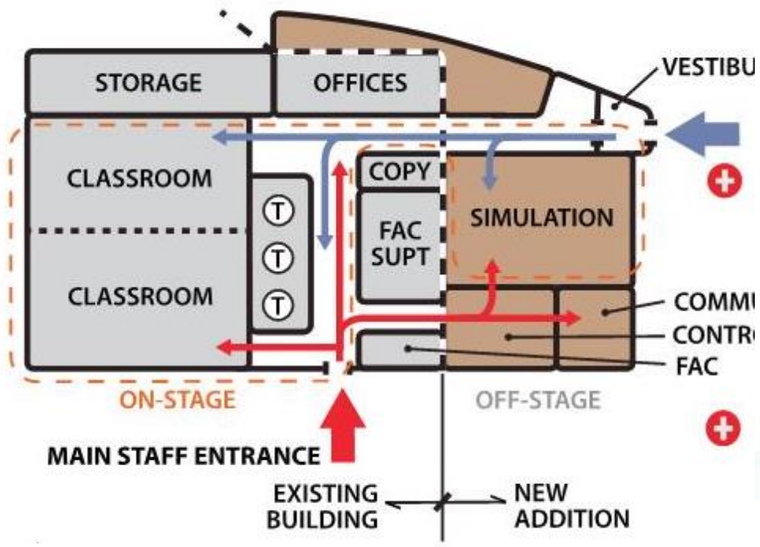


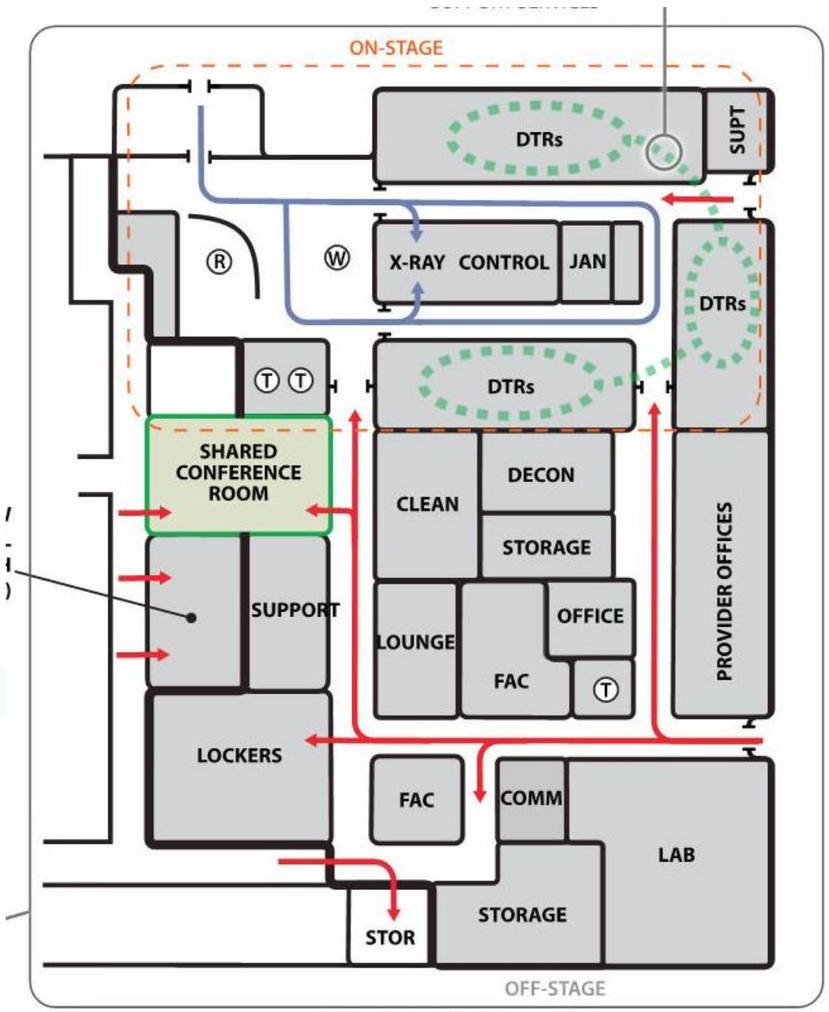
On-Stage / Off-Stage Design

- Creates ability for staff to work out of the flow

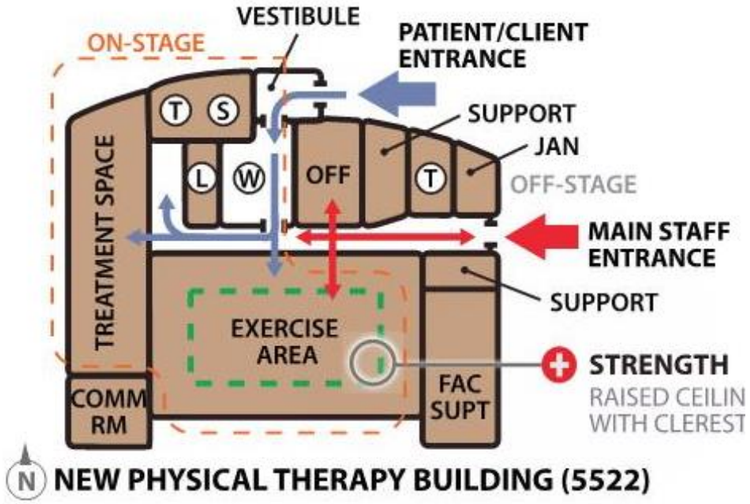
On-Stage / Off-Stage Design

- Examples





DENTAL CLINIC REMODEL



NEW PHYSICAL THERAPY BUILDING (5522)

LEGEND

- RECEPTION
- WAITING
- TOILET
- PATIENT/CLIENT CIRCULATION
- STAFF/LOGISTICS CIRCULATION
- AMBULANCE ACCESS
- ON-STAGE
- SHOWER
- LOCKERS
- NEW CONSTRUCTION
- RENOVATED SPACE
- SHARED SPACE

HFG architecture

Patient Centered Care – Biophilia and other "touchy-feely" topics architects are known to promote

- Article 1 – How Architects ruined healthcare - https://www.theglobeandmail.com/opinion/article-how-architects-ruined-healthcare/

OPINION

How architects ruined healthcare

JOSHUA LANDY
CONTRIBUTED TO THE GLOBE AND MAIL
PUBLISHED MAY 24, 2019

22 COMMENTS

Joshua Landy is a practising critical care physician and the co-founder of Figure 1.

The main lobby of the Credit Valley Hospital in Mississauga. The rise of patient-centred care means that among the open spaces and familiar coffee shops, there's little sign of the technical aspects of medical care.

TIBOR KOLLEY/THE GLOBE AND MAIL

- "So if Physicians across the country are reporting record levels of burnout, we might ask if hospitals are the problem?"
- "If you've been to a hospital that was built or renovated in the last decade, you know the aesthetic. Muted pastels, potted plants, and plenty of places for patients and their families to occupy themselves. "
- "Many people, when they walk in the ground floor, they say they don't feel like they're in a hospital," bragged one planner. "It's a grand space, the lobbies, the circular openings through the lower levels, nothing says 'hospital' there."
- "Bromley notes that 'architects built few conference rooms and lounges, leaving little room for physicians and nurses to congregate."

Patient Centered Care – Biophilia and other "touchy-feely" topics architects are known to promote

- Article 1 – How Architects ruined healthcare - https://www.theglobeandmail.com/opinion/article-how-architects-ruined-healthcare/

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TIBOR KOLLEY/THE GLOBE AND MAIL

- "Several of the administrators and architects speak glowingly of "the Disneyland concept," where all the messy parts are hidden "to generate a seamless fantasy world."
- "Let's be clear. Healthcare that does not look like healthcare is not healthcare — it is a sort of theatre created to distract an audience of anxious patients. It doesn't serve their interests. It's a funhouse mirror vision of patient-centred care, where it's more important to pretend you're not sick than to be properly treated."

Patient Centered Care – Biophilia and other "touchy-feely" topics architects are known to promote

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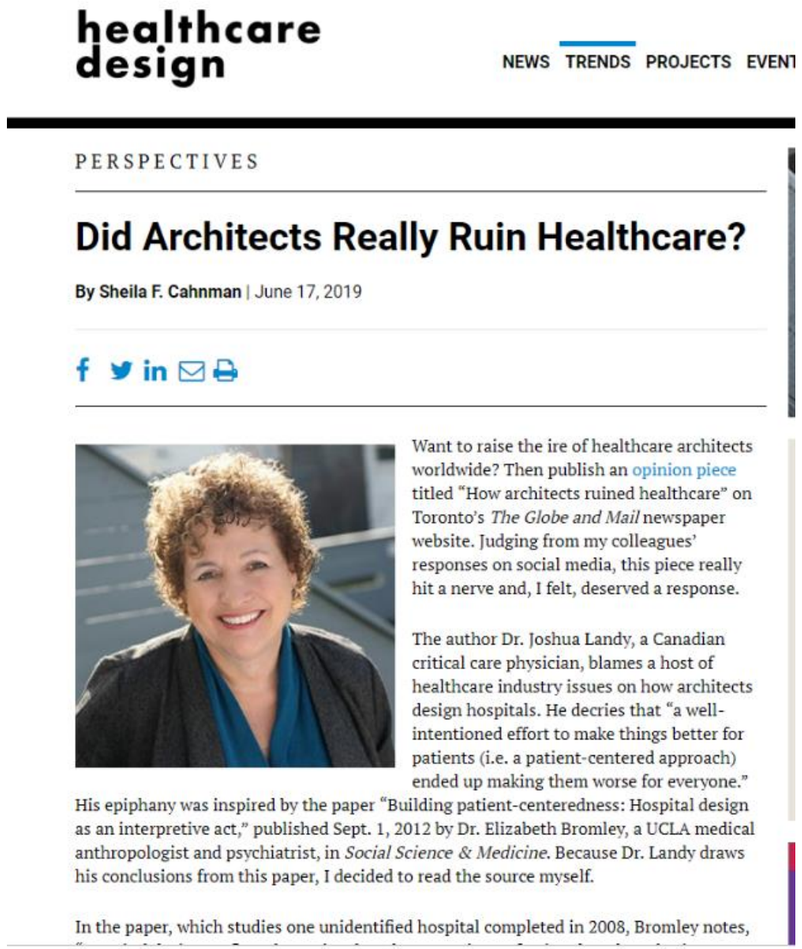
TIBOR KOLLEY/THE GLOBE AND MAIL

- "Business teamwork studies, including one by, ahem, the Disney Institute, recognize that collegiality between colleagues is a necessary ingredient for team success."
- "I remember one of my attendings once saying, as he flipped a series of switches in vain seeking a light to illuminate the patient's bed from above, that people who design hospitals should be punished by being treated in them."

HFG architecture

Patient Centered Care – Biophilia and other "touchy-feely" topics architects are known to promote

- Article 2 – Did Architects really ruin Healthcare - https://www.healthcaredesignmagazine.com/trends/perspectives/did-architects-really-ruin-healthcare/



healthcare design

NEWS TRENDS PROJECTS EVENT

PERSPECTIVES

Did Architects Really Ruin Healthcare?

By Sheila F. Cahnman | June 17, 2019

Want to raise the ire of healthcare architects worldwide? Then publish an opinion piece titled "How architects ruined healthcare" on Toronto's *The Globe and Mail* newspaper website. Judging from my colleagues' responses on social media, this piece really hit a nerve and, I felt, deserved a response.

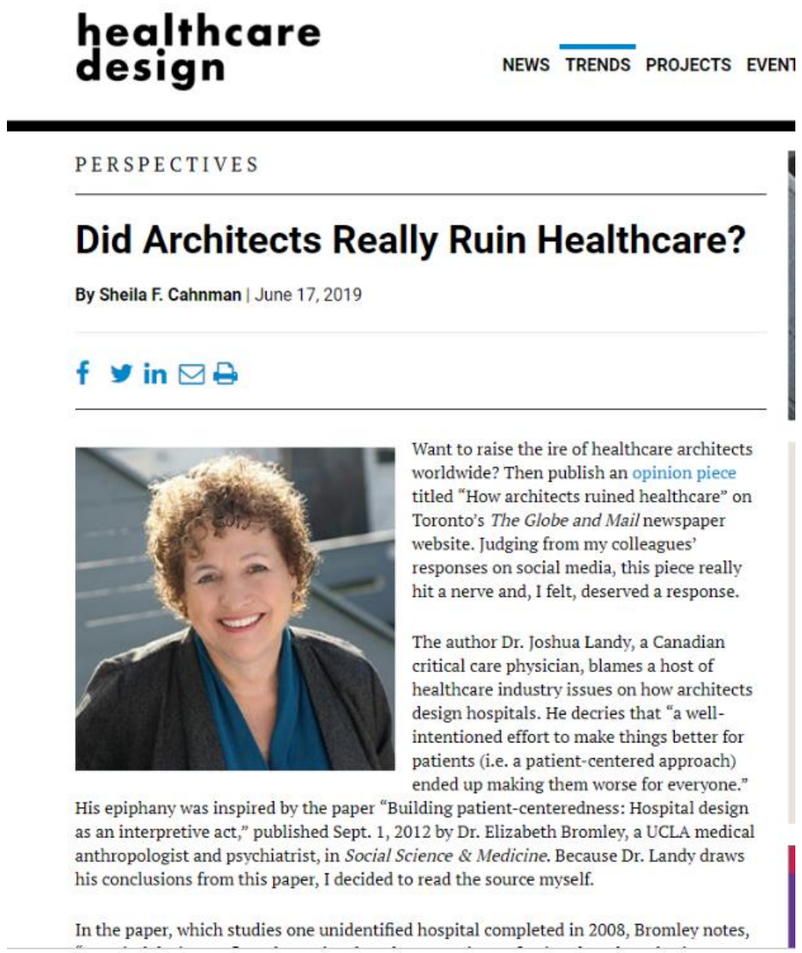
The author Dr. Joshua Landy, a Canadian critical care physician, blames a host of healthcare industry issues on how architects design hospitals. He decries that "a well-intentioned effort to make things better for patients (i.e. a patient-centered approach) ended up making them worse for everyone." His epiphany was inspired by the paper "Building patient-centeredness: Hospital design as an interpretive act," published Sept. 1, 2012 by Dr. Elizabeth Bromley, a UCLA medical anthropologist and psychiatrist, in *Social Science & Medicine*. Because Dr. Landy draws his conclusions from this paper, I decided to read the source myself.

In the paper, which studies one unidentified hospital completed in 2008, Bromley notes,

- "Want to raise the ire of healthcare architects worldwide? Then publish an opinion piece titled "How architects ruined healthcare" on Toronto's *The Globe and Mail* newspaper website. Judging from my colleagues' responses on social media, this piece really hit a nerve…"
- "This particular hospital administration chose to hyper-prioritize patient-centeredness through the "Disney Effect" of all clinical spaces being off-stage.
- "Citing this one 10-year-old study, Dr. Landy states in his op-ed that "Modern hospitals are specifically designed to eliminate collegiality."

Patient Centered Care – Biophilia and other "touchy-feely" topics architects are known to promote

- Article 2 – Did Architects really ruin Healthcare - https://www.healthcaredesignmagazine.com/trends/perspectives/did-architects-really-ruin-healthcare/



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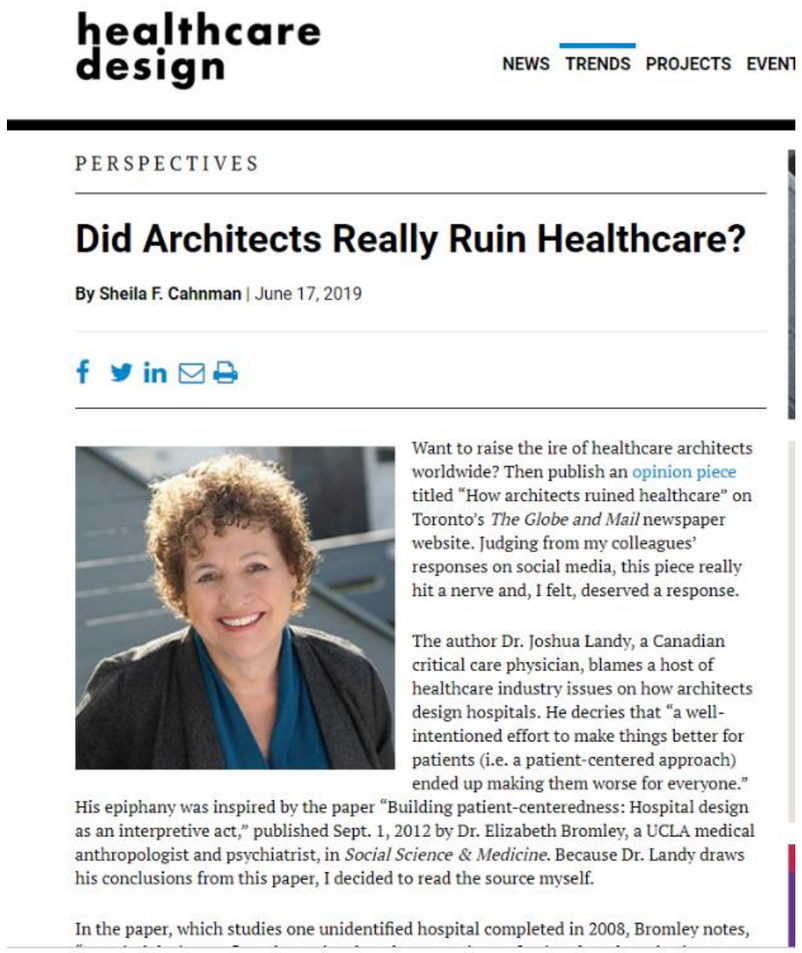
In the paper, which studies one unidentified hospital completed in 2008, Bromley notes,

- "Instead, I see today's healthcare designers and clients seeking a more balanced, research-based approach, recognizing patient-centered care means bringing caregivers closer to patients and that supporting a team-based approach is the future of healthcare…"
- "Apparently, Dr. Landy isn't familiar with the studies that have shown the healing effect of nature, positive distractions, and family support in reducing patient pain and anxiety, which ultimately could improve patients' medical conditions."

DESIGN TRENDS

Patient Centered Care – Biophilia and other "touchy-feely" topics architects are known to promote

- Article 2 – Did Architects really ruin Healthcare - https://www.healthcaredesignmagazine.com/trends/perspectives/did-architects-really-ruin-healthcare/



healthcare design

NEWS TRENDS PROJECTS EVENT

PERSPECTIVES

Did Architects Really Ruin Healthcare?

By Sheila F. Cahnman | June 17, 2019

Want to raise the ire of healthcare architects worldwide? Then publish an opinion piece titled "How architects ruined healthcare" on Toronto's *The Globe and Mail* newspaper website. Judging from my colleagues' responses on social media, this piece really hit a nerve and, I felt, deserved a response.

The author Dr. Joshua Landy, a Canadian critical care physician, blames a host of healthcare industry issues on how architects design hospitals. He decries that "a well-intentioned effort to make things better for patients (i.e. a patient-centered approach) ended up making them worse for everyone." His epiphany was inspired by the paper "Building patient-centeredness: Hospital design as an interpretive act," published Sept. 1, 2012 by Dr. Elizabeth Bromley, a UCLA medical anthropologist and psychiatrist, in *Social Science & Medicine*. Because Dr. Landy draws his conclusions from this paper, I decided to read the source myself.

In the paper, which studies one unidentified hospital completed in 2008, Bromley notes,

- "One intriguing issue I found is his op-ed was the comment that physically hiding the "messy part" of healthcare devalues medical professionals."

- "Understanding staff psychology is an important factor in hospital design, especially as their own health and well-being is threatened. Longer hours, increased documentation requirements, and the stress of ever more medically complex patients are contributing to staff burnout."

- "Despite Dr. Landy's strident tone, as healthcare designers we need to listen to and unbundle the concerns of all constituents, especially as medicine transforms."

Patient Centered Care – Biophilia and other "touchy-feely" topics architects are known to promote

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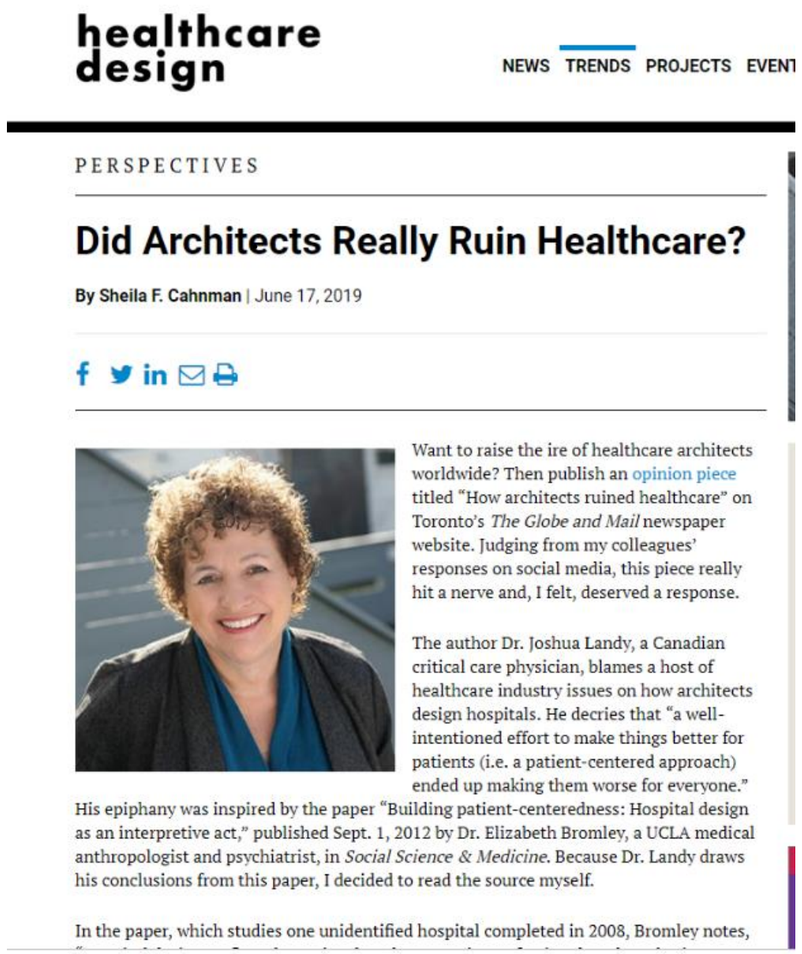

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In the paper, which studies one unidentified hospital completed in 2008, Bromley notes,

- "Finally, Dr. Landy asks, 'Is this place built to make us healthy—or to distract us from thinking about our health?' I don't believe the two are mutually exclusive. People, process, and place must all support care delivery, the patient's recovery and emotional well-being, and family involvement in a balanced approach…."

Session 4: Part 3
FGI Works in the Developing World

HFG architecture

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Oklahoma Association of Healthcare Engineers

2019 Summer Regional Event

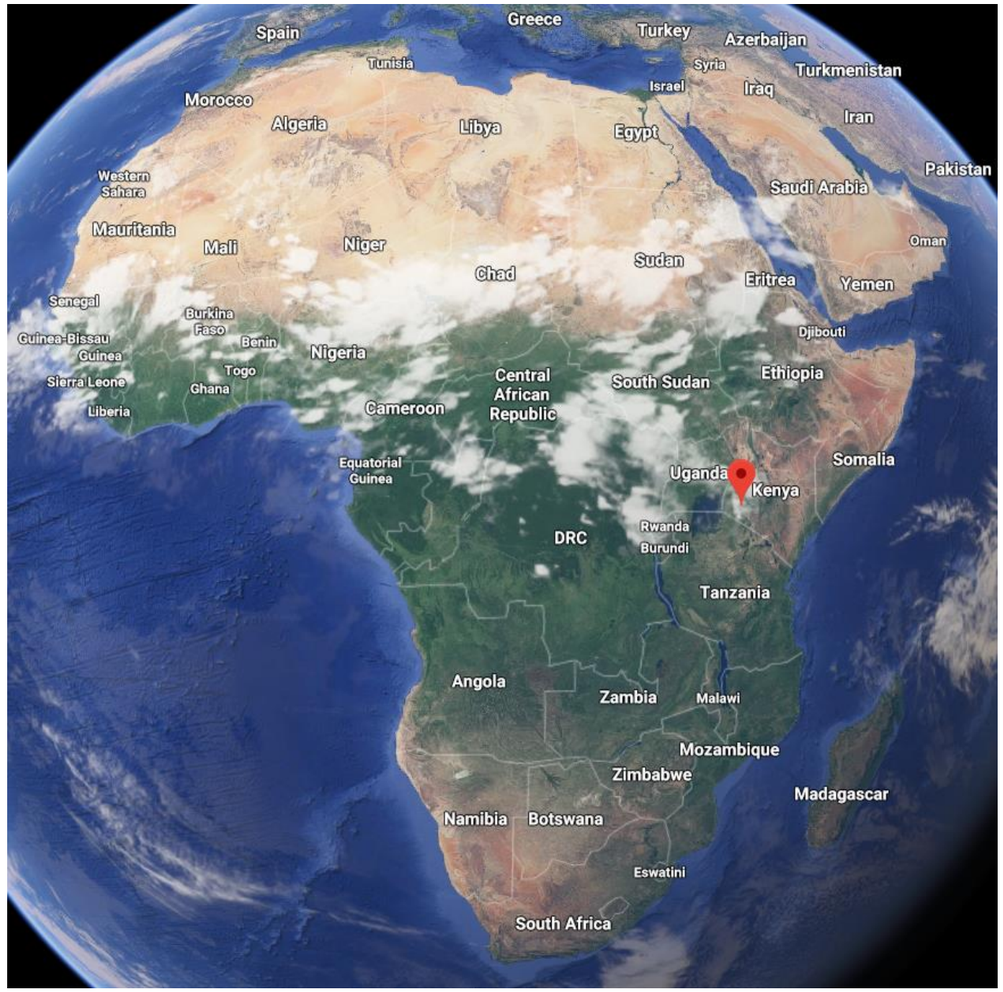
August 23, 2019

FGI Works in the Developing World

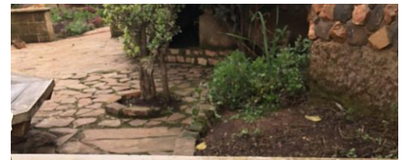
AGENDA

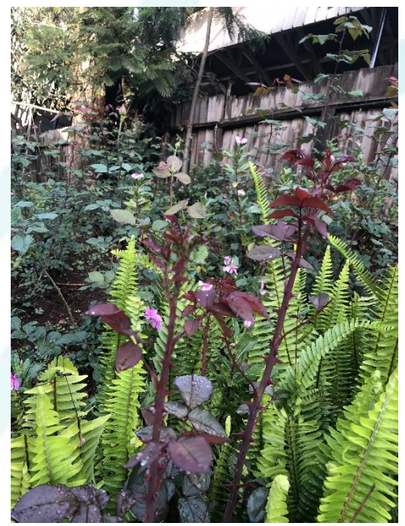
1. BOMET, KENYA
   - Environment
   - Tenwek Hospital
   - Public Health Crises
2. THE BILLY GRAHAM MEMORIAL CARDIOTHORACIC CENTER AT TENWEK HOSPITAL
   - Overview
   - FGI Compliance
   - Unique Design Features

Bomet, Kenya

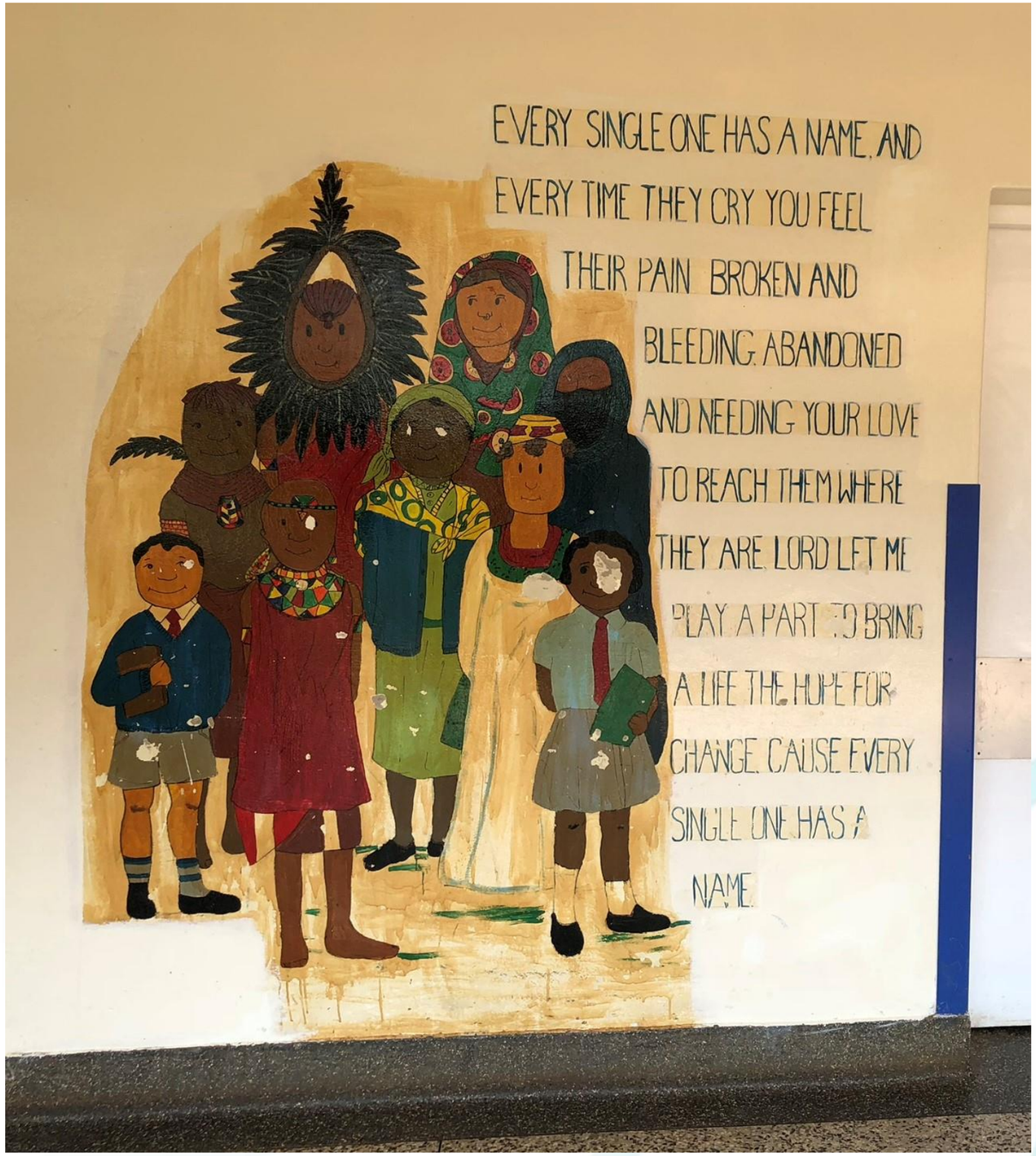


BOMET, KENYA

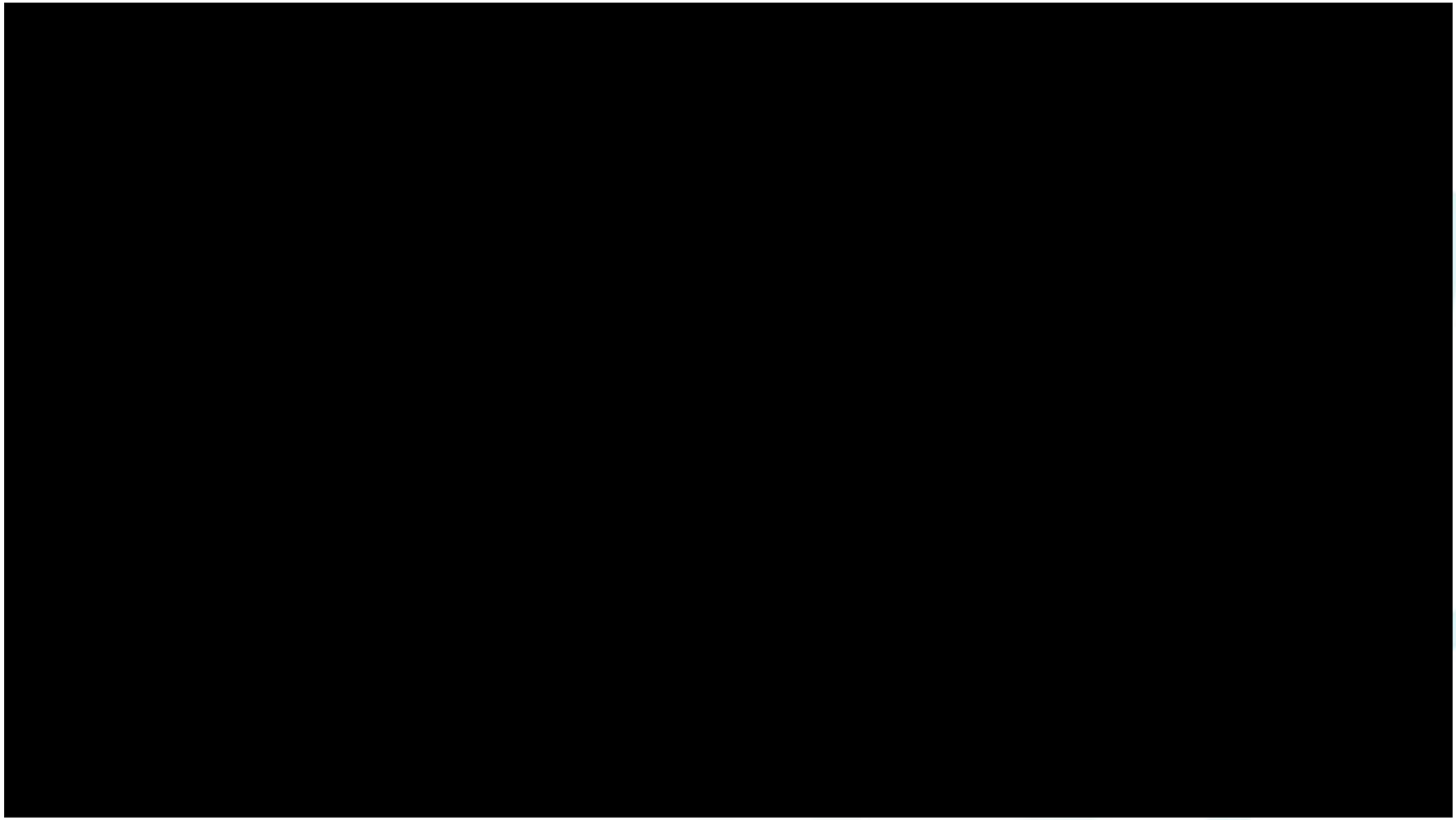


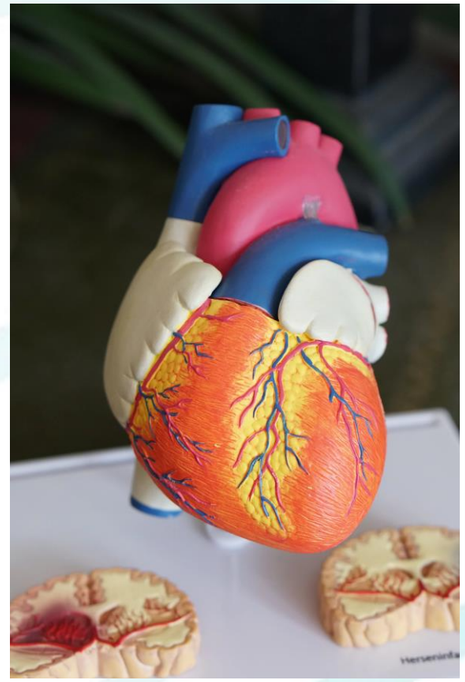



TENWEK HOSPITAL
WE TREAT
JESUS HEALS
A CHRISTIAN COMMUNITY COMMITTED TO EXCELLENCE IN
- COMPASSIONATE HEALTH CARE
- SPIRITUAL MINISTRY
- TRAINING FOR SERVICE


EVERY SINGLE ONE HAS A NAME, AND
EVERY TIME THEY CRY YOU FEEL
THEIR PAIN BROKEN AND
BLEEDING, ABANDONED
AND NEEDING YOUR LOVE
TO REACH THEM WHERE
THEY ARE, LORD LET ME
PLAY A PART TO BRING
A LIFE THE HOPE FOR
CHANGE CAUSE EVERY
SINGLE ONE HAS A
NAME

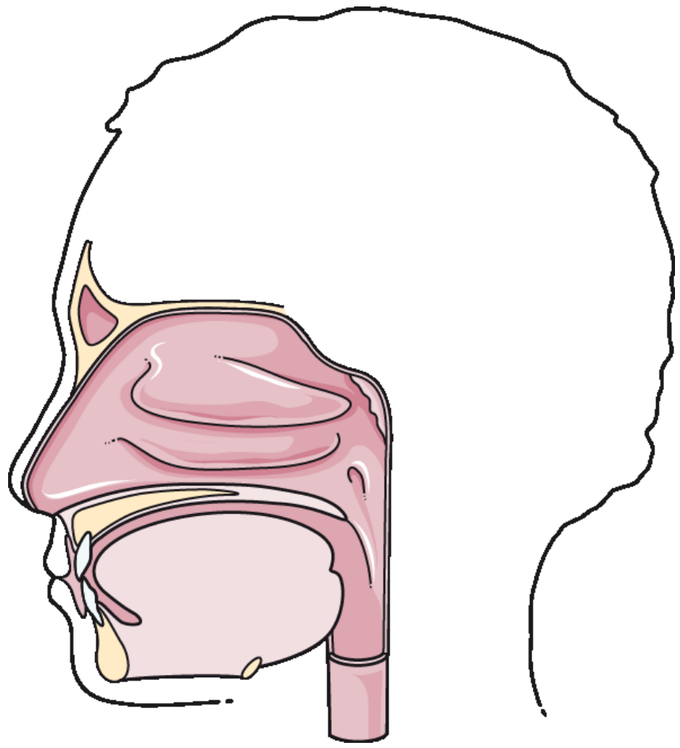
VIDEO TOUR

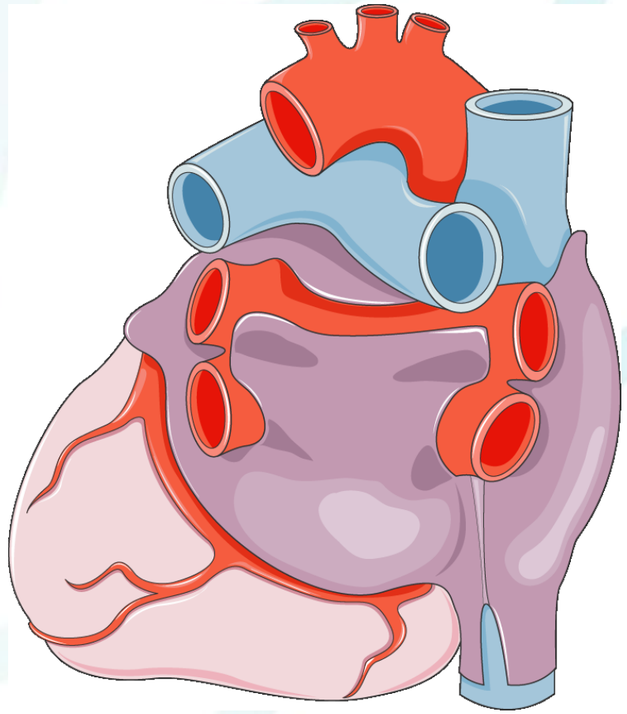




Rheumatic Heart Disease

- Caused by untreated and repeated Strep Throat infections
- Rheumatic Fever attacks the heart and causes Heart Valve damage
- Used to be more prevalent in the United States
- At Tenwek Hospital – 800 children and adolescents are on the waiting list
- Currently able to treat a limited number of cases



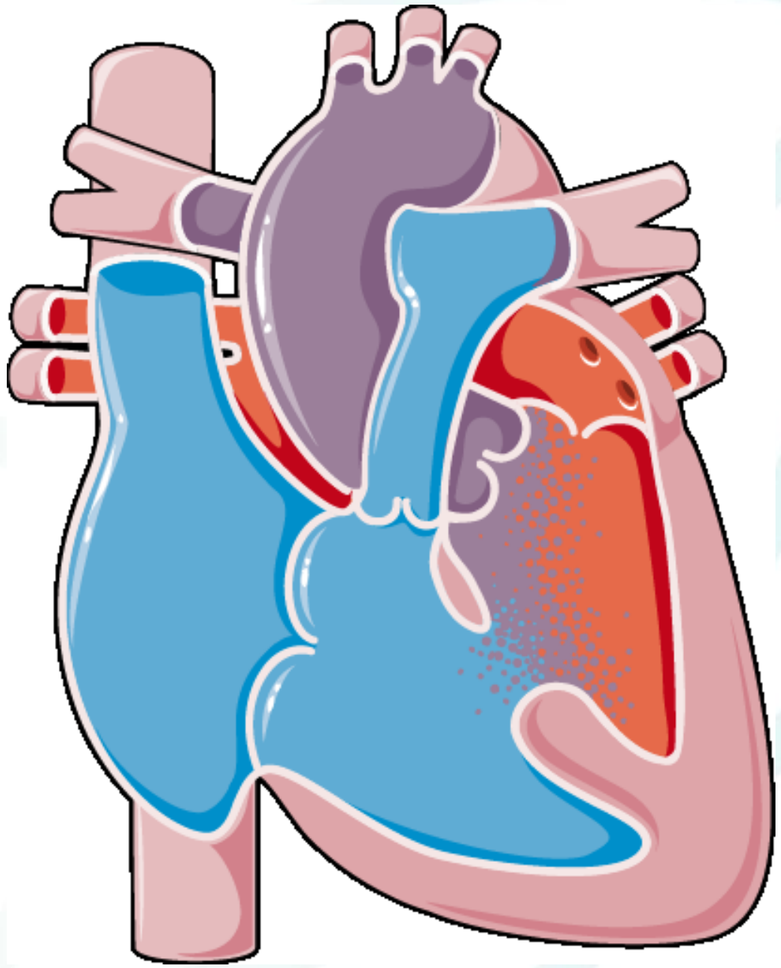


Esophageal Cancer

- The cause of the prevalence of Esophageal Cancer in Sub-Saharan Africa is not yet known
- 5 Patients a day are diagnosed at Tenwek Hospital
- Treatment involves placing stents and sometimes removing a large part of the Esophagus to treat and eliminate the cancer.

Congenital Heart Disease

- A variety of congenital heart defects exists in children and adolescents that require treatment and many times open heart surgery.
- Treatment changes the trajectory of a young person's life in Africa.



For me, healthcare has a name: Abigail

ABIGAIL

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BILLY GRAHAM CARDIOTHORACIC

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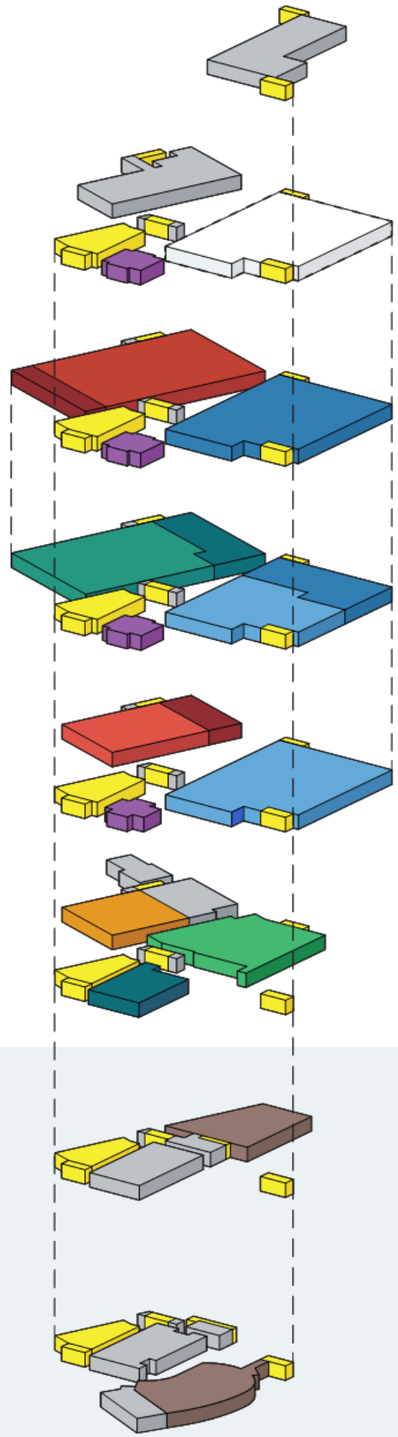
BUILDING ORGANIZATION



LEVEL 5
- VERTICAL CIRCULATION
- MECHANICAL PENTHOUSE

LEVEL 4
- FUTURE EXPANSION
- MECHANICAL PENTHOUSE
- CHAPEL
- VERTICAL CIRCULATION
- BUILDING SERVICES

LEVEL 3
- PACU / CCU
- SURGERY
- CHAPEL
- VERTICAL CIRCULATION
- BUILDING SERVICES

LEVEL 2
- ICU
- GENERAL WARD
- ADMINISTRATION
- EDUCATION
- CHAPEL
- VERTICAL CIRCULATION
- BUILDING SERVICES

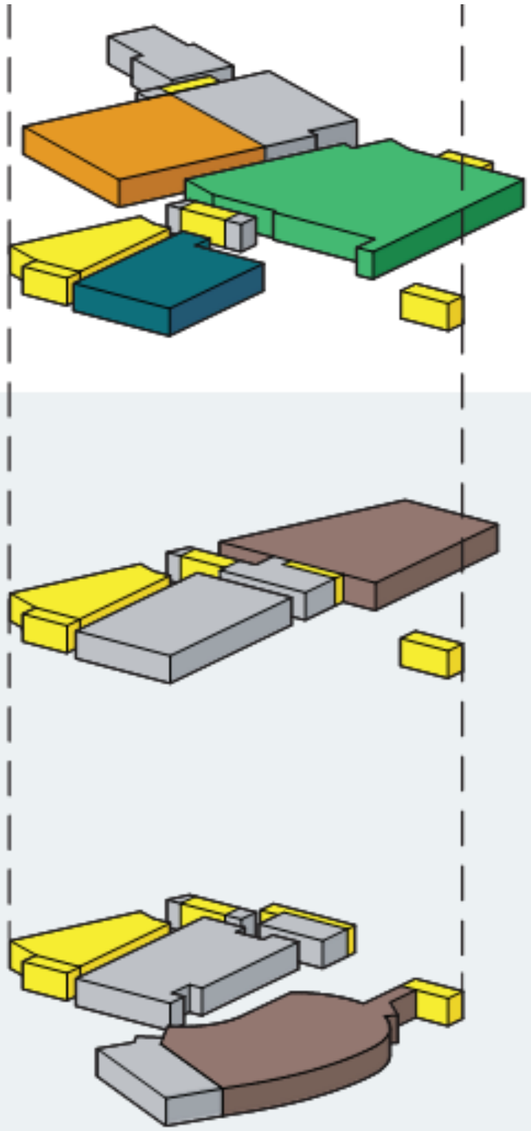
LEVEL 1
- GENERAL WARD
- ENDOSCOPY
- STAFF ON CALL / CHAPLAIN
- CHAPEL
- VERTICAL CIRCULATION
- BUILDING SERVICES

GROUND LEVEL
- CLINIC / DIAGNOSTIC
- REGISTRATION / BUSINESS OFFICE
- DIETARY
- VERTICAL CIRCULATION
- BUILDING SERVICES

BASEMENT 1
- STAFF PARKING
- VERTICAL CIRCULATION
- BUILDING SERVICES

BASEMENT 2
- STAFF PARKING
- VERTICAL CIRCULATION
- BUILDING SERVICES

HFG architecture



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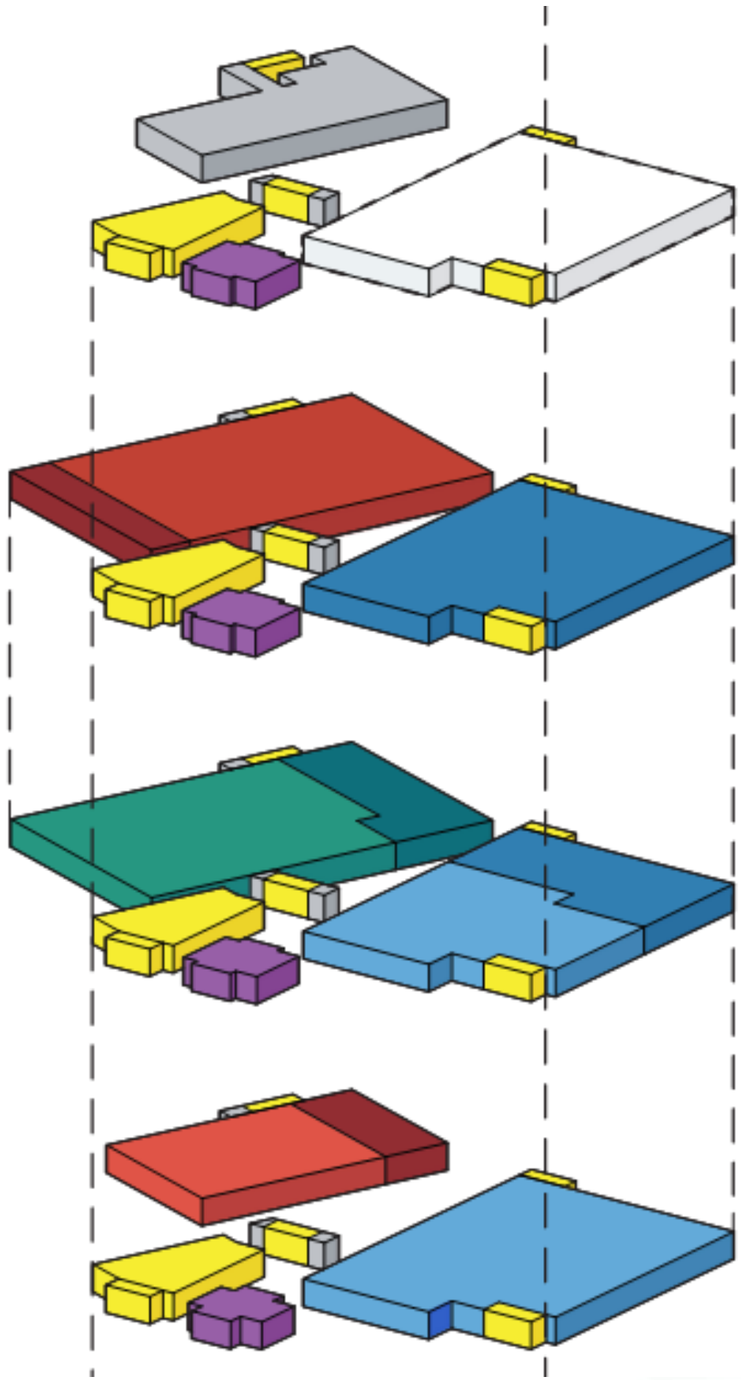
- VERTICAL CIRCULATION
- BUILDING SERVICES

BUILDING ORGANIZATION



LEVEL 4

- FUTURE EXPANSION
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LEVEL 3

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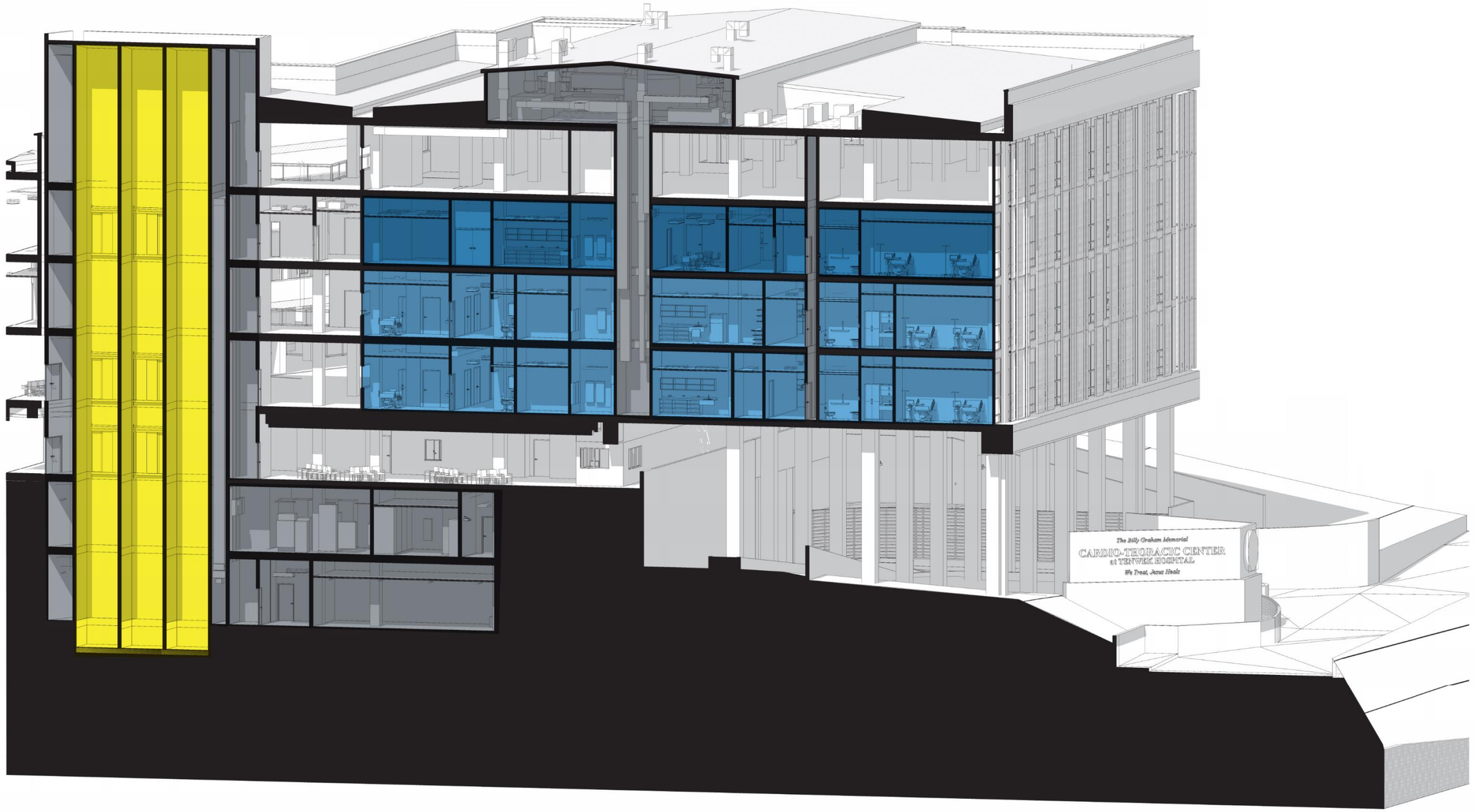
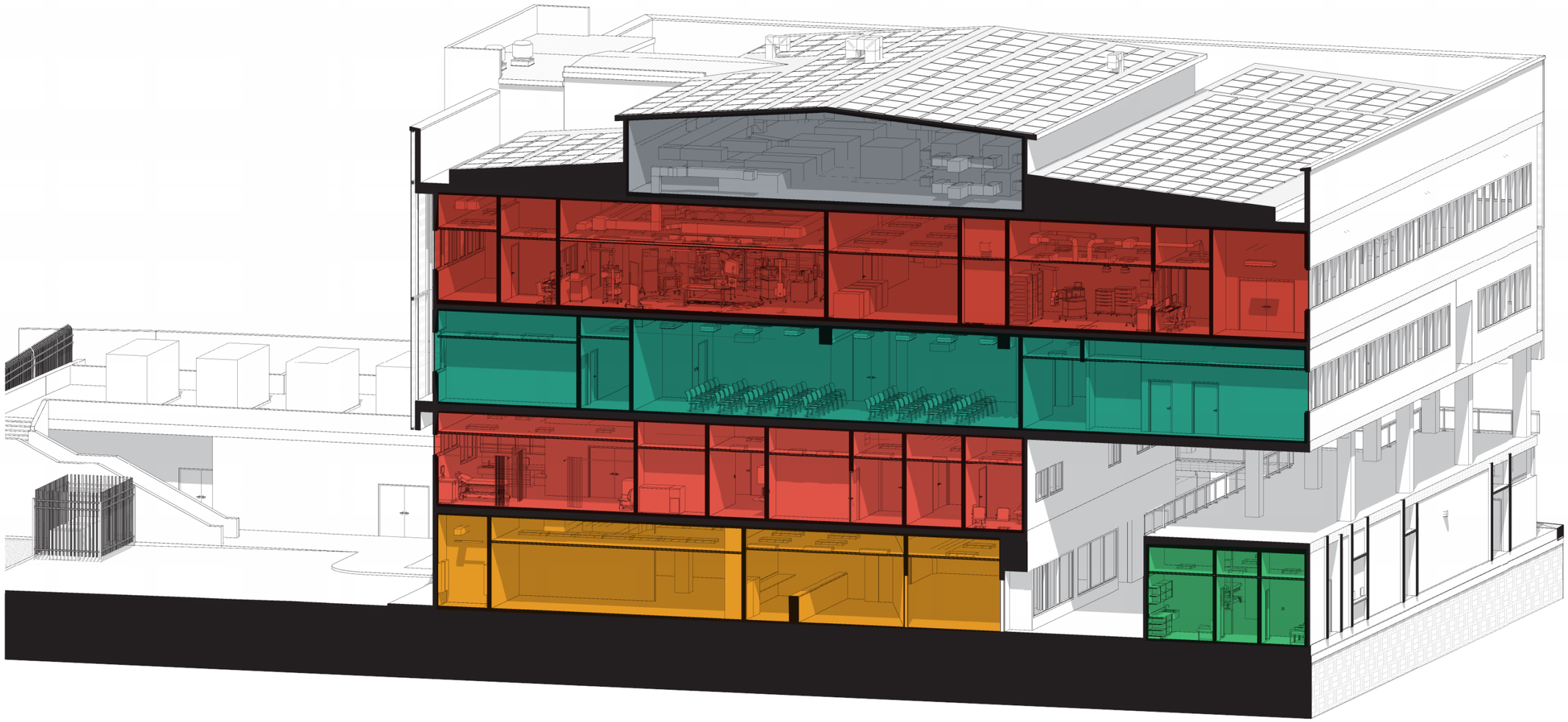
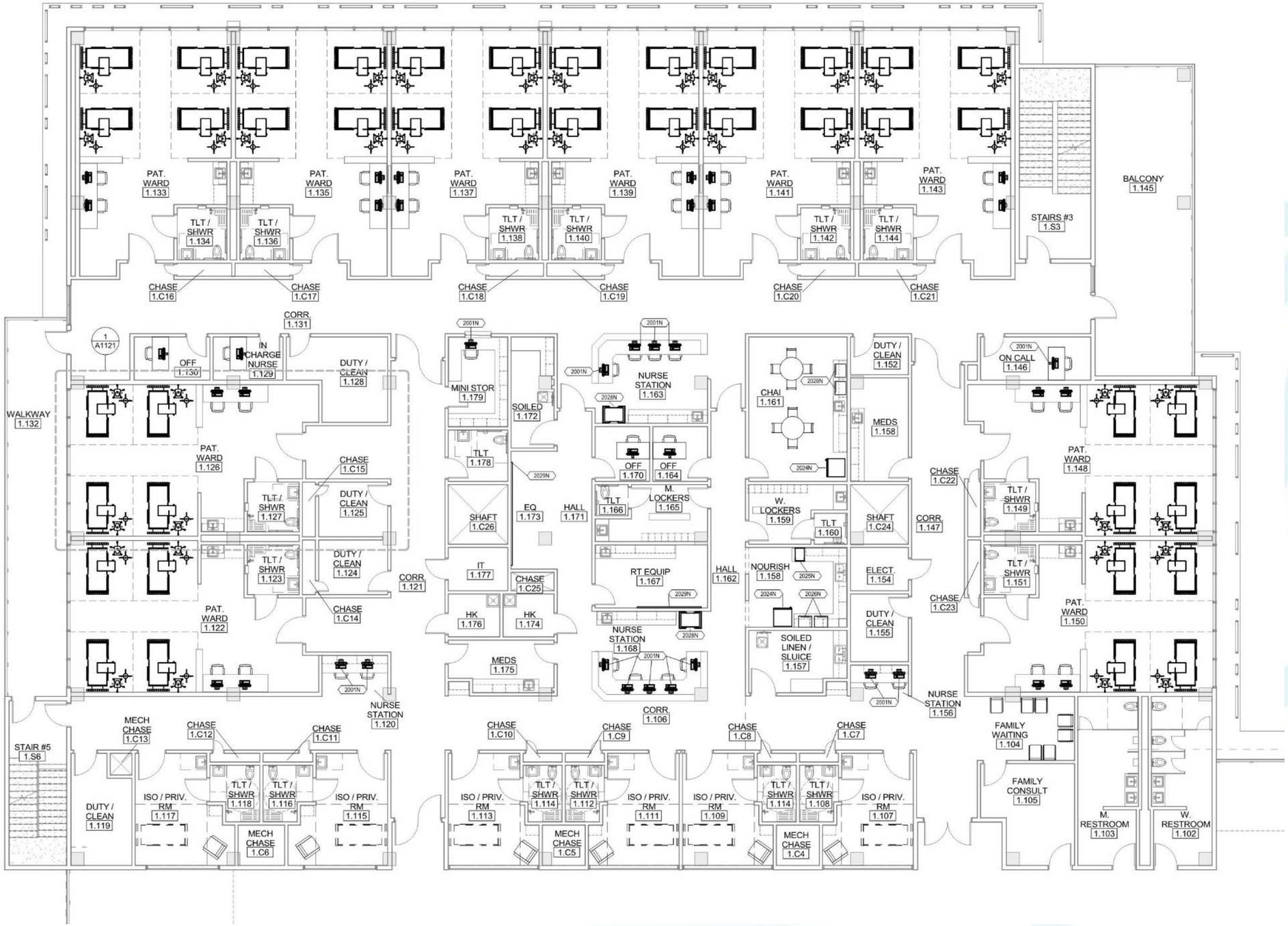
BUILDING ORGANIZATION



BUILDING ORGANIZATION



FGI COMPLIANCE



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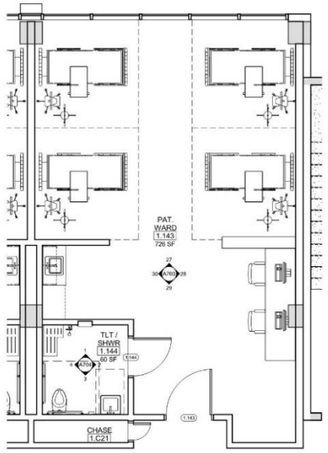
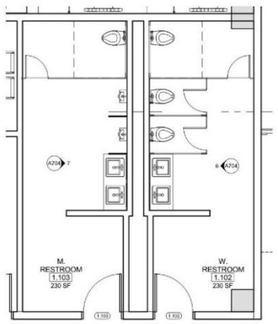
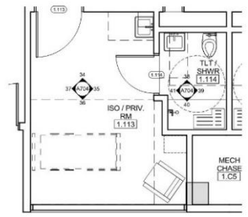


1 TYP. PATIENT WARD
1 : 50



2 ENLARGED PLAN
1 : 50



3 ENLARGED PLAN
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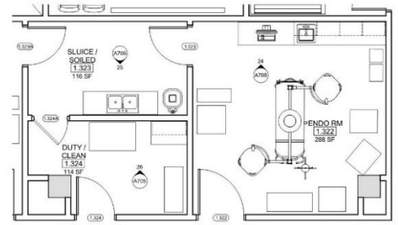

4 ENLARGED PLAN
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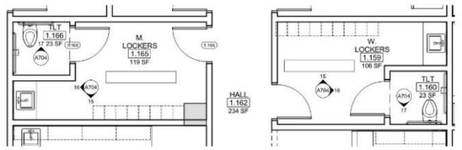

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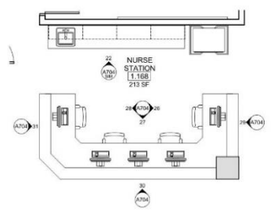

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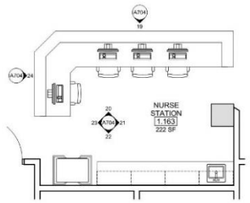

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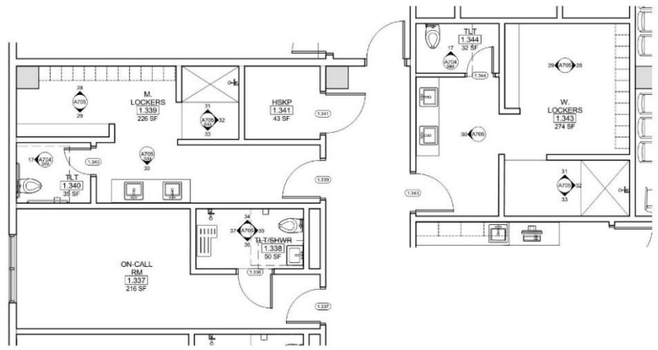
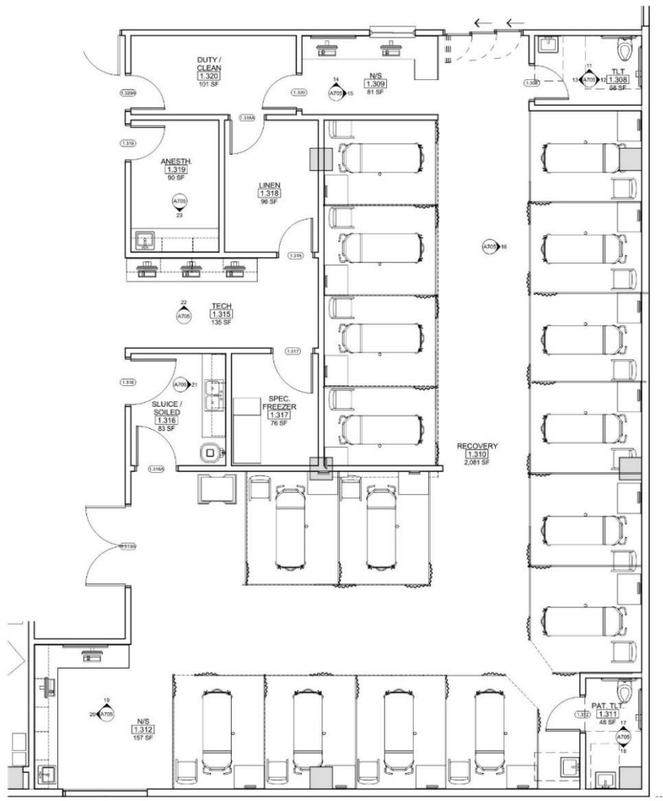
1 : 50



8 ENLARGED PLAN
1 : 50



9 ENLARGED PLAN
1 : 50

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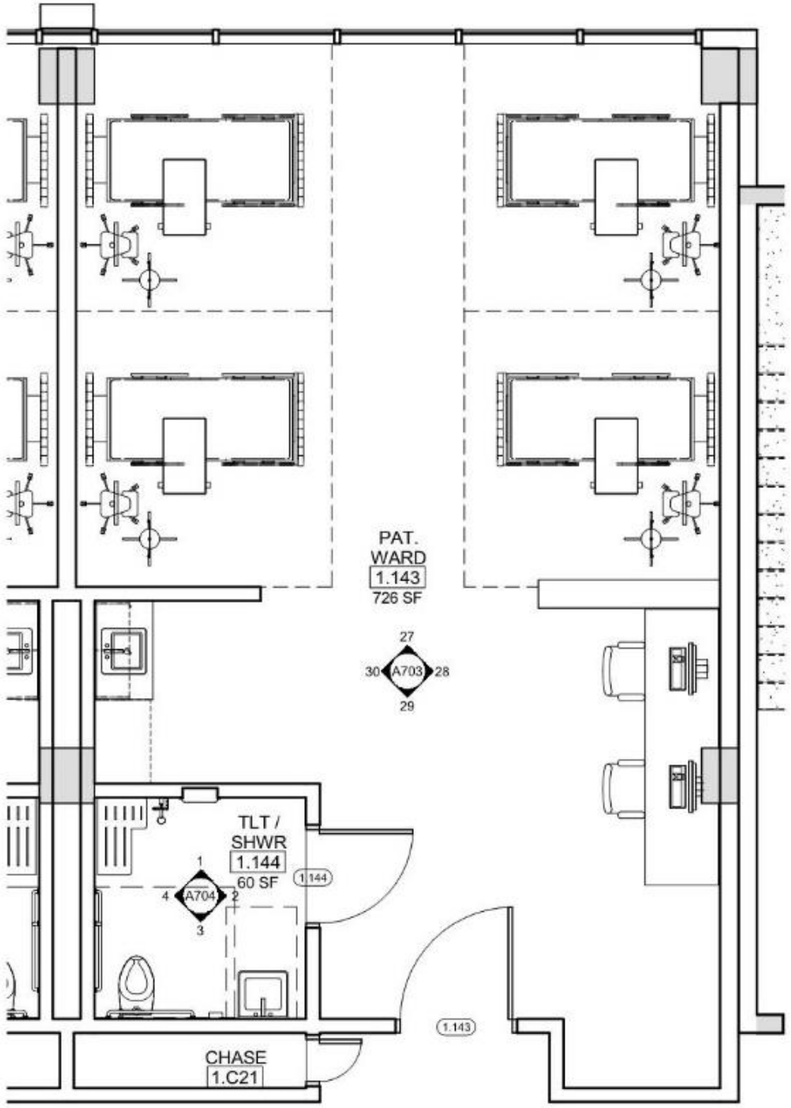


1 TYP. PATIENT WARD
1 : 50

*2.2-2.2 Medical/Surgical Nursing Unit

2.2-2.2.1 Reserved

2.2-2.2.2 Patient Room

See Section 2.1-2.2 (Patient Room) for requirements in addition to those in this section.

2.2-2.2.2.1 Capacity

(1) The maximum number of beds per room in a medical/surgical nursing unit shall be one unless the necessity of a two-bed arrangement has been demonstrated in the functional program. Two beds per room shall be permitted when approved by the authority having jurisdiction.

(2) Where renovation work is undertaken and the present capacity is more than one patient in each room, maximum room capacity shall be no more than the present capacity, with a maximum of four patients in each room.

2.2-2.2.2.2 Space requirements

*(1) Area

(a) Patient rooms shall be sized to accommodate the needs of the clinical services provided.

(b) Patient rooms shall have a minimum clear floor area of 120 square feet (11.15 square meters) in single-bed rooms and 100 square feet (9.29 square meters) per bed in multiple-bed rooms.

(2) Clearances (See "bed size" in the glossary.)

(a) The dimensions and arrangement of rooms shall provide a minimum clearance of 3 feet (91.44 centimeters) between the sides and foot of the bed and any wall or any other fixed obstruction.

(b) In multiple-bed rooms, a minimum clearance of 4 feet (1.22 meters) shall be available at the foot of each bed to permit the passage of equipment and beds.

(3) Where renovation work is undertaken and it is not possible to meet the above minimum standards, authorities having jurisdiction shall be permitted to grant approval to deviate from this requirement. In such cases, patient rooms shall have a minimum clear floor area of 100 square feet (9.29 square meters) in single-bed rooms and 80 square feet (7.43 square meters) per bed in multiple-bed areas.

2.2-2.2.2.3 Windows. See Section 2.1-7.2.2.5 (Windows in patient rooms) for requirements.

2.2-2.2.2.4 Patient privacy. See Section 2.1-2.2.4 (Patient Privacy) for requirements.

2.2-2.2.2.5 Hand-washing stations. See Section 2.1-2.2.5 (Hand-Washing Station in the Patient Room) for requirements.

2.2-2.2.2.6 Patient toilet room. See Section 2.1-2.2.6 (Patient Toilet Room) for requirements.

2.2-2.2.2.7 Patient bathing facilities

(1) Access shall be provided to bathing facilities in the toilet room directly accessed from each patient room or in a central bathing facility.

(2) Central bathing facilities

(a) General

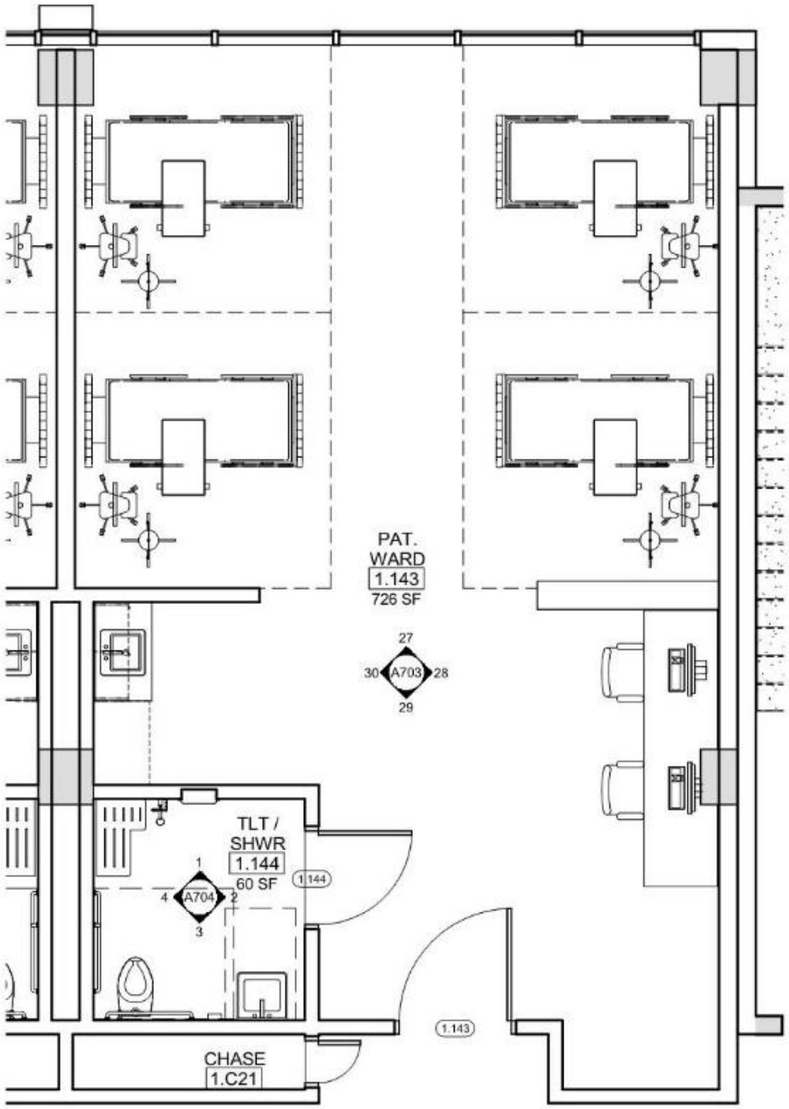
(i) Each bathtub or shower shall be in an individual room or enclosure that provides privacy for bathing, drying, and dressing.

(ii) Location of bathing facilities with space for an attendant for patients on stretchers, carts, and wheelchairs on a floor separate from the nursing unit shall be permitted.

APPENDIX

A2.2-2.2 Patient mobility considerations for nursing unit design. See appendix section A2.1-2.1 (Accommodations to encourage patient mobility) for mention of this aspect of nursing unit design.

A2.2-2.2.2.2 (1) In new construction, single-bed rooms should be at least 12 feet (3.66 meters) wide by 13 feet (3.96 meters) deep (156 square feet, or 14.86 square meters) exclusive of toilet rooms, closets, lockers, wardrobes, alcoves, or vestibules. These spaces should accommodate comfortable furniture for family members (one or two) without blocking staff members' access to patients. Movable seating to support visitation and teaming around the patient should be available in quantities sufficient to meet the needs described in the functional program. Efforts should be made to provide the patient with some control of the room environment.



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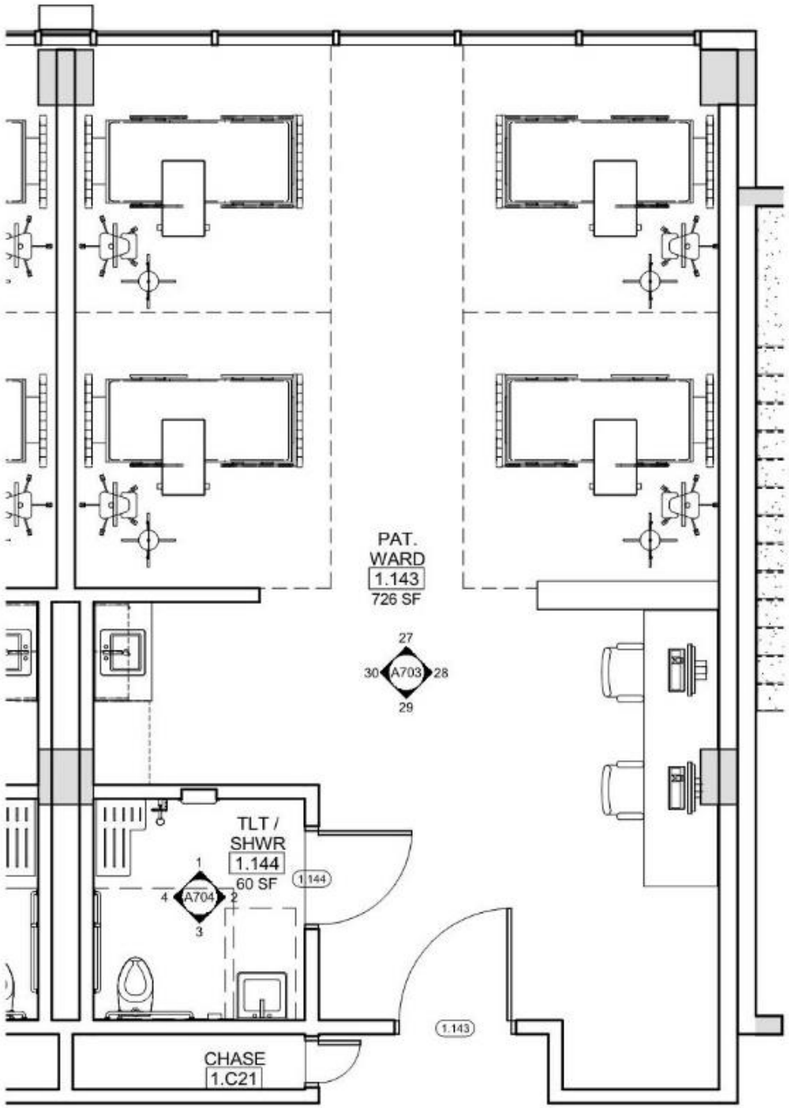

1 TYP. PATIENT WARD
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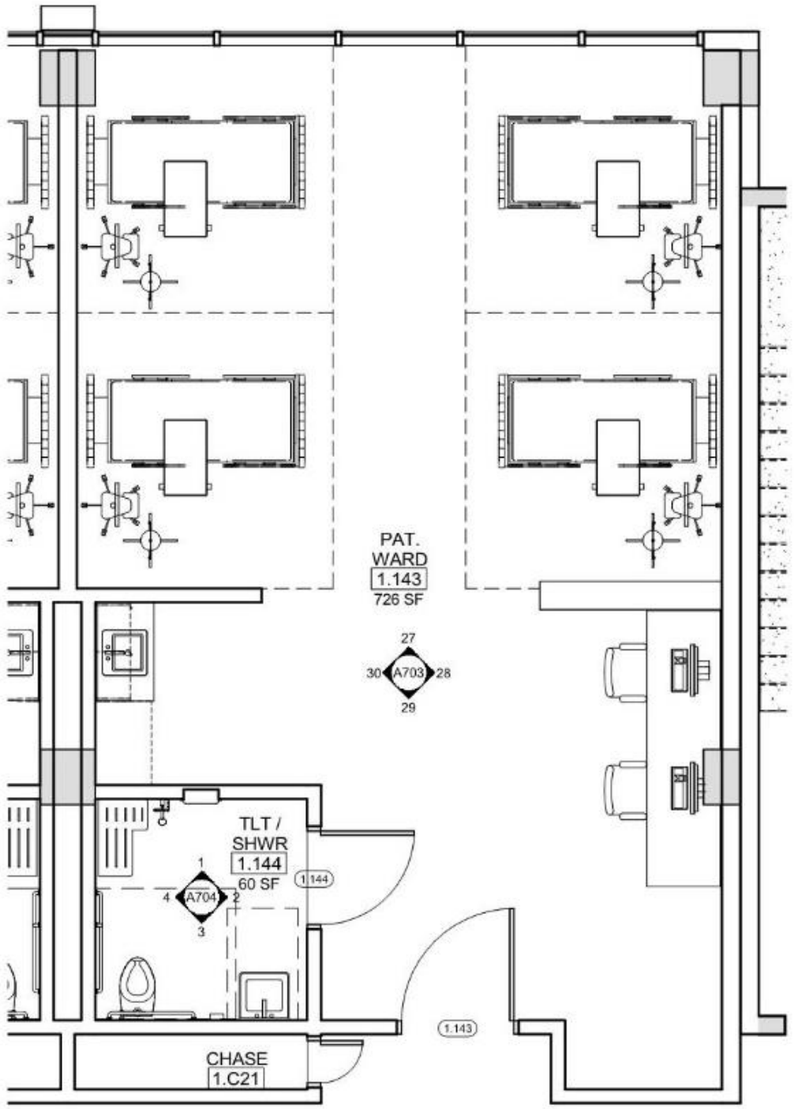
(b) In multiple-bed rooms, a minimum clearance



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Q
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Fast
Faster
Ctrl
Toggle Fly / Walk
Space
Show / Hide Map
M
Hide Instructions
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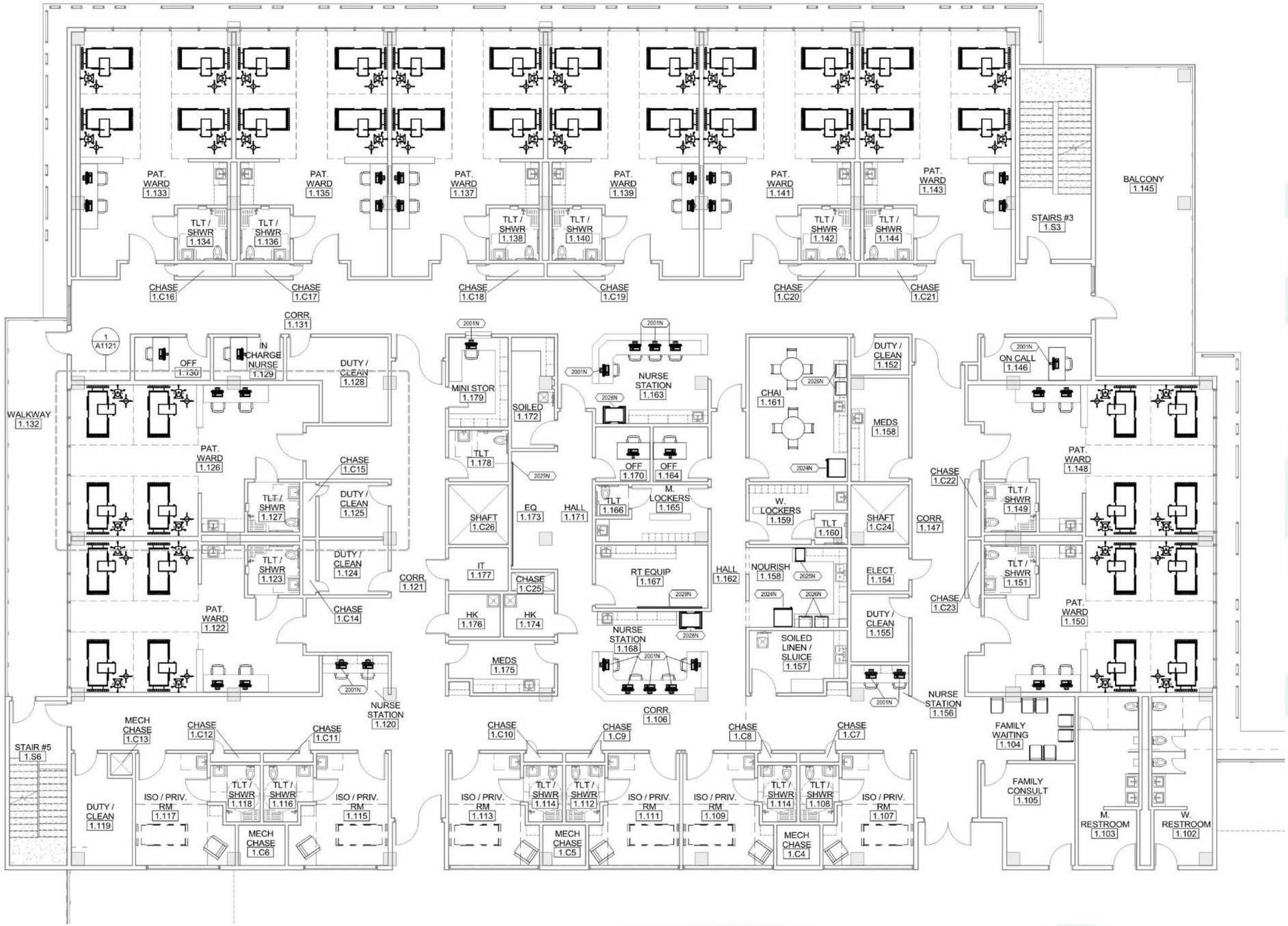
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CHASE 1.C16
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CHASE 1.C20
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STAIRS #3 1.S3
BALCONY 1.145
CORR. 1.131
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OFF 1.130
IN CHARGE NURSE 1.129
DUTY / CLEAN 1.128
WALKWAY 1.132
PAT. WARD 1.126
CHASE 1.C15
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PAT. WARD 1.122
NURSE STATION 1.120
CORR 1.121
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SOILED 1.172
TLT 1.178
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SHAFT 1.C26
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CHASE 1.C25
HK 1.176
HK 1.174
MEDS 1.175
2001N
NURSE STATION 1.163
OFF 1.170
OFF 1.164
TLT 1.166
M. LOCKERS 1.165
RT EQUIP 1.167
2028N
2029N
NURSE STATION 1.168
HALL 1.162
CHAI 1.161
2026N
2024N
DUTY / CLEAN 1.152
MEDS 1.158
W. LOCKERS 1.159
TLT 1.160
SHAFT 1.C24
NOURISH 1.158
2025N
2024N
2026N
ELECT. 1.154
DUTY / CLEAN 1.155
SOILED LINEN / SLUICE 1.157
NURSE STATION 1.156
CORR 1.147
CHASE 1.C22
CHASE 1.C23
ON CALL 1.146
PAT. WARD 1.148
TLT / SHWR 1.149
TLT / SHWR 1.151
PAT. WARD 1.150
FAMILY WAITING 1.104
FAMILY CONSULT 1.105
M. RESTROOM 1.103
W. RESTROOM 1.102
CORR 1.106
STAIR #5 1.S6
MECH CHASE 1.C13
CHASE 1.C12
CHASE 1.C11
DUTY / CLEAN 1.119
ISO / PRIV. RM 1.117
TLT / SHWR 1.118
TLT / SHWR 1.116
ISO / PRIV. RM 1.115
MECH CHASE 1.C6
CHASE 1.C10
CHASE 1.C9
CHASE 1.C8
CHASE 1.C7
ISO / PRIV. RM 1.113
TLT / SHWR 1.114
TLT / SHWR 1.112
ISO / PRIV. RM 1.111
ISO / PRIV. RM 1.109
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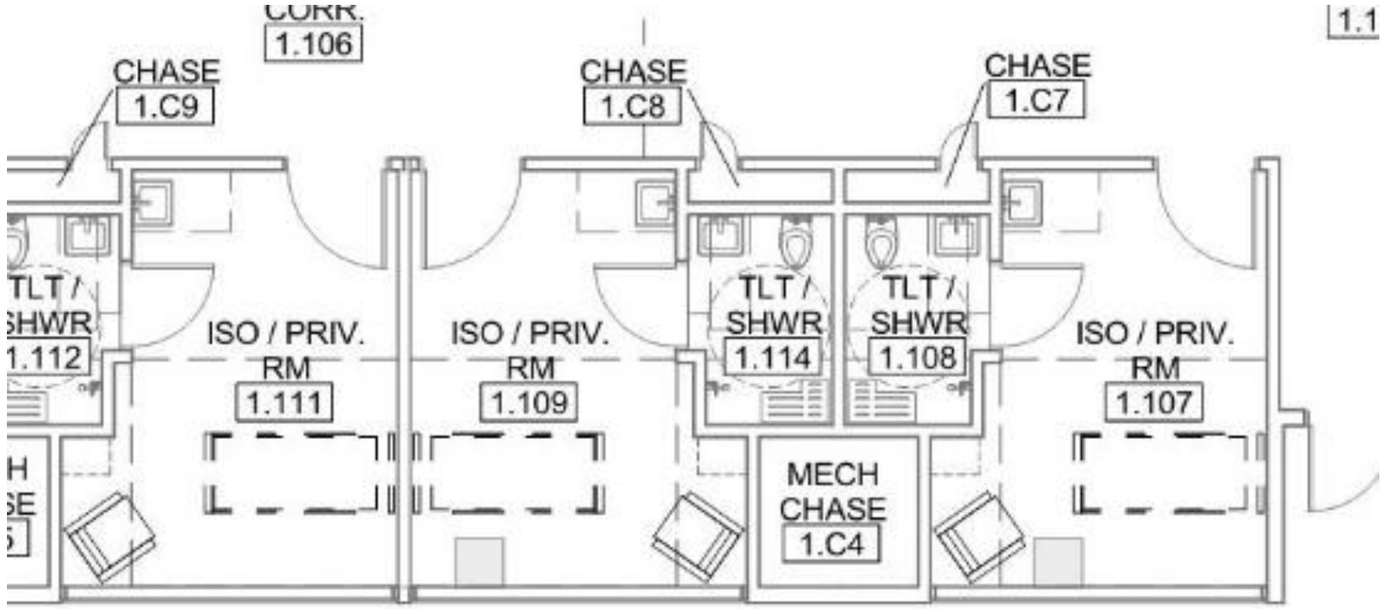
ISO / PRIV. RM 1.107
MECH CHASE 1.C5
MECH CHASE 1.C4



*2.1-2.4.2 Airborne Infection Isolation (AII) Room

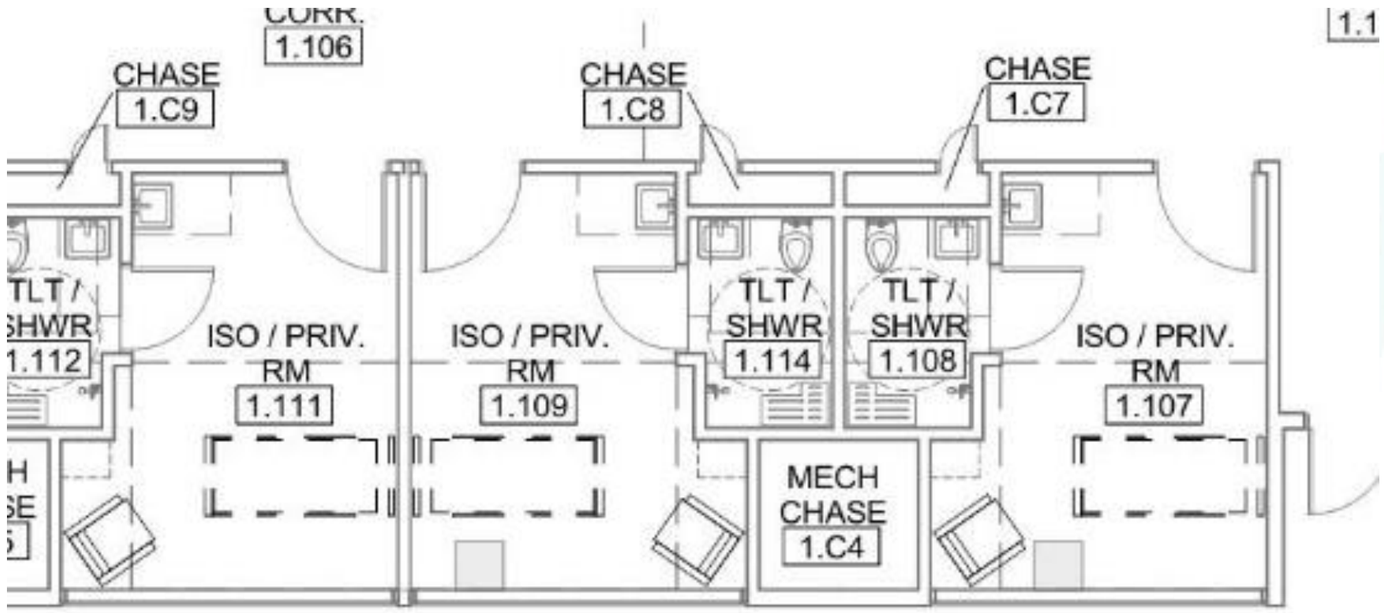
2.1-2.4.2.1 General

(1) The AII room requirements contained in the *Guidelines* for particular areas throughout a facility shall be:

(a) Predicated on an infection control risk assessment (ICRA).
(b) Based on the needs of specific community and patient populations served by an individual health care organization. See Section 1.2–3.2.3 (Infection Control Risk Mitigation).
(c) Used for patients who require an AII room but do not need a protective environment (PE) room.

(2) Number. For specific requirements, see facility chapters.

(3) Location. AII rooms shall be located in individual nursing units or grouped as a separate isolation nursing unit. When not required for patients with airborne infectious diseases, use of these rooms for acute care patients without airborne infectious diseases shall be permitted.



infection isolation room shall comply with the requirements in Section 2.2-2.2.2 (Medical/Surgical Nursing Unit: Patient Room) as well as the following requirements:

(1) Capacity. Each patient room shall contain only one bed.

(2) Provision shall be made for personal protective equipment (PPE) storage at the entrance to the room.

(3) Hand-washing stations

(a) A hand-washing station shall be located in each patient room.

(b) Placement of an additional hand-washing station outside the room entrance shall be permitted.

(c) Section 2.1-2.2.5.3 (3) (Hand-washing station in the patient room—Renovation) shall not apply to AII rooms.

(4) A separate room with a toilet, hand-washing station, and bathtub or shower shall be provided for each AII room.


HFG
HEALTH FACILITIES GROUP
architecture
FLYMODE
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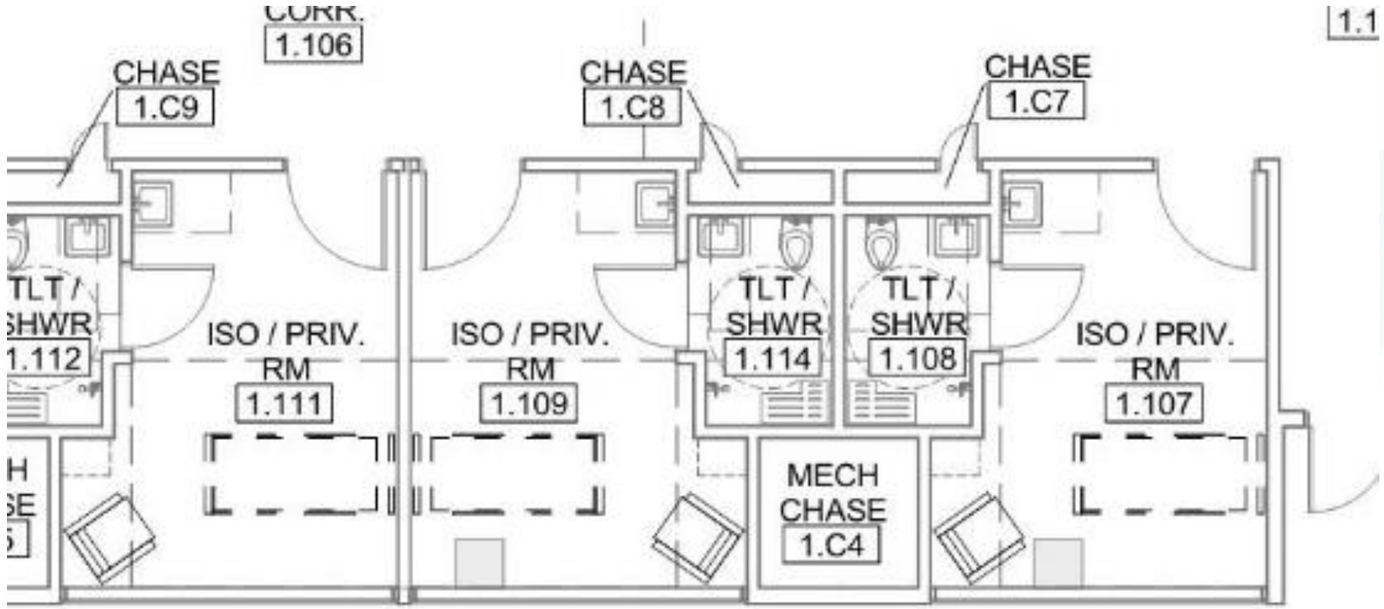
1.1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HFG
HEALTH FACILITIES GROUP
architecture
FLYMODE
PRESS SPACE TO WALK ON THE GROUND
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Space
Show / Hide Map
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Hide Instructions
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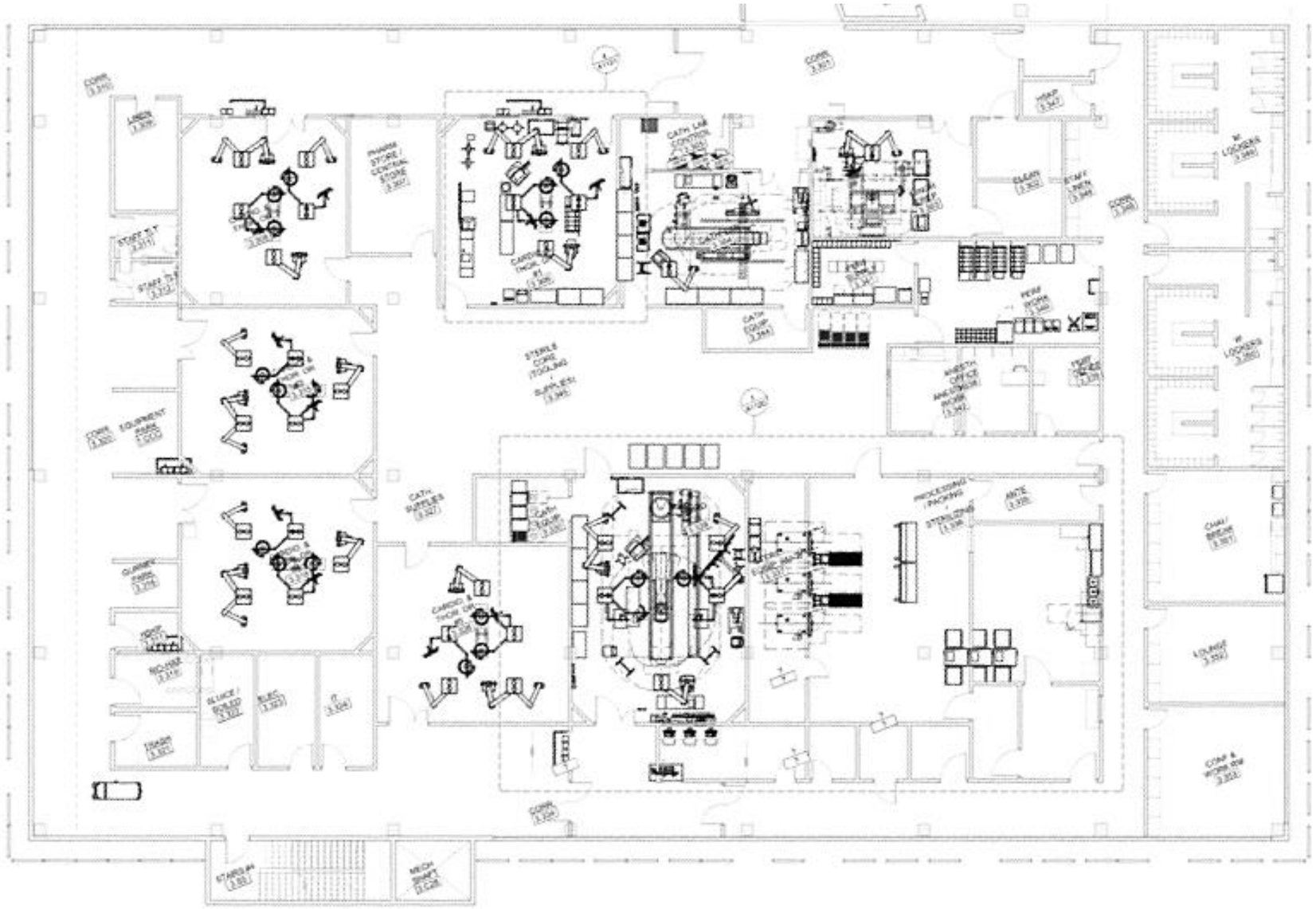
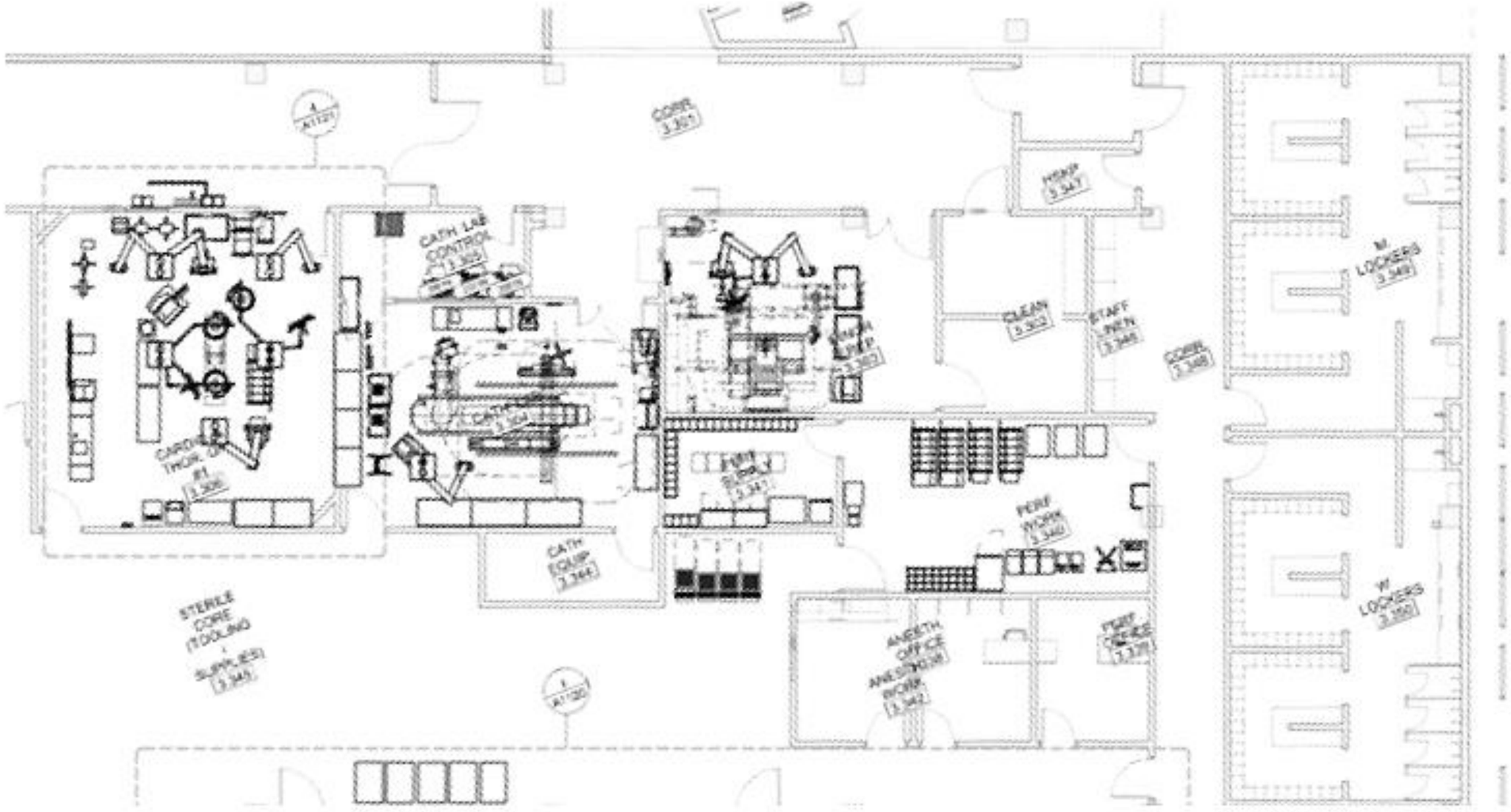
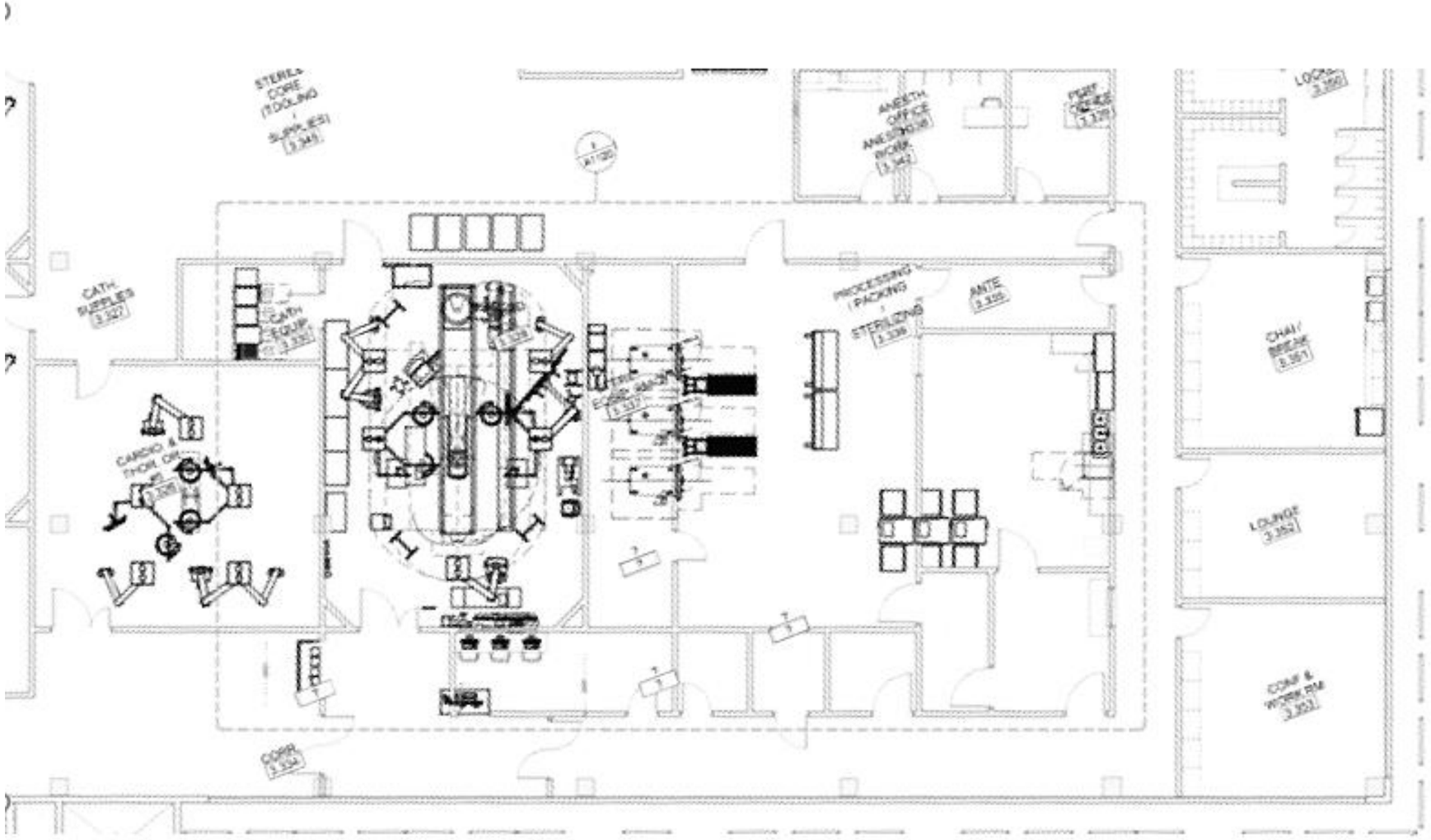


FGI COMPLIANCE




STERILE CORE (TOOLING / SUPPLIES)
3.341
ANESTH OFFICE
ANESTHESIOLOGIST WORK
3.342
PERF SERVICE
3.370
CATH RECEIVE
3.327
CATH EQUIP.
3.330
PROCESSING / PACKING / STERILIZING
3.339
ANTE
3.335
CHAIR
3.351
LOUNGE
3.350
CONF. & WORK RM
3.353
CONF.
3.354

2.2-3.3 Surgical Services

2.2-3.3.1 General

2.2-3.3.1.1 Location and Layout

(1) The surgical suite shall be located and arranged to prevent unrelated traffic through the suite.

(2) The clinical practice setting shall be designed to facilitate movement of patients and personnel into, through, and out of defined areas in the surgical suite.

(3) Signs that clearly indicate where surgical attire is required shall be provided at all entrances to semi-restricted areas.

*(4) The surgical suite shall be divided into two designated areas—semi-restricted and restricted—defined by the physical activities performed in each area.

*2.2-3.3.2 Operating Rooms

2.2-3.3.2.1 Space requirements

(1) Operating room

(a) Each operating room shall have a minimum clear floor area of 400 square feet (37.20 square meters) with a minimum clear dimension of 20 feet (6.10 meters).

*(b) Where renovation work is undertaken and it is not possible to meet the above minimum standards, each room shall have a minimum clear floor area of 360 square feet (33.48 square meters) with a minimum clear dimension of 18 feet (5.49 meters).

(c) Operating rooms used for cesarean and other delivery procedures shall meet the requirements in Section 2.2-2.11.9.2 (1) (Cesarean Delivery Rooms—Space requirements).

*2.2-3.3.3 Hybrid Operating Room

2.2-3.3.3.1 Application. Hybrid operating rooms shall be designed to comply with the requirements in Section 2.2-3.3.2 (Operating Rooms) and the requirements in this section.

***2.2-3.3.3.2 Space requirements**

(1) Each hybrid operating room shall meet the clear floor area, clearance, and storage requirements for the imaging equipment contained in the room.
(2) Minimum clear dimension
   (a) In new construction, the hybrid operating room shall have a minimum clear dimension of 24 feet (7.32 meters).
   (b) When renovation work is undertaken and it is not possible to meet the minimum clear dimension of 24 feet, a minimum clear dimension of 22 feet (6.70 meters) shall be permitted.
   (c) If mobile storage units are used in lieu of fixed cabinets, the minimum clear dimension shall be available between such units when they are parked against a permanent partition.

2.2-3.3.3.3 Control room. If required, a control room shall be provided that accommodates the imaging system control equipment.

(1) The control room shall have a minimum area of 120 square feet (11.15 square meters), which shall be permitted to include fixed work surfaces.
(2) The room shall be physically separated from the hybrid operating room with walls and a door.
(3) The room shall have viewing windows that allow for a full view of the patient and the surgical team.
(4) If the control room is adjacent to a restricted area, it must be physically separated from the restricted area with walls and a door.

2.2-3.3.3.4 Access route(s). Access route(s) for equipment installation and replacement shall comply spatially and structurally with the manufacturer's technical specifications.

***2.2-3.3.3.5 Structural support.** The floor and (if applicable) ceiling structures shall be designed to support the weight of the imaging equipment as well as other fixed ancillary equipment (e.g., lights, service columns) and movable ancillary equipment.

***2.2-3.3.3.6 Protection from vibration and other**

2.2-3.3.4 Pre- and Postoperative Patient Care Areas

2.2-3.3.4.1 General

(1) Patient care station design

(a) Bays, cubicles, or single-bed rooms shall be permitted to serve as patient care stations.
(b) When determining the area for a patient care station, space shall be provided for equipment described in the functional program.

(2) Provisions shall be made for the isolation of infectious patients.

(a) An airborne infection isolation room is not required in pre- and postoperative patient care areas.
(b) Provisions for the recovery of a potentially infectious patient with an airborne infection shall be determined by an infection control risk assessment (ICRA).

2.2-3.3.4.3 Phase I post-anesthetic care unit (PACU)

(1) General

(a) Location

(i) The PACU is an unrestricted area.
(ii) In new construction, at least one door to the recovery room shall provide access directly from the surgical suite without crossing unrestricted corridors.

*(b) PACU size. A minimum of 1.5 post-anesthesia patient care stations per operating room shall be provided.
(c) If pediatric surgery is part of the functional program, the following requirements shall be met:

Planning for Utilities

- Domestic Water
- Fire Protection
- Power
- Waste
- Ventilation and ASHRAE 170
- Common Utility Interruptions

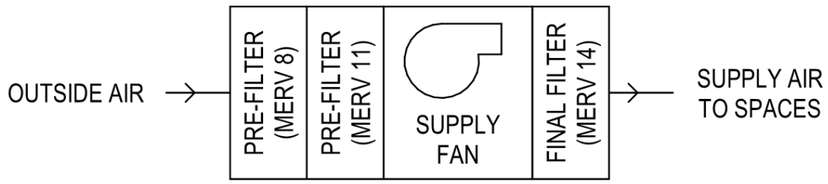
UNIQUE DESIGN FEATURES

Microgrid: Solar and Hydroelectric

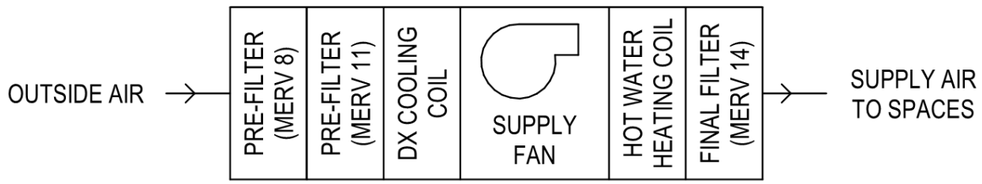
- Power Quality and Cost

Mechanically Assisted, Natural Ventilation

100% OUTSIDE AIR UNIT



100% OUTSIDE AIR UNIT, COOLING, HEATING, NO RECIRCULATION



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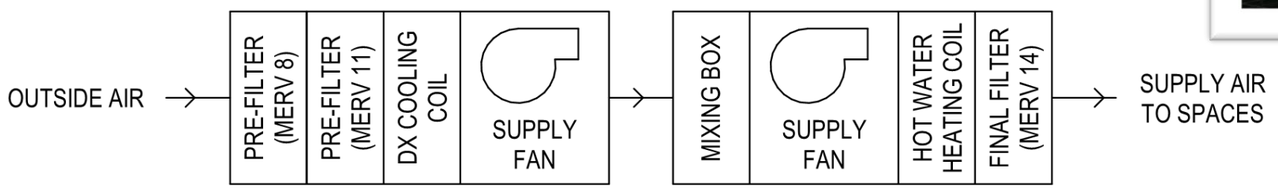

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Oklahoma Association of Healthcare Engineers

2019 Summer Regional Event

HFG architecture

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