# HAIO Healthcare Surge Solutions

## Creating Healthcare Settings for Post Acute Care for Covid-19 Patients in Non-Traditional Spaces

April 20, 2020

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Arup
Atrius Health
Baystate Health
Beth Israel Deaconess Medical Center
BI Lahey Health
BR+A Consulting Engineers
Boston Medical Center
Boston Children's Hospital
Boston Society of Architects
Brigham and Women's Hospital
CannonDesign
Colliers Project Leaders
Commodore Builders
Connecticut Children's Hospital
Consigli
Creative Office Pavilion
Dartmouth Hitchcock Hospital
e4h architecture
FGI - Facilities Guidelines Institute
Gensler
Harvard University Capital Project Management
HC Tangram Design
HDR
HED
Heywood Hospital
HDS Architecture
HGA
Indigo
The Innova Group
Jensen Hughes
Lavallee Brensinger Architects
Maine Medical Center
Margulies Perruzzi Architects
Massachusetts General Hospital
McGovern Foundation
Navilean
NBBJ
New England Life Care
Partners HC
Payette
Perkins and Will
Shepley Bulfinch
SmithGroup
Stamford Hospital
Steward Health
Stroudwater Associates
Suffolk Construction
Trinity Health of New England
Thompson Consultants, Inc.
Tsoi Kobus Design
Turner Construction
UMass Memorial Health Care
UMass Medical School
Walsh Brothers
Winchester Hospital
Wise Construction
Yale New Haven Hospital

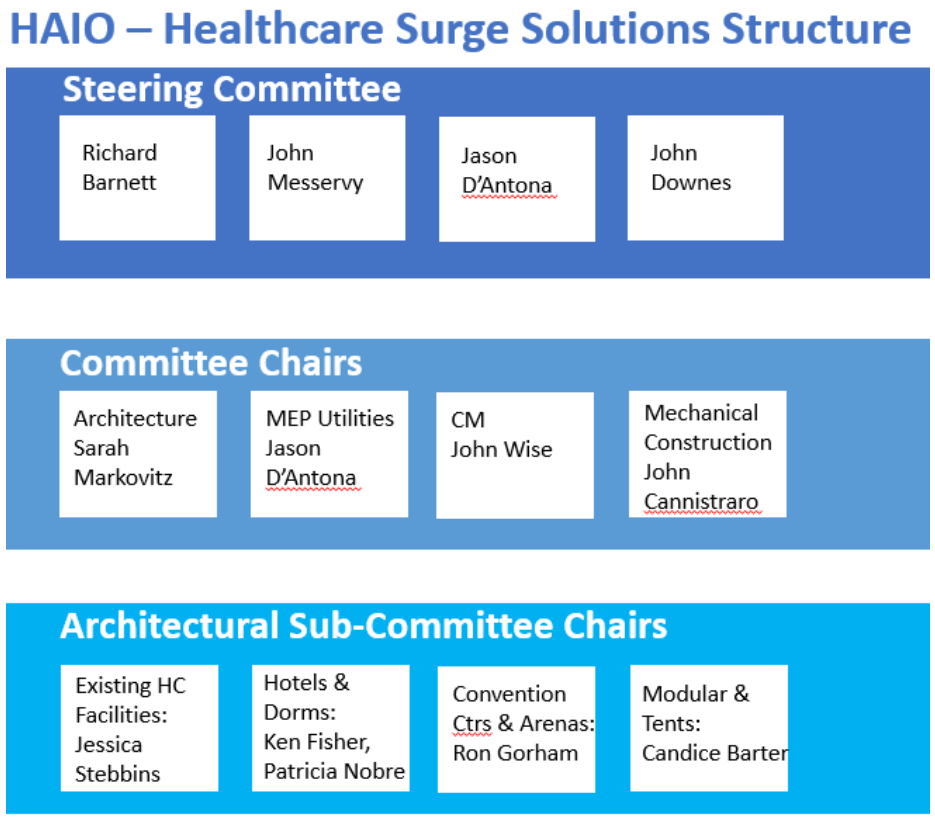
HAIO began in 2013, and is a collaborative nonprofit consisting of hospital professionals, infection control and environmental service representatives, project management teams, architects, engineers, and construction professionals, all with the mission to explore ways to reduce the spread of healthcare associated infections through the use of architecture, design and construction.

Since 2015, the HAIO group has been actively working with two Boston area hospitals as they redesign current inpatient rooms to reduce the risk of patient infection

Our mission: to listen and help healthcare organizations respond to crisis conditions as they identify their needs.

Our role: to manage the assessment of options, and deployment of immediate response action contingency plans, to provide surge space solutions to healthcare organizations in response to crisis conditions.

The committee structure has been formed to channel the resources of HAIO towards providing collaborative, specific responses as requested.



HAIO - Designing for Surge Capacity

# Lessons Learned from Roundtable Discussions

for Post Acute Care

## Thank you to our roundtable participants:

Walter Armstrong, Beth Israel Deaconess Medical Center
Win Brown, Heywood Hospital
Domenic Ciavarro, Trinity Health
Tom Goins, Dartmouth Hitchcock Health
Patrick Jordan, Dartmouth Hitchcock Health
Kris Kennedy, Baystate Health
Michael Knapik, Baystate Health
Dr. Mark Klempner, Univ. of Massachusetts Medical School
Jennifer McCarthy, Maine Medical Center
Vincent McDermott, Newton Wellesley Hospital
John Messervy, Partners HealthCare
Dr. Peter Slavin, Massachusetts General Hospital
Dr. Steven Stroudwater, Atrius Health
Dana Swenson, Umass Memorial Health Care
Kirsten Waltz, Baystate Health
Dr. Rick Weiner, Winchester Hospital
Brendan Whalen, Boston Medical Center

## Lessons Learned – Considerations for Future Planning and Design

### A. Building design/renovation

1. Consider adding operable windows to older buildings so can attain negative pressure by addition of exhaust fans.
2. Flexible construction that allows conversion of med/surg beds to ICUs (sufficient clearance and med gases).
3. Consider inclusion of non-invasive procedure rooms with negative pressure.
4. Consider providing additional infrastructure to some non-clinical areas (e.g. conference centers) so that more areas can be adapted for patient care.
5. Application of the known infection prevention strategies for the built environment (e.g. hands-free door openers) to stop transmission.
6. Allocate special rooms for disinfection of PPE (or at least be able assign space to this function at time of emergency.
7. Provide additional warehousing for storing PPE, so not so dependent on supply chains.
8. Spaces for staff respite: with all staff in full PPE, they need to be able to take breaks near their clinical units, decompress, while maintaining social distancing.
9. Provision of maker spaces with 3D printing capability – to respond to immediate needs.

**B. Regulatory**

1. Perhaps FGI might consider allowing “switchable” pressurization of rooms (i.e., from positive to negative pressure)?
2. Should it be mandatory that facilities have a plan for using exterior space for setting up mobile sites? Regulations to include requirements for building pads (e.g. utilities, med gases).

**C. Mechanical Systems**

1. Provide HEPA filtration everywhere in IP settings.
2. Consider oxygen capacity – size for potential respiratory pandemics.
3. Build in ability to convert more rooms to negative pressure.

**D. Access/Patient Flow**

1. Consider Disney-like flow into hospitals/clinics, allowing for space for social distancing; providing positive distraction to help with the wait times for screening or security.
2. Separate entry points for staff vs. patients/visitors; how to separate well patients exiting the facility from potentially sick/infectious patients arriving?

**E. Operational Change**

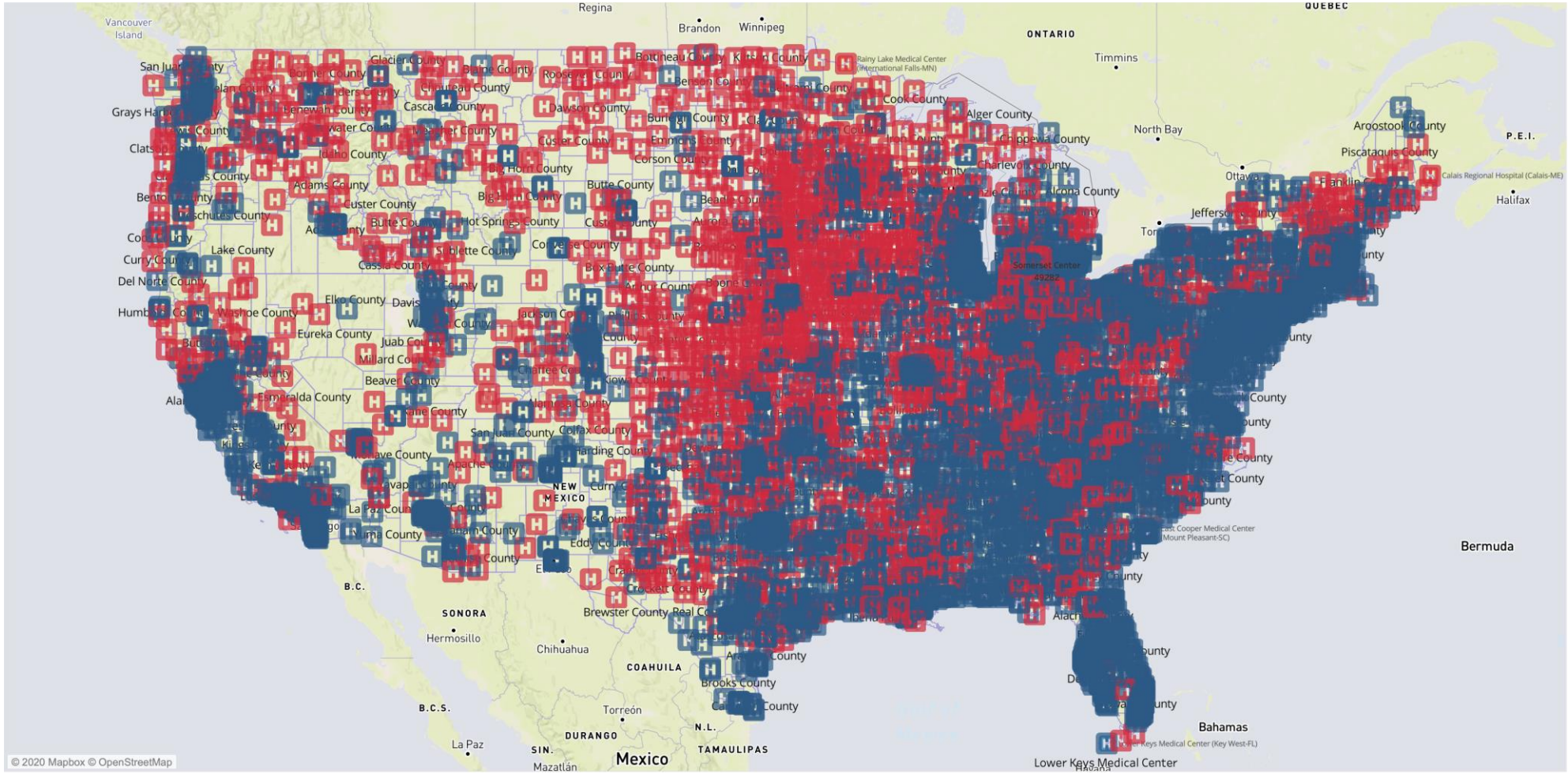
1. For hospital networks, level loading of patient care within the system is a successful strategy for expanding capacity.
2. Continuous masking be the norm.
3. Greater use of hydrogen peroxide “bombing” of rooms and equipment.

**F. Preparing for mobile sites – building extensions**

1. Hospital/healthcare facilities should have plans and infrastructure set up to support mobile sites/tents that allow for surge capacities, equipped with utilities, med gases.

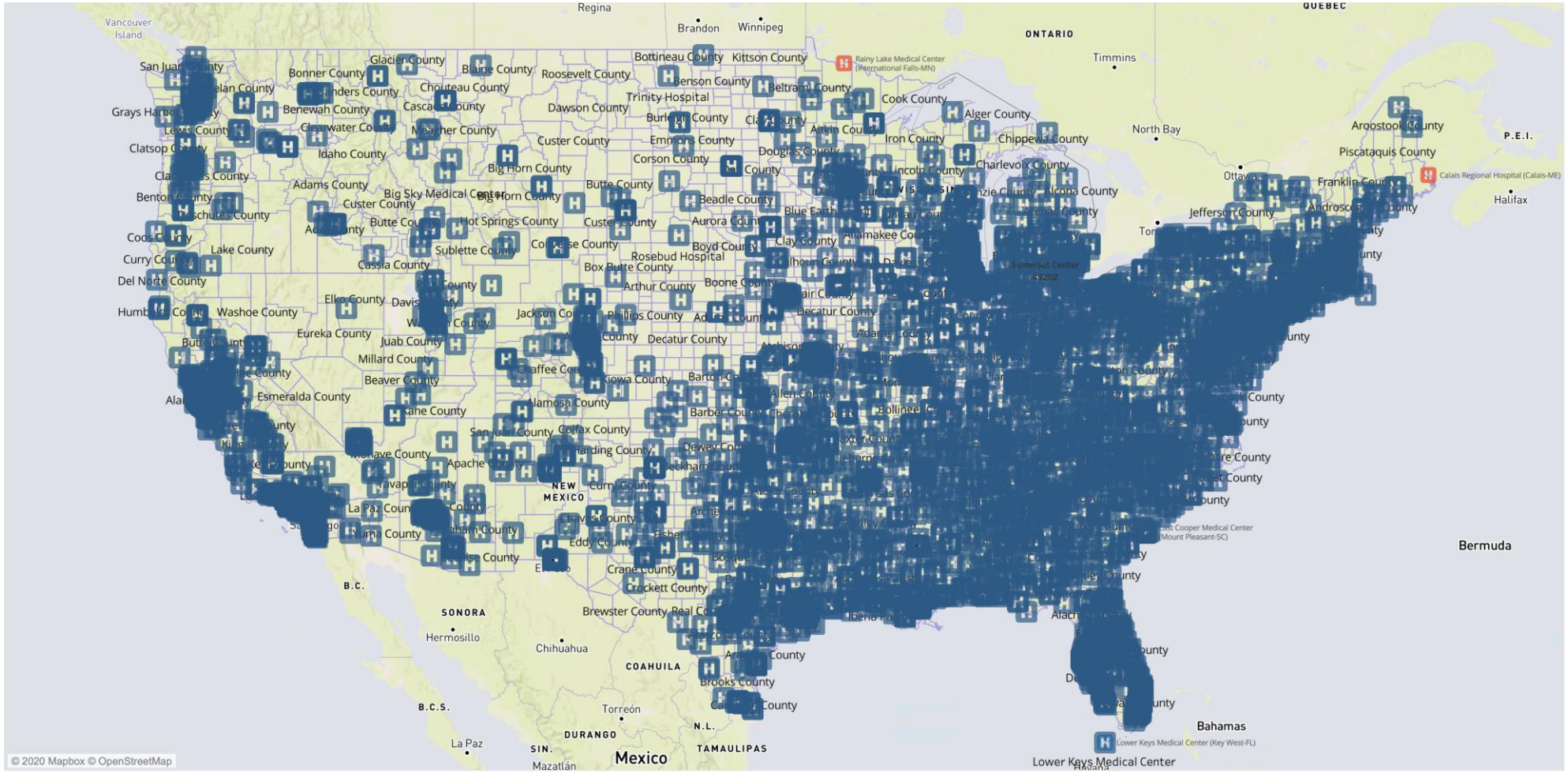
**G. Emergency Planning**

A. Consider planning dorms and hotels for future emergency conversion to patient care, rather than relying on tents and convention centers.
B. It is the collaborative efforts, between the state and institutions, between independent institutions, with various facilities within a network, with the architectural/engineering/builder/vendor community, that lead to successful solutions.



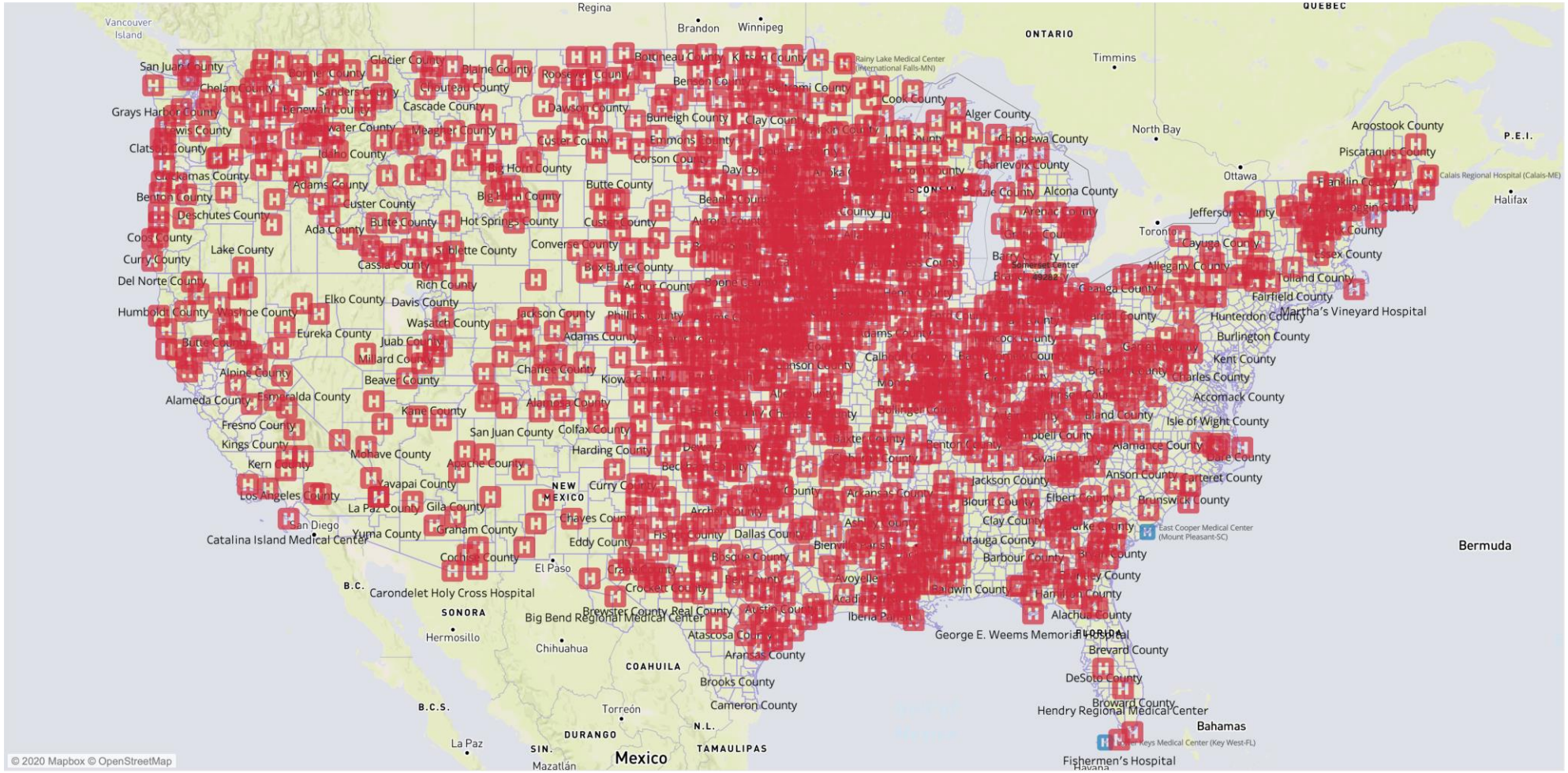

There are +/- 5,300 hospitals in the country. The diagram shows two of the main types of hospitals, Prospective Payment System (PPS) Hospitals shown in blue make up about 80% of acute hospitals. The other 20%, shown in red, are Critical Access Hospitals (CAH).

# Map PPS Hospitals in US




The Prospective Payment System Hospitals (PPS) include a tremendous range of hospitals, from large academic medical centers and large community hospitals all the way down to small rural hospitals.

Map CAH Hospitals in US




Critical Access Hospitals are determined by many criteria, including having fewer than 25 beds, average length of stay less than 96 hours (although this has been relaxed due to COVID-19) and being located a prescribed distance from any other hospital. Often, they are several hours from any kind of tertiary hospital. A surge of even a small number of COVID-19 patients has the ability to quickly strain the resources of the hospital and staff. ***The majority of these rural communities can benefit now from contingency planning of alternate spaces to address potential influx scenarios.***

# Definitions

## What is an acute care facility?

Acute care is immediate, high-level medical care for people suffering from serious injury, exacerbation of an existing illness, and other urgent medical conditions that require an intensive level of treatment and observation. Acute care facilities actively address life-threatening or limb-threatening conditions until the patient can be safely treated with a lower level of care. The length of stay in an acute care facility depends on the specific condition and the requirements of the patient, but stays are generally shorter in duration. A hospital is an example of an acute care facility.

## What is subacute care?

Subacute care takes place after or instead of a stay in an acute care facility. Subacute care provides a specialized level of care to medically fragile patients, though often with a longer length of stay than acute care. Many patients with acute illness or injury require comprehensive care that includes frequent assessments and procedures to manage their condition. People with pulmonary disease, cardiac disease, cancer, and conditions requiring IV therapy or tube feedings may need subacute care after a hospital stay. Subacute care can include dialysis, chemotherapy, ventilation care, complex wound care, and other inpatient medical and nursing services.

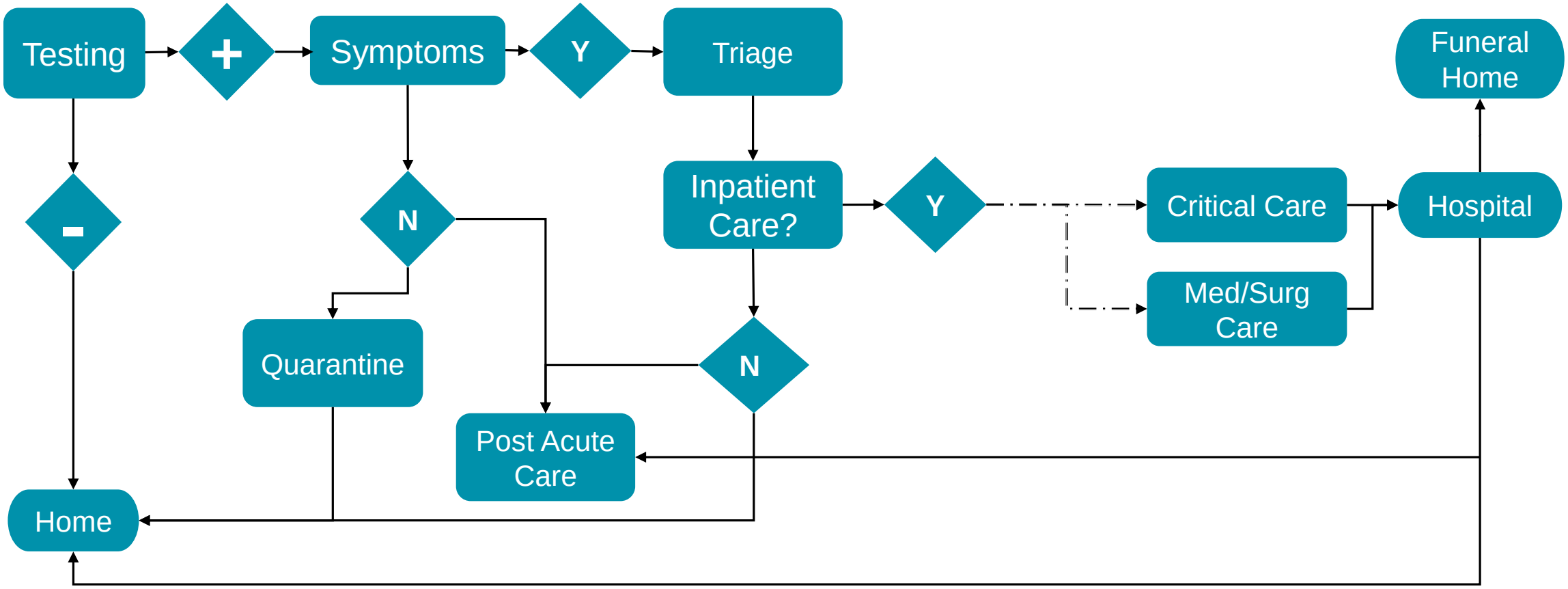
## What is post-acute care?

While post-acute care also provides continued medical treatment after a hospital stay, it maintains an emphasis on recuperation, rehabilitation, and symptom management. Patients in recovery from cardiac or pulmonary disease, stroke or neurological disorders, or orthopedic surgery often require rehabilitative therapies to help bridge the gap between hospital and home. The goal of post-acute rehabilitation is to maximize patient wellness and independence so they can get back to the business of living their best lives. Post-acute care services range from intensive short-term rehab to longer-term restorative care. Some patients will achieve full recovery, while others learn to manage the symptoms of a chronic illness.

Working Group Process

1. 4 Sub-committees were established to address Surge Capacity for Post-Acute Care Patients:
   - Conversion Existing Healthcare Facilities
   - Conversion Existing Non-Healthcare Facilities – Hotels and Dorms
   - Conversion Existing Non-Healthcare Facilities – Convention Centers and Arenas
   - New Facilities – Modular / Tents
2. Approximately 15-25 volunteers have participated in each work session.
3. Collaborative effort of architects, engineers, contractors, owners' project managers, and vendors
4. Groups have had some variation in the interpretation of the charge; this has led to a richness of material that you will all soon see
5. All have been developing surge capacity solutions from the broad lens of infection prevention – including protecting patients, clinicians and staff.

# Covid-19 Patient Flow to Post-Acute Care Flow Chart



Active Link to Site Appropriateness Selection Tool:

https://www.dropbox.com/sh/kpx07e3dv8yymxl/AACHTzA5Se9Uzjaabum1drJna/0.%20HAIO%20Presentations?dl=0&preview=200420+HAIO+Surge+Solutions+Site+Appropriateness+Tool+.xlsx&subfolder_nav_tracking=1

**HAIO Healthcare Surge Solutions**

## SITE APPROPRIATENESS SELECTION TOOL

This tool can be used to compare and assess the viability of any given location(s) or scenario(s) for providing additional surge bed capacity.
To best utilize this form:

1. Identify the location(s) or scenario(s) being considered for the type of bed capacity needed
2. Review each line item and rank accordingly for the location(s) or scenario(s) selected for comparison
3. First select the estimated construction time frame for the location selected. Then review each cost item and rank for the location(s) or scenarios(s) selected

The column with the highest total indicates the most approriate location or scenario

| | Convert private to semi | OR's, Recovery and holding areas | Former nursing units | Conference Areas; Public Spaces | Specialty or Shuttered Hospital | Rehab Facility | Ambulatory Surgery Center | Parking Garage (flat plate) | Modular Tent | Patient Prefabricated Room | Construction Trailer | Arena / Convention Center | Dormitories | Hotels |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Within Institution | | | | Within System or Primary Service Area | | | Outdoor, within 1 mile | | | | Indoor, within 1 mile | | |
| **Bed Need** indicate with **X** potential options | | | | | | | | | | | | | | |
| **PROPOSED ADDITIONAL BED NEED CAPACITY** | < 50 beds | | | | < 50 beds | | | +50 beds | | | | +50 beds | | |
| Type & Additional Bed Need | | | | | | | | | | | | | | |
| Critical Care | | | | | | | | | | | | | | |
| Med/Surg | | | | | | | | | | | | | | |
| Post Acute | | | | | | | | | | | | | | |
| Post Acute (cannot return to residence) | | | | | | | | | | | | | | |
| **Facility and Site Readiness** Rank: **4** = In Place/Easily Available; **3** = Necessary & Accessible; **2** = Necessary but not easily available; **1** = Nice to Have | | | | | | | | | | | | | | |
| **OPERATIONAL QUALITIES** | | | | | | | | | | | | | | |
| Access | | | | | | | | | | | | | | |
| Food | | | | | | | | | | | | | | |
| Pharmacy | | | | | | | | | | | | | | |
| Lab | | | | | | | | | | | | | | |
| Medical equipment | | | | | | | | | | | | | | |
| Supplies | | | | | | | | | | | | | | |
| Toilets | | | | | | | | | | | | | | |
| Showers | | | | | | | | | | | | | | |
| Separation of flows | | | | | | | | | | | | | | |
| Clean | | | | | | | | | | | | | | |
| Soiled | | | | | | | | | | | | | | |
| Staff | | | | | | | | | | | | | | |
| Patient | | | | | | | | | | | | | | |
| Safety | | | | | | | | | | | | | | |
| Security | | | | | | | | | | | | | | |
| Sight lines | | | | | | | | | | | | | | |
| **INFRASTRUCTURE AVAILABILITY** | | | | | | | | | | | | | | |
| Utilities | | | | | | | | | | | | | | |
| Electric | | | | | | | | | | | | | | |
| Emergency Power | | | | | | | | | | | | | | |
| Site Lighting | | | | | | | | | | | | | | |
| Oygen | | | | | | | | | | | | | | |
| Sewer | | | | | | | | | | | | | | |
| Contaminated Water Holding | | | | | | | | | | | | | | |
| Water | | | | | | | | | | | | | | |
| IT | | | | | | | | | | | | | | |
| Wi-Fi | | | | | | | | | | | | | | |
| HVAC Controls | | | | | | | | | | | | | | |
| Exhaust | | | | | | | | | | | | | | |
| Roadways | | | | | | | | | | | | | | |
| Access for deliveries | | | | | | | | | | | | | | |
| Access for waste holding | | | | | | | | | | | | | | |
| **Time & Cost** Rank: **4** = Minimum; **3** = Moderate; **2** = Expensive; **1** = Challenged | | | | | | | | | | | | | | |
| **IMPLEMENTATION** | | | | | | | | | | | | | | |
| Construction/renovation time frame | | | | | | | | | | | | | | |
| Immediate | | | | | | | | | | | | | | |
| < 2 weeks | | | | | | | | | | | | | | |
| < 4 weeks | | | | | | | | | | | | | | |
| Cost | | | | | | | | | | | | | | |
| Land costs | | | | | | | | | | | | | | |
| Infrastructure costs | | | | | | | | | | | | | | |
| Material Costs | | | | | | | | | | | | | | |
| Labor Costs | | | | | | | | | | | | | | |
| Cost to ship and set-up | | | | | | | | | | | | | | |
| Cost to return or convert back | | | | | | | | | | | | | | |
| **TOTAL (maximum of 136 points)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**HAIO Healthcare Surge Solutions**

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| Critical Care | | | | | | | | | | | | | | |
| Med/Surg | | | | | | | | | | | | | | |
| Post Acute | | | | | | | X | | X | | | | X | |
| Post Acute (cannot return to residence) | | | | | | | | | | | | | | |
| **Facility and Site Readiness** Rank: **4** = In Place/Easily Available; **3** = Necessary & Accessible; **2** = Necessary but not easily available; **1** = Nice to Have | | | | | | | | | | | | | | |
| **OPERATIONAL QUALITIES** | | | | | | | | | | | | | | |
| Access | | | | | | | | | | | | | | |
| Food | | | | | | | 3 | | 2 | | | | 3 | |
| Pharmacy | | | | | | | 4 | | 2 | | | | 2 | |
| Lab | | | | | | | 4 | | 2 | | | | 2 | |
| Medical equipment | | | | | | | 4 | | 3 | | | | 2 | |
| Supplies | | | | | | | 4 | | 3 | | | | 2 | |
| Toilets | | | | | | | 4 | | 2 | | | | 4 | |
| Showers | | | | | | | 4 | | 2 | | | | 4 | |
| Separation of flows | | | | | | | | | | | | | | |
| Clean | | | | | | | 4 | | 4 | | | | 2 | |
| Soiled | | | | | | | 4 | | 4 | | | | 2 | |
| Staff | | | | | | | 4 | | 4 | | | | 2 | |
| Patient | | | | | | | 4 | | 4 | | | | 2 | |
| Safety | | | | | | | | | | | | | | |
| Security | | | | | | | 4 | | 3 | | | | 4 | |
| Sight lines | | | | | | | 4 | | 3 | | | | 2 | |
| **INFRASTRUCTURE AVAILABILITY** | | | | | | | | | | | | | | |
| Utilities | | | | | | | | | | | | | | |
| Electric | | | | | | | 4 | | 4 | | | | 4 | |
| Emergency Power | | | | | | | 4 | | 4 | | | | 2 | |
| Site Lighting | | | | | | | 4 | | 4 | | | | 4 | |
| Oxygen | | | | | | | 4 | | 2 | | | | 2 | |
| Sewer | | | | | | | 4 | | 3 | | | | 4 | |
| Contaminated Water Holding | | | | | | | 1 | | 1 | | | | 1 | |
| Water | | | | | | | 4 | | 4 | | | | 4 | |
| IT | | | | | | | 4 | | 3 | | | | 3 | |
| Wi-Fi | | | | | | | 4 | | 3 | | | | 4 | |
| HVAC Controls | | | | | | | 4 | | 4 | | | | 2 | |
| Exhaust | | | | | | | 4 | | 4 | | | | 2 | |
| Roadways | | | | | | | | | | | | | | |
| Access for deliveries | | | | | | | 4 | | 3 | | | | 4 | |
| Access for waste holding | | | | | | | 4 | | 3 | | | | 2 | |
| **Time & Cost** Rank: **4** = Minimum; **3** = Moderate; **2** = Expensive; **1** = Challenged | | | | | | | | | | | | | | |
| **IMPLEMENTATION** | | | | | | | | | | | | | | |
| Construction/renovation time frame | | | | | | | | | | | | | | |
| Immediate | | | | | | | 4 | | | | | | | |
| < 2 weeks | | | | | | | | | 3 | | | | 4 | |
| < 4 weeks | | | | | | | | | | | | | | |
| Cost | | | | | | | | | | | | | | |
| Land costs | | | | | | | 4 | | 4 | | | | 4 | |
| Infrastructure costs | | | | | | | 4 | | 3 | | | | 3 | |
| Material Costs | | | | | | | 4 | | 2 | | | | 3 | |
| Labor Costs | | | | | | | 4 | | 2 | | | | 3 | |
| Cost to ship and set-up | | | | | | | 4 | | 2 | | | | 3 | |
| Cost to return or convert back | | | | | | | 4 | | 2 | | | | 3 | |
| **TOTAL (maximum of 136 points)** | 0 | 0 | 0 | 0 | 0 | 0 | 128 | 0 | 98 | 0 | 0 | 0 | 94 | 0 |

EXAMPLE: SITE COMPARISON EVALUATION

HAIO - Designing for Surge Capacity

# Existing Facilities within Hospital Networks

## for Post Acute Care

Jessica Stebbins, HDR (sub-committee chair)
Milly Baker, HGA
Richard Barnett, Colliers Project Leaders
Gretchen Battle, CannonDesign
Sean Brice, Thompson Consultants, Inc.
Win Brown, Heywood Hospital
Andrew Brumbach, SmithGroup
Allen Buie, HDR
Matthew Cotton, SmithGroup
Jason D'Antona, Partners Healthcare
Doug Erickson, FGI
Jeff Galvin, Lavallee Brensinger Arch.
Keith Garratt, SmithGroup
Anne Garrity, Tsoi Kobus Design
Kieran Guinan, Thompsons Consultants, Inc.
Ronald Hayduk, Indiogorem
Anna Mancini, HGA
Sarah Markovitz, NBBJ
Frank Morse, Walsh Brothers
Scott Mueller, Shepley Bulfinch
Daniel Quinn, Colliers Project Leaders
Deborah Rivers, HDR
Michael Roughan, HDR
Alberto Salvatore, HED
Amy Sowersby, Turner Healthcare
Dale Taglienti, E4H Architecture
Cynthia Tsao, Navilean
Wendy Weitzner, The Innova Group
Greg Wells, HDR
Teresa Wilson, Colliers Project Leaders
Kathleen Woods, HDR
Evan Wyner, Colliers Project Leaders
Bobbe Young, HED

# Existing facilities within hospital network

- Facility needs different based on patient needs

## FACILITY / SPACE TYPE

AMC's, Community Hospitals, Critical Access
- Closed Units
- Shell Space
- **Med / Surg Beds**
- **Prep-recovery**
- **Conference Centers**
- **Rehab Gym**
- Administration
- Main Lobby

Closed Hospital
Medical Office Buildings
**Ambulatory Surgical Centers**
**Rehabilitation Hospitals**
LTACs (Long term Acute Care Facility)
Skilled Nursing Facility
**HomeCare**

*NOTE: **Bolded** are spaces considered in the following slides:*

## PATIENT TYPES

**Type 1. Per other HAIO groups working on "Post Acute"**

- Covid positive patients only
- Have been discharged from the hospital but cannot go home either due to:
  - Medical needs (minor medical attention still required)
  - Social needs (lives alone, has inappropriate or no housing, etc.) or inability to be placed (such as a nursing home patient who cannot return to the nursing home due to Covid status)

**Type 2. Spaulding Cambridge LTAC COVID 19 Dedicated Unit "Sub Acute"**

*Medium and complex patients who will need oxygen and suction setups.*

- Dedicated unit for Covid positive patients only
- Private rooms required for Covid positive patients that are on nebulized therapy, vented, open trach, Bipap/Cipap. They need to remain in their rooms.
- Cohort Covid positive patients utilizing semiprivate and private rooms.

*NOTE: These are still relatively acute "hospital" patients*

# Site Appropriateness

- Key Considerations

## Building / Space Assessment

Check list items

- ❑ MEP/FP Life Safety Infrastructure
- ❑ Emergency Backup
- ❑ IT BackBone Infrastructure
- ❑ Supply-chain / Logistics/ Loading Dock
- ❑ Patient Transport Capabilities
- ❑ Building & Site Area / Parking
- ❑ Building Egress & Security
- ❑ Local Regulatory Agencies
- ❑ ADA/Accessibility
- ❑ Waste Management
- ❑ Central Sterile
- ❑ Morgue

## Operational Qualities

Check list items

- ❑ Bed Capacity / Patients per Sq Ft
- ❑ Staffing Efficiency / Caregiver per Patient Ratio
- ❑ Sight Lines
- ❑ Separation of Clean / Dirty Flows
- ❑ Space for Donning/Doffing
- ❑ Food Service / Delivery Access
- ❑ Equipment & Materials Storage
- ❑ Pharmacy / Medical Supply Access
- ❑ Rehabilitation PT/OT Space
- ❑ Safety to Healthcare Providers
- ❑ Staff Respite Space /On-Call Rooms
- ❑ Proximity to AMC

## Time & Costs

Check list items

- ❑ Deployable/Limited Make-Ready Requirements
- ❑ Local Prefabrication Capability
- ❑ Labor Market
- ❑ Robust Wireless System
- ❑ Reusability vs. Permanence / Impact on Space Long-Term
- ❑ Construction Cost Estimate
- ❑ Design & Construction Schedule
- ❑ Report – Prioritize Recommendations

# Site Adaptation

- How to adapt your site to accommodate post-acute care

## Recommission Closed Hospital

Check list items

- ❑ Inventory Amount of Private versus Non-Private Spaces; Negative Pressure / Isolation
- ❑ Life Safety / Infrastructure
- ❑ Testing of systems, Med Gas, IT, HVAC, Emergency Power
- ❑ Bulk Oxygen Tank Capacity
- ❑ Cleaning of Facility & Systems
- ❑ Interior Environment Suitability / Healthy vs Hazardous
- ❑ Understand Site Access & Building Egress
- ❑ Evaluate Construction Logistics

## Convert Closed Unit or Other Clinical Space (e.g. PACU)

Check list items

- ❑ Inventory Amount of Private versus Non-Private Spaces Negative Pressure / Isolation
- ❑ Check Pressurization to Adjacent Spaces
- ❑ Test of systems, Med Gas, IT, HVAC, Emergency Power.
- ❑ Cleaning of Facilities & Systems
- ❑ Interior Environment Suitability/ Healthy vs Hazardous.
- ❑ Ensure Interior Finishes are Easily Cleanable

## Convert Non-Patient Room Spaces

Check list items

- ❑ Quantify Capacity of “Ward Type” # of Beds
- ❑ Ensure Adequate Power and Plumbing are Available
- ❑ Temp / Additional IT Network Infrastructure
- ❑ Use of Temporary Modular Systems
- ❑ Develop Protocols for Portable Oxygen and Gases
- ❑ Ensure Capability to Separate Covid and Non-Covid Patients

*Steps needed if only for Type 1/true post-acute & custodial patients*

# Site Adaptation

- How to adapt your site to accommodate post-acute care

## Ambulatory Surgical Center

Check list items

- ❑ Inventory Amount of Private versus Non-Private Spaces
- ❑ Check Pressurization to Adjacent Spaces
- ❑ Check Humidity, Life Safety, Generators
- ❑ Develop Protocols for Portable Oxygen and Gases
- ❑ Ensure Capability to Separate Covid and Non-Covid Patients
- ❑ Interior Environment Suitability
- ❑ Assess Parking Capacity
- ❑ Food Service

## Medical Office Building

Check list items

- ❑ Inventory Amount of Private versus Non-Private Spaces
- ❑ Confirm HVAC suitability – Ducted vs Open Plenum
- ❑ Check Humidity, Life Safety
- ❑ Temporary Generators?
- ❑ Develop Protocols for Portable Oxygen and Gases
- ❑ Temporary Bulk Oxygen Tank
- ❑ COVID Positive Patients Only
- ❑ Interior Environment Suitability
- ❑ Food Service

## Home Care

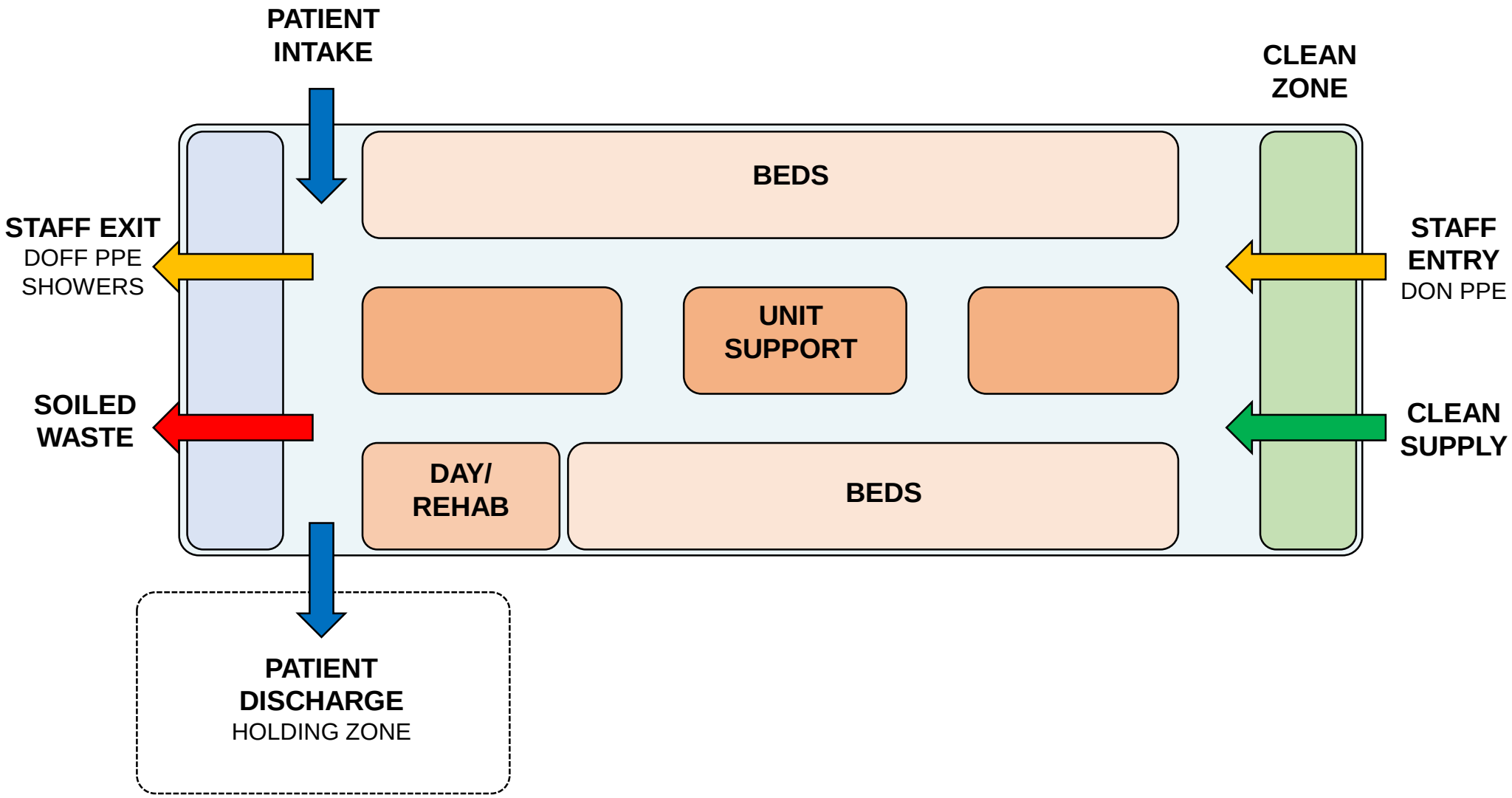
Check list items

- ❑ Test Internet Connectivity
- ❑ Train Patients & Family on Virtual Care Usage
- ❑ Train Patients & Family in Infection Control Techniques
- ❑ Assess Space for Accessibility (if Applicable)
- ❑ Organize Space Into “Dirty” and “Clean” Areas
- ❑ Visiting Nurse, PT and OT
- ❑ Develop Quarantine Space for Patient With Majority of Needed Items for Daily Living

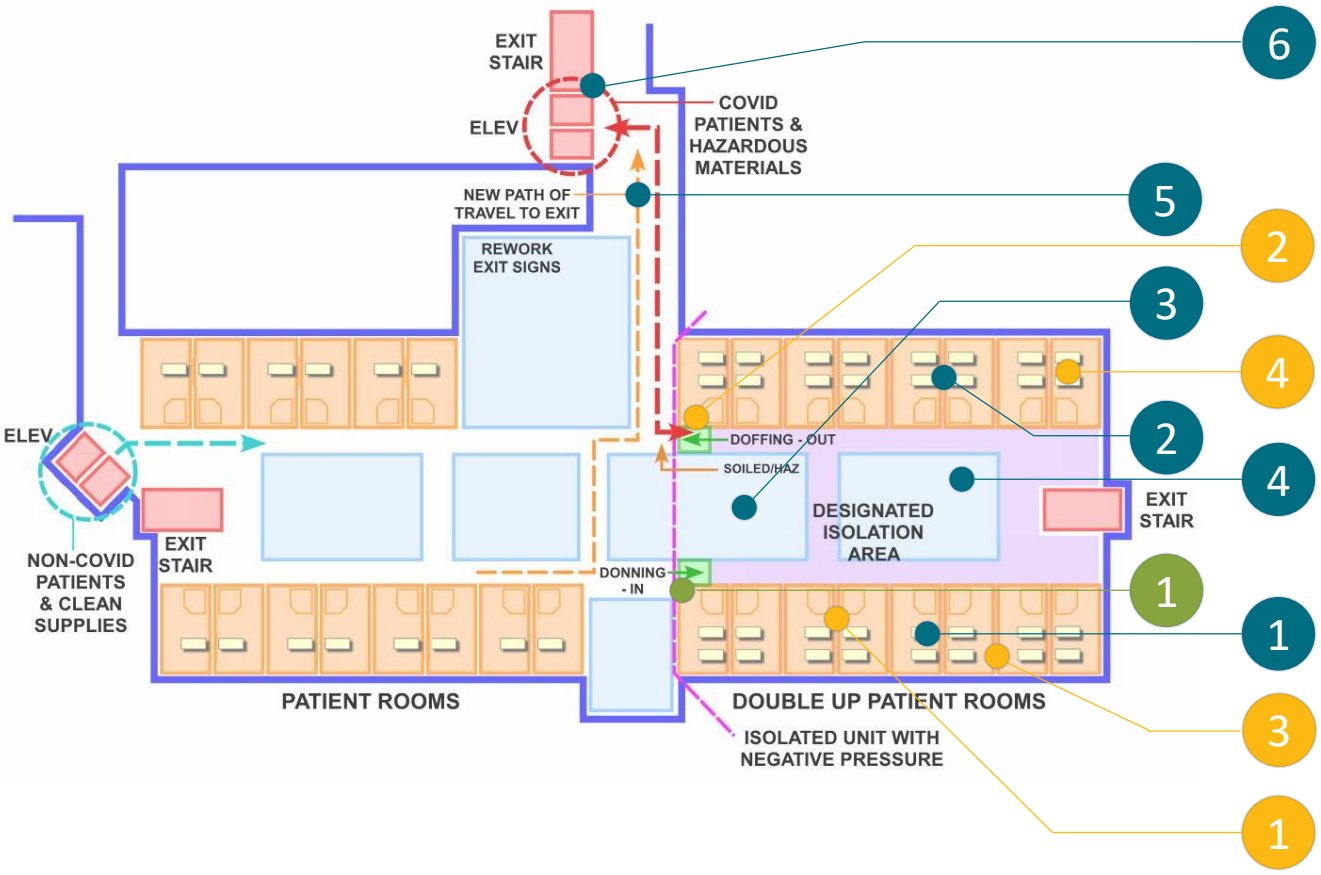
*Steps needed if only for Type 1/true post-acute & custodial patients*

# Operational Flows

- To Hospital Covid-19 + Post Acute Care



# MED/SURG Unit Conversion Diagram




## Existing Space Benefits

1. Private patient rooms – can be used for double occupancy
2. Medical Gasses, Power, Tel/Data
3. Nurse stations & support space for staff
4. Clean, Soil, Nour & Equipment Space
5. Life safety provisions
6. Ability to Isolate elevator cores

## Changes Recommended

1. Convert to negative pressure
2. Ante rooms for donning & doffing
3. Remove excess furniture and equipment in patient rooms
4. Privacy for patients

## Challenges

1. Infection control at entry / exit

## Infrastructure

- All necessary infrastructure is available in a med/surg suite for post acute care

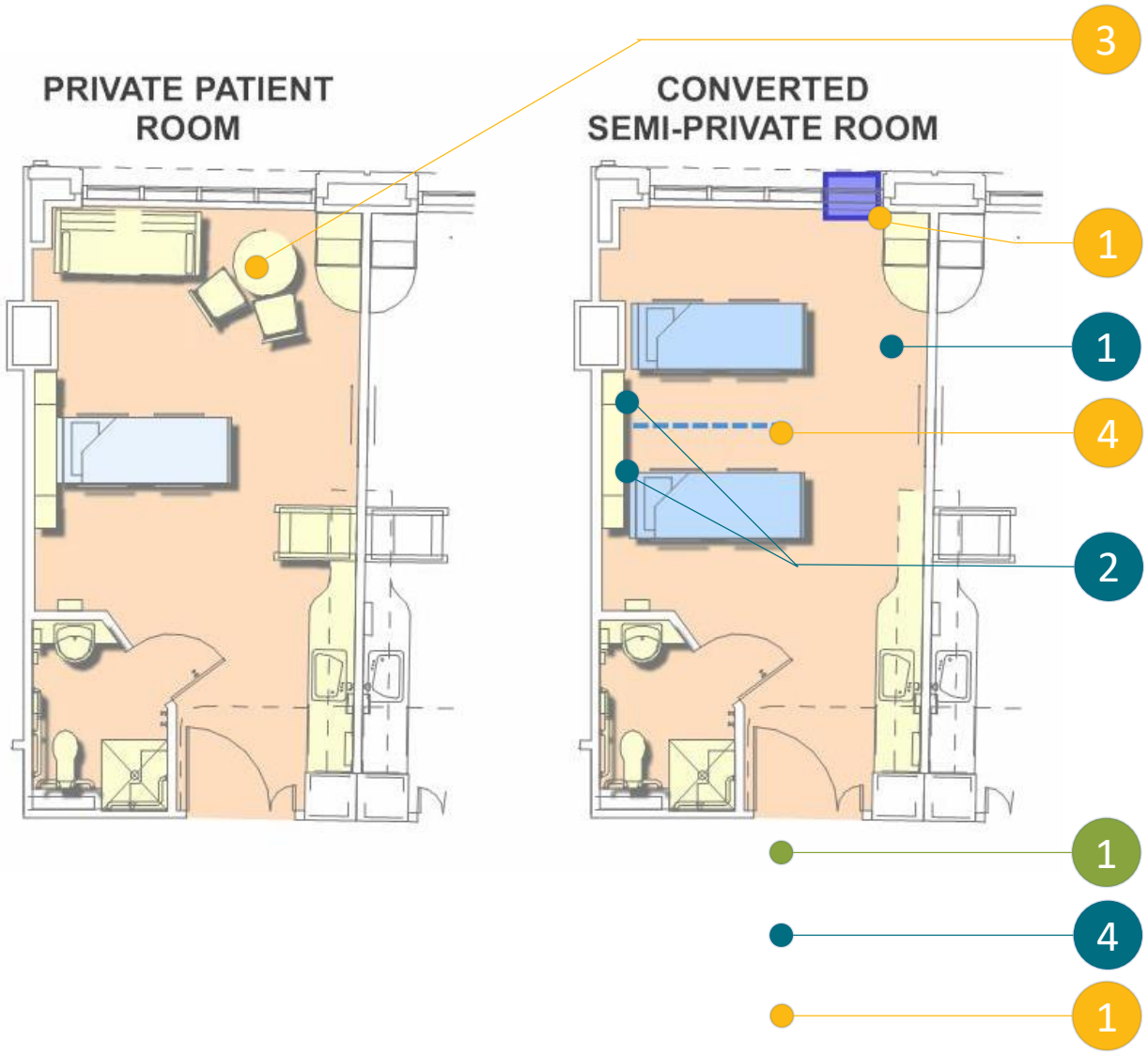
## Staff Flow

- Control clean and dirty entries with ante rooms

## Patient Flow and Life Safety

- Good patient flow and egress from clinical spaces

# Private Patient Room Conversion Diagram




## Existing Space Benefits

1. Private patient rooms – can be used for double occupancy
2. Medical Gasses and power
3. Nurse stations & support space for staff
4. Clean, Soil, Nour & Equipment Space
5. Life safety provisions

## Changes Recommended

1. Convert Unit to negative pressure or rooms to negative pressure (through window unit & portable exhaust fan w/HEPA filter)
2. Ante rooms for donning & doffing
3. Remove excess furniture and equipment in patient rooms
4. Privacy for patients

## Challenges

1. Infection control at entry / exit

## Infrastructure

- All necessary infrastructure is available in a med/surg suite for post acute care

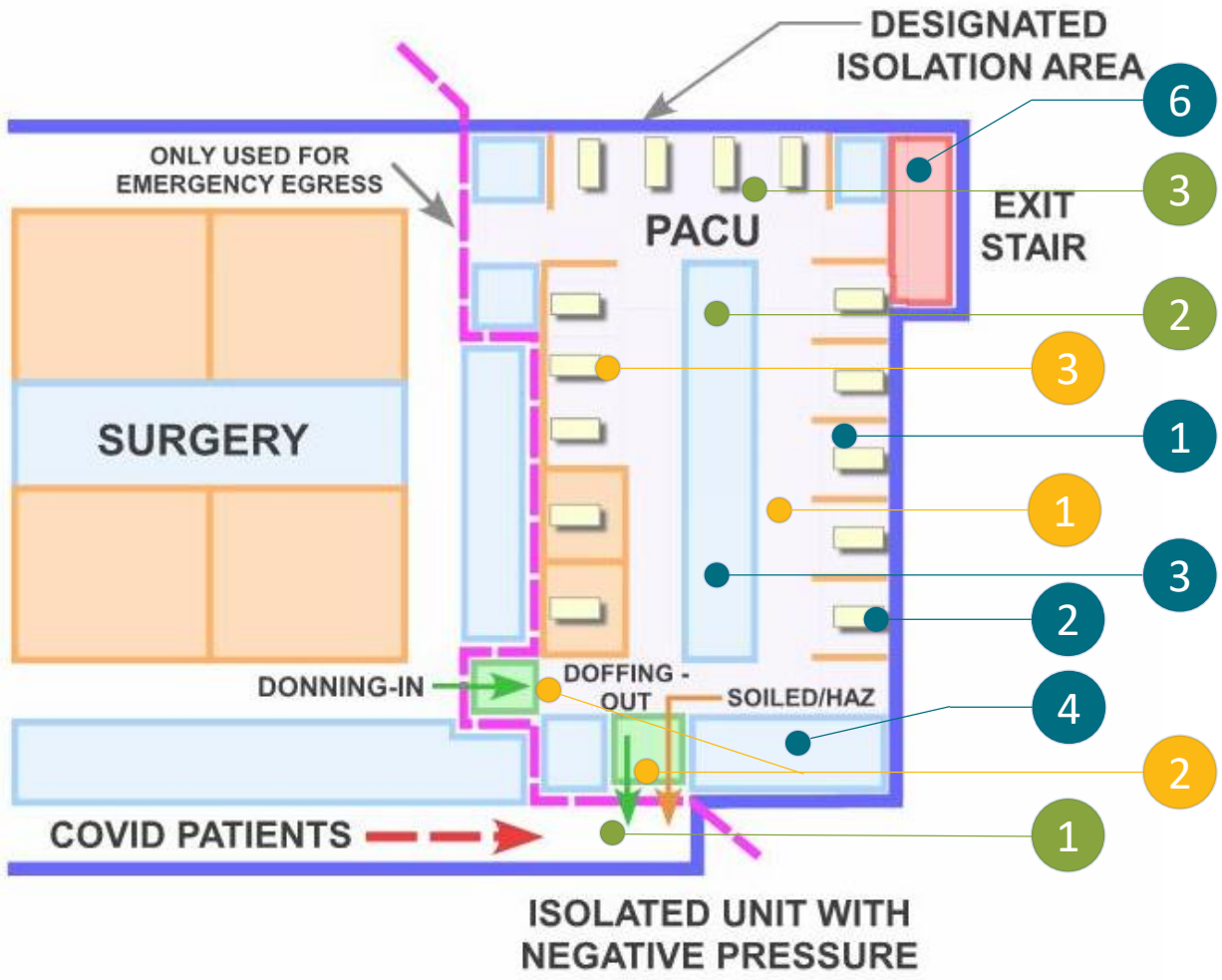
## Staff Flow

- Control clean and dirty entries with ante rooms

## Patient Flow and Life Safety

- Good patient flow and egress from clinical spaces

# PACU Conversion Diagram




## Existing Space Benefits

1. Patient recovery bays adequately sized
2. Medical Gasses and power
3. Nurse stations & support space for staff
4. Clean, Soil, Nour & Equipment Space
5. Cleanable surfaces
6. Life safety provisions

## Changes Recommended

1. Convert to negative pressure
2. Ante rooms for donning & doffing
3. Remove excess furniture and equipment in patient bays

## Challenges

1. Infection control at entry / exit
2. Limited patient toilets
3. Limited privacy in suite

## Infrastructure

- All necessary infrastructure is available in a PACU suite for post acute care

## Staff Flow

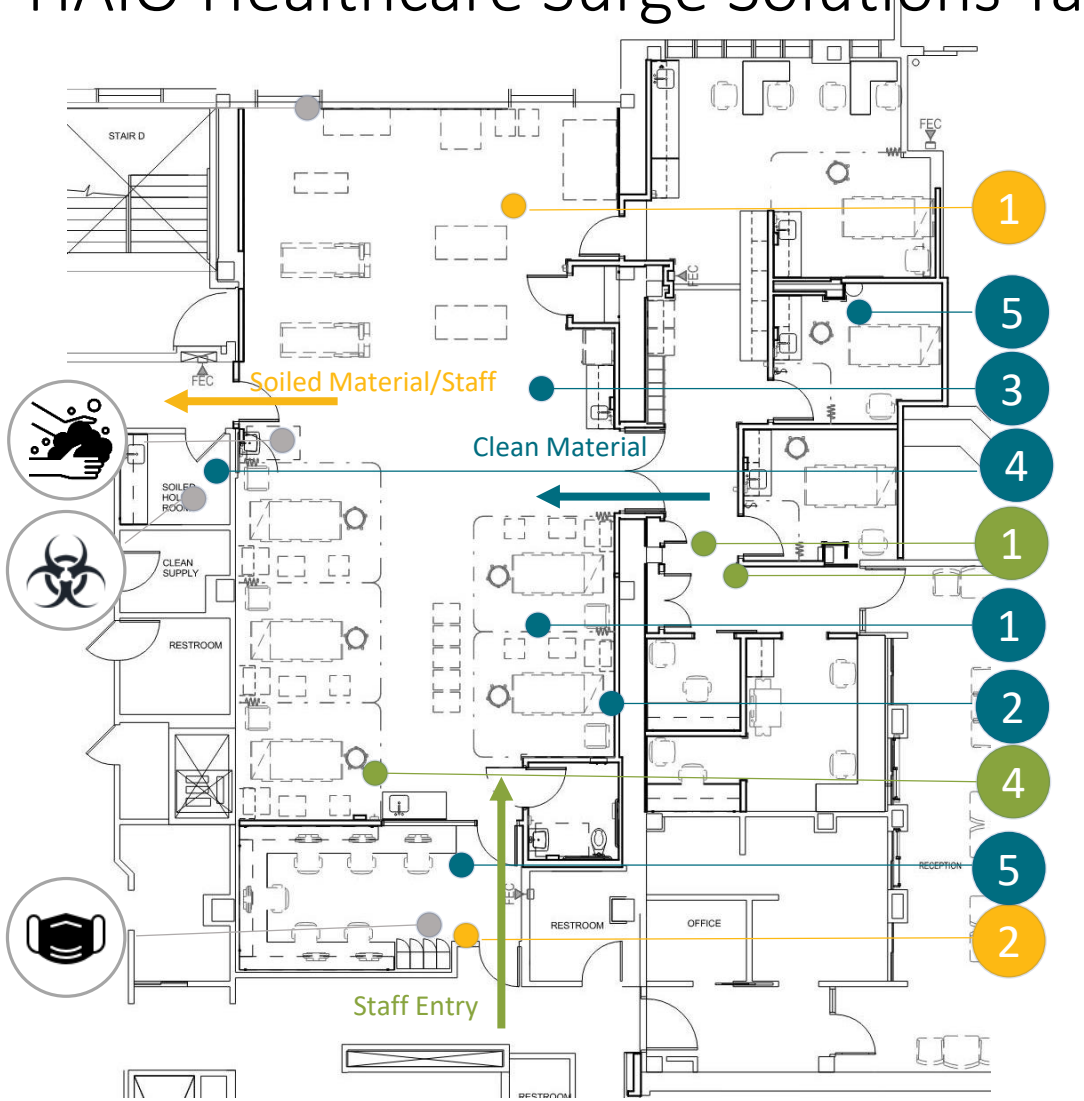
- Control clean and dirty entries with ante rooms

## Patient Flow and Life Safety

- Good patient flow and egress from clinical spaces

# Rehab gym space conversion Diagram

## HAIO Healthcare Surge Solutions Task Force




### Existing Space Benefits

1. Existing appropriately sized bays
2. Normal power existing
3. Cleanable finishes
4. Clean and Soiled space
5. Enclosed staff viewing area
6. Enclosed examination spaces

### Changes Recommended

1. Create additional bays in Gym area
2. Create donning/doffing area

### Challenges

1. Corridors may be small for stretcher
2. No emergency power
3. No bathing facility
4. Curtain only bays
5. No medical gases

### Infrastructure

- Space not equipped for acute patients
- Need to confirm pressure differentials

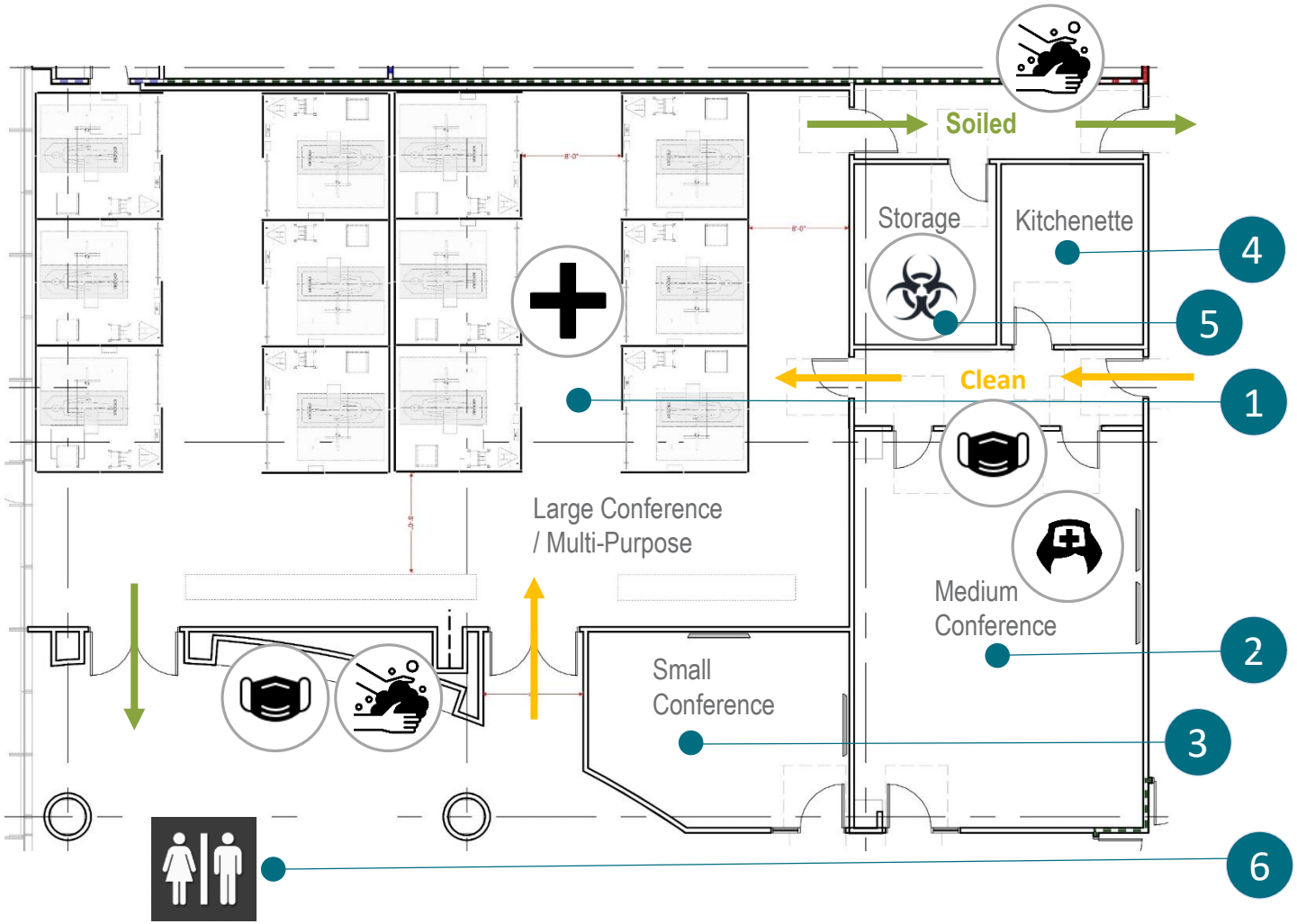
### Staff Flow

Multiple entry points may make material and staff flows unclear. Each site would need flows mapped and secured.

### Patient Flow and Life Safety

Depending on location in hospital may not have appropriate Life Safety or connection with all support spaces.

# Conference Center




## Existing Space Benefits

Repurpose Rooms to provide:

1. Patient Treatment Zone
2. Staff Respite and Work Areas
3. Communications / Command Center
4. Nourishment Room
5. Soiled Holding
6. Access to toilet facilities - separate staff and patients

## Changes Recommended

- Create temporary patient treatment bays using mobile equipment and furniture
- Provide dedicated clean and soiled traffic flow
- Replace carpeting with hard, monolithic flooring

## Challenges

- Not all facilities have a multi-room conference center
- Sizes and adjacencies differ
- Space is not equipped for mid to high level patient care – gases, neg air flow, etc.

## Infrastructure

- Good adjacencies to support services
- Large open rooms to house multiple bays
- Strong IT capabilities

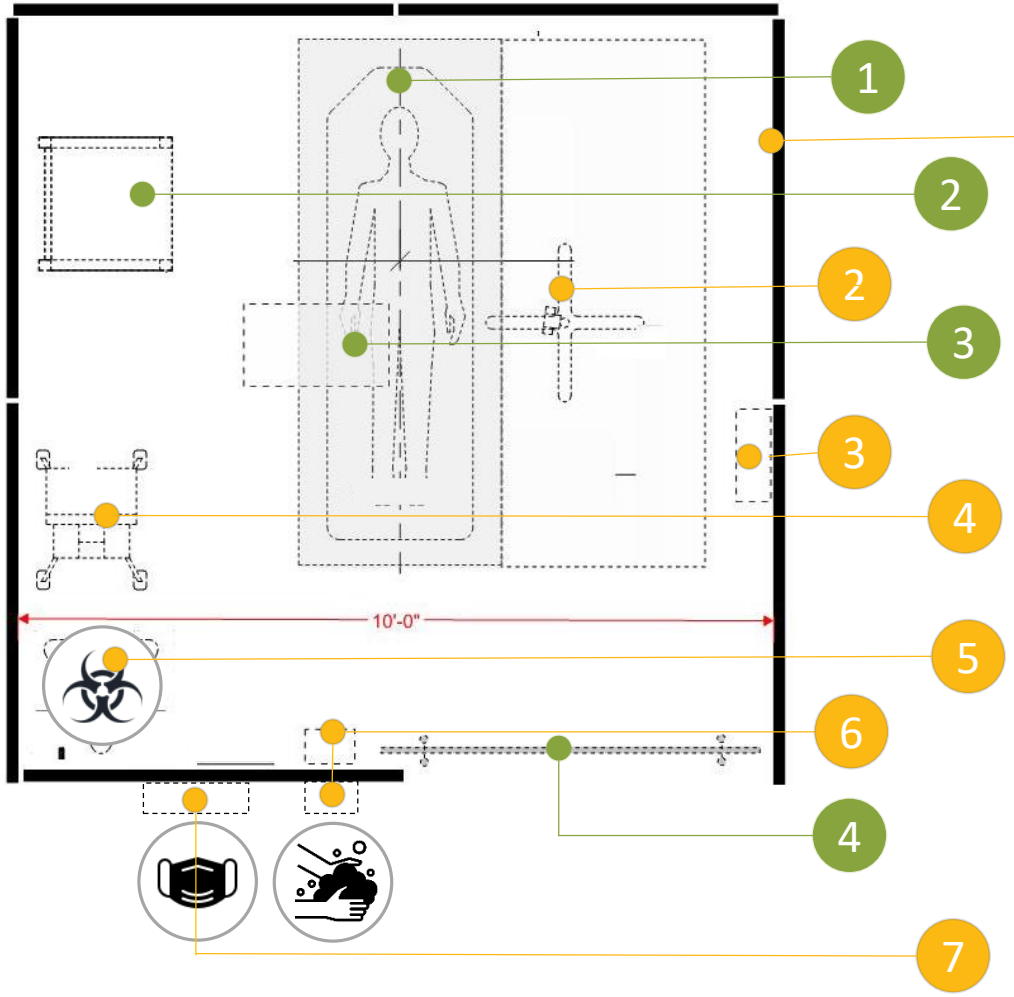
## Staff Flow

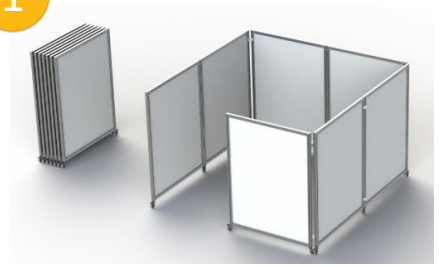
- Create dedicated entry point to treatment bays with area for don/doff and handwashing.
- Create dedicated rooms for staff respite, work and communication center

## Patient Flow and Life Safety

- Depending on size and location within the hospital, life safety requirements may be limiting

# Conference Center – Patient Treatment Bay



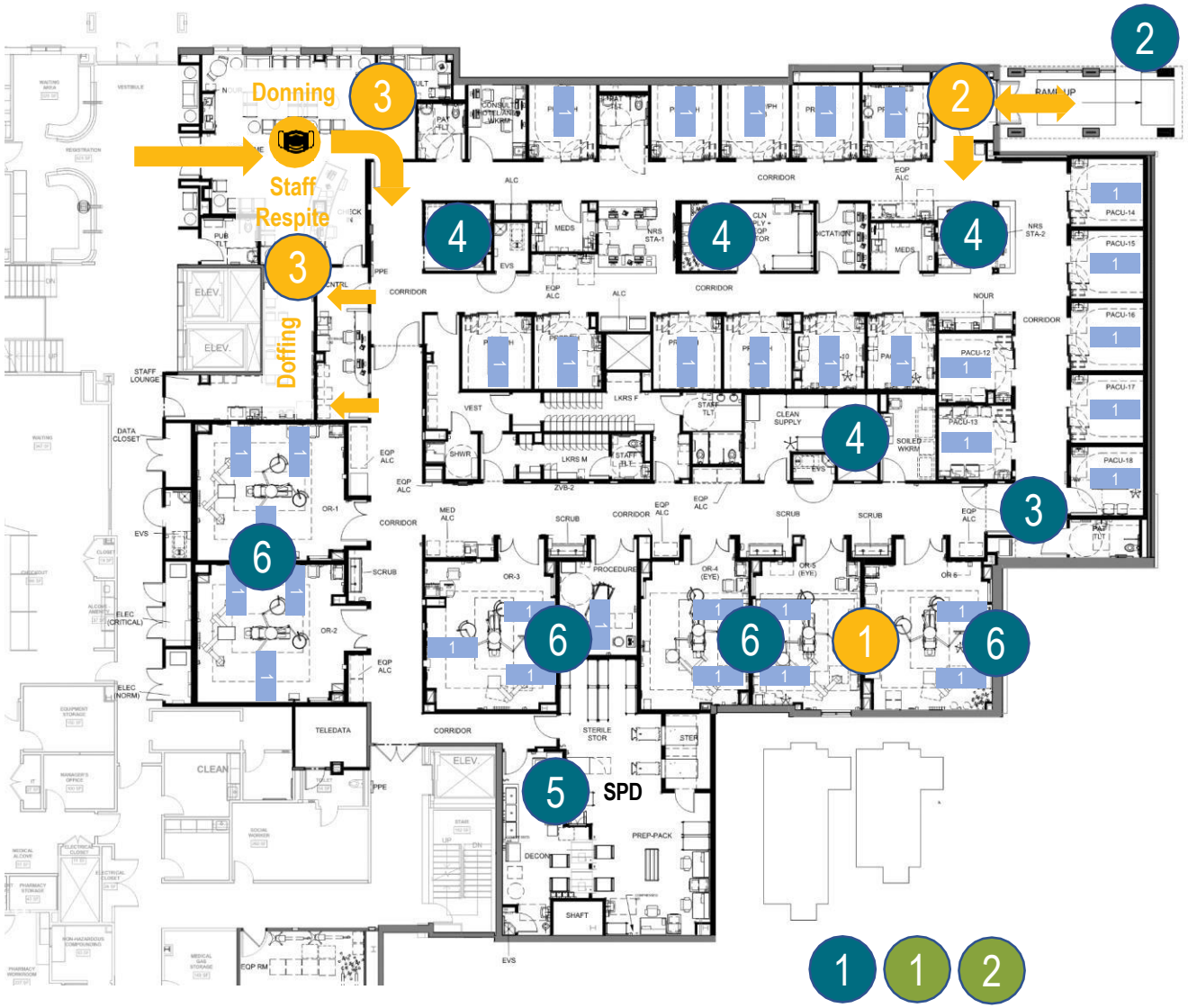
## Treatment Bay Equipment

1. Temporary Modular Wall
2. IV Stand
3. Sharps
4. Mobile Workstation
5. Linen Hamper
6. Hand Sanitizer Station x2
7. PPE

## Treatment Bay Furniture

1. Hospital Bed / Stretcher
2. Patient Recliner / Chair
3. Overbed Table
4. Mobile Privacy Screen

# Ambulatory Surgery Center




## Existing Space Benefits

1. Existing healthcare use
2. Ease of community access / families know that loved ones are nearby
3. Suitability of finishes / materials
4. Availability of healthcare support spaces (meds, supplies, soil, equipment, toilets)
5. Built-in sterilization potential in SPD (for masks & equipment)
6. Utilize OR and Procedure Rooms to accommodate 1 to 3 beds; Endo Rooms are well-suited as they are always negative pressure

## Changes Recommended

1. Move surplus furniture & equipment to vacated adjacent areas
2. Utilize patient discharge for patient in/out
3. Convert Waiting to command center, staff respite, PPE donning and doffing

## Challenges

1. Remoteness if more intense care required or back-up clinical staff needed
2. Support availability – food, supplies, etc.

## Infrastructure

- Built for healthcare, but not acute patient care
- Availability of medical gases

## Staff Flow

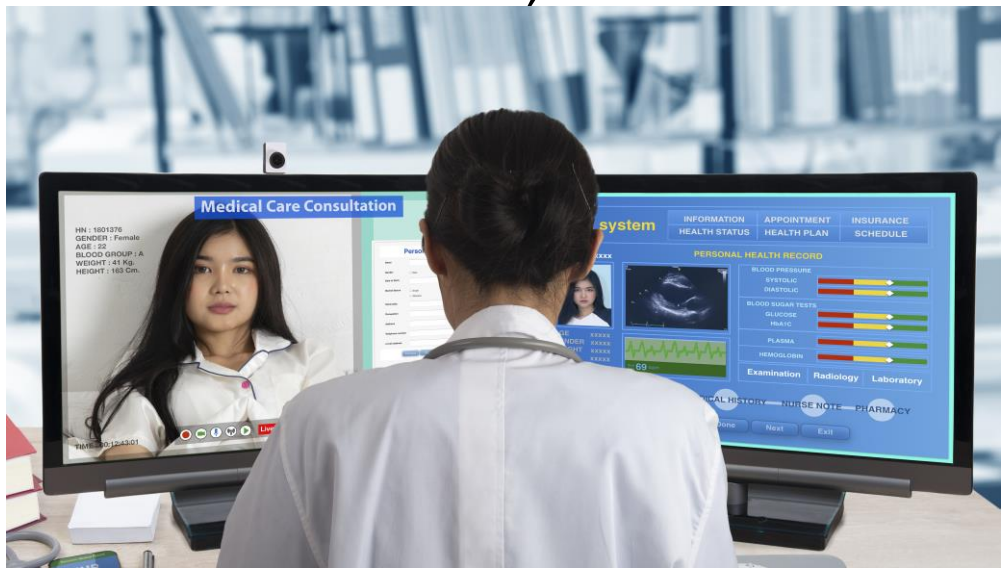
- Separation of staff entry possible though ASC Waiting &/or Control
- Dedicated Staff Respite and PPE Clean / soiled areas possible

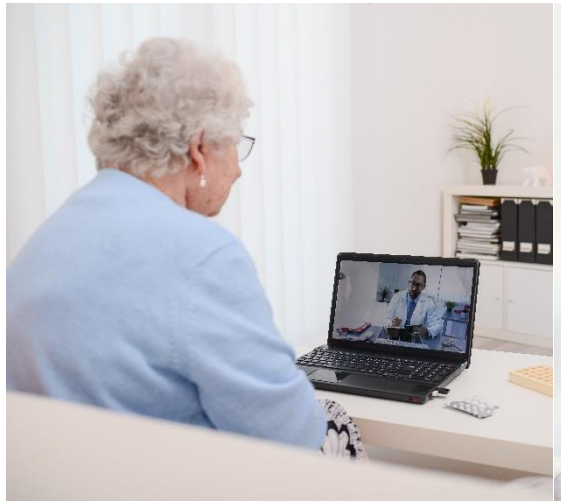
## Patient Flow and Life Safety

- Ambulatory Care compliant
- Separation of patient flow possible through patient discharge building exit

# Homecare: Technology Systems

- Virtual check-in, telehealth visits, e-visits



## Existing Space Benefits

1. Existing Administrative Space
2. Existing Call Center Space
3. Existing Patient Home WiFi
4. "Non-Public" Facing Applications
    1. Zoom, FaceTime, WhatsApp, Skype, Webex, Doxy.me
5. Third Party Telehealth Provider

## Considerations

1. Balance Natural & In-Room Lighting
2. Avoid Background Noise
3. Test System(s) in Advance of Call
4. Charge/Power Device
5. Close Other Applications/Save Bandwidth
6. Close Proximity to WiFi Router
7. Wearable Patient Monitoring Devices

## Challenges

1. Training of Staff and Patients
2. Timely Electronic Record Keeping
3. Maintaining Cyber Security Protocols
4. Threat & Liability of Patient Information
5. Reliability of Home Internet Access

## Infrastructure

- Patients Home Internet Access
- Clinician Home Internet
- Existing Hospital/Third Party Network

## Staff Flow

- Call Center
    - On Premise
    - Virtual
- Electronic Record Input
    - On Premise
    - Encrypted Virtually

## Patient Flow

- Call Center Management System
- Virtual Check In
- Scheduled Telehealth & E-Visits
- HHS Relaxed Guidelines

# Rehabilitation Hospital


## Existing Space Benefits

1. Existing healthcare use
2. Ease of community access / families know that loved ones are nearby
3. Suitability of finishes / materials
4. Availability of healthcare support spaces (meds, supplies, soil, equipment, toilets)

## Changes Recommended

1. Move surplus furniture & equipment to mobile trailers if space is not available in the facility
2. Utilize patient discharge for patient in/out
3. Convert Waiting to command center, staff respite, PPE donning and doffing

## Challenges

1. Suspended use for out-patient rehabilitation

## Infrastructure

- Built for healthcare out-patient and acute patient care
- Availability of medical gases on in-patient unit

## Staff Flow

- Separation of staff entry
- Dedicated Staff Respite and PPE Clean / soiled areas available

## Patient Flow and Life Safety

- Ambulatory Care and In-patient care compliant
- Separation of patient flow possible through patient discharge building exit

# Rehabilitation Hospital

Typical In-Patient Floor Plan

Areas for additional Beds

## Existing Space Benefits

1. Existing healthcare use will allow immediate use of existing in-patient beds
2. Potential to add a bed in each room
3. Ease of community access / families know that loved ones are nearby
4. Suitability of finishes / materials
5. Availability of healthcare support spaces (meds, supplies, soil, equipment, toilets)
6. Utilize In-patient Gyms and Day Rooms for additional bed capacity.

## Changes Recommended

1. Move surplus furniture & equipment to mobile trailers if space is not available in the facility

## Challenges

1. Relocation of existing Rehab. Patients

## Infrastructure

- Built for healthcare out-patient and acute patient care
- Availability of medical gases on in-patient unit

## Staff Flow

- Separation of staff entry
- Dedicated Staff Respite and PPE Clean / soiled areas available

## Patient Flow and Life Safety

- Ambulatory Care and In-patient care compliant
- Separation of patient flow possible through patient discharge building exit

# Engineering Infrastructure Matrix

| What is Needed | Existing Hospital Closed Unit | Existing Hospital Shell Space | Existing Hospital Med/Surg Beds | Existing Hospital Prep/Rec Spaces | Existing Hospital Rehab Gym | Existing Hospital Conference Center | Existing Hospital Administration | Existing Hospital Main Lobby | Medical Office Building | Closed Hospital | Rehabilitation Hospital | Skilled Nursing Facility | LTAC Hospital | Home Care | Ambulatory Surgical Center |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Convert Room/Space to Negative Pressure or Directional Airflow** | Verify operation if any of HVAC systems | Extend ventilation systems | Verify Directional Airflow / Convert Return air systems to Exhaust | Verify Directional Airflow / Convert Return air systems to Exhaust | Verify Directional Airflow / Convert Return air systems to Exhaust | Verify Directional Airflow / Convert Return air systems to Exhaust | Verify Directional Airflow / Convert Return air systems to Exhaust/Verify toilet exhaust systems | Relax positive pressurization / Convert Return air systems to Exhaust | Convert Return to Exhaust in Exam Rms | Verify operation if any of HVAC systems | Verify Directional Airflow / Convert Return air systems to Exhaust | Verify Patient Toilet Exhaust operation / Verify PTAC operation | Verify Patient Toilet Exhaust operation / Verify PTAC operation | N/A | Convert Return to Exhaust in PACU / set up OR's negative for wards |
| **Modular Dividers (Reusable walls i.e., DIRT, STARC, Edgeguard, etc.)** | N/A | POSSIBLE | N/A | N/A | ADD | ADD | N/A | POSSIBLE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **Medical gases** | N/A | ADD | N/A | N/A | ADD | ADD | ADD | ADD | ADD | ADD/TEST | N/A | N/A | N/A | ADD | N/A |
| **Electrical** | TEST | ADD | N/A | N/A | ADD | ADD EMERGENCY | ADD EMERGENCY | ADD EMERGENCY | POSSIBLE | TEST | POSSIBLE | POSSIBLE | N/A | ADD | N/A |
| **Video Streaming Device/Monitoring device (i.e., nicuview or something more low tech like a baby monitor or "RING" device)** | ADD | ADD | N/A | N/A | ADD | ADD | ADD | ADD | ADD | ADD | ADD | ADD | N/A | ADD | N/A |
| **Internet Connection** | POSSIBLE | ADD | N/A | N/A | N/A | N/A | N/A | ADD | N/A | ADD | N/A | N/A | N/A | ADD | N/A |

**HAIO - Designing for Surge Capacity**

# Hotels + Dorms
## for Post Acute Care

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Randy Keiser, Turner Healthcare
Paul Kondrat, CannonDesign
Sarah Markovitz, NBBJ
Jeff Saad, Gensler
Matthew Tharp, Gensler
Dan Quinn, Colliers Project Leaders
Evan Wyner, Colliers Project Leaders

# Site Evaluation
## for Post Acute Care

### CORE CONSIDERATIONS

1. **Agility to Respond to COVID Surge**
   *Speed to market | Capacity | Pathway for Stretcher*
2. **Infectious Disease Control**
   *Ventilation | Staff support areas*
3. **Part of an Integrated Continuum of Care**
   *Location | Connectivity | Host Caregivers*
4. **Ability to Support Broader Care**
   *Oxygen Tubes | Generator | Food Facilities | Laundry | Loading Dock | Parking*

Site

## Hotel-Dorm

| | Categories | Points | Points |
|---|---|---|---|
| 1 | Days to Patient Ready | 2 | < 7 days = 2<br>< 21 days = 1<br>> 21 days = 0 |
| | Capacity (consider ability to put 2 beds in large rooms) | 2 | > 200 people = 2<br>> 75 people = 1<br>< 75 people = 0 |
| | Ease of Pathway for a stretcher from ambulance to room (Elevator with dimensions to move patient on stretcher) | 1 | accessible = 2<br>not accessible = 0 |
| 2 | Individual Heating and Cooling Units | 1 | yes = 1<br>no = 0 |
| | Central exhaust (attention to distance between discharge and intake) | 1 | yes = 1<br>no = 0 |
| | Private Restrooms | 2 | individual restrooms = 2<br>shared restrooms < 2 patients= 1<br>shared restrooms > 2 patients = 0 |
| | Access to handwashing and support space for staff beyond patient toilet rooms (wide corridors/use of room by elevator) | 1 | yes = 1<br>no = 0 |
| 3 | Adjacency to Acute Care Hospital/Screening | 1 | < 10 Mi = 1<br>> 10 Mi = 0 |
| | Robust WiFi | 1 | yes = 1<br>no = 0 |
| | Ability to host caregivers | 1 | yes = 1<br>no = 0 |
| 4 | Ease of running oxygen tubes into rooms | 1 | yes = 1<br>no = 0 |
| | Emergency generator | 2 | able to keep facility operational = 2<br>life-safety and smoke control= 1<br>not available = 0 |
| | Food facilities | 1 | yes = 1<br>no = 0 |
| | Laundry | 1 | yes = 1<br>no = 0 |
| | Loading dock | 1 | yes = 1<br>no = 0 |
| | Parking lot | 1 | yes = 1<br>no = 0 |
| | Total | **20** | Max **20** |

# Conversion Checklist

## for Post Acute Care

### CORE CONSIDERATIONS

1. **Mold/Hazmat**
2. **Ventilation**
3. **Contact Surfaces**
4. **Protect Care Team**
5. **Double Occupancy**

| By Construction Manager | Post-Acute COVID Care |
|---|---|
| Mold/Haz Mat Removal or Containment | ☐ |
| HVAC - direct exhaust room units | ☐ |
| HEPA filtering | ☐ |
| Create negative in pressure room by optimizing existing exhaust system (to try to get to 0.01) | ☐ |
| Ensure air discharge is far enough from the intake | ☐ |
| Protect building duct system from contamination | ☐ |
| Zip wall | ☐ |
| Disengage locks of room doors | ☐ |
| Install carpet protector over existing carpet | ☐ |
| Emergency Back-up and Power | ☐ |
| Verify Electrical Outlets | ☐ |
| Install wireless nurse call + camera | ☐ |
| Install O2 temporary piping system | ☐ |
| Segregate staff area on each floor, if possible add sinks in the corridor or use first room by elevator as staff support are for donning and doffing | ☐ |
| Install cleanable Partitions/Plastic to subdivide multiple occupancy rooms (18" below ceiling) | ☐ |

| By Hotel | Post-Acute COVID Care |
|---|---|
| Hotel Bed (with medical linen) | ☐ |
| Hotel Chair | ☐ |
| Hotel Desk | ☐ |
| Hotel Wardrobe | ☐ |
| Hotel Plumbing Fixtures | ☐ |

| By Others (Hospital) | Post-Acute COVID Care |
|---|---|
| Ventilator | ☐ |
| Telemetry/Pump on IV Stand | ☐ |
| Stool | ☐ |
| Over bed table | ☐ |
| Mobile Workstation | ☐ |
| Linen Hamper | ☐ |
| Sharps/Gloves | ☐ |
| Hand Sanitizer Station | ☐ |
| Infectious Waste | ☐ |
| Portable Med Gases | ☐ |
| Use of Concentrator for O2 | ☐ |

# Space Conversion Diagram
## for Post Acute Care

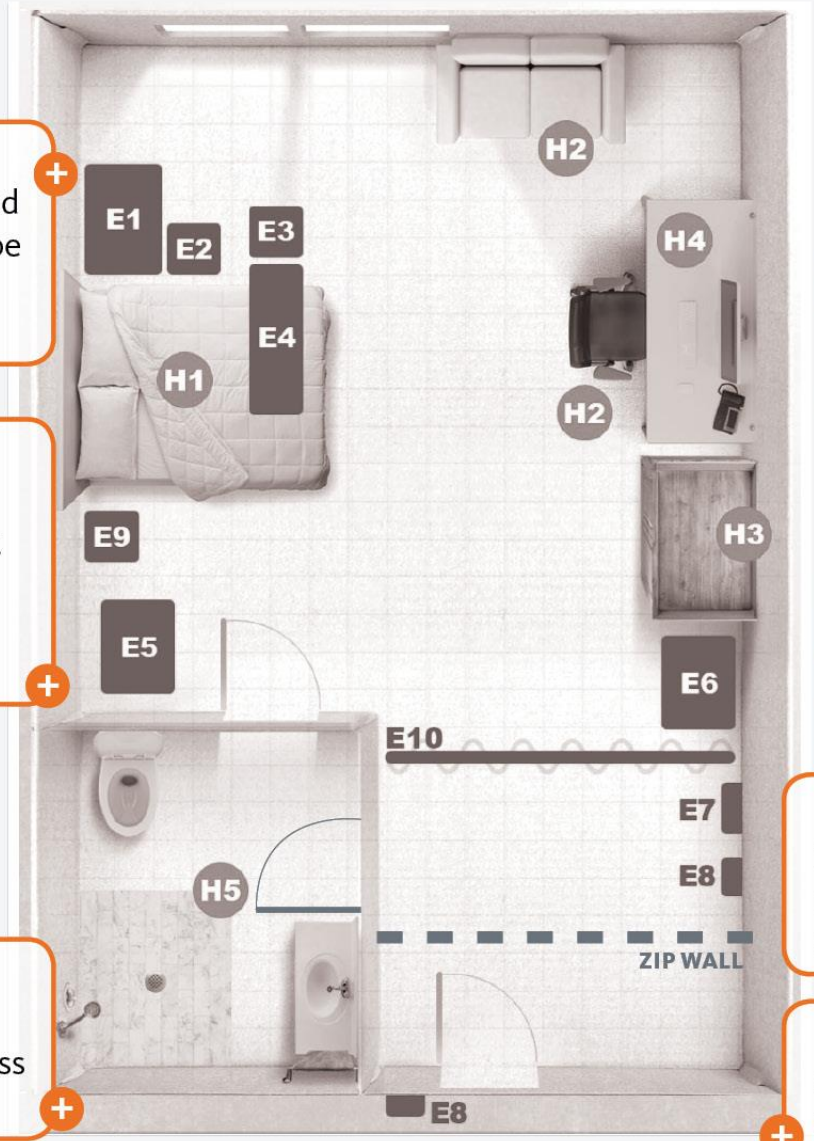
**HOTEL ROOM | CORE CONSIDERATIONS**

1. **Mold/Hazmat**
2. **Ventilation**
   *Negative Pressure / HEPA filtering / Explore direct room exhaust*
3. **Contact Surfaces**
   *Disengage door lock*
4. **Protect Care Team**
   *Add sinks and area for donning and doffing in corridor/room by elevator*
5. **Double Occupancy**
   *Install cleanable partitions/plastic to subdivide rooms*

Instead of removing carpet, we recommend carpet protectors to be installed for agility

Restroom door is often located in proximity to the front door, potentially posing challenges for placement of zip wall

Disengage door lock to minimize surface contact. Install wireless nurse call + camera.




*Source: USACE hotel room to healthcare room diagram*

*USACE KEY*

**HOTEL PROVIDED**
H1 HOTEL BED
H2 HOTEL CHAIR
H3 HOTEL DESK
H4 HOTEL WARDROBE
H5 HOTEL PLUMBING FIXTURES

**ENGINEERING CHANGES**
1 REMOVE CARPET
2 INSTALL VINYL FLOORING OR EPOXY
3 REVISE HVAC DUCTING AND HEPA FILTERING
4 ADD EMERGENCY BACK-UP POWER & UPS
5 ADD ELECTRICAL OUTLETS
6 ADD PRIVACY CURTAIN

**SPECIAL MEDICAL EQUIPMENT**
E1 VENTILATOR
E2 TELEMETRY/PUMP ON IV STAND
E3 STOOL
E4 OVER BED TABLE
E5 MOBILE WORK STATION
E6 LINEN HAMPER
E7 SHARPS/GLOVES
E8 HAND SANITIZER STATION
E9 INFECTIOUS WASTE
E10 PRIVACY CURTAIN

E10: Privacy curtain is best avoided for mitigation of infectious disease contamination.

E8: Beyond hand sanitizers, install sinks for staff in corridor or room by elevator

# Space Conversion Diagram

## for Post Acute Care

**HOTEL TYPICAL FLOOR PLATE | CORE CONSIDERATIONS**

Dedicate room(s) by elevator for staff and materials.

Explore possibility for O2 tubing from the exterior of building


If possible add sinks in the corridor or in existing janitorial closets with mop sinks

Ensure elevators have dimensions to accommodate stretchers

Explore possibility for direct exhaust room units

*Source: USACE hotel room to healthcare room diagram*

# Space Conversion Diagram

## for Post Acute Care

**HOTEL GROUND FLOOR PLATE** | CORE CONSIDERATIONS

Dedicate room(s) by elevator for staff and materials.

Explore possibility for O2 tubing from the exterior of building


*Source: USACE hotel room to healthcare room diagram*

If possible add sinks in existing janitorial closets with mop sinks

Ensure elevators have dimensions to accommodate stretchers

Explore possibility for direct exhaust room units

# Space Conversion Diagram
## for Post Acute Care

**DORM ROOM | CORE CONSIDERATIONS**

1. **Mold/Hazmat**

2. **Ventilation**
   *Negative Pressure / HEPA filtering / Explore direct room exhaust*

3. **Contact Surfaces**
   *Disengage door lock*

4. **Protect Care Team**
   *Add sinks and area for donning and doffing in corridor/room by elevator*

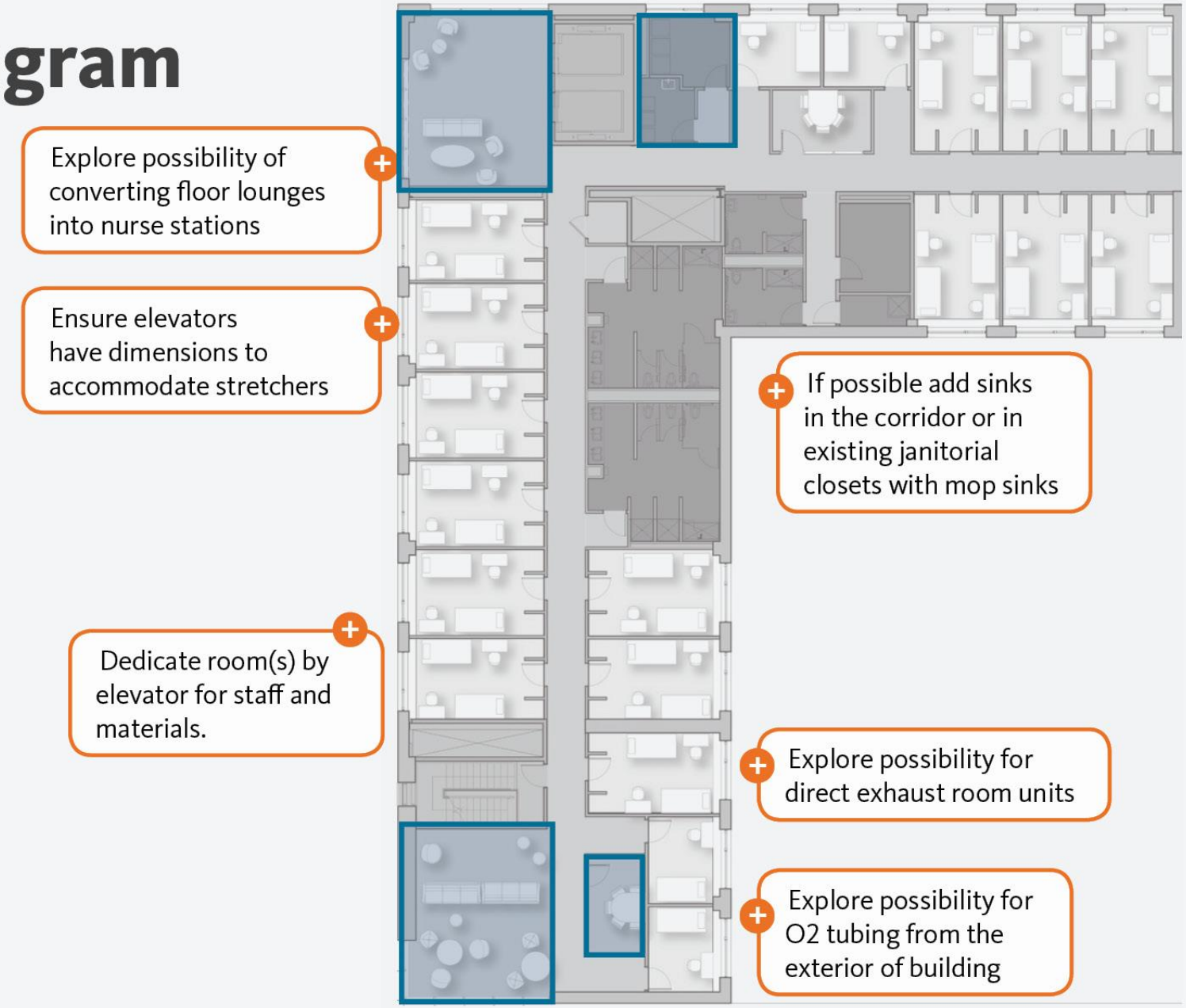
5. **Double Occupancy**
   *Install cleanable partitions/plastic to subdivide rooms*

# Space Conversion Diagram

## for Post Acute Care

**DORM FLOOR PLATE | CORE CONSIDERATIONS**

1. **Mold/Hazmat**
2. **Ventilation**
3. **Contact Surfaces**
4. **Protect Care Team**
5. **Double Occupancy**



**HAIO - Designing for Surge Capacity**

# Convention Centers & Arenas
## for Post Acute Care

Ron Gorham, Perkins & Will (sub-committee chair)
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Randy Kaiser, Turner Healthcare
Tim King, Creative Office Pavilion
Paul Kondrat, CannonDesign
Cindy Lee, CannonDesign
Michael Lorimer, Arup
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Danielle Santos, Lavallee Brensinger Arch
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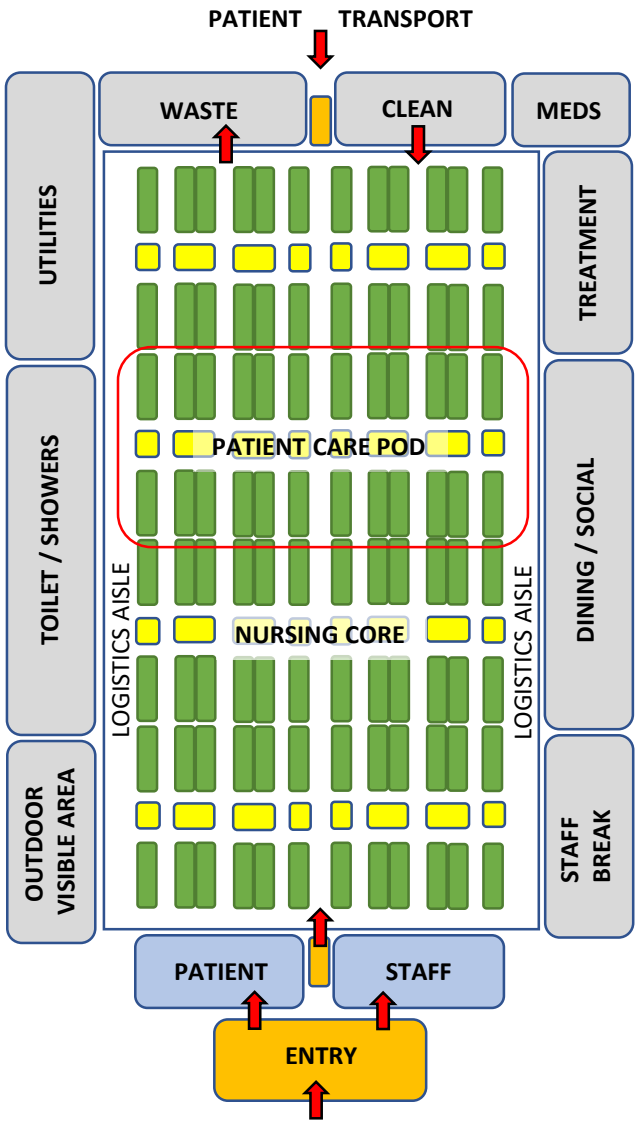
Evan Wyner, Colliers Project Leaders
Bobbe Young, HED

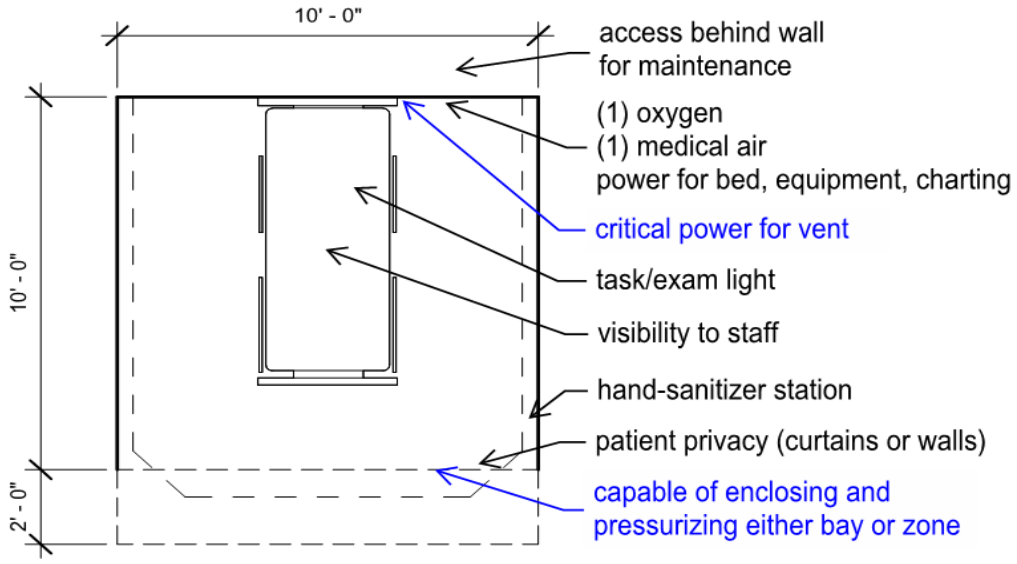
# SPACE CONVERSION PROGRAM

PROGRAM YOUR SITE TO ACCOMMODATE POST-ACUTE CARE




SAMPLE PROGRAM DIAGRAM

## Patient Care Bays




Consider clusters to allow for reduced travel distances, sight line to staff, possible one-way flow or isolated zones for staff, patient, and logistics.

COVID-19 patients: zoned for patient isolation

## Patient Support

- ❑ Nurse / Staff Station
- ❑ Patient Showers
- ❑ Toilets / ADA
- ❑ Handwash Stations
- ❑ Sanitizing Stations
- ❑ Equipment Storage
- ❑ Clean Supplies
- ❑ Soiled Area

## Staff Support

- ❑ Lockers / Changing Rooms
- ❑ Toilet / Shower
- ❑ Staff Respite Area
- ❑ Telemedicine

## Logistics

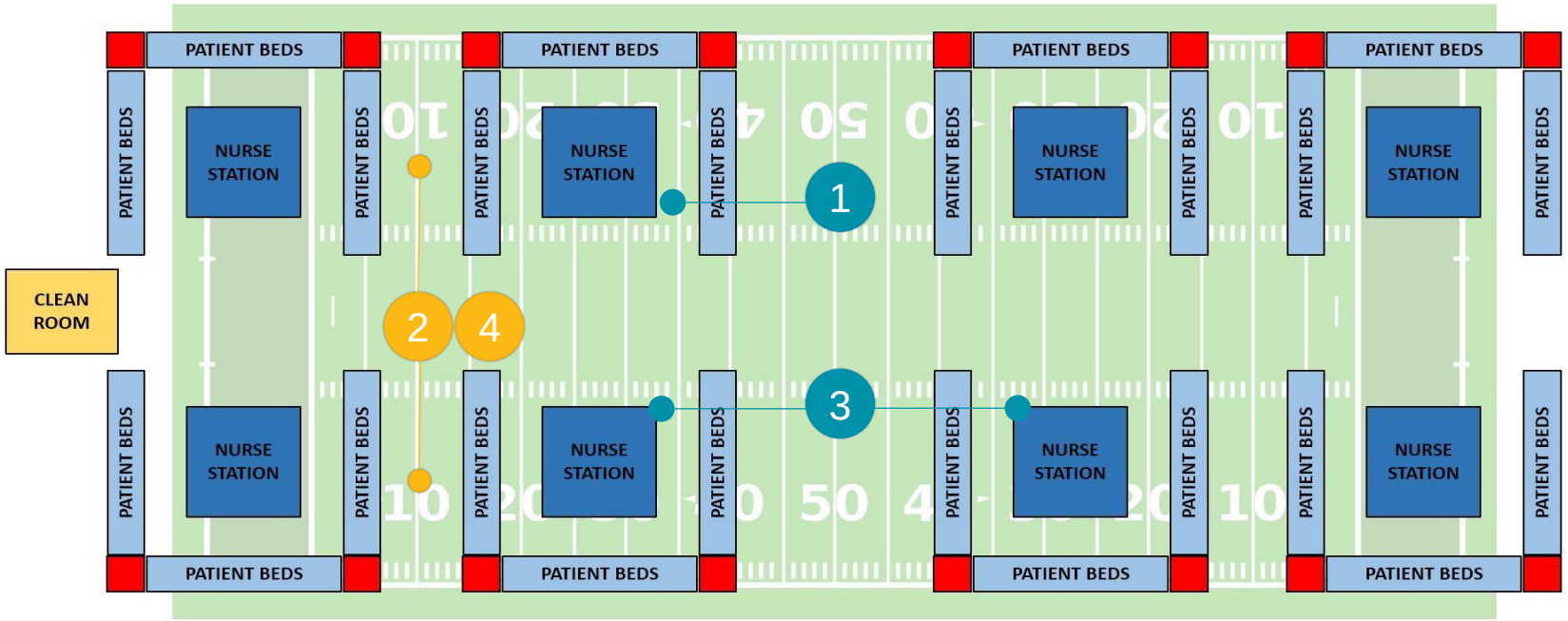
- ❑ Pharmacy / Meds
- ❑ Treatment Area(s)
- ❑ EVS Supplies
- ❑ Ambulance Area
- ❑ Mobile Trailer Parking
- ❑ Waste Management
- ❑ Materials Management
- ❑ Dining / Social
- ❑ Infrastructure – IT, Power, Med Gas, etc.

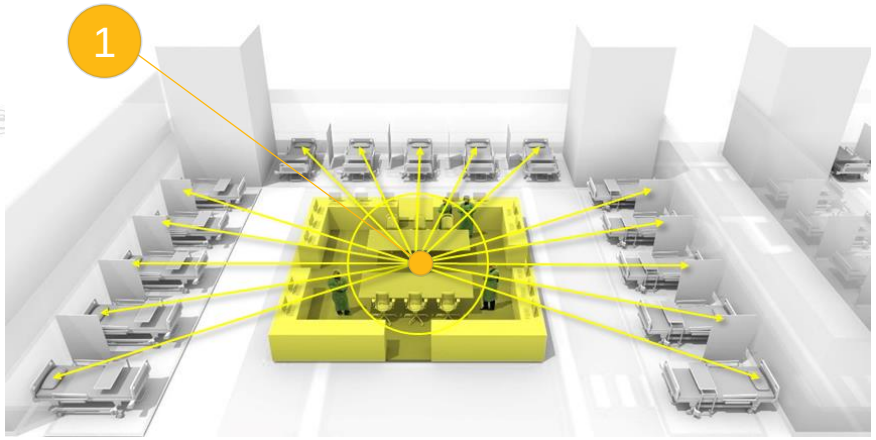
## Entry / Screening

- ❑ Screening stations
- ❑ Testing
- ❑ PPE Station
- ❑ Handwash / sanitizing station

# SPACE CONVERSION PLAN

## SAMPLE PLAN - FOOTBALL ARENA





### Patient Care Zone

1. **POD:** 3 sides x 5 bays = 15 bays ea.
2. Multiple Pods / Designate Zones
3. **Flexible / Scalable**
4. Adaptable to most large open space

### Patient / Staff Support

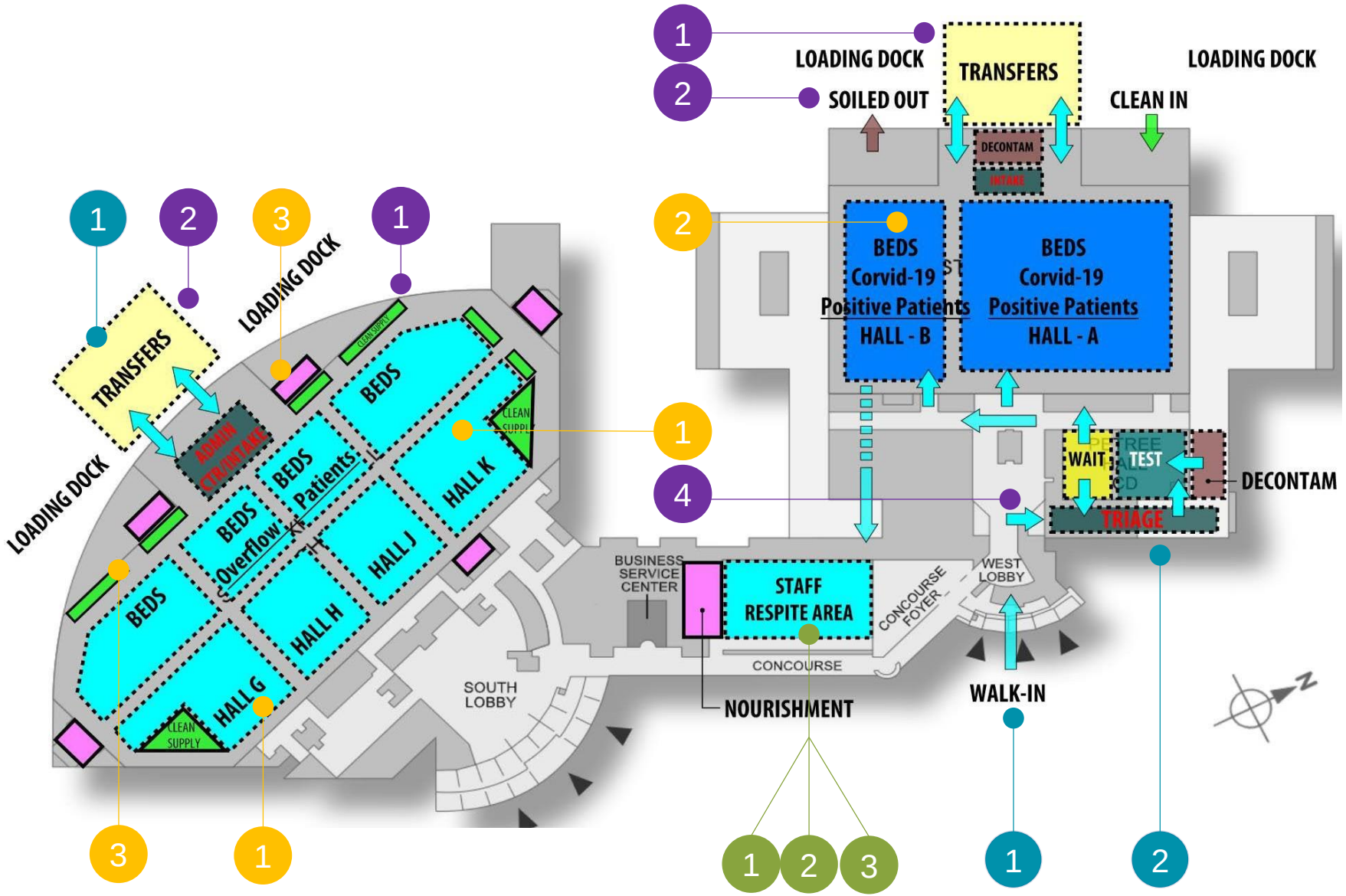
1. **Visibility** – Nurse to Patient
2. **On Stage / Off Stage** Capable
3. Optimized Clinical Operation
4. **Equipment Storage / PPE**

### Modular / Prefabrication

1. **Unitized Headwall / Wall Panels**
2. **Freestanding Mechanical Units**
3. **PRIORITY: SPEED TO MARKET**

# SPACE CONVERSION DIAGRAM

## SAMPLE PLAN – LARGE CONVENTION CENTER




## Entry / Screening

1. Segregated / Secured
2. Triage / Screening Capable
3. Decon (Optional)

## Patient Care Area

1. Non COVID
2. COVID 19 Positive
3. Patient Support

## Staff Support

1. Dining
2. Lockers
3. Touch Down Space

## Logistics

1. Materials / Waste Management
2. Ambulance
3. Pharmacy
4. One-way flow

# SPACE CONVERSION DIAGRAM

## SAMPLE PLAN – LARGE CONVENTION CENTER


### Patient Care Zone

1. Patient Care Bays - Density
2. Multiple Pods / Designated zones
3. Flexible / Scalable
4. Adaptable to large open space

### Patient / Staff Support

1. Visibility – Nurse to Patient
2. On Stage / Off Stage
3. Equipment Storage / PPE
4. Dining / Social

### Modular / Prefabrication

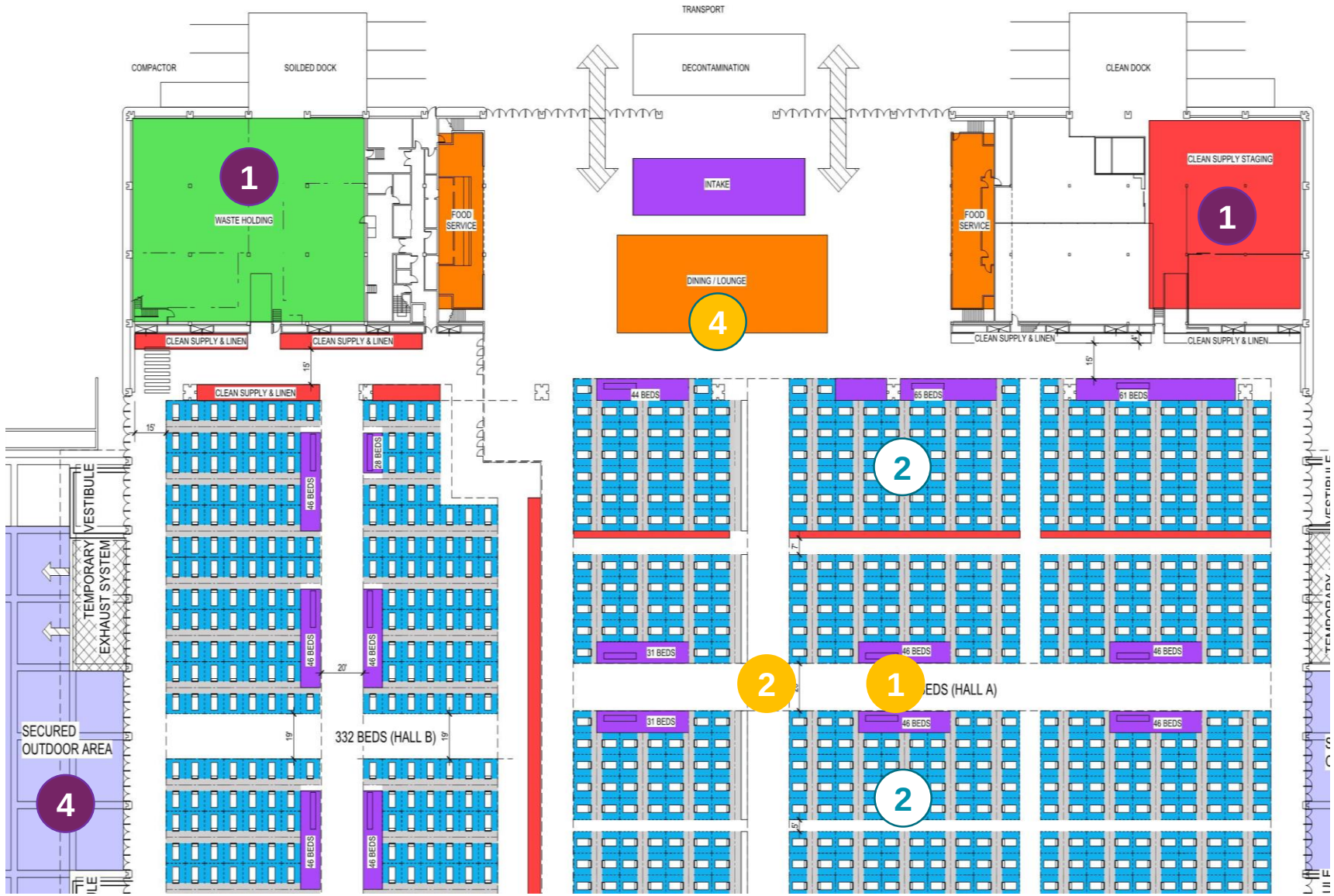
1. Unitized Headwall / Wall Panels
2. Freestanding Mechanical Units
3. PRIORITIZE: SPEED TO MARKET

### Logistics

1. Materials / Waste Management
2. Ambulance
3. Pharmacy
4. One Way Flow

# SPACE CONVERSION DIAGRAM

## SAMPLE PLAN – LARGE CONVENTION CENTER




## Patient Care Zone

1. Patient Care Bays - Density
2. Multiple Pods / Designated zones
3. Flexible / Scalable
4. Adaptable to large open space

## Patient / Staff Support

1. Visibility – Nurse to Patient
2. On Stage / Off Stage
3. Equipment Storage / PPE
4. Dining / Social

## Modular / Prefabrication

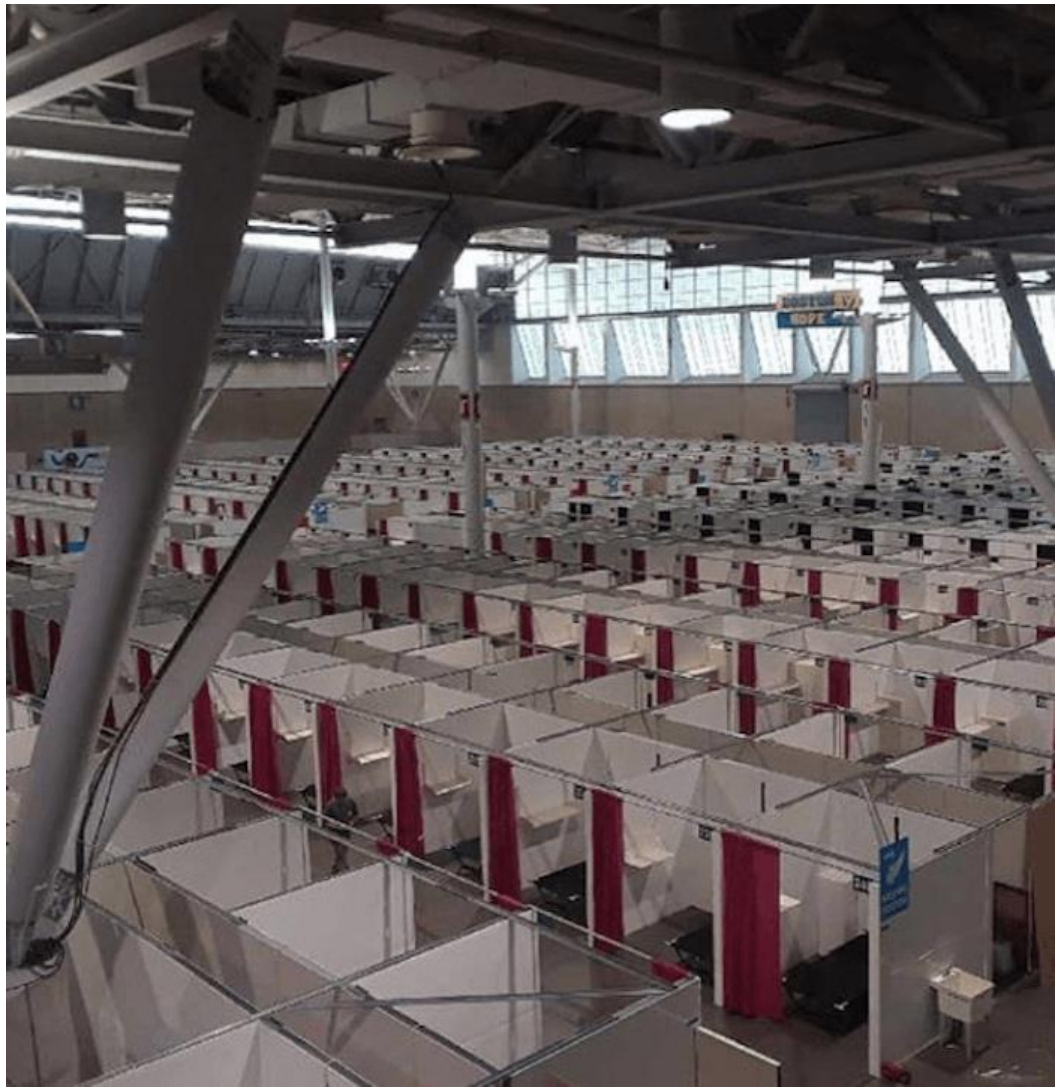
1. Unitized Headwall / Wall Panels
2. Freestanding Mechanical Units
3. PRIORITIZE: SPEED TO MARKET

## Logistics

1. Materials / Waste Management
2. Ambulance
3. Pharmacy
4. One Way Flow

# SPACE CONVERSION DIAGRAM

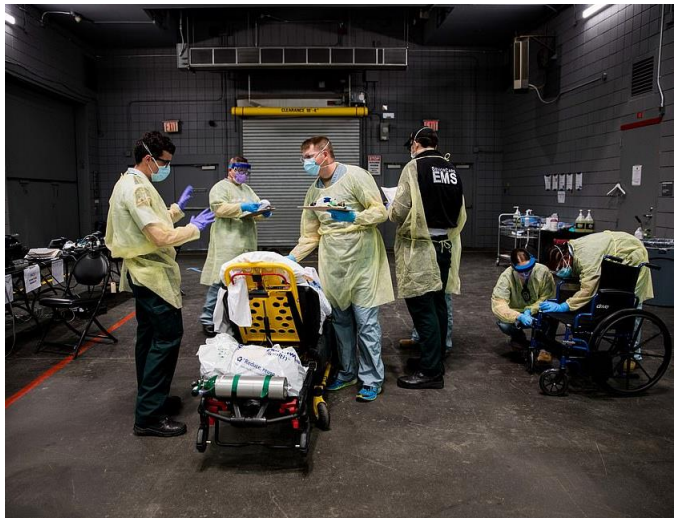
## SAMPLE IMAGES – LARGE CONVENTION CENTER



Boston Convention and Expo Center – Patient Bays

Javit Center- NYC: Patient Bay


Denver Health MC – Material Supply




Javit Center – NYC: Logistic Area


Denver Health MC – Pharmacy

**HAIO - Designing for Surge Capacity**

# Modular Solutions + Tents

## for Post Acute Care

Candice Barter, HGA (sub-committee chair)
William Angelosanto, Wise Construction
Richard Barnett, Colliers Project Leaders
Win Brown, Heywood Hospital
Andrew Brumbach, SmithGroup
Matthew Cotton, SmithGroup
Silvia Cuervo-Cortazar, NBBJ
Doug Erickson, FGI
David Fennell, CannonDesign
Tim King, Creative Office Pavilion
Paul Kondrat, CannonDesign
Cindy Lee, CannonDesign
Inga Lenova, CannonDesign
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Jocelyn Lum Frederick, HC Tangram Design LLC
Anna Mancini, HGA
Sarah Markovitz, NBBJ
Kevin Neumann, E4H Architecture
Rhonda Paradis, Suffolk
Daniel Quinn, Colliers Project Leaders
Andrew Quirk, Suffolk
Harry Shanley, CannonDesign
Amy Sowersby, Turner Healthcare
Jimmy Su, Arup
Dale Taglienti, E4H Architecture Evan Wyner, Colliers Project Leaders
Bobbe Young, HED

# SITE APPROPRIATENESS

PRIORITIZING SELECTION AND EVALUATION FOR ADDITIONAL PATIENT CARE CAPACITY

**SITE LOCATION**

**Address:**

**Owner:**

BED ACUITY

POTENTIAL LOCATIONS WITHIN SYSTEM

| | Within Institution | | | | | | Within System or PSA | | | | | Outdoor, within 1 mile | | | Indoor, within 1 mile | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Convert private to semi | Recovery/holding areas | Former nursing units | Cafeteria/Dining | Conference areas | Clinics | Shuttered Hospital | Rehab Facility | Ambulatory Surgery Center | Dialysis/Infusion Centers | Clinics | Parking Lot | Parking Garage (flat plate) | Park or Grassy Field | Other | Arena | School | Hotel Meeting Space | Warehouse | Vacant Retail | Other |
| **PROPOSED ADDITIONAL BED NEED PRIORITY** | | | | | | | | | | | | | | | | | | | | | |
| **Type & Additional Need** | | | | | | | | | | | | | | | | | | | | | |
| Critical Care | | | | | | | | | | | | | | | | | | | | | |
| < 12 | | | | | | | | | | | | | | | | | | | | | |
| < 36 | | | | | | | | | | | | | | | | | | | | | |
| +36 | | | | | | | | | | | | | | | | | | | | | |
| Intermediate Care | | | | | | | | | | | | | | | | | | | | | |
| < 12 | | | | | | | | | | | | | | | | | | | | | |
| < 36 | | | | | | | | | | | | | | | | | | | | | |
| +36 | | | | | | | | | | | | | | | | | | | | | |
| Med/Surg | | | | | | | | | | | | | | | | | | | | | |
| < 12 | | | | | | | | | | | | | | | | | | | | | |
| < 36 | | | | | | | | | | | | | | | | | | | | | |
| +36 | | | | | | | | | | | | | | | | | | | | | |
| Post Acute | | | | | | | | | | | | | | | | | | | | | |
| < 12 | | | | | | | | | | | | | | | | | | | | | |
| < 36 | | | | | | | | | | | | | | | | | | | | | |
| +36 | | | | | | | | | | | | | | | | | | | | | |
| **ABILITY TO CONVERT, EQUIP, STAFF** | | | | | | | | | | | | | | | | | | | | | |
| **Time Frame** | | | | | | | | | | | | | | | | | | | | | |
| Immediate | | | | | | | | | | | | | | | | | | | | | |
| < 2 weeks | | | | | | | | | | | | | | | | | | | | | |
| < 4 weeks | | | | | | | | | | | | | | | | | | | | | |

**Checklist for an institution which is starting to address a surge.**

**Consider as a system** – similarly to what BIDMC is doing, shifting volume to New England Baptist that has additional capacity.

This checklist can be combined with similar assessment tools being prepared by the other subcommittee.

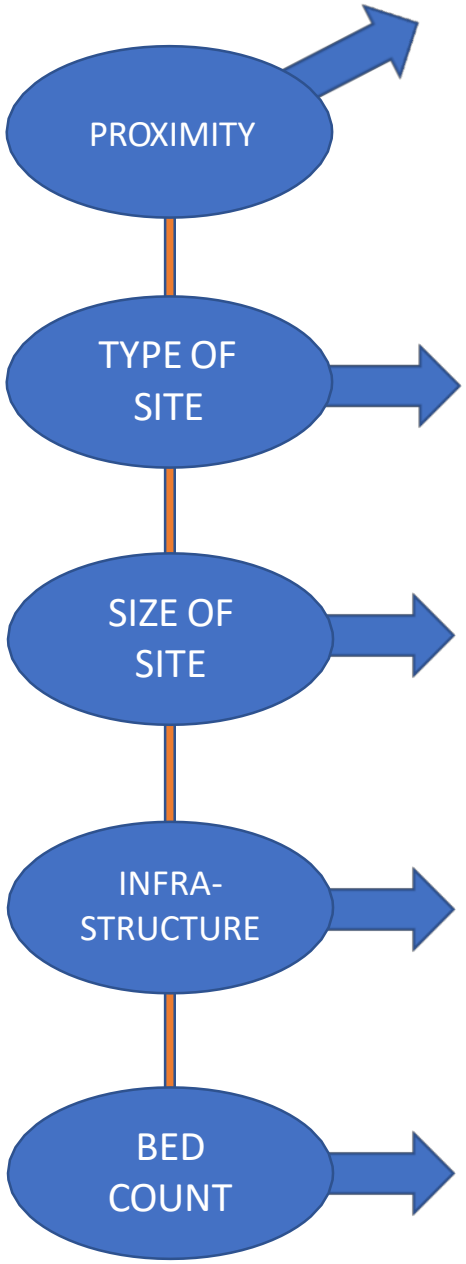
# SITE APPROPRIATENESS

SELECTION AND EVALUATION OF SITE FOR POST ACUTE CARE

**Checklist for Site Evaluation**

1. **Locate potential site**
2. **Evaluate**
3. **Score**
4. **Determine Bed Count**

.




| | | | | | |
|---|---|---|---|---|---|
| **SITE LOCATION** | | | | | |
| | Address: | | | | |
| | Owner: | | | | |
| **LOCATION** | | | | SCORE | COMMENTS |
| | Proximity | | | | |
| | | Within 1 mile of Medical Center | x | | |
| | | Within 5 miles of Medical Center | | | |
| | | Within 10 miles of Medical Center | | | |
| **TYPE OF SITE** | | | | | |
| | Outdoor | | | | |
| | | Parking Lot | x | | |
| | | Parking Garage (flat plate) | | | |
| | | Park or Grassy Field | | | |
| | | Other (define) | | | |
| | | | | | |
| | Weather | | | | |
| | | Winter Conditions Considerations | | | |
| | | Summer Cooling issues | | | |
| | | | | | |
| | Indoor | | | | |
| | | Arena | | | |
| | | School | | | |
| | | Convention Center | | | |
| | | Hotel Meeting Space | | | |
| | | Warehouse | | | |
| | | Vacant Retail | | | |
| | | Other (define) | | | |
| | | | | | |
| **SIZE OF SITE** | | | | | |
| | Dimensional Data | | | | |
| | | Open Clear Area | ____ ft by _____ft | | |
| | | Additonal open area | ____ ft by _____ft | | |
| | | | | | |
| **INFRASTRUCTURE AVAILABLE** | | | | | |
| | Utilities | | | | |
| | | Electric | | | |
| | | Site Lighting | | | |
| | | Sewer | | | |
| | | Water | | | |
| | | IT | | | |
| | | | | | |
| | Existing Uses available for potential use | | | | |
| | | Parking | | | |
| | | Delivery access | | | |
| | | Garage | | | |
| | | Storage | | | |
| | | Commercial Kitchen | | | |
| | | Refrigeration | | | |
| | | Toilets | | | |
| | | Staff areas | | | |
| | | Other (define) | | | |
| | | | | | |
| | Module Type | | Module size | Qty | Patient Qty |
| | | Modular type 1 | | | |
| | | Modular type 2 | | | |
| | | Tent Type 1 | | | |
| | | Tent Type 2 | | | |

# SITE ADAPTATION – MODULAR & TENT

HOW TO ADAPT YOUR SITE TO ACCOMMODATE POST-ACUTECARE

## Site Preparation

- ❑ Excavation/Fill/Slab
- ❑ Temporary Site Work & Access
- ❑ Parking

## Additional Requirements

- ❑ Food Service
- ❑ Materials Management
- ❑ Linen Supply
- ❑ Clean/Soiled Delivery

## Regulatory

- ❑ Life Safety Review/AHJ
- ❑ Waiver of DPH
- ❑ Special Permit/Oversize Load
- ❑ Temporary Permitting
- ❑ ADA/Accessibility

## Infrastructure

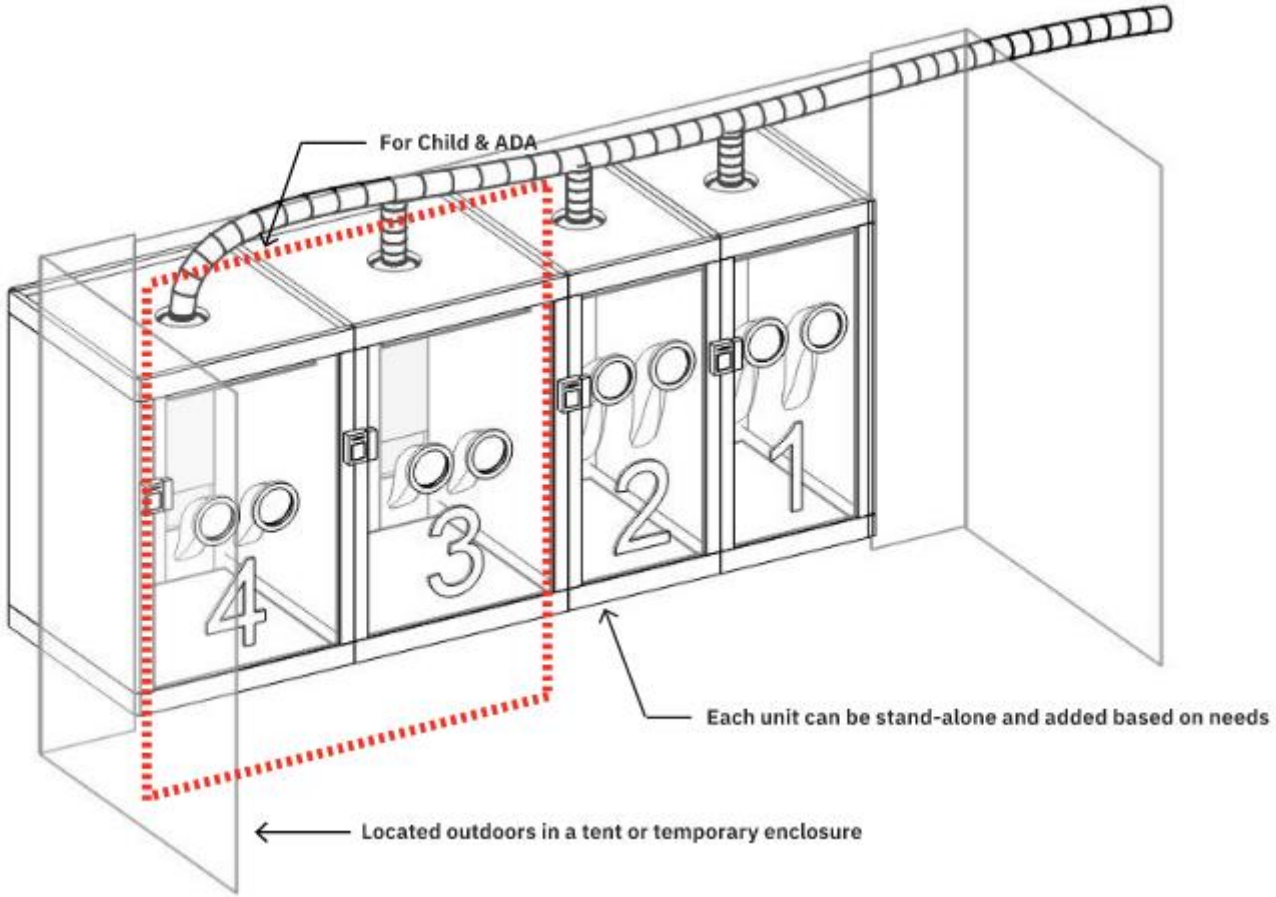
- ❑ Sanitation
- ❑ Potable Water Source
- ❑ Adequate Power
- ❑ Emergency Power/Generator
- ❑ Adequate WiFi (Firewall)
- ❑ Telephone
- ❑ Security
- ❑ HVAC (filtration, pressure)
- ❑ Med Gas access/storage

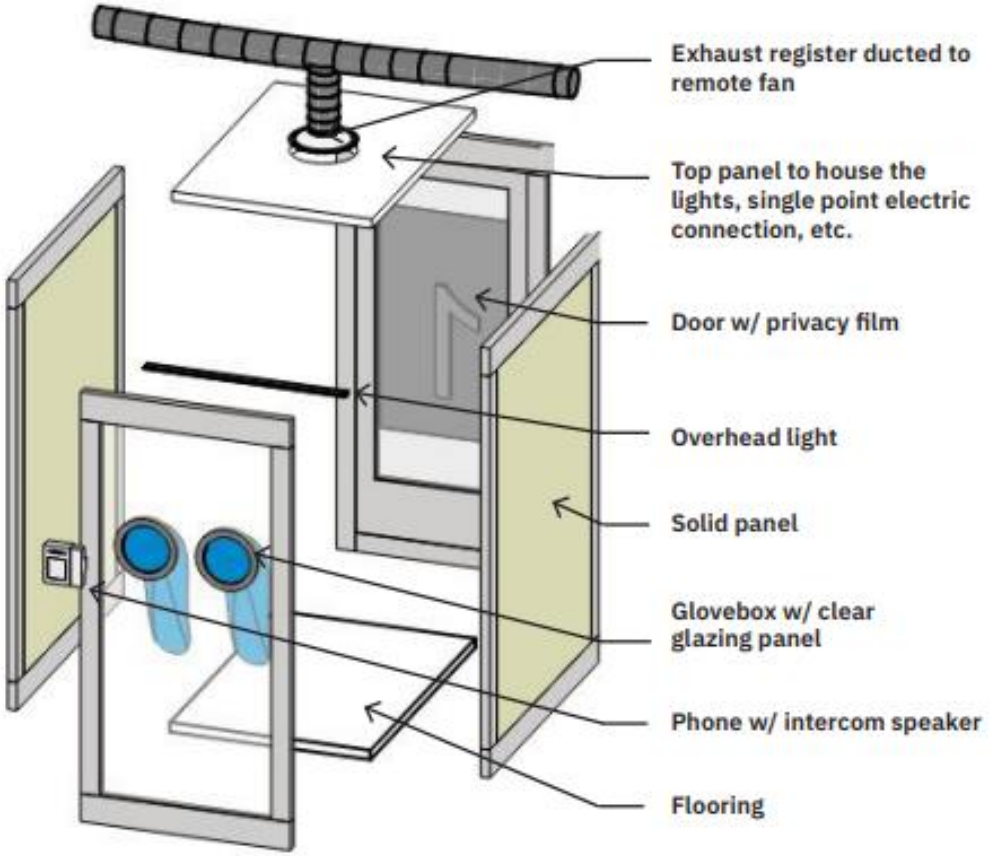
# SPACE CONVERSION DIAGRAM – TESTING BOOTH



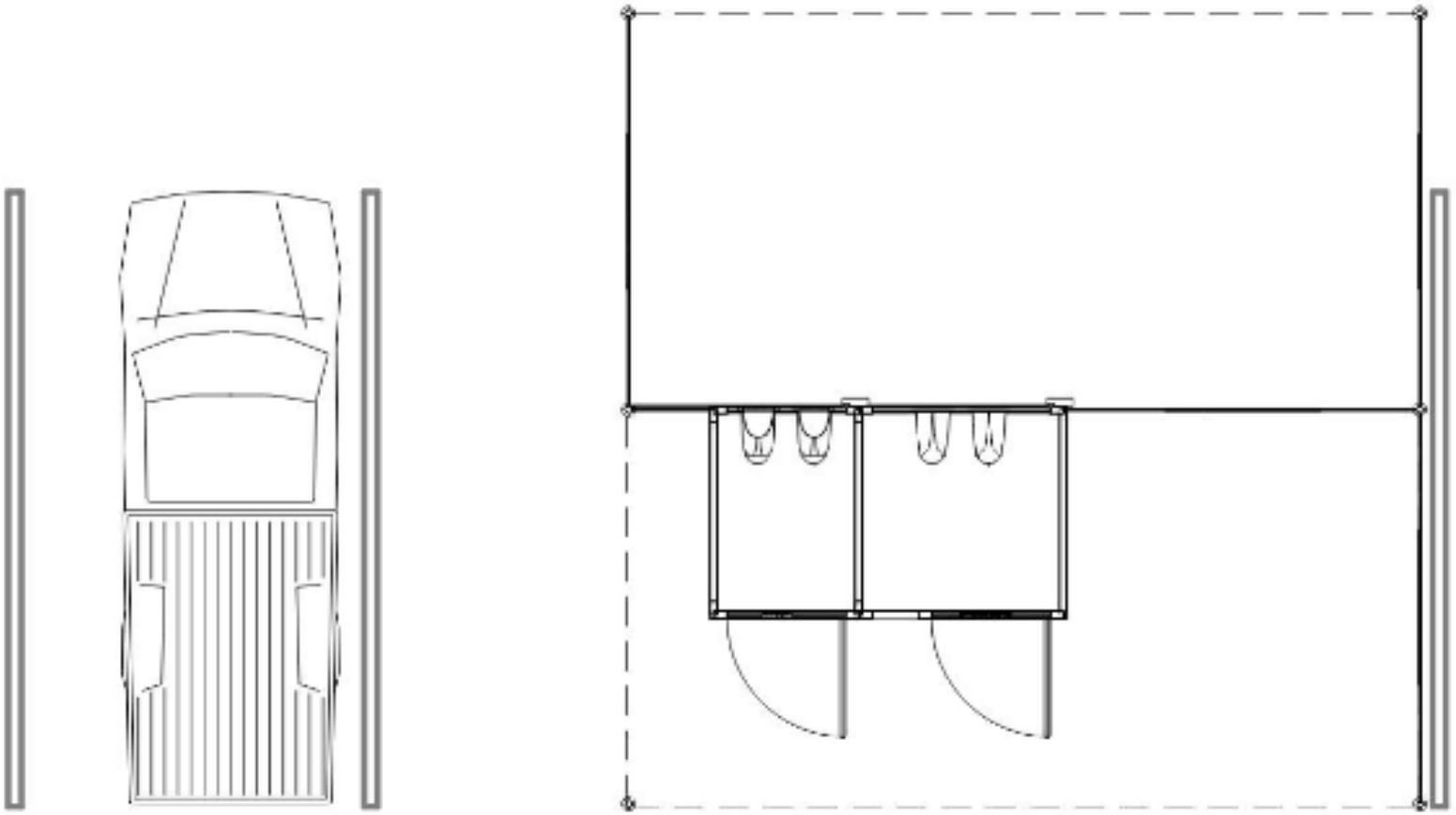
Keeping medical professionals healthy during the COVID-19 pandemic is essential in both slowing the rate of infection and meeting heightened staffing needs. Shortages of personal protective equipment (PPE) supplies make the task difficult. Walk-in testing booths eliminate physical provider-patient exposure in a modular format that can be deployed for temporary testing operations. More information is available via this link.

# SPACE CONVERSION DIAGRAM – TESTING BOOTH



# SPACE CONVERSION DIAGRAM – TESTING BOOTH



KEY PLAN - PARKING LOT CONFIGURATION



- Eliminates physical provider-patient exposure
- Minimizes PPE consumption
- Facilitates faster testing cycles without interruption
- Mobile, modular structure for temporary testing operations
- Outdoor installation with limited infrastructure needs
- Easy connection to existing building electrical source

Contact:
mbailey@cannondesign.com

# MODULAR TENT – FLEXIBLE POST ACUTE CARE


## Clinical Services Supported

1. Wide variety of configurations available, including Testing modules, hospitals from 15-200 beds
2. Lab, Imaging, Pharmacy modules
3. Surgery modules
4. Intake, Triage, Emergency modules

### Considerations

- Evaluate need for negative pressure units
- Need staff support connector to all modules
- Typical 4-week delivery time
- Set-up in 2 days or less

## Support Services Accommodated

1. Food Service/Dining modules
2. Supplies Management module
3. Bio Hazard Waste Management
4. Administrative Support

### Adaptation

- Bed units can be used for staff respite/sleeping
- Post-Acute Patients will need entertainment area and rehab space

## Infrastructure Available

1. Environmental Control Units
2. NPI Filtration
3. Potable, Grey, Black Water Bladders
4. Generators

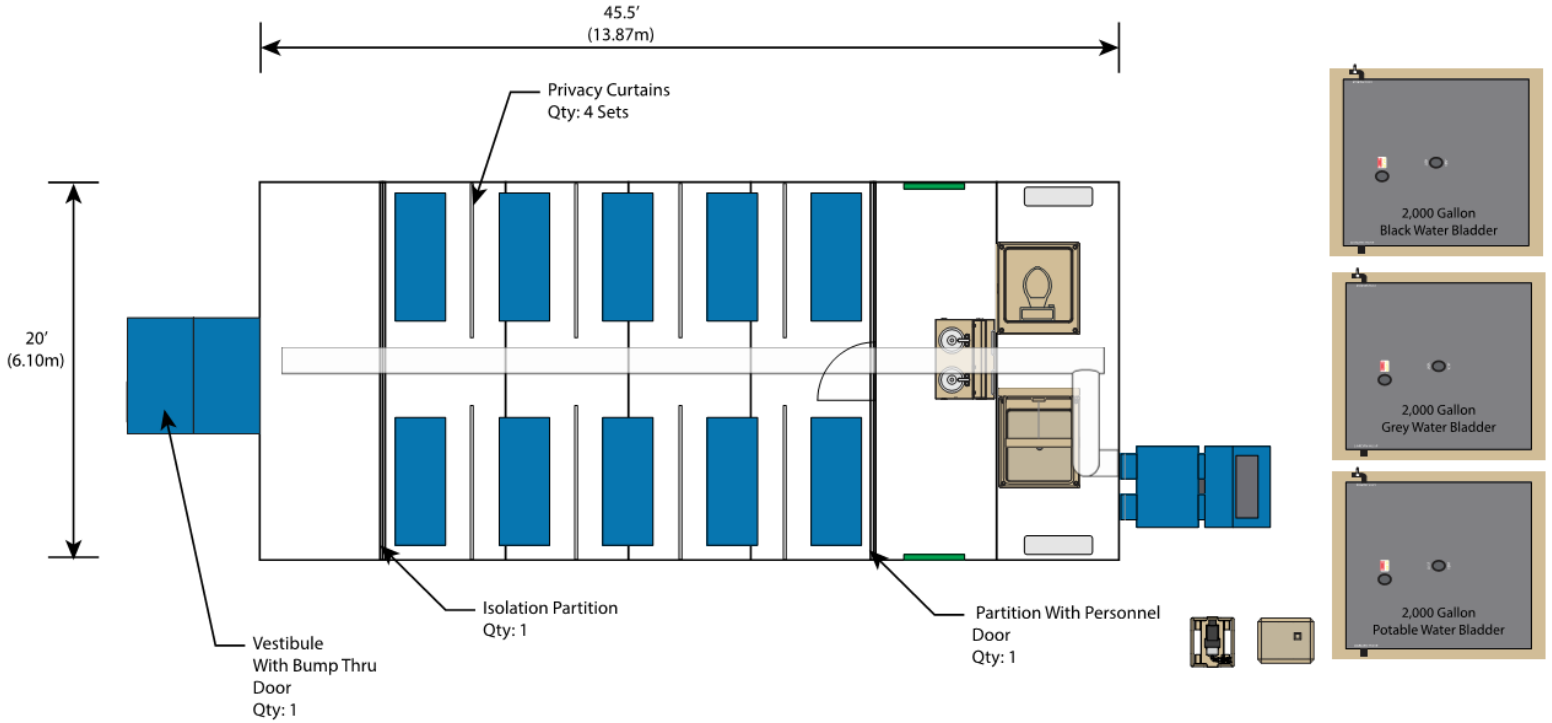
### Considerations

- 5-ton ECU typical
- Patient & staff bathing facilities require special purpose modules or adjunct support in existing facilities
- Temporary morgue facility by others

# MODULAR TENT – FLEXIBLE POST ACUTE CARE

BLUMED Response Systems

20' x 45.5' Isolation System
With Shower And Latrine
(6.10m x 13.87m)



# MODULAR TENT – FLEXIBLE POST ACUTE CARE

BLU-MED Response Systems®
*The World's Leader in Deployable Medical Facilities™*

## 12-Shelter Medical Facility with 100-Beds
## Negative Pressure / Isolation

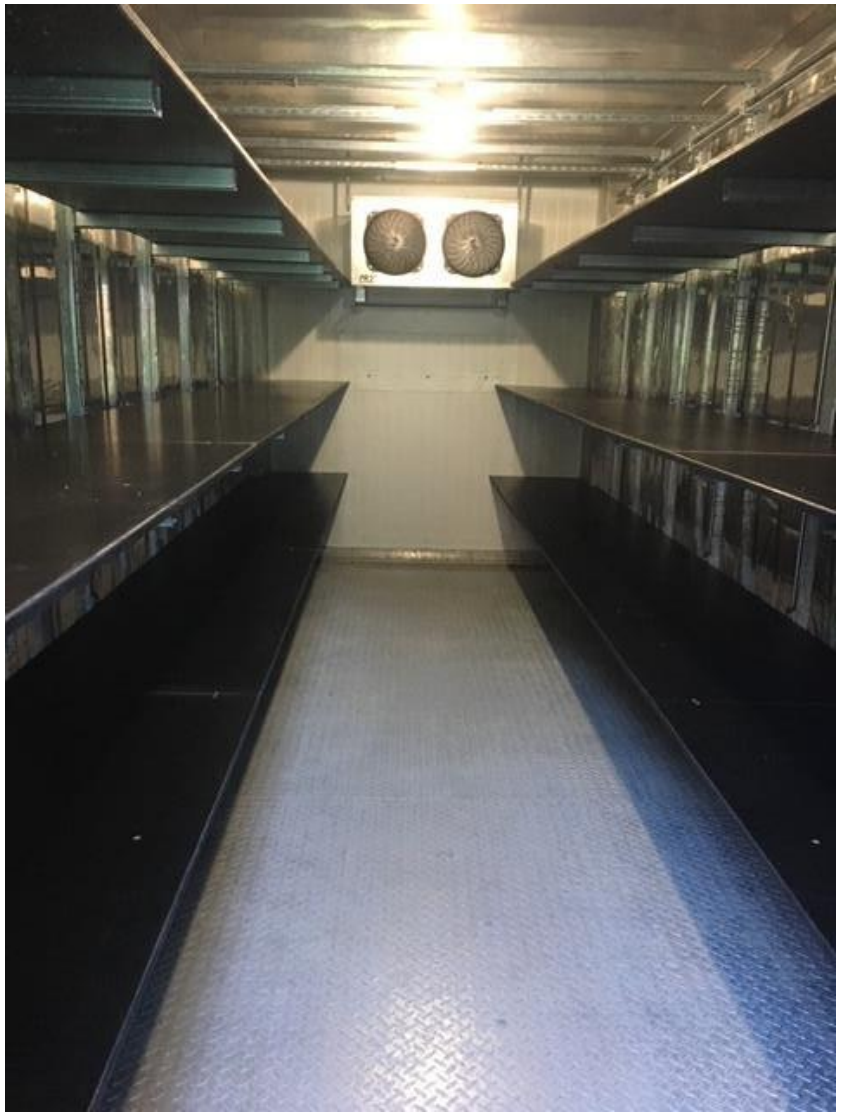
# MODULAR SOLUTIONS

## PPE Disinfection

1. Skinned the walls and floor
2. Installed eyelets on the wall
3. Cabling will be run horizontally and hold PPE for disinfecting

## Temporary Morgue

1. Reefer box (insulated trailer) rented by client
2. Outfitted with unistrut, brackets, SS platforms / shelving, flooring ramp
3. Temp refrigeration unit



# PREFABRICATED PATIENT CARE SPACES

Expert-tested in virtual reality simulation by:

- Lean Process Engineers
- Critical Care Nurse trained in COVID-19 protocols
- Hospital Environment Specialist in Infection Control

**Doffing Zone** allows removal and disposal of contaminated PPE, with hand wash prior to entering clean corridor.

**Donning Station** in alcove allows for hand washing prior to donning PPE equipment and entering room.

**Exterior windows** reduce staff stress, improve staff well-being and improve job satisfaction. Exterior window could be used for emergency contact with family.

**Fixed medical gases** provide access to ventilators, cardiac and vital monitoring and respiratory treatment at the headwall.

**The 15' wide room** orientation provides adequate space for bed transfers and portable chest x-ray.

**Viewing window and door** into patient room from the corridor reduces mortality rates.

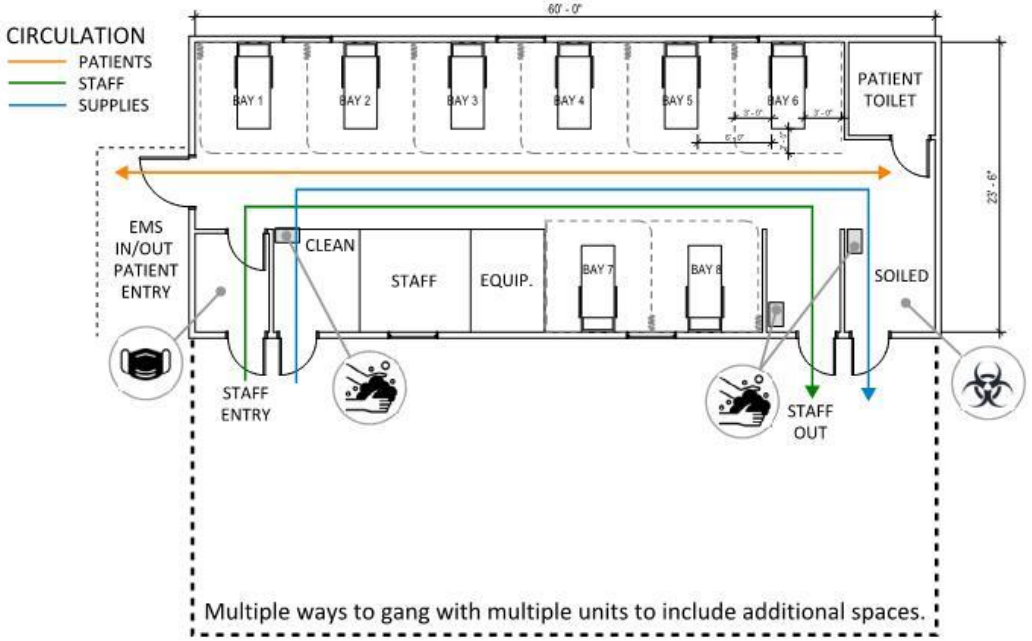
**Mobile carts** with medical supplies for direct patient care and patient charting. Supplies and additional charting alcoves are also provided outside the room in clean zone.

## Critical to Quality

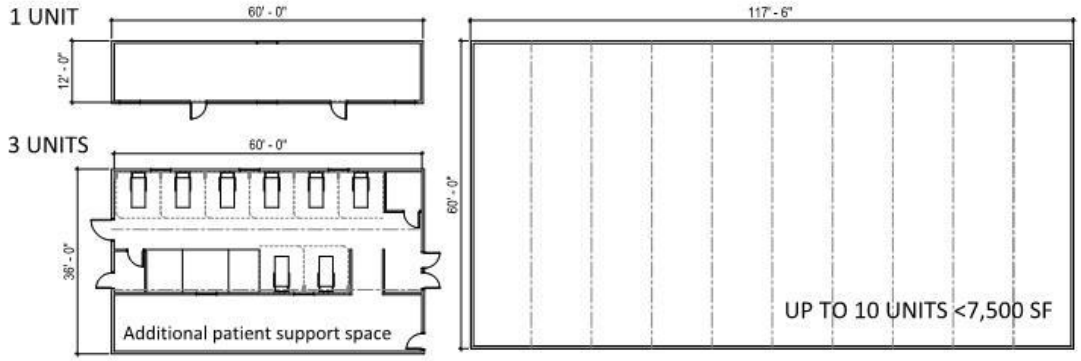
1. Exterior Window
2. Fixed Medical Gases
3. 15'-0" Wide Room
4. Donning Station
5. Doffing Zone
6. Viewing Window/Door
7. Mobile Carts

# CONSTRUCTION TRAILER CONVERSION DIAGRAM

## TYPICAL DOUBLE WIDE TRAILER




## SINGLE TRAILER




NOT TO SCALE

## Space Benefits

1. Typical size 60 ft wide. Option to gang multiple units to create larger spaces.
2. Interior flexibility to accommodate multiple layouts. Multiple openings and doors can be provided to create a one way flow.
3. Options to provide hand washing sinks, toilets and showers and other support spaces inside the unit.

## Changes recommended

1. Use of stick-build construction for the interior layouts to shorten completion date.

## Challenges

1. Require transportation permits for oversized loads. Teams will have to coordinate will local authorities.
2. Infrastructure required for MEP will vary depending on the size and location.

# CONSTRUCTION TRAILER CONVERSION

## Trailer sizes

| WILLIAMS SCOTTSMAN / Triumph / Likely Sizes | | | | | | |
|---|---|---|---|---|---|---|
| **Length** | Width | Boxes | SF | BEDS | ~~ add' space needed | TOTAL FOOTPRINT |
| **64** | 24 | 2 | 1536 | 8 | 750 | 2286 |
| **64** | 36 | 3 | 2304 | | 750 | 3054 |
| **64** | 48 | 4 | 3072 | 16 | 1000 | 4072 |
| **64** | 60 | 5 | 3840 | | 1000 | 4840 |
| **64** | 72 | 6 | 4608 | 24 | 1200 | 5808 |
| **64** | 84 | 7 | 5376 | | 1200 | 6576 |
| **64** | 96 | 8 | 6144 | 32 | 1400 | 7544 |
| **64** | 108 | 9 | 6912 | | 1400 | 8312 |
| **64** | 120 | 10 | 7680 | 40 | 1500 | 9180 |

## Power and Data considerations

1. Use of rented generators for normal and emergency power. Considerations for space and hook up.
2. Power Lines can be hooked to permanent plant or closest utility. Considerations for lines thru lot and paths)
3. Data availability using campus Wifi hotspots. Wired connection base on campus proximity.

## HVAC

1. HVAC is integral to the trailers. Additional portable units are needed to provide negative air

## Plumbing

**WATER – TOILETS** (waste holding tank or potential waste line w pumping)

1. Toilets integral to units with exterior waste holding tank. Might not be enough toilets – add porta-pottys.
2. Option to add advanced exterior portable toilet units..

**WATER – SHOWERS** (large waste holding tank or potential waste line w pumping)

1. Showers available in trailer or as an advanced exterior portable units.

**WATER SINKS**

1. Sinks integral to trailers as kitchen set up/other - piped from source or tanks
2. Portable hand washing units that can be fill/empty daily.

# CONSTRUCTION TRAILER CONVERSION

## Companies


## OTHER CONSIDERATIONS

**EXTREME WINTER CONDITIONS**

1. Water lines and tanks freezing will need specialty-constructed ideas to heat these utilities. Heating blankets, boxed enclosures, etc.
2. Porta-pottys will need some sort of temp 'hut' to heat to avoid freezing or climate discomfort for patients /staff
3. Portable shower units (exterior) may need some type of 'bridge' constructed to avoid outside travel.

**FOOD**

1. Food must use institution/facility or local food service (caterers/banquet). 3 meals a day delivered, limited rotation menu. Snacks distribution – brown bag/other.

**DUMPSTER/Trash**

1. Room for a dumpster can will be needed for flow of food and potential other wastes.

## Dissemination beyond HAIO through Healthcare Networks and Local & National Organizations

HAIO Surge Solutions Library:
Please send information to:
Haio.surgesolutions@colliers.com

## To review and download information:

https://www.dropbox.com/sh/kpx07e3dv8yymxl/AADhxvqzM_lT21hDNw485gmoa?dl=0

To Provide Feedback Please Contact:

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*A special thanks to Colliers Project Leaders who have supported the efforts of the HAIO Surge Solutions Process: Richard Barnett, Matt Dunn, Skyla Eastman, Dominic Gagnon, Stan Hunter, Matt Morrisey, Joe Naughton, Adam Troidel, Dan Quinn, Teresa Wilson, Evan Wyner*