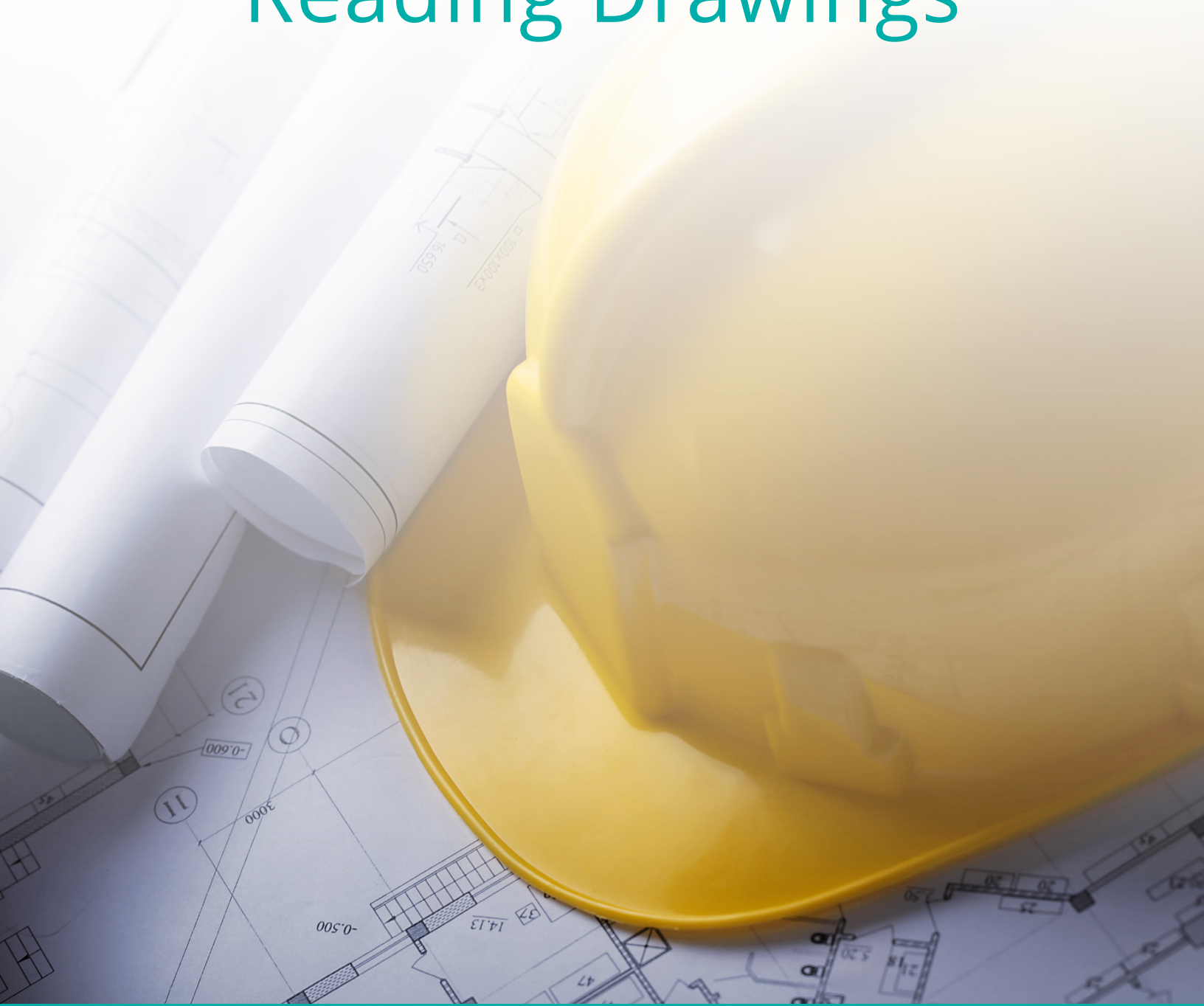


# MANUAL 4:

## Reading Drawings



# Design & Construction

**The original tool kit was updated by the team below in 2024:**

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Michelle Boos-Stone – Five Elements Consulting Group, LLC- Illustrations

# Introduction

The multidisciplinary team provides different skill sets from each team member. The perioperative leader and team members bring clinical expertise, flow of traffic through the department and department culture to the multidisciplinary team, These are important skills to drive the project. One skill that may not be a strength for the perioperative team members is the ability to read architectural drawings. This manual will provide insight into understanding Architectural drawings at each phase of the construction project:

- Validation (may include Master Planning and Programming)
- Criteria Design (also referred to as Schematic Design)
- Detail Design (may include Equipment Planning)
- Construction Documents
- Construction Administration
- Occupancy

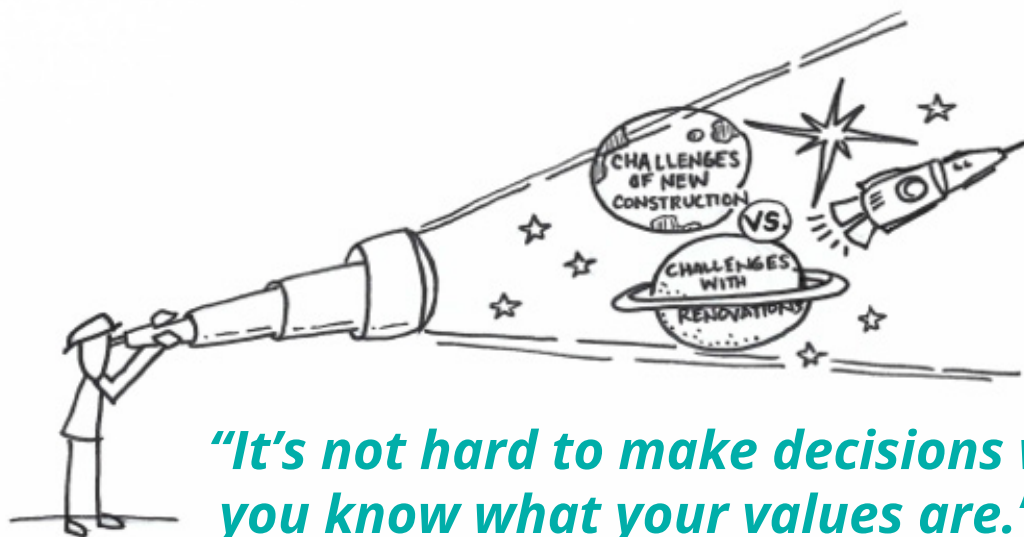
Understanding the design elements in the construction documents at each of the phases of the construction project is critical since these blueprints will be the foundation for communication between the entire team. All decisions will be grounded in the final set of documents which will be the "Construction Documents".

It is important for perioperative stakeholders to familiarize themselves with the symbols, scale and elevation drawings. Spend time when the first blueprint is presented going over the concepts discussed in this manual with the design team to make sure all perioperative stakeholders are able to have a basic understanding of the drawings.

This manual will also provides other options to assist the perioperative team in understanding the three dimensional aspect of these two-dimensional drawings.

## MANUALS IN TOOL KIT:

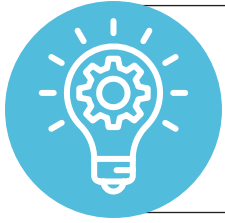
1. How we begin - Developing the Team
2. Design in Depth - building codes, room types, terminology.
3. Construction Projects Steps
- 4. Reading construction Documents**
5. Design Guide for SPD
6. Infection control and prevention



***"It's not hard to make decisions when you know what your values are."***

- Roy E. Disney

# Phases of a Project



## VALIDATION

### Big Picture

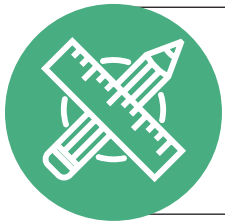
- Define high-level space program
- Review future state process maps
- Detail space planning
- Align needs/wants with schedule and budget



## CRITERIA DESIGN

### Key Adjacencies and Critical Flows

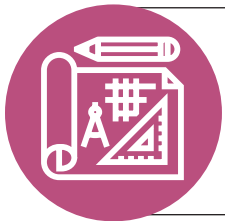
- Department adjacencies and locations
- Critical flows (review and improve)
- Site plan layout
- Building footprint/massing
- Capture future space needs
- Confirm scope and costs
- Opportunities for innovation



## DETAIL DESIGN

### Focus on Details

- Room-specific requirements
- Furniture, fixtures, and equipment (FF&E)
- Review mechanical, electrical, IT, security
- Coordinate code requirements
- Discuss site details and landscape
- Reconfirm scope and cost
- Finalize and sign off interior/exterior design & signage



## CONSTRUCTION DOCUMENTS

### Prepare Documents

- Final coordination with each discipline
- Confirm constructability with Construction Manager (CM)
- Final documentation and coordination (“blueprints”)
- Final review with regulatory agencies



## CONSTRUCTION ADMINISTRATION

### Break Ground

- City and State Reviews
- Shop drawing Reviews
- On-site observations
- Review and Process change orders



## OCCUPANCY

### Grand Opening

- Change Management
- Transition Planning
- Supply/stage space
- Trial/practice runs
- Open Doors!
- **Post Occupancy Evaluation**
- Evaluate performance to the original design intent

The icons on this page are distributed throughout the manuals and provide a quick reference to the phase of the project. Each icon will provide the reader with a quick reference and understanding of the current phase of the project and what decisions should be made or should have been made leading up to that moment.

The six phases of a construction project begin with **Initiation and Concept**, where initial planning and stakeholder discussions define the project’s purpose and feasibility. This is followed by **Planning and Design**, involving the development of detailed plans and blueprints, and securing necessary permits. **Pre-Construction** includes site analysis and finalizing

contracts, setting the stage for **Procurement**, where materials and labor are acquired. **Construction** is the phase where the building takes shape, with site preparation and the installation of systems and finishes. Finally, **Close-Out and Handover** ensures the project is completed to specifications, with a final inspection and transfer of the completed project to the client.

# Design Process

## ENGAGE STAKEHOLDERS IN THE DESIGN PROCESS

Utilize evidence based design concepts to create flow diagrams of existing and future state processes. Visit other recently completed construction projects.

Utilize Human centered design concepts to engage the stakeholders in reimagining processes.

**Empathize** - understand challenges

**Define** - create actionable statement to address key challenges

**Ideate** - brainstorm solutions

**Prototype** - develop design solutions

**Test** - try out solutions

## RESPONSIBILITY OF STAKEHOLDERS

**Evaluate design solutions**

**Determine aesthetic and ergonomic design**

**Determine project budget**

**Select medical equipment**

**Set project schedule**

## STAKEHOLDER SIGN-OFF

Drawings are designed from input of operational flow, equipment lists, vendor specifications, budget, and structural/code limitations. At the end of Criteria Design the documents will be difficult to change without increasing the cost of the project. After Detail Design, the final version will be submitted to the contractor for bid purposes. Review each room for technology, electrical, etc. before sign-off.

# Reading Drawings

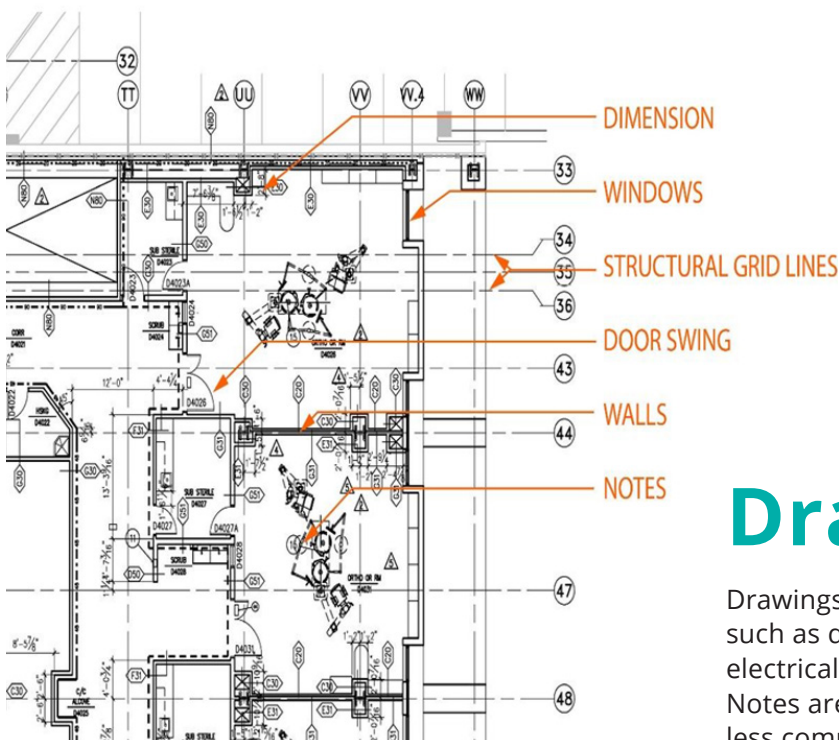
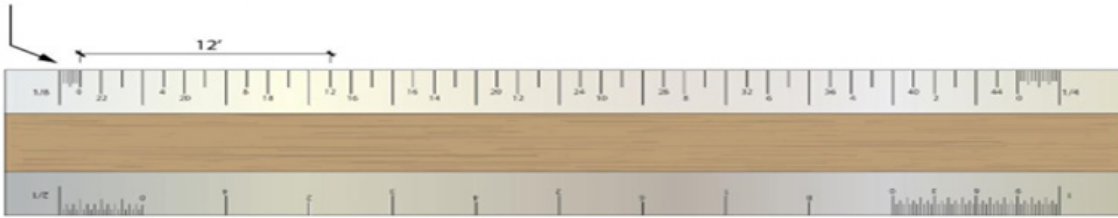
Architectural drawings contain scales and symbols. The scale used may vary from one drawing to the next and is indicated on the drawings, so look at each individual drawing to obtain the correct scale. Scales are indicated on rulers, commonly as 1/16, 1/8, 1/4, 1/2, or 1 inch. As an example, the site drawing may be at a 1/16-inch scale, but the room drawing may be at a 1/2-inch scale. This means that every 16th of an inch

is equivalent to 1 ft for the site drawing, and every 1/2 inch equals 1 ft for the room drawing.

Determine early on how the team will be meeting and reviewing architectural drawings. In-Person or Virtual will have advantages and should be deliberated at the beginning of the project.

## LEGENDS & SCALES

INDICATES THE SCALE REFERENCED ON THE DRAWINGS.  
THE EXAMPLE SHOWN INDICATES 1/8" = 1'-0"



## Drawing Symbols

Drawings contain symbols representing many things, such as door swings, window openings, cabinetry, electrical systems, and mechanical/plumbing systems. Notes are included with matching numbers to identify less common elements.

# Viewing Drawings

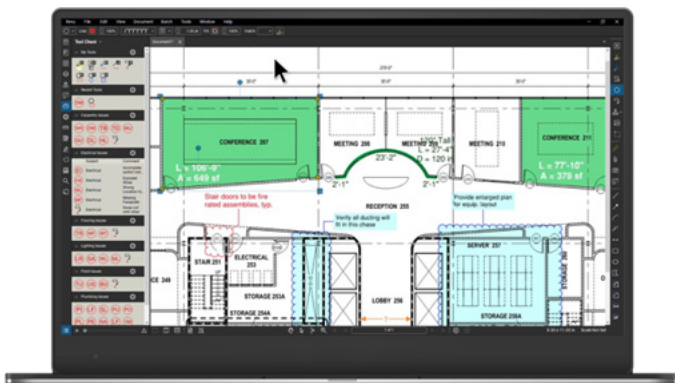


3D COMPUTER RENDERINGS ARE EFFECTIVE TOOLS FOR A GENERAL VISUALIZATION OF THE ROOMS BUT *whenever possible* PHYSICAL MOCKUPS OF THE ROOM WITH CARDBOARD ARE A GREAT WAY TO DETERMINE OPTIMAL ROOM LAYOUT

The validation, criteria and detail design phases of the project provide practice in understanding the legends, symbols and drawings while you are still brainstorming ideas and design documents can be changed without great impact in cost.

Stakeholder involvement can take place in person or virtually. In a virtual environment, sketching often takes place on top of digital drawings to allow virtual attendees to see the changes made in the room. This process has led to fewer printed drawings however stakeholders may ask for large-scale printed copies to review within their clinical location with their staff.

Team members who are less familiar with reading these documents should request a review from the Architectural team.



## DIGITAL VIEWING

Viewing architectural drawings on a screen offers a dynamic and interactive experience, allowing users to zoom in, pan, and navigate effortlessly through intricate details. The digital format provides enhanced clarity and the ability to toggle between different layers, offering a comprehensive understanding of the design. The convenience of electronic storage ensures easy accessibility and quick sharing among collaborators, fostering seamless communication.



## PRINTED IN-PERSON VIEWING

On the other hand, printed sheets offer a tangible and tactile experience, allowing for a holistic overview of the entire drawing at once. The physicality of printed drawings can aid in group discussions and design reviews, as individuals can gather around a table to analyze and annotate the sheets collectively. Both methods have their advantages, with digital screens emphasizing versatility and interactivity, while printed sheets provide a traditional, hands-on approach to architectural exploration.

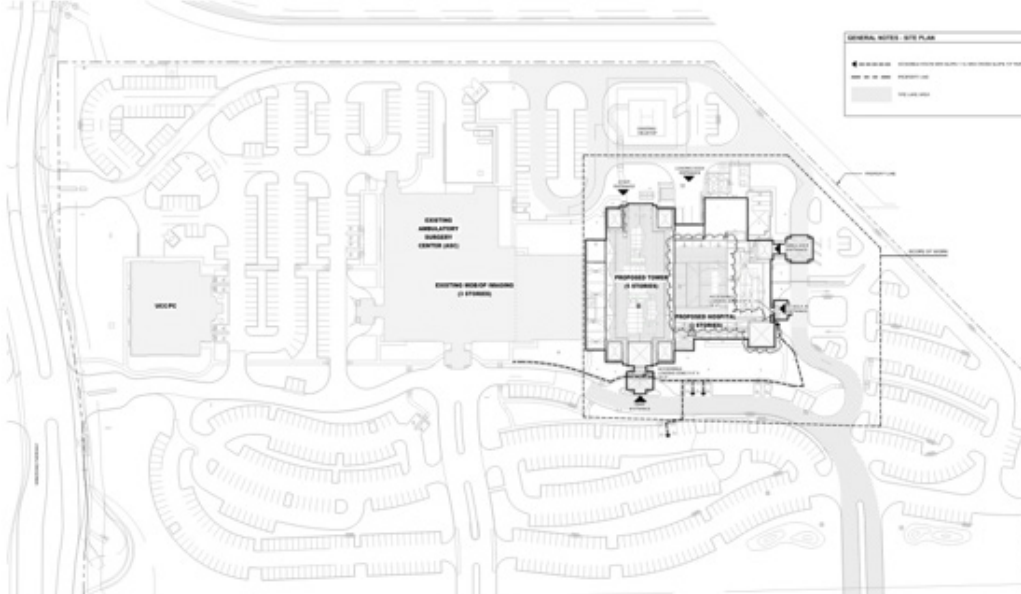
# Validation: Big Picture

## CONCEPT SITE PLAN



Construction documents in the Validation phase will reflect rough outlines of spaces. This example of a Master Plan establishes a framework for orderly and prioritized growth and development of capital improvements at the system, campus or facility level. The master plan represent an organization's strategic objectives and current and projected needs to accommodate changes that can be expected to occur in the future.

## CONSTRUCTION DOCUMENT SITE PLAN



Site drawings are used to show how the building will be oriented on the grounds and include items such as parking lots, sidewalks, and traffic flow outside the building.

Technical site drawings locate the project in reference to other buildings, property lines, fire lanes, accessible routes, or other critical reference points for construction approval.





# PROGRAMMING & DEPARTMENT ADJACENCIES (BLOCK & STACK)

The architectural drawings during this phase of the design process will include a functional space program of all departments.

## Typical Topics represented in these drawings:

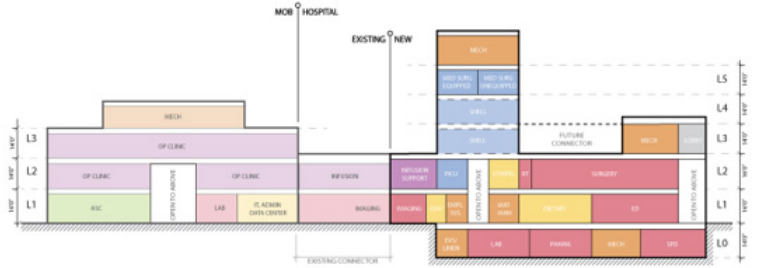
- Sizes and quantities of individual rooms in each department
- Process and Flows
- Staffing Patterns - number of people working in a space
- Equipment Use - type and quantity
- Support Functions

## Space Definitions are presented from the following formulas:

- Net Square Feet (NSF) - usable square footage within the room or area as measured wall-to-wall
- Department Gross Square Feet (DGSF) - sum of the individual room elements (combined NSF) plus an allowance for intradepartmental circulation and internal walls/partitions
- Building Gross Square Feet (BGSF) - combined DGSF plus non-departmental space required to make the building function including: public corridors, stairs, elevators, major mechanical spaces and exterior walls.



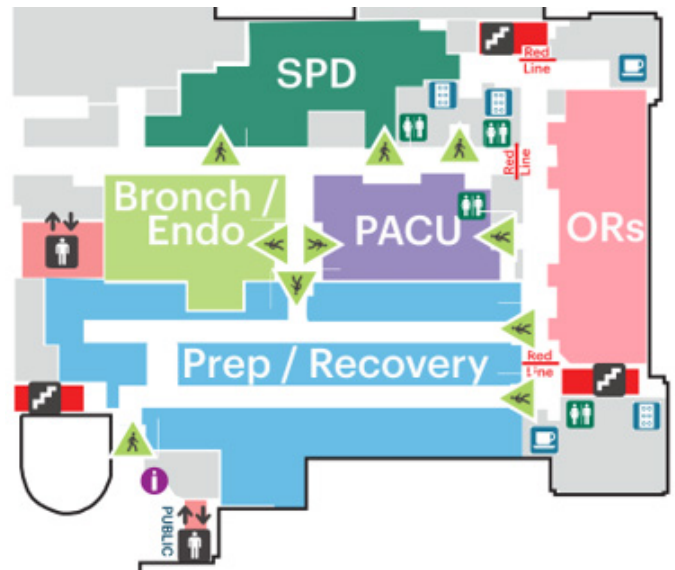
building block plan



stacking diagram

Representing departmental adjacencies can be achieved with either a stacking drawing or block drawing. Stacking highlights vertical adjacencies while blocks highlight horizontal adjacencies. In the early stages of the project, it is valuable to involve all departments in a blocking and stacking exercise to negotiate the most critical Intra-Department adjacencies. Some facilities will have unique operational flows that require specific co-locations.

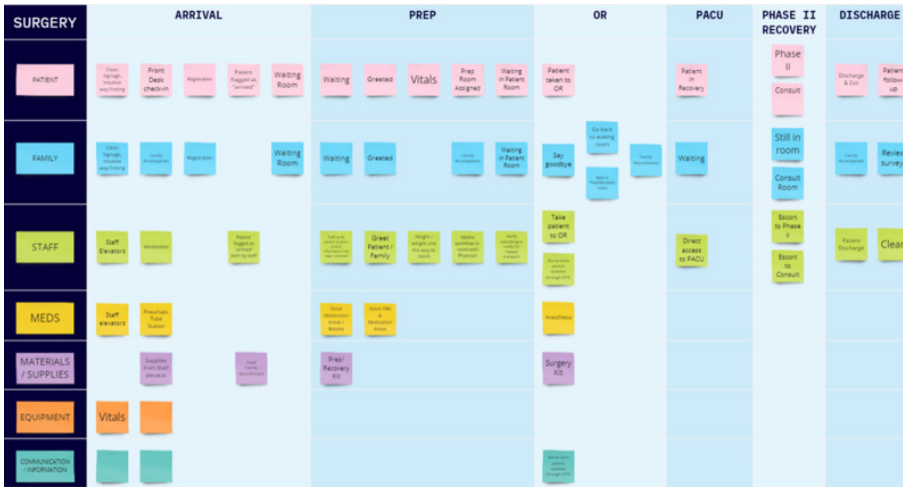
Note that many predetermined elements such as shafts, columns, and existing conditions will need to be considered thoughtfully in this phase of design.



departmental block plan



# Criteria Design: Key Adjacencies and Critical Flows

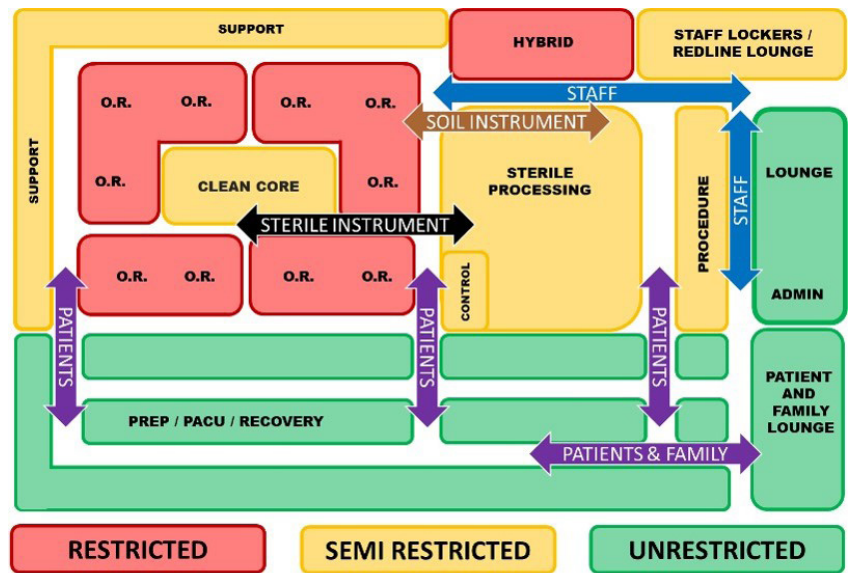


process map - 7 flows of healthcare  
patient, family, staff, meds, materials, equipment, communication

The architectural drawings in this phase will be drafts of the ideas the team has discussed up to this point. Refer to Manual 3 for topics to be discussed by the team.

## Typical Topics:

- Departmental adjacencies within the building
- Major circulation flows
- Proposed workflows and operational implications
- Development of floor plan layouts locating all rooms identified from approved program.
- Color plans that indicate debarments, room locations, size, geometries, and proximal relationships.
- Confirm and approve layouts upon completion of criteria design phase



flow diagram (more detail in manual 5)

The use of flow diagrams assists the team in identifying an ideal state for the flow of the following:

- Clean supplies
- Dirty supplies
- Patient transport
- OR personnel work spaces
- Restricted, Semi-restricted and Unrestricted zones.



# PROGRAM TO PLANNING



## ROOM INDEX

### Main rooms

- 01 Operating room general surgery
- 02 Operating room general surgery
- 03 Operating room general surgery
- 04 Operating room general surgery
- 16 Recovery room

### Ancillary rooms

- 06 Equipment storage
- 08 Induction
- 09 Induction
- 11 Dirty utility
- 12 Operating table preparation
- 19 Cleaning room

The provided blueprint illustrates an OR suite comprising four surgical rooms arranged in an H shape, tailored for general surgical procedures. These rooms are versatile, capable of facilitating various surgeries including appendectomies and orthopedic procedures. The forthcoming images will depict distinct circulation routes within the surgical floor.

(julianeherzog, n.d.)

### Connecting rooms

- 05 Sterile corridor
- 07 Corridor 1
- 10 Corridor 2
- 17 Disposal lock
- 18 Supply lock

### Staff rooms

- 13 Operating manager
- 14 Doctor's room
- 15 Recreation room
- 20 Men's changing room
- 21 Men's clean
- 22 Men's restroom
- 23 Men's restroom
- 24 Men's unclean
- 25 Women's changing room
- 26 Women's clean
- 27 Women's restroom
- 28 Women's restroom
- 29 Women's unclean



# STAFF CIRCULATION AND DIAGRAMMATIC TOOLS

Viewing 3D diagrams for staff circulation enhances the design process by providing a comprehensive visual representation of spaces, allowing architects to better understand spatial relationships and detect potential issues early. This perspective facilitates clearer communication with stakeholders, ensuring alignment on design intentions. It also aids in accurate decision-making and coordination among multidisciplinary teams, promoting efficiency and reducing errors. Ultimately, 3D visualization supports more informed and collaborative design development, leading to superior outcomes.



Isometric view: staff (julianeherzog, n.d.)



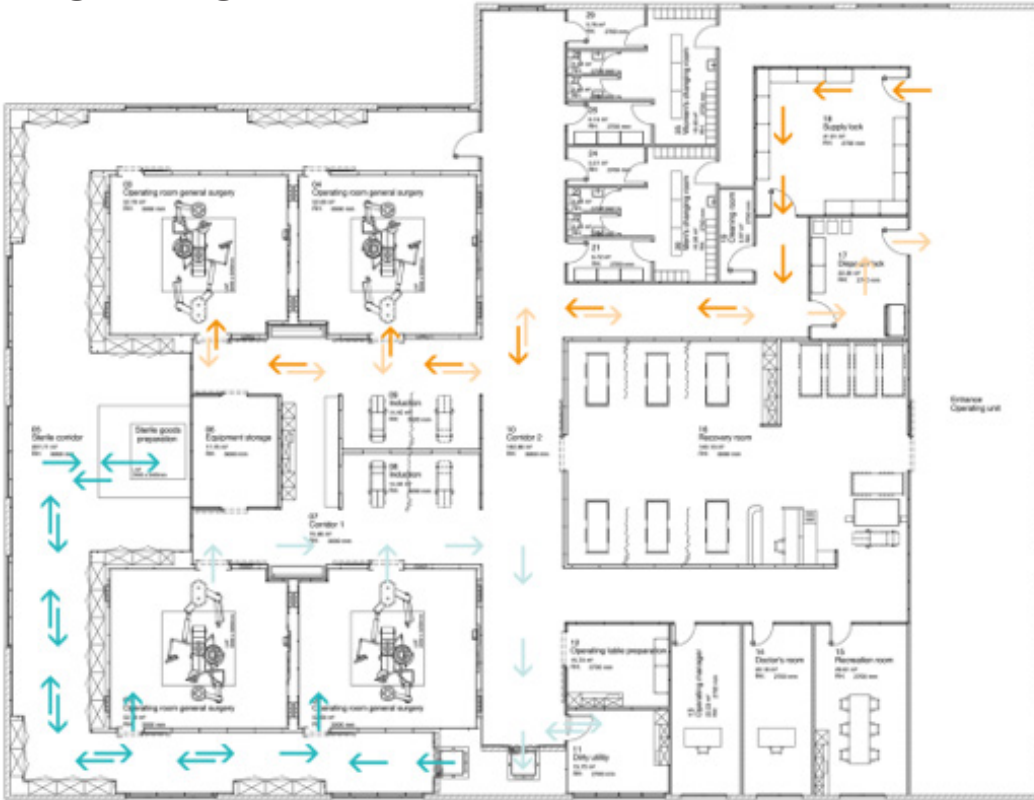
Workflow index: sterile staff circulation (julianeherzog, n.d.)

⇄ Staff in

⇄ Staff out

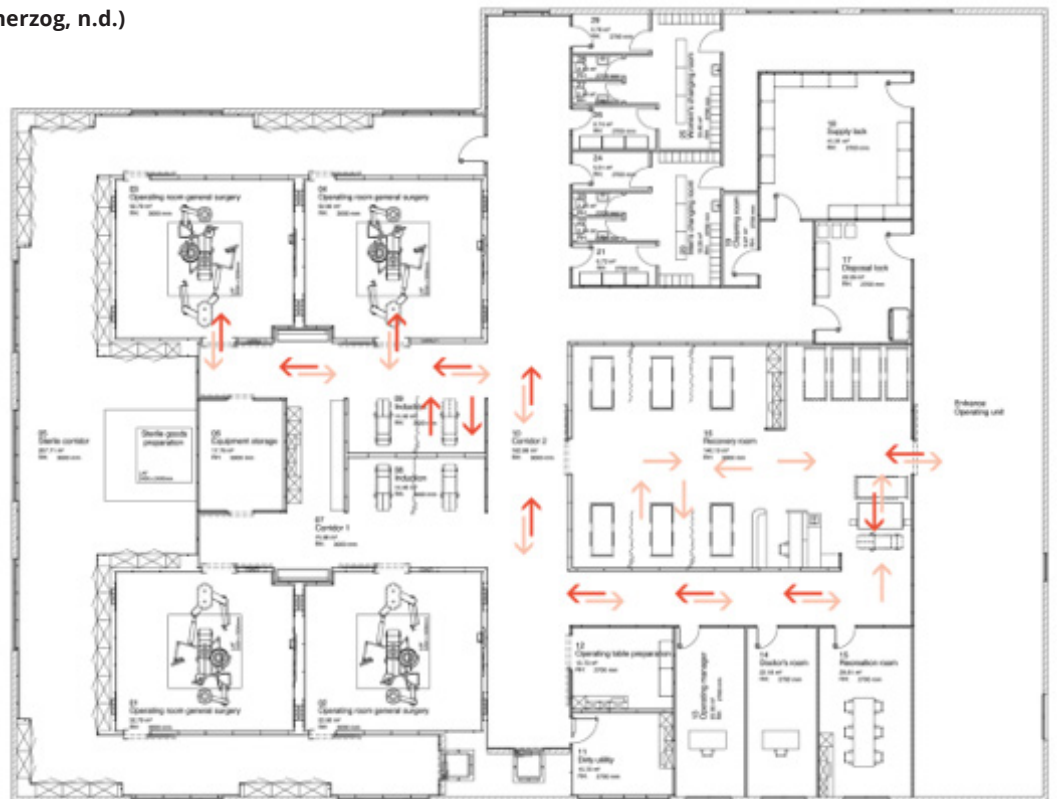


# WORKFLOW



Workflow index: material (julianeherzog, n.d.)

- Material in
- Material out
- Sterile goods in
- Sterile goods out

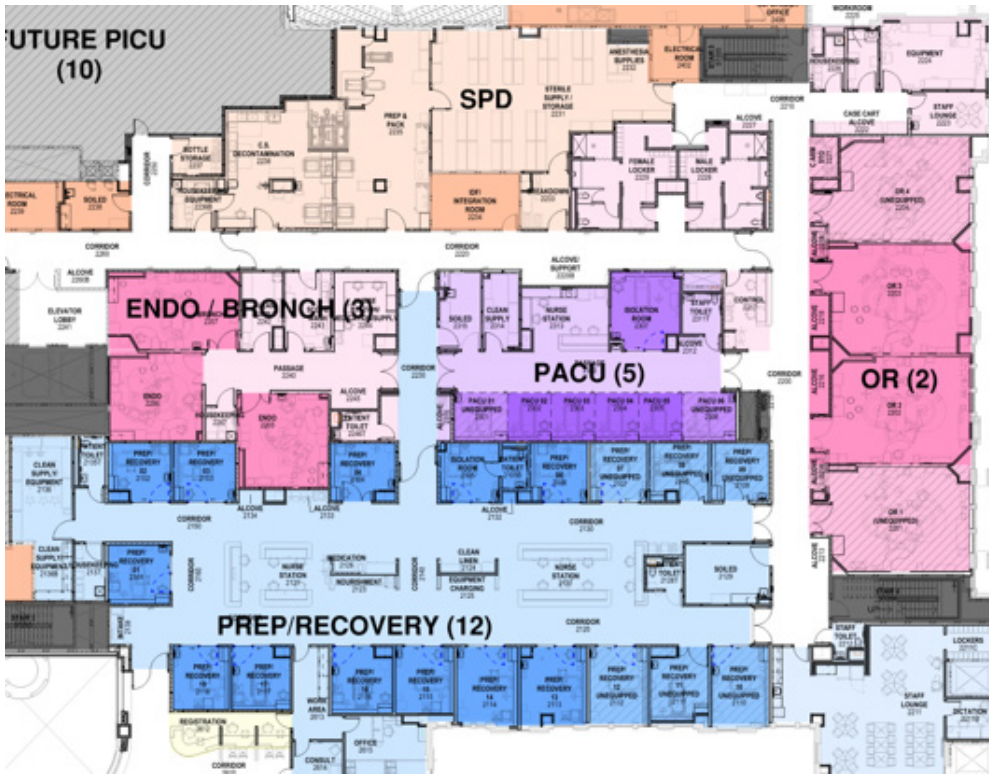


Workflow index: patient (julianeherzog, n.d.)

- Patient in
- Patient out



# Detail Design: Focus on Details



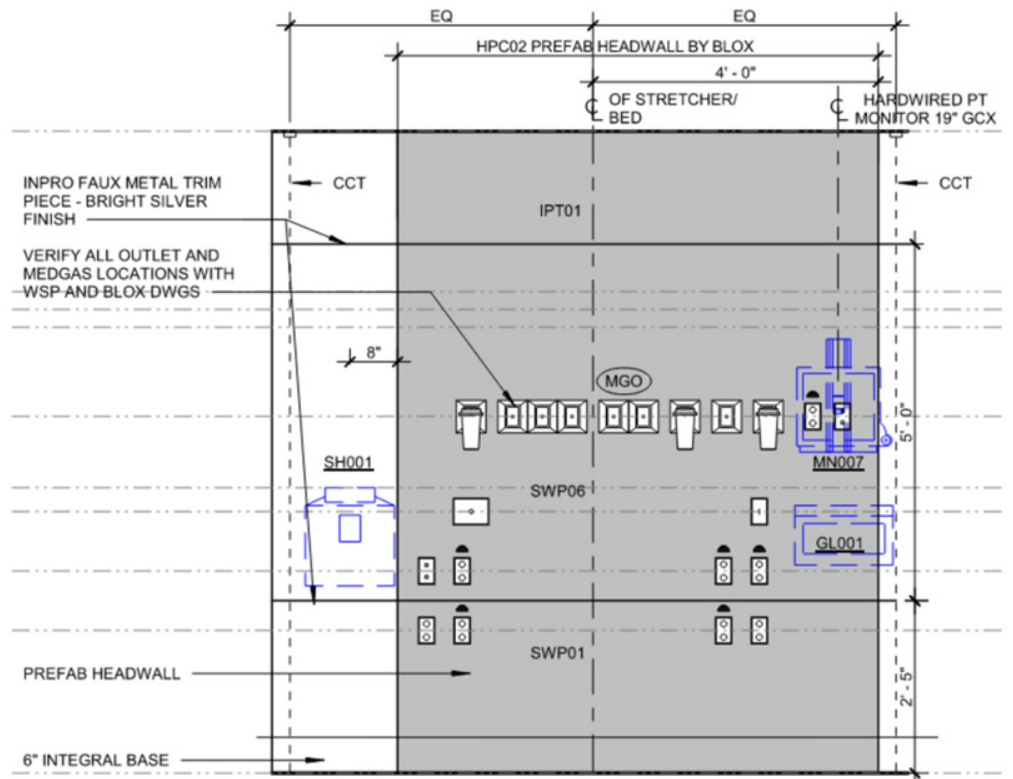
detail floor plan

The product of this phase of the design process will include:

- Review of the floor plan layouts locating all rooms identified match the approved program.
- Color plans that indicate departments, room locations, size, geometries, and proximal relationships.
- Location of plumbing fixtures, life safety, coordination of desired fenestrations, and special features.
- Review and approval of the design by the owner is completed at the end of this phase.

The design of room layouts will include:

- Casework
- Medical Equipment
- Technology requirements
- Furnishings
- Accessories
- Door size, location, & hardware
- Outlets
- Finishes
- Ceiling design & lighting

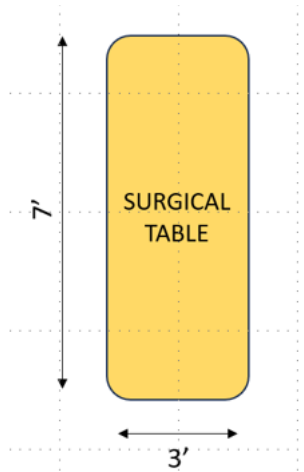


**14 TYP PACU BAYS HEADWALL**  
1/2" = 1'-0"

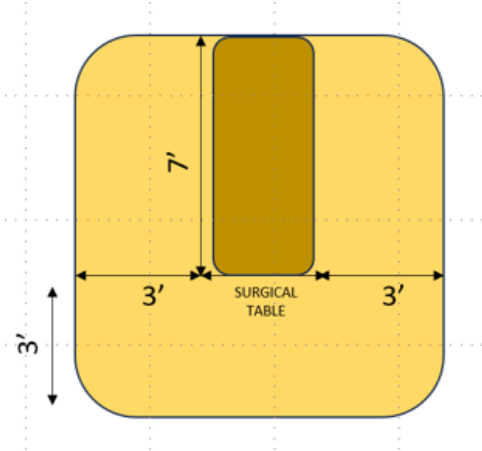
detail elevation



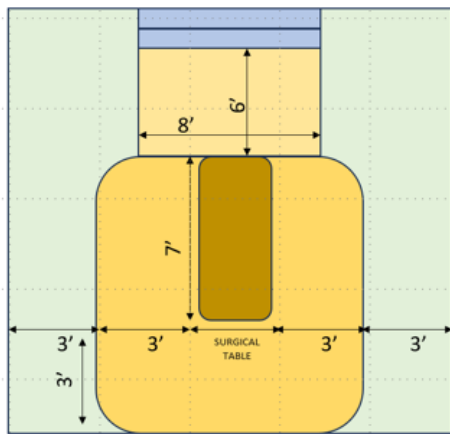
# SURGICAL ZONES



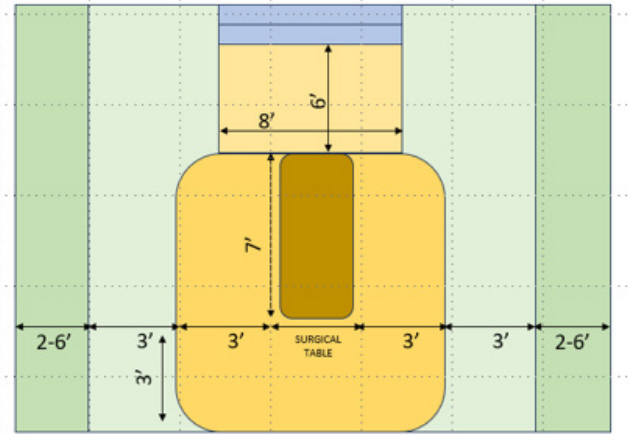
**Sterile table A**



**Sterile field B**



**Anesthesia and circulation zone C**



**Mobile equipment zone D**

This is a visual representation of the jigsaw puzzle-like configuration of an OR. The left side of the manual features four images illustrating the key components of the OR layout.

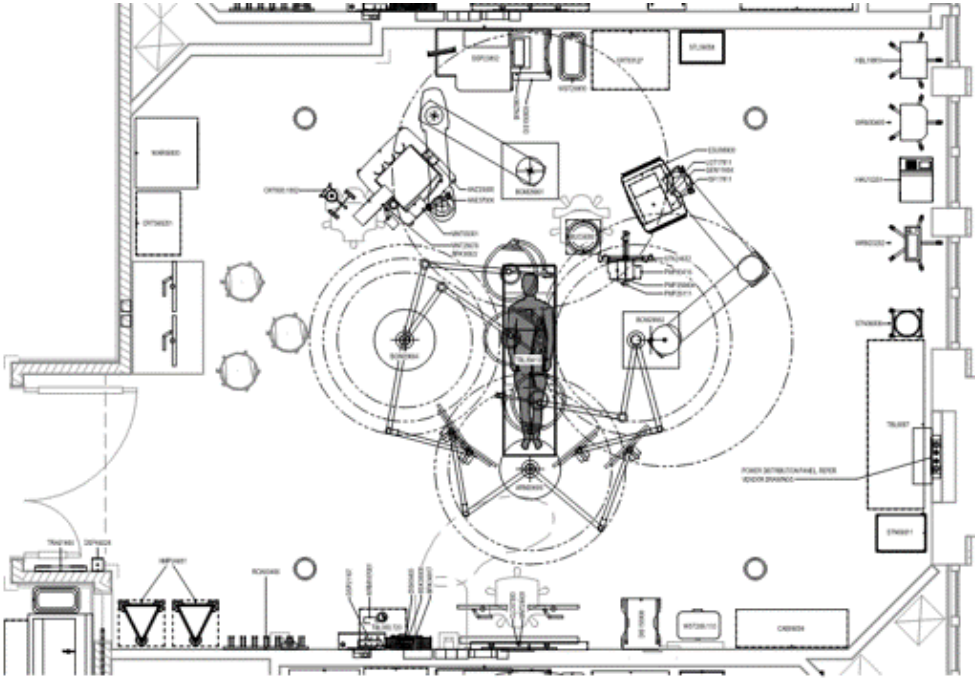
1. Image A: Surgical Table (7 ft x 3 ft). This image depicts the primary focal point, the surgical table, measuring 7 ft by 3 ft, where surgical procedures take place.
2. Image B: 3 ft Clearance Around Surgical Table. The second image illustrates a 3-ft clearance surrounding the surgical table on three sides. This clearance establishes the sterile field, ensuring a hygienic and contamination-free environment for surgical activities.
3. Image C: Sterile Field and Anesthesia Zone (6 ft x 8 ft). Image C showcases the sterile field, which is an

aseptic area around the surgical table. This space is crucial for maintaining the cleanliness required during medical procedures. Adjacent to the sterile field is the 6 ft by 8 ft anesthesia zone. In the anesthesia zone, the administration of anesthesia and monitoring of the patient occur.

4. Image D: Additional Clearances for Mobile Equipment and Circulating Purposes. The final image, Image D, introduces additional clearances to accommodate mobile equipment and support circulating activities. There is an extra 3-ft clearance on three sides of the room for the movement of mobile equipment (such as portable diagnostic tools or robotic surgical devices). Additionally, there are two 6-ft clearances on either side of the room dedicated to circulating purposes, allowing staff to move efficiently within the OR for tasks unrelated to the sterile field.



# Room Layouts



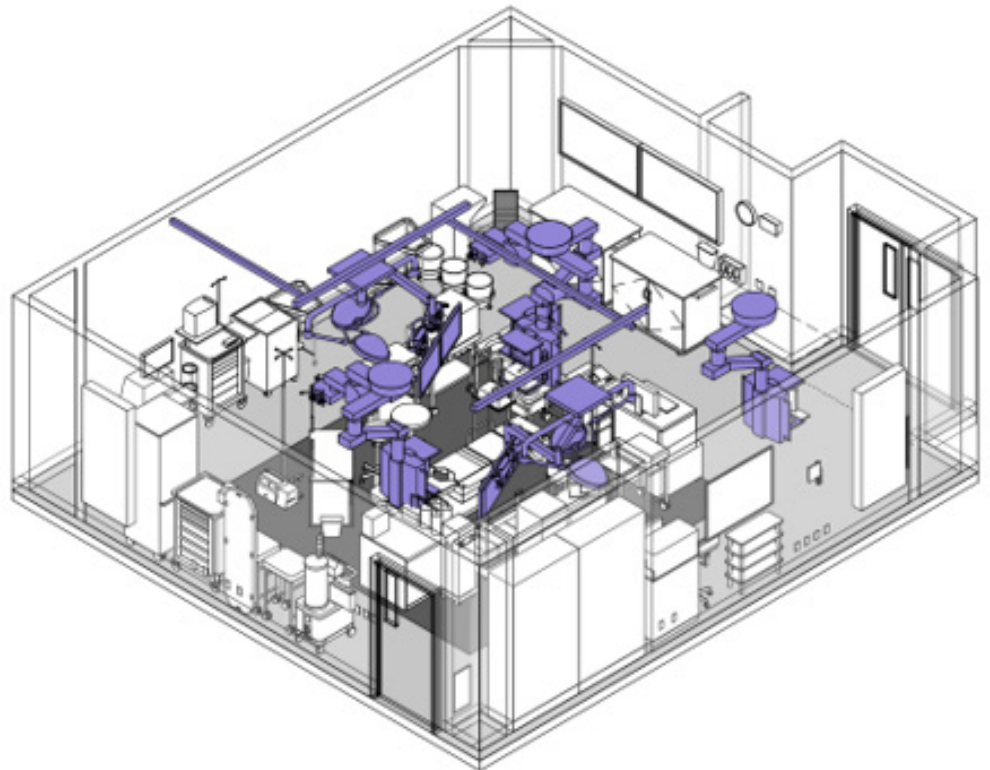
**These drawings begin to illustrate:**

- Layout of typical rooms with equipment and furniture to scale.
- Beginning to locate plumbing fixtures, life safety, and coordinate with design on desired fenestrations, special features, and massing's.
- Pieces of equipment or furniture that could impact the size of the room

It can be helpful to use computerized renderings of a room layout to illustrate the movement of equipments such as overhead lights or booms to test for collisions and workflow.

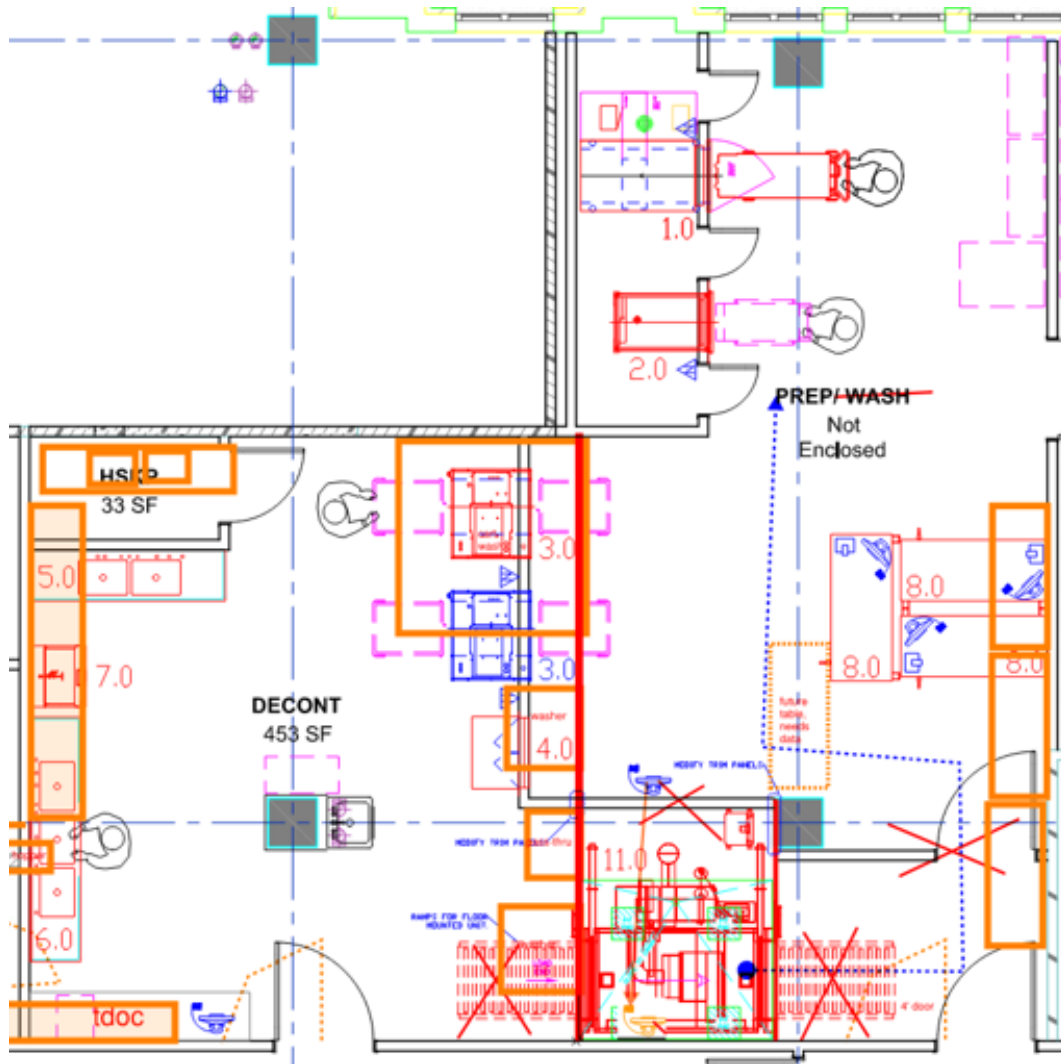
Creating a mockup of the room with cardboard boxes from the drawing can also help orient the stakeholders to the space and the symbols on the drawings.

At the end of this phase the architect will take all information and develop the final construction documents.





# Equipment Vendor Test Fits



The equipment list will drive the placement of electrical outlets, HVAC system, technology support, medical gas ports, plumbing, work space requirements, and light fixtures on architectural drawings. Review the codes on the drawings related to equipment to confirm equipment decisions and location.

Final selection of the lights, booms, video integration systems, computer stations, anesthesia equipment should be determined prior to the construction document phase.



# Equipment List

## EQUIPMENT LIST

| <u>ITEM</u> | <u>QTY</u> | <u>DESCRIPTION</u>  |
|-------------|------------|---|
| 1.0         | 1          | MODEL GSS6713N STEAM STERILIZER, SINGLE DOOR, RECESSED, 51" CHAMBER   |
| 2.0         | 1          | MODEL 533HCE STEAM STERILIZER, DOUBLE DOOR, RECESSED, 38" CHAMBER   |
| 3.0         | 1          | MODEL 8668 WASHER-DISINFECTOR, RECESSED, DOUBLE DOOR  |
| 3.0         | 1          | MODEL 8668 WASHER-DISINFECTOR, RECESSED, DOUBLE DOOR. FUTURE.   |
| 4.0         | 1          | MODEL 8000 PASS THROUGH WINDOW  |
| 5.0         | 1          | MODEL HW6748 DOUBLE SINK WORKSTATION, 8'LG - 30" BOWLS  |
| 6.0         | 1          | MODEL HW6760 THREE SINK WORKSTATION, 10'LG - 30" BOWLS  |
| 7.0         | 1          | MODEL 1150 ULTRASONIC CLEANER   |
| 8.0         | 3          | HAT72 PREP AND PACK TABLE, 36"X72"  |
| 9.0         | 1          | MODEL WPT150 WATER TREATMENT SYSTEM, RO POLISHER.   |
| 10.0        | 1          | DETERGENT MANAGEMENT SYSTEM.<br>(FOR REPRESENTATION ONLY)<br>(CUSTOMER RESPONSIBLE FOR INSTALLING CONDUIT). |
| 11.0        | 1          | MODEL 9120E CART WASHER, DOUBLE DOOR, RECESSED, PIT MOUNTED, 78" CHAMBER.                                   |
| 12.0        | 2          | 2 BAY SCRUB SINK.   |

### T-DOC EQUIPMENT COMPONENTS



T-DOC STATION W/ MONITOR.  
NETWORK CONNECTION & POWER SUPPLY  
REQUIRED (BY OTHERS)



CCD HAND SCANNER



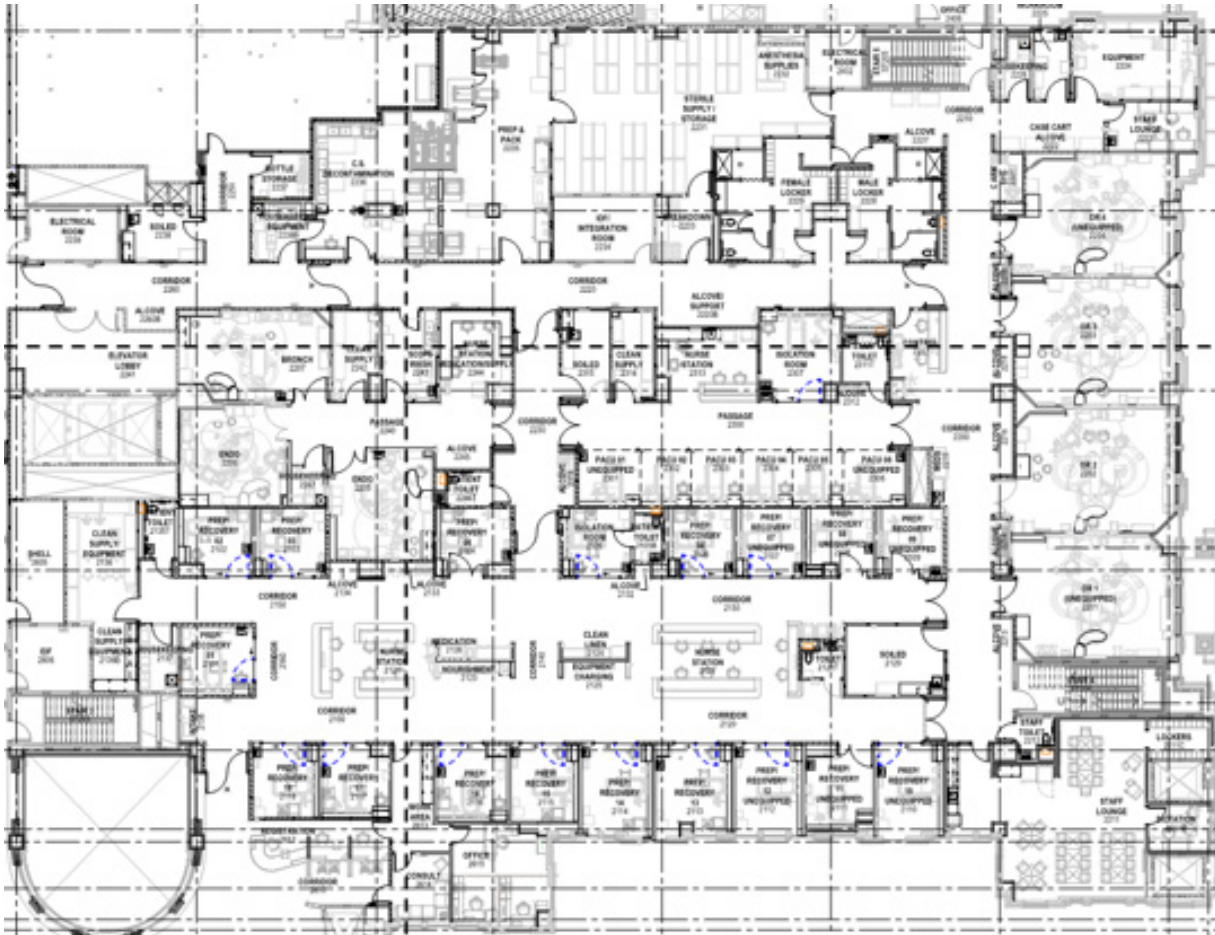
LABEL PRINTER.  
NETWORK CONNECTION & POWER SUPPLY  
REQUIRED (BY OTHERS)



T-DOC NETWORK CONNECTION. TO BE LOCATED  
WITHIN 5' OF INDICATED CONNECTION POINT  
(BY OTHERS)



# Construction Documents: Prepare Documents



- At the completion of design development, all planning decisions will be finalized and approved for incorporation into the construction documents.
- This includes ceiling plans, lighting, mechanical requirements, and room by room discussion with users.

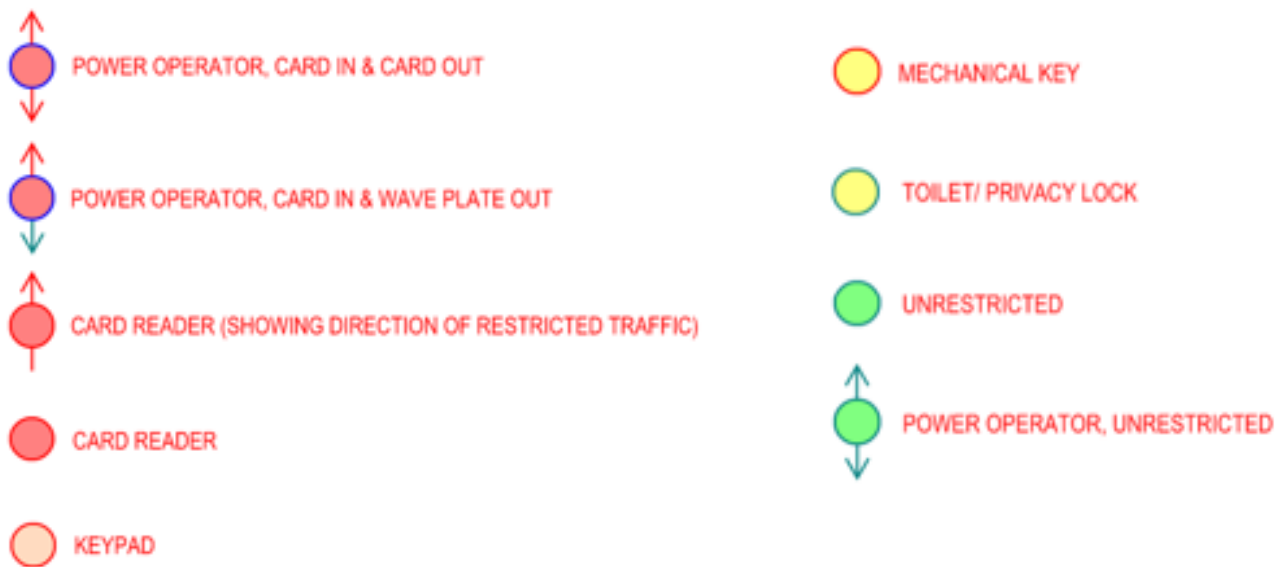
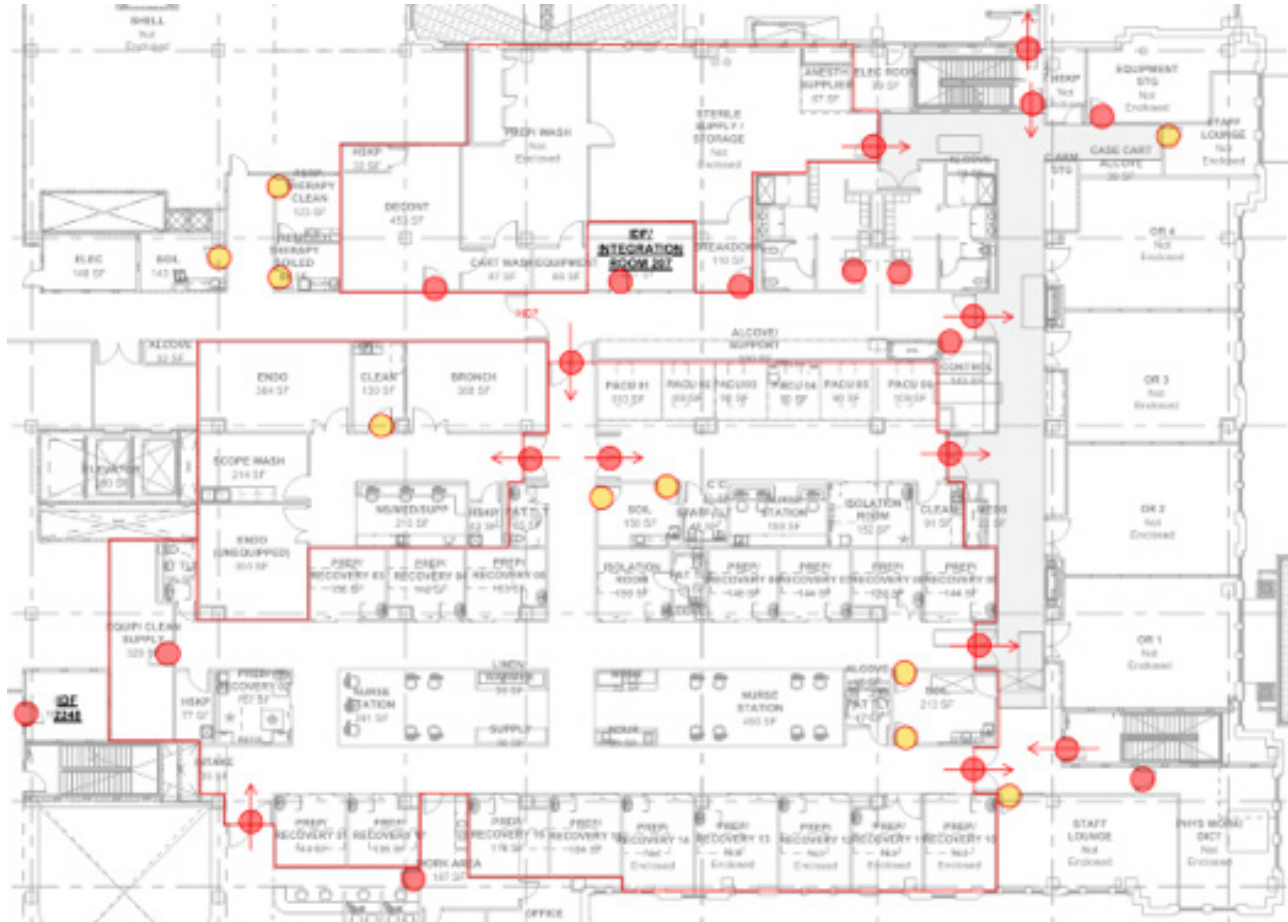
During the construction phase regular walk throughs should be planned to confirm “as built” matches the drawings. Contractors or vendors may ask questions about location of items. Refer to the Architectural drawings first and then determine if a change order is required.



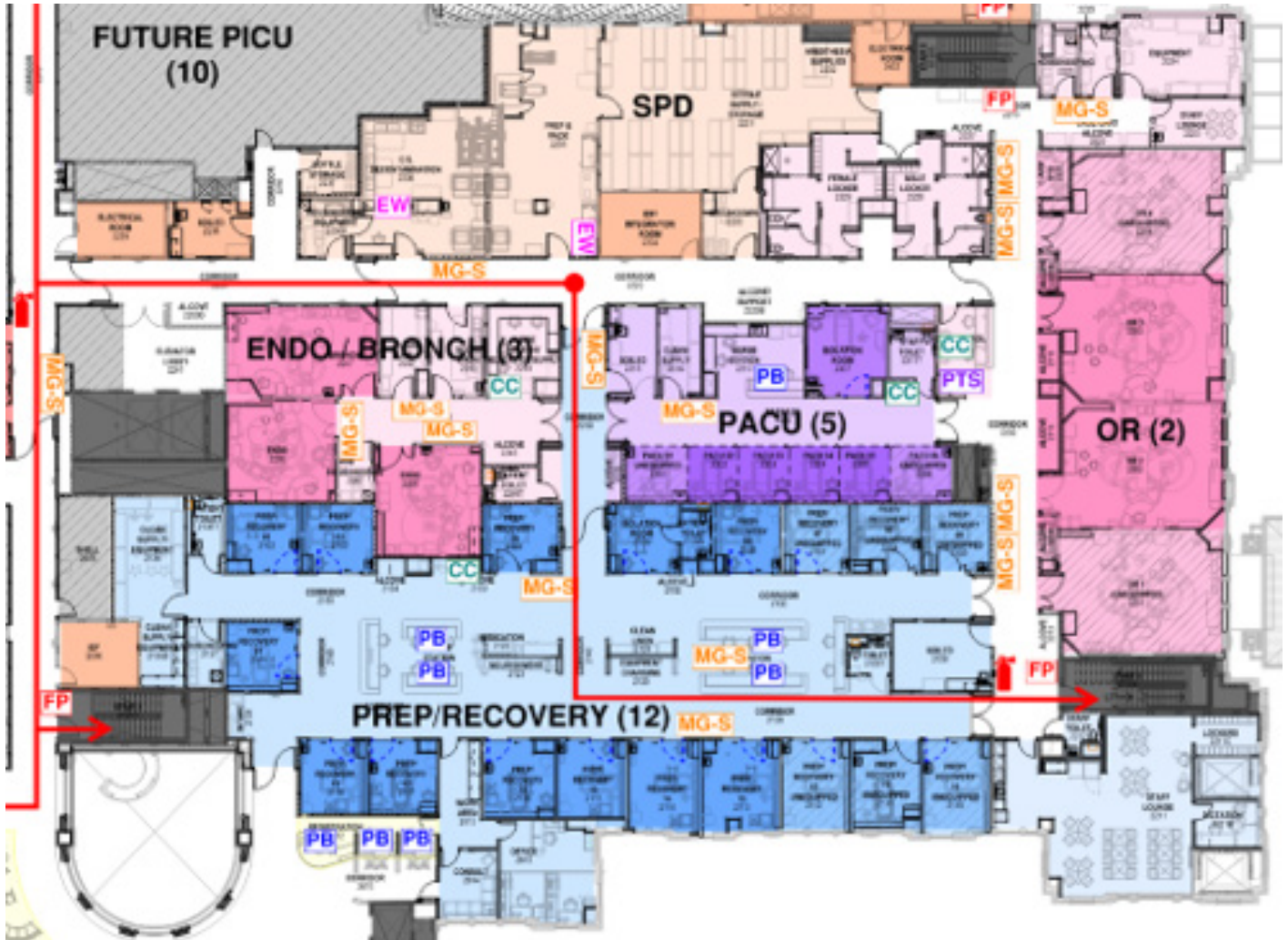
# Security Drawings

## Door Hardware

- Prior to first patient day, a walkthrough will be completed to verify that the door hardware aligns with the security drawings. This includes doors with free egress, card readers, etc.



# Occupancy: Grand Opening



## Transition Planning

- This phase requires a detailed strategy for move-in and staff orientation.
- Drawings are required to coordinate the phased move-in of casework, fixed furniture, equipment, mobile furniture, technology, and accessories.
- Emergency management and wayfinding maps will be required for staff training and orientation.

- FP FIRE PULL
- FIRE EXTINGUISHER
- PB PANIC BUTTON
- CC CRASH CART
- MG-S MED GAS SHUTOFFS
- EW EYE WASH
- PTS PNEUMATIC TUBE STATION

