Returning to the
Scientific Workplace:
*Risk-management
Strategies*

Flad

CONTENTS

GUIDING PRINCIPLES ——

The COVID-19 virus has ushered in a new era of workplace design considerations. As of the publication date of this document, there is no effective virus treatment and no mass-produced vaccine. With the timetable for both unknown, it falls to businesses to work within the guidance offered by state and federal government, professional practice organizations, and international NGOs. Many of these documents overlap and occasionally draw different conclusions from similar data. We have prioritized the findings as follows:

- Centers for Disease Control (CDC)

- Washington State Legislative Council

- Occupational Safety and Hazard Association (OSHA)

- Professional Organization Position Papers

It is important also to recognize the principles guiding our research and reporting. They are summarized as follows:

BE CAUTIOUS – Recognize the immediate impact to essential work and make fundamental adjustments to protect the worker and the work.

BE PRUDENT – Avoid unproven technologies or esoteric solutions. Recognize that there are other environmental risks that play a role in workplace safety. Shopping, school, transport, and recreation are all adjacent risk vectors for transmission.

BE SCIENTIFIC – Seek the latest and best information. Be willing to change approach when better information becomes available.

EXECUTIVE
SUMMARY ——

The purpose of this document is to understand how to best mitigate transmission risks in a Return to Work (RTW) scenario with critical processes and personnel. A key aspect of our analysis was understanding how risk modalities for non-critical processes would affect the strategy for protecting critical processes. To create a strategy that minimizes risk while allowing enhanced functionality, the following guidelines were implemented throughout:

1   Understand risk at the broadest scale - review expert literature and understand transmission vectors in the work environment.

2   Understand how risks overlap within the work environment for essential and non-essential services, comprised of separate arrival, amenities, bathrooms, and workspaces.

3   Understand when risk mitigation strategies converge and place emphasis on those strategies for reducing exposure risks to assist with decision-making and prudence in expenditure.
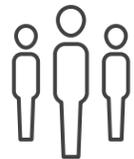
F O L L O W   T H E   D . O . T . S .

DURATION:

The length of time the virus is communicable

OPPORTUNITY:

The number and duration of contacts in a day

TRANSMISSION PROBABILITY:

The chance of passing the virus on under specific circumstances

SUSCEPTIBILITY:
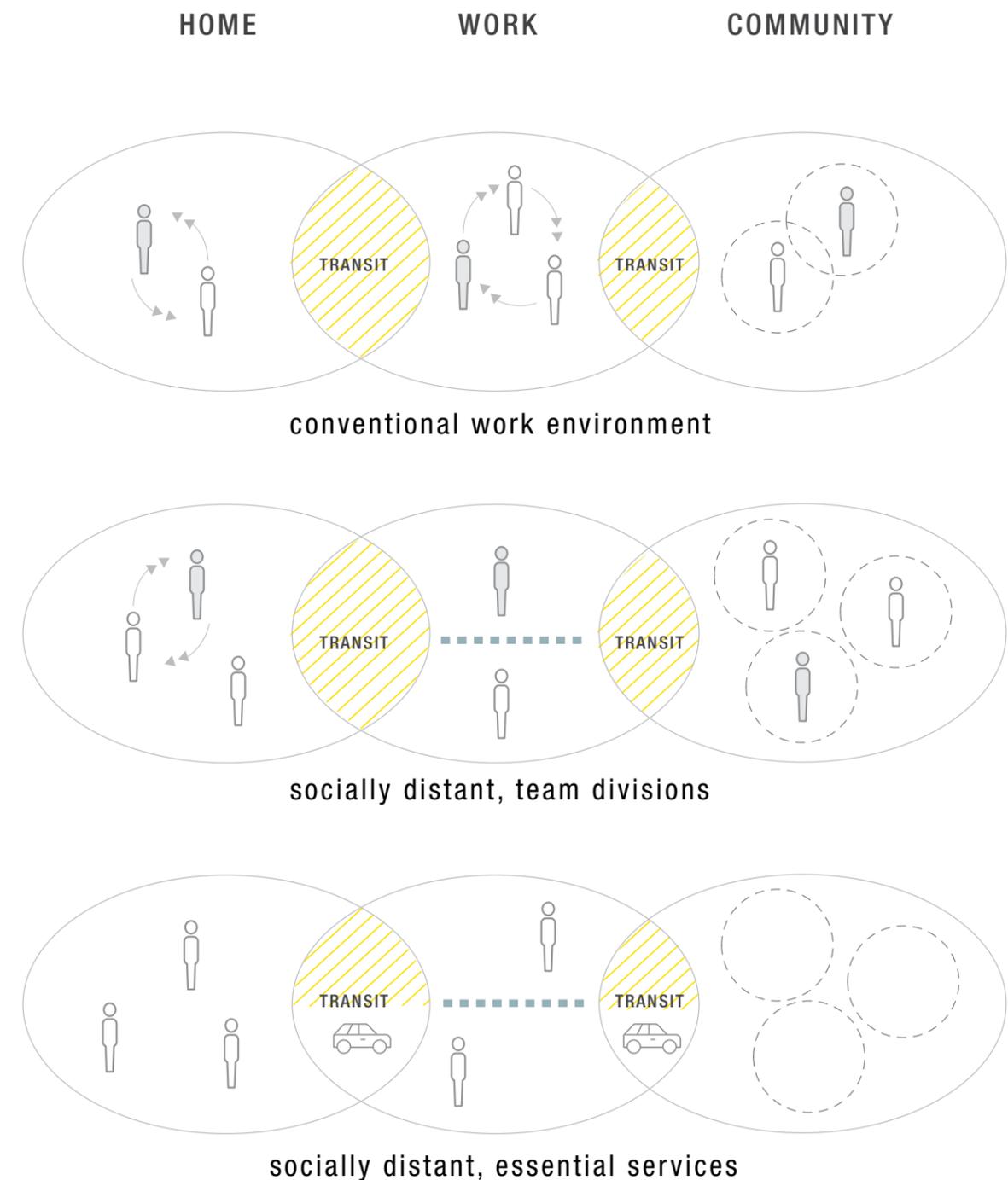
The innate vulnerability to the disease

FOLLOW THE D.O.T.S. (CONTINUED)

Duration and susceptibility are most adequately addressed in workplace policy around Work-From-Home (WFH) and the daily self-assessment of potential symptoms prior to coming in to work.

Opportunity and transmission probability affect many dimensions of work life: HVAC settings, air filtration, the use of PPE in lab and non-lab environments, access to amenities, social distancing, co-working, and many others.

Finally, there is the matter of how work fits into all other modalities of life: school, home, community, and transit all affect outcomes at work because they each have a different rate of infection and different vectors of transmission. In the most basic response, work life simply means social distancing. In a more robust model, work may partition teams as a way to protect essential processes or as a way to limit overall mixing of staff. This could combine strategies like work share, WFH, or shift work, or could incorporate boundaries or informal separations between groups. And in the more ambitious cases, there is an effort to solve at least some of the risks that lie outside work, such as transit, the considerations of health and susceptibility and a responsible social contract around engagement in community life. This is particularly important to understand because not every geography is implementing the same strategies.

HOME   WORK   COMMUNITY

conventional work environment

socially distant, team divisions

socially distant, essential services

KEY FINDINGS:

1 PRIORITIZE BEHAVIORAL CHANGE

While sources available at this time differ drastically in the real and perceived effectiveness of bricks-and-mortar improvements like increased airflow, air compartmentalization, and architectural interventions like the replacing of desking systems, the CDC has consistently promoted the proven strategies of simple behavioral adjustments:
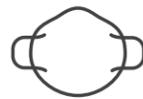
A. FACE MASKS — Strongly consider requiring those at work to wear face masks. The limit of the spread of air droplets that can carry the virus is proven science.

B. SOCIAL DISTANCING — The report makes recommendations regarding social distancing across several categories of behavior.

C. WORK FROM HOME AND SHIFT WORK — The report acknowledges the increased role of remote work in order to implement and maintain social distancing.

D. SHIFT THE POLARITY ON PERSONALIZATION — The current guidance recommends co-located trash, recycling, and compost handling over personal bins and containers at each desk. The same is true for lunch storage and for elements like lab coats, which under current restrictions should be single-use and recyclable or laundered and individually wrapped. After use, lab coats should be binned for laundry or recycling in a container with a lid.

2 DE-DENSIFY LABS, WORKSPACES, AND MEETING ROOMS

It is presumed that systems furniture, lab process planning, and the efficiencies that come with them are here to stay. That said, it may be some time before the development of a vaccine allows the full re-deployment of those efficiencies. Risk responsiveness over the short term means less efficiency so that the behavioral changes can take full effect.

3 RETHINK THE BATHROOM

Bathrooms have shown to be one of the places vulnerable to spreading across surface-to-human vectors. This document provides detailed information on the approach.

4 ADD OCCUPANCY MAXIMUMS AND QUEUING AT ALL LOGJAMS

Copy areas, elevators, kitchen areas, amenity spaces, and showers will all benefit from establishing safe waiting distances and limiting users to a safe number. One-way circulation has been implemented in grocery stores to help reduce congestion. It is not clear that one-way travel would significantly reduce transmission in a lab environment where PPE is already being used.

5 DISTRIBUTE HEALTH RESOURCES IN A WAY THAT IS INTUITIVE AND REINFORCES HUMAN PATTERNS

Fresh supplies of the following should be readily available in standard packaging at most interior locations: hand sanitizer, face masks, tissues, wipes, and hands-free trash containers. Labs would have a variation on this with a few adjustments to reflect the work in those locations.

6 MECHANICAL RECOMMENDATIONS

The following recommendations represent a top-level summary of the approach to creating a safer work environment. The key strategies in the mechanical design are as follows.

1. Increase outside air volume to 100%

2. Increase air changes where possible (in the case of 1165 this will likely be 11 ACH)

3. Where outside air volume can't be 100%, increase filtration to .1 micron (Merv-17 or Merv-18)
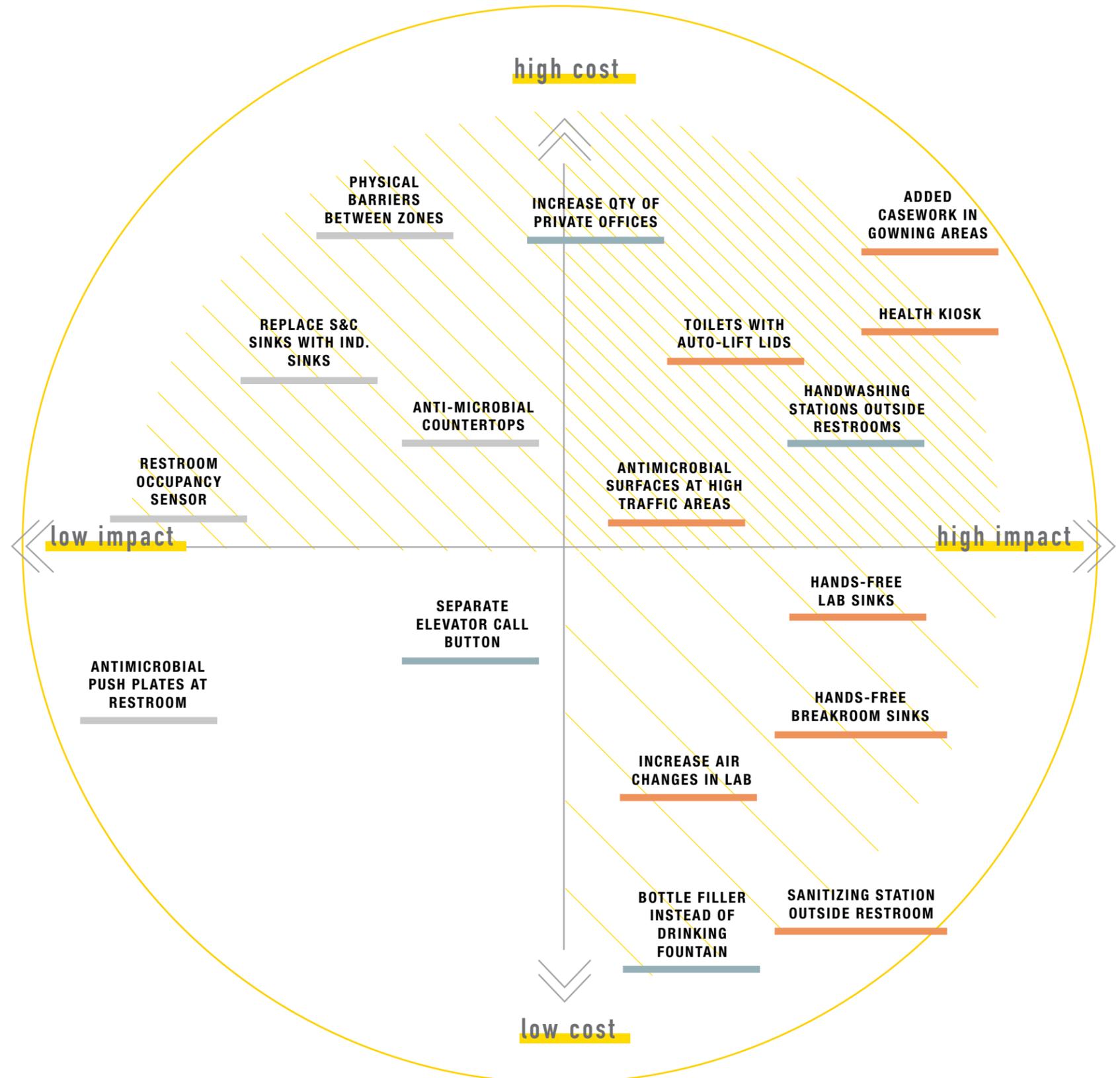
4. Run the system 24/7

A NOTE ON MECHANICAL SYSTEMS

If we had a better way to study viral propagation, we would be able to rank transmission risks on a scale and create priorities. But early opinion on CoV2 indicates the transmission vectors are imperfectly understood, with many conflicting opinions reflecting gaps in the knowledge. Rather than attempt to guess, it seems prudent to establish practices that get the best result within existing constraints. The HVAC industry is divided on the effectiveness of additional air filtration and compartmentalization in comparison with the more established behavioral strategies. There already appears to be emerging debate as no controlled studies have yet been performed on the effect of advanced strategies in reducing transmission of COVID-19. Since many, but not all, of the potential measures in air delivery come at significant increased complication and expense, even in a new facility, it seems prudent to begin with an assessment of any liabilities and advantages of current systems.

COST/BENEFIT ANALYSIS

Evaluating cost and impact is challenging when so much is still unknown. The following recommendations represent a case study in how to evaluate cost and impact. It is clear that cost and impact do not track together, so one key recommendation is to consider all adjustments as part of a larger budget for addressing workplace safety.

Also, managing perceptions is as important as managing risk. Some strategies may have an indeterminate impact on risk: the visual presence of sanitation stations may not decrease transmission risk more than another measure, but caring for the perceptions around work still pays a benefit.

HIGHLY RECOMMEND

NEUTRAL

NOT RECOMMENDED

high cost

PHYSICAL BARRIERS BETWEEN ZONES

INCREASE QTY OF PRIVATE OFFICES

ADDED CASEWORK IN GOWNING AREAS

HEALTH KIOSK

REPLACE S&C SINKS WITH IND. SINKS

TOILETS WITH AUTO-LIFT LIDS

ANTI-MICROBIAL COUNTERTOPS

HANDWASHING STATIONS OUTSIDE RESTROOMS

RESTROOM OCCUPANCY SENSOR

ANTIMICROBIAL SURFACES AT HIGH TRAFFIC AREAS

low impact

high impact

HANDS-FREE LAB SINKS

SEPARATE ELEVATOR CALL BUTTON

ANTIMICROBIAL PUSH PLATES AT RESTROOM

HANDS-FREE BREAKROOM SINKS

INCREASE AIR CHANGES IN LAB

BOTTLE FILLER INSTEAD OF DRINKING FOUNTAIN

SANITIZING STATION OUTSIDE RESTROOM

low cost

IMPLEMENTING SAFETY MEASURES ——

COMMUNICATIONS —

No strategy for the reduction of viral transmission will work without correct implementation. The CDC has recommended their guide literature be posted at the workplace. We would make the additional recommendation that the literature be made available as part of employee orientation, whether digital or manual, to allow for ease of reference.

Advantages to using literature from the CDC and WHO:

- This information is free.
- This information is vetted by science.
- This information is non-copyrighted to allow for dissemination.
- The repeated use of this information may help establish more consistency among PPE users.

DAILY ASSESSMENT

The practice of conducting a daily body inventory for potential symptoms is a mainstay of workplace health in the COVID-19 era. There are several potential approaches and applications, including required online surveys, voluntary assessments, and simple reminders of the key symptoms to look out for. The upshot is to develop better physical health assessments PRIOR to entering the work environment, where limiting contact duration and physical proximity then become the key safeguards against transmission.

How to Safely Wear and Take Off a Cloth Face Covering

Wear your face covering correctly
- Wash your hands before putting on your face covering
- Put it over your nose and mouth and secure it under your chin
- Try to fit it snugly against the sides of your face
- Make sure you can breathe easily
- Do not place a mask on a child younger than 2

Use the face covering to help protect others
- Wear a face covering to help protect others in case you're infected but don't have symptoms
- Keep the covering on your face the entire time you're in public
- Don't put the covering around your neck or up on your forehead
- Don't touch the face covering, and if you do, clean your hands

Follow everyday health habits
- Stay at least six feet away from others
- Avoid contact with people who are sick
- Wash your hands often, with soap and water, for at least 20 seconds each time
- Use hand sanitizer if soap and water are not available

Take off your cloth face covering carefully, when you're home
- Untie the strings behind your head or stretch the ear loops
- Handle only by the ear loops or ties
- Fold outside corners together
- Place covering in the washing machine
- Wash your hands with soap and water

https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-to-wear-cloth-face-coverings.html

MITIGATION — STRATEGIES

HEALTH KIOSK

provides medical and sanitation supplies, dispersed around the building

RECYCLE/COMPOST/TRASH

waste receptacles placed in centralized locations

POWER UMBILICAL

increased flexibility to relocate workstation rows as spatial requirements fluctuate

VIRTUAL MEETING

digital virtual collaboration needs to be met through equipment and program needs
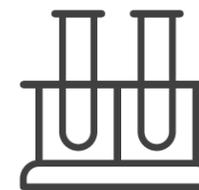
OFFICE

workstations must be separated to maintain recommended distance

MEETING

collaboration must be adjusted as the headcount of groups in conference rooms is limited

LAB

as in the open office, workbenches in the labs will also be given more sufficient spatial separation

AMENITIES

social distancing protocol will ensure the cleanliness and reduced utilization of amenity spaces

SOCIAL DISTANCING ——

ADJUSTMENTS TO PROMOTE HEALTH + SAFETY

Social distance protocols involves maintaining personal space, minimizing large group activities, and supporting hygienic procedures.
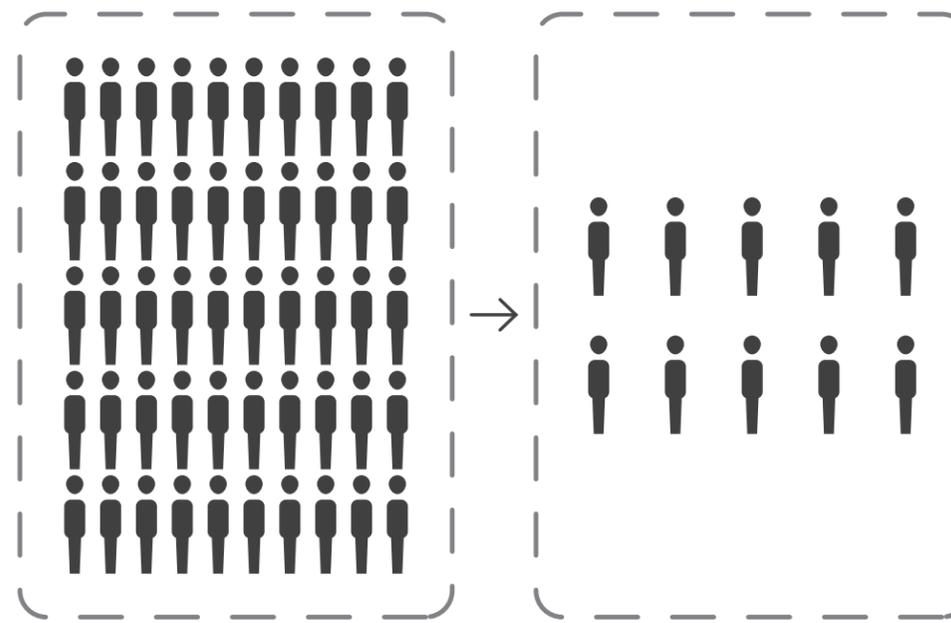
LARGE GATHERING

LIMITED GROUPS
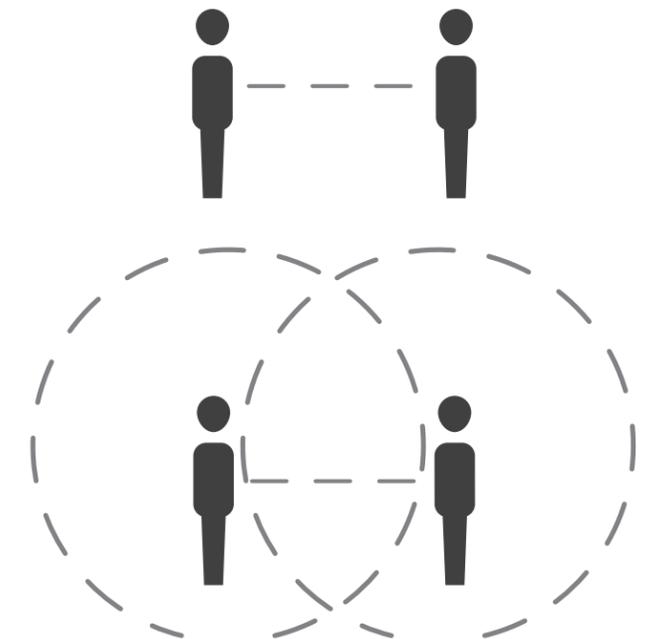
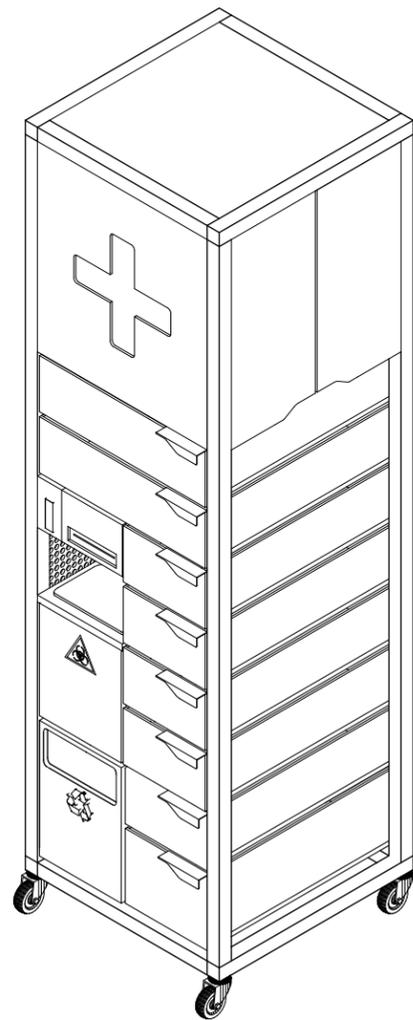6 FEET APART

PERSONAL SPACE:

6' RADIUS

OFFICE

LAB
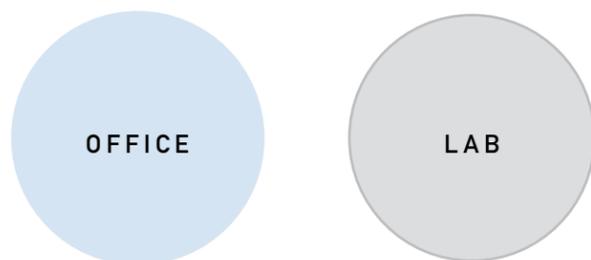
HEALTH
KIOSK —

These stations help minimize the potential for spreading contagious diseases by providing a location for sanitation and disposal.
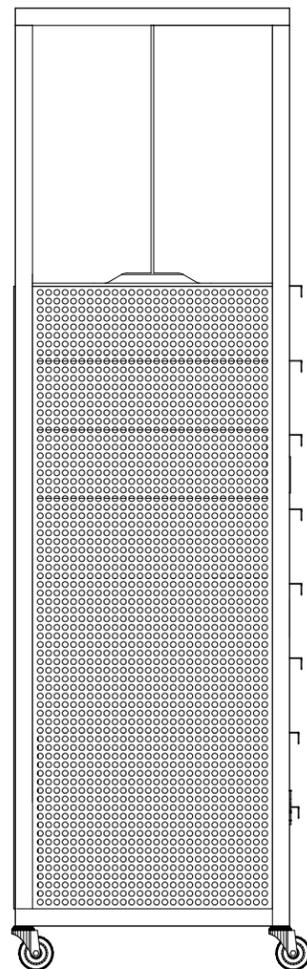
The kiosks are to be located at major entrances, common spaces, and meeting rooms; always within a reasonable distance for employees and visitors. Promote disinfecting surfaces routinely and washing hands.

HEALTH KIOSK

MEDICAL SUPPLIES
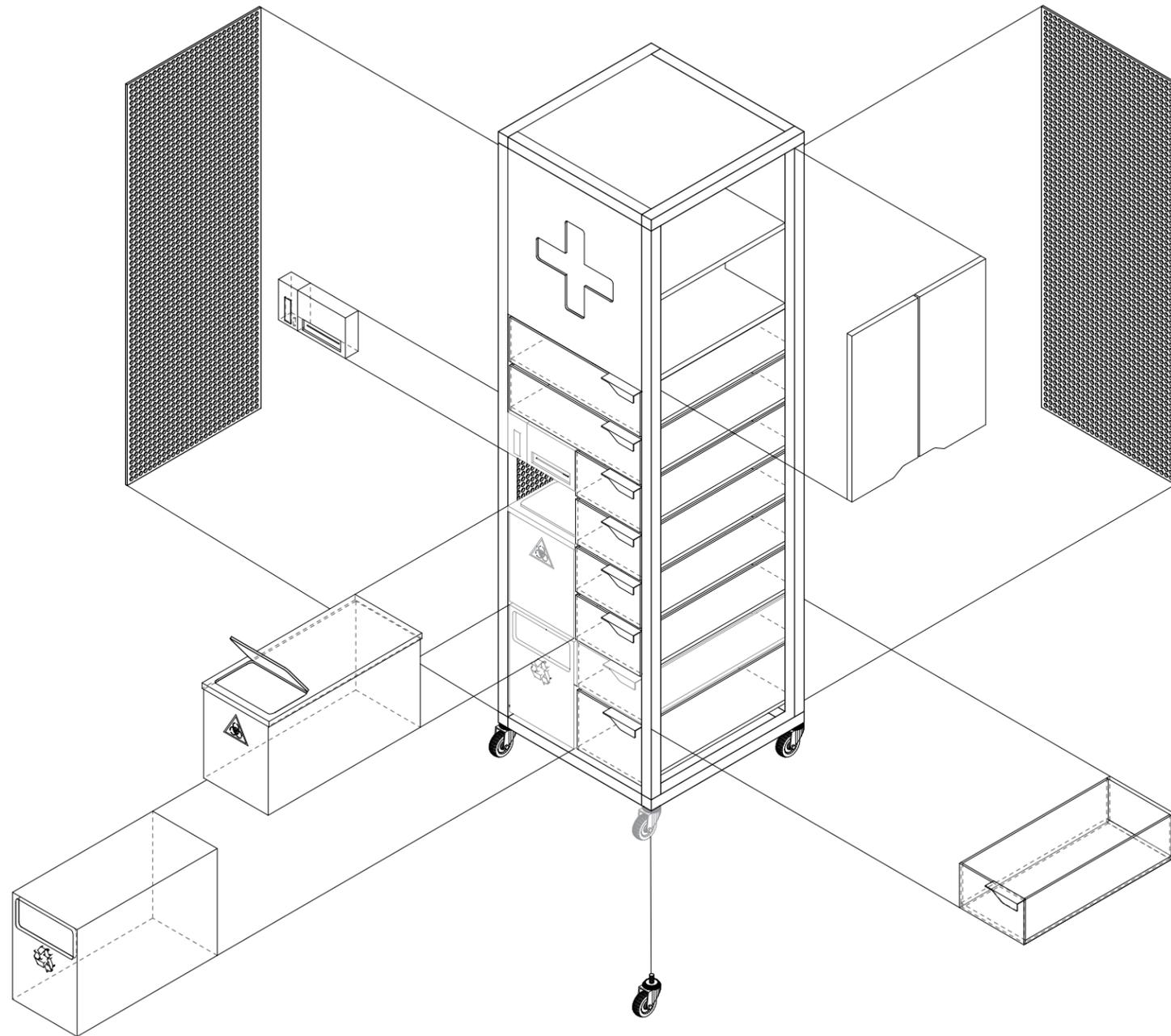
FACE MASKS

SANITARY TISSUES

HAND WASHING

HANDS-FREE DISINFECTANT

DISINFECTING WIPES

WASTE

PLAN

2'
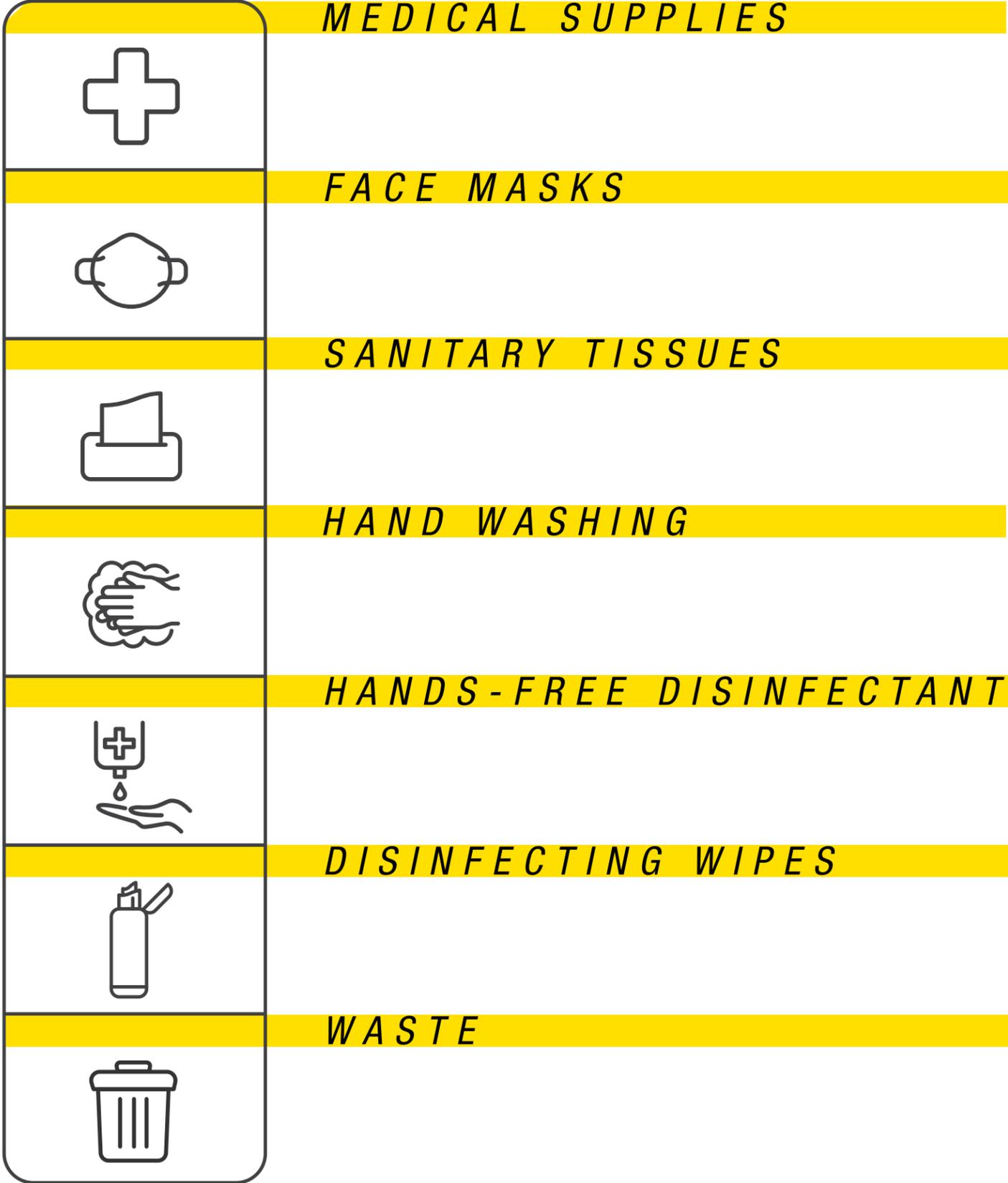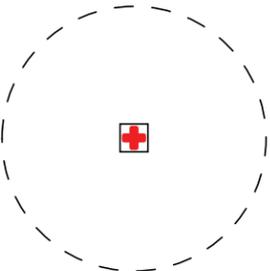
AXONOMETRIC

SIDE ELEVATION

FRONT ELEVATION

7'

2'

WAYFINDING/SIGNAGE

BULK STORAGE

CONVENIENT STORAGE

HANDS-FREE DISINFECTANT
SANITARY WIPES/KLEENEX

BIO-WASTE: Hands-free Top Access

RECYCLE

PLEXIGLASS

DRAWERS: paper masks

N-95 masks

sterile gloves

sanitary wipes
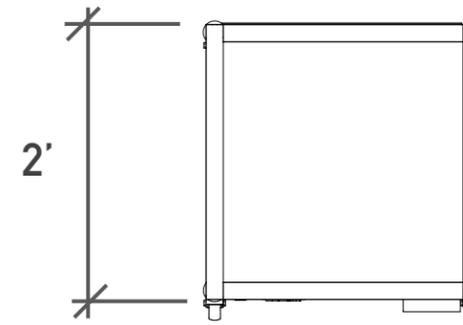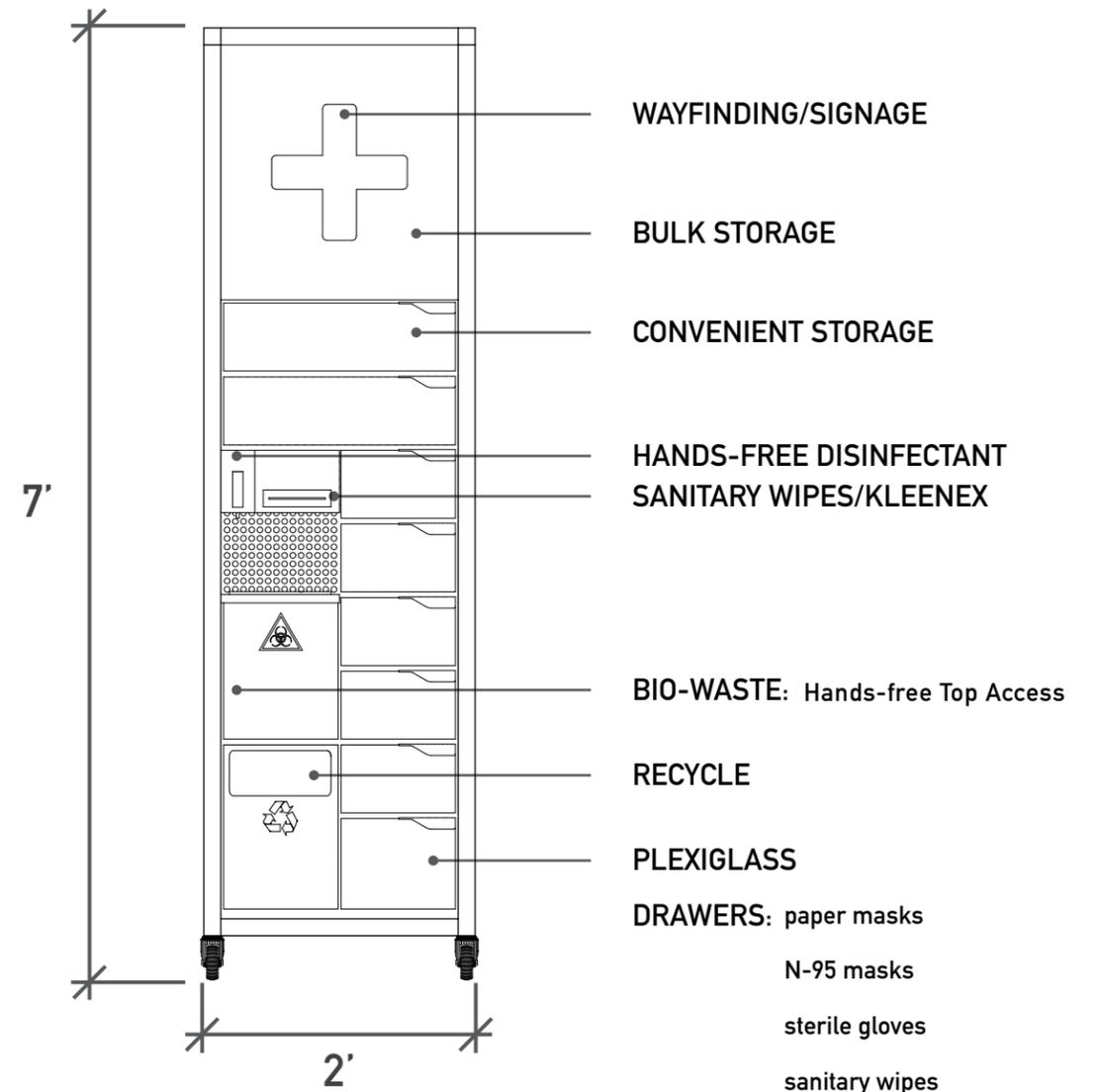
EXPLODED AXONOMETRIC

SANITIZER COMPARTMENT

ADDITIONAL STORAGE

DRAWERS: masks, gloves, and wipes

SANITIZER & TISSUE DISPENSERS

WASTE
Fits 10-gallon trash can

STRUCTURE
Powder coated steel Plexiglas

CASTERS
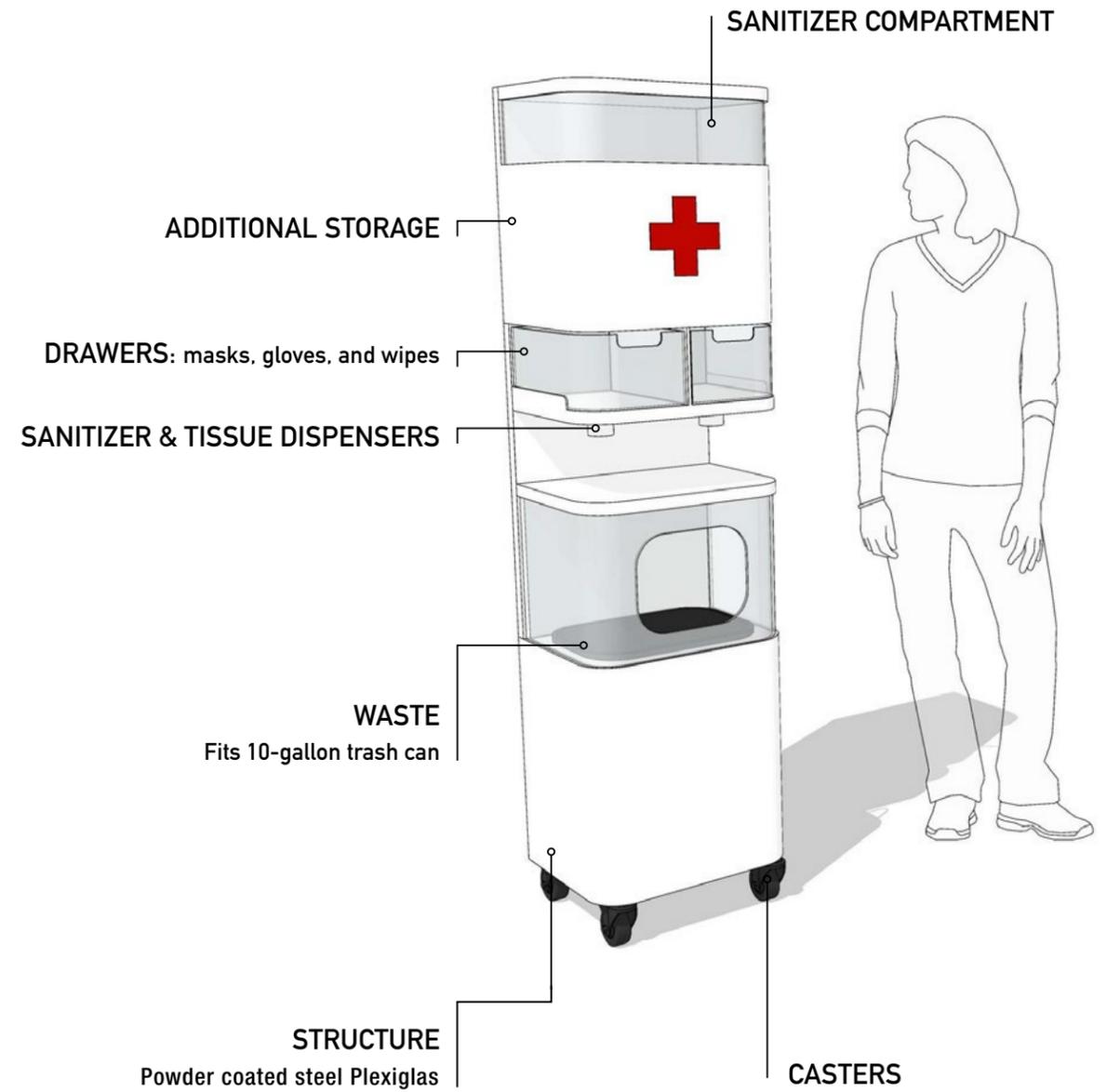
SAMPLE PROTOTYPE OF MANUFACTURED KIOSK

STRATEGIES ——

WASHROOM STUDY —

The CDC guidance has identified washrooms as high-risk vectors for virus shedding. Washrooms are high-cost elements within a building as plumbing is expensive to reroute. It is beneficial to consider the organizational inputs: dedicated washrooms for essential and non-essential staff.

Ceiling: Epoxy-painted gypsum

Motion sensing bottle filler in lieu of drinking fountain

Self-actuated doors or push hardware: Remove latches at single occupancy

Occupancy sensor/counter

Sanitize station

Antimicrobial push plate

Hands-free toilet lid

Individual sinks in lieu of countertops

No queuing inside bathroom

Paper towel dispenser in lieu of hand air dryer

MECHANICAL SUMMARY ——

The purpose of this summary is to provide a description of HVAC Contamination Mitigation strategies in order to aid in the discussion of contaminant control between spaces. The following descriptions are listed in descending order of effectiveness for contaminant mitigation.

1 PHYSICAL BOUNDARIES

Physical boundaries are the best strategy for limiting contaminant migration spread via airflow. Compartmentalizing spaces into smaller rooms/more zones helps reduce airflow migration from space to space that could potentially spread airborne contaminants.

2 INCREASE OUTSIDE AIR (REDUCE/ELIMINATE RECIRCULATED AIR)

Increase Outside Air (reduce/eliminate recirculated air) — Bringing in fresh outside air and reducing recirculation helps reduce the spread of airborne contaminants introduced within a building. Outside air has an extremely low chance of introducing COVID-19 into the space.

3 PRESSURIZATION BOUNDARIES

Designating rooms positively or negatively pressurized relative to each other is an effective means of mitigating airflow migration.

A. Create pressurization boundaries by offsetting supply and exhaust airflow to create a pressure difference.

B. Assigning pressure relationships (cascading relationships) can help limit airflow migration in a more predictable manner.

C. Open spaces will be a challenge implementing pressurization boundaries. This strategy is more effective on a room-by-room level. In large spaces, localized airflow patterns can be created by several different means outside the controllability of the system. Examples include buoyancy effects, changing weather conditions, changing wind patterns, and opening and closing of operable openings into the building.

D. Pressurization boundaries are dependent on physical boundaries. A pressure relationship can't be created without a defined and confined volume.

4 FILTRATION / PURIFICATION

A. Filtration and Purification systems in general can be installed at the AHU level, a central point in the ductwork, at zone terminal units, or at points of return. Due to the 100% Outside Air AHUs, filtration is recommended only at the AHU level and at a zone terminal unit if it has recirculation.

B. Office-zoned VAV terminal units could be upsized and selected to accommodate MERV 13 filters. This will help mitigate recirculating contaminant within the respective zone.

C. The use of UV Light Purifiers or Ionization Purifiers could be evaluated but they are most beneficial in a typical recirculating VAV AHU.

FLOW ——
SEPARATION

AXONOMETRIC
FLOW DIAGRAM

Personnel and material separation of production lab/support are to operate independently from non-lab groups.

L4

L3

L2

L1

OFFICE ENTRY

LAB ENTRY
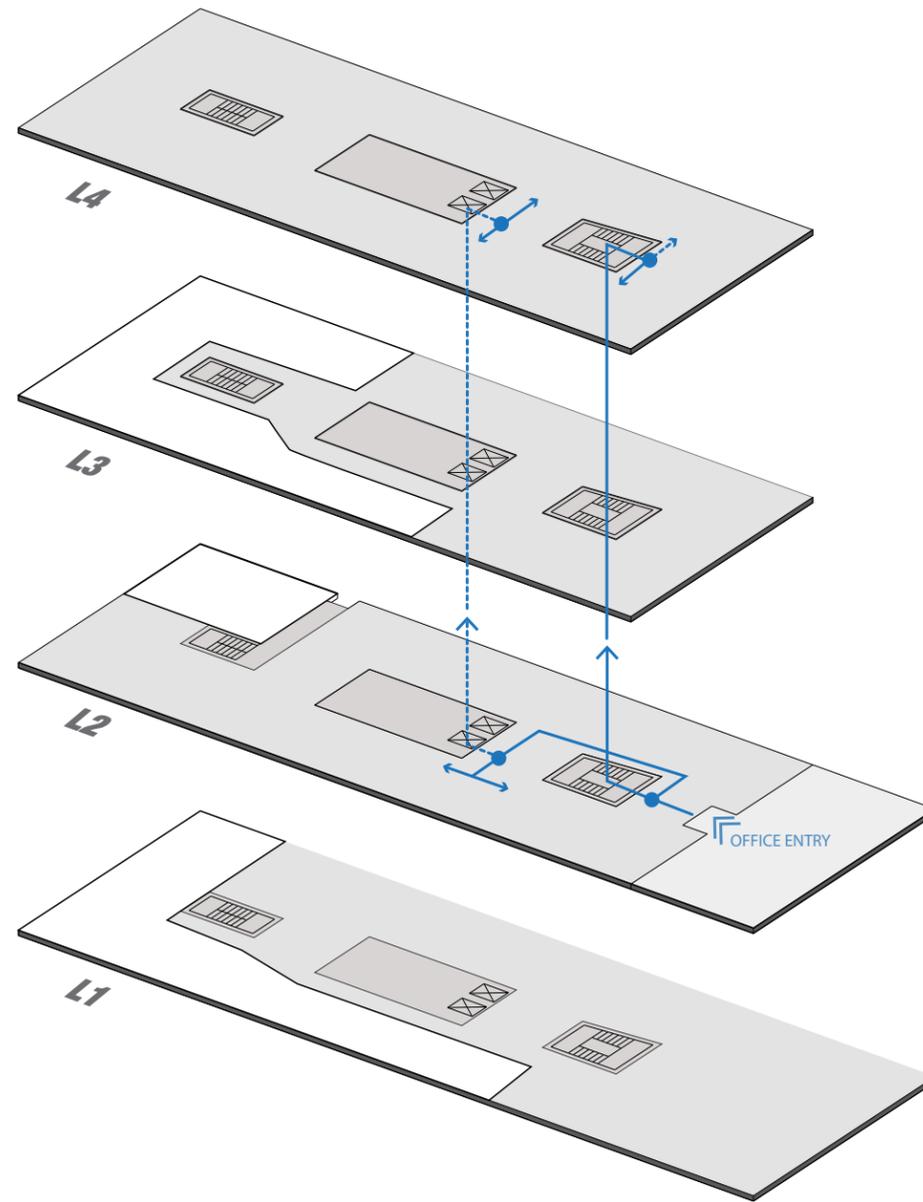
OFFICE (NON-LAB)
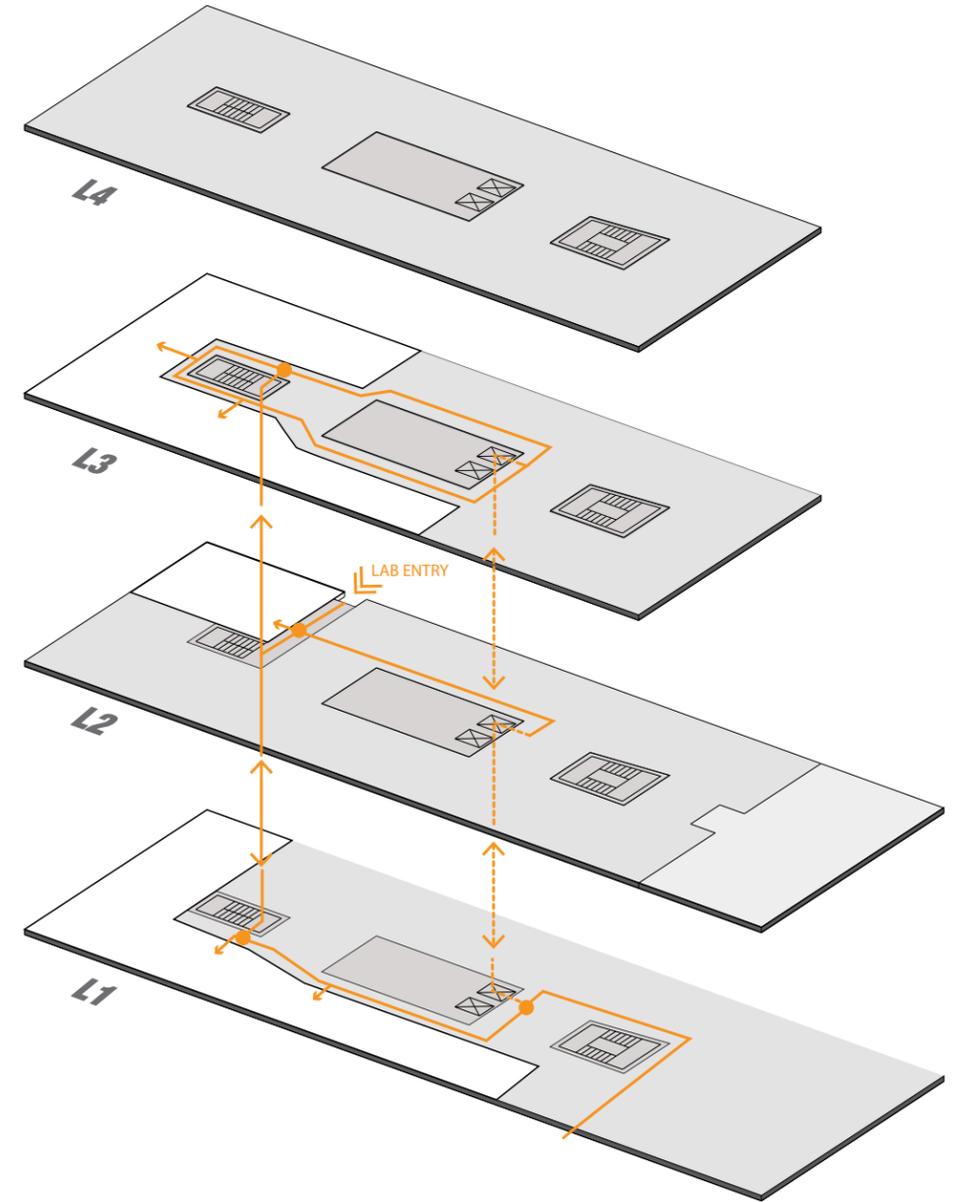
LAB OPERATIONS

ELEVATOR DIAGRAM ——

ISOMETRIC DIAGRAM

SEPARATE CALL BUTTON

LAB QUEUING AREA

OFFICE QUEUING AREA

PLAN DIAGRAM

6' SEPARATION
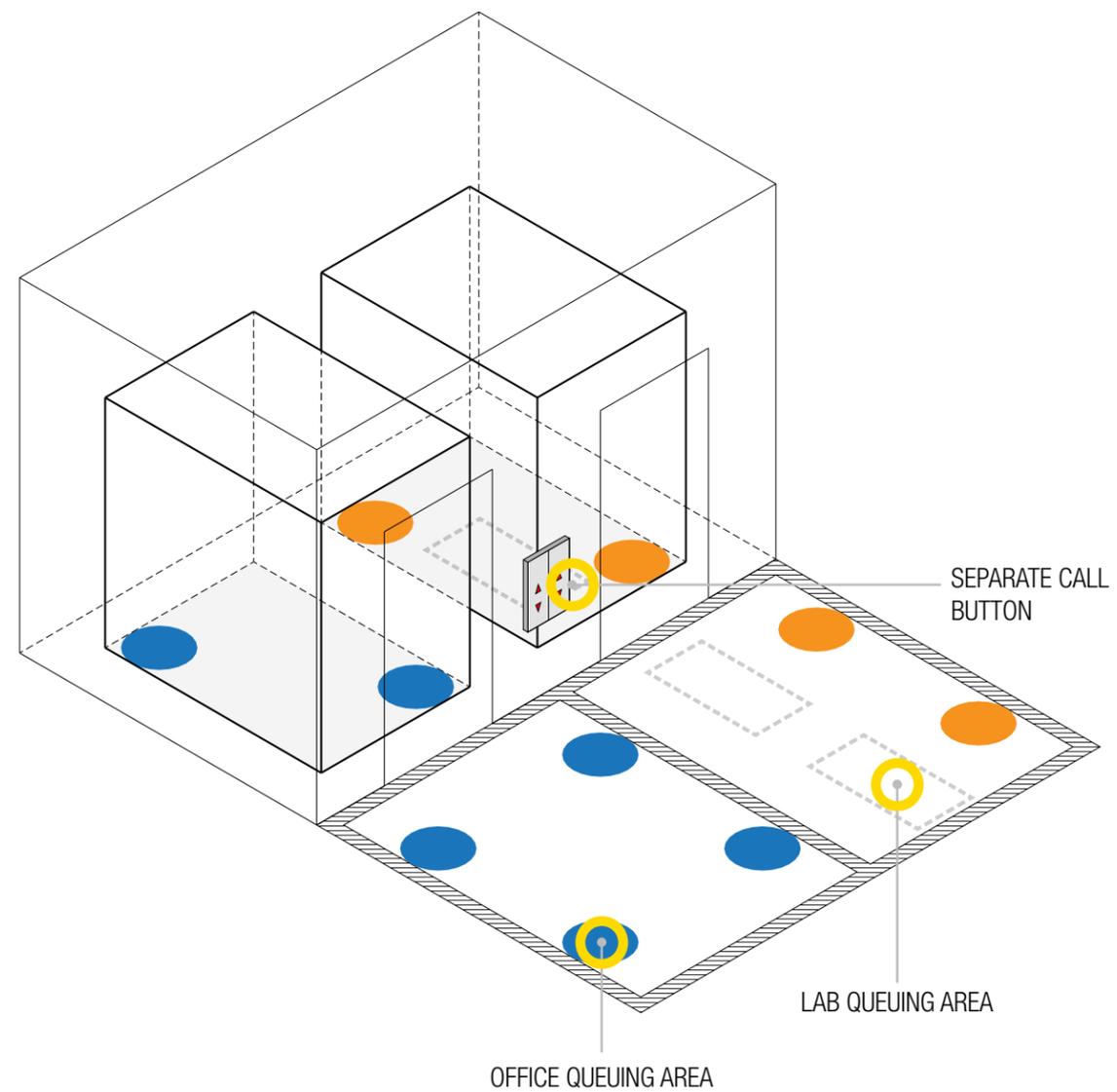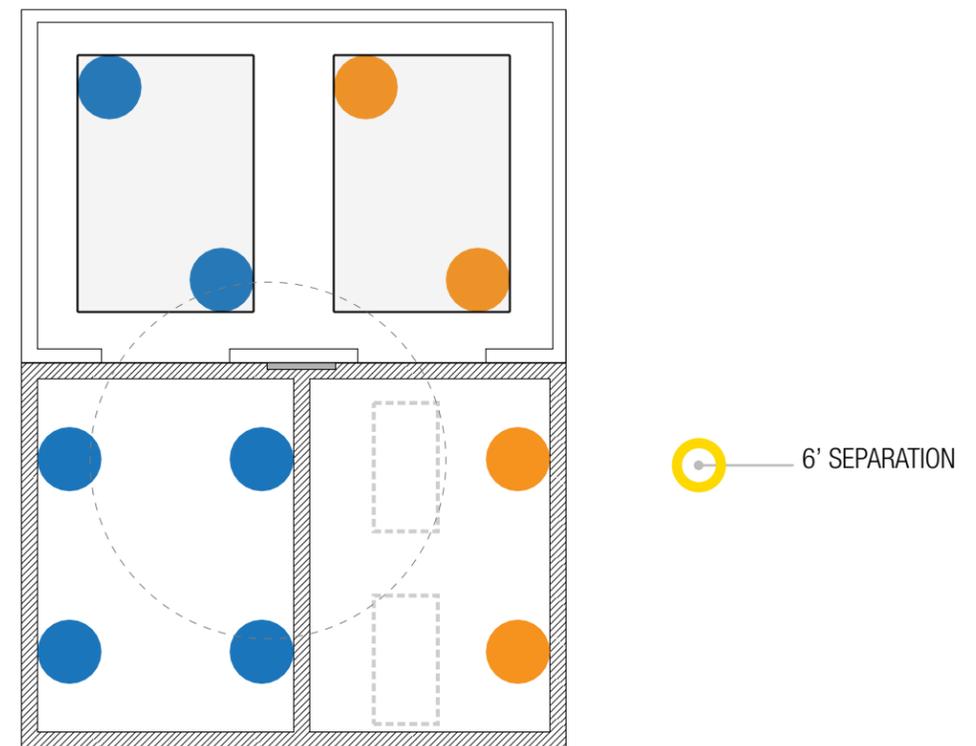
LAB PLANNING — STRATEGIES

LAB CHOREOGRAPHY ——

ARRIVING (WITH MASK ON)

1. WASH HANDS
2. PUT ON GLOVES
3. FRESH GOWN (DISPOSE PACKAGE)
4. EYE PROTECTION

DEPARTING (WITH MASK ON)

1. DE-GOWN (TO USED GOWNS)
2. REMOVE GLOVES
3. RECYCLE EYEGLASSES
4. WASH HANDS
5. RECYCLE MASK IF POLICY
5. EXIT

FRESH, PACKAGED GOWNS OR COTTON DISPOSABLES

EXTRA SUPPLY

EYE PROTECTION

4

FACE SHIELDS

RECYCLING
(CLEAN & REPLACE)

3

S   M   L   XL

3

1   **2**

USED GOWNS   TRASH

5

LAB ACCESS

HEALTH
KIOSK

EXTRA SUPPLY

GLOVES

2   S   M   L   XL

1   **4**

SINK
(HANDS-FREE)
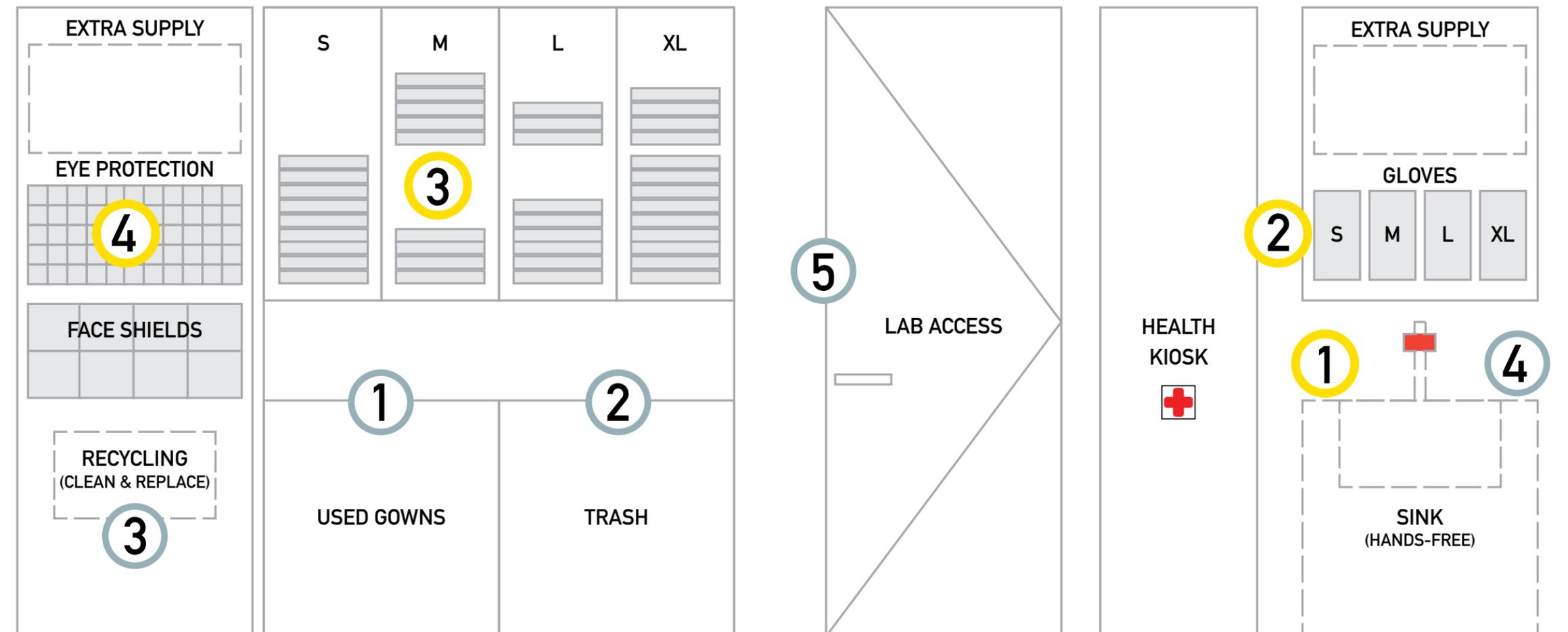
LAB GOWN ENTRY
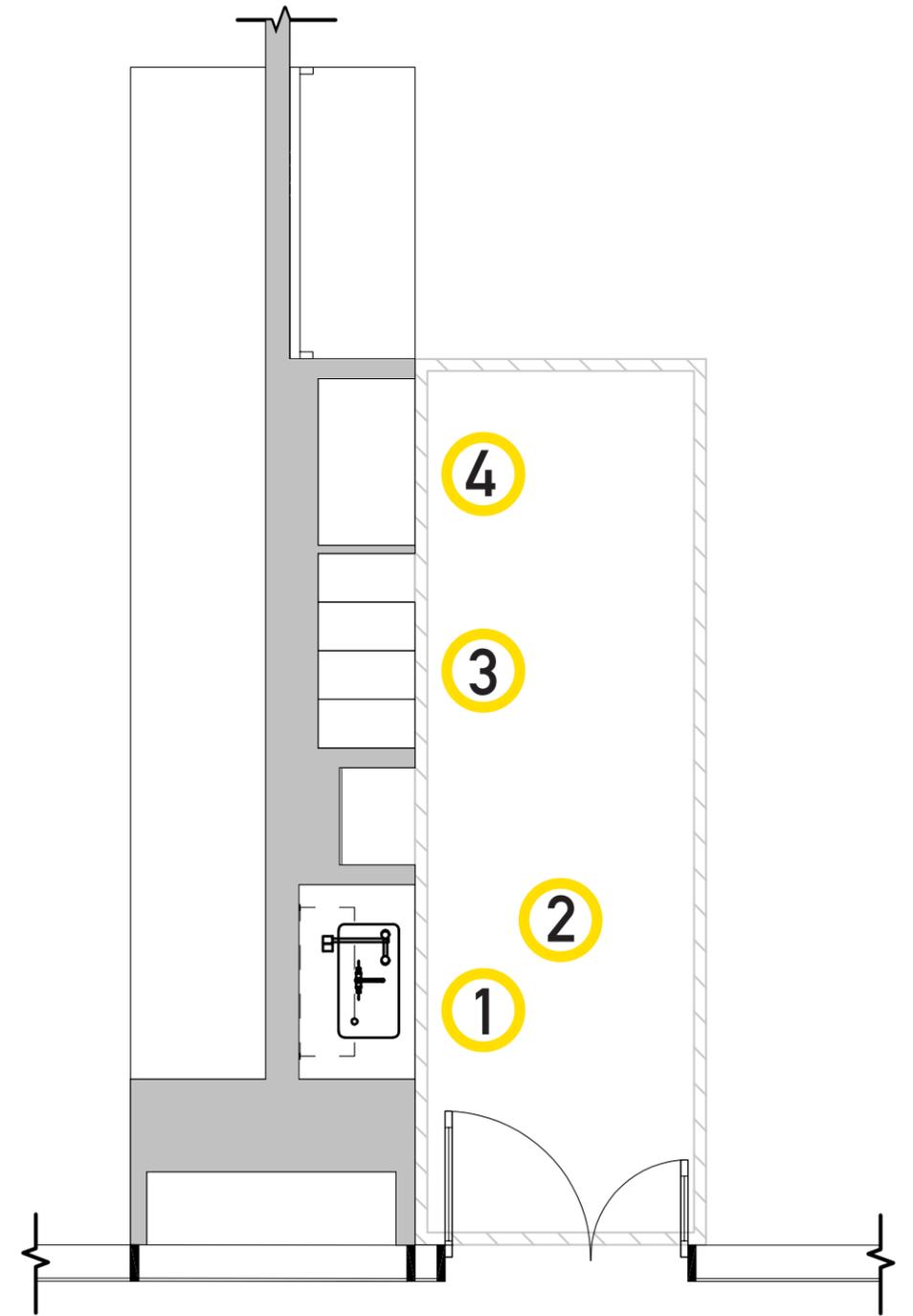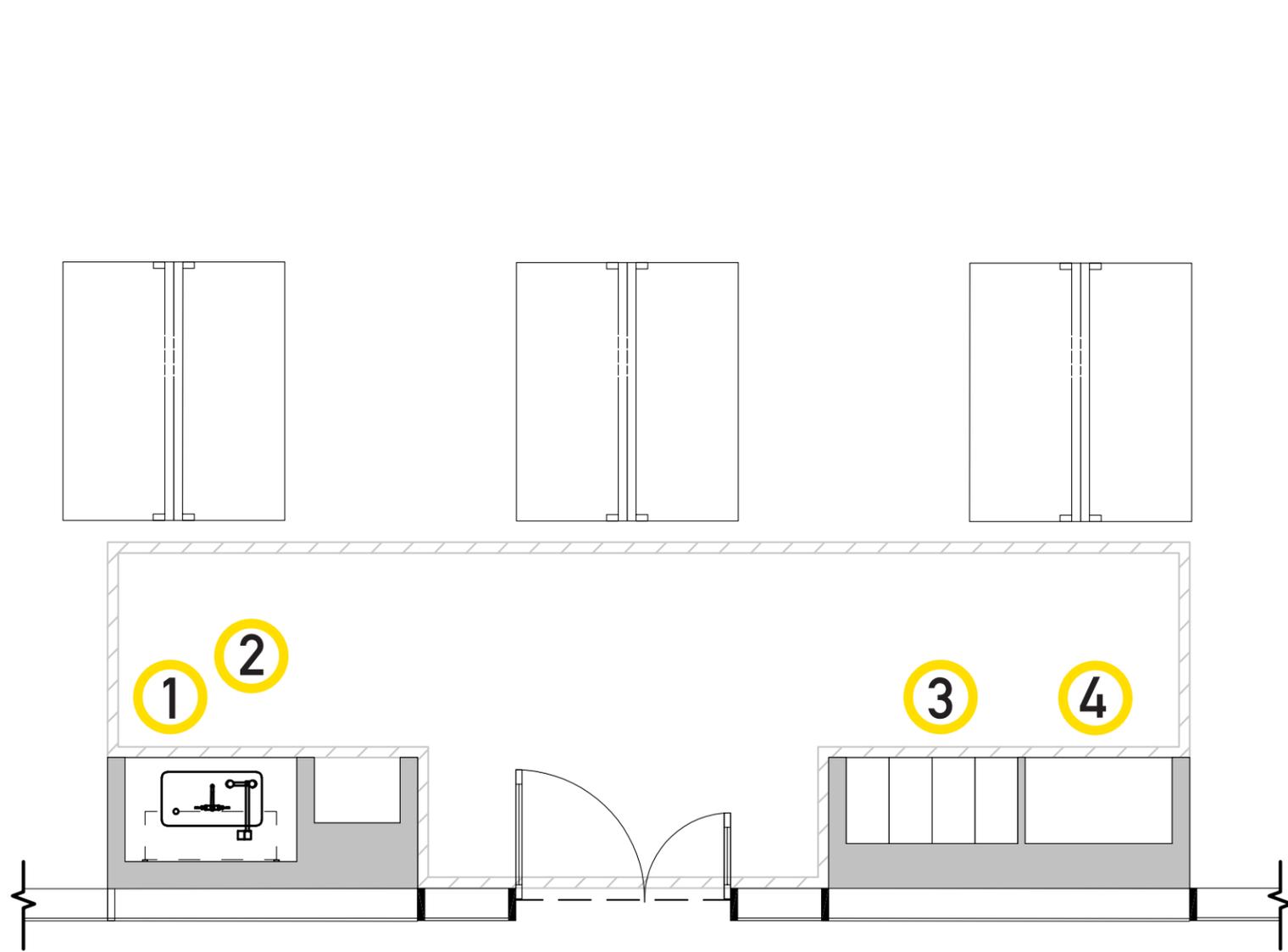
L A B S —

SPECIFIC ADJUSTMENTS

The typical capacity of lab benching will be reduced, providing increased personal space for employees. The program, use of specific equipment, and layout of each lab typology must be considered unique to its respective uses, needs, and flexibility.

The diagrams to the right show a phased approach and provide guidance on density, directional flow, egress, and locations for lab coats and PPE to limit employee contact and maintain a safe scientific environment.

START-UP PLAN
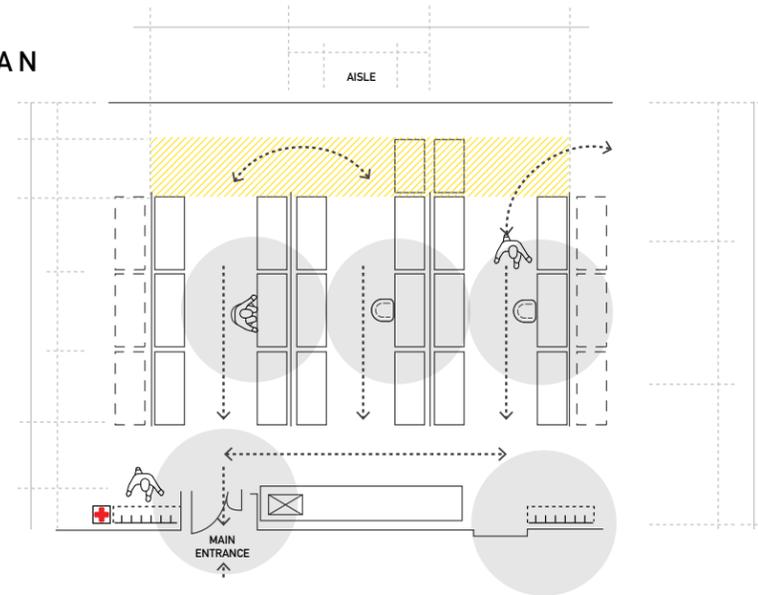
INCREASED DENSITY
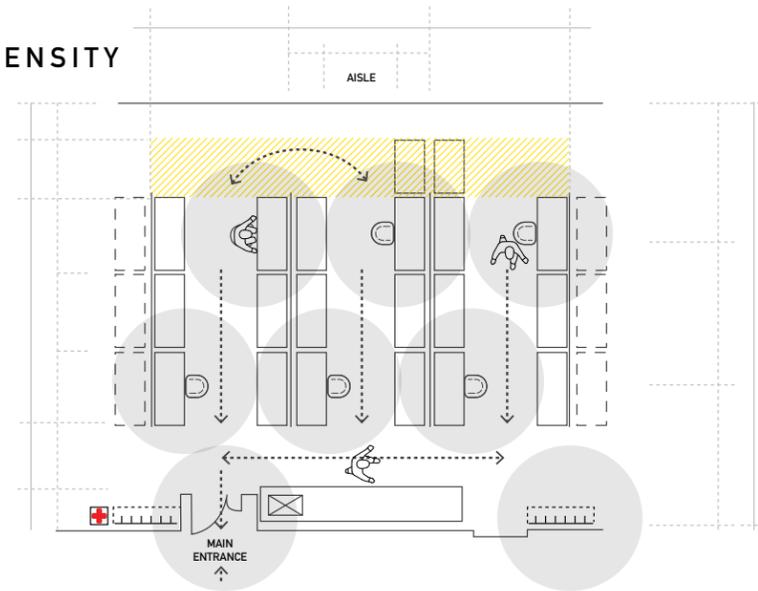
FUTURE STATE
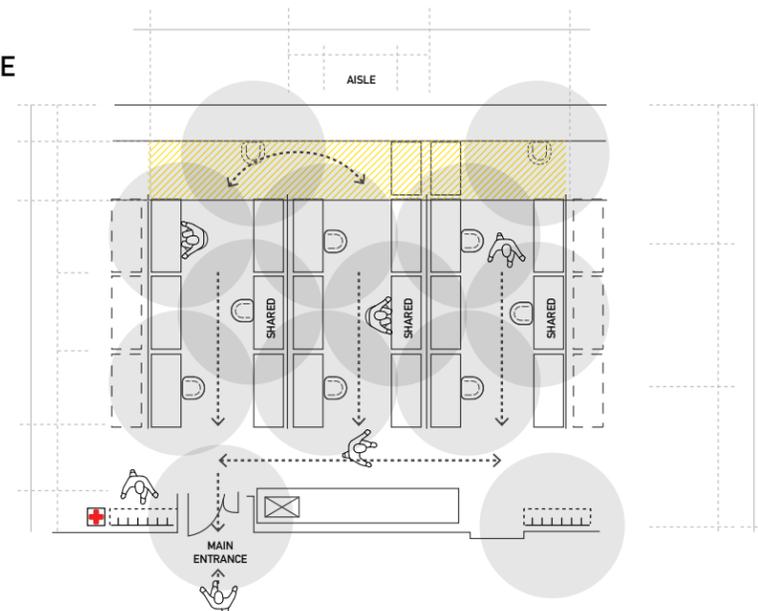
Area Analysis:
Module 10.5' x 31.5' = 330.75 nsf
Module 11' x 33' = 363 nsf

32.25 nsf difference (9.7% increase) from corporate to academic

Peninsula Bench:
Module 11' x 26' = 286 nsf
143 nsf / researcher
ELF = 52.5 LF
26.2 ELF / researcher

Island Bench:
Module 11' x 33' = 363 nsf
181.5 nsf / researcher
ELF = 58 LF
29 ELF / researcher
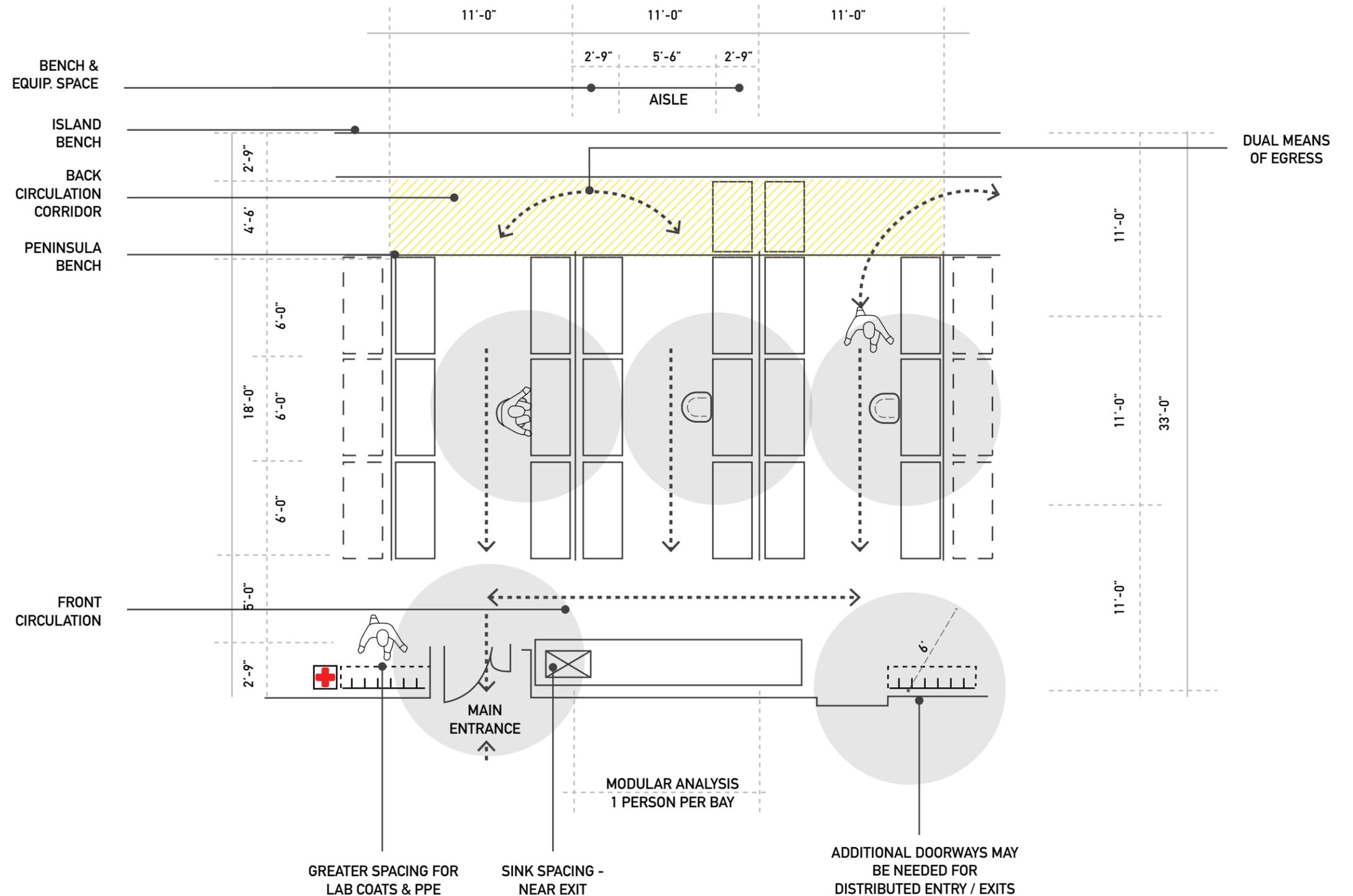49.5 nsf additional for Island
(8.5% increase in area/researcher)

* circles have 6' radius

* converting every other island bench to peninsula gains ELF

START-UP PLAN

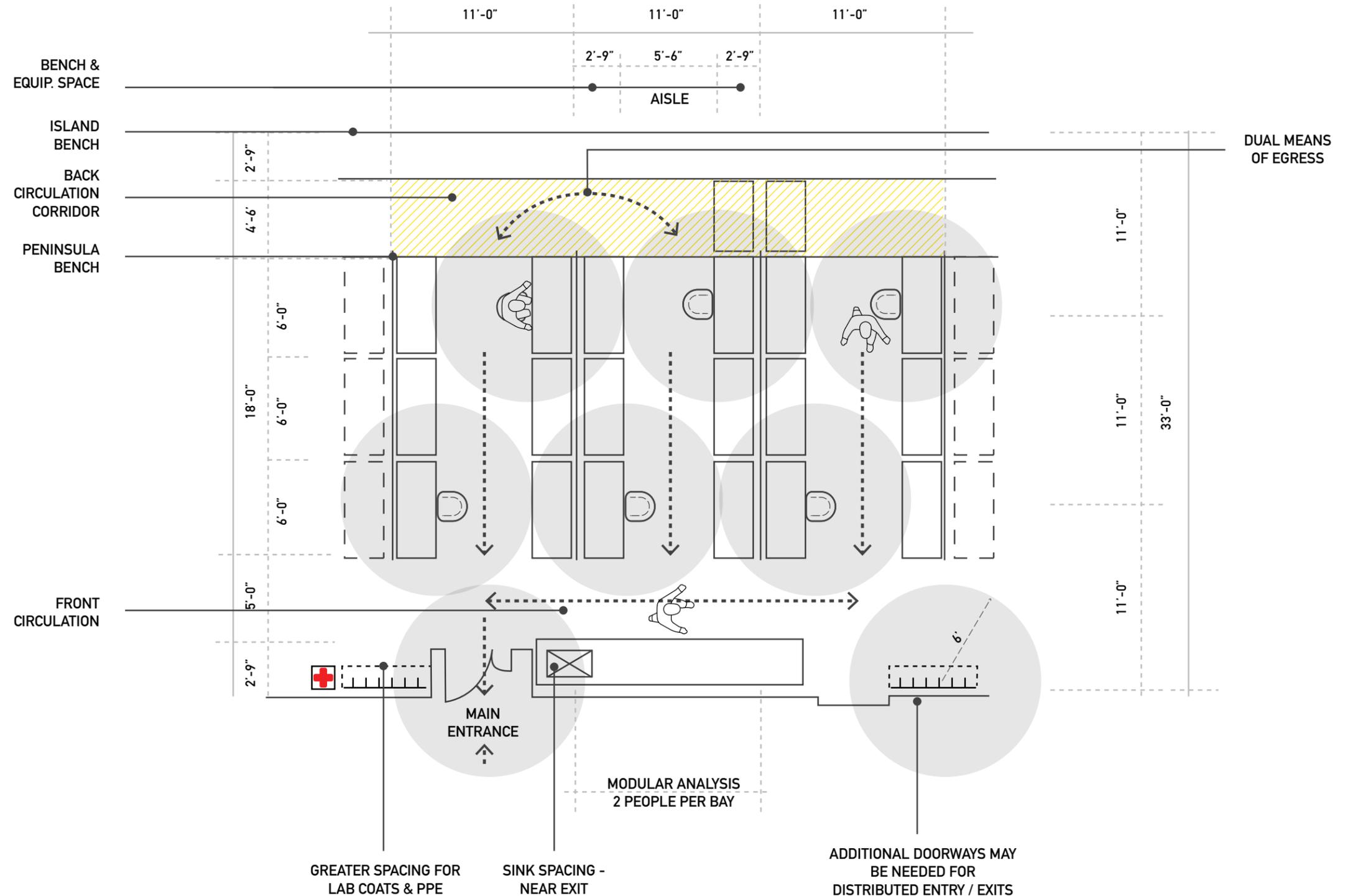The start-up scenario for initial reoccupancy includes one person per bay.

· Controlled space and circulation

· Less congestion of people in the lab allows fewer entries into the lab

· Greater spacing for lab coats and PPE

· Easier to manage and supervise procedurally

BENCH & EQUIP. SPACE

ISLAND BENCH

BACK CIRCULATION CORRIDOR

PENINSULA BENCH

FRONT CIRCULATION

11'-0"   11'-0"   11'-0"

2'-9"   5'-6"   2'-9"

AISLE

DUAL MEANS OF EGRESS

2'-9"

4'-6"

6'-0"

18'-0"   6'-0"

6'-0"

5'-0"

2'-9"

11'-0"

11'-0"   33'-0"

11'-0"

6'

MAIN ENTRANCE

MODULAR ANALYSIS
1 PERSON PER BAY

GREATER SPACING FOR LAB COATS & PPE

SINK SPACING - NEAR EXIT

ADDITIONAL DOORWAYS MAY BE NEEDED FOR DISTRIBUTED ENTRY / EXITS

INCREASED DENSITY

The second scenario shows two people per bay, where it is feasible to add a second person if there is proper spacing at their primary workstation. This scenario is based on the availability of additional testing.

· Less congestion of people in the lab allows fewer entries into the lab

· May require a secondary entrance/exit and additional PPE stations

· More challenging to supervise

BENCH & EQUIP. SPACE

ISLAND BENCH

BACK CIRCULATION CORRIDOR

PENINSULA BENCH

FRONT CIRCULATION

11'-0" 11'-0" 11'-0"

2'-9" 5'-6" 2'-9"

AISLE

DUAL MEANS OF EGRESS

2'-9" 4'-6" 6'-0" 18'-0" 6'-0" 6'-0" 5'-0" 2'-9"

11'-0" 11'-0" 11'-0" 33'-0"

6'

MAIN ENTRANCE

MODULAR ANALYSIS
2 PEOPLE PER BAY

GREATER SPACING FOR
LAB COATS & PPE

SINK SPACING -
NEAR EXIT

ADDITIONAL DOORWAYS MAY
BE NEEDED FOR
DISTRIBUTED ENTRY / EXITS

FUTURE STATE //
FULL OCCUPANCY

The future-state scenario shows two to three people per bay as the new normal. This scheme includes a separate corridor for dual egress should other people be in the same bay.

· More congestion of people in the lab, consideration for additional entries/exits and PPE stations

· Strongly suggests dual egress corridor based on higher densification

· More challenging to supervise, requires significant training and additional protocols

BENCH & EQUIP. SPACE

ISLAND BENCH

BACK CIRCULATION CORRIDOR

PENINSULA BENCH

FRONT CIRCULATION

AISLE

2'-9"   5'-6"   2'-9"

11'-0"   11'-0"   11'-0"

2'-9"

4'-6"

6'-0"

18'-0"   6'-0"

6'-0"

5'-0"

2'-9"

SHARED   SHARED   SHARED

DUAL MEANS OF EGRESS

11'-0"

11'-0"   33'-0"

11'-0"

MAIN ENTRANCE

MODULAR ANALYSIS
2-3 PEOPLE PER BAY

GREATER SPACING FOR
LAB COATS & PPE

SINK SPACING -
NEAR EXIT

ADDITIONAL DOORWAYS MAY
BE NEEDED FOR
DISTRIBUTED ENTRY / EXITS
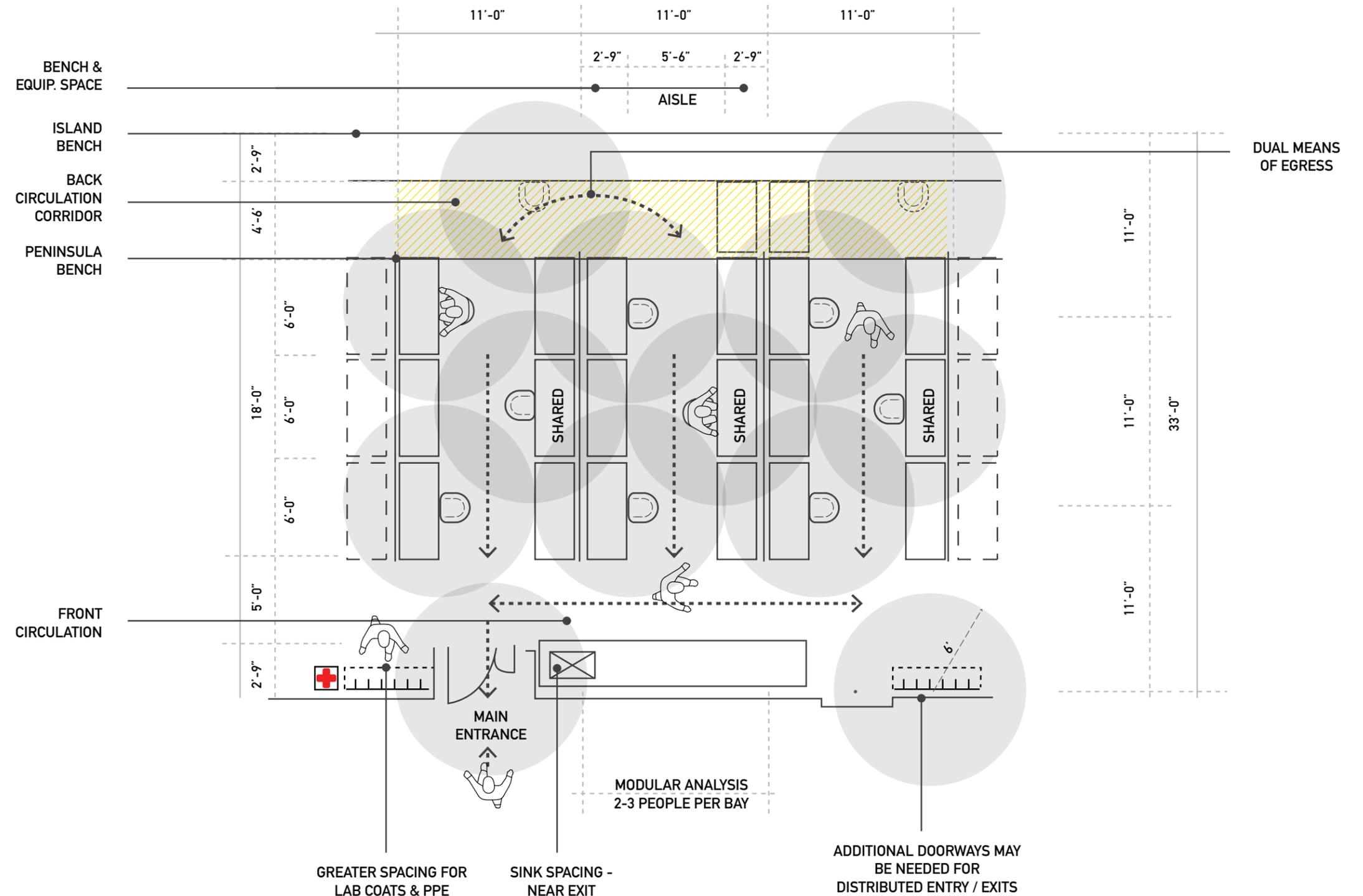
FUTURE STATE // FULL OCCUPANCY ANALYSIS

INSTITUTIONAL MODEL
10.5' X 31.5' MODULE
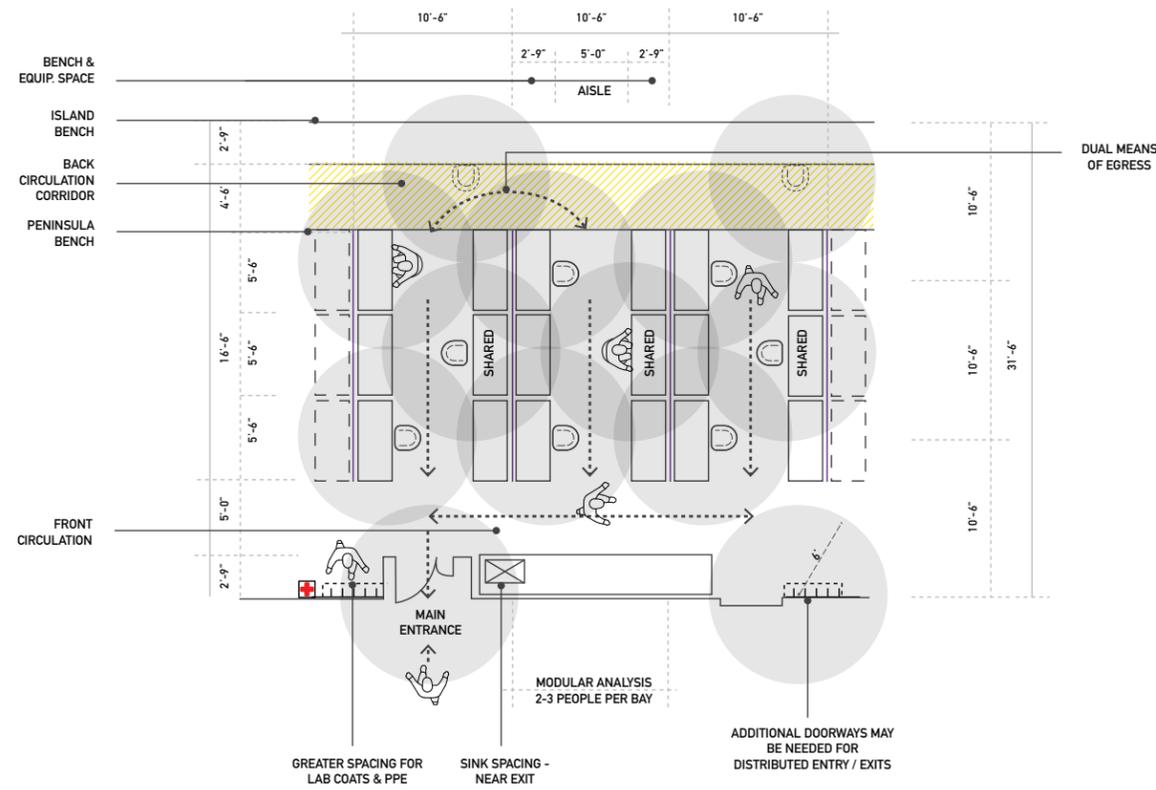
CORPORATE MODEL
11' X 33' MODULE

Area Analysis:
Module 10.5' x 31.5' = 330.75 nsf
Module 11' x 33' = 363 nsf

32.25 nsf difference (9.7% increase) from corporate to academic

Peninsula Bench:
Module 11' x 26' = 286 nsf
143 nsf / researcher
ELF = 52.5 LF
26.2 ELF / researcher

Island Bench:
Module 11' x 33' = 363 nsf
181.5 nsf / researcher
ELF = 58 LF
29 ELF / researcher
49.5 nsf additional for Island
(8.5% increase in area/researcher)

* circles have 6' radius

* converting every other island bench
  to peninsula gains ELF

WORKPLACE & COLLABORATION SPACES ——

OPEN —

OFFICE

WORKSTATION DENSITY

The typical layout of benching in an open office will be adjusted under social distancing to provide ample space. The density of 4' and 5' workstations creates an intense amount of connection in typical set-up.

HEADCOUNT

62

HEADCOUNT

30

OPEN ——— OFFICE
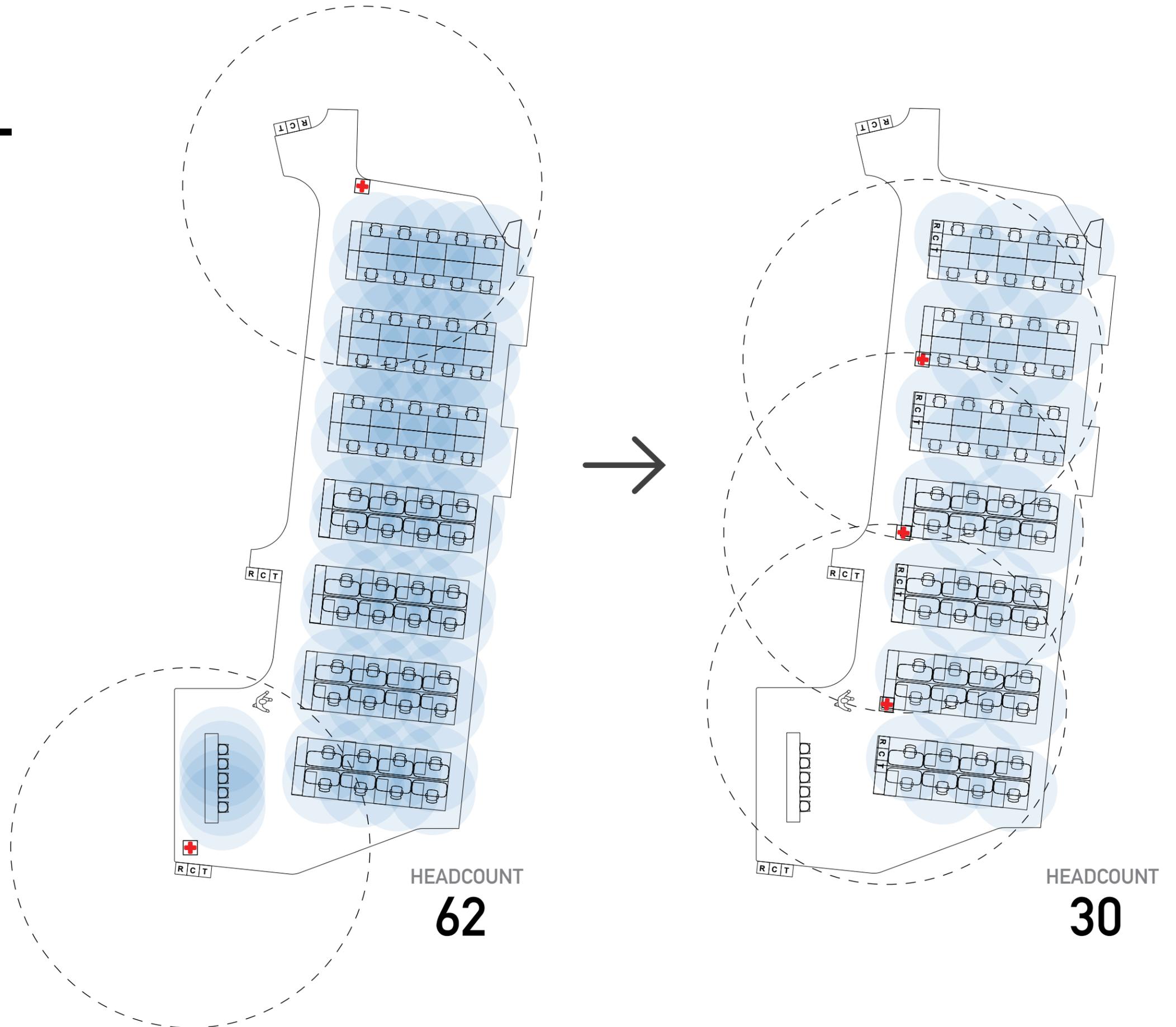
LONG-TERM CHANGE
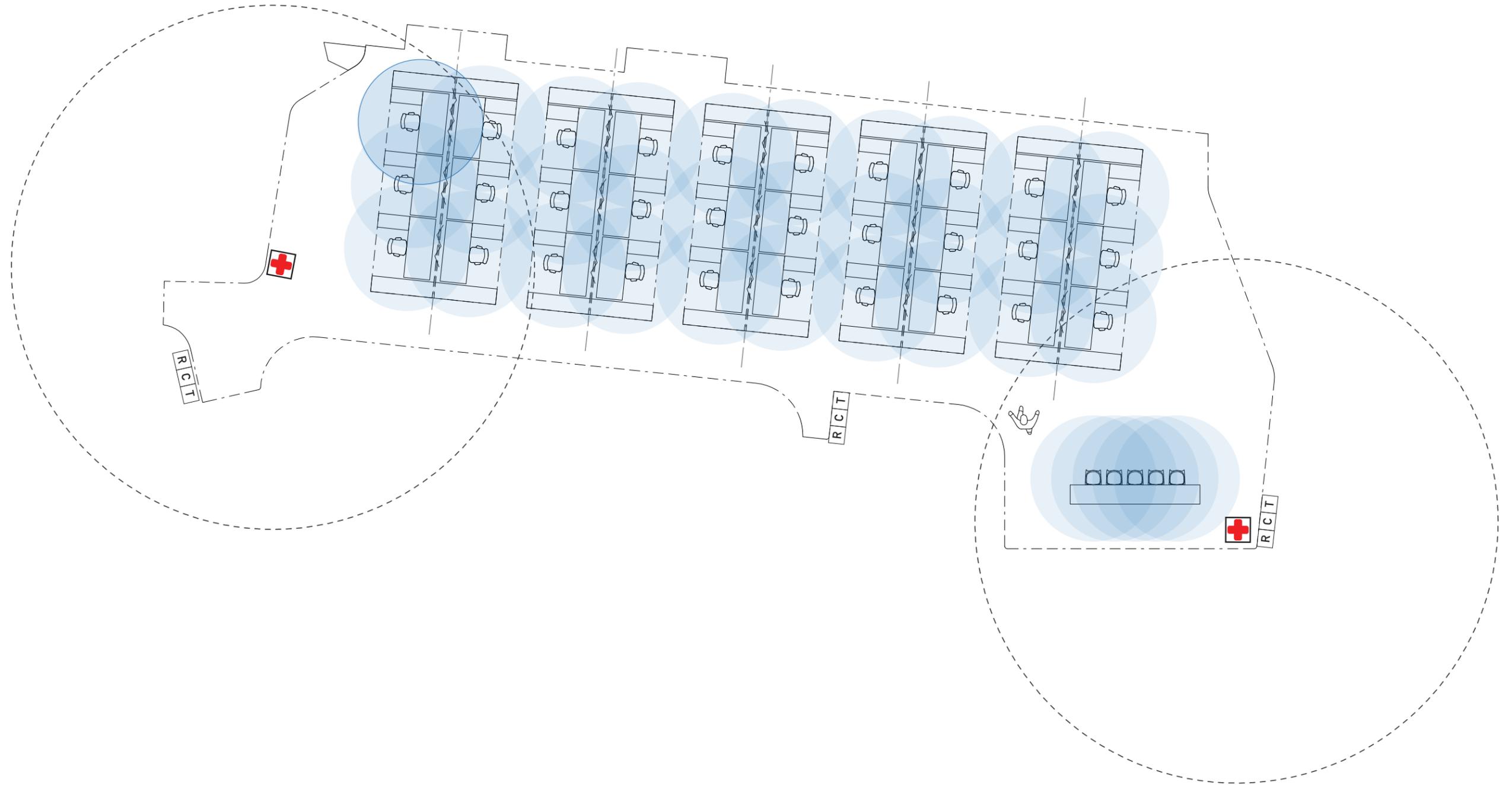
SHARED ——— OFFICE

OFFICE LAYOUTS

HEADCOUNT
2

HEADCOUNT
2

HEADCOUNT
2

HEADCOUNT
2

TOTAL —— HEADCOUNT

	TYPICAL		*SOCIAL DISTANCING*
WORKSTATIONS & TOUCHDOWN	2	→	1
PRIVATE OFFICE	1	→	1

VIRTUAL —— MEETINGS

WORKING OFF-SITE

Working remotely limits person-to-person contact and will need to be embraced in most industries in the coming years. With increased technology and capabilities of virtual collaboration, working from home will become easier and a sought-after commodity for employees. The physical workplace needs to reflect these changes and adjust accordingly.

REMOTE WORKERS
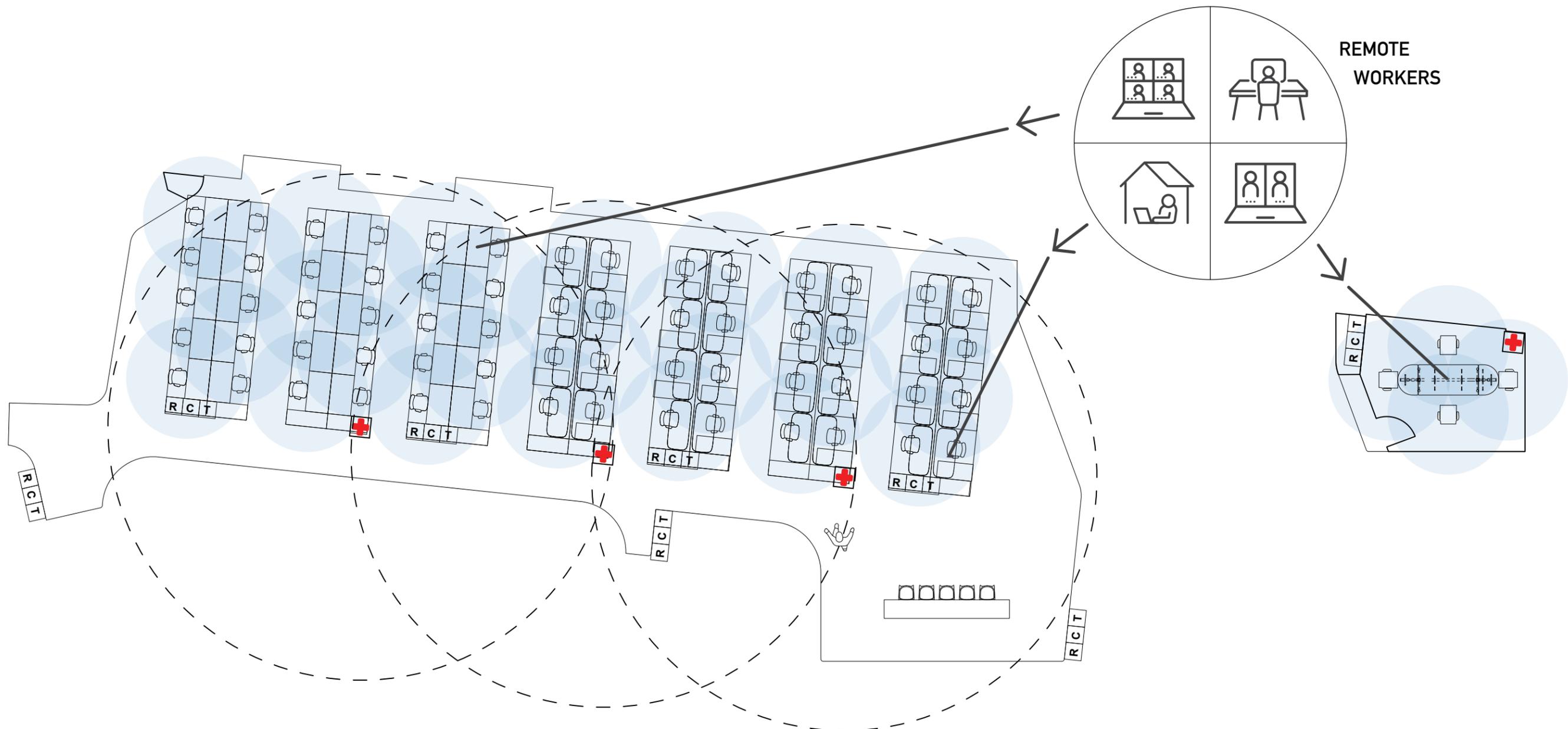
CONFERENCE ROOMS —

MEETINGS

The limited enclosed space in most meeting rooms will require reduction in headcount.

LARGE CONFERENCE
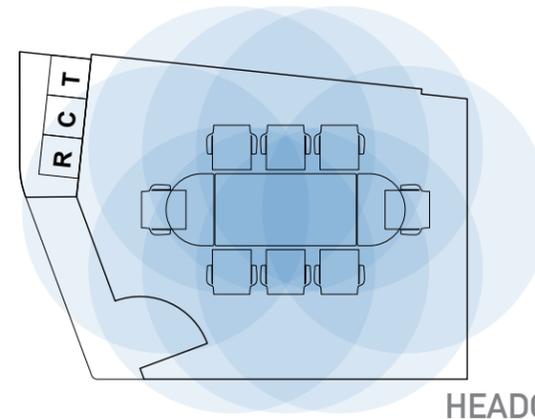
HEADCOUNT
8

HEADCOUNT
4

MEDIUM CONFERENCE
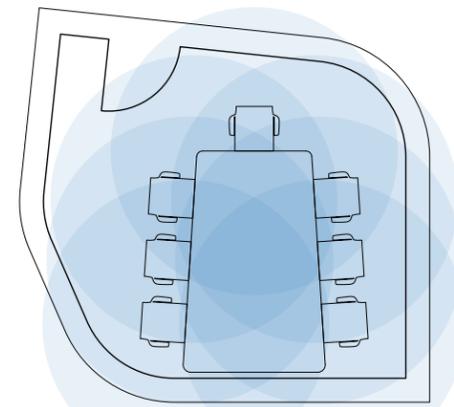
HEADCOUNT
7
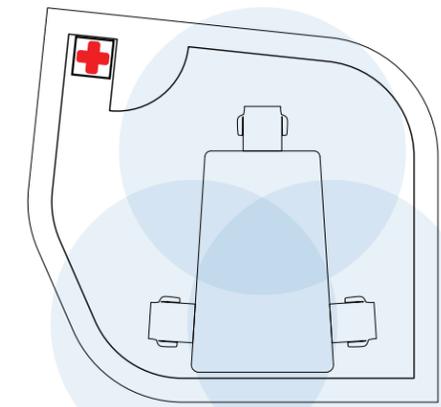
HEADCOUNT
3

SMALL CONFERENCE
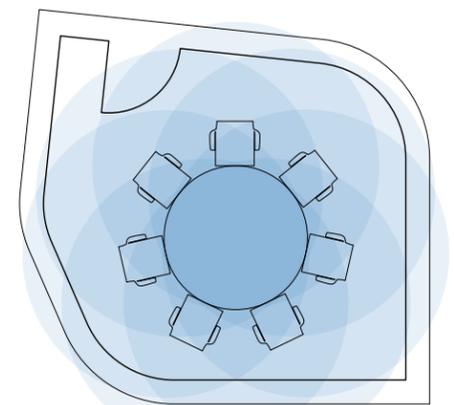
HEADCOUNT
7

HEADCOUNT
3

BOARDROOM

HEADCOUNT

22
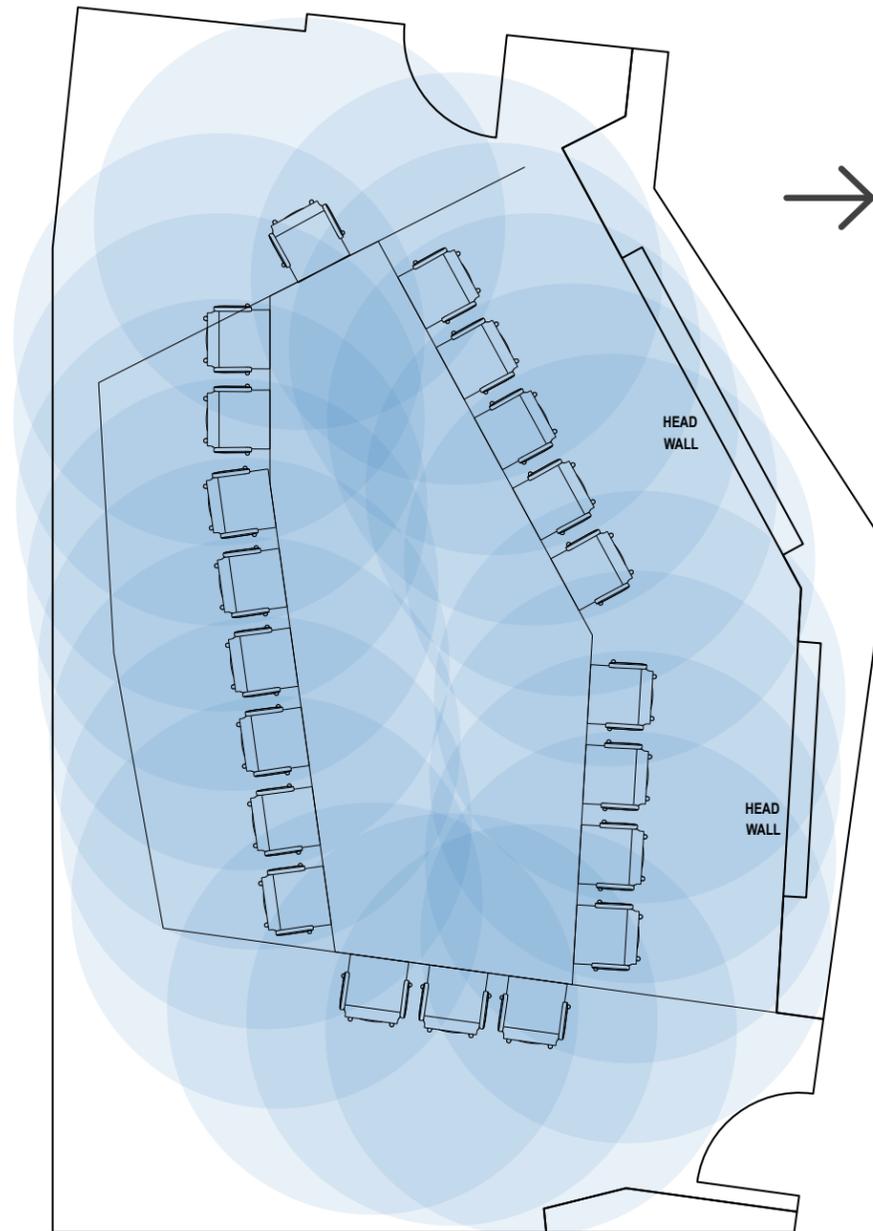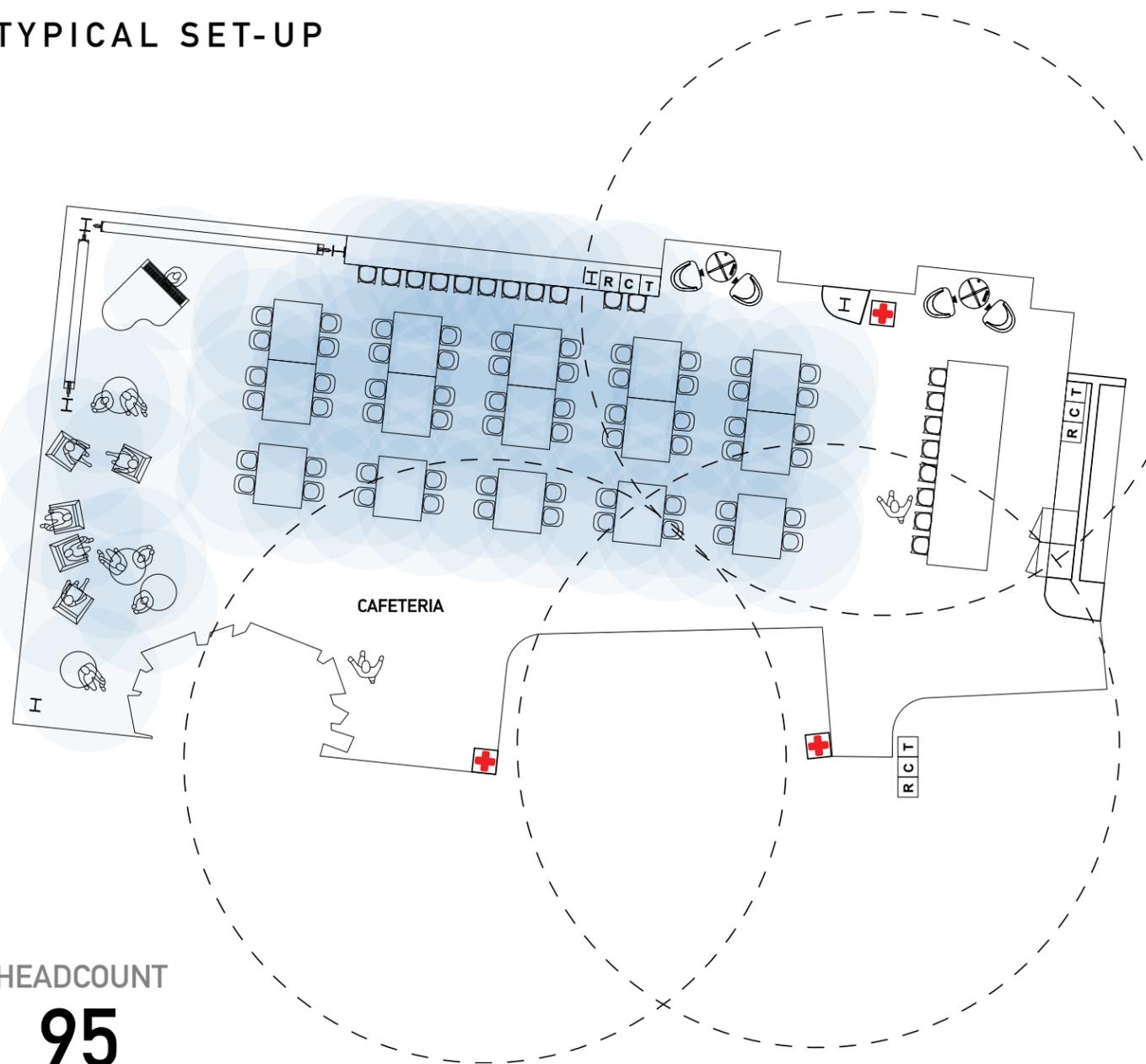
HEADCOUNT

8

ALL-HANDS ROOM ——
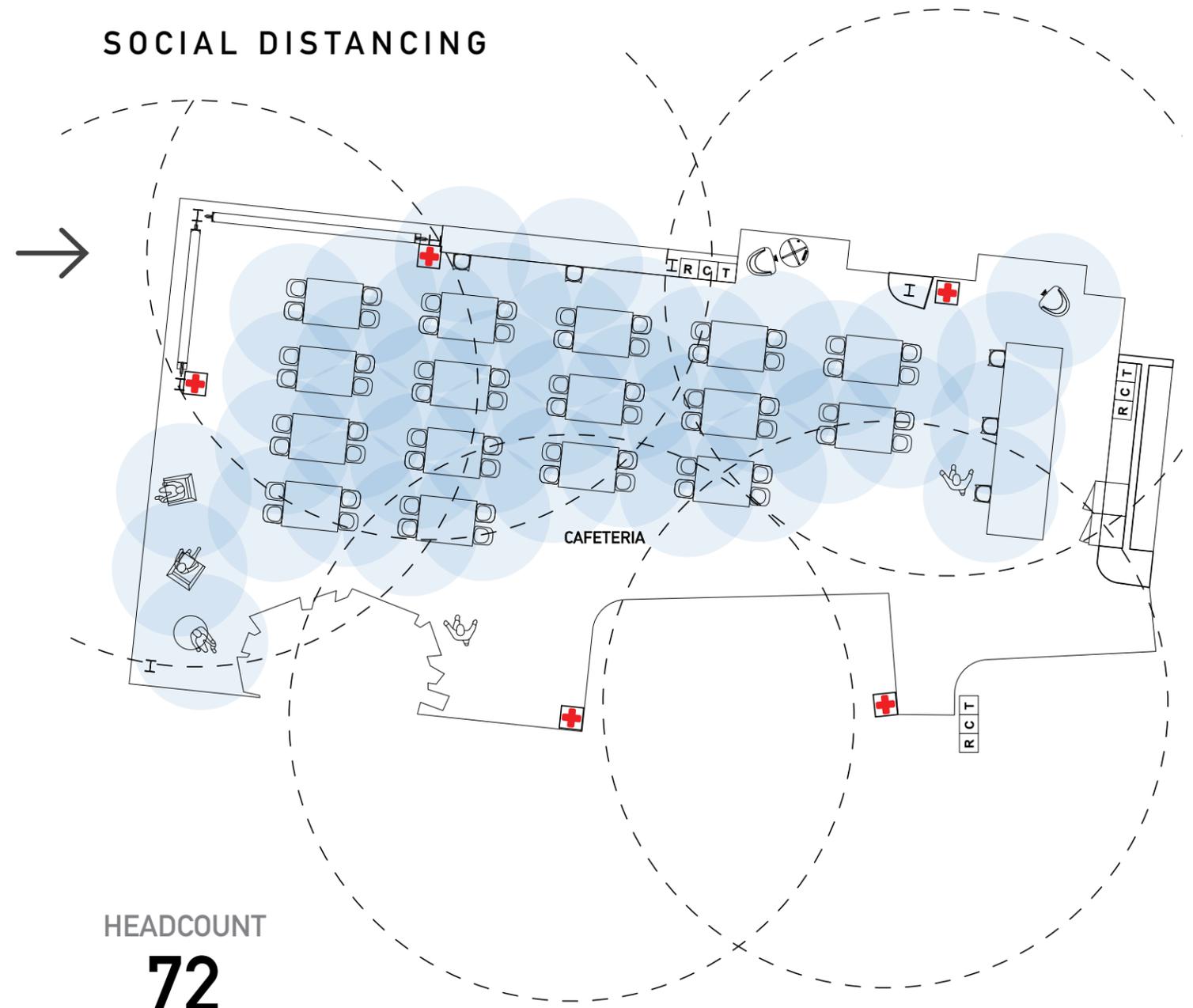
Limiting interaction at communal spaces will be an integral part of social-distancing measures.

TYPICAL SET-UP

SOCIAL DISTANCING

CAFETERIA

CAFETERIA

HEADCOUNT
95

HEADCOUNT
72

MEETING —— HEADCOUNT

TYPICAL   SOCIAL DISTANCING

MEETING
HEADCOUNT   2   →   1

TOTAL
HEADCOUNT   2   →   1

MEETING:HEADCOUNT   2   →   1

HOTELING ——

What will make work personal? If desks are not personalized, thought should be given to the experience of booking through arriving. Furniture systems may be modified to manifest an employee avatar upon arrival and to help teams assemble more fluidly. How does co-working function with contact tracing? This also needs to be considered when making a move to fully flexible interior space assignments.

Ford. Harrison T.
reserved

Smith. Jane A.
reserved
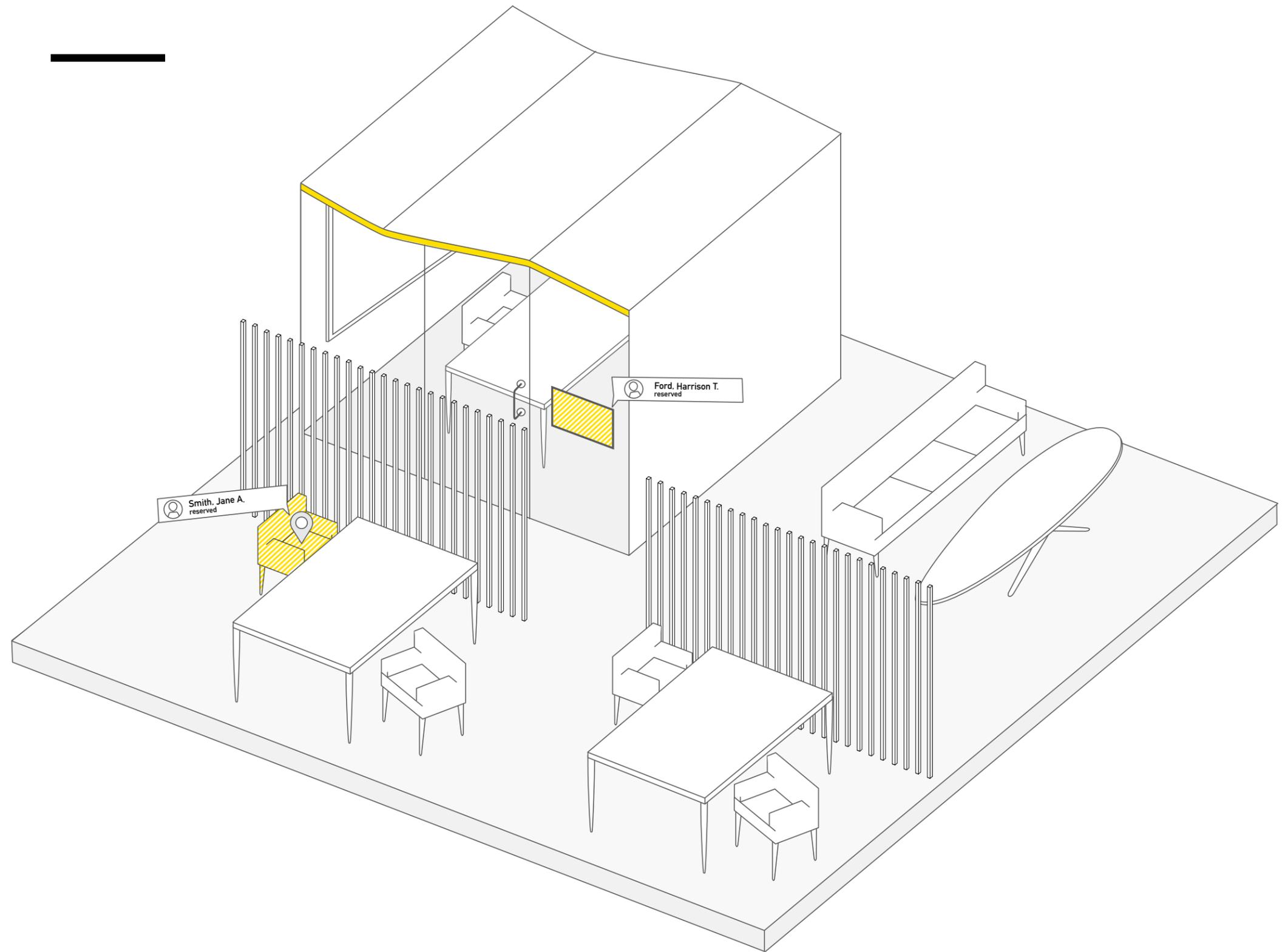
COWORKING —

TYPICAL SPACES & FEATURES

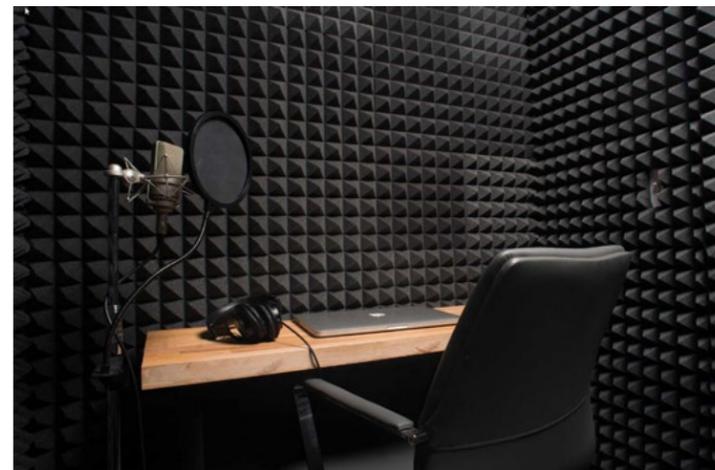|	
Meeting Rooms	"Library" Desking
Phone Rooms	Plants
Lounge	Communal Tables
Bar/Pantry	Sheer Curtains
Quiet Place	Residential Furniture

GATHERING - divisible conference room

DESKING - private, open, and "rentable" options

ACOUSTICS - super quiet space for once in a while

COMFORT - residential language

FLEXIBLE - sheer curtains to divide areas

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