



Evolving Code and Regulatory challenges

with the emergence of Logistics Automation using Robotics and AI

October 3rd, 2023

Speakers



Sandesh Jagdev
Founding Principal
Logimaxx
jagdevs@logimaxx.com
404-429-6036
www.logimaxx.com



Thank You!

CTBUH Article

https://global.ctbuh.org/resources/papers/4614-Jagdev_LogisticsAutomationUsingRobotics.pdf

Future Events

**AIA AAH Robotics
National Webinar-
December 12th, 2023**



Douglas J King AIA NCARB ACHA
Vice President
National Healthcare Sector Leader
Project Management Advisors Inc.
dougk@pmainc.com
312-848-1588
www.pmainc.com



Show of Hands

Owners

Vendors

Architects/Planners

Facility managers



Agenda

- **What** are various options available Logistics Automation?
- **Why** Logistics Automation?
- **Impacts** of employing this technology?
- **Code and Regulatory Challenges** and how to address them?
- **Summary & Questions**

Why Logistics Automation

logimaxx
Maximizing Logistics Efficiencies

PMA

Project Management Advisors, Inc.



Robotics - Conception to Realization



R2D2 & 3CPO



Relay AMR & BD Robot

Logistics Automation by Numbers

2023

> 90%



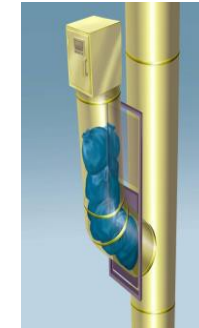
PTS
Pneumatic
Tube
System

< 2%



AGV/AMR
Automated
Guided Vehicles/
Autonomous
Mobile Robots

< .5%



PCS
Powered Chute
System

2030

>90%

> 40 %

> 1%

Logistics Automation – Use of technology for transferring materials to improve productivity and performance

Evolution of Logistics Automation



First Generation AGVs and Monorail systems



Second Generation AGVs



Fully Monitored AGVs



New Generation AGVs/AMRs

1970

< 10 Installations
2-4 Vendors

1985

15- 25 Installations
3-5 Vendors

2000

30- 40 Installations
5-8 Vendors

2020

Over 100 Installations
20+ Vendors



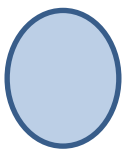
PTS technology is been use in Healthcare since 1950s and PCS in past 20 years



History/Evolution of Large Hospital Projects

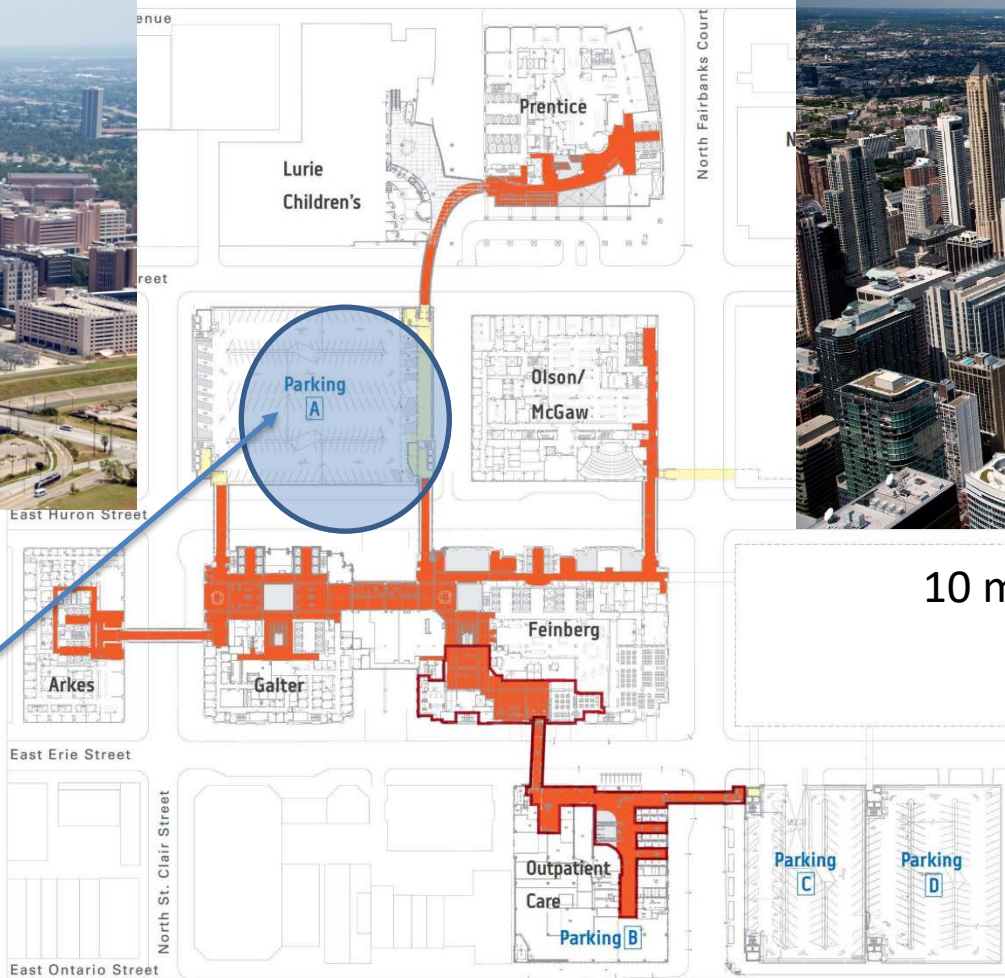


50 million SF in a campus - not connected



Central Loading Dock and Med Gas Tank Farm.

logimaxx
Maximizing Logistics Efficiencies

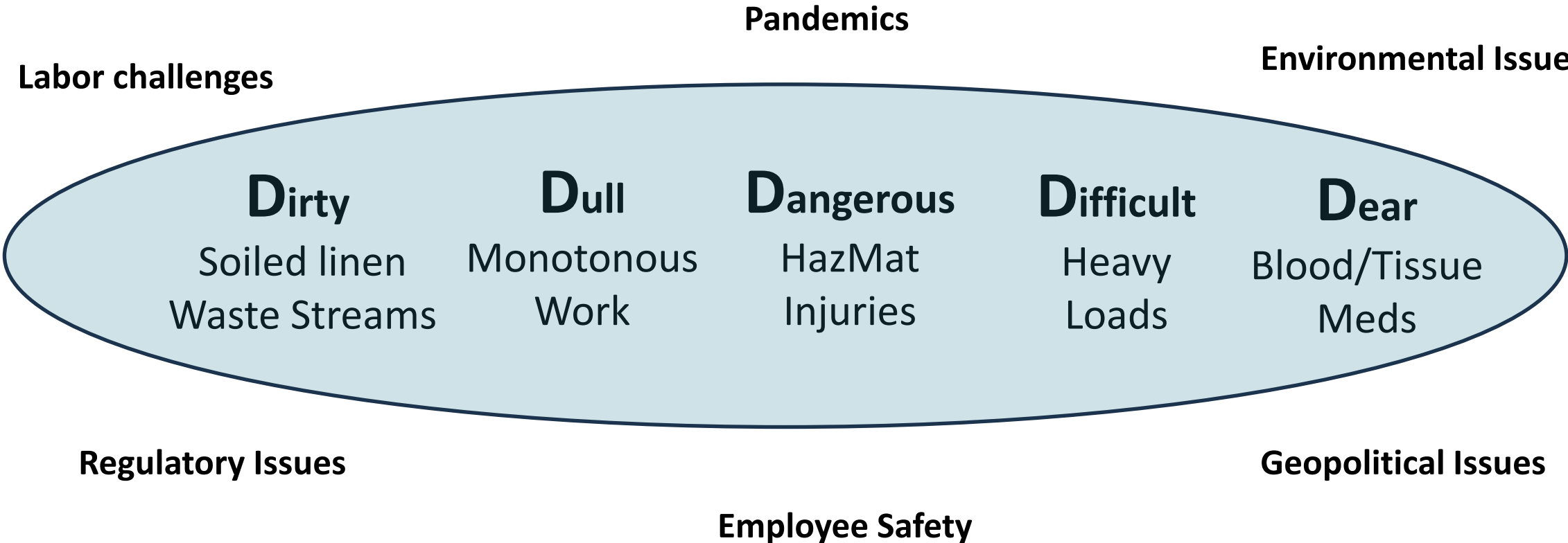


10 million SF - connected

1000 carts per day
traveling approx. 250 miles

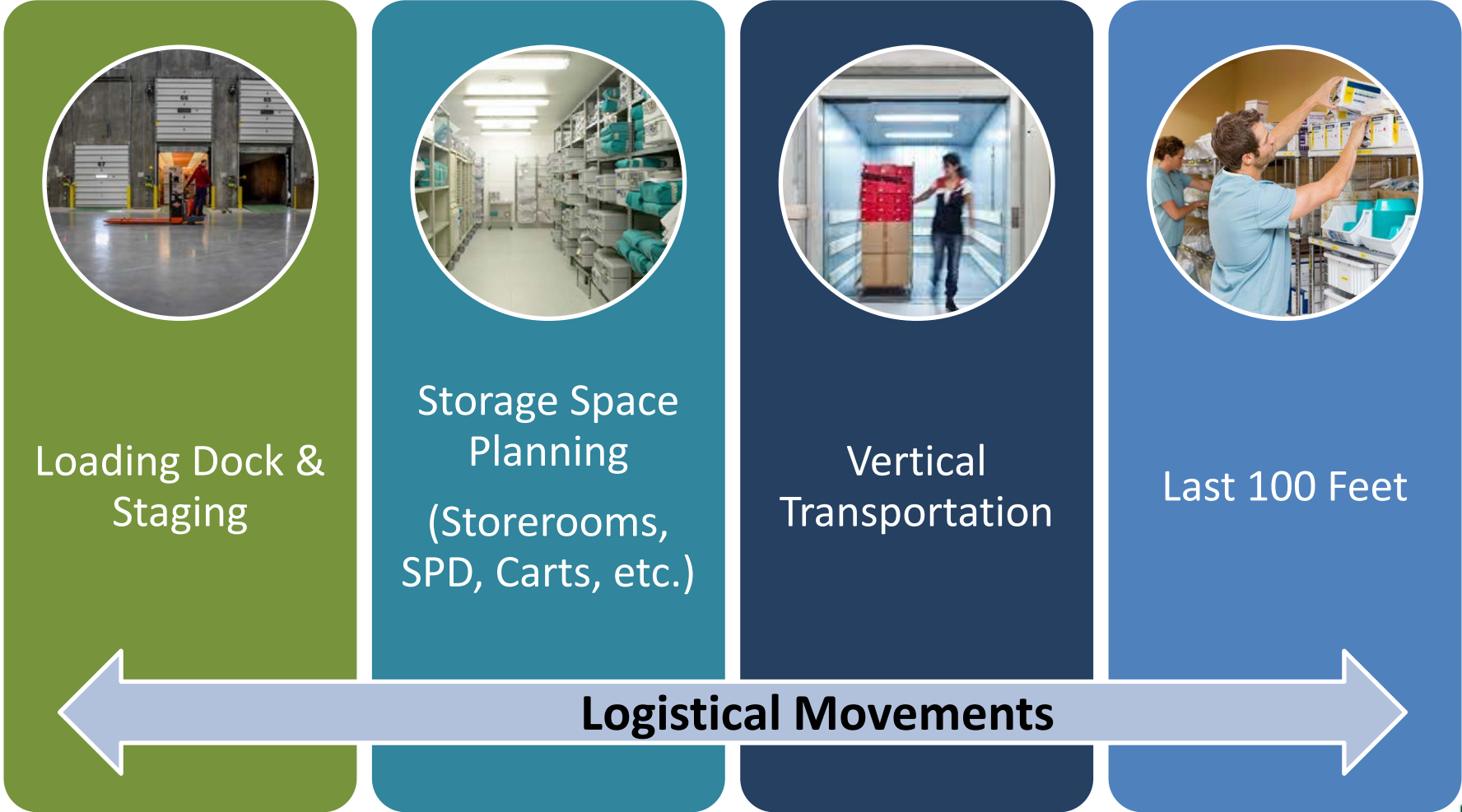
PMA
Project Management Advisors, Inc.

Automation Qualifiers and Influencing Factors



Facilities Planning Factors Influencing Automation

Overall logistics planning has direct impact on the logistics cost over Life of the New Facility



What are Various Automation Alternatives



Project Management Advisors, Inc.



Logistics Automation Solutions in Healthcare

Automated Material Transport Systems (AMTS)

- Automated Guided Vehicle Systems (AGVs)
- Autonomous Mobile Robots (AMRs)
- Pneumatic Tube Systems (PTS)
- Pneumatic Chute Systems (PCS)

Some Form Of Logistics
Automation Is Considered In
Almost All New Healthcare
Facilities



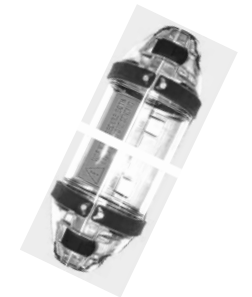
AGVs



AMRs



PCS



PTS



Automated Guided Vehicle Systems (AGVS)

AGVS

- Transports heavy payloads/carts 1,000- 1300 lbs
- Reduces risk of injury to people and buildings
- Reduces dependence on manual labor
- Safely shares corridors with human traffic
- Interfaces with elevators & doors
- Operational 24/7

Transports:

- Linen
- Food trays
- Central supplies
- Bulk Food
- Pharmacy
- OR supplies (Case Carts)
- General waste
- Medical waste
- Recyclable Waste



Autonomous Mobile Robot (AMR) - Suitable for Existing Facilities

- Suitable for Meds, small patient equipment, and Lab specimen
- The AMR eliminates human transport time, enabling staff to remain focused on patient-related tasks
- Efficiency increases while the cost of labor decreases



Biometric Authentication



Speed- 150 feet per second
Payloads – 1,000 lbs

logimaxx
Maximizing Logistics Efficiencies

PMA
Project Management Advisors, Inc.

Powered or Pneumatic Chute Systems

- Automated Soiled Materials Transfer & Collection
- **Helps reduce Hospital Acquired Infections (HAIs)**
- **Lower floor space requirements on most patient areas**
- Typically uses double doors for better safety
- Typically uses 20" shaft

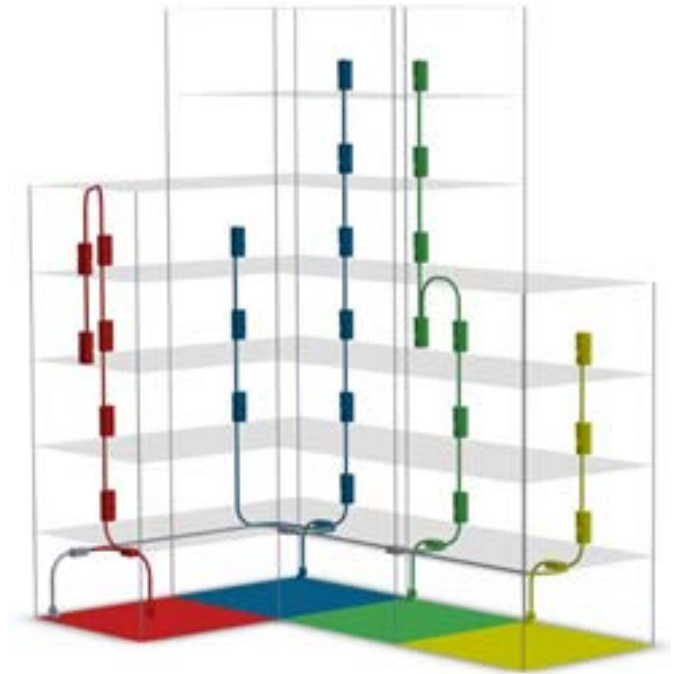


Appropriate for transfer of soiled linen, regulated waste and recyclables

Pneumatic Tube Systems (PTS)

PT Systems

- Promotes patient safety and privacy
- Protects sensitive medical materials
- Provides fast and reliable delivery
- An expandable, long-life system
- **25 fps High Speed Transport**
- **Payloads up to 15 lbs**
- Transports lab specimens, medications, sensitive items, IVs, patient records

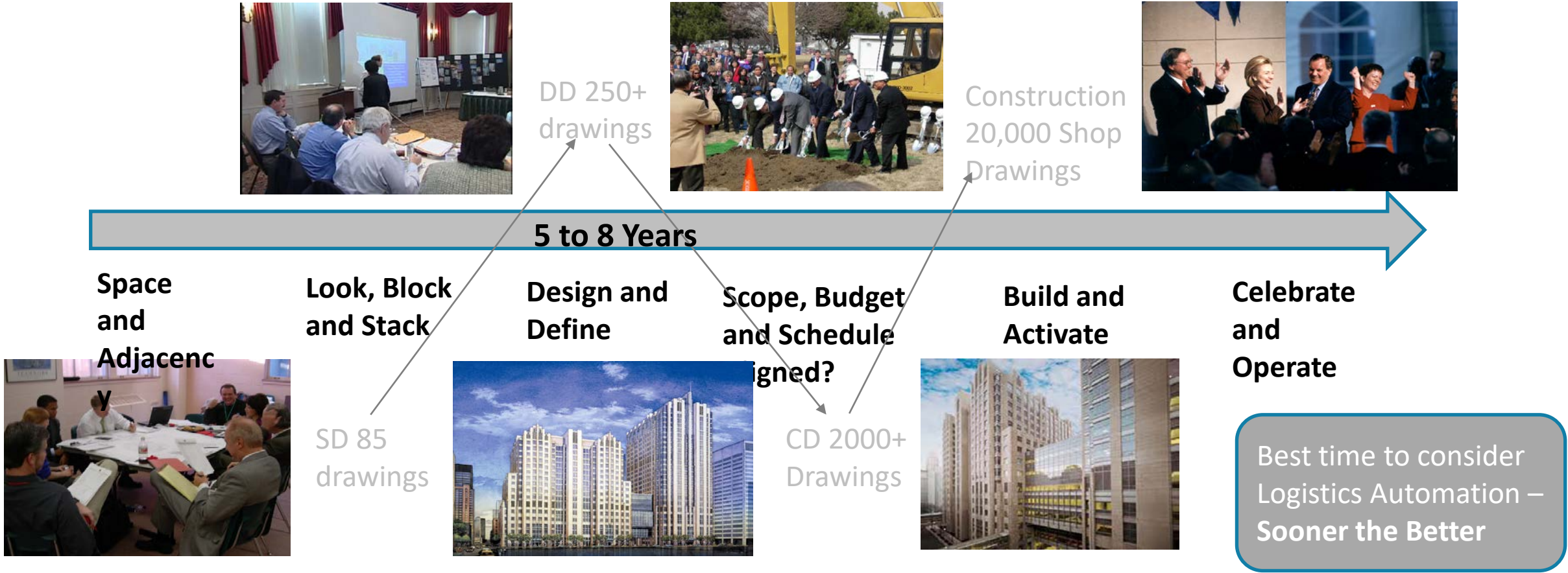


Pneumatic Tube System (PTS) is the most commonly used logistics automation system in Healthcare

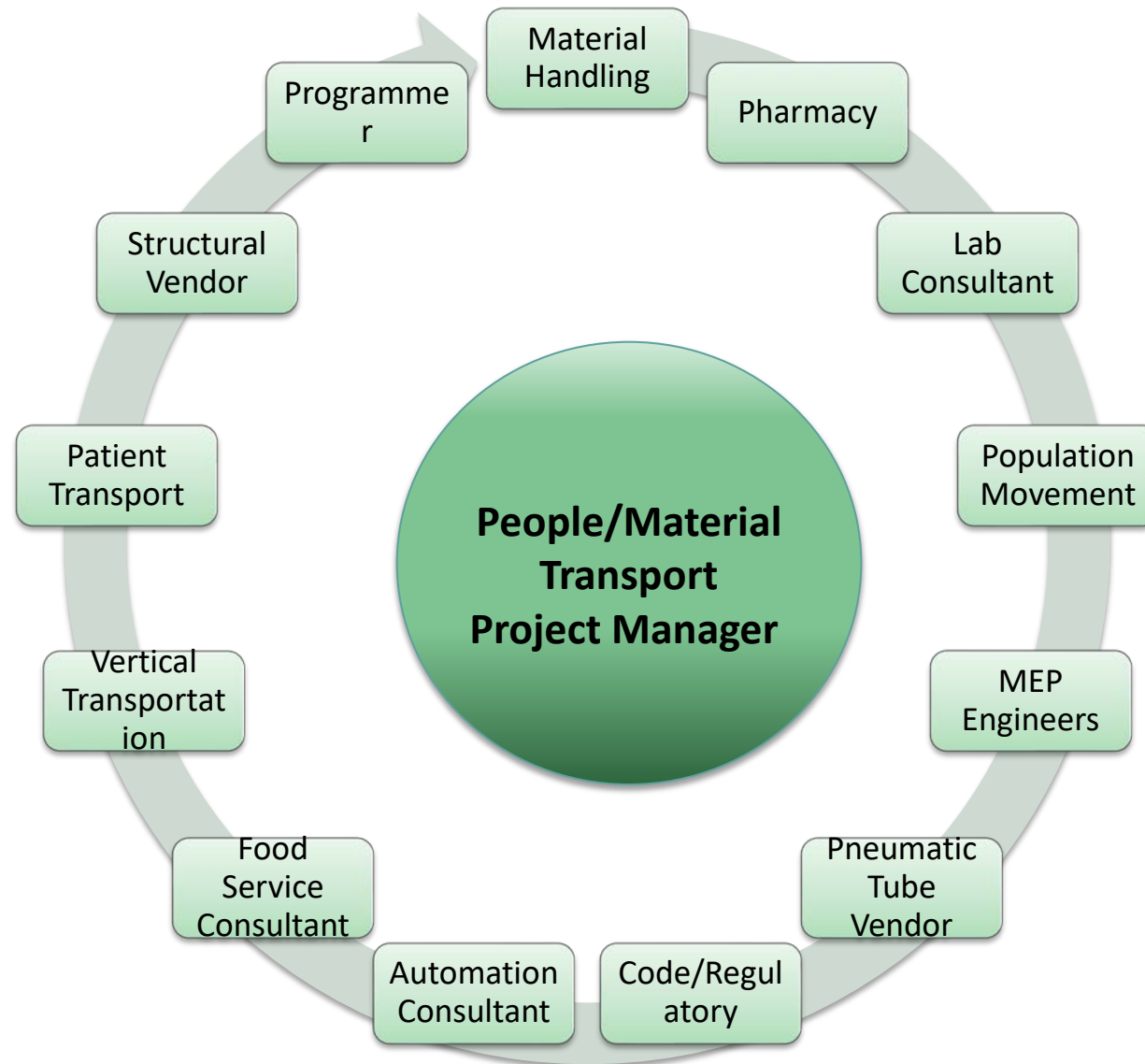
Planning, Code, and Regulatory Challenges



Planning, Design and Construction – Project Arc



Project Management and Coordination



Codes and Regulations – Current State

PTS

NFPA® 654

Standard For
Pneumatic
Conveying
Systems

AGV/AMRs

No Codes *

VA is in the process
of developing
ANSI/RIA 15.8 for
their own use

PCS

NFPA® 82

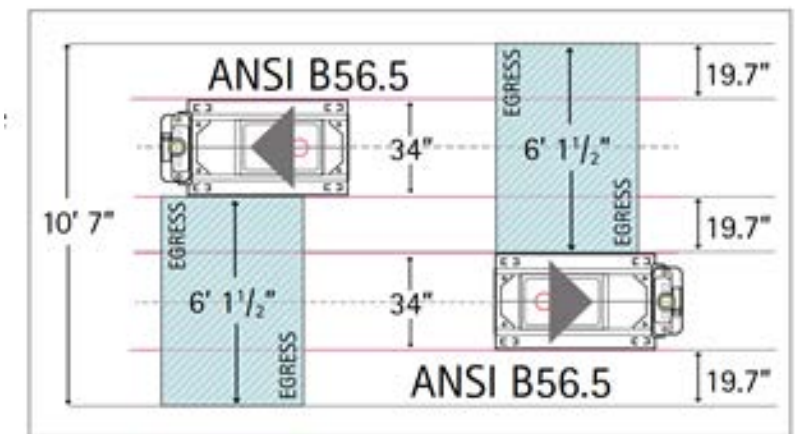
Standard on
Incinerators and
Waste and
Linen Handling
Systems
and Equipment

AGVs Related Planning Impacts

Facility Considerations

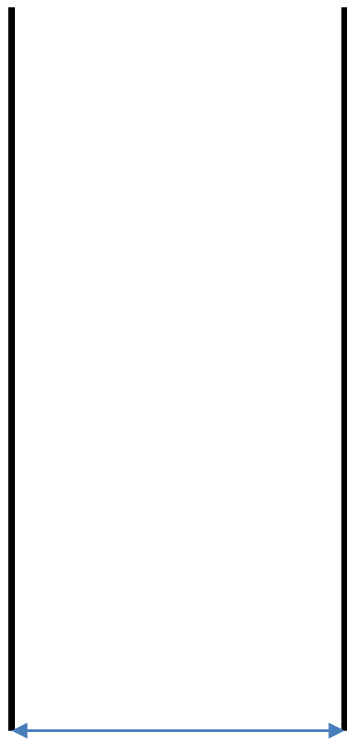
- Influence corridor sizes/absence of regulations
- Planned space for egress, P&D areas & material handling pathways
- Possible dedicated/commandeered lifts (elevators)
- Plan for power circuits, WiFi /LAN coverage, elevator interfaces
- Space
 - **Technology related space**
 - Mechanical and Interstitial Space
 - Dept. Specific Space

Elevators are the most constrained and critical resource in planning of a Healthcare facility



**Support Floor Service Corridor
example**

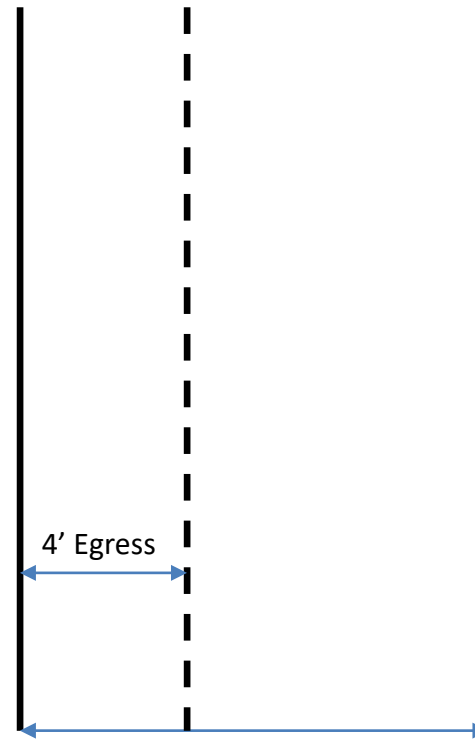
Service Corridor Widths



8 Foot Corridor



10 Foot Corridor



12 Foot Corridor

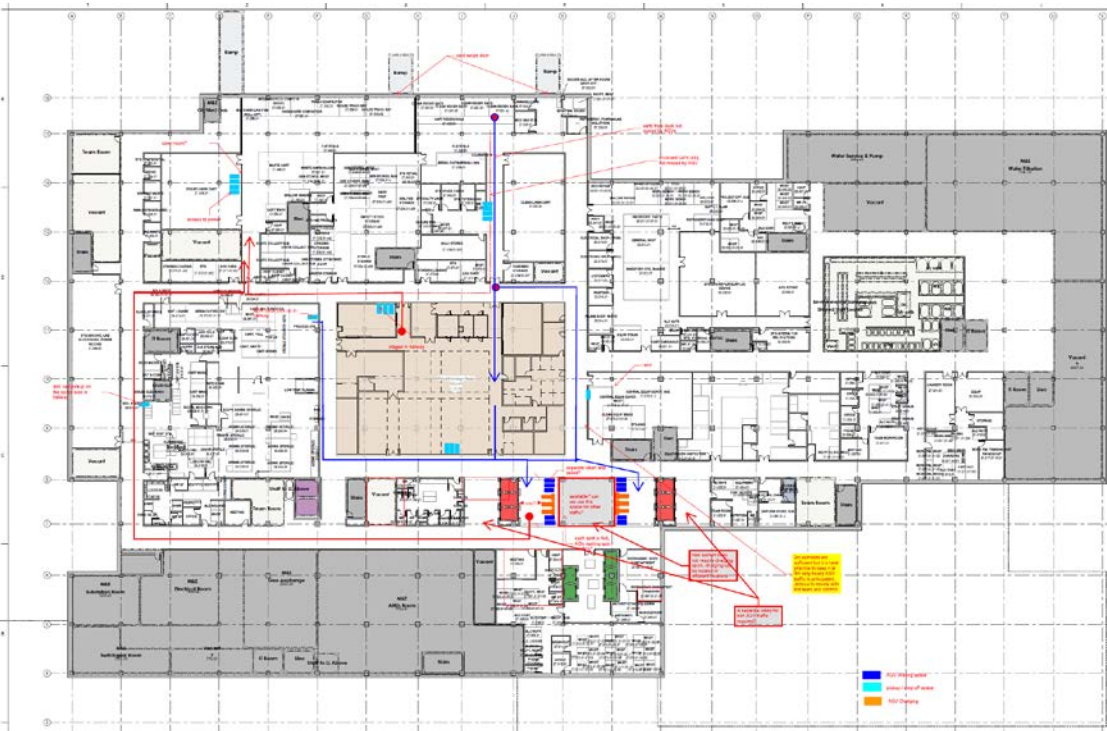
- Layout (one way/Two way)
- Volumes
- Schedules
- Egress corridor

Industry Guidelines – such as the American National Standards (ANSI) and their guideline B56.5 - Safety Standard for Driverless vehicles

Safety Concerns – about the mingling of pedestrian (staff and patient) traffic with an AGV/AMR

Emergent Event Concerns – such as a fire or other emergency where traffic patterns are altered temporarily

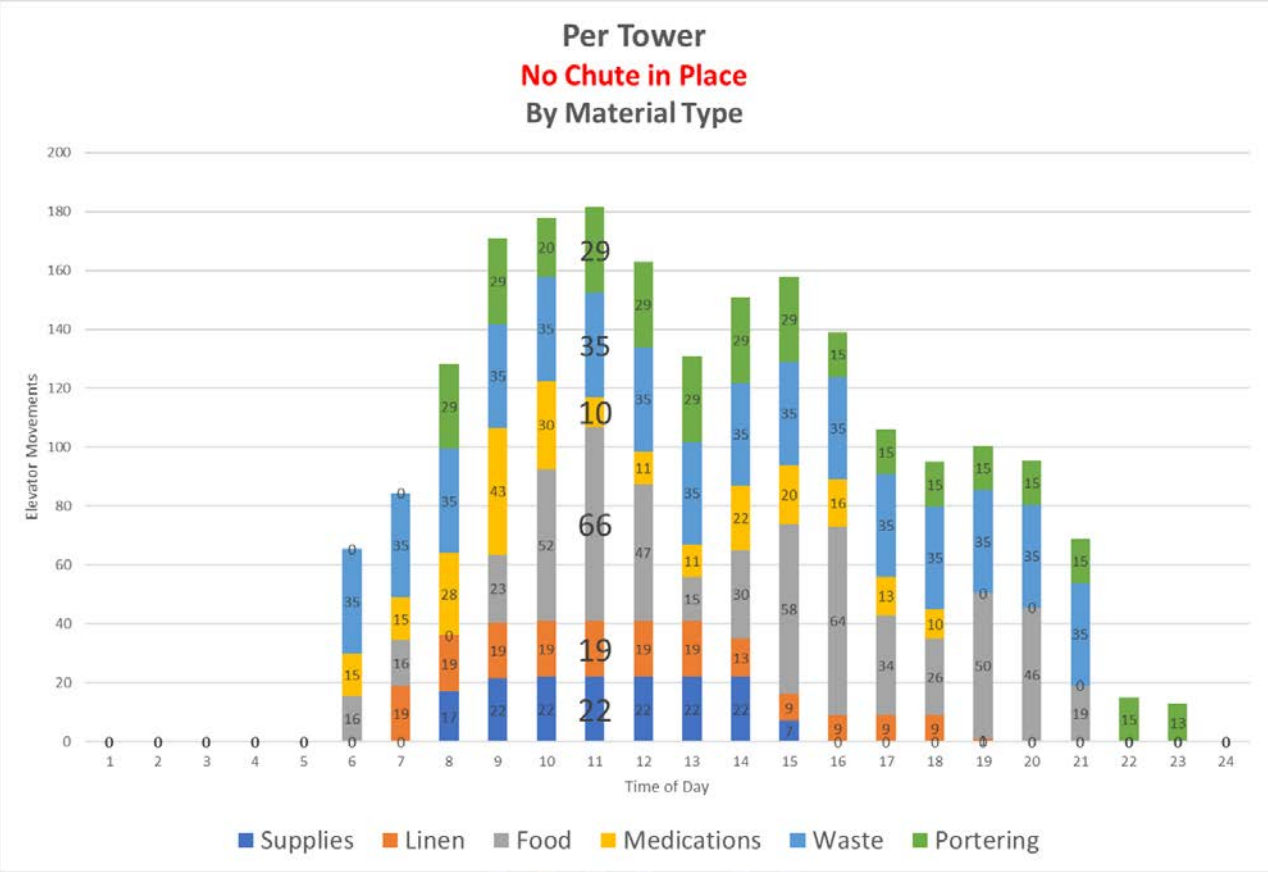
Last 100 feet - Corridor Widths



Typically, 8- foot corridors are sufficient given there are maximum of 2-4 vehicles on a patient care unit at any time

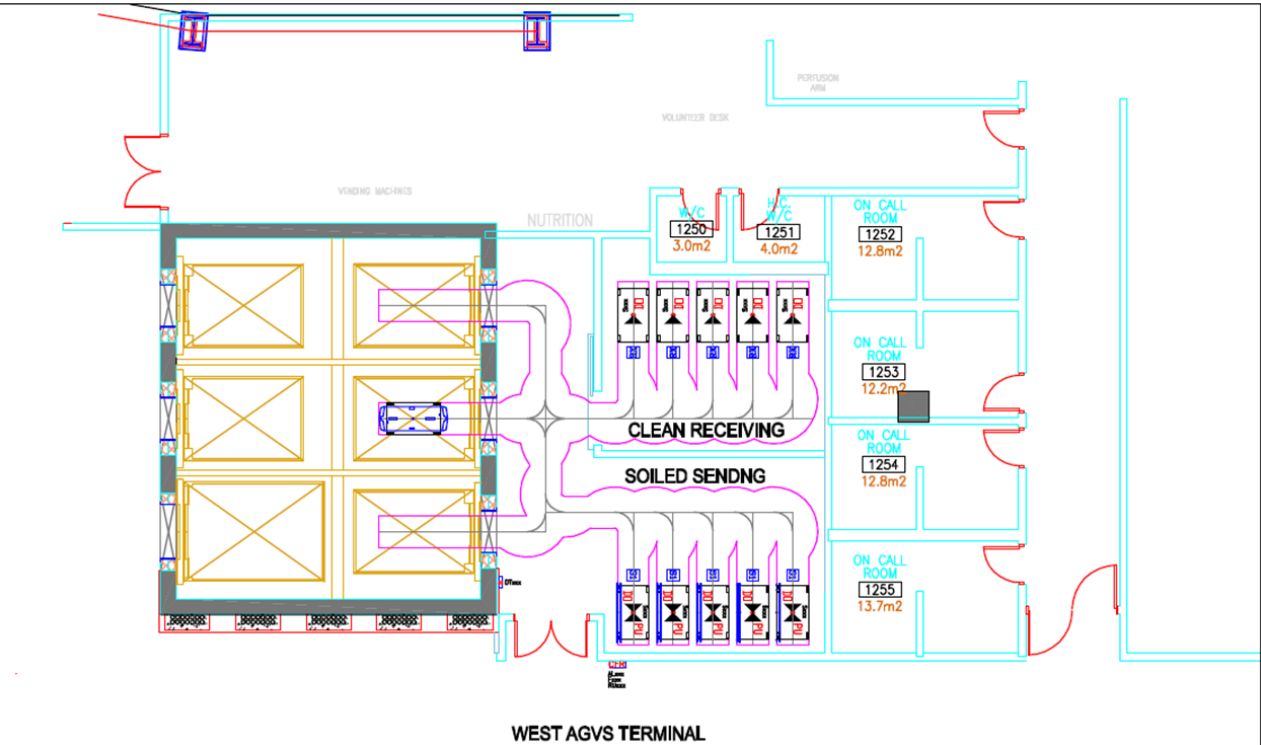


Movement Summary Example

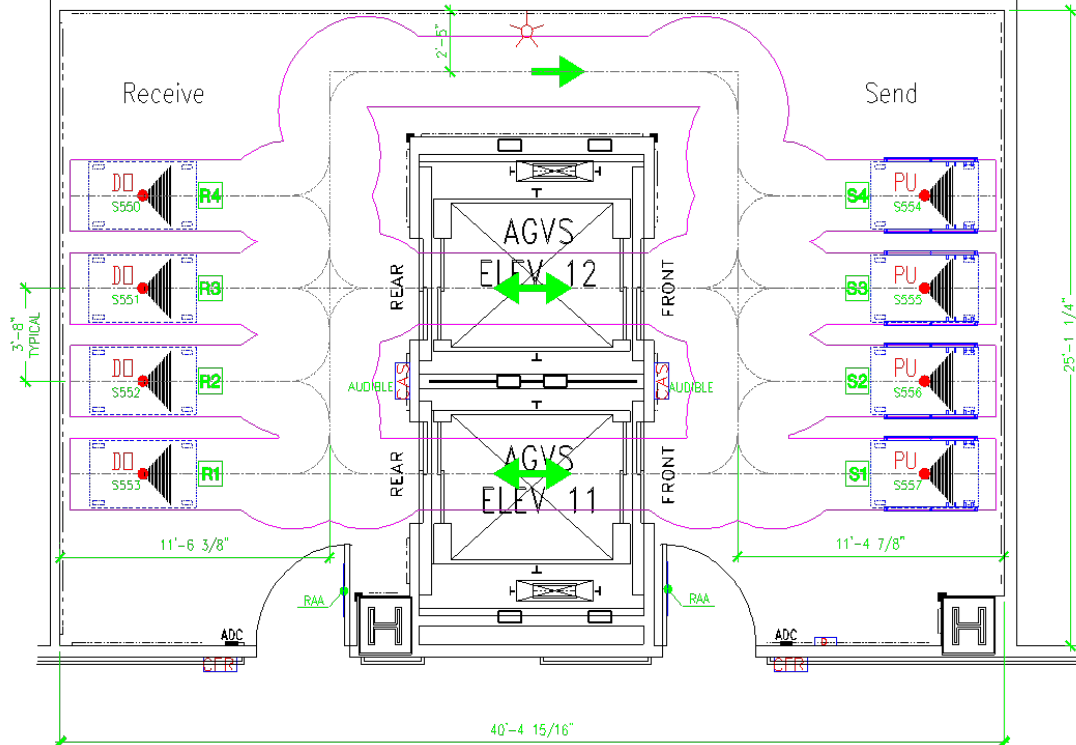


Peak Hour has an impact on how many elevators need commandeering/
Dedicated Use

Elevator Access



One Side Access

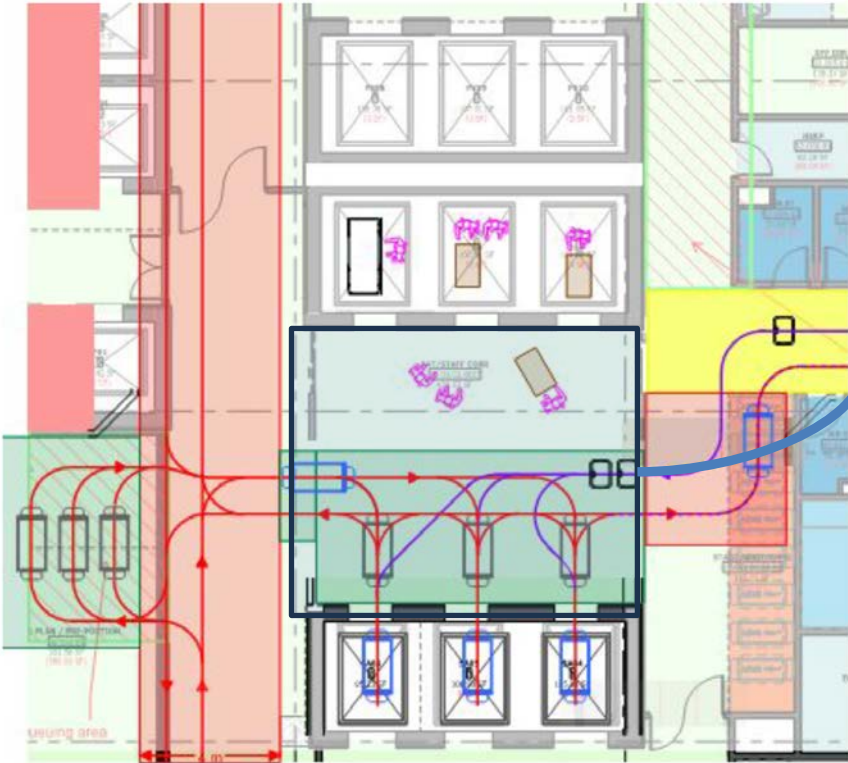


2 Side Access

One Side Access typically leads to 30 seconds per instance



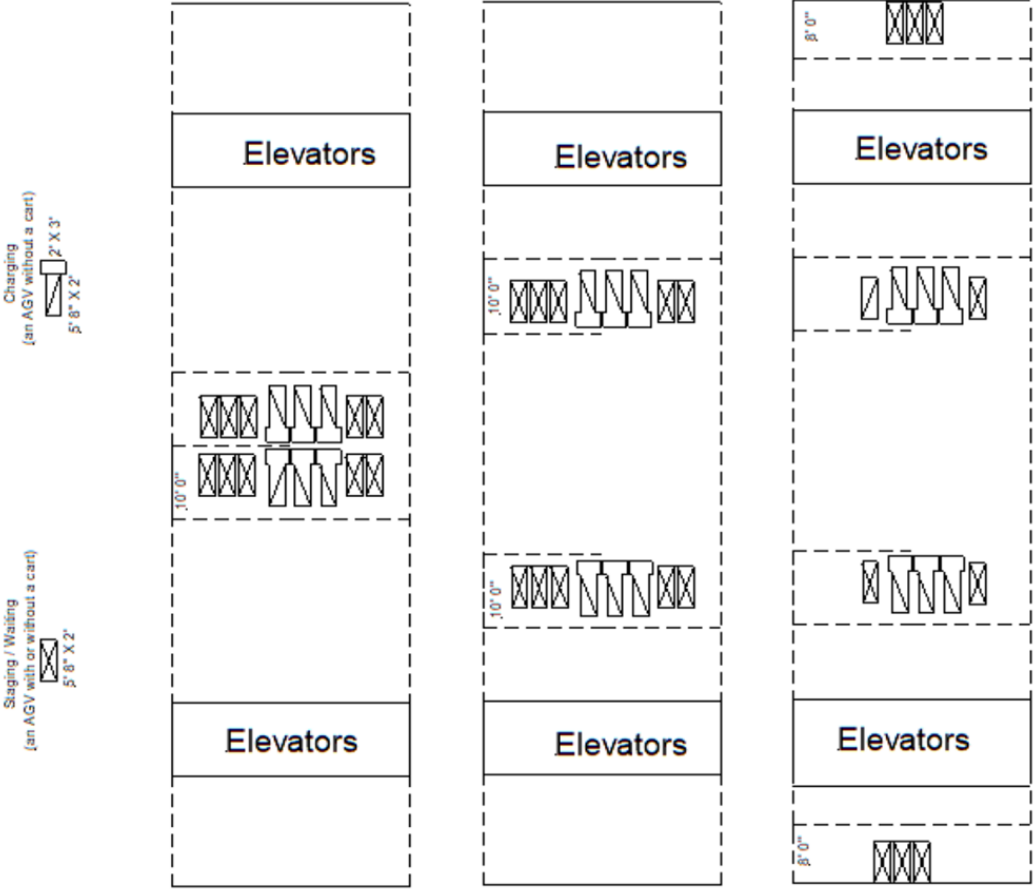
Elevator waiting lobbies for AGVs and Staff



LEVEL 0 SOUTH TOWER ATS ELEVATOR LOBBY

Elevator Lobby with AGV and Service Personnel traffic

Regulatory impact on total battery count on Bullpen Design



Decentralizing the Home bases for AGVs/AMRs is one of the ways to disperse battery counts within and outside of service floors

Recap and Current State and Future State for Code/Regulatory issues specific to AGV/AMR

- Need for robust code definition to address corridor width on the Service Departments floor
- Need for clearly defined codes for elevator waiting lobbies with co-mingling of AGVs and service staff
- Need for code definition to address total battery count on service floor and location of home base for AGVs/AMRs
- Need to establish standards around programming AGVs/AMRs during Emergency events

Questions and Answers



Sandesh Jagdev
Founding Principal

Logimaxx
jagdevs@logimaxx.com
404-429-6036
www.logimaxx.com



Thank You!

CTBUH Article
https://global.ctbuh.org/resources/papers/4614-Jagdev_LogisticsAutomationUsingRobotics.pdf

Future Events
AIA AAH Robotics
National Webinar-
December 12th, 2023



Douglas J King AIA NCARB ACHA
Vice President
National Healthcare Sector Leader
Project Management Advisors Inc.

dougk@pmainc.com
312-848-1588
www.pmainc.com

