



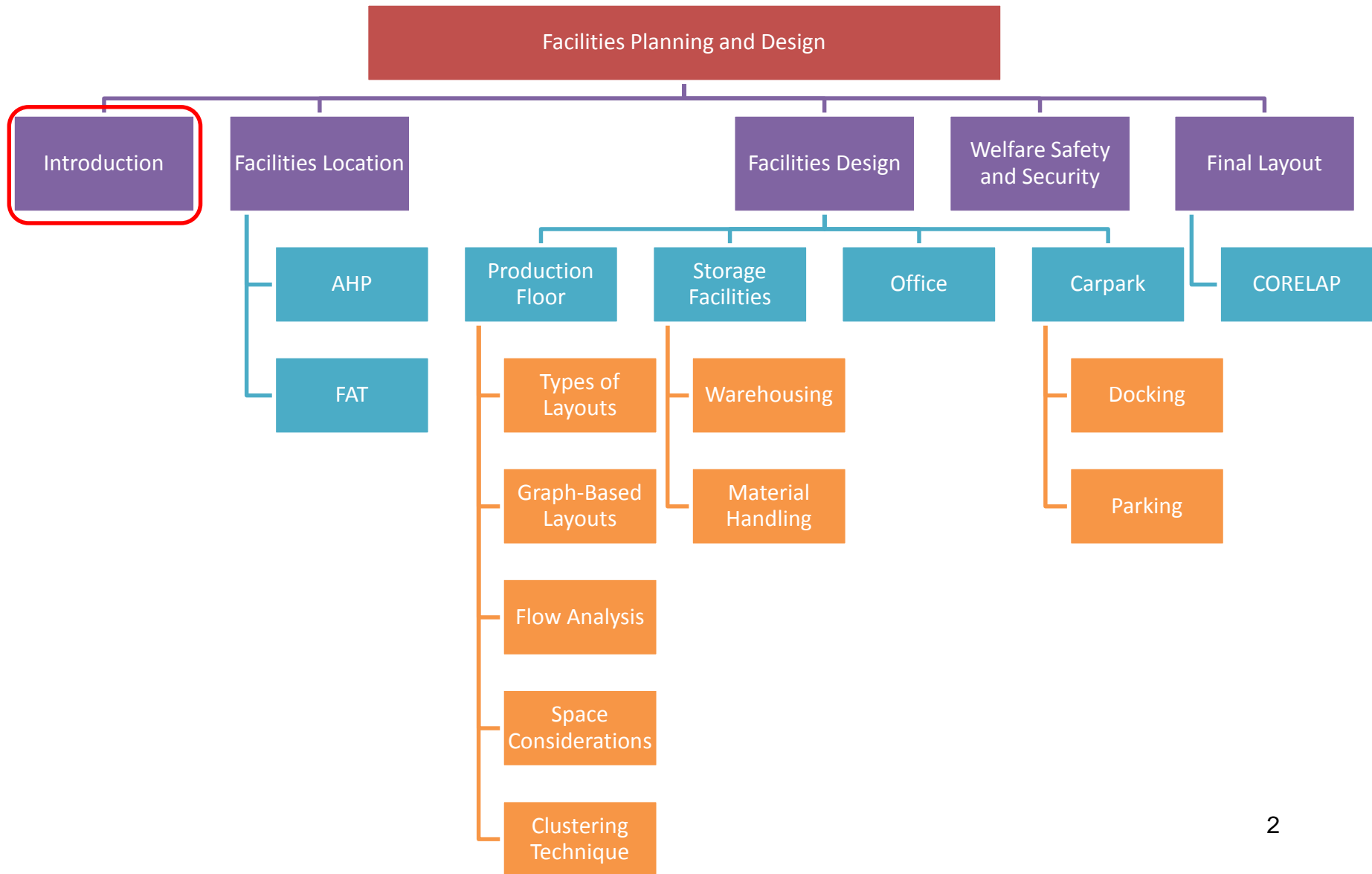
P01

The Proposal

E212 – Facilities Planning and Design

SCHOOL OF
ENGINEERING

E212 Facilities Planning & Design - Topic Tree



Learning Objectives

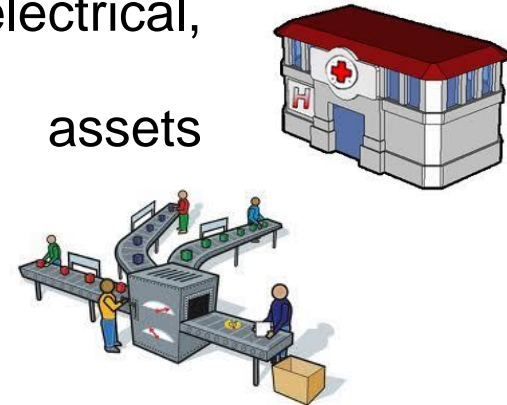


- List the 2 facilities planning components.
- Identify and describe 3 facilities design components in a facility.
- Explain the objectives of facilities planning and designing a facility layout.
- Describe the process of facilities planning and the key activities for each process.
- Draft out a facility layout using AutoCAD Architecture 2018.

Introduction to Facilities Planning



- A **facility** is a space in which people utilize raw materials, equipment and other resources to make a tangible product or provide a service.
- A **facility layout** refers to the arrangement of all equipment, machinery and furnishings within the building after considering the facility objectives.
- In order to ensure that the facility achieves its objectives, it is important to properly plan and design the facility layout.
- **Facilities planning** is a broad field of study that spans across several engineering disciplines - civil, electrical, industrial, mechanical, etc.
- Facilities planning determines how physical assets support the facility objectives.
- Examples of facilities planning applications:
 - Building a new hospital
 - Designing the campus of a new university
 - Redesigning an existing manufacturing facility
 - Designing the layout of a shopping mall



Motivations for Facilities Planning



- **Productivity** gains and **cost** savings (such as in areas of material handling, personnel and equipment utilization, inventory levels, etc)
- Employee **safety** and **health**
- **Energy** conservation
- **Community** considerations
- **Fire** protection
- **Security**
- ... etc.

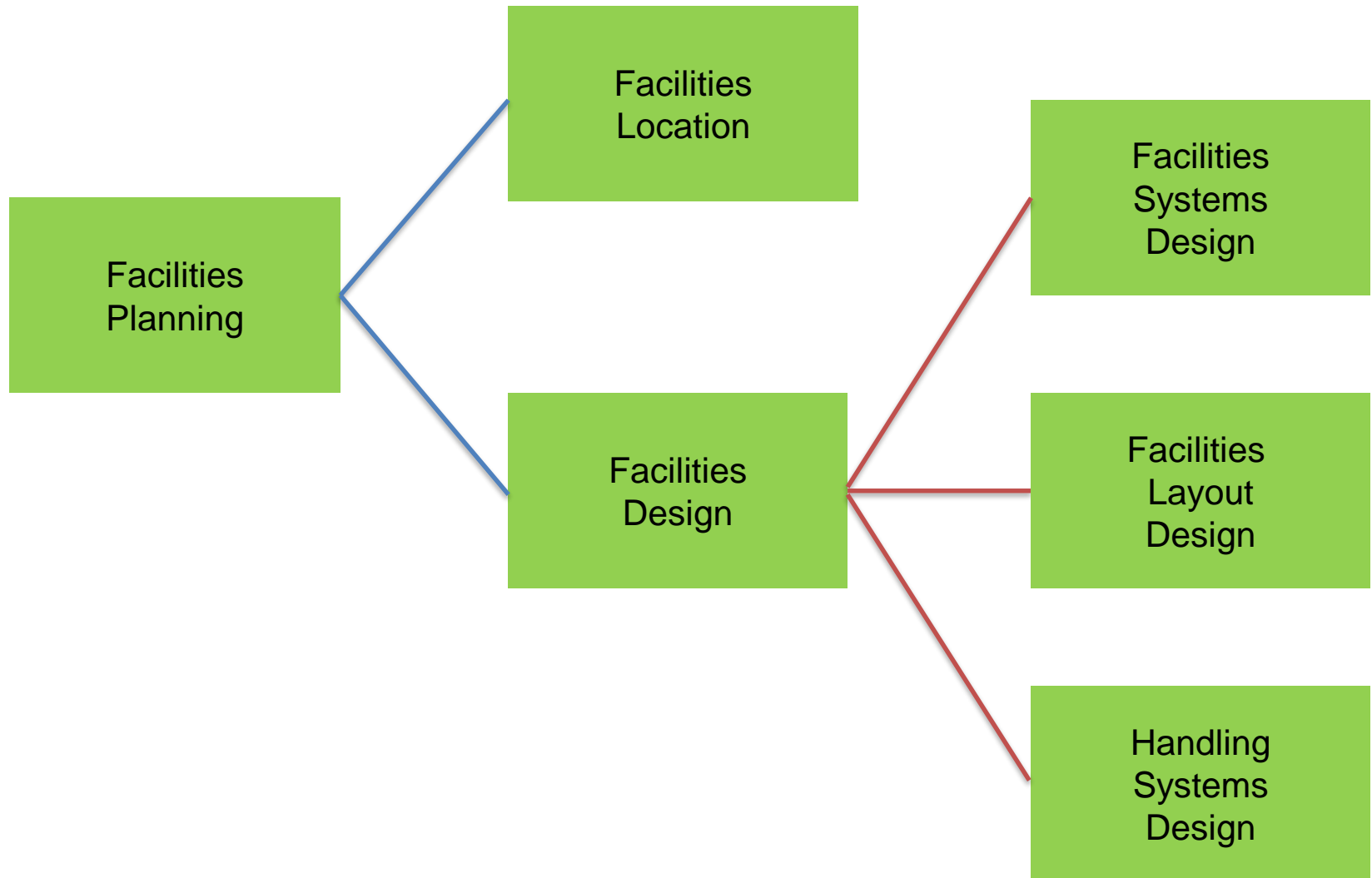


Key Objectives of Facilities Planning



- Effectively utilize people, equipment, space and energy
- Provide for employee safety, job satisfaction and morale, environmental responsibility
- Minimize costs and improve profitability
- Minimize waste and increase work productivity
- Enhance adaptability to changing conditions and promote ease of facility maintenance
- Provide for continuous improvement throughout facility life cycle

Facilities Planning Hierarchy



Facilities Location



- **Facilities location** refers to its placement with respect to its customers, suppliers and other facilities with which it interfaces.
- Some factors affecting facilities location:
 - Distance to raw material sources (suppliers)
 - Distance to customers
 - Distance to other supporting facilities with which it interfaces
 - Transportation infrastructure
 - Economic development (financial) incentives

Facilities Design



- **Facilities design** consists of facility systems design, facility layout design, and handling systems design:
 - **Facility systems design** – consists of structural systems, enclosure systems, atmospheric systems, electrical and lighting systems, life safety systems, sanitation systems, automation systems, facilities maintenance and management systems, communication systems etc.
 - **Facility layout design** – the arrangement of equipment, machinery, furnishings and fittings within the facility envelope
 - **Handling systems design** – the mechanisms needed to move materials, personnel, information & equipment within the facility.
- Material handling is important to the facility design activity. The choice of material handling equipment will greatly influence the suitability of the facility design.

Facilities Planning Process



Applying the engineering design approach:

Steps:

1. Define the problem

- Define (or redefine) the objectives of the facility
- Specify the primary and support activities to be performed in accomplishing the objectives

2. Analyse the problem

- Determine the inter-relationships among all activities

3. Determine the space requirements for all activities

- Generate alternative facilities plans

4. Evaluate the alternatives

- Evaluate alternative facilities plans

5. Select the preferred design

- Select a facilities plan

6. Implement the design

- Implement the facilities plan
- Maintain and adapt the facilities plan
- Redefine the objectives of the facility (if needed)



Dimensions for Facilities Planning Improvement

- Dimensions for Improvement:
 - **Physical factor** – fittings, equipment, layout, furnishings, human factor interactions
 - **Time factor** – flows of personnel, machines and equipment
 - **Safety factor** – security, hazards preventive measures



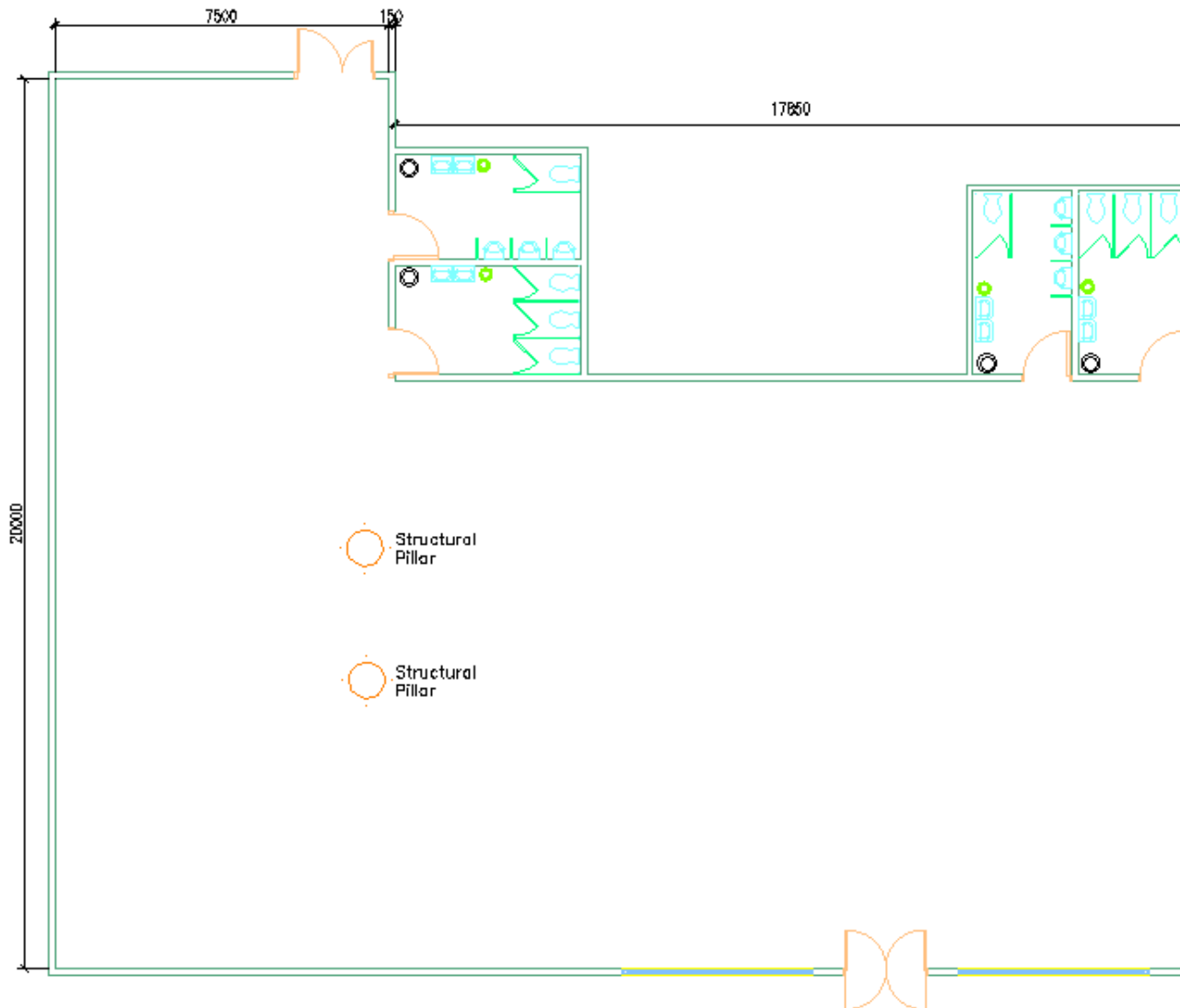
Problem 01

Suggested Solution



There is no unique, best solution to this
problem
- only many good ones!

Suggested Solution



It is important to take note of the locations of any fixed and/or existing features as they will affect how we will design the layout.

If the features are fixed in nature, so we will have to be more creative to incorporate them to come up with an ideal plan that meets the facilities' objectives.

Suggested Solution



1. Backend Office / Work Area

Objective: An area for staff and manager to perform backend tasks and work.

Facilities Design Requirements:

- *System Design:* Good lighting, good ventilation, good temperature and humidity control, ample power supply, internet coverage.
- *Layout Design:* Accessible from both outside and customer service area to ease flow of materials, customers and staff.
- *Handling System Design:* Trolleys for shifting bulkier materials and items around. Cabinet to hold documents and work tools.



Better Improvements (Functional emphasis):

- *Physical:* Flexible/adjustable work desks & chairs. Easily accessible work equipment such as phone, computer, and work tools.
- *Time:* Signage for exit.
- *Safety:* Uncluttered walkway to exit in case of emergency, and first aid box

Suggested Solution



2. Storage Area

Objective: An area for staff to store and access spare parts, product, documents, work tools, etc.

Facilities Design Requirements:

- *System Design:* Good lighting, good ventilation, good temperature and humidity control.
- *Layout Design:* Secured, easy access for the staff, and neat arrangement of racks for easy storage and retrieval.
- *Handling System Design:* Trolleys for shifting bulkier materials and items around. Cabinet to hold documents and work tools. Ladders for access to high areas.



Better Improvements (Functional emphasis):

- *Physical:* Shelves/racks with integrated ladders for effective and safe access to all areas.
- *Time:* Label for every item or rack.
- *Safety:* Uncluttered walkway to exit in case of emergency.

Suggested Solution



3. Customer Service Area

Objective: For attending to customers' enquiries, and Including a waiting area.

Facilities Design Requirements:

- *System Design:* Good lighting, good ventilation, good temperature and humidity control, ample power supply, high-speed internet access.
- *Layout Design:* Comfortable sofa for customers near service counter, and bookshelf holding magazines for visitors to read.
- *Handling System Design:* Trolleys for shifting bulkier materials and items around.



Better Improvements (Functional emphasis):

- *Physical:* Easily accessible work equipment such as telephone, computer and printer for customer service. Queue number machine for the customer near entrance. Queue number display clearly visible.
- *Time:* Electronic display to indicate the queue number.
- *Safety:* Uncluttered walkway to exit in case of emergency, and first aid box.

Suggested Solution



4. Pantry Area

Objective: An area for staff to eat, drink, and relax.

Facilities Design Requirements:

System Design: Good lighting, good ventilation, good temperature and humidity control.

Layout Design: Neat arrangement of tables and chairs with comfortable spaces, and safe arrangement of kitchen appliances.

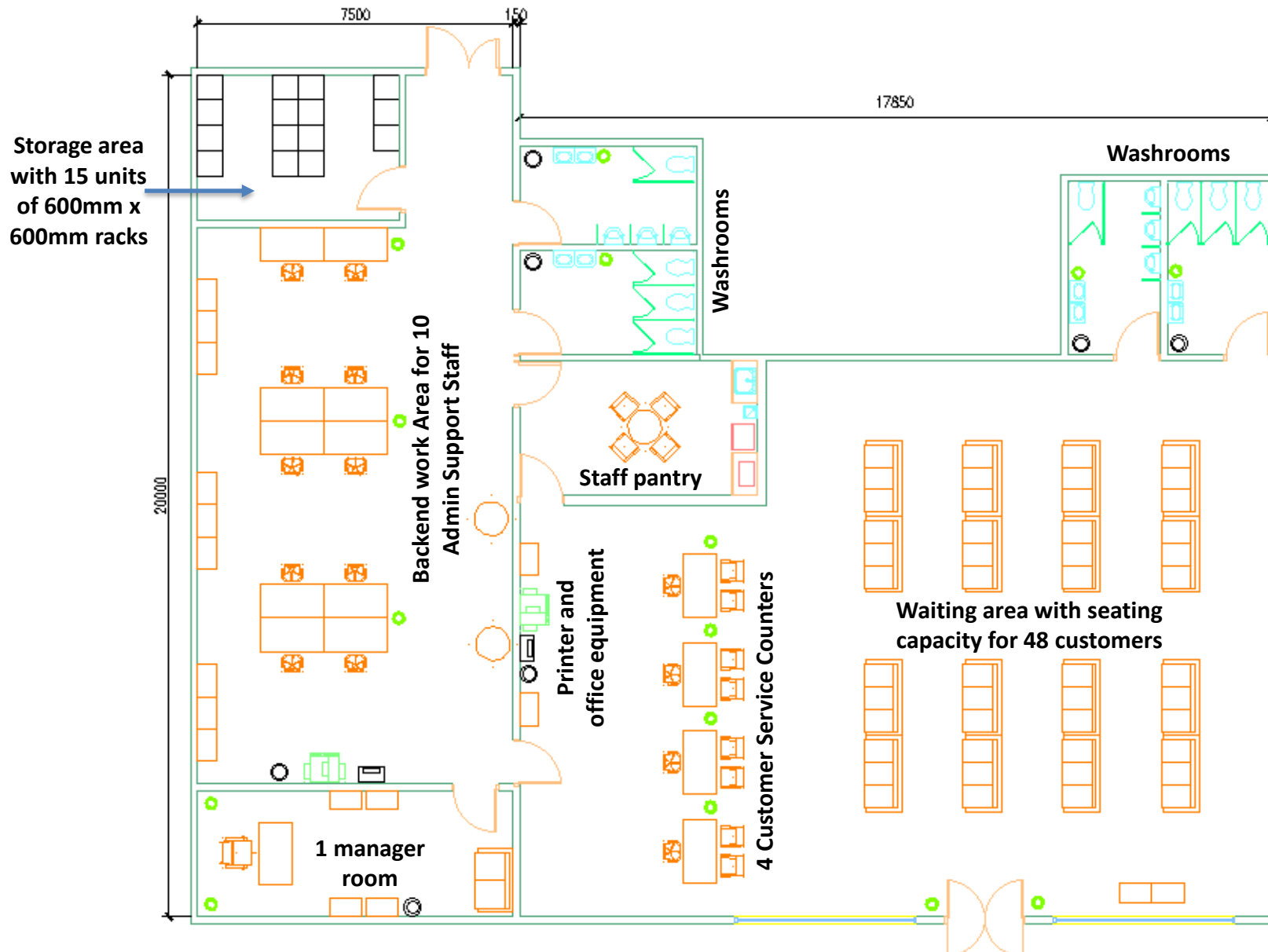
Handling System Design: Trolleys for carrying materials.



Better Improvements (Functional emphasis):

- *Physical:* Ensure good lighting, ensure adequate space at each tables for staff comfort, moveable tables and chair for reconfiguration of layout when necessary.
- *Time:* Change table design to allow networking discussion.
- *Safety:* Uncluttered walkway to exit in case of emergency.

Suggested Possible Solution

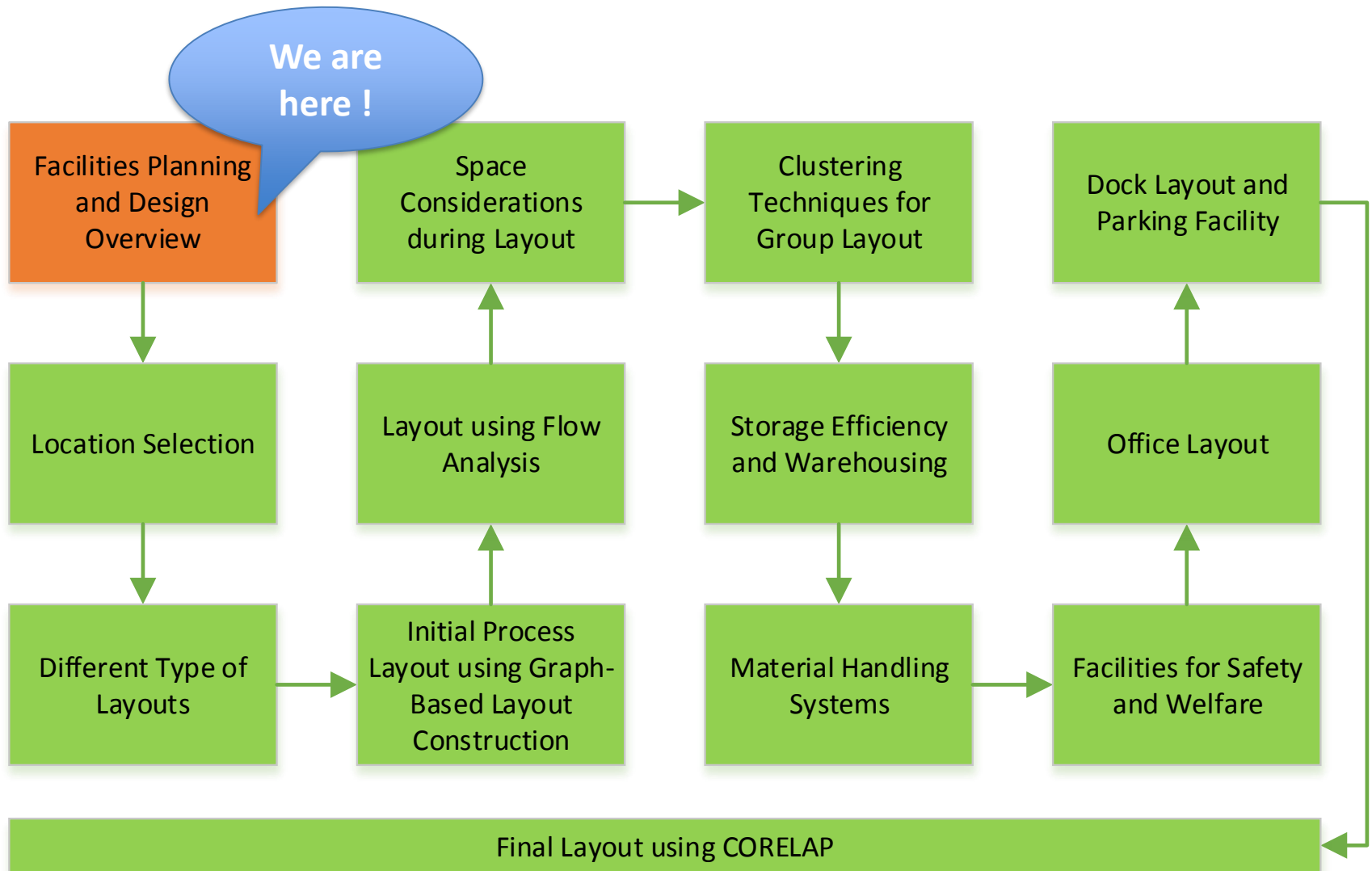


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Overview of E212 Facilities Planning and Design



Before you leave the class...



Make sure you have your AutoCAD Architecture 2018 working for this semester.

As informed previously, you can download it from Autodesk website below:

<http://www.autodesk.com/education/free-software/autocad-architecture>

(you will need to sign up for a student account first)