I2.05 - Facility Layout Optimization

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Problem Statement

- Crews have issues navigating the yard without causing damage to inventory or other assets in the process.
- Due to the space available and the inventory currently being stocked, aisles are constricted which makes it difficult for crews to safely navigate.
- Partially used spools of cable accumulate and occupy space in the yard with no process to limit their levels.

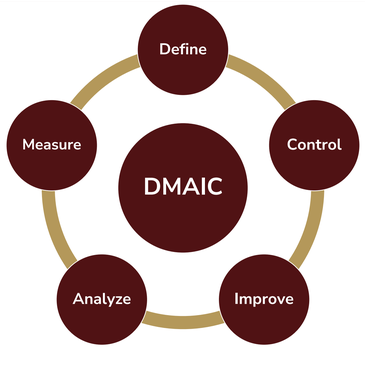
Problem Purpose

- The goal of this project is to provide recommendations for an updated facility design that allows crews to move through the facility without damaging additional inventory.
- It is unlikely the recommendations will be implemented at the current facility, but the aim is for them to be carried over in the design of a new facility when the time comes.
- Develop a process for storing partially used spools that will control their levels and limit the space they occupy.

Problem Objectives

1. Optimize the current facility layout to ensure that utility vehicles are allotted the 50' minimum turning radius.
2. Minimize inventories to a level that will save NBU money on holding cost while still allowing them to complete all necessary work orders.
3. Develop operation processes that will create a base level of operational development.

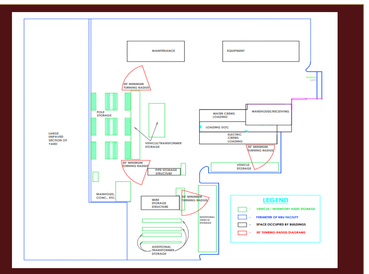
Methodology



Measure

Inventory

- Compiled a list of parts contained within yard.
- Of those parts, determined which impede traffic the most.
- Determined demands, prices, lead times, area, and ordering for each of the parts.



Facility Layout

- Constraints related to the current facility layout included the area available (facilities total square foot), any departments that cannot be moved and the dimensions of the departments.
- We used Google Earth to determine the dimensions of the yard and its departments.
- We also measured the relationships between departments. In our case, we considered a department relation to be the loading of parts from different departments onto the same vehicle.

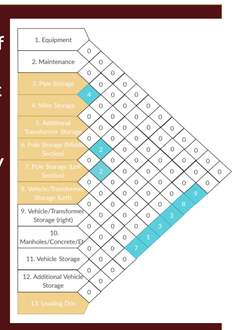
Analyze

Inventory

- Developed an inventory model to minimize the total of holding and ordering cost while still meeting demand of work orders and new construction.
- Determined the proper current on hand levels using inventory model but dimensionally, yard could not support these levels.

Facility Layout

- The dimensional data that we collected corresponds to the departments that are pictured in our original facility layout drawing.
- These dimensions, along with department relations are what was needed for us to complete a graph-based facility layout method.
- By sorting a week's work of work order data, we were able to determine department relationships and construct the activity relationship diagram that is pictured to the right.



Processes

- New processes will be developed to control traffic flows, advise storage in the lot, and SOPs that would accompany the processes introduced.
- Human factors will play a role following the implementation of these new processes. There will be traffic signage for team members to adhere to as well as instructions related to the pulling of partial spools of materials.

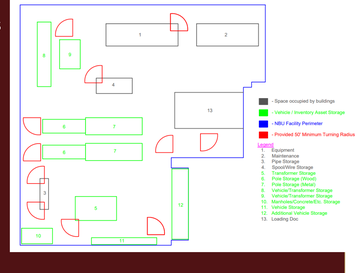
Improve

Inventory

- Worked with sponsor to develop a process that would require customers of large capital projects to store parts on site.
- Only parts needed for smaller projects or repair services would have to be stored in the yard.
- New process would reduce inventory stored in the yard by 30% - 40%.

Facility Layout

- Pictured to the right is the improved facility layout that was constructed by utilization of the graph-based facility layout method.
- The dimensions of all departments were kept the same for this design.
- After optimal inventory levels are determined, the dimensions of these departments will change.
- NBU will then be able to re-utilize this approach with the improved department dimensions.



Progress

We used the graph method to develop a facility layout. → We developed an Inventory Model based on data gathered. → We made recommendations for processes to follow for future work.

Future Work

- Begin tracking when parts are pulled from stock to determine mean and standard deviation of demand.
- Begin tracking time between placing an order and delivery to determine mean and standard deviation of lead time.
- Utilize data gathered above to determine optimum inventory levels.
- Based on these inventory levels determine area required in the yard to stock these parts.
- Begin tracking parts pulled onto a single truck to determine relationships between departments.
- Utilize relationship matrix and new department dimension to implement graph method in planning future facility.

Team

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