Integrated Value Analysis and Problem-Solving Techniques Case Study: "Shop Layout Optimization"

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Overview

- EPCOR Drainage Services
- Shop Layout Optimization Study
- Value Engineering & Integration
- Workshops Planning
- Project Outcome
- Questions

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Background

- Drainage Services undertook transformation initiative in 2013 to improve the overall performance of the Design and Construction Services Section
- One of the initiative outcome is to consolidate equipment support services & shop in one location.
- A shop optimization study was completed in 2015 with the following objectives:
  - To optimize and secure buy-in on the shop space utilization
  - To identify what are the gaps to make the move successful
  - To develop a moving schedule to minimize impact on on-going construction projects

Coronation Yard

1- Store

2- Electrical Shop

3- Welding Shop

4- Mechanical Shop

5- Hydraulic Area

6- Waste Management

7- Lubrication Area

8- Storage Area-1

9- TBM Mechanic Shop

10- Storage Area-2

11- Storage Area-3

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Poundmaker Yard

1- Drill Rig Rebuild Area

2- TBM Storage

3- Battery

4- Akreman & Storage

5- Storage

6- Generator & Storage

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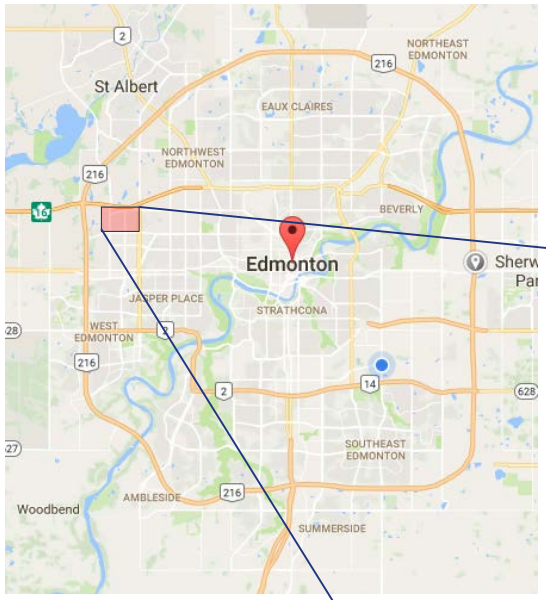
Issues With Original Setup

- Inadequate shop space
- Disperse inventory
- Weather impact
- Inventory control and access
- Travel time between the two yards
- Multiple user access to the yards

Edmiston Yard



- Yard acquired in 2015
- Located in between the two existing Yards
- Easy access to major traffic corridors
- Much larger shop area (50,000 sf vs. 7,500 sf)

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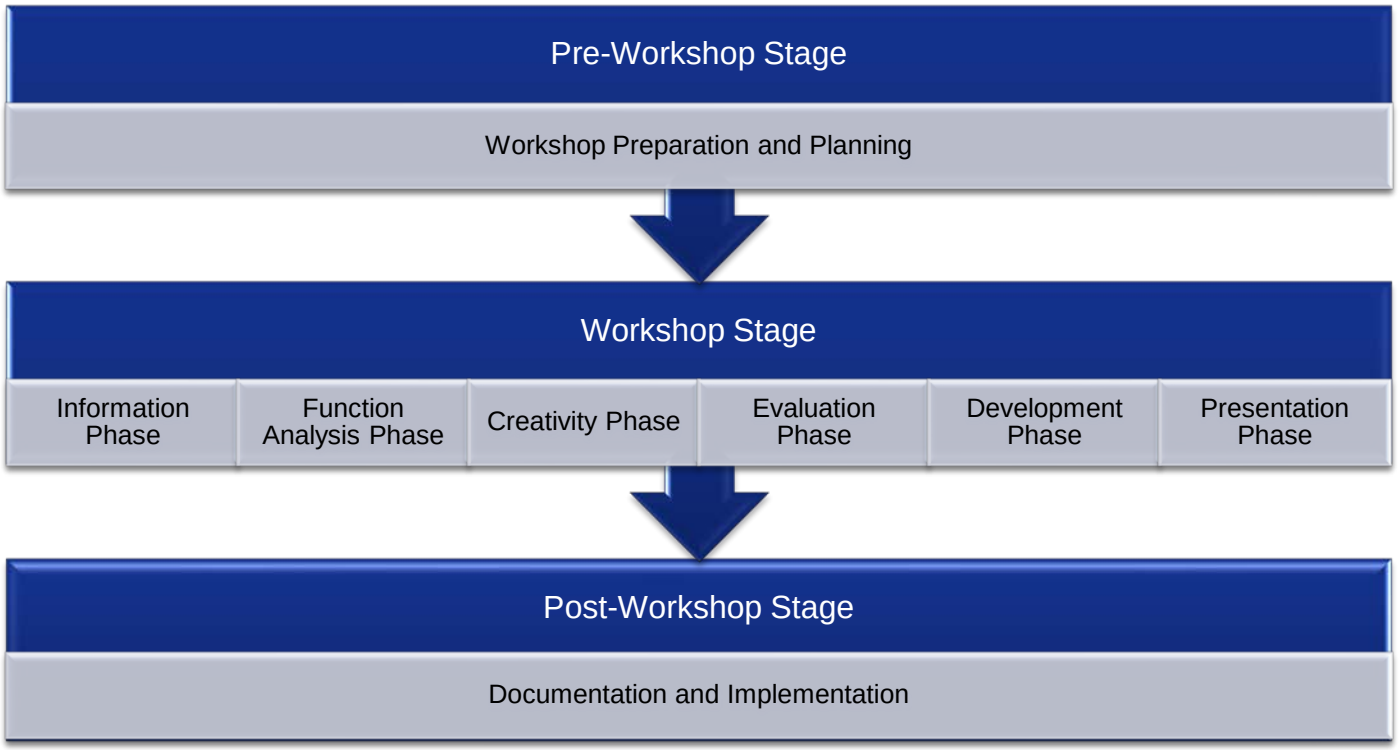
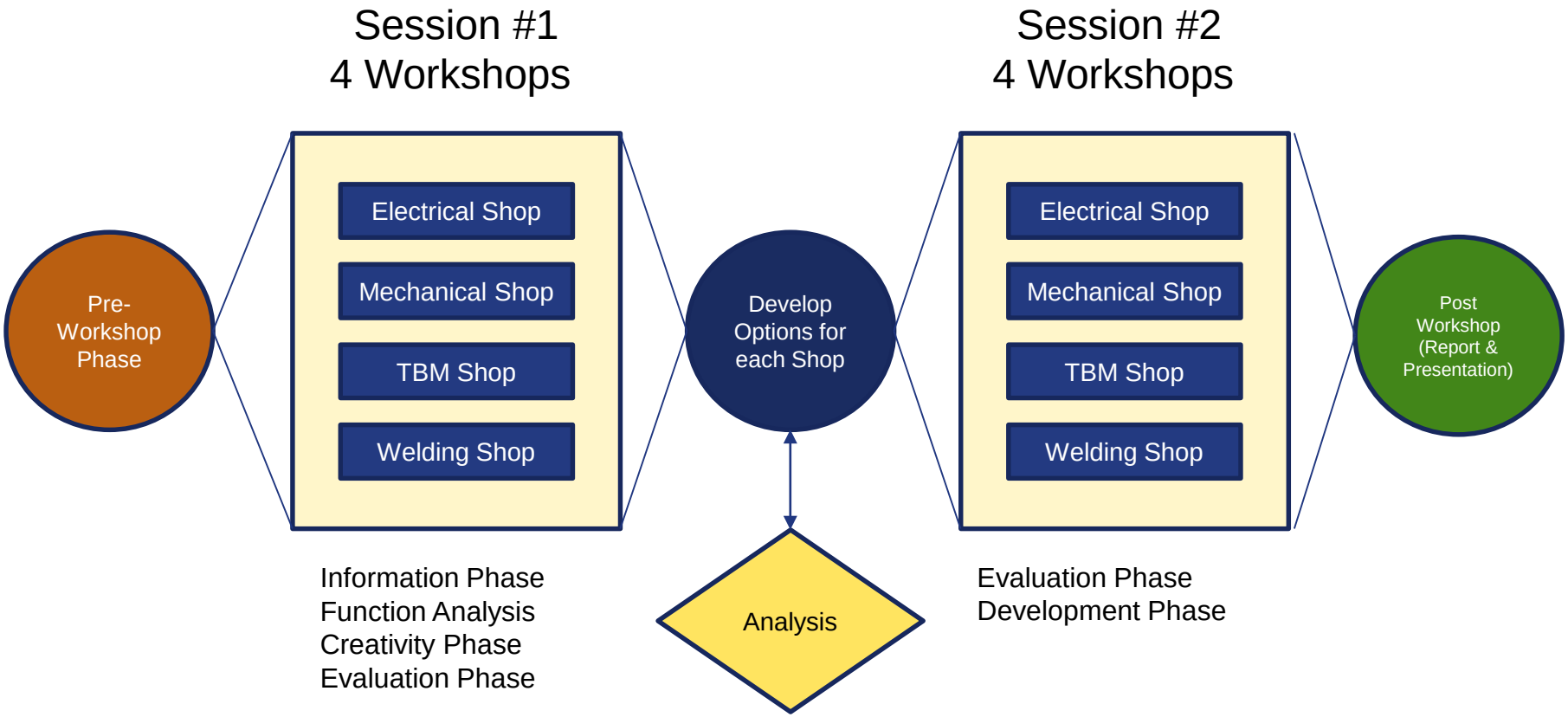
Value Engineering

- Definition:
  - "A systematic process used by a multidisciplinary team to improve the value of a project through the analysis of its functions." (SAVE International)
- Integration
  - Value Engineering is flexible in terms of its capability to be integrated with tools to accomplish the job plan.
  - This presentation will demonstrate case studies illustrating this integration at various stages

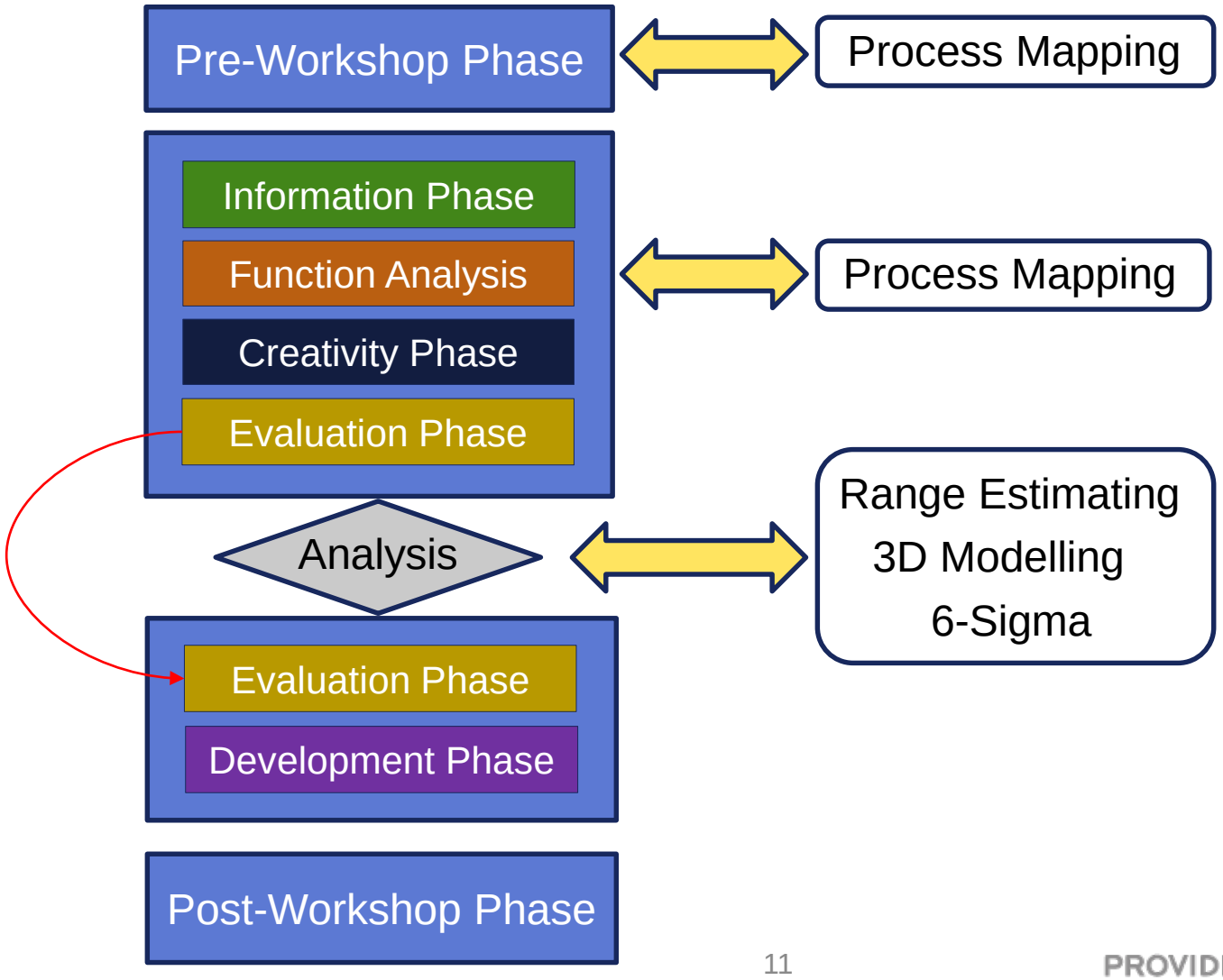
Value Engineering/Analysis



Workshops Planning



VE Integration



Pre-Workshop Stage

- Conduct site visit and identification of the shop components/equipment
- The shop components were located in two locations
  - Coronation Yard
  - Poundmaker Yard
- For the original setup, as a base, the team identified:
  - Current Functional Area
  - Current Space Assigned
  - Current Utilization (frequency of use)
  - Logic for the current area assignment

Pre-Workshop Phase

- Meetings with various shops (individually)
  - Mechanical Shop Function Mapping
  - Welding Shop Function Mapping
  - Electrical Shop Function Mapping
  - TBM Shop Function Mapping
- Data collected:
  - Current Functionality (Functional area, Functions, Current size, Location)
  - Process Mapping (major activities)
  - Compile current setup baseline
  - Base need & good to have
  - Pictures

Pre-Workshop Phase- Shop Process Mapping

- For each shop, the team identified its major activities and developed process mapping:
  - Process
  - Space requirements
  - Lifting requirements (crane)
  - Resources involved
  - Duration
  - Overlap with other shops
  - Frequency

Session #1

- Value Analysis was conducted for each shop:
  - Information Phase:
    - Review current setup, process, base condition and issues
  - Function Analysis Phase:
    - Identify/categorize functions (Basic & Secondary)
    - Major Process (resources needs-space)
  - Creativity Phase:
    - Identify options to satisfy the identified functions and space requirement
    - Storage space requirement
    - Lifting capability requirement
    - Working stations' needs (power)
  - Evaluation Phase:
    - Screen options
    - Identify few options for more analysis

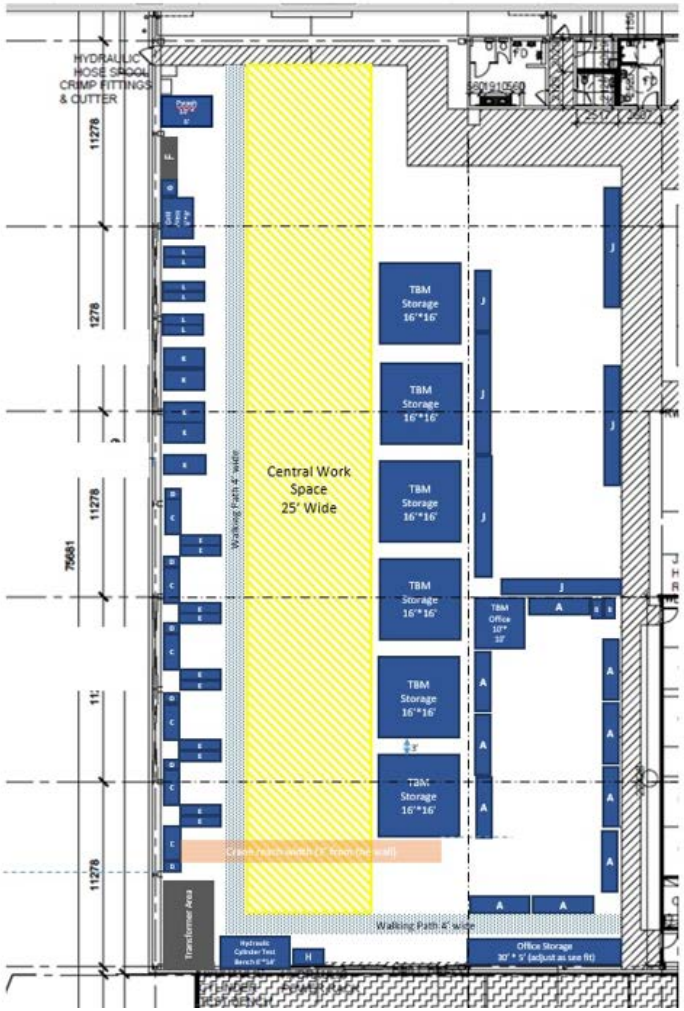
Options Developments (Analysis)

- Between the two sessions the team developed the selected options:
  - 2D & 3D Modelling
  - 6-Sigma & Lean Concepts to improve productivity & assess impact of various options (layout) on shop major activities
  - Identify gaps and work with management to assess the ability to bridge the gaps
  - Check for conflicts and Implementability (power supply, maneuverability, access, floor capacity, etc.)
  - Range Estimating to assess confidence level and sensitivity of the relocation schedule and impact on on-going project

Session #2

- Conduct evaluation session
  - Review options & analysis results
  - Evaluate options and select highest value option for layout for each shop
  - Secure buy-in regarding relocation schedule

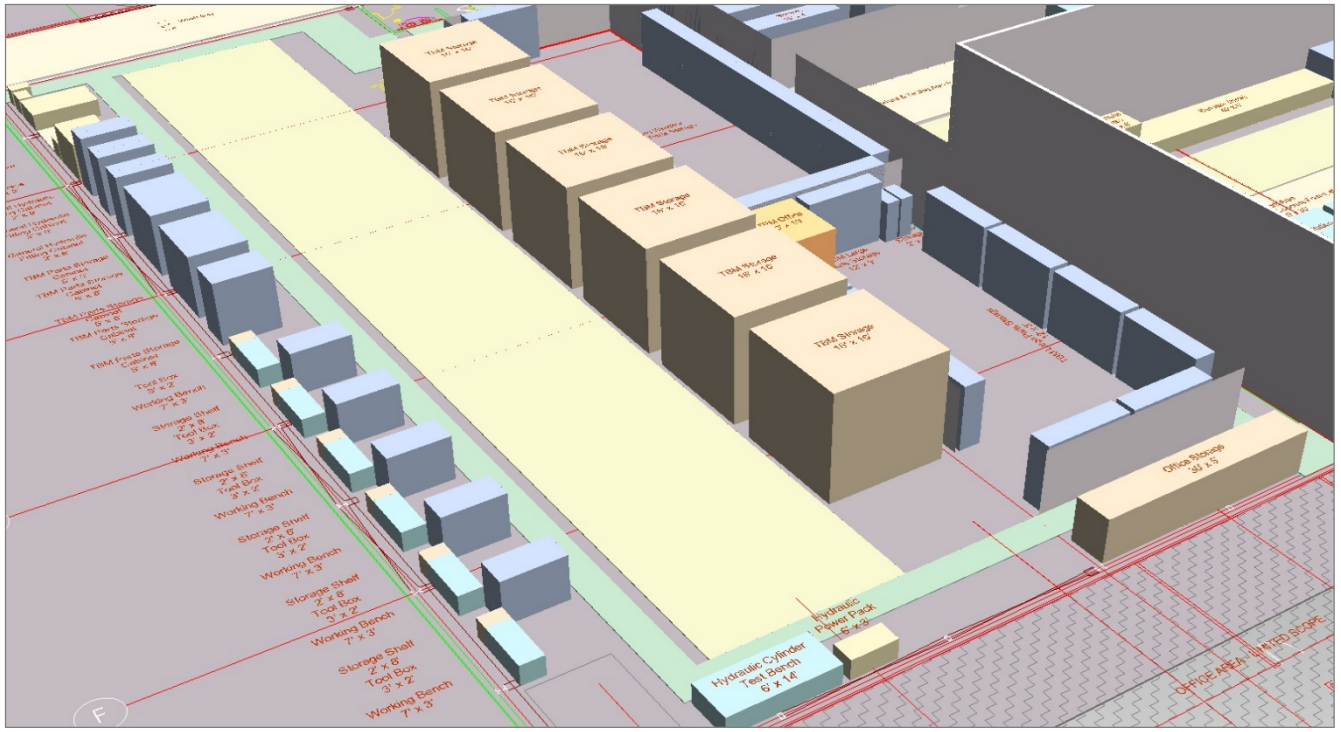
Selected TBM Shop Layout



Notes:

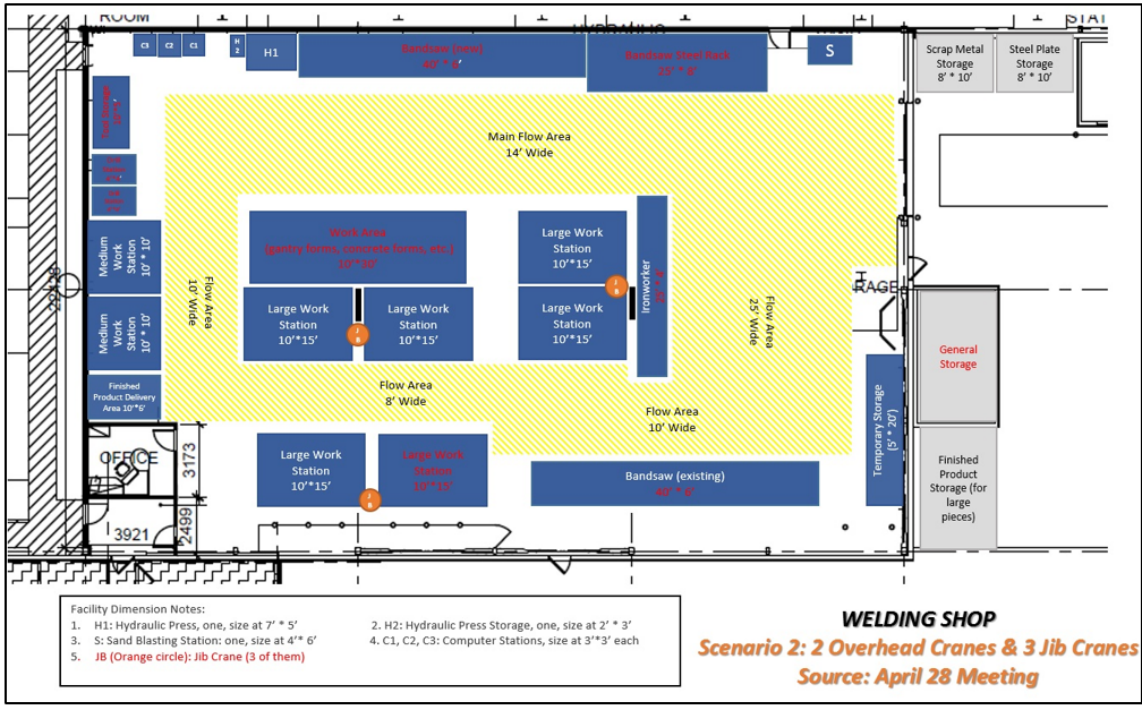
1. A: TBM Large Parts Storage; 10 of them, sizes at 12′ * 3′ each
2. B: TBM Information Storage; 2 of them, sizes at 2′ * 4′
3. C: Working Bench (7′*3′); D: Tool Box (3′*2′). 6 Groups
4. E: Storage Shelf (2′*8′); 5 pairs
5. F: Blocked Area due to Electrical Wall location. Sizes at 3′D*8′W from the footing.
6. G: Bench Grinder, sizes at 3′*3′
7. H: Hydraulic Power Pack, sizes at 6′*3′
8. J: General Storage, sizes at 24′*3′ or 12′*3. Note the entrance/exit area to/from General Mechanical/Electrical Shop – keep it 8′ wide.
9. Forklift sizes at 5′*14′; allow 8′ clearance while entering TBM Large Parts Storage
10. K: TBM Parts Storage Cabinet (size and distance as per site visit)
11. L: General Hydraulic Fitting Cabinet (size and distance as per site visit)

TBM Shop Layout

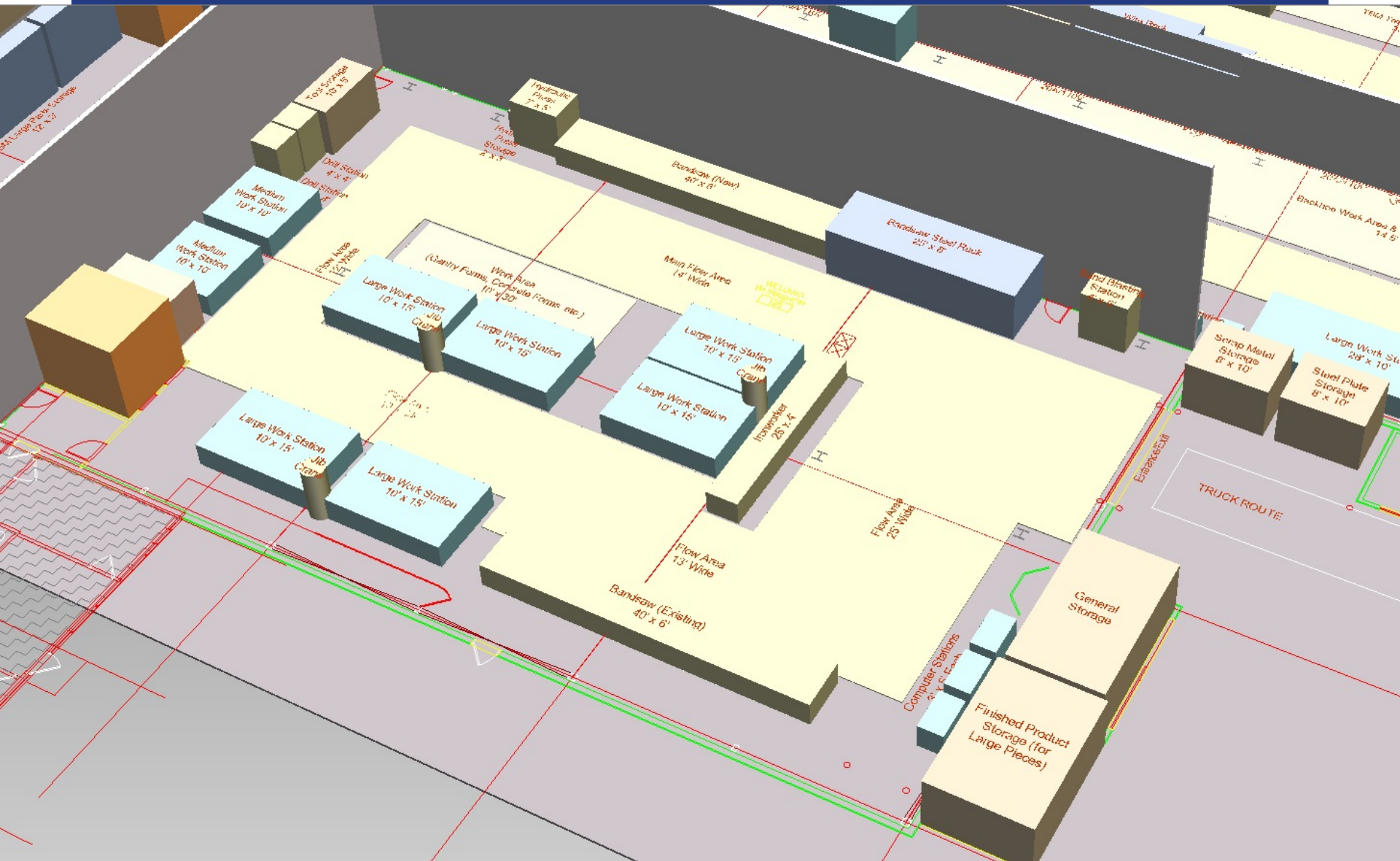


TBM Shop Layout

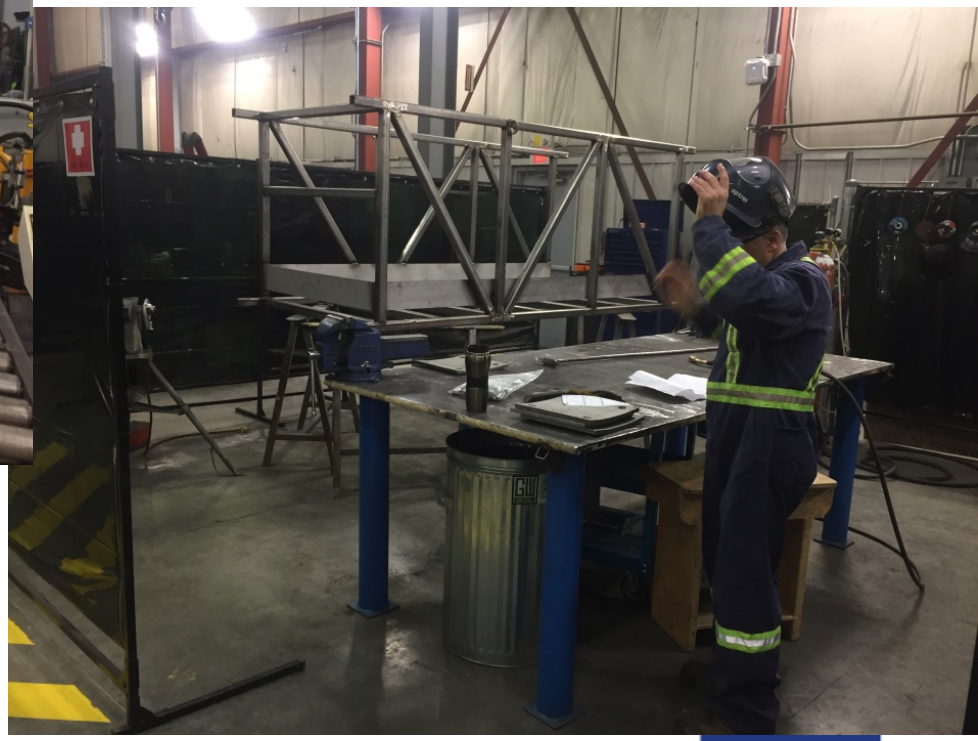
Welding Shop Layout



Welding Shop Layout



Welding Shop Layout



Results and Outcome

- Value Analysis is flexible and easily integrated with other tools
- Visualization helps participants to understand and evaluate options
- Dividing the workshop into two sessions, with options developed (analysis) in-between, helped the team to realize the variation between the options
- Utilization of function analysis helped the various shop foremen to focus on the identification of need
- The process helped with securing buy-in from project team members (welding shop example)
- The transition was completed as planned with no impact on the ongoing construction projects

Questions