MODULE ASSEMBLY FRAMEWORK

A BEST PRACTICE TOOL OF THE CONSTRUCTION OWNERS ASSOCIATION OF ALBERTA

CURT – Offsite Construction and Modularization Workshop – August 26, 2020

PCL CONSTRUCTION

INTRODUCTION

VISION: To make optimum use of the already strong Alberta fabrication capabilities to deliver globally competitive modules.

GOAL: Establish and implement an industry-accepted Modular Best Practice to improve total installed cost, scheduling, quality, transportation and safety

MODULE ASSEMBLY FRAMEWORK

The Module Assembly Best Practices Sub-Committee has developed a “Principled base Framework” with the intent that it:

- provides guidance for proper planning and execution
- is adaptable and non-prescriptive
- is scalable to fit the needs of various project sizes
- allows contracting flexibility
- recognizes that organizations within the contracting supply chain have their own specific strengths, weaknesses and risk profiles
- put ownership at the front end with the decision maker, early involvement in planning

PRINCIPLES VS BEST PRACTICES

What's the difference?

- **Principle:** "A fundamental truth; a comprehensive law or doctrine from which others are derived or on which others are founded; a governing law of conduct."
- **Best Practice:** "Commercial or professional procedures that are accepted or prescribed as being correct or most effective."

MODULE ASSEMBLY FRAMEWORK

Scalable for your project

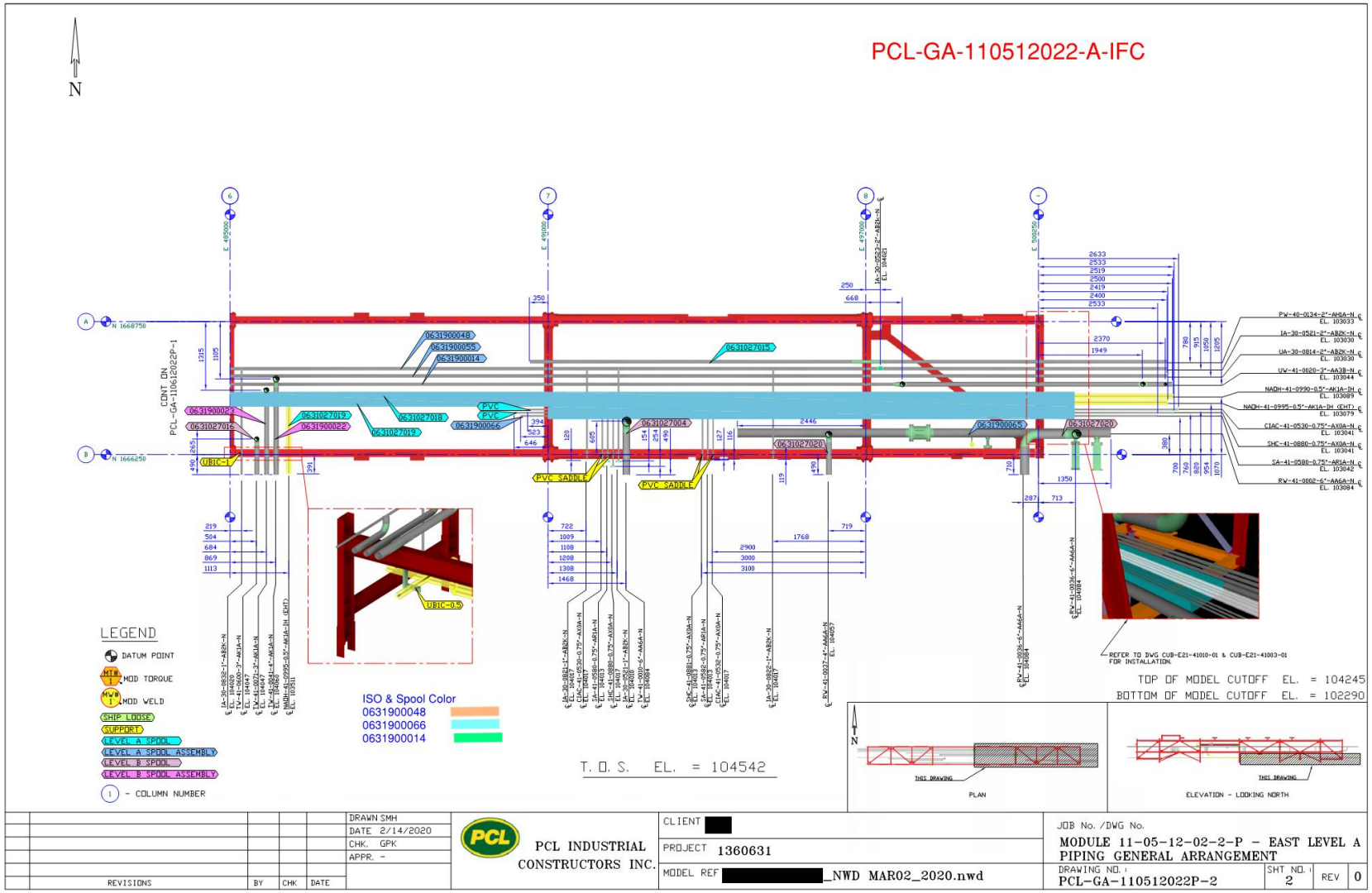
- **Principle** (industry applicable):
  5.3 All required materials delivered to fabricator prior to start of fabrication

- **Best Practice** (project specific):
  Example:
  - Materials arriving from local suppliers are required to arrive a minimum of 7 days prior to the start of fabrication.
  - Materials arriving from international suppliers are required to arrive a minimum of 30 days prior to the start of fabrication.

MODULE ASSEMBLY FRAMEWORK

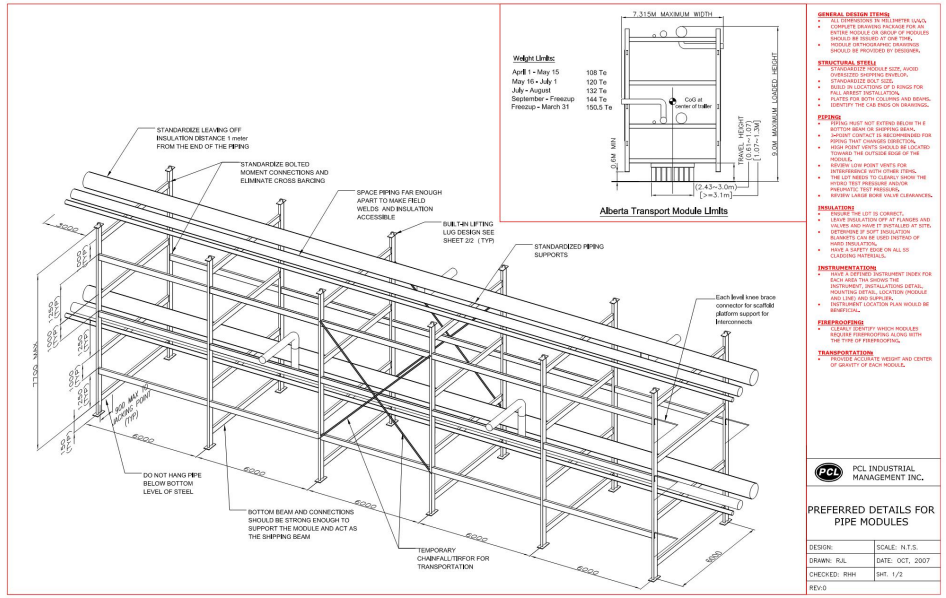
1. Design
2. Procurement
3. Contracting
4. Work Packaging
5. Fabrication
6. Module Assembly
7. Lifting and Shipping Preparation
8. Transport and Receiving (Offload)
9. Module Installation Considerations
10. Completion

FRAMEWORK FOR DESIGN



FRAMEWORK FOR DESIGN

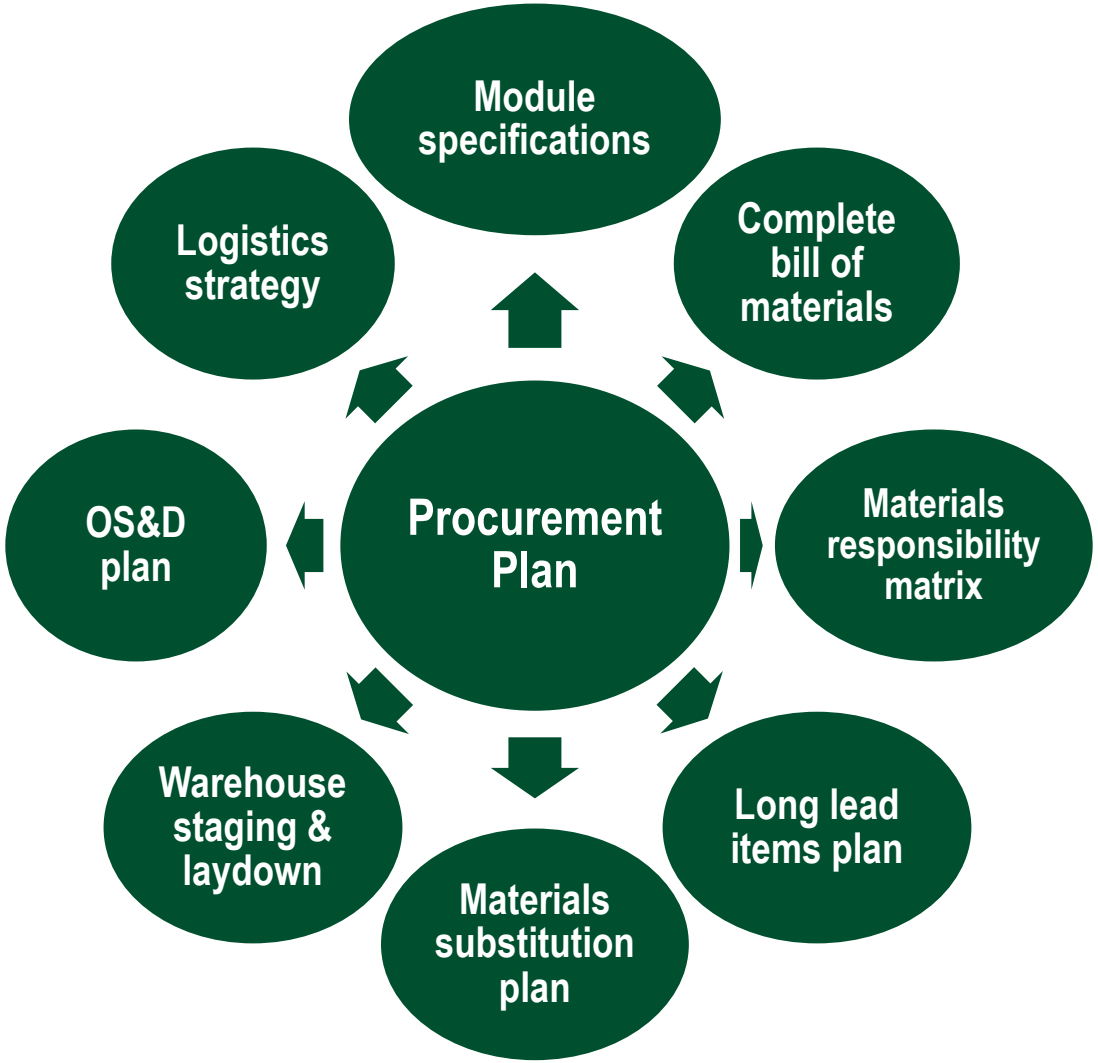
- Constructability involvement through the FEED stage
- Prepare the module design philosophy early in FEED
- Plot plan layout of modules early in FEED
- Module execution plan during FEED



FRAMEWORK FOR PROCUREMENT

- Establish clear responsibilities
- Potential savings through procurement planning
- Develop a procurement plan with stakeholders

FRAMEWORK FOR PROCUREMENT



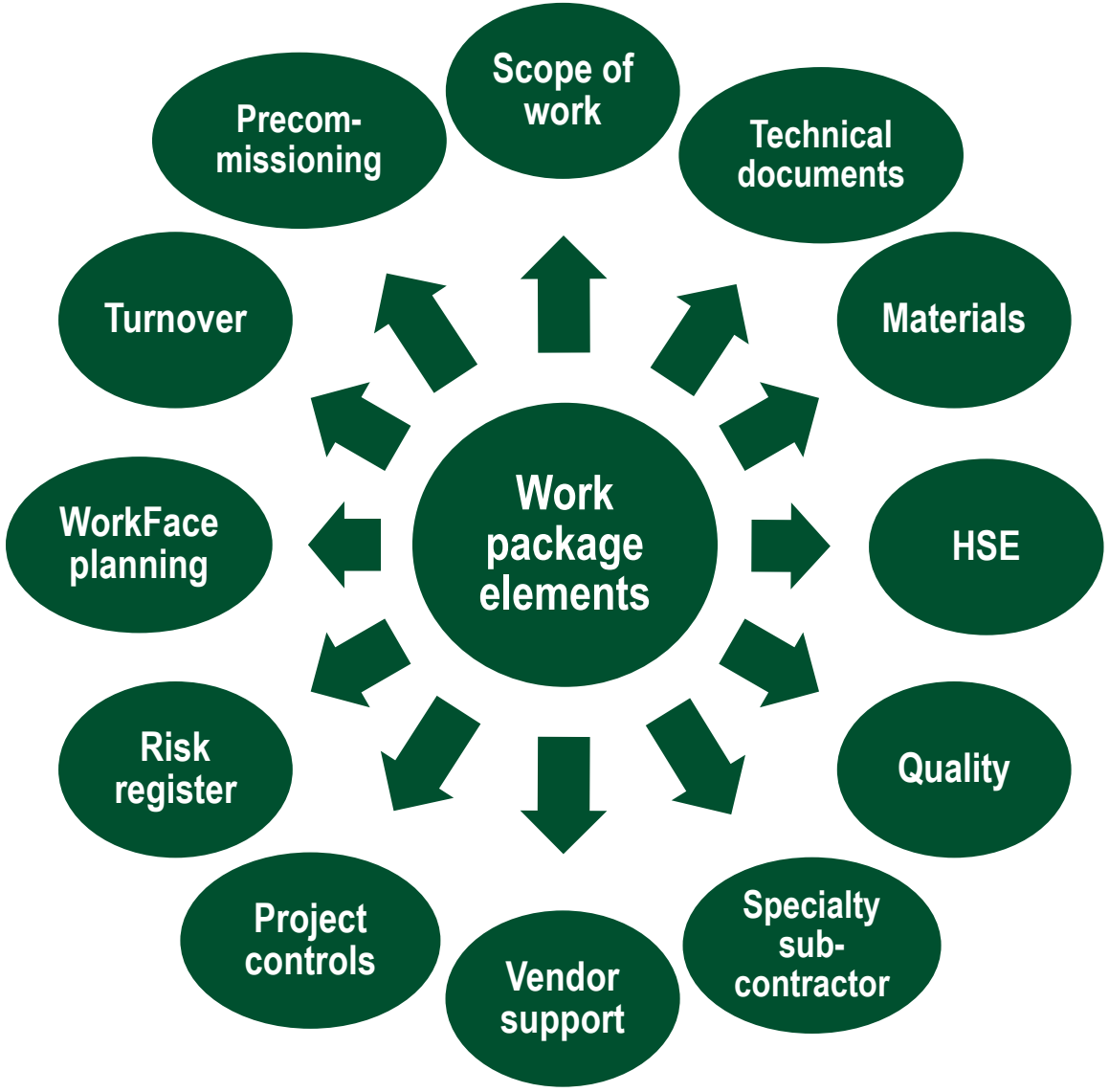
FRAMEWORK FOR CONTRACTING

- Define sufficient time for the contract cycle
- Develop a contracting strategy
- Well defined scope of work
- Prepare a closeout plan

FRAMEWORK FOR WORK PACKAGING

- Work package scope review
- Requirements are agreed by stakeholders in advance of module assembly
- Work package sequencing
- Minimize changes
- Develop work package elements

FRAMEWORK FOR WORK PACKAGING



FRAMEWORK FOR FABRICATION

FOCUS ON FABRICATION PRINCIPLES AND PRACTICES

- Engage fabricator at earliest stage of engineering design
- Complete IFC drawings required – module sequence
- All required materials delivered to fabricator prior to start of fabrication
- Fabrication to include all required components (i.e. supports for miscellaneous piping, electrical, etc.)
- Maximize pre-assembly for modular erection efficiency

FRAMEWORK FOR MODULE ASSEMBLY

FOCUS ON MODULE ASSEMBLY PRINCIPLES AND PRACTICES

- Issued for construction design models are available to module contractor
- Design is complete before assembly commences
- Module assembly contractor is engaged as a stakeholder in the engineering, procurement and construction schedule – integrated project schedule
- Module contractor utilizes work face planning and lean manufacturing principles
- QC/QA requirements are defined up front by stakeholders
- Materials are shipped on time
- Limit requirements for marshalling and handling
- Module yard infrastructure supports project goals

FRAMEWORK FOR LIFTING AND SHIPPING PREPARATION

FOCUS ON LIFTING AND SHIPPING PRINCIPLES AND PRACTICES

- Minimize the number of lift points and standardize bay spacing
- Modules with unequal lift lug elevations
- Lift lugs to fit the required shackle size
- Fundamental design considerations
- Shipping season
- Ensure adequate tie down provisions

FRAMEWORK FOR TRANSPORTATION AND RECEIVING

FOCUS ON TRANSPORTATION AND RECEIVING BEST PRACTICES

Transport

- Integrated transport beam
- Build on shipping beams
- Self-load / offload versus hoisting
- Leave temp steel as permanent

FOCUS ON TRANSPORTATION AND RECEIVING (OFFLOAD) BEST PRACTICES

Receiving

- Straight to hook (just-in-time)
- On-site laydown area
- Straight to piles

FRAMEWORK FOR MODULE INSTALLATION

FOCUS ON MODULE INSTALLATION BEST PRACTICES

- Reduce work at heights
- Early involvement by module installer
- Bolted construction of interconnects
- Preassemble at site
- Include construction supports
- Plan for site conditions

FRAMEWORK FOR COMPLETION

FOCUS ON COMPLETION BEST PRACTICES

- Define pre-commissioning / commissioning requirements
- Define turnover requirements
- Identify all temporary materials that must be removed at site
- Remediation of deficiencies and scope transfer

SUMMARY

GOAL: Establish and implement an industry accepted Modular Best Practice to improve total installed cost, scheduling, quality, transportation and safety

- Provided brief overview of modular best practice work to date
- **Prescriptive:** Needs to be tailored to your project
- **Modular Best Practice:** Part of project execution plan
- **COAA Committee:** Broad cross-section representing all aspects of the industry
- https://www.coaa.ab.ca/library/module-assembly-best-practice/

QUESTIONS