CONSTRUCTION OWNERS ASSOCIATION of ALBERTA

WORKFACE PLANNING CONFERENCE
WFP IS MAKING IT HAPPEN

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PROJECT PLANNING – A CASE STUDY
Wayne Cusitar, P.Eng., MBA
INTRODUCTION

• This presentation is generic and at a high level, in order to present “Project Planning” as a topic and to introduce fresh perspectives.

• The opinions expressed are those of the Author:
  • Reflecting > 40 years of personal project execution experience;
  • Spanning industrial settings including Oil Sands, Oil & Gas, Production of Fertilizers, Mining & Mining Plants and Business Ownership;
  • Arising from projects both small and large, including recent Alberta Oil Sands Mega-Projects;
  • Arising from projects using and not using “COAA WFP Best Practice”
  • The Author’s insights were formed largely within the environment of Calgary’s EPC(M) community.

• This Case Study presumes a (hypothetical) Alberta Oil Sands “Mining” mega-project.
AUTHORITIES

The following authorities are acknowledged for “BEST PRACTICES” for construction project management:

1. Construction Industry Institute (CII): “Constructability Best Practice”

2. Independent Project Analysis Inc. (IPA): “Unique competencies in quantitative timing of practices to business results”.


The Author also acknowledges the contributions of many mentors, associates and nurturing team environments for contributing to the insights presented herein.
WE COULD DEFINE “PROJECT PLANNING” AS

The process of anticipating the sequential, time-sensitive needs of project stakeholders, to enable optimal allocations of inherently limited project resources, so as to satisfy stakeholder’s needs in a timely and cost effective manner.
WHY IS A “PROJECT PLANNING” PERSPECTIVE NEEDED?

(ref. COAA)

On a typical oil sands construction project, ~ 40% of the total cost is for direct craft labour. A COAA study has observed that on average only 37% of a normal working day is spent on productive work.

Productivity improvement will be a primary objective of “Project Planning”.

...The need to improve productivity
WHAT BENEFITS CAN “PROJECT PLANNING” ACHIEVE?

- COAA has researched the productivity losses due to “wait time” and other delays and estimated that up to 25% productivity gain could be achieved through more detailed execution planning i.e. 37% “Tool Time” could become ~ 43%;

- By a corollary calculation, COAA estimated that a net 9% reduction in project “Total Installed Cost” (TIC) could accompany this improvement in “Tool Time”;

- On a $5 billion project, the “net benefit would be $450 million”.

Also, better organization and planning leads to a SAFER working environment.
MODEL: EFFECTIVE ORGANIZATIONAL STRUCTURES (by IPA)

A MODEL FOR EFFECTIVE “PROJECT PLANNING” COULD BE ADAPTED AS SHOWN:

Elements of Organizational Effectiveness

How to best implement a portfolio of projects?

- People
  - Owner
  - Engineering
  - Procurement
  - Scheduling
  - Construction
  - Project Controls

- Work Process
  - Best Practices
  - Auditable Protocols
  - Rules & Interface Boundaries

- Organizational Structure
  - Vertically Integrated WBS Silo Teams

- Organizational Effectiveness
  - Shared Goals
  - Integrated Planning
  - Cooperation & Synergy
  - Risk Management
  - Predictable Results

…A formula for success
MODEL: EFFECTIVE ORGANIZATIONAL STRUCTURES (by IPA)

LET’S CONSIDER THE "PEOPLE" AND THEIR ROLES, FIRST.

Elements of Organizational Effectiveness

How to best implement a portfolio of projects?

Owner, Engineering, Procurement, Scheduling, Construction, Project Controls

Best Practices, Auditable Protocols, Rules & Interface Boundaries

Vertically Integrated WBS Silo Teams

Shared Goals, Integrated Planning, Cooperation & Synergy, Risk Management, Predictable Results
**PROJECT PLANNING** recognizes the interests, responsibilities and accountabilities of all **STAKEHOLDERS**:

- **OWNER’s Role**
  - CORPORATE / GOVERNMENT / POLICIES & STANDARDS / OIL SANDS MINE
  - CONTRACTING STRATEGY & THE ``GOLDEN PEN``
  - COMMUNITIES & PUBLIC RELATIONS

- **EPC(M) ENGINEER’s Role**
  - ENGINEERING / PROJECT CONTROLS / SCHEDULES / CONSTRUCTION SUPPORT

- **PROCUREMENT’s Role**
  - BID REQUESTS, P.O.s FOR MATERIALS & EQUIPMENT / CONTRACT ADMIN
  - QA / EXPEDITING, MTLS MGMNT

- **CONSTRUCTION’s Role**
  - CONSTRUCTABILITY & EXECUTION PLANNING
  - CONSTRUCTION EXECUTION
  - PROGRESS & COST REPORTING
QUESTION: whose role is “PROJECT PLANNING” - in view of the need for Coordination / Integration / Conflict Resolution?

• Mine vs. Plant
• Owner vs. Engineer
• Owner vs. Constructors
• Engineer vs. Vendors
• Engineer vs. Constructors
• Constructor vs. Constructor

PROJECT PLANNING is a role of the LEADERSHIP TEAM and is a shared responsibility among all STAKEHOLDERS.
WHOSE ROLE IS "CONSTRUCTION PLANNING"?

- Given the typical project phases and project timeline, it is difficult to obtain any direct constructability input before the Sanction Date:

**PROJECT TIMELINE**

**EPC PATH OF ENGINEERING**
- CONCEPTUAL / DBM / EDS / DETAILED ENGINEERING & CONSTRUCTION SUPPORT...
  - RFP...
  - RFQ
  - P.O.s & CONTRACTS / EXPEDITING / CHANGE ORDERS

**PATH OF PROCUREMENT**
- RFP...
- RFQ
- P.O.s & CONTRACTS / EXPEDITING / CHANGE ORDERS

**CONSTRUCTION MANAGEMENT TEAM (CMT)**
- DIRECT SUPERVISION / QUALITY ASSURANCE / CHANGE MANAGEMENT / MANAGE THE WFP PROCESS

**GWC PATH OF CONSTRUCTION**
- EARLY WORKS (PRE-SANCTION)
  - CONFIRM CONSTRUCTABILITY & CWP MAP
  - MOBILIZE MODULE YARD FABRICATION
  - MOBILIZE EQUIPMENT / TOOLS / TRADES / SITE ACCESS & LAYDOWN, SECURITY
  - CREATE & EXECUTE FIWPS

...Need for Construction input
Suggest adding a "CONSTRUCTION PLANNING TEAM (CPT)" as a formal discipline within Engineering:

PROJECT TIMELINE

EPC PATH OF ENGINEERING & PROCUREMENT
• CONCEPTUAL / DBM / EDS / DETAILED ENGINEERING & CONSTRUCTION SUPPORT…
  • RFP… * RFQ… * P.O.s & CONTRACTS / EXPEDITING / CHANGE ORDERS

CONSTRUCTION PLANNING TEAM (CPT)
• CONSTRUCTABILITY PLANNING / MODULE PLAN / COST & SCHEDULE ESTIMATES / CWP IDENTIFICATION & RELEASE PLAN

PROJECT SANCTION DATE

CONSTRUCTION MANAGEMENT TEAM (CMT)
• DIRECT SUPERVISION / QUALITY ASSURANCE / CHANGE MANAGEMENT / MANAGE THE WFP PROCESS

GWC PATH OF CONSTRUCTION
• EARLY WORKS (PRE-SANCTION)
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  • CREATE & EXECUTE FIWPS
Effective Constructability & WFP Planning needs to begin much earlier than the “Project Sanction Date”, but Owners are constrained:

1. **Add a “CONSTRUCTION PLANNING TEAM (CPT)” discipline within Engineering**

2. Scope of Work for the CPT includes:
   - Constructability inputs to Design, including the optimal “PATH OF CONSTRUCTION”
   - Contribute to Cost Estimates & integrated Schedule development
   - Develop “CWP RELEASE PLAN” for each WBS Silo
   - Develop contract language to implement WFP for subcontractor bid documents
   - Identify / Develop “WFP PROJECT PROCEDURES & FORMS”
   - Assess WFP Training needs for subcontractors

3. The CPT transitions into the “CONSTRUCTION MANAGEMENT TEAM (CMT)” following the Project Sanction Date.
MODEL: EFFECTIVE ORGANIZATIONAL STRUCTURES (by IPA)

In the MODEL let’s consider examples of “WORK PROCESS”, next:

- Owner
- Engineering
- Procurement
- Scheduling
- Construction
- Project Controls

Best Practices, Auditable Protocols, Rules & Interface Boundaries

Vertically Integrated WBS Silo Teams

Shared Goals, Integrated Planning, Cooperation & Synergy, Risk Management, Predictable Results
**EXAMPLE 1: FRONT END LOADING & BEST PRACTICES (by IPA)**

IPA case studies show that increasing from “poor” to “best” in the early use of ‘best practices’ achieved an associated 8% reduction in Total Installed Cost (TIC).

Typical “FEL” & “Best Practices”
- Modularization
- Process Pilot
- Process Technical Risk
- HAZID, HAZOP, EIA, etc.
- Value Engineering
- Constructability
- CWP Map
- 3-D Model Reviews
- Readiness Reviews

![Diagram showing Cost Competitiveness Correlates With FEL](image-url)
EXAMPLE 2: WORKFACE PLANNING (ref. COAA)

WFP is a key construction management initiative by COAA. The CWP will form the central hub of all planning for site labour resources, construction tools, equipment, materials, engineering documents & Safety.

Construction Work Package(s)
- Single Discipline
- 5,000 to 15,000 mhrs
- Project may have 1,500 to 2,000 CWPs
- Budget Control Point aligned with WBS
Example 3: WFP Work Processes

- CWPs will be developed jointly among the CPT, Engineering & Constructors
- FIWPs are created by the Constructors under QA oversight of the CPT & Project Controls

**CWP**s

- Engineering Part A
- Procurement Part B
- Construction Part C
- Project Controls Requirements
- Schedule Level 3

**FIWP**s

- Transformation Process
  - FIWP, detailed work scopes
  - HSE
  - Schedules Level 4 & 5
  - Manpower
  - Materials
  - Equipment
  - Tools
  - Project Controls Reporting

...CWP inputs to FIWP outputs
Example 4: CWP Protocols, Rules & Interface Boundaries

1. CWP Templates to ensure consistency
2. CWP Constraints – small packages, single discipline
3. Coordinated CWP assembly (Engineering, CPT & Constructors)
4. CWP preparation milestones on Level 3 schedule
5. CWP inputs 100% complete before IFC
6. Uniform rules for Progress & Cost accounting via CWP coding structure
7. Clear Accountabilities – Engineering, Procurement, Construction inputs populating CWP
8. Etc…
Example 5: WFP Deliverables in Timeframe (ref. COAA - WFP model)

<table>
<thead>
<tr>
<th>PROJECT PHASE</th>
<th>DBM</th>
<th>EDS</th>
<th>DETAILED ENGINEER’G &amp; CONSTRUCT’N</th>
</tr>
</thead>
</table>
| Deliverable   | CWP Templates - created by CPT | CWP Identification & Release Plan – created by CPT | 1. IFC – CWP inputs by Engrg, Procrmt & Const’n  
2. IFC – FIWPs by GWC Contractors |
| Details       | CWP task descriptions for all const’n disciplines & modules | Update & align CWPs with Level 3 Project Schedule | Continuous creation, approvals & execution |
| Timing        | Late DBM | Late EDS | |

Project Sanction Date

…Planning before & after Sanction Date
EXAMPLE 6: INTEGRATED PROJECT SCHEDULE (ref. COAA)

The inputs from Engineering, Procurement and Construction will be linked to each CWP on the Level 3 Project Schedule, providing the PMT with visible tracking of progress and/or early warning of slippage:

- 120 days CWP Part A = Engineering Input
- 90 days CWP Part A&B = IFC
- 60 days CWP Part B = Procurement Input
- 60 days CWP Part C = Construction Input
- 30 days FIWP ready for release
- 0 days Release FIWP

- Begin populating FIWPs
- Confirm material, tool & equipment availability
- Plan resources
- Develop Back Log or “Plan B” FIWPs
- FIWP readiness checklist
- Integrate plans with other disciplines
- Add to 3 Week Look-ahead
- Confirm material and equipment received
- Get sign off

- Print ‘hard copy’ of FIWPs that are 100% ready
- Begin to execute FIWPs

Timing of inputs on the Schedule

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COAA WORKFACE PLANNING CONFERENCE
Project Planning – Integrated Schedule...
MODEL: EFFECTIVE ORGANIZATIONAL STRUCTURE (by IPA)

IN THE MODEL LET’S CONSIDER “ORGANIZATIONAL STRUCTURE”, NEXT:

Elements of Organizational Effectiveness

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Best Practices,
Auditable
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Vertically Integrated
WBS Silo Teams

Shared Goals,
Integrated Planning,
Cooperation &
Synergy,
Risk Management,
Predictable Results
### EPC(M) ORGANIZATIONAL STRUCTURE

**ASSUMING A TYPICAL ALBERTA OIL-SANDS “MINING” PROJECT:**

<table>
<thead>
<tr>
<th>WBS “SILOS”</th>
<th>AREA 1 ORE PREPARATION</th>
<th>AREA 2 TAILINGS</th>
<th>AREA 3 EXTRACTION</th>
<th>AREA 4 FROTH TREAT / RECOV’RY</th>
<th>AREA 5 UTILITIES</th>
<th>AREA 6 OFF-SITES</th>
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<tr>
<td><strong>ENGINEERING (typical matrix organization structures)</strong></td>
<td>GWC #1</td>
<td>GWC #2</td>
<td>EPC #1</td>
<td>EPC #2</td>
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- The WBS Silos reflect logical, "RIGHT SIZE" divisions of the “SCOPE OF WORK”
- Subcontractor organization charts, reporting, responsibilities & accountability are vertically aligned with the WBS
ORGANIZATIONAL EFFECTIVENESS cont’d:

• Features of the Team Relationships

FOR THE OWNER
1. Assign OWNER REPs to each WBS Silo Team
2. Assign LEGAL / CONTRACT COUNSEL to the project
3. Facilitate an efficient P.O. / CONTRACT / TRENDs REVIEW & APPROVAL PROCESS

FOR THE ENGINEER
1. Each WBS Silo Team should be self-sufficient
2. Engineering Silo Teams to be organized by WBS, not by commodity specialist
3. Procurement Silo Teams to be organized by WBS, not by commodity specialist
4. Identify and manage all interfaces at Battery Limits – horizontal integration.

THESE CONDITIONS PRECEDENT ARE ESSENTIAL TO ENABLE CONTROL & ACCOUNTABILITY BY THE WBS SILO AREA MANAGERS.

FOR THE CONSTRUCTOR
1. Constructor Silo Teams maintain 1-to-1 Relationship with Engineer Silo Teams
2. INFRASTRUCTURE & UTILITIES require construction access across battery limits
Given the definition and concepts of “Project Planning” as presented:

- Is the “Project Planning Model” valid for mega-projects ...... Yes/No
- Is “Project Planning” a “Leadership responsibility” .......... Yes/No
- Is the CPT’s role truly a missing Engineering discipline .... Yes/No
- Does “Project Planning” complement the use of WFP ........ Yes/No
- Are the Safety & Financial benefits of P.P. attractive .......... Yes/No
- Is “Project Planning” a potential “Best Practice”............. Yes/No
- Will you use (P.P.) concepts on your next project ! ...........Yes/No

It has been my pleasure speaking to you today !