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WORKFACE PLANNING CONFERENCE-WIDE SESSION

FROM CONCEPT TO COMMISSIONING

INTRODUCTION

- *From Concept to Commissioning: what does it mean?*
- *Who is on the panel?*
  - ✓ **Ron Embury** | Engineering Team Leader, NOVA Chemicals (Owner)
  - ✓ **Ken Kohlruss** | Vice President Operations, Commonwealth Construction [CH2M Hill] (CMT)
  - ✓ **Jose Herrero** | Vice President, Fluor (Engineering Contractor)
  - ✓ **Tannis Liviniuk** | Lead Construction Analyst, Cenovus Energy (Construction Contractor)
  - ✓ **Lloyd Rankin** | Researcher, COAA (Facilitator)

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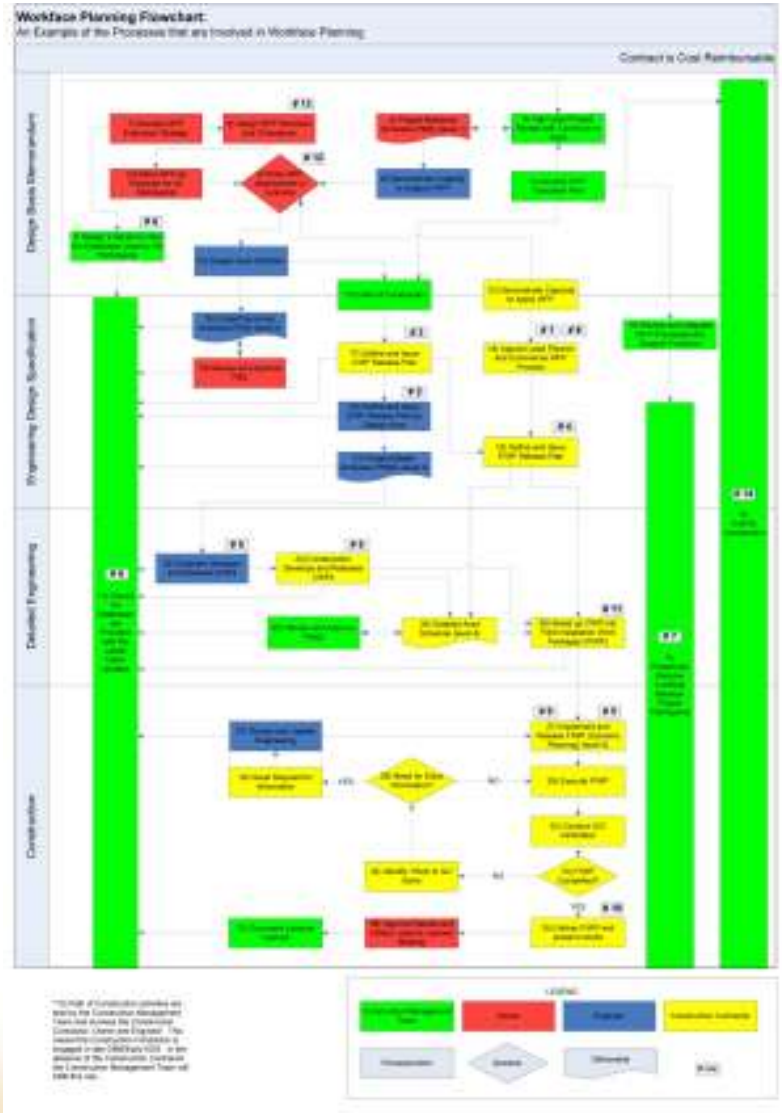
INTRODUCTION



DESIGN BASIS MEMORANDUM (DBM)

Defines the basic design parameters for the intended project. Generation, review, and approval of the DBM is a prerequisite for the development of the Engineering Design Specification (EDS).

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DESIGN BASIS MEMORANDUM (DBM)

1) Develop WFP execution strategy

2) Assign WFP sponsors and champions

4) Project Milestone Schedule (PMS) (level 1)

6) High-level project review with construction input

3) Define WFP as required for all participants

9) Write WFP requirements in contracts

8) Demonstrate capacity to support WFP

5) Develop WFP execution plan

7) Design a server to host the databases used by all participants

10) Design Area Definition

13) Path of Construction

12) Demonstrate capacity to apply WFP

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DBM: OWNER

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DBM: OWNER

At the DBM phase, we have three documents that set the stage for WorkFace Planning:

- Project Execution Plan
- Construction Execution Plan
- Constructability Implementation Plan

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DBM: OWNER

Project Execution Plan (PEP):

- **Overall Project Milestone Schedule**
- **Project Strategy:**
  - **The project will be Construction-driven**
  - **Engineering and Procurement will sequence their work to meet Construction needs.**
  - **There will be extensive constructability input into the design and Engineering Work Package (EWP)**
  - **WorkFace Planning will be part of the Construction Execution Plan**
  - **No work packages (FIWPs) will start without all engineering, materials, tools, equipment and labour present on site.**
  - **Owner's commissioning sequence will be by operating systems and will be introduced in the engineering and construction schedules.**

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DBM: OWNER

Construction Execution Plan (CEP):

- With respect to WorkFace Planning, the construction execution plan will:
  - Set out the Construction Management Organization.
  - Describe the Contracting Strategy
  - Contain the WorkFace Planning Execution Plan
    - Workface Planning Approach
    - Workface Planning Overview
    - Workface Planning Implementation
    - Workface Planning Training
    - Workface Audit Process
  - Progress Reporting

DBM: OWNER

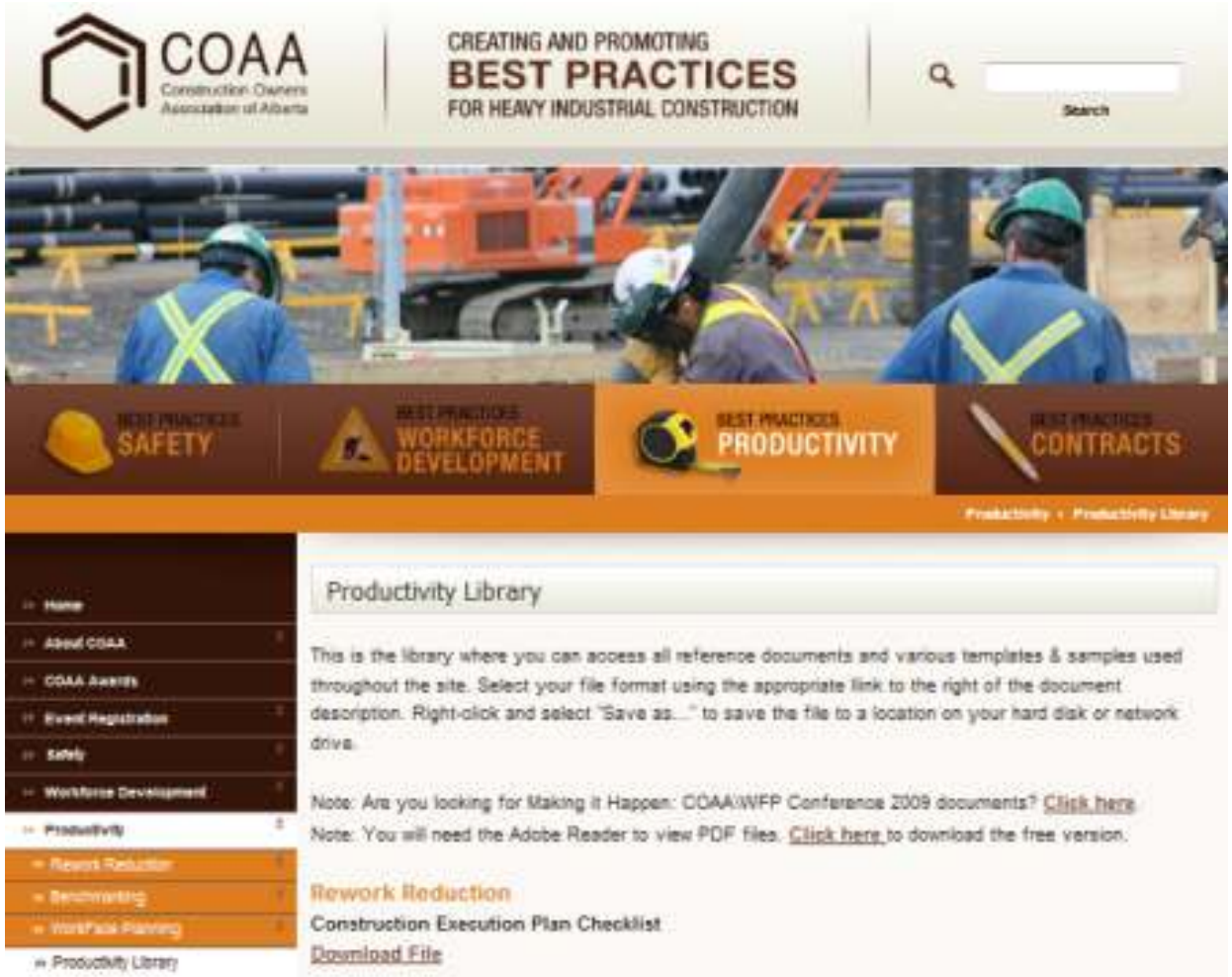
Constructability Implementation Plan (CIP)

- CIP is developed and started in the DBM phase. CIP is used to support WFP concepts.
  - Led by Construction
  - Sponsor(s) identified, Policy Statements described and Constructability Manager is appointed.
  - Sets out focus groups between engineering disciplines, Procurement, Owner, etc.
  - High-level construction sequence is developed.
  - Details of schedule integration is developed between parties.
    - i.e., Engineering drawing sequence developed to support FIWP Schedule
    - i.e., Procurement deliverables developed to support FIWP Schedule.
  - Various other activities are completed to promote ease of construction (design, layout, modular design, pre-fabrication, construction methods, weather, etc.)

DBM: OWNER

Contract types:

- C
- CM
- EP
- EPC
- EPCM



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DBM: CONSTRUCTION MANAGEMENT TEAM

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DBM: CONSTRUCTION MANAGEMENT TEAM

WorkFace Planning Execution Plan

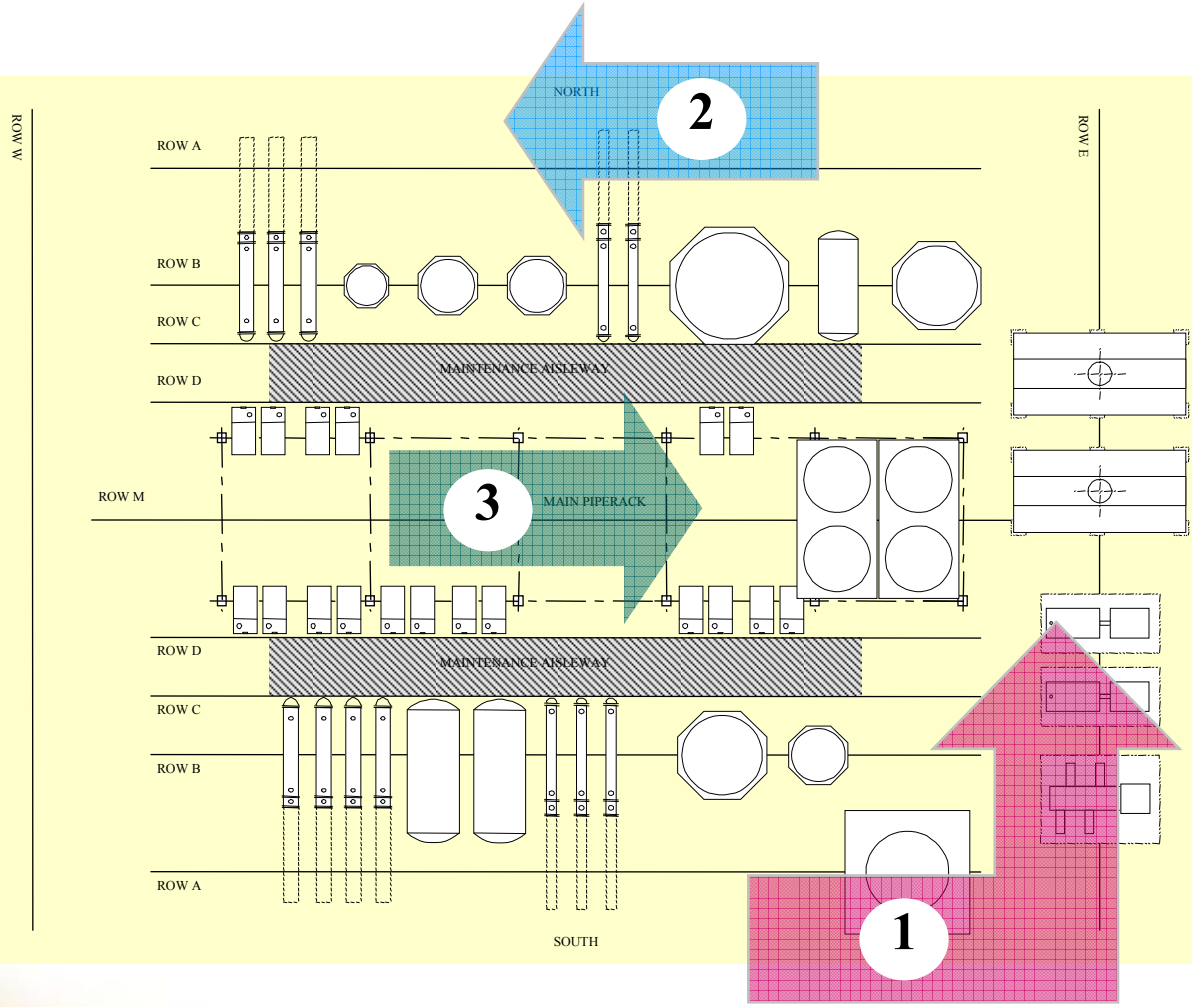
JACOBS™

1.0 Definition
2.0 Purpose
3.0 Scope
4.0 Strategies
5.0 Participants
6.0 Roles and Responsibilities
7.0 Method
8.0 Systems
9.0 FIWP'S Release Process
10. Auditing

DBM: CONSTRUCTION MANAGEMENT TEAM

High-level project review which leads to Path of Construction

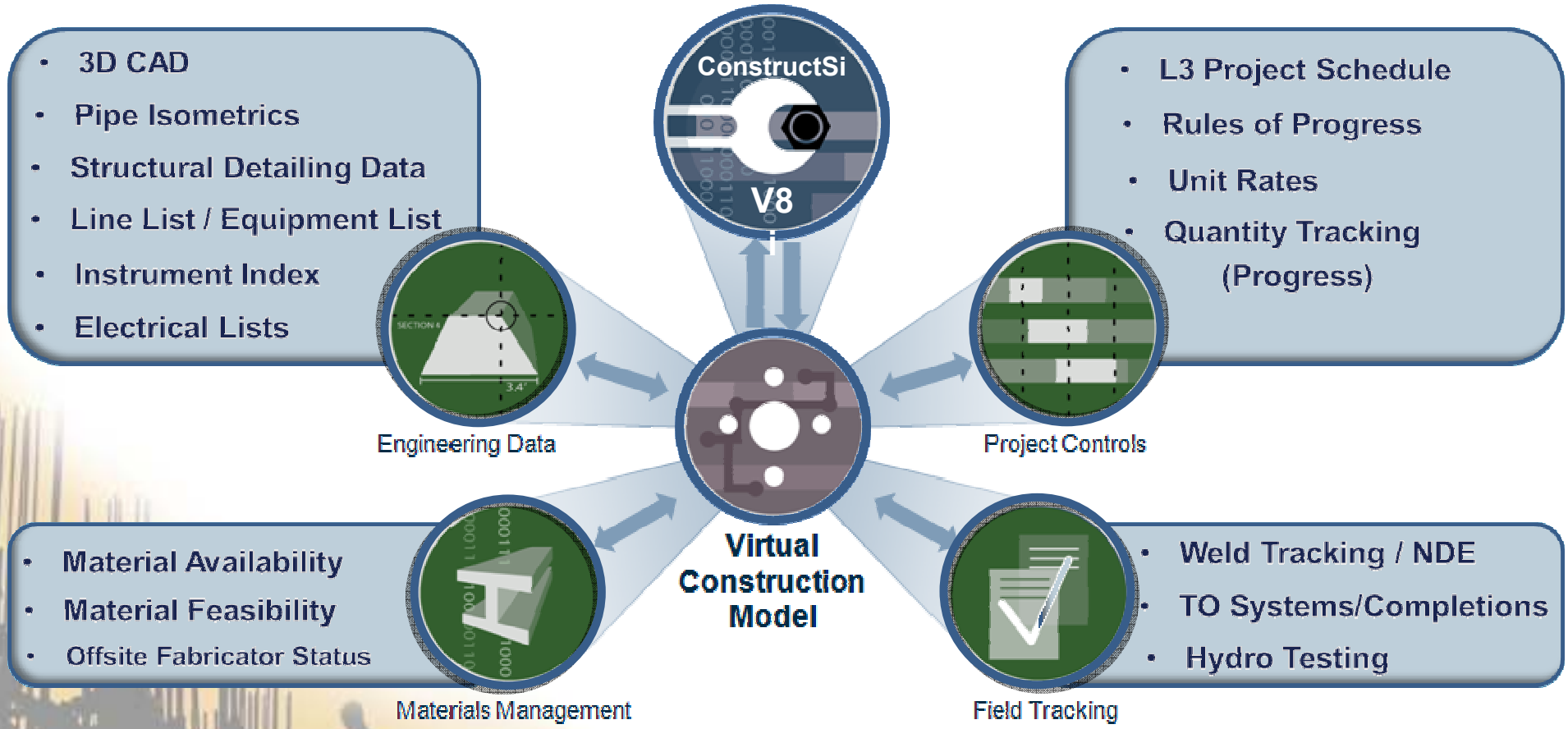
DBM: CONSTRUCTION MANAGEMENT TEAM



Path of Construction

DBM: CONSTRUCTION MANAGEMENT TEAM

WFP Automation
Bring your data together in one location



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DBM: CONSTRUCTION MANAGEMENT TEAM

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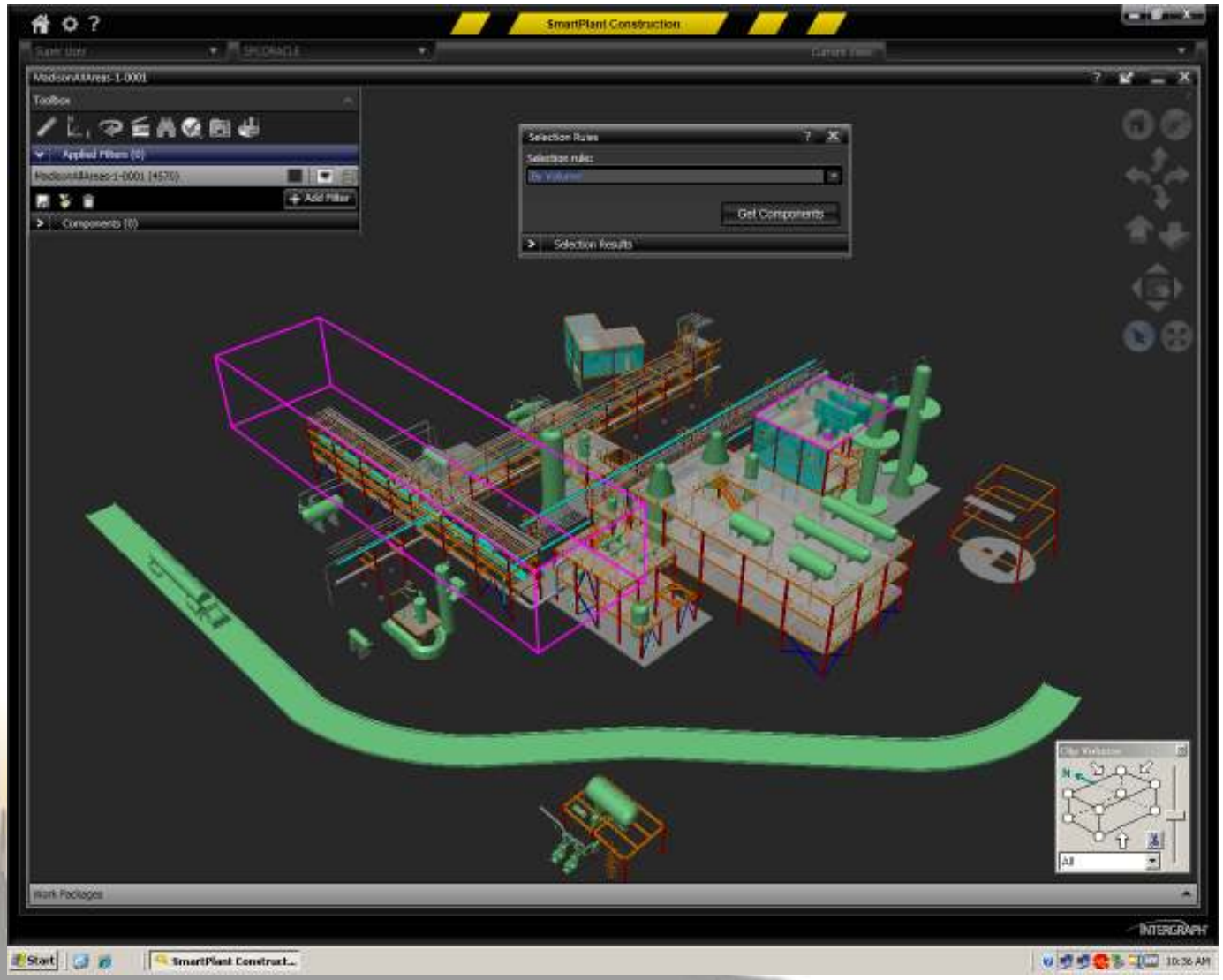

DBM: CONSTRUCTION MANAGEMENT TEAM

- Experienced trainers, educators and assessors (auditors)
- Assessment services
- Self-assessment tools

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DBM: ENGINEERING

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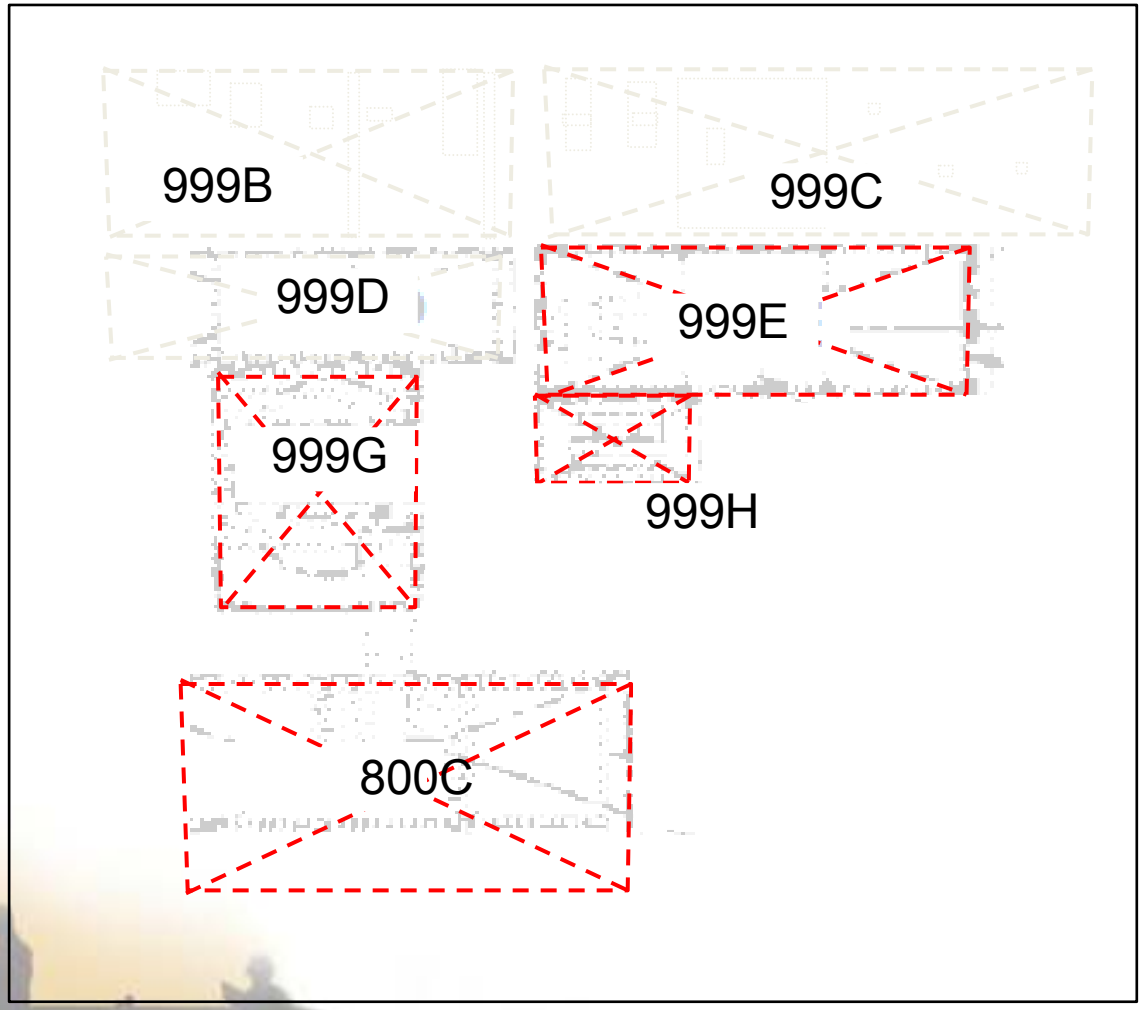
DBM: ENGINEERING

Sample plot plan (partial)



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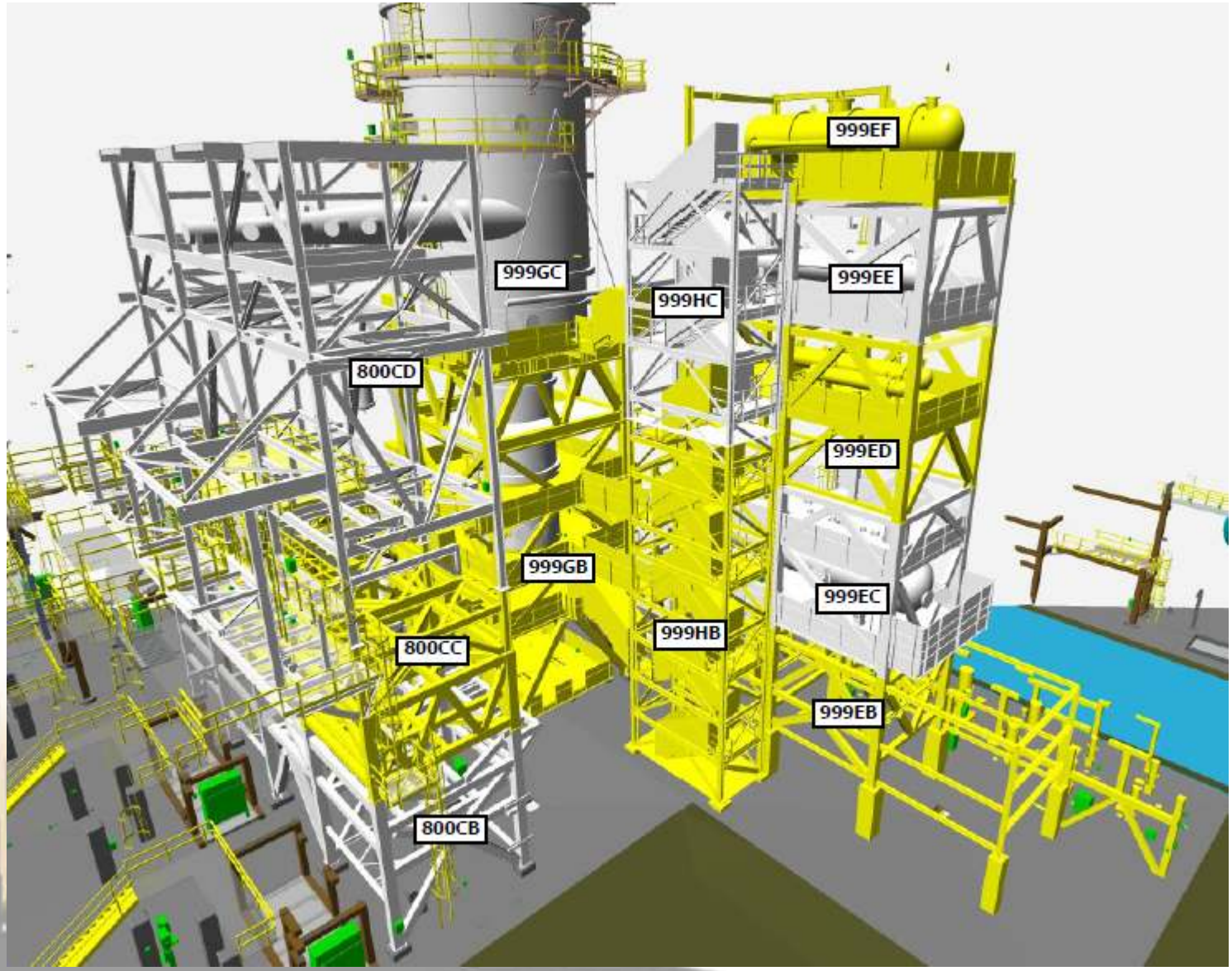
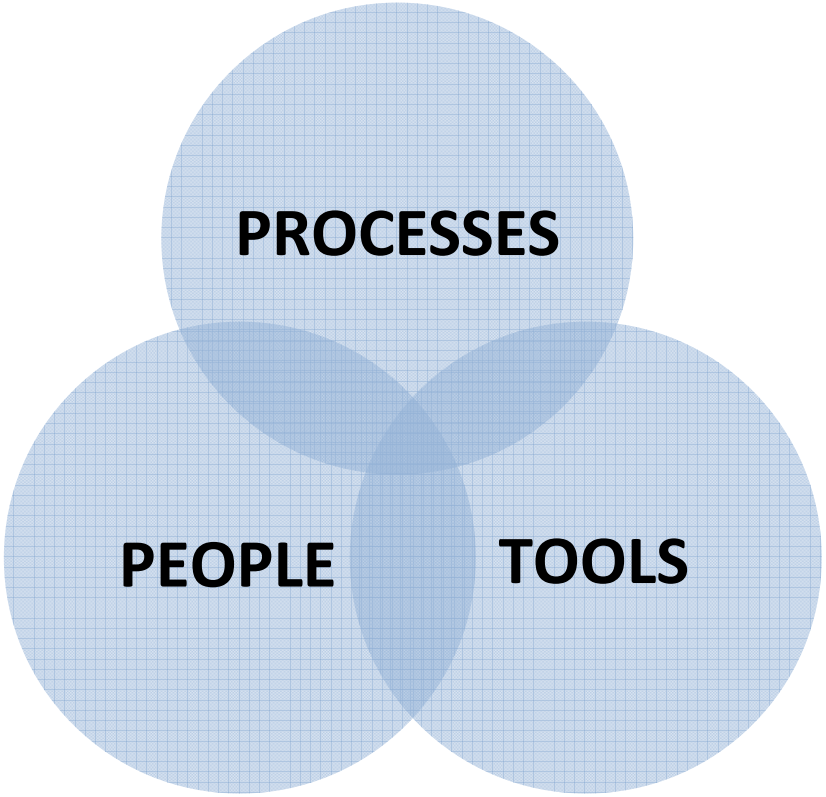
DBM: ENGINEERING



DBM: ENGINEERING



Click to see process

Click to see table of contents

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DBM: CONSTRUCTION CONTRACTOR

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DBM: CONSTRUCTION CONTRACTOR

- Demonstrate high-level capacity to support WorkFace Planning
- WorkFace Planning Awareness for Trades People scheduled for delivery February 2011.
- Pre-beta sample available at this conference

DBM: CONSTRUCTION CONTRACTOR

WorkFace Planning Awareness for Trades People:

DBM: CONSTRUCTION CONTRACTOR

WorkFace Planning Course Development Roadmap

ENGINEERING DESIGN SPECIFICATION: DEFINITION

EDS defines all elements of project scope and is the control document for commencement of detailed engineering and procurement activities on the project. It is also used in scoping the development of the Authorization for Expenditure (AFE).

ENGINEERING DESIGN SPECIFICATION (EDS)

15) Project Summary Schedule (PSS) (level 2)

16) Review and Approve PSS

17) Define and Issue CWP Release Plan

20) Define and Issue EWP Release Plan by Design Area

21) Project Master Schedule (PMaS) (level 3)

18) Appoint Lead Planner; Commence WFP Process

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14) Review and integrate WFP processes and support functions

* Proactively resolve conflicts between project participants

11) Ensure all databases are provided with the latest data

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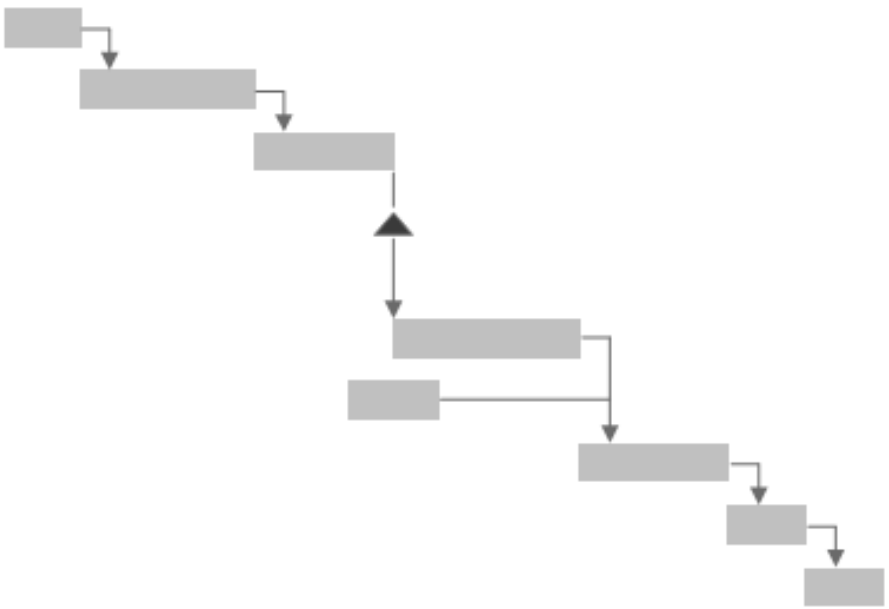
EDS: ENGINEERING

Level 2 Schedule

ID	Task Name
001	**Piping**
002	Establish EWP/WBI Boundaries
003	Model Development
004	Prepare and Issue ISO
005	WBI/EWP Release
006	**Construction**
007	Pipe Fabrication
008	Develop FIWP
009	Install Piping per FIWP
010	Hydrotest FIWPs
011	Reinstate

Timeline



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EDS: ENGINEERING

EWP Release Plan

Schedule Ref ID	Discipline Code	WBS Number	WBI Number	WBI Description	Engineering WBI Release Date	Materials WBI Release Date	Remarks
511176 - Cooling Water Pumps & Tankage							
UTW1030	1	511176	511176100U	Underground Concrete CW	1-Jun-07		
UTW1040	1	511176	511176100N	Aboveground Concrete CW	29-Jun-07	Note >>	Embeds: 27-Jul-07
UTW1050	1	511176	511176100P	Paving CW	17-Sep-07		
UTW1580	2	511176	511176200N	Steel CW	13-Aug-07	24-Oct-07	Bracings
UTW1590	2	511176	511176200L	Miscellaneous Steel CW	3-Sep-07	2-Dec-07	
UTW1970	4	511176	511176400N	Equipment CW	2-Jul-07	Note >>	Materials release for install. per Eqp delivery schedu
~~UTW2110~~	~~5~~	~~511176~~	~~511176500U~~	~~Underground Piping CW~~	~~17-May-07~~		Replaced by WBI#5199995502U schedule Ref ID U
UTW2120	5	511176	511176500N	Aboveground Piping CW	6-Aug-07	Note >>	Release for fabrication per release curve
UTW2460	6	511176	511176600N	Electrical CW	30-Jul-07		
UTW2710	7	511176	511176700N	Instruments CW	26-Oct-07	Note >>	Field Instruments delivery: 01-Sep-07 to 30-Jun-08
~~UTW2940~~	~~8~~	~~511176~~	~~511176800F~~	~~Fireproofing CW~~	~~3-Jul-07~~		Deleted
UTW2950	8	511176	511176800N	Insulation CW	3-Jul-07		
511177 - Cooling Water Plate & Frame Exchangers							
UTW1060	1	511177	511177100U	Underground Concrete EX	24-Apr-07		
UTW1070	1	511177	511177100N	Aboveground Concrete EX	30-Aug-07		Added
UTW1080	1	511177	511177100P	Paving EX	30-Aug-07		
UTW1600	2	511177	511177200N	Steel EX	13-Aug-07	29-Oct-07	Steel structure
UTW1610	2	511177	511177200L	Miscellaneous Steel EX	30-Aug-07	28-Nov-07	
UTW1980	4	511177	511177400N	Equipment EX	2-Jul-07	Note >>	Materials release for install. per Eqp delivery schedu
~~UTW2140~~	~~5~~	~~511177~~	~~511177500U~~	~~Underground Piping EX~~	~~17-May-07~~		Replaced by WBI#5199995502U schedule Ref ID U
UTW2150	5	511177	511177500N	Aboveground Piping EX	2-Aug-07	Note >>	Release for fabrication per release curve
UTW2470	6	511177	511177600N	Electrical EX	30-Jul-07		
UTW2720	7	511177	511177700N	Instruments EX	26-Oct-07	Note >>	Field Instruments delivery: 01-Sep-07 to 30-Jun-08
UTW2960	8	511177	511177800F	Fireproofing EX	3-Jul-07		
UTW2970	8	511177	511177800N	Insulation EX	3-Jul-07		

DBM: ENGINEERING

WBI/EWP Structure

- **Activity code breaks down discipline code into different activities**

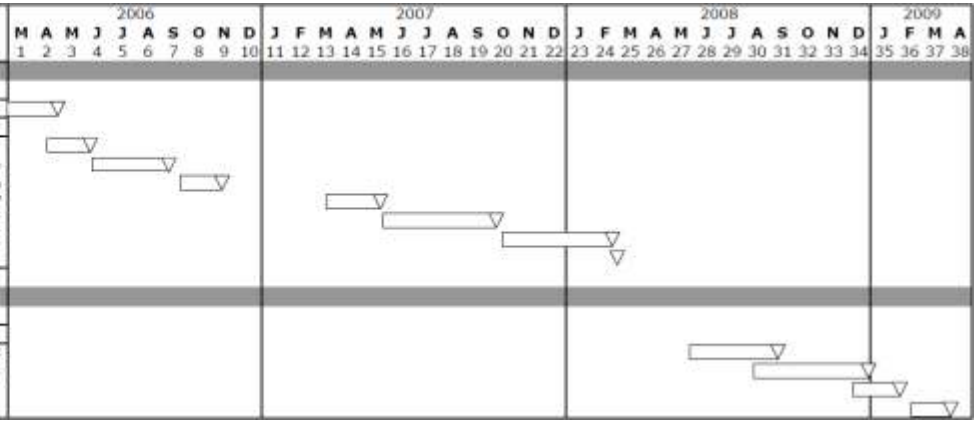
Discipline Code	Model Type
0	Civil Works
1	Concrete
2	Structural Steel
3	Buildings
4	Equipment
5	Piping
6	Electrical
7	Control Systems

U	Underground
N	New construction, stick built above ground
P	Paving and Road.
L	Miscellaneous steel
T	Electrical Heat Tracing
F	Equipment Fireproofing

EDS: ENGINEERING

Level 3 Schedule

Activity ID	Activity Description	Orig Dur	Actual Dur	Rem Dur	Start	Finish
DESIGN						
Mechanical						
VA10120	Issue Sized Equipment List - AFD	120	0	120	1-Jan-06	1-May-06
Piping						
VA10870	Dev 3D Piping Layout - Process Area	57	0	57	17-Apr-06	4-Jul-06
VA10900	Dev 3D Piping Model to 30% Reivew Pre VE	53	0	53	5-Jul-06	15-Sep-06
VA111010	Dev 3D Pip Model to 60% - DA151108 Compression	125	0	125	25-Sep-06	10-Nov-06
VA111012	Dev 3D Pip Model to 60% - DA151108 Compress VE	50	0	50	19-Mar-07	25-May-07
VA112005	Dev 3D Pip Model to 90% - DA151108 Compression	90	0	90	28-May-07	11-Oct-07
VAE2310	Issue Pipe Isos IFC - DA151108 Compression	40	0	40	19-Oct-07	29-Feb-08
VAW1870	Release WBI 151108500N - A/G Piping Compr	1	0	1	3-Mar-08	3-Mar-08
CONSTRUCTION						
Compression						
Piping						
15C508500	Prefabricate Pipe Spools	90	0	90	31-May-08	17-Sep-08
15C508502	Install A/G Pipe	132	0	132	12-Jul-08	28-Dec-08
15C508504	Pipe Pressure Tests	45	0	45	18-Dec-08	8-Feb-09
15C08505	Reinstatement	35	0	35	23-Feb-09	4-Apr-09



EDS: CONSTRUCTION MANAGEMENT TEAM

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14) Review and integrate WFP processes and support functions

* Proactively resolve conflicts between project participants

11) Ensure all databases are provided with the latest data

EDS: CONSTRUCTION MANAGEMENT TEAM

Proactively resolve conflicts

EDS: CONSTRUCTION MANAGEMENT TEAM

Review and integrate WFP processes and support functions

EDS: CONSTRUCTION MANAGEMENT TEAM

Ensure all databases are up to date

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EDS: CONSTRUCTION

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EDS: CONSTRUCTION

Define and Issue CWP release plan

- Identify the size and description of all CWPs
- Determine when those CWPs will be developed and released
- These can be reported in Excel spreadsheets, Primavera schedules, and other documents
- The EWP schedule will be driven by the CWP schedule

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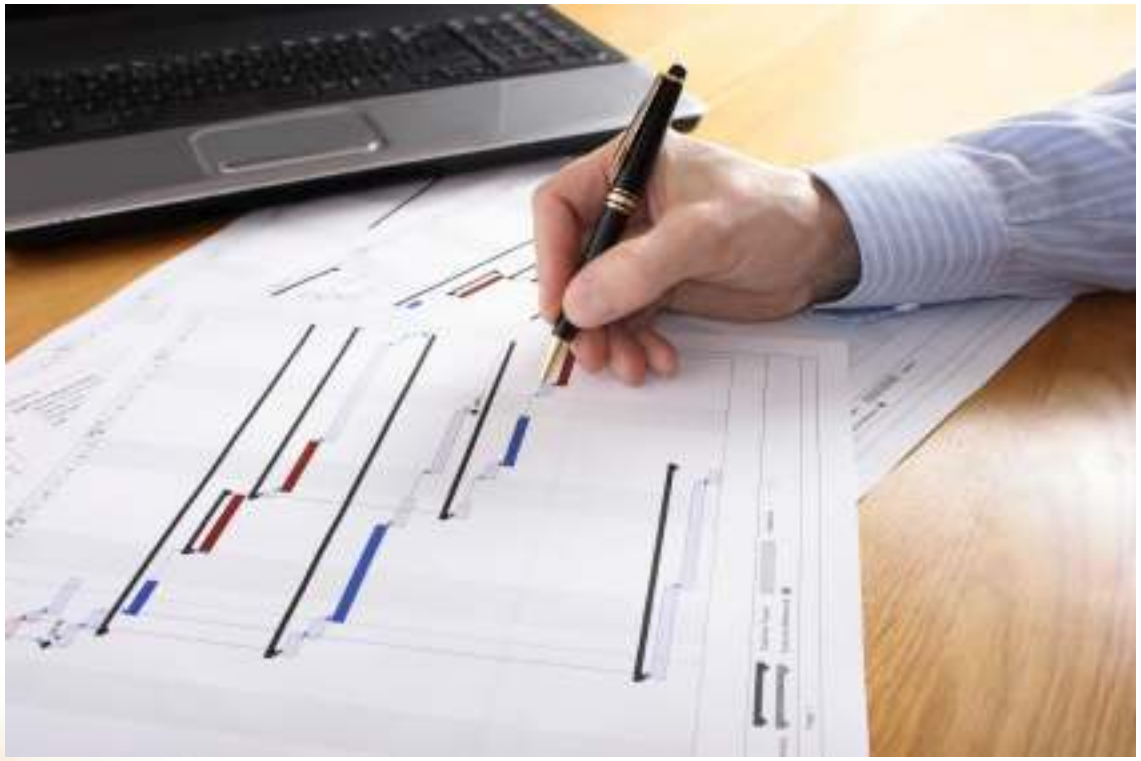
EDS: CONSTRUCTION

Appoint lead planner and commence WFP process



EDS: CONSTRUCTION

Define and Issue FIWP release plan

- Identify the size and description of all FIWPs
- Determine when those FIWPs will be developed and released
- These can be reported in Excel spreadsheets, Primavera schedules, and other documents
- FIWP development is driven by the CWPs

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DETAILED ENGINEERING

22) Engineer develops and releases EWPs

23) Construction develops and releases CWPs

25) Review and approve PMaS

24) Detailed Area Schedule (level 4)

26) Break up CWP into Field Installation Work Packages (FIWP)

DETAILED ENGINEERING: CONSTRUCTION CONTRACTORS

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25) Review and approve PMaS

24) Detailed Area Schedule (level 4)

26) Break up CWP into Field Installation Work Packages (FIWP)

DETAILED ENGINEERING: CONSTRUCTION CONTRACTORS

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Construction develops and delivers CWPs

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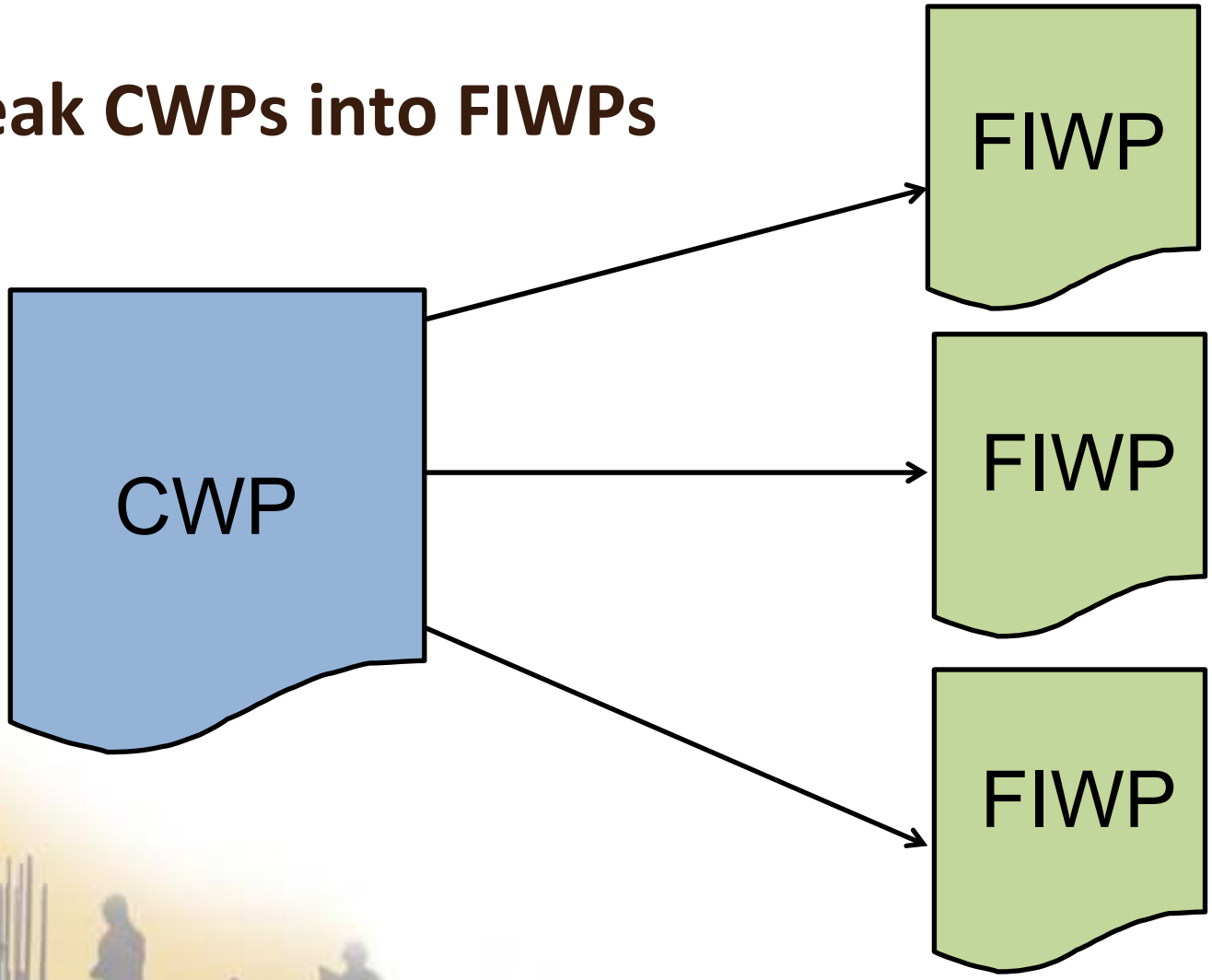
DETAILED ENGINEERING: CONSTRUCTION CONTRACTORS

Detailed Level 4 Schedule

- This is a schedule of the release of the Field Installation Work Packages (FIWPs)
- These can be reported in Excel spreadsheets, Primavera schedules, and other documents

DETAILED ENGINEERING: CONSTRUCTION

Break CWPs into FIWPs



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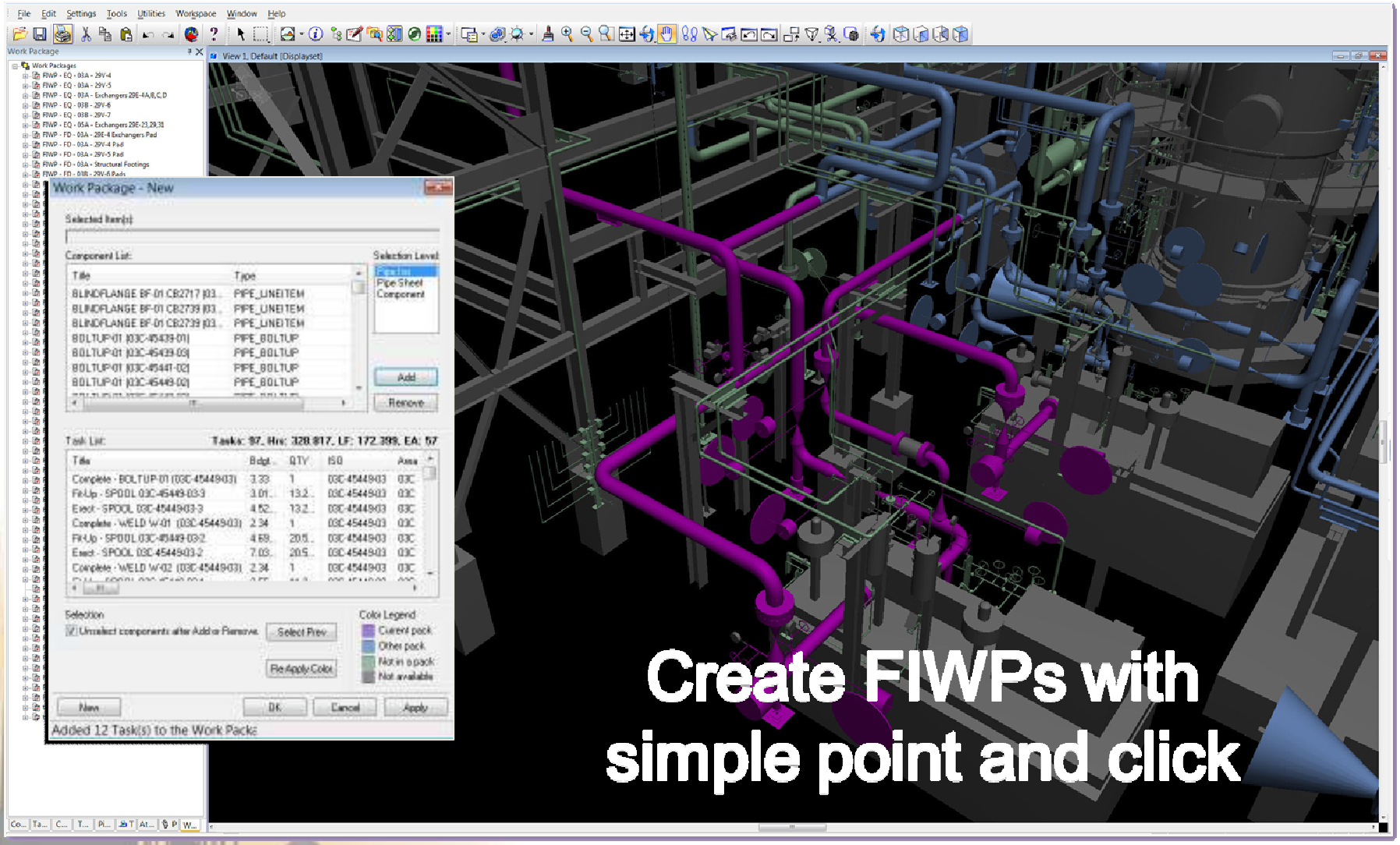
DETAILED ENGINEERING: CONSTRUCTION



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Bentley
Sustaining Infrastructure

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DETAILED ENGINEERING: CONSTRUCTION

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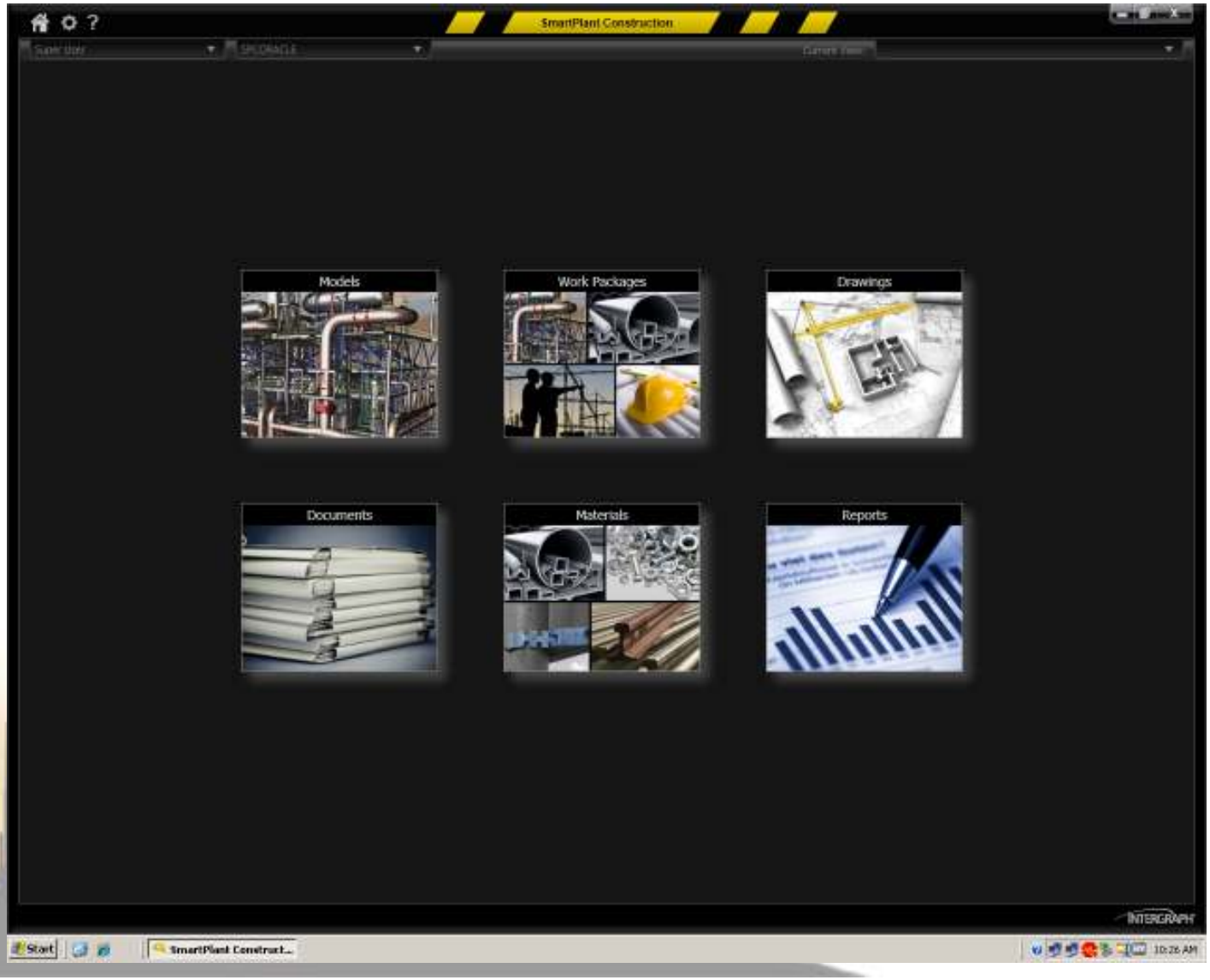

DETAILED ENGINEERING: ENGINEERING

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DETAILED ENGINEERING: ENGINEERING

WBI RELEASE FORM	
WBI	512350100U
WBI TITLE	North South Pipe Rack Foundations
REV	0
DATE PREPARED:	27-Mar-07
UPDATED:	
PREPARED BY	Roopendra Singh

Construction is informed that Engineering is complete in this WBI and the WBI is released for construction with the drawings listed below.

DOCUMENT NUMBER	REV	TITLE
Engineering Documents		
51-SR-23-CSF-017	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION DETAILS
51-SR-23-CSF-016	0	UTILITIES - 512350 - NORTH-SOUTH PIPERACK - FOUNDATION DETAILS
51-SR-23-CSF-015	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION DETAILS
51-SR-23-CSF-014	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION DETAILS
51-SR-23-CSF-013	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION DETAILS
51-SR-23-CSF-012	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION DETAILS
51-SR-23-CSF-009	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
51-SR-23-CSF-008	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
51-SR-23-CSF-007	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
51-SR-23-CSF-006	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
51-SR-23-CSF-005	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
51-SR-23-CSF-004	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
51-SR-23-CSF-003	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
51-SR-23-CSF-002	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
51-SR-23-CSF-001	0	UTILITIES-512350 - NORTH_SOUTH PIPERACK - FOUNDATION LOCATION PLAN
Vendor Drawings		

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CONSTRUCTION PHASE

31) Review and update Engineering

27) Implement and release FIWP (Dynamic Planning) (level 5)

30) Issue Request for Information

29) Need for extra information?

28) Execute FIWP

32) Conduct Q/C verification

34) Identify "Work to Go" items

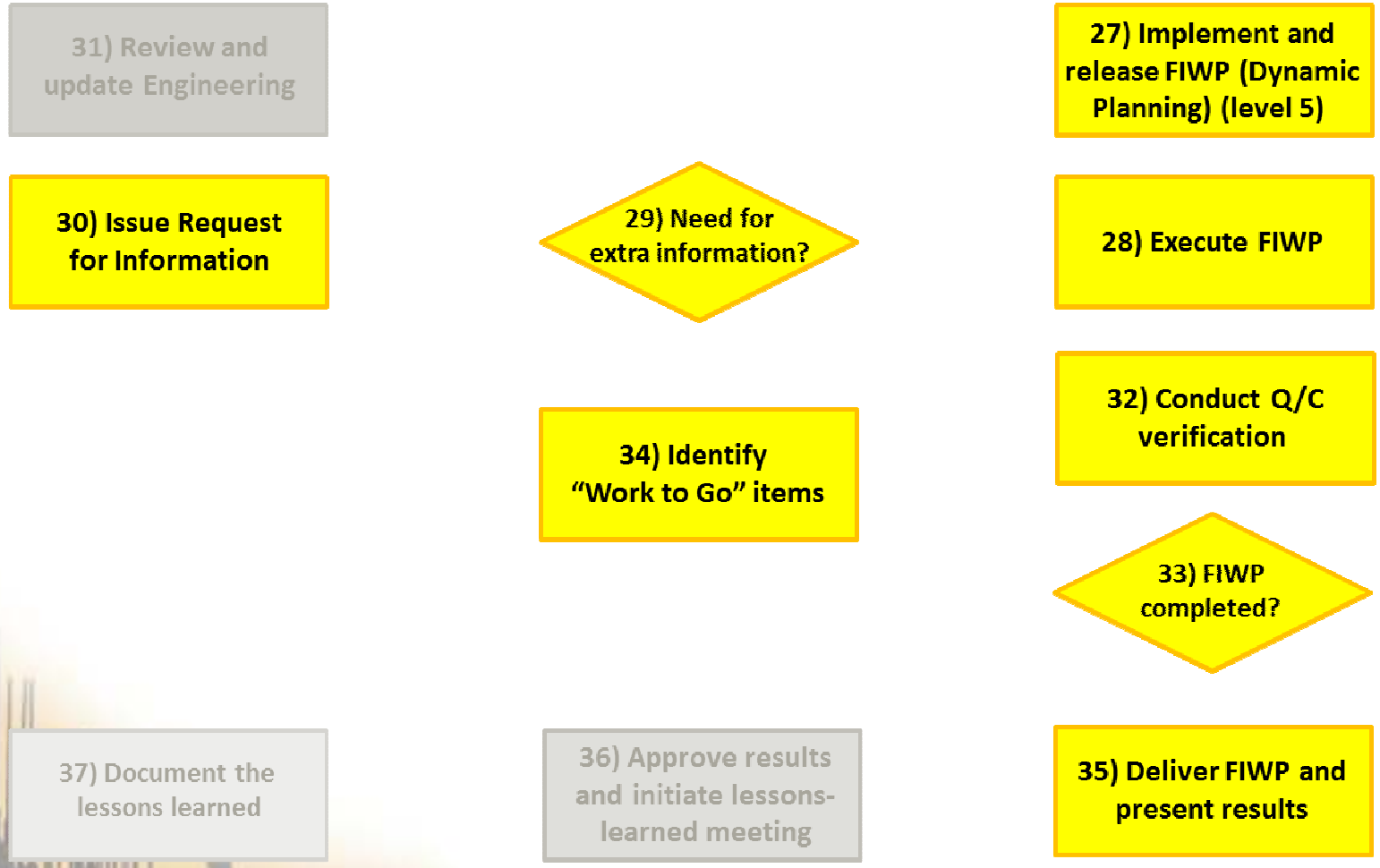
33) FIWP completed?

37) Document the lessons learned

36) Approve results and initiate lessons-learned meeting

35) Deliver FIWP and present results

CONSTRUCTION PHASE: CONSTRUCTION CONTRACTOR



CONSTRUCTION PHASE: CONSTRUCTION CONTRACTOR

Implement and Release FIWP

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CONSTRUCTION PHASE: CONSTRUCTION CONTRACTOR

Execute FIWP

One of our silver-level sponsors - Phoenix Industrial - has incorporated their maintenance experience into the Phoenix WorkFace Planning approach.

CONSTRUCTION PHASE: CONSTRUCTION CONTRACTOR

Progress project

CONSTRUCTION PHASE: CONSTRUCTION CONTRACTOR

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What if execution doesn't go according to plan?

RISK EVENTS

'PLAN B'

BACKLOG

CONSTRUCTION PHASE: OWNER

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27) Implement and release FIWP (Dynamic Planning) (level 5)

30) Issue Request for Information

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CONSTRUCTION PHASE: OWNER

WorkFace Planning Lessons Learned:

- Conduct Lessons Learned at the end of each phase of the project
- Do ‘temperature checks’ during each phase
- At the end of the project, conduct a final Lessons Learned.

WORKFACE PLANNING EXCELLENCE

Two of our sponsors have been recognized by COAA, winning awards for their excellence and leadership in WorkFace Planning.

COAA
Construction Owners
Association of Alberta

WORKFACE PLANNING

FROM CONCEPT TO COMMISSIONING

COAA
Construction Owners
Association of Alberta

AUDIENCE FEEDBACK

NOTE: The information collected is anonymous and may be used for research purposes. By participating, you are giving your consent for the use of this data.