

Digital Engineering for Project Delivery

Wulkaraka Rolling Stock Maintenance Centre

BrisBIM Gathering – August 2015



LAING O'ROURKE



Project Data

Scope:

Design, construction, commissioning and fit out of a maintenance depot to service new 100 car fleet in 6 car configurations, including all necessary depot plant and equipment.

The new depot includes:

- Maintenance Building
- Wheel Lathe Building
- Operator Area/QR Train Crew Facility
- Gatehouse
- Remote Stores Building
- Approx 10km of rail

Client: Bombardier Transportation Australia Pty Ltd (BTA)

Contract Signed: January 2013

Location: Wulkuraka, Queensland

Site Mobilisation Date: 15th January 2014

Practical Completion: 5th Feb 2016

Team Structure

Key Designers Interface

Hyder Structure, Civils, Rail, MEP

NDY Acoustics / Fire

McKenzie BCA and DDA

Mode Architecture and Landscape

Webb Security

LORAC OLE and signaling

All working within a coordinated model environment

Key Subcontractors, Interfaces, ECI with Design

Precast Service Trenches / Pits

Steelwork/ILB

Electrical

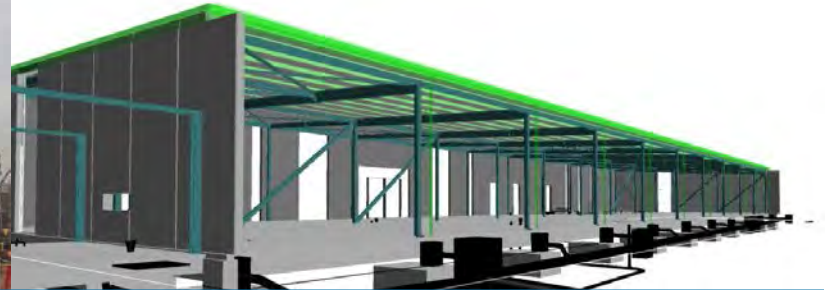
Specialist Rail Equipment

Civils

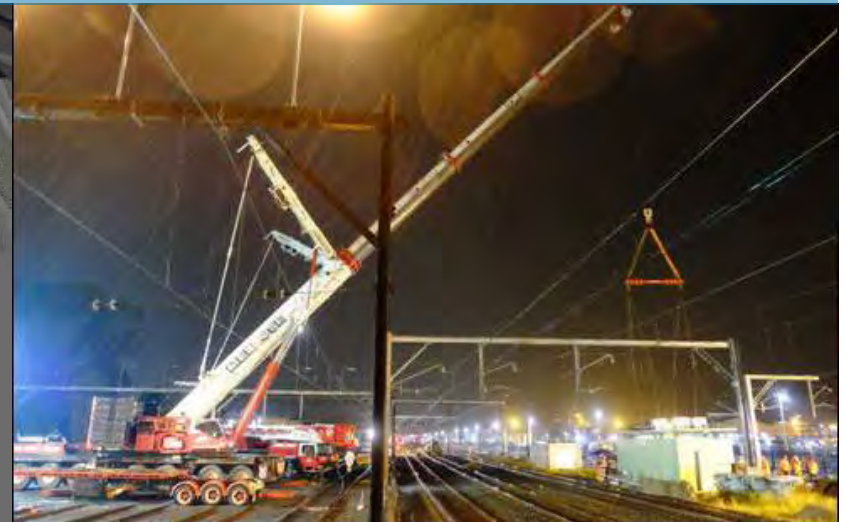
BMS / Security

Cladding

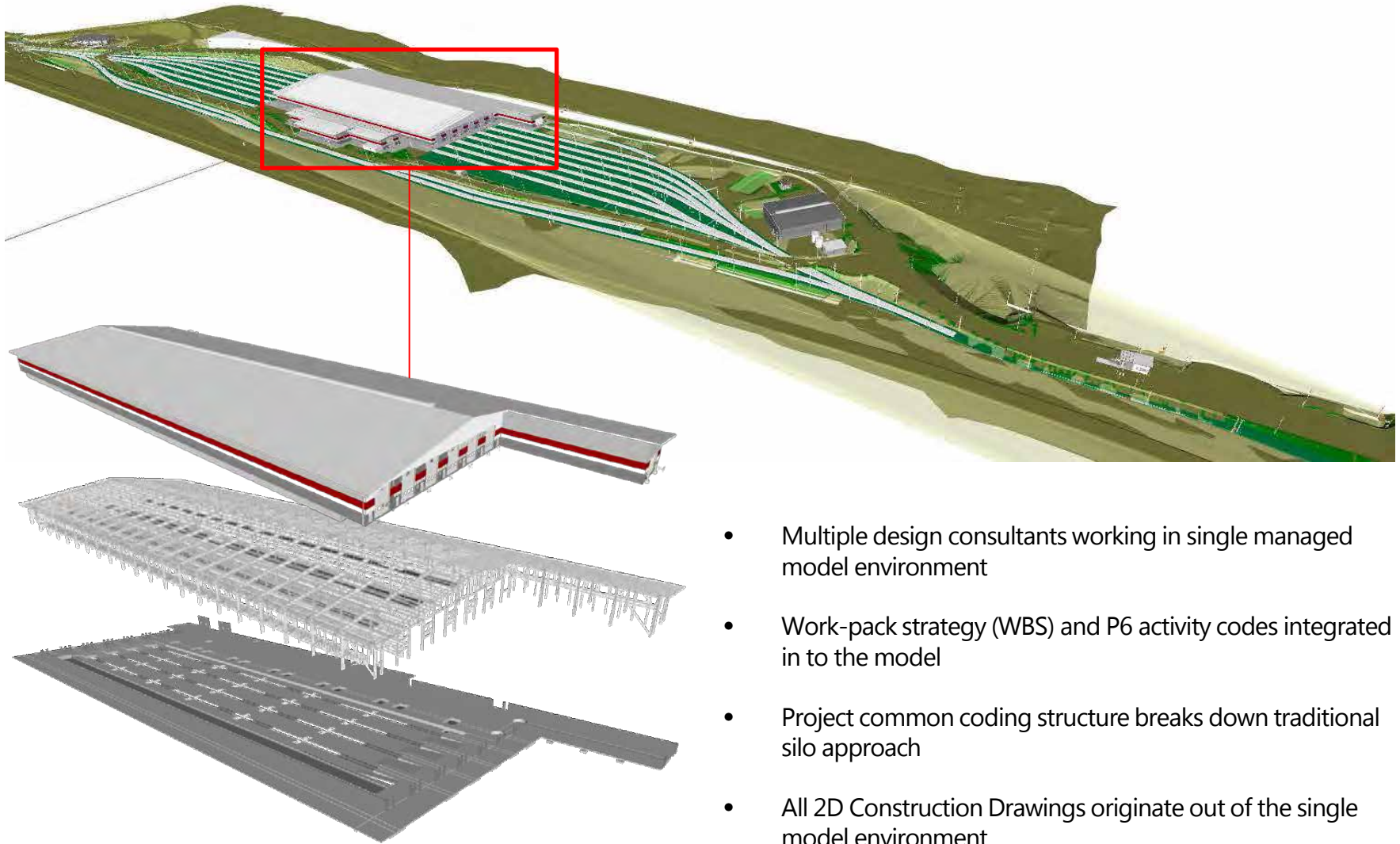




Build Twice – Once Virtually!



Model Strategy



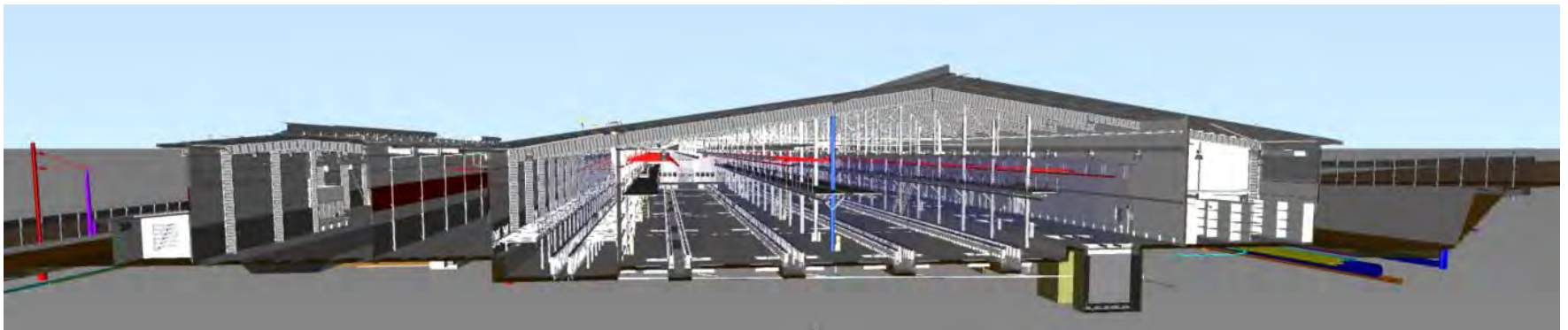
- Multiple design consultants working in single managed model environment
- Work-pack strategy (WBS) and P6 activity codes integrated in to the model
- Project common coding structure breaks down traditional silo approach
- All 2D Construction Drawings originate out of the single model environment

Updated Navisworks model is shared weekly with:

- Bombardier
- Facility Operations Team (A&M)
- Project Co (Qtechtic)
- State (TMR)

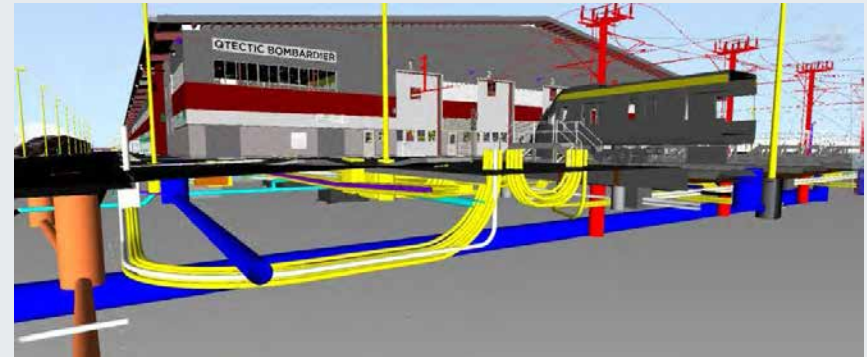
Model being utilised for:

- Safety in Design (SiD)
- Hazards in Operations (HAZOP)
- Operational Strategy (A&M)
- Safety in Operations
- Interface Management
- Integration with New Generation Rollingstock (NGRS)
- Weekly Design Collaboration Meetings with all Stakeholders



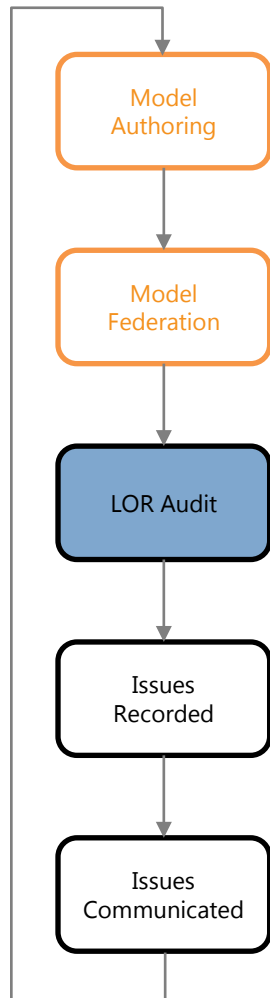
Benefits

- All construction information co-ordinated in a single model environment, integrating multiple software platforms
- Clash detection and co-ordination, 2000+ clashes resolved prior to construction
- Early DfMA Strategy
- Integration and Interface co-ordination of multiple systems
- Detailed Co-Ordination with evolving Rollingstock design
- Multiple SiD and HAZOP reviews incl. reviews of Operator requirements and Stakeholder Management / User Groups walk throughs (allocation of Equipment) .
- P6 Planned vs. Actual reporting / Progress heat mapping
- 5D (Progress Claims / Earned Value)
- Digital Method Statements
- BIM360 construction team access to model

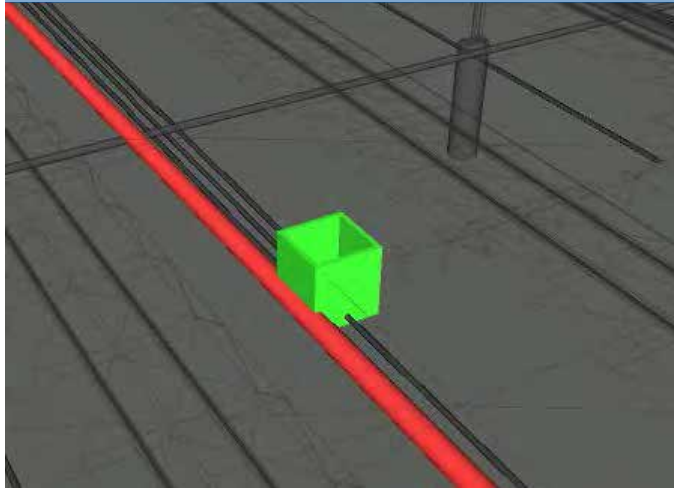




Design Collaboration Workflow



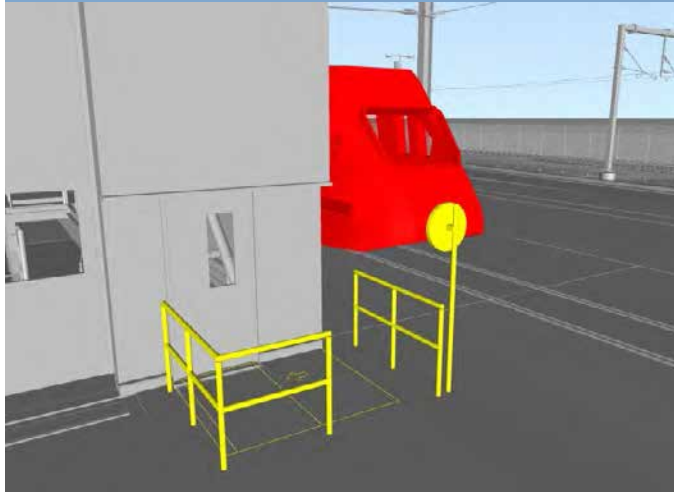
Clash Detection



Design Coordination Workshops



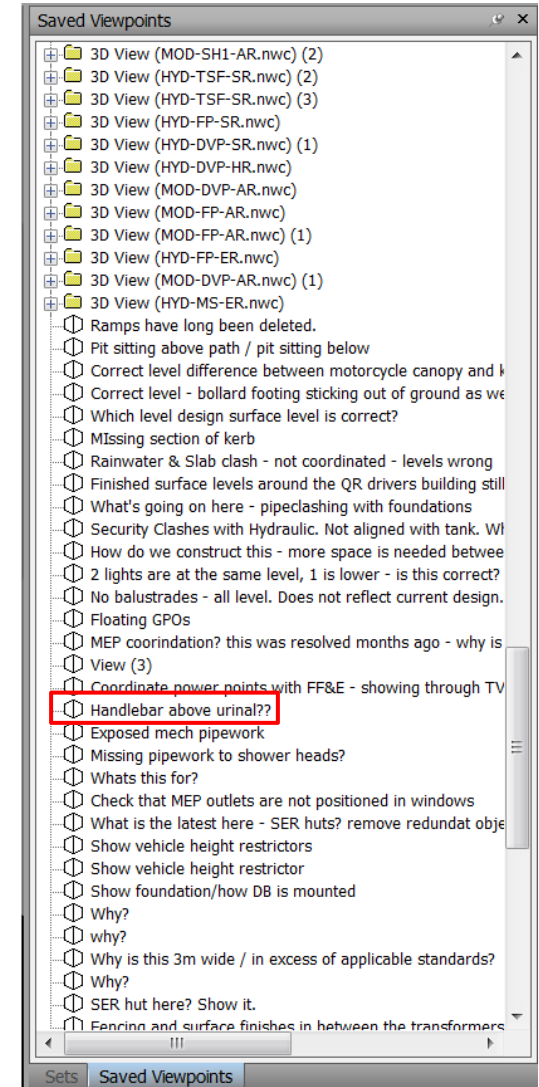
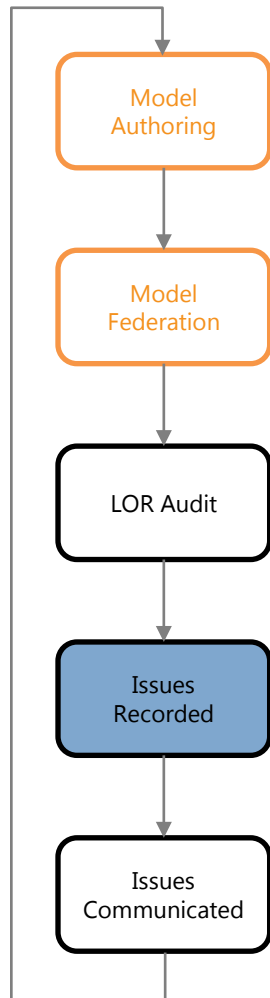
Safety in Design



Programme Alignment

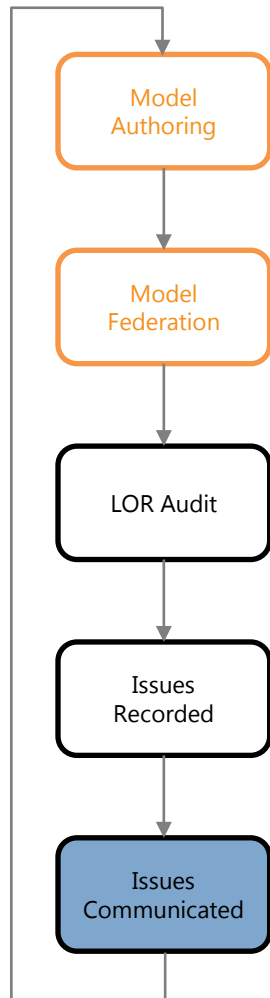
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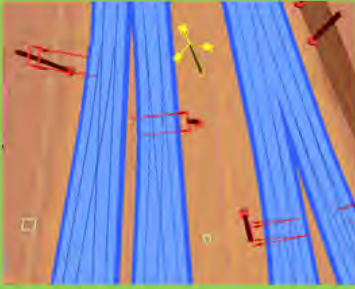
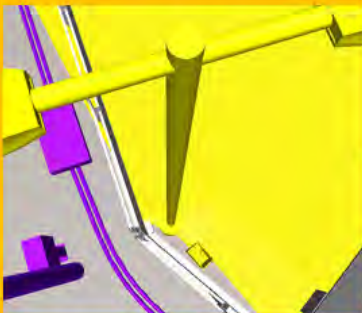
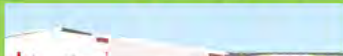
Design Collaboration Workflow



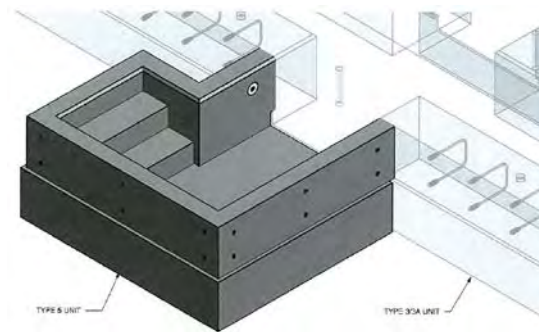
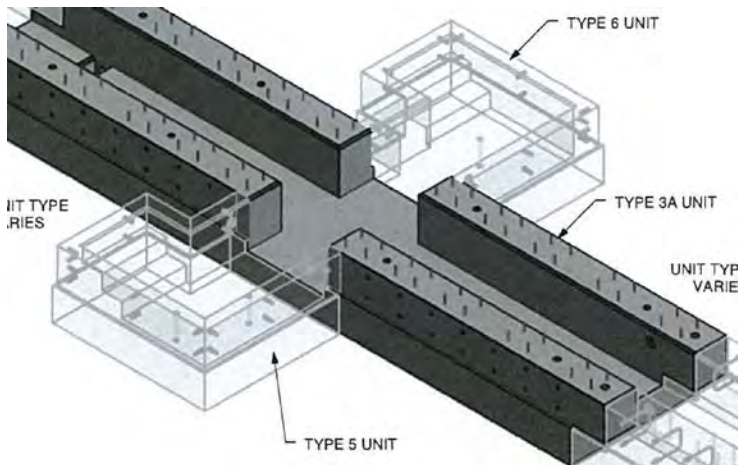
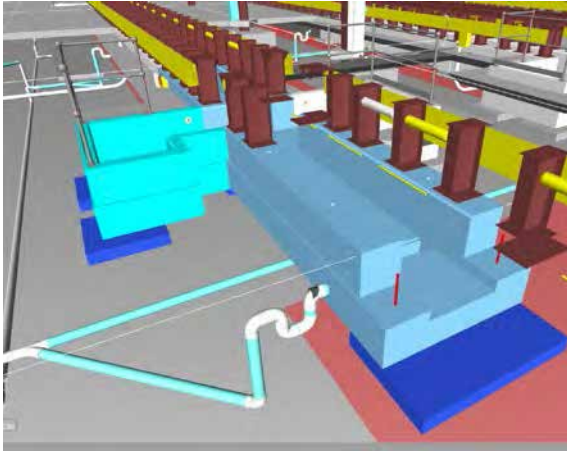


Design Collaboration Workflow



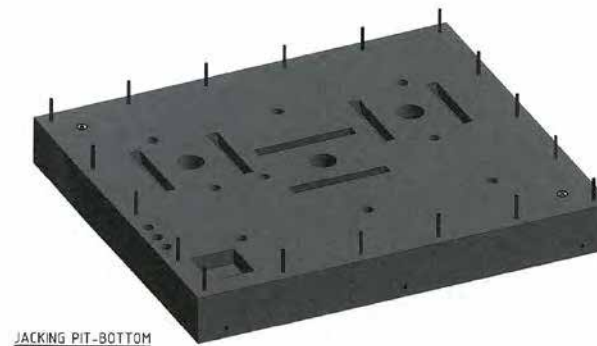
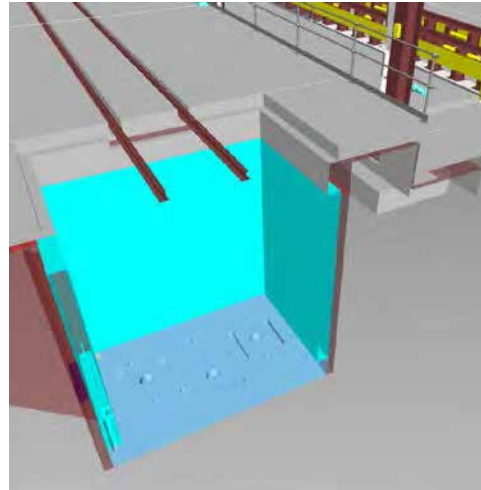
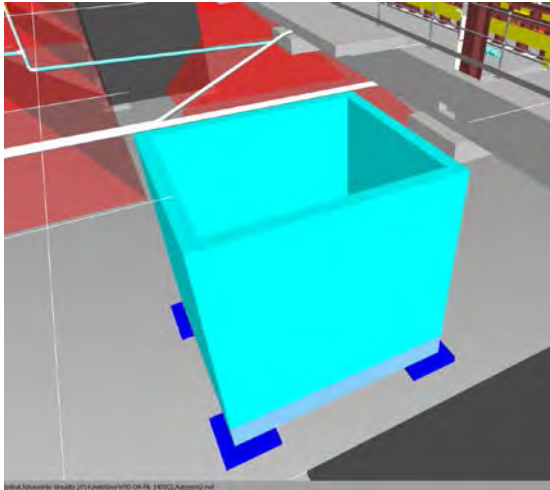
	A	B	C	D	E	F	G
1	COMPLETE THINKING					minutes	
2	Laing O'Rourke Australia					LAING O'ROURKE	
3							
4							
5	3. INGROUND SERVICES						
6	Date	Thursday 22 May 2014				WIP - action from prior meeting	
7	Venue	Site Meeting Room 1				Closed	
8	Meeting	Navisworks Model review meeting #15				Overdue	
9						Blue text, new item/comment in meeting	
10	Item	Date Raised	Action Description	By	When	Before	After
32	9.09	10-Apr	Remaining 8 electrical clashes to be resolved	Hyder	WIP		
33	10.10	17-Apr	Hyder to check distance of electrified fence from structures - minimum 550 (preferred 750mm)	Hyder	TBA		Ongoing with IG services review
							
<div> <div>1. Rail and OLE</div> <div>2. Civils</div> <div>3. Inground services</div> <div>Security</div> <div>5. Maintenance Centre</div> <div>6. Wheel Lathe Building</div> <div>7. Rem</div> </div>							

DfMA Thinking

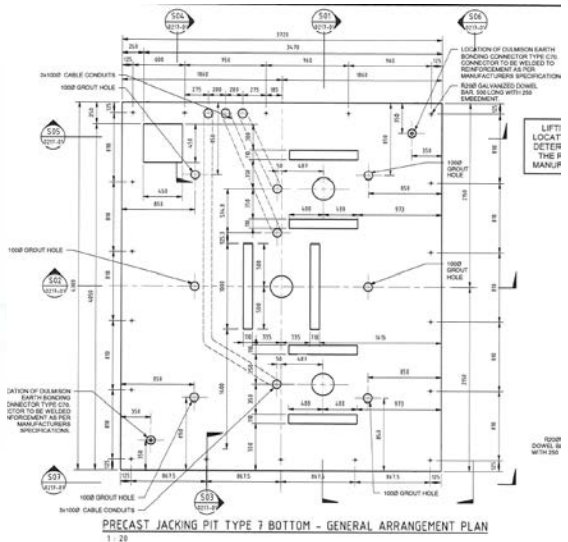


- Design is tested for construction in 3D
- DFMA strategy established in the 3D environment
- Transportation & Install of elements planned in Model

DfMA Thinking



JACKING PIT-BOTTOM





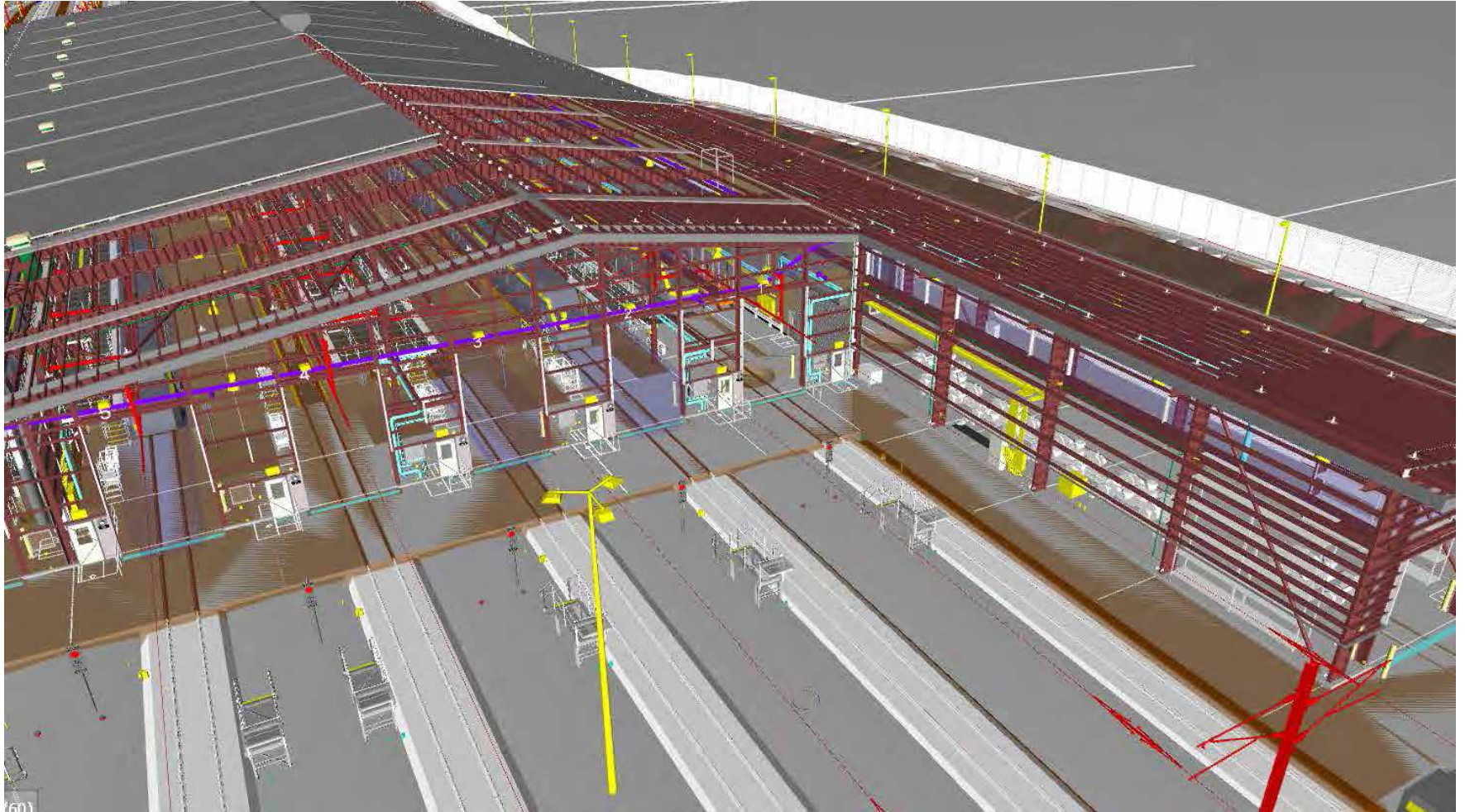
Construction

- Automated machine guidance
- Communication improved through Digital Method Statements
- Generation of Digital Workpacks using BIM 360

Machine Guidance



Digital Method Statements

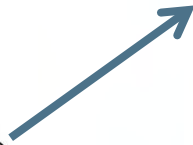
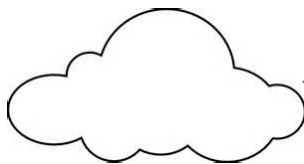


- Supervising staff and engineers can access relevant project data (Work Packs) whilst on site;
 - Drawings
 - Specifications
 - ITR's
 - 3D Model
 - Safety Inspection Sheets
 - Environmental Inspection Sheets
 - Defect Punch List
- Access to task sheets and quality reports on the tablet
- Ability to view and interrogate 3D model in the field.
- Issues can be "pinned" to specific locations on the model.



Digital Work Package – Dashboard

- Notebook or Desktop access to upload, and manage digital workbooks
- Customize Dashboard
- Generate custom reports
- Automate generation and emailing of reports



Digital Workpacks



Checklists (ITP / ITR)



Work Pack Documents



Snag List

