LIFTING CONSTRUCTION DELIVERY THROUGH PRACTICAL BIM

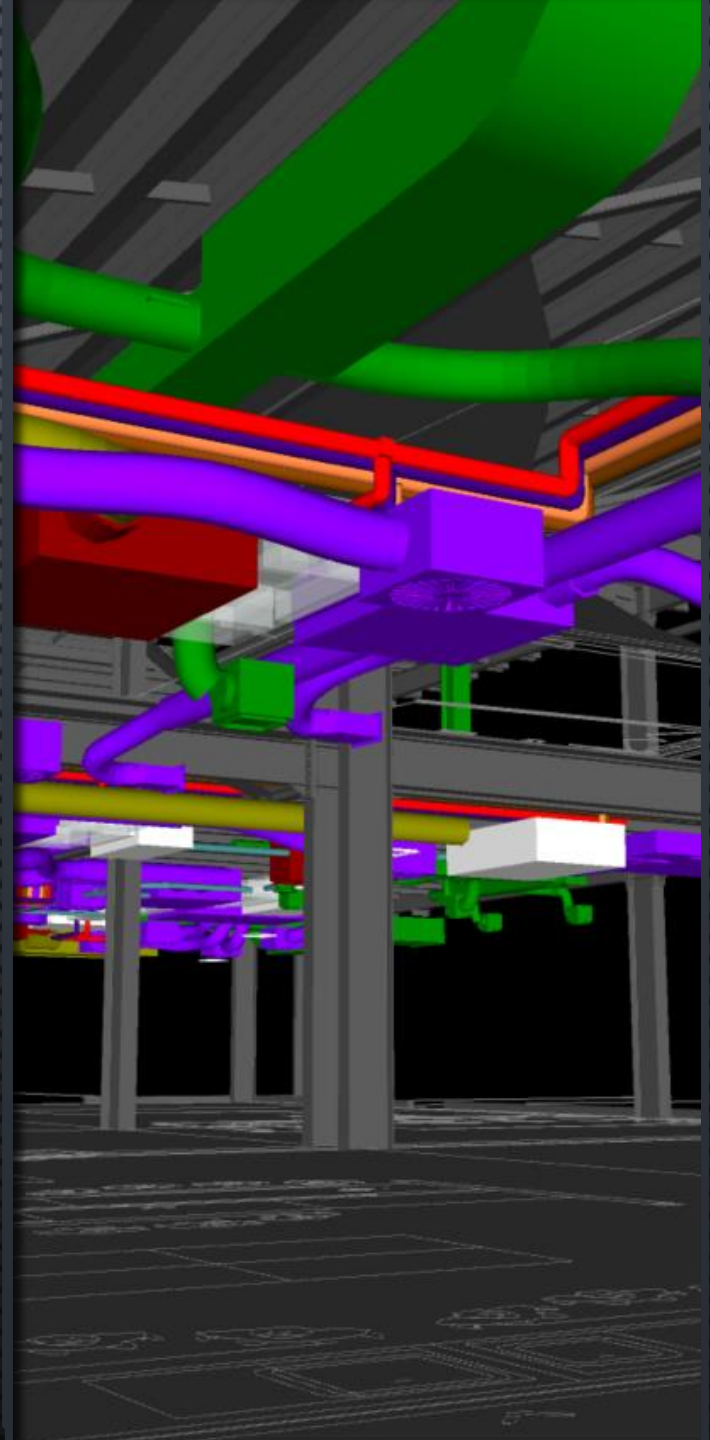
BLAIR GRIER, PROJECT MANAGER
HAWKINS CONSTRUCTION
WAKATIPU HIGH SCHOOL

HAWKINS RE-ESTABLISHED IN QUEENSTOWN 18 MARCH 2016

- PPP2 -WAKATIPU HIGH SCHOOL PROJECT
- DESIGN / BUILD
- $ 45 MILLION CONSTRUCTION VALUE
- 20 MONTH CONSTRUCTION PROGRAMME

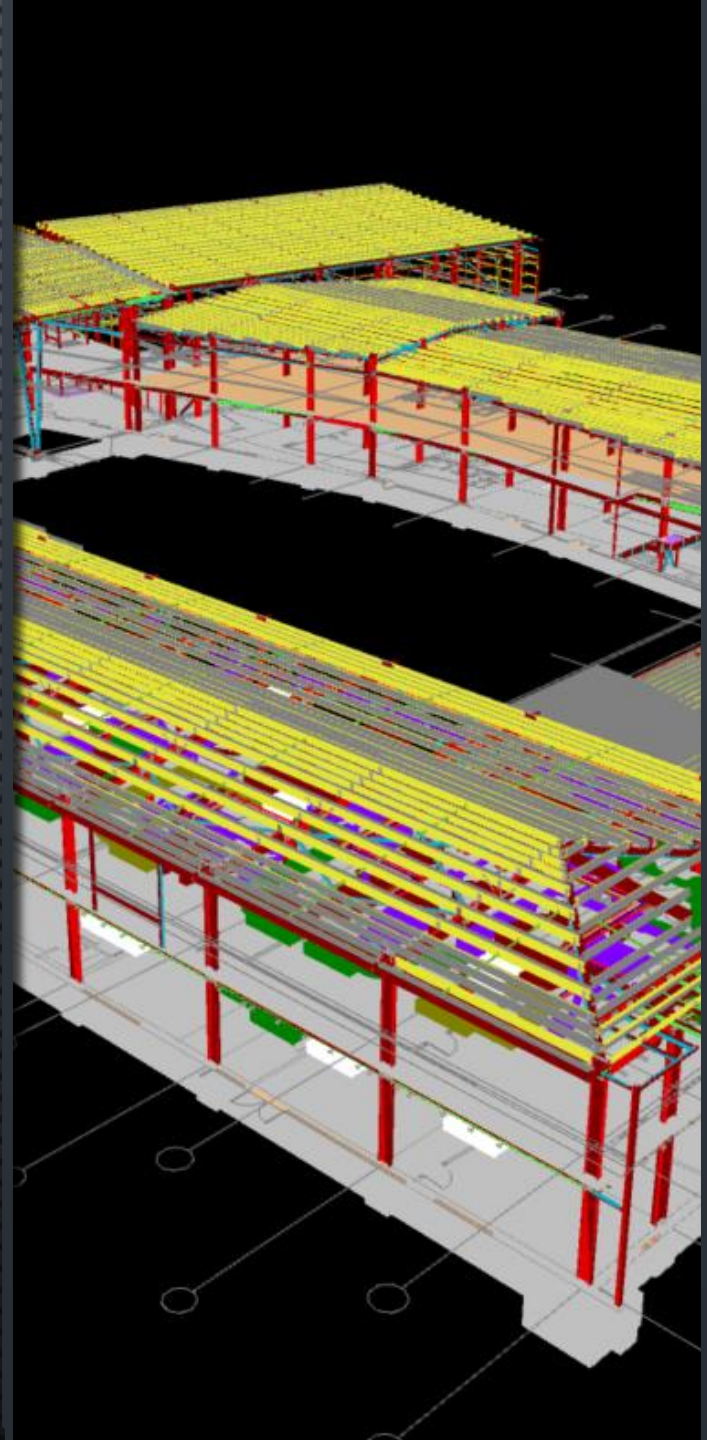
WHAT IS BIM

- Building Information Modeling
- Digital Representation of the Physical and Functional Characteristics of a Facility
- Varying LOD's (Level of Development, 100 to 400)
- Shared Knowledge Resource
- Coordination Tool
  - Architectural, Structural, Services, Site Works



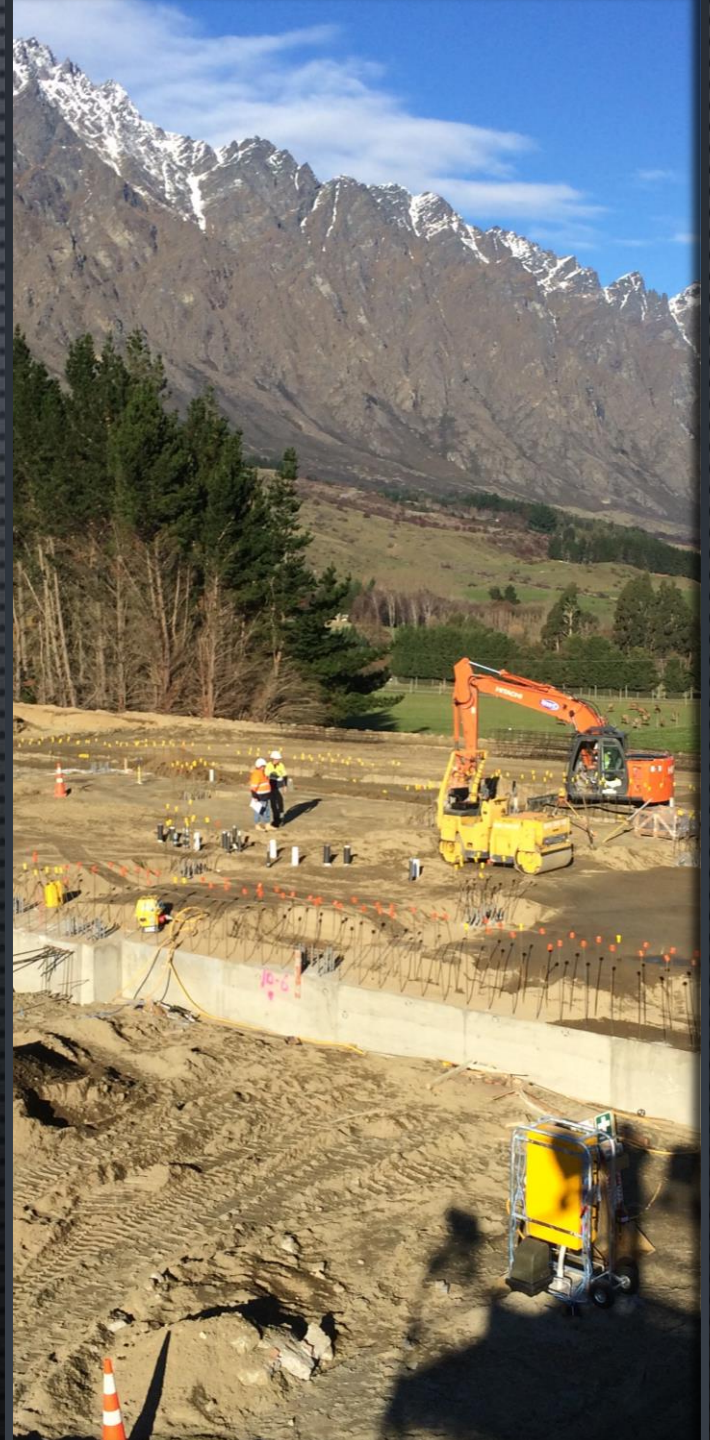
I AM NOT A BIM EXPERT

- Wakatipu Project Users
  - PM's, Site Managers, Service Managers, Quantity Surveyors, Administrators
- Novice Users
  - Minimal Training – 1 Full Day +/-
  - Operate a Mouse? You Can Navigate Bim
  - Able to Navigate, Snip Screen Shots, Comment, Share, Write RFI's
- Free Web Navigation Software
  - Navisworks, Solibri, Tekla Bimsight, Revit Viewer, CAD Dwg Viewers



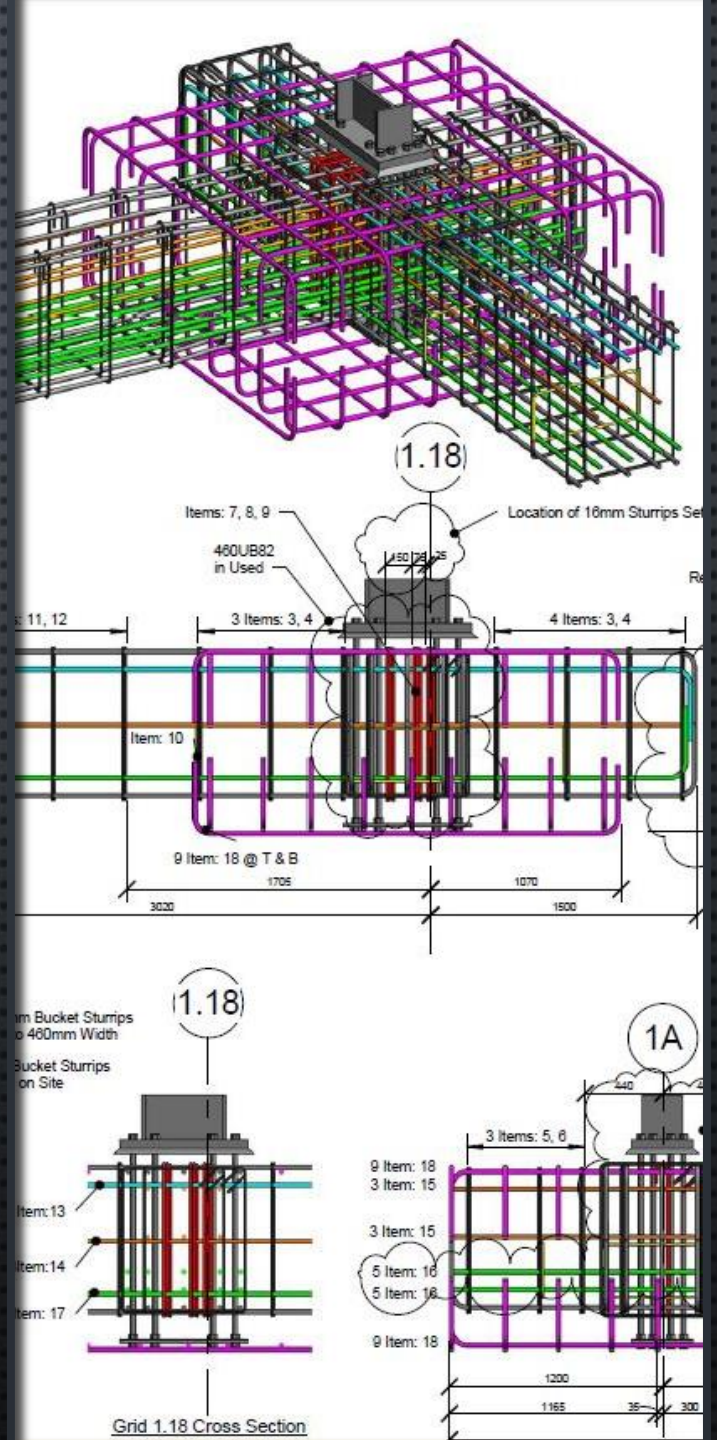
PROJECT CHALLENGES

- LOCAL LABOUR RESOURCES
- LOCAL MANAGEMENT RESOURCES
- LOCAL SUBCONTRACTOR CAPACITY
- TIGHT PROGRAMME



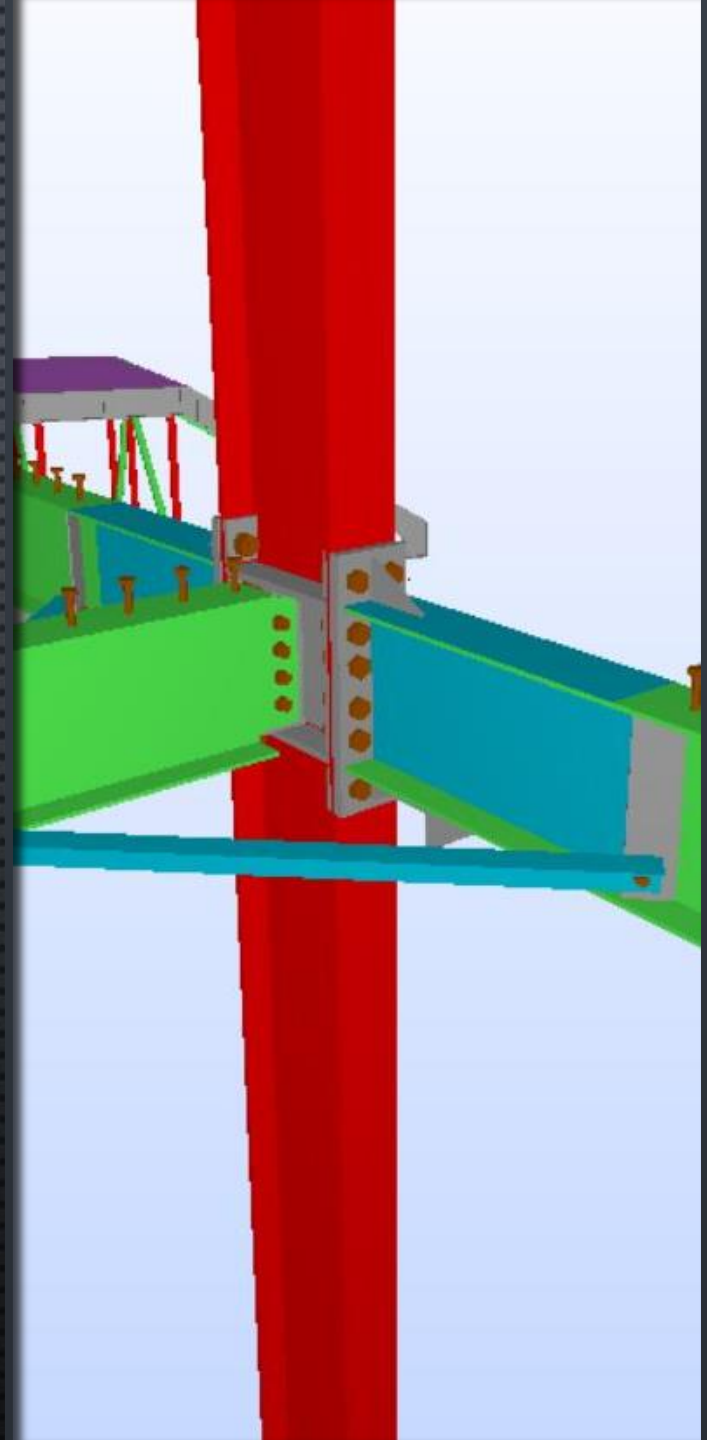
DELIVERY SOLUTIONS

- BIM CAPABLE DESIGN CONSULTANTS
  - BIM COORDINATION OF DESIGN DISCIPLINES
    - ARCHITECTURAL
    - STRUCTURAL
    - SERVICES
- EARLY PROJECT TEAM INVOLVEMENT
  - MODEL REVIEWS
  - VALUE ENGINEERING
- BIM CAPABLE SUBCONTRACTORS
- OFF-SITE FABRICATION / RESOURCES



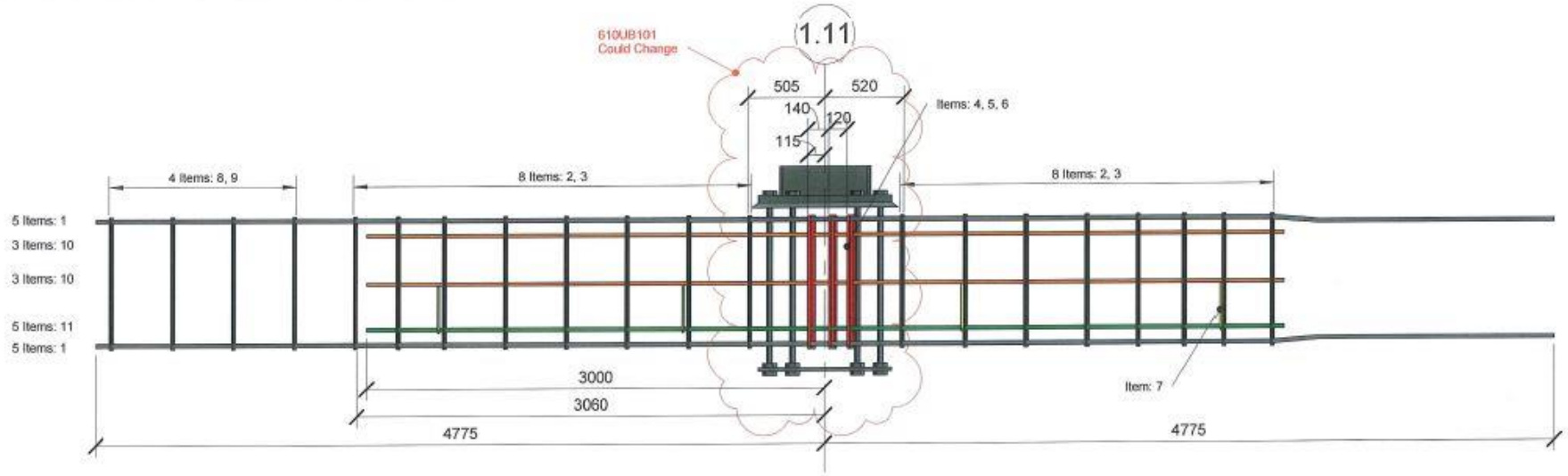
PRACTICAL BIM APPLICATIONS

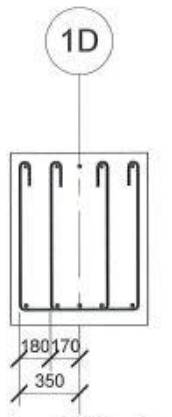
- GRADE BEAM REINFORCING (CAD)
  - COMPLETE REINFORCING
- STRUCTURAL STEEL (TEKLA BIMSIGHT)
  - JOHN JONES STEEL
- HVAC MECHANICAL SERVICES (REVIT)
  - AQUAHEAT



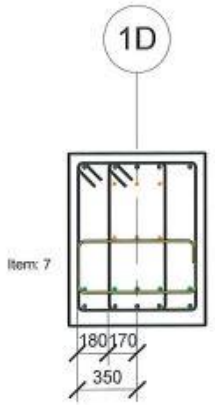
GRADE BEAM REINFORCING

- 3D Modeling of Grade Beam Reo
- Reo Coordinated with Anchor Bolts
- Reo Cages Shop Fabricated in Christchurch
  - Delivered to Site
  - Installed with Hiab Crane
  - "Stitched" Together on Site with Bucket Stirrups

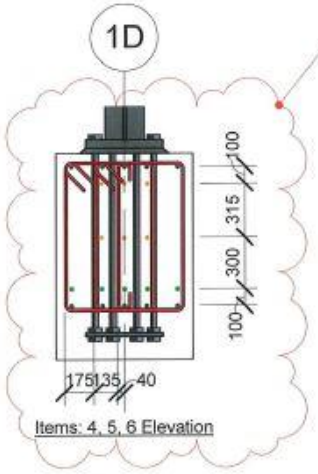




Items: 8, 9 Elevation

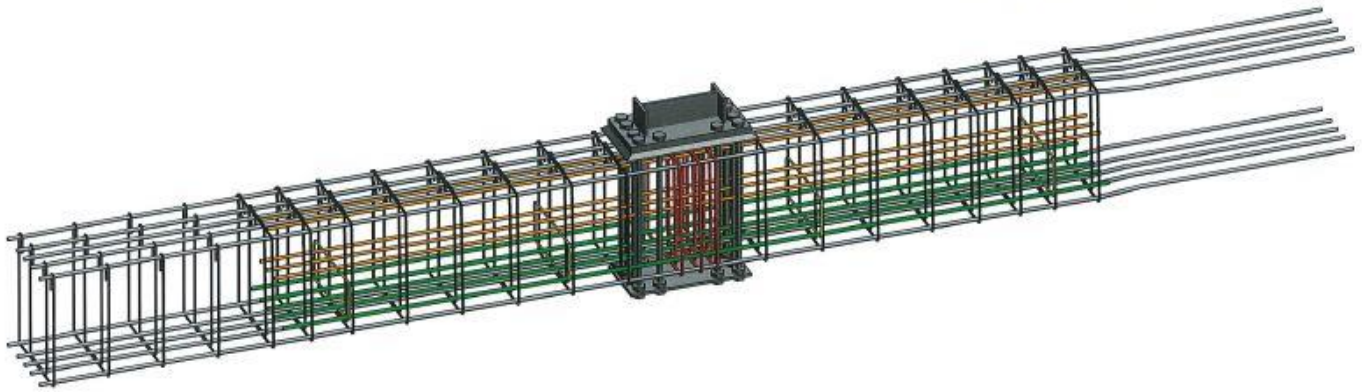


Items: 2, 3 Elevation



Items: 4, 5, 6 Elevation

Concrete Cover:
50mm @ Top & Sides
85mm @ Base



Rebar Schedule

Mark	Location	Type	Total Bar Length	Count	A	B	C	Image	kg's
1	Main Bars Cranked	Complete _HD25	9550 mm	10	9550	7705	300		37
2	Stumps Outside @ 400	Complete _HR12	3374 mm	16	865	700			3
3	Stumps Inside @ 400	Complete _HR12	2664 mm	16	865	340			2
4	Stumps @ Columns Outside	Complete _HR16	3414 mm	3	865	700			5
5	Stumps @ Columns Inside	Complete _HR16	2712 mm	3	865	350			4
6	Link @ Columns	Complete _HR16	1135 mm	3	865				2
7	Spacer	Complete _H12 Spacer	2035 mm	4	310	700			2
8	Bucket Stumps @ Lap-Outside @ 400	Complete _HR12	2705 mm	4	865	700			2
9	Bucket Stumps @ lap- Inside @ 400	Complete _HR12	2357 mm	4	865	340			2
10	Internal Add Bars	Complete _HD20 6m Add	6000 mm	6	6000				15
11	Internal Add Bot Bars	Complete _HD25 6m Add	6000 mm	5	6000				23

Complete Reinforcing
SUPPLY • FABRICATE • INSTALL

Project: Wakatipu School

Project No. 14828

Drawing: FB1 Beam P4-8

Drawn By: June.Y
Checked By: Andrew.G

Date: 05/20/16

Sheet No: FB1 P4-8

Revision: 04

Weight Factor: 7850kg/m³

Unit Weight: 718kg's

Quality Assurance

Reinforcing Name:

	☒	☑
Bar Type & Diameters	☐	☐
Bar Lengths	☐	☐
Stirrup Type & Diameters	☐	☐
Stirrup Sizes & Centers	☐	☐
Braced & Adequate Tied	☐	☐
Tagged	☐	☐

Notes:

Precast Name:

	☒	☑
Beam Length	☐	☐
Beam Height	☐	☐
Beam Width	☐	☐
Reinforcing Starter Lengths	☐	☐
Bolts in Correct Location	☐	☐
Tagged	☐	☐

Notes:

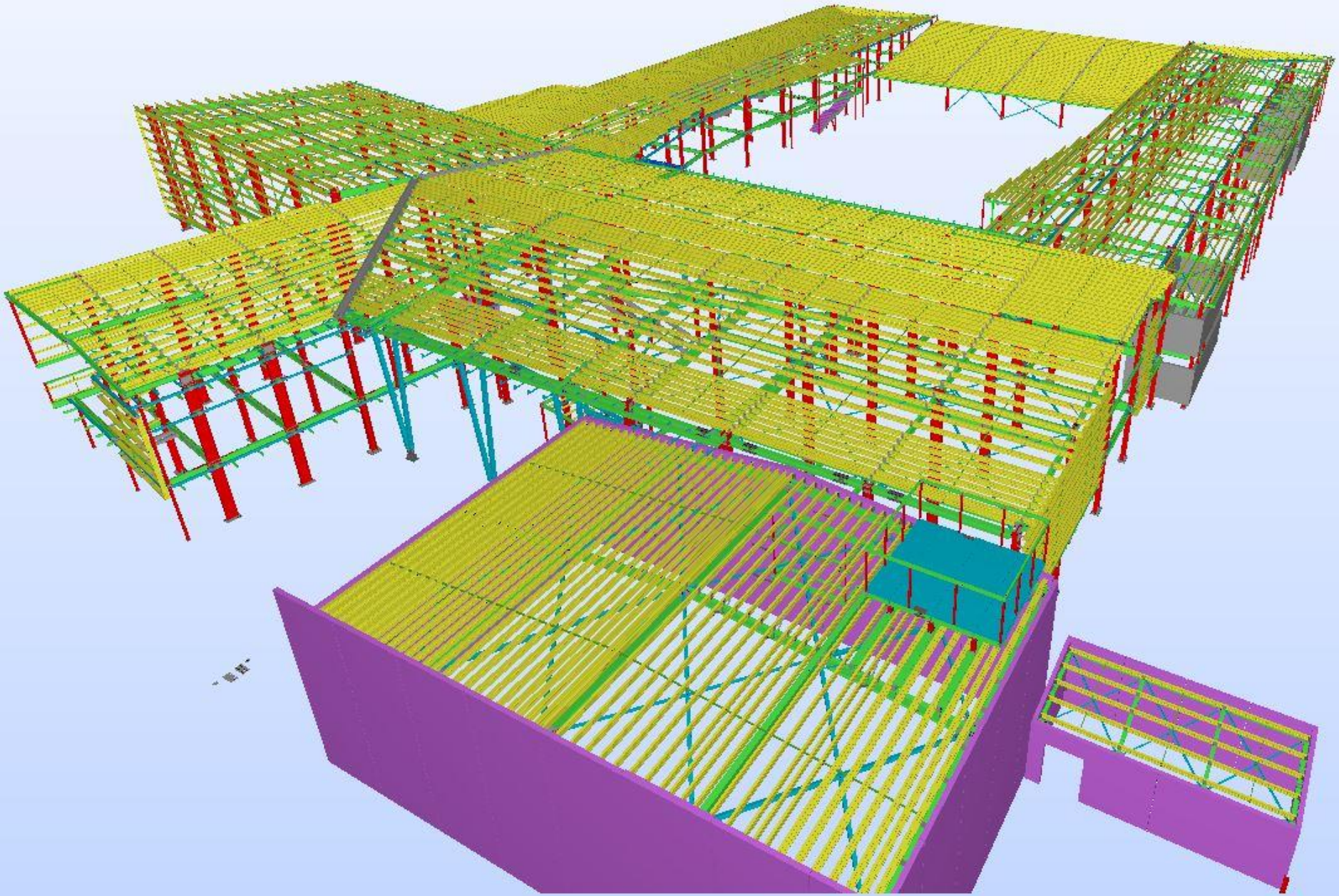
Drawn Scale: 1 : 30

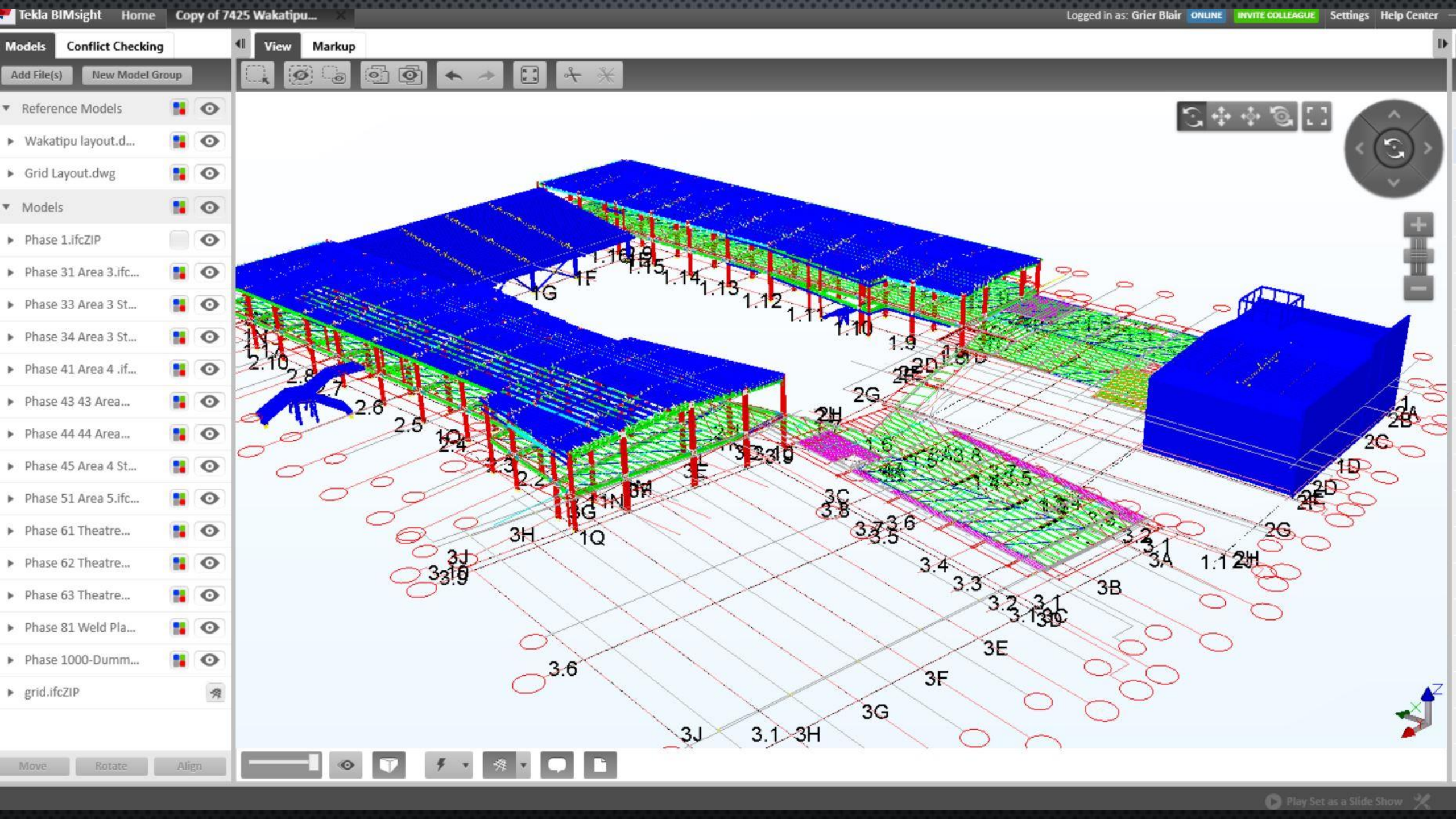
PRODUCTION RESULTS

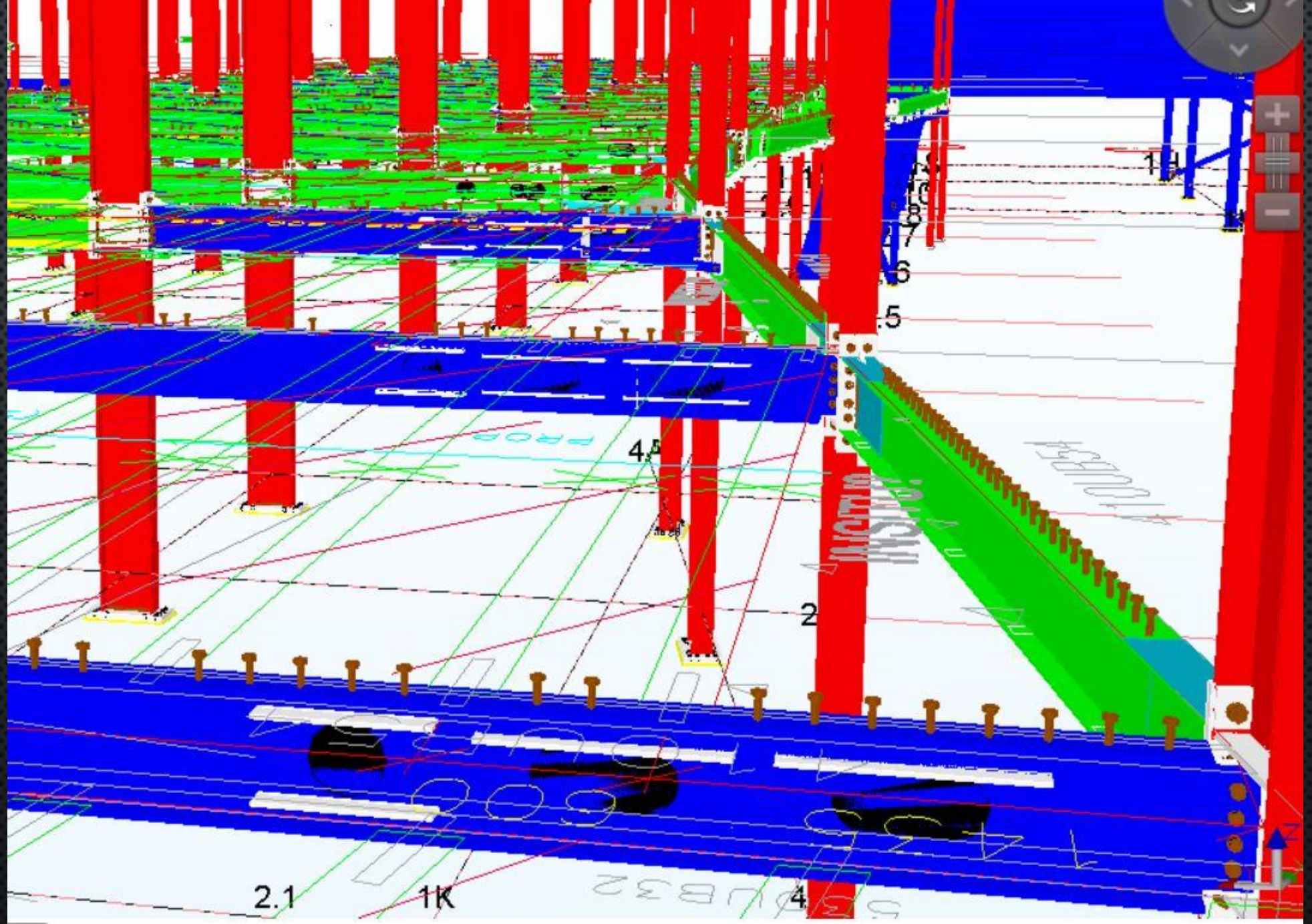
- 1 Day Installation of Reo Cages in Typical Grade Beams
- Weekly Cycle of 100m3 Grade Beam Pours
- Reo Install Crew Labour Savings
- Formwork Crew Labour Savings
- Coordination of Anchor Bolts

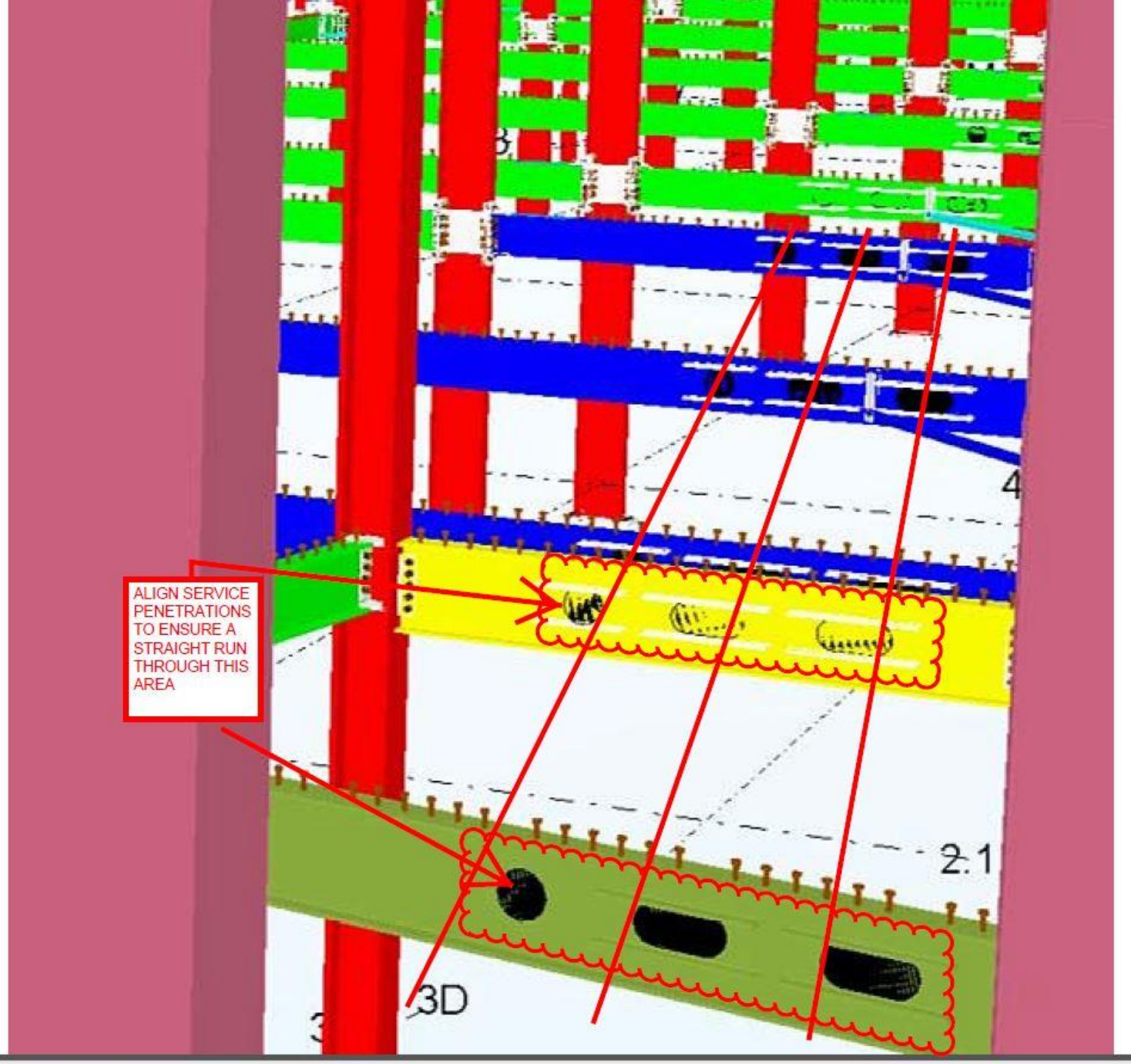
STRUCTURAL STEEL

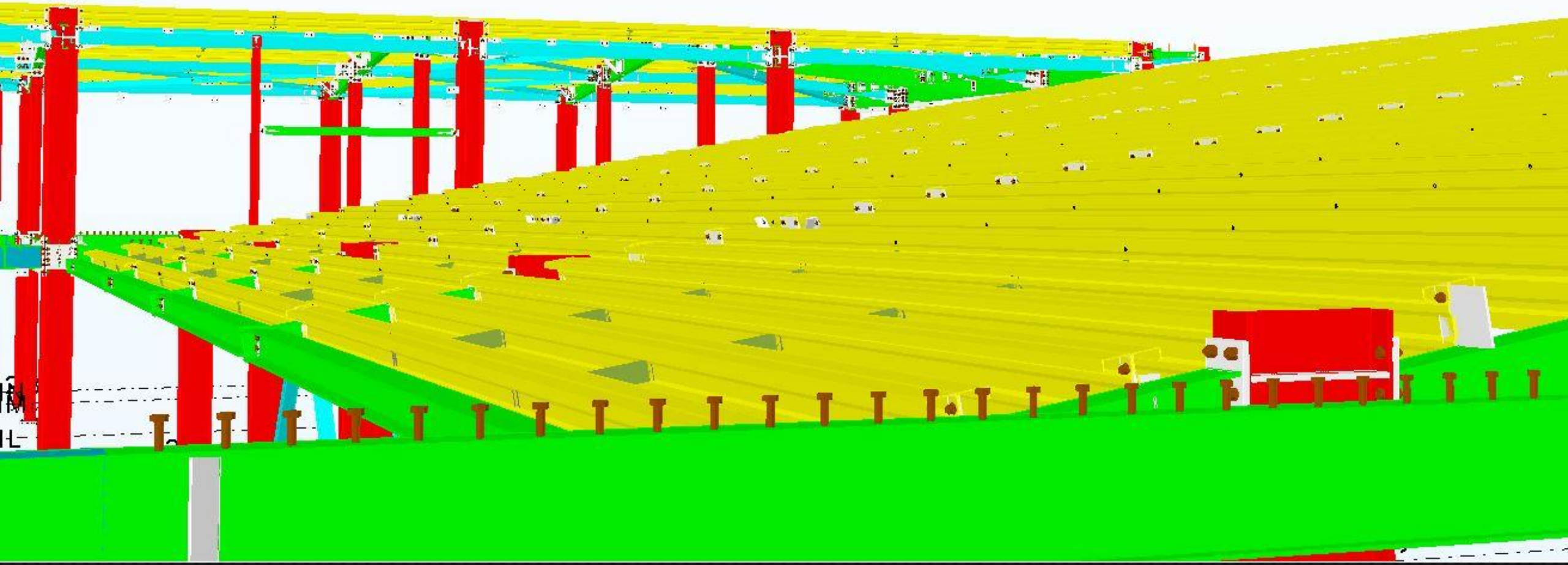
- 3D Modeling of Structural Steel using Tekla Bimsight by JJS Detailers
- Weekly Model Updates Posted to Aconex and Drop Box (as TBP, IFC)
- Design Consultants Used Models for Shop Drawing Reviews
- Imported Services Model, Precast Rib Model Into Structural Model
  - Service Clash Detection
  - Coordinated Services thru Beam Openings
  - Imported Anchor Bolt As-Builts into Model




Tekla BIMsight
Home
Copy of 7425 Wakatipu...
Logged in as: Grier Blair
ONLINE
INVITE COLLEAGUE
Settings
Help Center
Models
Conflict Checking
Add File(s)
New Model Group
View
Markup
Reference Models
Wakatipu layout.d...
Grid Layout.dwg
Models
Phase 1.ifcZIP
Phase 31 Area 3.ifc...
Phase 33 Area 3 St...
Phase 34 Area 3 St...
Phase 41 Area 4 .if...
Phase 43 43 Area...
Phase 44 44 Area...
Phase 45 Area 4 St...
Phase 51 Area 5.ifc...
Phase 61 Theatre...
Phase 62 Theatre...
Phase 63 Theatre...
Phase 81 Weld Pla...
Phase 1000-Dumm...
grid.ifcZIP
Move
Rotate
Align
Play Set as a Slide Show


2.1
1K
4
2


ALIGN SERVICE PENETRATIONS TO ENSURE A STRAIGHT RUN THROUGH THIS AREA
4
2.1
3D

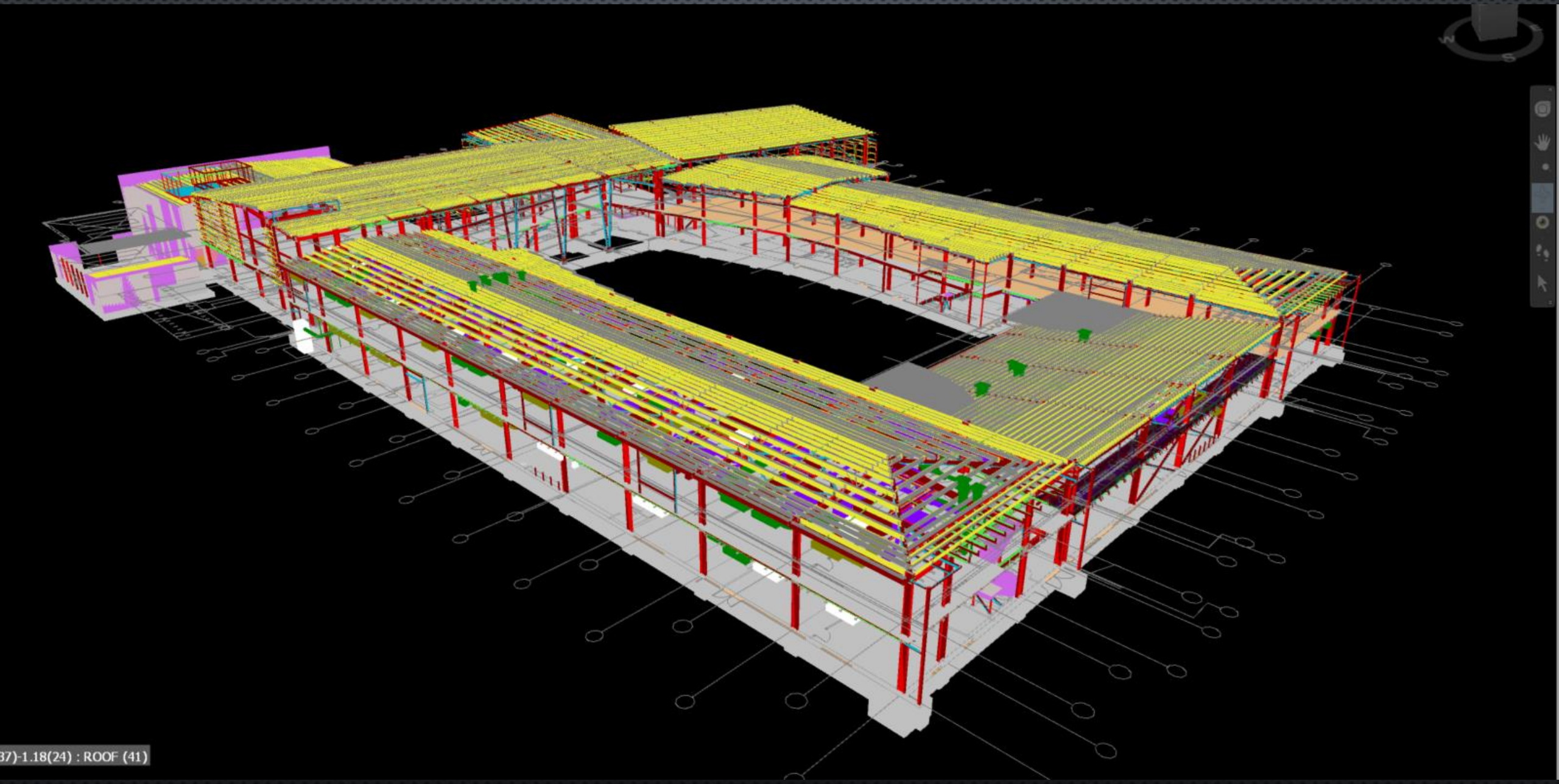


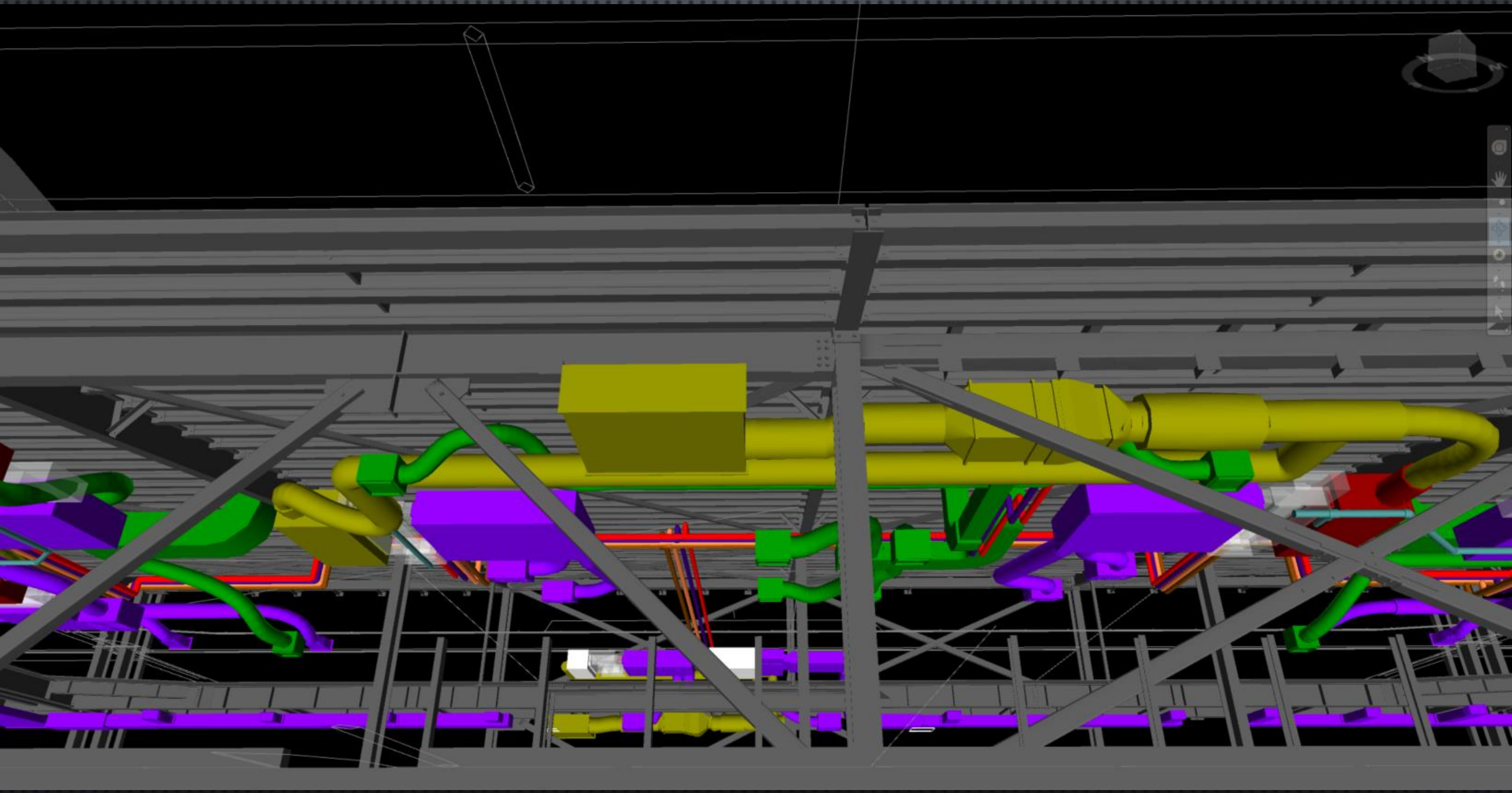
Production Results

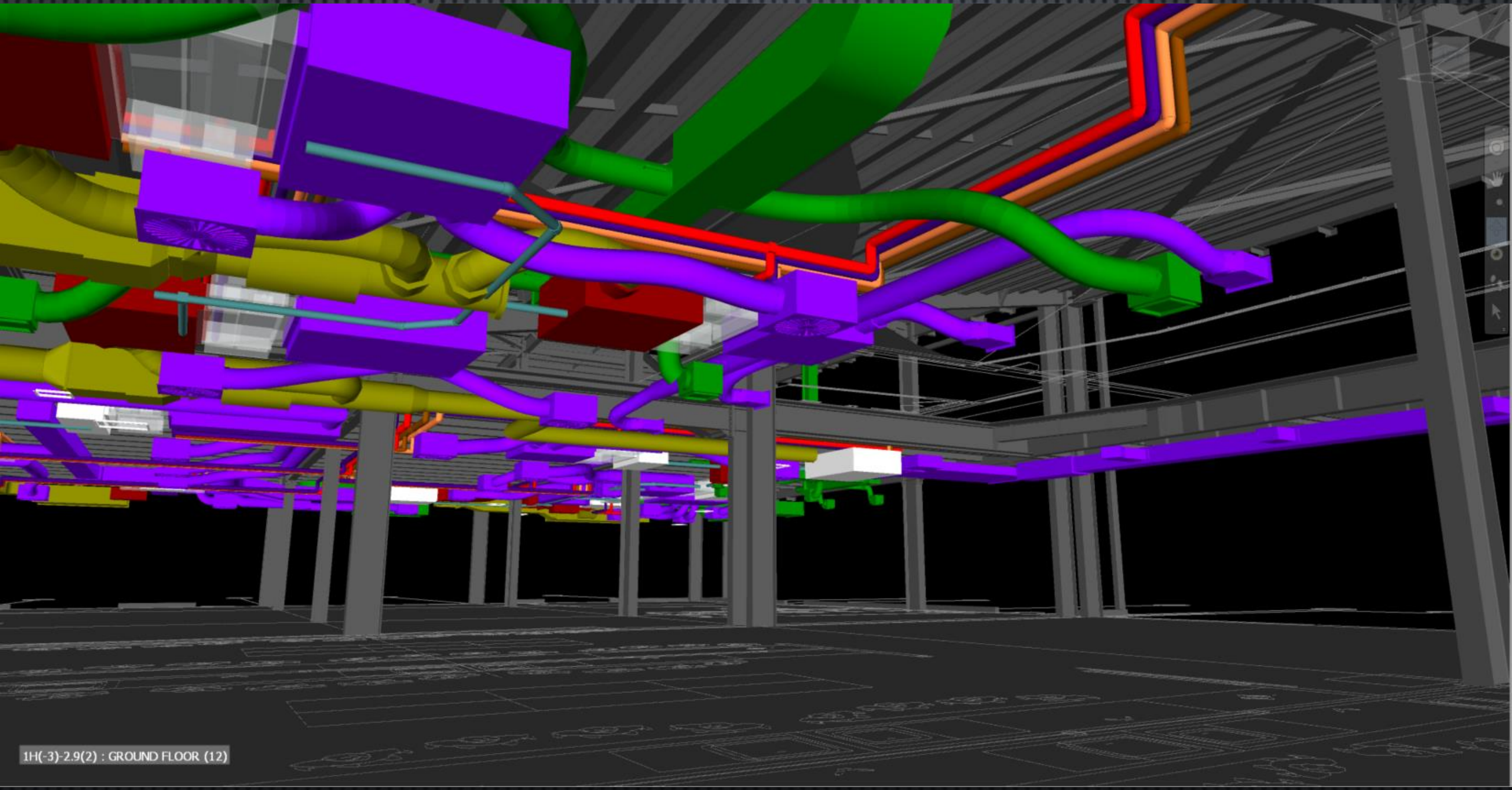
- Rigorous RFI Vetting of Structural Details Before Shop Drawing Submissions
- Faster Steel Shop Drawing Reviews
- Early Structural Coordination with Architectural / Services
- Faster Steel Erection Times
  - Imported As-Built Anchor Bolt Setouts
- Fast Resolution of Field Installation issues

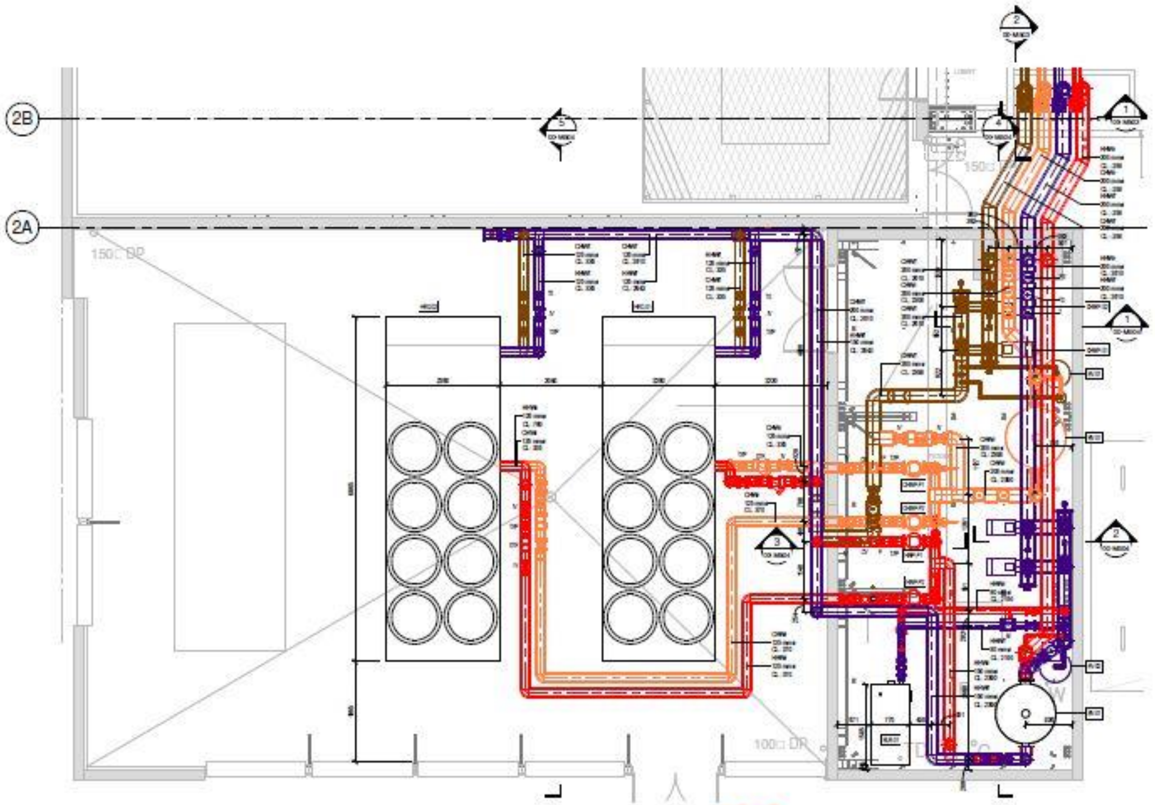
HVAC MECHANICAL

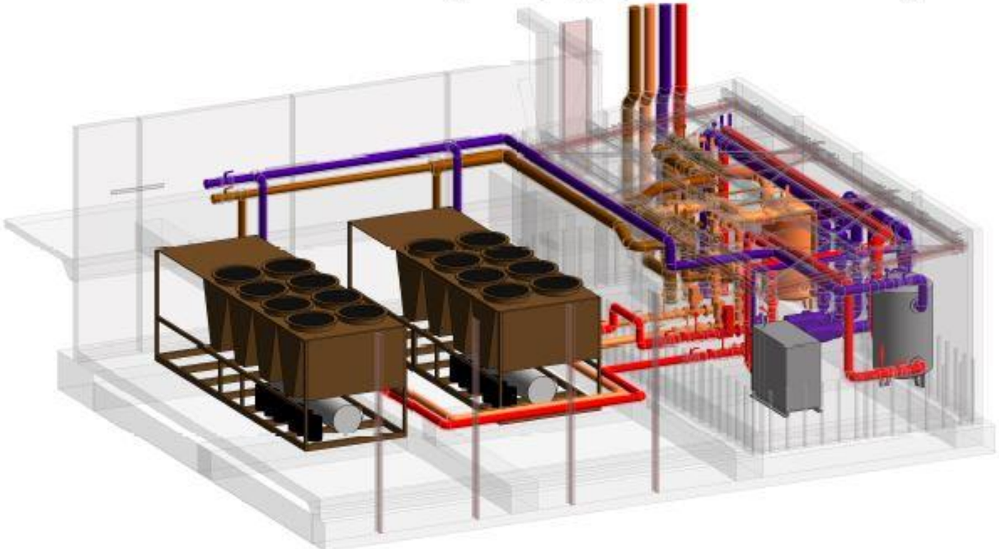
- 3D Modeling of HVAC Mechanical Services using Revit
- Weekly Model Updates Posted
- Electrical, Sprinkler and Hydraulics coordinating with HVAC Services
- Structural Model Imported into Services Model

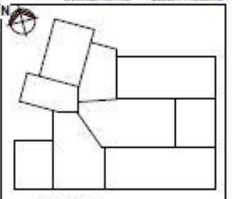

37)-1.18(24) : ROOF (41)




1H(-3)-2.9(2) : GROUND FLOOR (12)







BUILDING KEY

A	26.04.17			FOR APPROVAL
Issue	Date	By	Tr	Description

Mechanical Contractor

Aquaheat New Zealand Limited

Main Contractor

HAWKINS

Consultant

Norman Disney & Young

Client

FUTURE SCHOOLS

Job Title

WAKATIPU HIGH SCHOOL

Drawing Title

MECHANICAL SERVICES
GF Piping Layout - Plantroom

Scale at A1: 1 : 50

Discipline: HVAC

Drawn By: ANISH N

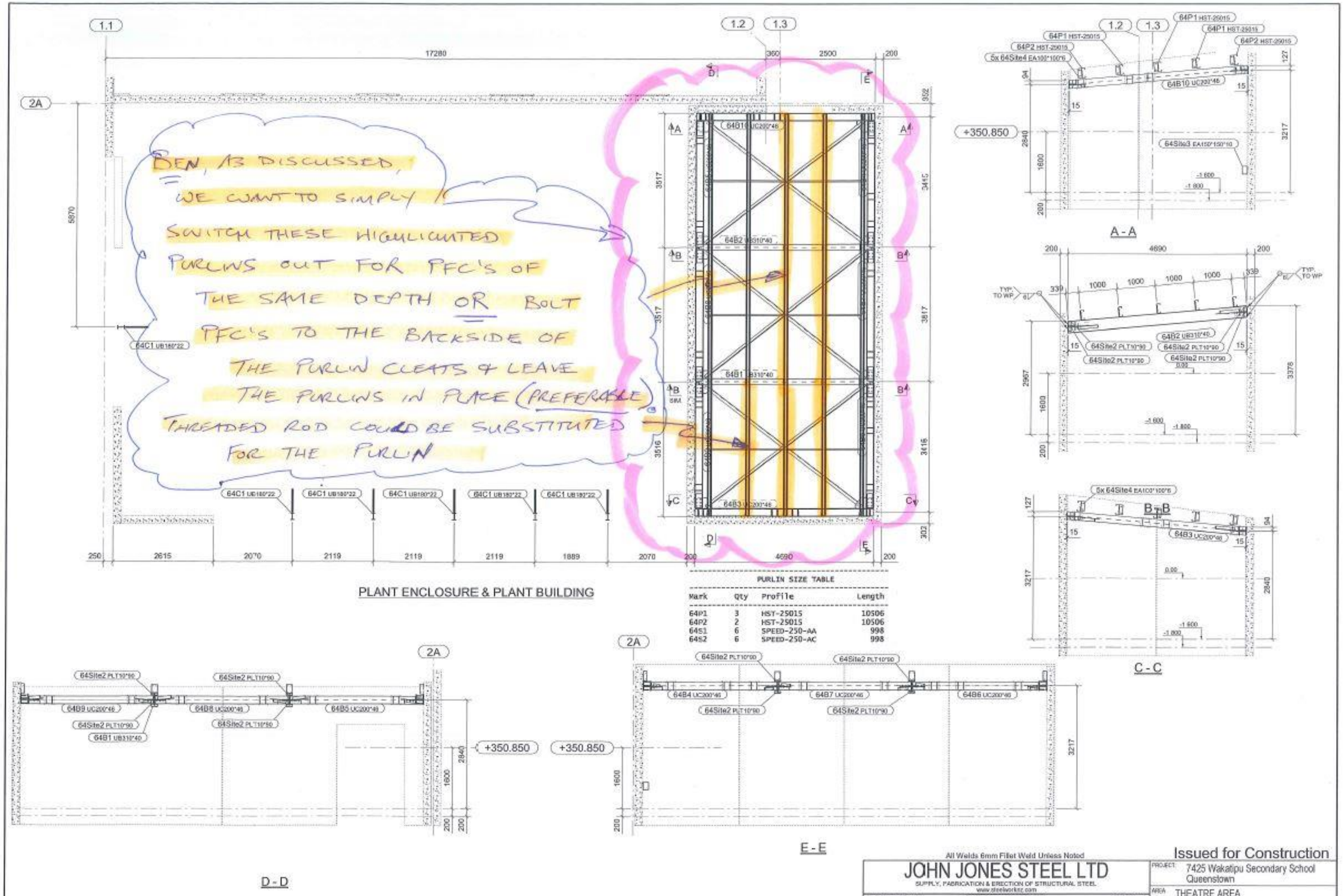
Checked By: DD

Drawing Status

APPROVAL

Job No	Drawing No	Issue
1061	1061- 00-M450	A

DO NOT SCALE



PURLIN SIZE TABLE

Mark	Qty	Profile	Length
64P1	3	HST-25015	10506
64P2	2	HST-25015	10506
64S1	6	SPEED-250-AA	998
64S2	6	SPEED-250-AC	998

All Welds 6mm Fillet Weld Unless Noted

Issued for Construction

JOHN JONES STEEL LTD

SUPPLY, FABRICATION & ERECTION OF STRUCTURAL STEEL

PROJECT: 7425 Wakatipu Secondary School Queenstown

AREA: THEATRE AREA

TITLE: PLANT ENCLOSURE & BUILDING

CLIENT: Hawkins Construction

DRN: Clare

DATE: 13.12.2016

DWG No: 7425 - 64-MP1

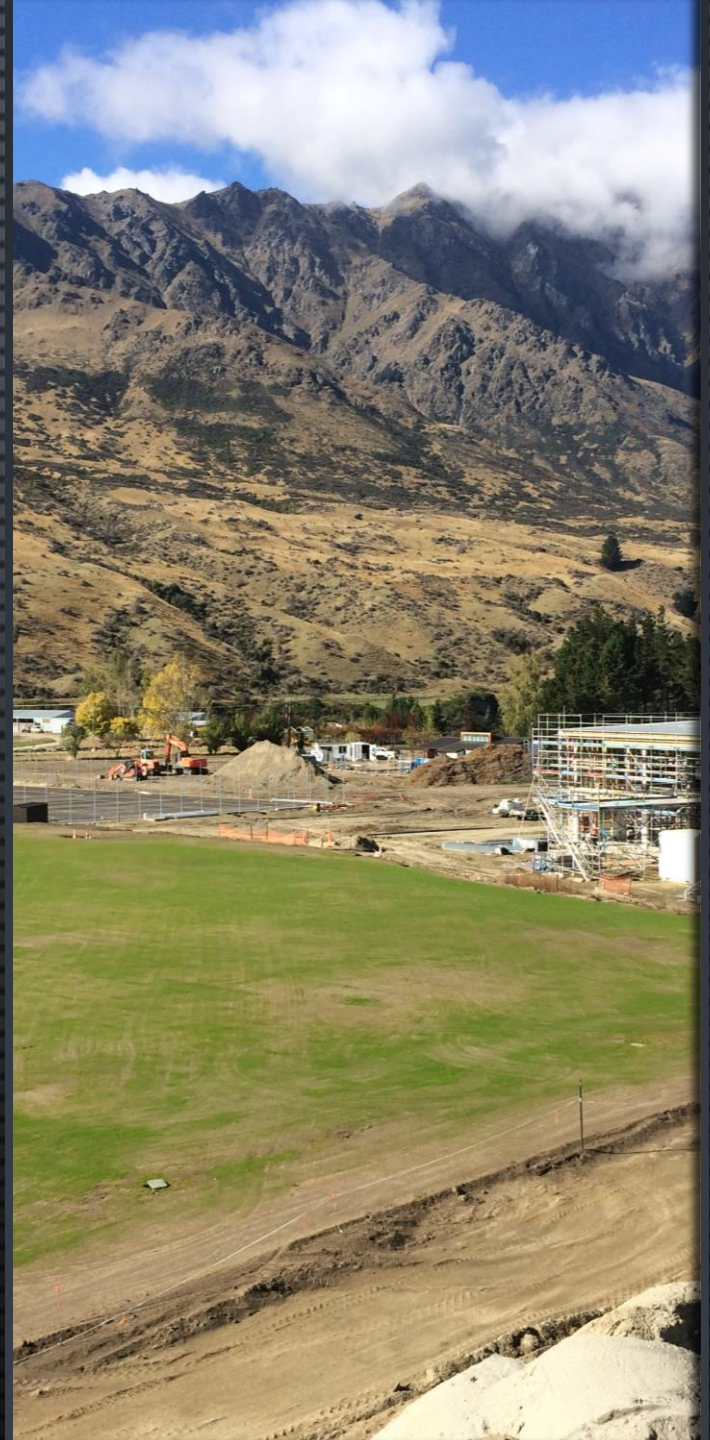
Rev: 0

PRODUCTION RESULTS

- Shop Drawings are Extremely Accurate, produced from the model
- Fast Shop Drawing Reviews
- Wall Penetration Elevations Issued to Framer in Advance
- Installation Drawings are 3D and Very Accurate
  - Installations can occur out of Sequence as Pipe / duct / Equipment accurately drawn to elevation
  - More specialized Crew Labour can be used
- Design Errors are Obvious and rectified prior to installation

BIM USE - PROJECT WIDE BENEFITS

- Less On-Site Resources Required
- More Off-Site Pre-fabrication
- Faster On-Site Installation
- Subs Coordinating with each other, sourcing each other's models
- Less Rework
- Better Work Flows Due to Reductions in Work Stoppages due to Errors
- Predictable Programmes



QUESTIONS

HAVE A NICE DAY