

Tun Zaw Oo

MEP BIM COORDINATOR | FIRE PROTECTION SPECIALIST

Clash Coordination · ISO 19650 · Dynamo / Python · Fire Protection Design

Fire Protection Design Engineer | BEng / MSc Mechanical Engineering · 15+ years in FP design and delivery
· 9+ years of BIM coordination since 2017

Design Manager / BIM Coordinator - Fire Protection (BIM Coordination, Digital Delivery & Fire Protection Design) since 2022, Tong Loong Engineering, Singapore · with the company since 2013

RIGHT TO WORK Potentially eligible for the UK High Potential Individual (HPI) route based on my NTU MSc (2024). HPI application planned. Currently based in Singapore and available to relocate within 3 months of offer.

ISO 19650-2

BRE PIM Practitioner · applied at task-team level

10 tools

Dynamo / Python for model QA & clash coordination

15+ years

Fire protection design - the specialist edge

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PHONE

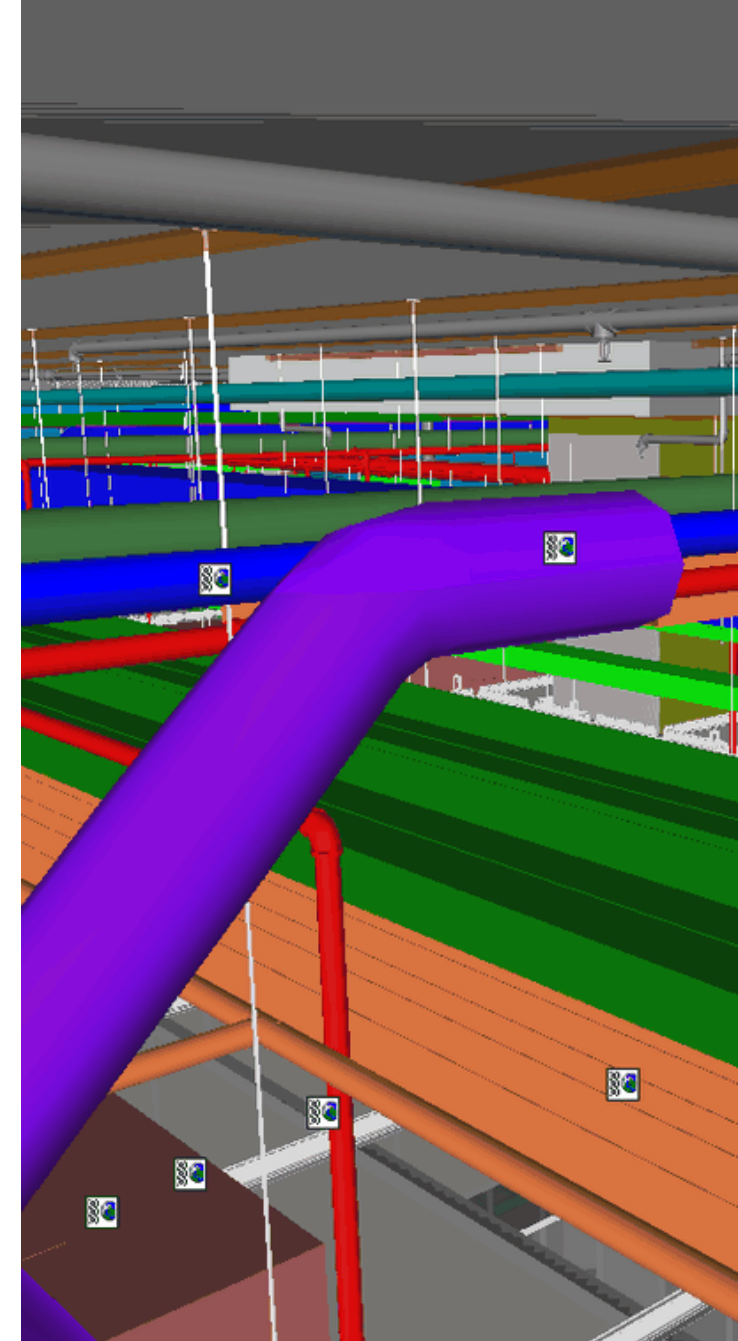
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Professional Profile

PROFILE

MEP BIM Coordinator with 9+ years of BIM coordination and digital project delivery experience since 2017, covering Revit MEP modelling, Navisworks Manage model federation, clash detection and resolution, coordination issues and RFIs, model QA/QC, and practical ISO 19650 task-team workflows within Autodesk Construction Cloud (ACC).

My specialist advantage is 15+ years of fire protection design engineering experience, providing the technical understanding to coordinate sprinkler, hydrant, hose reel, riser, pump and associated fire protection systems with multidisciplinary MEP, structural and architectural requirements.

I combine BIM coordination with engineering judgement, assessing clashes beyond model geometry to consider design intent, installation constraints, system requirements, access, maintainability and hydraulic implications. I also hold the BRE Global ISO 19650-2:2018 Project Information Management Practitioner certification and have knowledge of relevant UK fire protection standards, including BS EN 12845, BS 9251 and BS 9990.

CAREER PATH - ENGINEERING TO BIM COORDINATION



CORE SOFTWARE

Revit (MEP / FP) · Navisworks Manage · ACC (now Autodesk Forma) / BIM 360 · Revizto · Aconex · Dynamo · Python (Revit API) · AutoCAD · FHC hydraulics · Microsoft Excel

AT A GLANCE

15+ years

Fire protection design & delivery, incl. 9+ years BIM coordination

MSc

Mechanical Engineering, NTU Singapore

BRE PIM

ISO 19650-2:2018 PIM Practitioner (BRE Global)

10 Tools

Dynamo / Python tools developed for design & BIM tasks

8 sectors

· Cleanroom · biopharma
· food & cold chain · logistics
· education · aviation
· transport · assisted living

Career Progression

CAREER

Engineering → FP design → BIM coordination (2017) → BIM Coordinator & digital delivery (2022) · 13 years with Tong Loong Engineering, progressing from AutoCAD design to BIM coordination and design management.



CAPABILITY BUILT UP OVER TIME (CUMULATIVE)



Current role - Design Manager / BIM Coordinator – Fire Protection, Tong Loong Engineering, Singapore: MEP and BIM coordination · Revit / Navisworks federation and clash resolution · coordination issues and RFIs · CDE / ACC workflows · ISO 19650 task-team processes · model QA/QC · Dynamo / Python automation · Fire Protection design and technical review.

BIM coordination is the core of the role; fire protection design responsibility gives the coordination its engineering depth.

How I Work - Coordination-Led, Engineering-Informed

ROLE FOCUS

BIM coordination is the core of the role; fire protection engineering makes each coordination decision technically sound.

PRIMARY FOCUS

MEP BIM Coordination



CORE DELIVERY

Federation · Clash · RFIs · Model QA · ISO 19650



SPECIALIST ADVANTAGE

Fire Protection Engineering

BIM & COORDINATION

- Revit MEP / FP modelling to project standards
- Federated model review in Navisworks
- Clash detection, classification, resolution and re-test
- Issues requiring design-team / consultant input escalated as RFIs; responses checked before model update.
- Issues tracked in Revizto; models shared via ACC / BIM 360

Evidence: Slides 5, 8, 11–12

INFORMATION & AUTOMATION

- ISO 19650-2 task-team delivery: DRM, TIDP, naming
- CDE workflow: WIP → Shared (S1) → Published
- Model QA against BEP rules before every Shared submission
- FM asset data (COBie-aligned) populated and checked
- 10 Dynamo / Python tools for QA, clash flags and modelling

Evidence: Slides 6–10, 14–16

FIRE PROTECTION ADVANTAGE

- 15+ years FP design: sprinkler, hydrant, hose reel, riser, foam, pre-action, deluge, water curtain, Linear Heat Detection System
- Code-aware rerouting: coverage, spacing and obstruction checked before geometry changes
- Hydraulic checks (FHC) when routes or pipe sizes change
- Current role: Design Manager for FP packages and design QA/QC

Evidence: Slides 11–13, 28–33

BIM Coordination Workflow

COORDINATION

A coordination workflow that connects design requirements, multidisciplinary federation, clash detection, RFIs, QA and controlled information exchange.

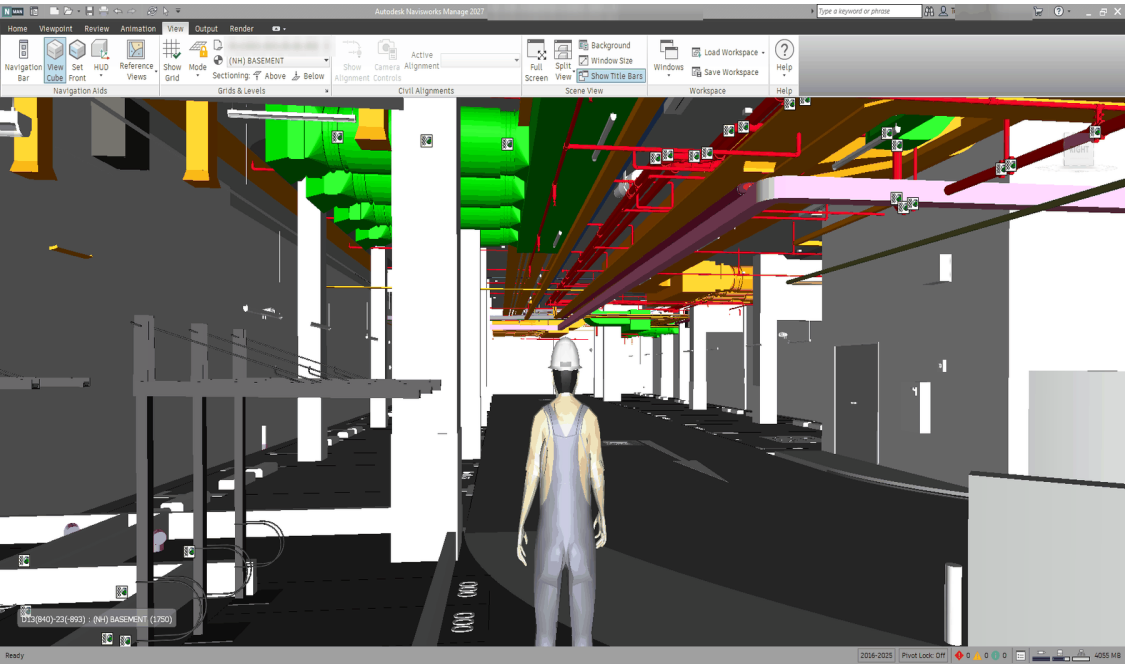


Fig. 1 Navisworks - federated model review (Parry Avenue; file names redacted)

AUTODESK®
NAVISWORKS®

Clash Report

1.1.ACMV VS FIRE		Tolerance	Clashes	New	Active	Reviewed	Approved	Resolved	Type	Status
		0.100m	18	0	16	0	0	2	Hard	OK

Image	Clash Name	Status	Distance	Grid Location	Description	Date Found	Clash Point	Item 1		Item 2	
								Item ID	Item Name	Item ID	Item Name
	Clash15	Active	-0.268	G-13 - HT CSR LEVEL	Hard	2024/3/4 06:28	k:36582.097,ElementID:39561.020,z:16.966	15T STOREY Duct	ElementID:1788577	15T STOREY Black Steel	
	Clash2	Active	-0.184	F-3 - EXT'G DRIVEWAY 3RD STOREY	Hard	2024/2/26 08:27	k:36527.527,ElementID:39444.460,z:18.301	15T STOREY Duct	ElementID:1747687	15T STOREY Black Steel	
	Clash8	Active	-0.180	G-7 - HT CSR LEVEL	Hard	2024/2/26 08:27	k:36556.517,ElementID:39489.295,z:17.072	15T STOREY Duct	ElementID:2509952	15T STOREY Black Steel	
	Clash13	Active	-0.168	G-7 - HT CSR LEVEL	Hard	2024/2/26 08:27	k:36556.357,ElementID:39489.352,z:17.068	15T STOREY Duct	ElementID:1751242	15T STOREY Black Steel	
	Clash3	Active	-0.153	H-1 - HT CSR LEVEL	Hard	2024/2/26 08:27	k:36543.895,ElementID:39418.940,z:17.004	15T STOREY 80 Degree	ElementID:2080967	15T STOREY Black Steel	
	Clash16	Active	-0.153	H-1 - HT CSR LEVEL	Hard	2024/3/4 06:28	k:36543.895,ElementID:39418.940,z:17.004	15T STOREY Duct	ElementID:2080967	15T STOREY Black Steel	
	Clash14	Active	-0.147	H-1 - HT CSR LEVEL	Hard	2024/2/26 08:27	k:36544.571,ElementID:39420.832,z:17.035	15T STOREY Duct	ElementID:2081000	15T STOREY Black Steel	
	Clash10	Active	-0.146	H-1 - HT CSR LEVEL	Hard	2024/2/26 08:27	k:36545.559,ElementID:39423.588,z:16.964	15T STOREY 60 Degree	ElementID:2081039	15T STOREY Black Steel	

Fig. 2 Clash report extract - shown as evidence of the coordination process, not final project status

COORDINATION PRINCIPLES

- Clashes classified: Clashes assessed for time/cost, structural, authority, safety/code and design-responsibility impact; issues requiring external design input escalated as RFIs, while task-team issues are resolved within the model.
- FP design intent and code rules checked before geometry is changed
- Evidence kept in the CDE: QA checklists, clash viewpoints, RFI log, status history

ISO 19650 & CDE - Practical Experience

ISO 19650

Applied within the Fire Protection task-team (subcontractor) scope. Task-team BIM coordination, DRM review, TIDP preparation, naming validation, CDE workflow, model QA and information exchange.

CDE WORKFLOW - ACC

WIP → Shared → Published → Archived. S1 suitability applied at WIP → Shared; revision and status history kept; access permissions checked against the project CDE workflow.

INFORMATION REQUIREMENTS

BEP naming convention validated; Detailed Responsibility Matrix (DRM) reviewed for 14 FP containers; FP TIDP prepared with dates and dependencies.

QA & INFORMATION EXCHANGE

BEP model validation checklist before each Shared submission; missing data identified and corrected; FM asset data (COBie-aligned) and IFC parameters on FP elements.

Certification: ISO 19650-2:2018 PIM Practitioner - BRE Global, Aug 2026, No. BREP10354

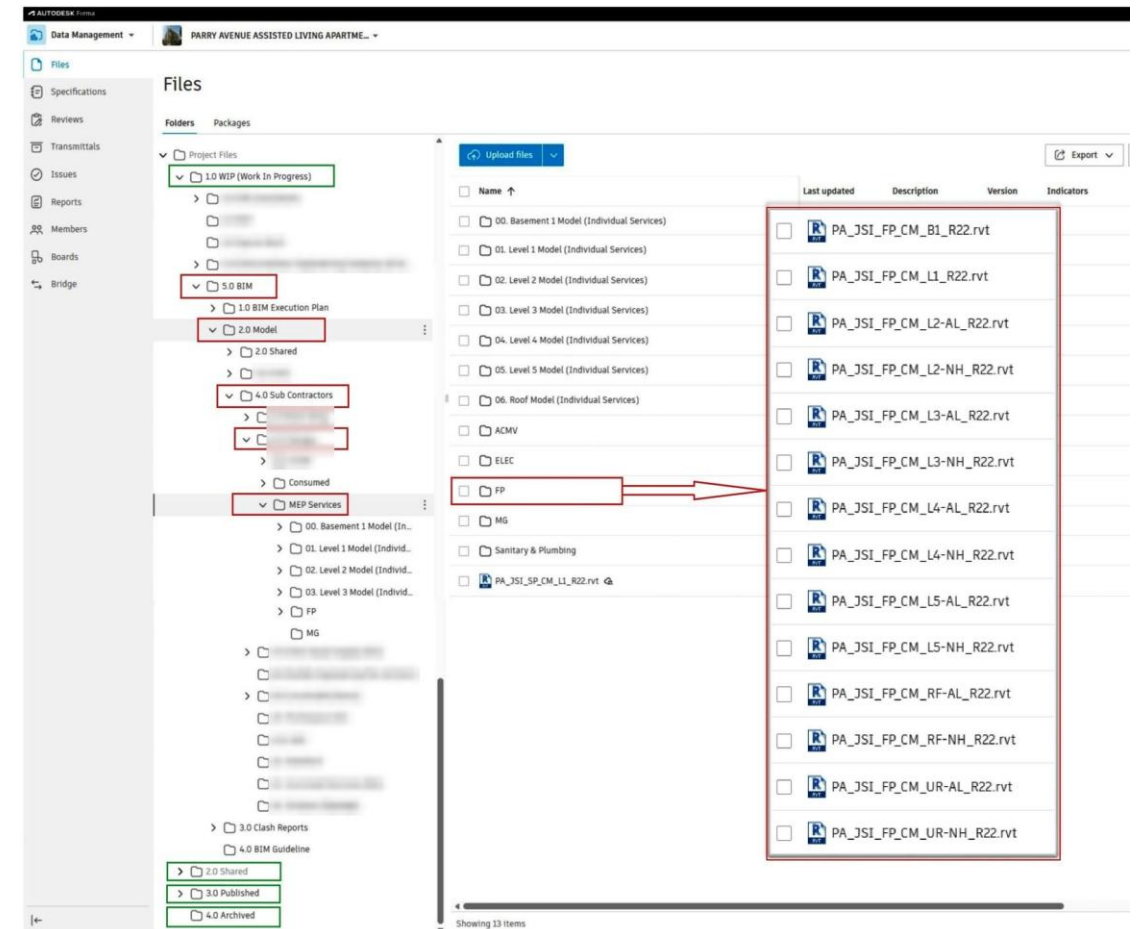


Fig. Autodesk Construction Cloud (ACC) (now Autodesk Forma) - Parry Avenue fire protection containers in the WIP area; other companies' folders redacted

Parry Avenue - ISO 19650 Case Study

ISO 19650 CASE STUDY

Practical application of ISO 19650-2 within the Fire Protection task-team scope - Parry Avenue Assisted Living (Perennial), Singapore.

PROJECT ROLE Fire Protection BIM Coordinator, Tong Loong Engineering FP task team (subcontractor scope) · CDE: ACC · BEP, TIDP preparation, MIDP coordination and dependency tracking

1 TENDER RESPONSE / PRE-APPOINTMENT

Capability & capacity

- Assessed task-team people, process and technology against the project information requirements (EIR / BEP)
- Identified a WIP-to-Shared workflow skills gap; training arranged before the first submission
- Confirmed my Fire Protection BIM Coordinator scope in writing with the lead appointed party

14

information containers planned and delivered

2 APPOINTMENT

Responsibility & planning

- Reviewed the Detailed Responsibility Matrix (DRM); verified all 14 FP containers
- Identified a naming error (“UR-ALL”) and escalated it for correction before DRM sign-off
- Prepared the FP Task Information Delivery Plan (TIDP): containers, information requirements, dates and dependencies

3

FP BIM team members
1 coordinator + 2 modellers

3 MOBILISATION

Test before production

- Checked ACC WIP / Shared / Published / Archived areas and verified access permissions against the project CDE workflow
- Validated container names against the BEP naming convention
- Tested federation on national coordinates and ran a trial clash test

1

naming error caught
before DRM sign-off

4 PRODUCTION & QA

Check, then share

- Completed the BEP model validation checklist before each Shared submission
- Applied S1 (suitable for coordination) at WIP → Shared
- Identified missing installation-status data on L2 sprinklers; corrected before resubmission

2 wks

L3 (third-storey) buffer added to the MIDP after escalation

5 REVIEW & AUTHORISATION

Coordinate, then submit

- Classified clashes by severity; escalated major clashes as RFIs to other task teams / consultants
- 4 key RFIs raised and closed before model update
- Submitted for lead appointed party authorisation; moved to Published only after appointing party acceptance

4

key RFIs: 3 coordination
+ 1 information, all closed

Parry Avenue - Coordination & RFI Workflow

Issue identified → RFI raised → consultant response → model / design coordination → QA → resubmitted to Shared.

RFI LOG - KEY RFIs (3 COORDINATION, 1 INFORMATION)

RFI reference	Subject	Issue	Status
PARRY_RFI_FP_118	Sprinkler routing at beam zone	Structural clearance conflict	Closed
PARRY_RFI_FP_126	HVAC (ACMV) duct coordination at L2	Major MEP clash	Closed
PARRY_RFI_FP_131	Ceiling void clearance	Not enough coordination space	Closed
PARRY_RFI_FP_139	Fire hydrant plinth size	Missing dimensional information	Closed

WORKED EXAMPLE (INFORMATION RFI) - PARRY_RFI_FP_139

1 30 Apr 2025

RFI raised: fire hydrant plinth size missing from the drawings

2 2 May 2025

Consultant reply: 1 x 1 m plinth, per the CPG-A layout plan

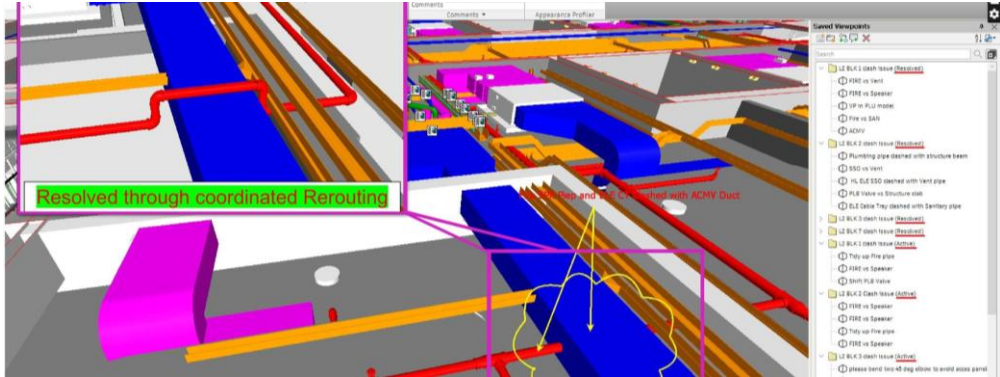
3 Coordinate & update

Reply checked, then the Revit model was updated

4 QA & resubmit

QA checklist passed; resubmitted to Shared (S1)

CLASH → RESOLUTION (NAVISWORKS, L2)



L2 ceiling void: sprinkler, HVAC (ACMV) duct and cable tray clash rerouted within agreed mounting heights and service zones; riser and plant space agreed with architect and structure.

WHEN DOES A CLASH BECOME AN RFI?

MAJOR

Time or cost impact, or affects structure, authority approval, safety / code compliance or façade → RFI to the responsible designer / consultant

MINOR

Within agreed design responsibility and coordination rules; no external design decision required.

EVIDENCE TRAIL - EVERY STEP IS RECORDED



Records kept in the CDE: completed QA checklists, clash viewpoints, the RFI log with consultant replies, and the container status history.

Delivery Planning & Risk - Fire Protection TIDP

ISO 19650 CASE STUDY

Each FP container planned with its date and upstream dependency, so delivery risks were visible before production started.

TASK INFORMATION DELIVERY PLAN (TIDP) - FIRE PROTECTION

#	Container	Model	Level	Planned	Upstream dependency
1	PA_JSI_FP_CM_B1_R22	Basement Model	B1	21-Mar-25	C&S + Arch basement
2	PA_JSI_FP_CM_L1_R22	1st Storey Model	L1	4-Apr-25	C&S + Arch L1
3	PA_JSI_FP_CM_L2-AL_R22	AL 2nd Storey Model	L2	17-Apr-25	C&S + Arch L2
4	PA_JSI_FP_CM_L2-NH_R22	NH 2nd Storey Model	L2	17-Apr-25	C&S + Arch L2
5	PA_JSI_FP_CM_L3-AL_R22	AL 3rd Storey Model	L3	2-May-25	C&S beams + ceiling clearance
6	PA_JSI_FP_CM_L3-NH_R22	NH 3rd Storey Model	L3	2-May-25	C&S beams + ceiling clearance
7	PA_JSI_FP_CM_L4-AL_R22	AL 4th Storey Model	L4	16-May-25	C&S + Arch L4
8	PA_JSI_FP_CM_L4-NH_R22	NH 4th Storey Model	L4	16-May-25	C&S + Arch L4
9	PA_JSI_FP_CM_L5-AL_R22	AL 5th Storey Model	L5	30-May-25	C&S + Arch L5
10	PA_JSI_FP_CM_L5-NH_R22	NH 5th Storey Model	L5	30-May-25	C&S + Arch L5
11	PA_JSI_FP_CM_RF-AL_R22	AL Roof Model	RF	13-Jun-25	Arch roof
12	PA_JSI_FP_CM_RF-NH_R22	NH Roof Model	RF	13-Jun-25	Arch roof
13	PA_JSI_FP_CM_UR-AL_R22	AL Upper Roof Model	UR	13-Jun-25	Arch roof
14	PA_JSI_FP_CM_UR-NH_R22	NH Upper Roof Model	UR	13-Jun-25	Arch roof

Level of information need (BS EN ISO 7817-1): geometrical information - installation-level FP pipework & fittings, as required by the project specification; alphanumerical information - required asset parameters; documentation - QA checklist per Shared submission.

Owner: FP BIM Coordinator.

Highlighted rows: L3 (third storey) dependency. AL / NH = the two blocks. C&S = civil & structural.

DRM CHECK

14 / 14 containers confirmed as assigned to Tong Loong as the authoring task team.

Naming error found: PA_JSI_FP_CM_UR-AL/NH_R22 was recorded as "UR-ALL". Escalated, corrected before DRM finalisation and cross-checked against the TIDP.

THIRD-STOREY (L3) DEPENDENCY RISK

RISK

L3 sprinkler routing depended on structural beam coordination and ceiling clearance. One coordinator and two modellers were handling overlapping L3–L5 submissions.

ACTION

Recorded the dependency in the TIDP and escalated it in writing to the lead appointed party before the MIDP was finalised.

RESULT

The lead appointed party added a 2-week sequencing buffer for L3 (third storey) in the MIDP, aligning the structural and FP submission windows and reducing rework risk.

Model QA / QC

MODEL QA

Model QA and coordination QA checked separately before models are shared - QA/QC is broader than clash detection.

MODEL QA

- ✓ File size within limit
- ✓ Grids & levels aligned with architecture
- ✓ Model opens without errors; unnecessary content reviewed and removed where appropriate.
- ✓ Links & CAD cleaned
- ✓ Correct worksets & categories
- ✓ No misplaced / duplicate elements
- ✓ Required parameters filled (data completeness)
- ✓ Naming & system standards applied

COORDINATION QA

- ✓ Services clear of structure (interdisciplinary clashes)
- ✓ Self-clash free
- ✓ Installation clearance & access
- ✓ Fixture / device mounting heights correct

Clash detection is one part of coordination QA; model health, standards and data completeness are checked first, supported by Dynamo tools (slides 15 and 21).

Fire Protection Model QA Checklist

Project: PARRY AVENUE ASSISTED LIVING APARTMENT
Date: 13 JUNE 2025

Created by: BIM Manager
Checked by: BIM Manager
Reviewed by: BIM Manager

Model Quality Check List

MEP (Fire Protection Discipline)	Poor 0	Fair 50	Excellent 100
Components belong to correct system			✓
System Colours are defined systematically			✓
System assigned correct material			✓
Naming convention follows BEP			✓
Shared coordinates correctly applied			✓
AIR parameters populated (Zone, Level, System, Classification)			✓
Fire Zone/ Classification parameter correctly assigned			✓
Equipment correctly placed and connected			✓
Parameters match project standards (Size, Flow, Pressures Type)			✓
No unresolved warnings in model			✓

Total	100%
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Remarks/ Observations:		
Prepared by Name : Tun Zaw Oo Position : Fire Protection BIM Coordinator Company : Tong Loong Engineering Pte Ltd Date : 13 June 2025 Signature :	Checked by Name : [Redacted] Position : Fire Protection BIM Manager Company : Tong Loong Engineering Pte Ltd Date : 13 June 2025 Signature :	Reviewed by Name : [Redacted] Position : BIM Manager Company : [Redacted] Date : 13 June 2025 Signature :

Fig. Fire protection model QA checklist (Parry Avenue, 13 Jun 2025), with sign-off; names and signatures redacted

Industrial FAB Facility

INDUSTRIAL / CLEANROOM FACILITY · SINGAPORE

BIM COORDINATION CASE STUDY

01 PROJECT OVERVIEW

- 3-storey single-user industrial factory - FAB cleanrooms, central utility building (CUB), ultrapure water (UPW) & chemical rooms, gas yard
- Single-storey warehouse with mezzanine & ancillary facilities

02 FIRE PROTECTION SCOPE

- ❖ Sprinklers - K8.0 heads; ESFR K25.2 in warehouse
- ❖ External fire hydrant system & pillar hydrants
- ❖ Hose reel & dry riser systems
- ❖ Sprinkler / hydrant pump room & tanks

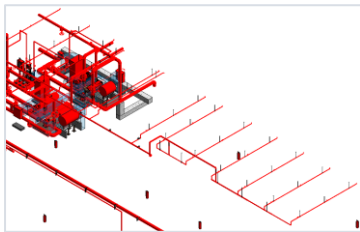


Fig. 2 Pump room & hangers

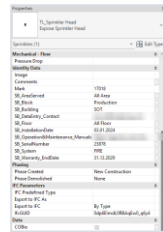


Fig. 3 Sprinkler asset data

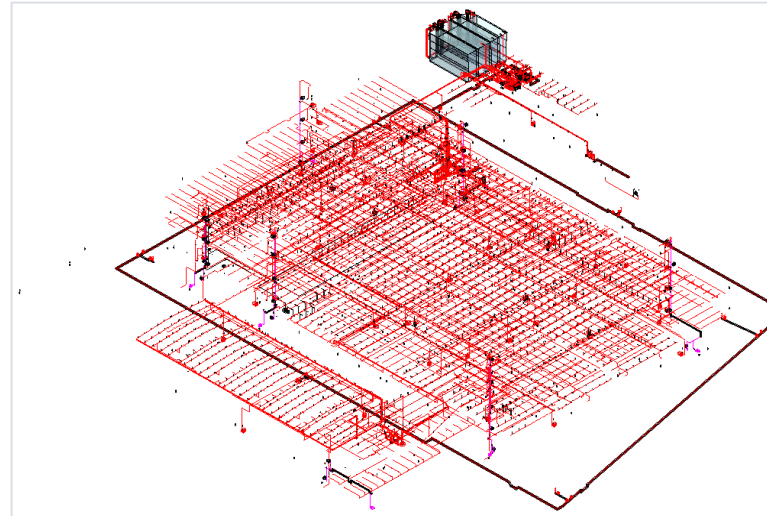


Fig. 1 Revit 3D - overall FP model: sprinklers, hydrant ring main & pump room

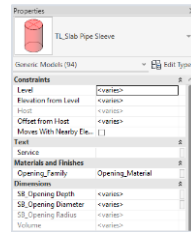


Fig. 4 Slab pipe sleeves (94)

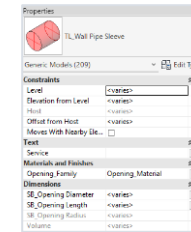


Fig. 5 Wall pipe sleeves (209)

03 MY ROLE & RESPONSIBILITIES

Coordination & compliance

- ✓ Multi-trade clash coordination; code compliance checks

Design & hydraulic calculation

- ✓ Fire Protection / sprinkler system design

Hydrant compliance checking

- ✓ External fire hydrant system review

Pipe hanger placement

- ✓ Hangers modelled on FP pipework in Revit

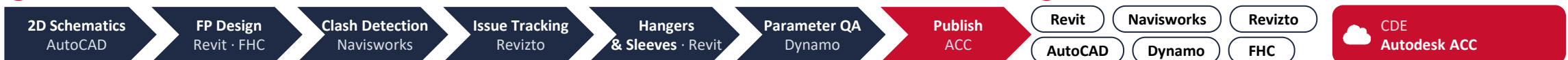
Slab & wall pipe sleeves

- ✓ 94 slab + 209 wall sleeve instances placed

Parameter checking

- ✓ Project asset parameters (COBie-aligned) verified

04 BIM / COORDINATION WORKFLOW



06 KEY TECHNICAL / COORDINATION CHALLENGES

- Mixed hazards: FAB / CUB zones (hazard category HC-2) and ESFR warehouse on one pump set
- 303 slab & wall penetrations (BWIC) coordinated with structure; hangers in congested plant

05 SOFTWARE & CDE



07 KEY OUTCOMES / DELIVERABLES

- Hydraulically designed, coordinated FP model → 25 sheet as-built set
- Sleeves & hangers modelled; asset data checked for handover

Tee Yih Jia Food Hub (45 m High ASRS Cold Store)

FOOD FACTORY WITH COLD STORAGE · SINGAPORE

BIM COORDINATION CASE STUDY

01 PROJECT OVERVIEW

- Proposed 9-storey industrial factory (Tee Yih Jia Food Hub) and warehouse
- Warehouse: 2 cold rooms, dry store & anteroom with 45 m high automated storage & retrieval system (ASRS)

02 FIRE PROTECTION SCOPE

- ❖ In-rack & ceiling sprinklers - K8.0 fast-response heads
- ❖ Pre-action systems & Linear Heat Detection (LHD) serving cold store zones
- ❖ Hose reel & dry riser systems
- ❖ Sprinkler / hose reel tanks & pump room
- ❖ Fire alarm & firefighters' intercom (schematic)

45 m

ASRS Rack Height

9

Storeys

30

FP Drawing Sheets

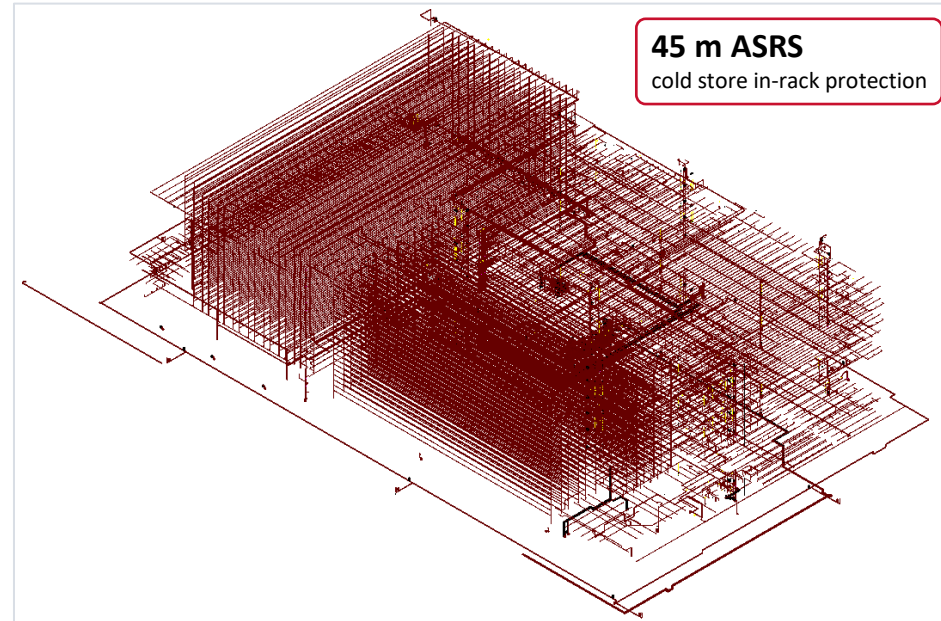
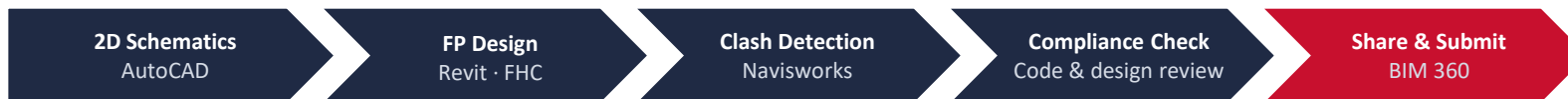


Fig. 1 Revit 3D - overall fire protection model: ASRS cold stores, dry store and building sprinkler network

04 BIM / COORDINATION WORKFLOW



06 KEY TECHNICAL / COORDINATION CHALLENGES

- Multi-level in-rack sprinkler protection over the full 45 m ASRS rack height
- Heads & DN50 range pipes fitted within tight rack clearances (guard & plate details)
- Routing mains around racking steel, roof trusses and pre-action valve zones

03 MY ROLE & RESPONSIBILITIES

- ✓ **Coordination:** clash detection with racking, architecture, structure & MEP; model sharing via BIM 360
- ✓ **Design:** Fire Protection system for the 45 m ASRS cold room storage (in-rack & ceiling sprinkler layouts modelled in Revit)
- ✓ **Compliance:** checked layouts against code & design requirements

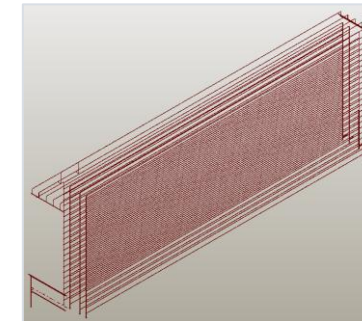


Fig. 2 Revit 3D - in-rack sprinkler array

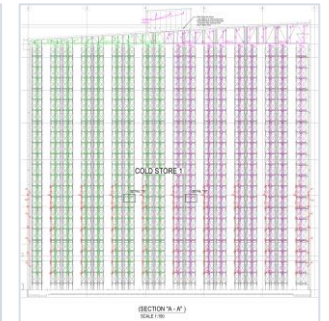
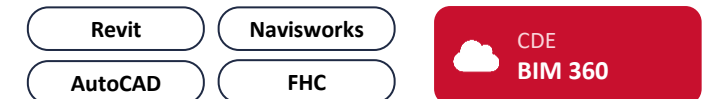


Fig. 3 Section A-A, Cold Store 1

05 SOFTWARE & CDE



07 KEY OUTCOMES / DELIVERABLES

- Coordinated FP model for ASRS cold stores & dry store, basis for the installation drawing set
- 30-sheet FP drawing package (CCDC_TYJ_TL_FP series) issued for consultant review
- Rack-level sprinkler installation details resolved in model before submission

Specialist Advantage - Hydraulic Design

SPECIALIST ADVANTAGE

When a clash forces a reroute, pipe sizes, flow and pressure are re-checked in FHC so the coordinated model still works.

WORKED EXAMPLE - DESIGN CRITERIA

Design standard (FHC report)	NFPA 13:2016
Hazard class (as input in FHC)	High Hazard Cat 1
Sprinkler type	ESFR K25.2 (K 360 L/min/bar½)
Operating sprinklers × area / head	12 × 9.0 m²
Design area of operation	108 m²
Equivalent density (output only)	67 mm/min
Minimum sprinkler pressure	2.80 bar (actual 2.81–2.91)
Loss equation · highest head	Hazen-Williams · 14.2 m

CALCULATED HYDRAULIC DEMAND - FHC OUTPUT

Source duty at FHC node 100

7,299.7 L/min

@ 7.429 bar

Check: 12 operating heads at 603.0–614.5 L/min each sum to ≈ 7,300 L/min, matching the source duty.

FHC - Hydraulic Calculation Report

Submitted by user number: 1995
Tong Loong Engineering Pte Ltd

Project: 2PS1
Project Ref: 19887
Area Ref: MOST UNFAVOURABLE AREA
Inst. Number: 1

FHC:

Operating Sprinkler Heads, Nozzles and Hydrants

Head no	Node no	Size mm	K factor	Flow l/min	Area m ²	Density mm/min	Pressure bar	Height m	Pipe no
1	610	25.0	360.00	608.6	9.000	67.00	67.62	2.80	2.858 14.196 51
2	650	25.0	360.00	603.8	9.000	67.00	67.08	2.80	2.813 13.761 55
3	680	25.0	360.00	609.6	9.000	67.00	67.73	2.80	2.867 14.196 58
4	780	25.0	360.00	608.4	9.000	67.00	67.60	2.80	2.856 14.196 70
5	830	25.0	360.00	603.3	9.000	67.00	67.04	2.80	2.809 13.761 74
6	860	25.0	360.00	609.3	9.000	67.00	67.70	2.80	2.865 14.196 77
7	870	25.0	360.00	608.3	9.000	67.00	67.58	2.80	2.855 14.196 89
8	1010	25.0	360.00	603.0	9.000	67.00	67.00	2.80	2.806 13.761 93
9	1040	25.0	360.00	609.2	9.000	67.00	67.69	2.80	2.864 14.196 96
10	1150	25.0	360.00	613.9	9.000	67.00	68.21	2.80	2.908 14.196 108
11	1190	25.0	360.00	608.1	9.000	67.00	67.57	2.80	2.853 13.761 112
12	1220	25.0	360.00	614.5	9.000	67.00	68.27	2.80	2.913 14.196 115

0 heads are under the required density / minimum pressures

Designers reference : TONG LOONG ENGINEERING PTE LTD

Project Data File : TL-2PS1-FHC-CV6-23 MUFA.FHC

Hazard classification : HIGH HAZARD CAT 1

Design authority : NFPA 13 : 2016 - Installation of Sprinkler

Insurance company : N.A

Specified density of discharge : 67.00 mm/min (l/min/m²)

Assumed maximum area of operation : 108.00 m²

Number of operating sprinkler heads : 12

Maximum area covered per head : 9.00 m²

Highest head / nozzle above source : 14.20 m

Number of pipes in system : 121 from 65 to 250 mm

Pressure loss equation used : Hazen-Williams

Fluid : Water

Pipe Data Table : STD_PIPE.PDT

Maximum fluid velocity : 4.24 m/s in pipe 510 560

Volume of pipework and fittings : 20.01 m³

Elbows are welded for : 65 mm and above

Comment : ---

Checked by & Date :

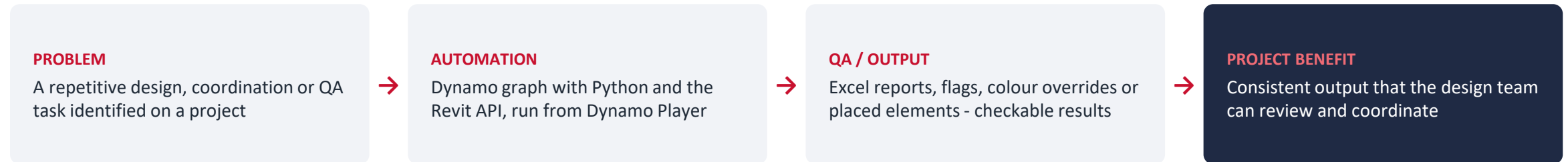
Source duty = 7299.7 l/min @ 7.429 bar at node no 100

Fig. FHC hydraulic calculation report (extract) and isometric - all values on this slide are taken from the report output.

Digital Automation Approach

DIGITAL AUTOMATION

I use Dynamo / Python to turn repetitive design, BIM coordination and model QA tasks into repeatable workflows, with illustrative time-saving estimates shown for individual tools.



TOOL LIBRARY - 10 DYNAMO / PYTHON TOOLS



Scope: tools support design and BIM delivery within my role; they are not presented as software-development experience. Time-saving figures are illustrative estimates, not measured productivity data. Some tools are shown on test models; project file names are redacted.

Digital Automation - Model Health Checker

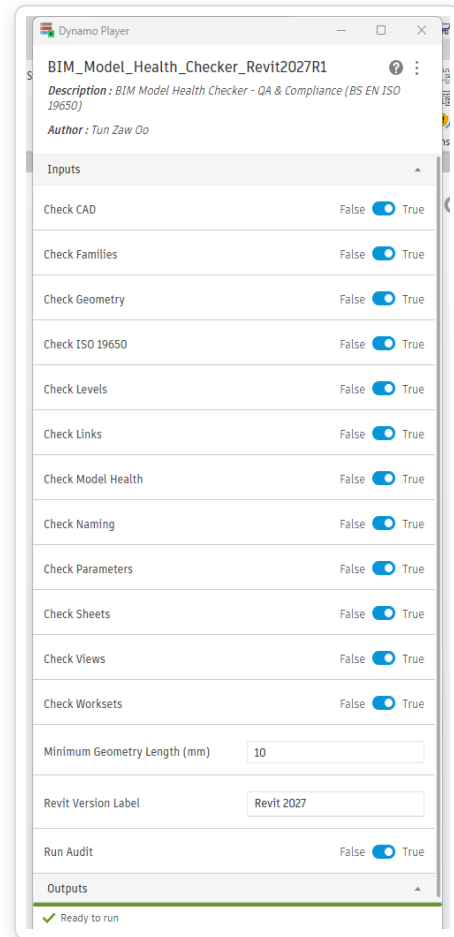
DIGITAL AUTOMATION

BIM MODEL HEALTH CHECKER

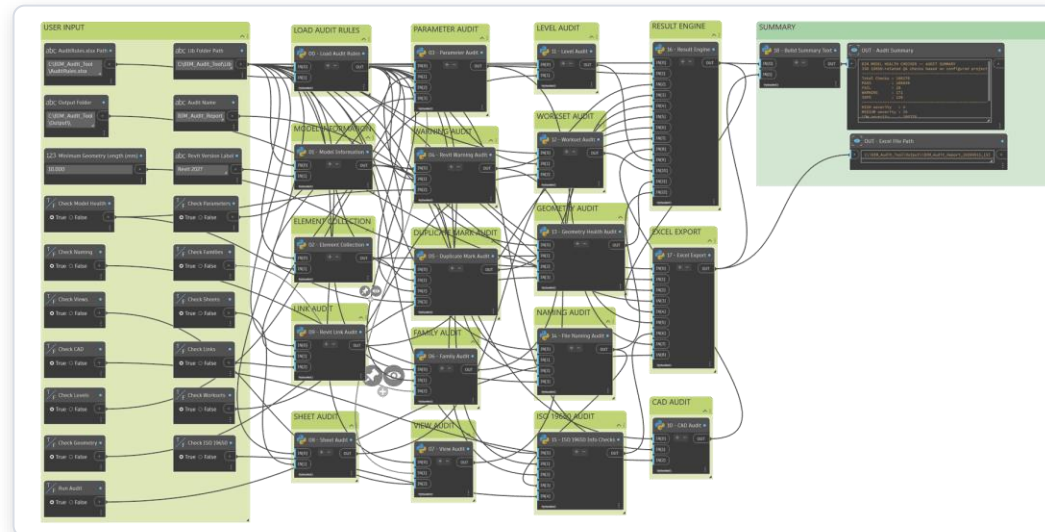
ILLUSTRATIVE RUN-TIME COMPARISON 8 h manual → 10 min with Dynamo

Problem: manual, inconsistent model health checks · **Approach:** 12 switchable Python audit modules (incl. ISO 19650 naming) with a multi-tab Excel report · **Benefit:** repeatable internal model QA

01 Choose checks in Player



02 Dynamo graph: Python audit modules



03 Excel report: executive summary

Field	Value
Project Name	
Project Number	
Model Name	
Revit Version	Revit 2027
Audit Date	2026-09-16 01:06:32
Audit Engine Version	2.3-2026-09-15 (unwrapp+builtinlookup+inlinestr+bbox)
Report Title	BIM Model Health Checker / BIM Audit Report
Total Checks	106376
PASS	106066
FAIL	11
WARNING	171
INFO	128
Overall Score (%)	99.98
-- Module Statistics --	
Families	PASS 141 / FAIL 0 / WARNING 0 / INFO 0
Geometry	PASS 0 / FAIL 0 / WARNING 146 / INFO 0
Levels	PASS 1 / FAIL 0 / WARNING 0 / INFO 0
Naming	PASS 0 / FAIL 7 / WARNING 1 / INFO 0
Parameter QA	PASS 105917 / FAIL 4 / WARNING 0 / INFO 0
Revit Links	PASS 0 / FAIL 0 / WARNING 6 / INFO 0
Revit Warnings	PASS 0 / FAIL 0 / WARNING 14 / INFO 0
Sheets	PASS 7 / FAIL 0 / WARNING 1 / INFO 0
Views	PASS 0 / FAIL 0 / WARNING 3 / INFO 127
Worksets	PASS 0 / FAIL 0 / WARNING 0 / INFO 1

106,376

checks run across the model

11

fails to fix: 7 naming, 4 parameter

171

warnings: 146 geometry, 14 Revit, 11 other

12

audit modules, each switchable

Note: Read as findings, not a score: the 11 fails are the items to correct before sharing. The report's "Overall Score" follows the tool's own rules and is not an industry metric. Project identifiers redacted.

Digital Automation - Clash Flag Coordination

DIGITAL AUTOMATION

CLASH FLAG PLACEMENT FROM CLASH POINTS

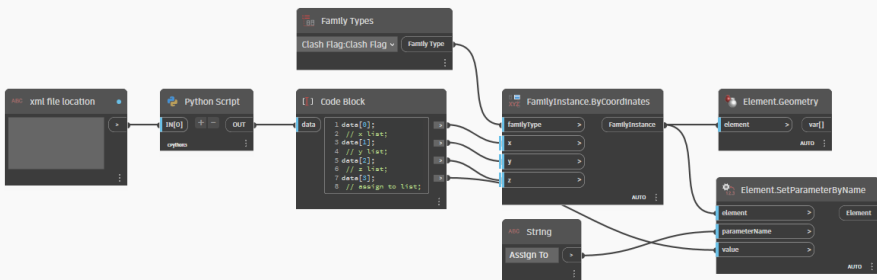
Workflow: Navisworks clash report → XML → Dynamo → flags placed in Revit at clash points → assigned to responsible team · **Benefit:** clash locations visible in the design model

ILLUSTRATIVE RUN-TIME COMPARISON 1 h manual → 3 min with Dynamo

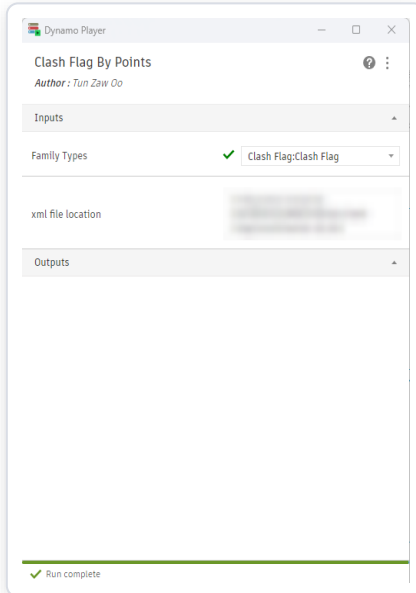
01 Navisworks clash report (XML)

```
<rule name="Items in same group/block/cell" enabled="1" creator="lcp_clash_adaptor_for_lcpdclash_ignore_same_group">
  <ruleparams/>
</rule>
</rules>
<summary total="2" new="2" active="0" reviewed="0" approved="0" resolved="0">
  <testtype>Hard</testtype>
  <teststatus>OK</teststatus>
</summary>
<clashresults>
  <clashgroup name="01 STOREY : A-1" guid="4a6147df-f8ee-46a8-9fcb-588d90514a27" status="new">
    <resultstatus>New</resultstatus>
    <clashpoint>
      <pos3f x="4661.852" y="29866.193" z="2956.402"/>
    </clashpoint>
    <clashpoint>
      <pos3f x="4661.852" y="29866.193" z="2956.402"/>
    </clashpoint>
    <gridlocation>A-1 : 01 STOREY</gridlocation>
    <createddate>
      <date year="2024" month="9" day="4" hour="6" minute="55" second="51"/>
    </createddate>
    <createddate>
      <date year="2024" month="9" day="4" hour="6" minute="55" second="51"/>
    </createddate>
    <assignedto>ACMV TEAM</assignedto>
    <clashobjects>
      <clashobject>
        <objectattribute>
          <name>Element ID</name>
          <value>876827</value>
        </objectattribute>
        <layer>01 STOREY</layer>
      </clashobject>
      <clashobject>
        <objectattribute>
          <name>Element ID</name>
          <value>878954</value>
        </objectattribute>
        <layer>01 STOREY</layer>
      </clashobject>
    </clashobjects>
  </clashgroup>
</clashresults>
```

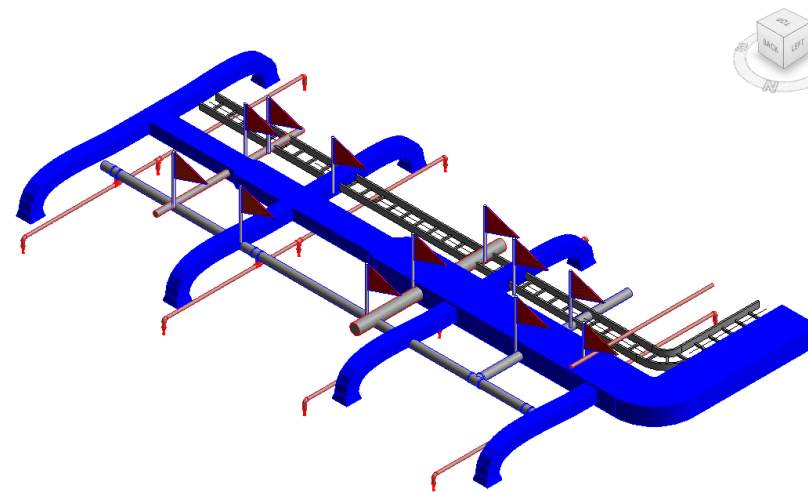
02 Dynamo graph: parse and place



03 Run in Dynamo Player



04 Clash flags placed in Revit



05 Track by team

<Clash Flag Schedule>		
A	B	C
Family	Assign To	Count
Clash Flag	ACMV TEAM	4
Clash Flag	ELECTRICAL TEAM	2
Clash Flag	FIRE PROTECTION TEAM	3
Clash Flag	PLUMBING TEAM	3

12
clash flags placed

4
trade teams
assigned

Automated
report-to-
model flag
placement

UK READINESS - ISO 19650, FIRE SAFETY & WORK ELIGIBILITY

UK READINESS

ISO 19650 applied in practice; UK codes held as knowledge and mapped to delivered work. No UK project delivery is claimed.

INFORMATION MANAGEMENT - UK FRAMEWORK

PRACTICAL EXPERIENCE

- ISO 19650-2 task-team Application
- CDE Workflows
- Information status and suitability
- Naming conventions
- BEP requirements
- TIDP preparation
- Model QA/QC
- MIDP coordination and dependency tracking

UK BIM/ INFORMATION MANAGEMENT – TECHNICAL KNOWLEDGE

- UK BIM Framework
- EIR / AIR / PIR
- LOIN
- IFC / BCF
- COBie

FIRE SAFETY - UK CONTEXT

PROJECT EXPERIENCE – SINGAPORE

- SCDF Fire Code
- SS CP 52
- SS 575
- SS 645
- SS 546
- NFPA 13
- NFPA 2001
- NFPA 409

UK FIRE PROTECTION – TECHNICAL KNOWLEDGE

- BS EN 12845
- BS 9251
- BS 9990

RIGHT TO WORK & TARGET ROLES

Right to work: Potentially eligible for the UK High Potential Individual (HPI) route based on my NTU MSc (2024). HPI application planned. Currently based in Singapore and available to relocate within 3 months of offer.

Target roles

MEP BIM Coordinator

BIM Coordinator

Fire Protection BIM Coordinator

Software: Autodesk Revit (MEP) · Navisworks Manage · ACC (now Autodesk Forma) · BIM 360 · Revizto · Aconex · Dynamo + Python · AutoCAD · FHC · Microsoft Excel

Professional Development & Certifications

DEVELOPMENT

Recent professional development focused on ISO 19650 information management and BIM automation.

PROFESSIONAL CERTIFICATIONS & TRAINING

2026

ISO 19650-2:2018 PIM Practitioner

BRE Global · Aug 2026 · Certificate No. BREP10354

2026

ISO 19650-1 & 19650-2 Project Delivery

BRE Academy

2026

ISO 19650 Delivering IM in Practice

BRE Academy

2026

Automation BIM Essential (Dynamo)

Autodesk

2026

Modular MEP Design & Prefabrication

BCA-STAS introductory course · BCA Academy

2020

Specialist Diploma in VDC

BCA Academy

2019

Specialist Diploma in BIM

BCA Academy

2016

Revit MEP 2017 Level II Advanced

Autodesk

EDUCATION

2024

MSc Mechanical Engineering

Nanyang Technological University (NTU), Singapore

2010

BEng Mechanical Engineering

Yangon Technological University, Myanmar

Appendices - Supporting Evidence

APPENDIX

Detailed evidence behind the main portfolio, for BIM managers and hiring managers who want to go deeper.

A

Automation library - Dynamo / Python tools

Slides 20–27

20 BEP Compliance Checker

21 Missing Parameter Checker

22 Fire Hydrant Spacing Checker

23 Pipe Sleeve Placement

24 Wall Opening

25 Pipe Hanger Placement

26 Pipe & Duct Split by Length

27 Pipe & Duct System Creation

B

Additional project references - fire protection BIM, Singapore

Slides 28–33

28 Multi-User Food Factory

29 Lonza 2KL Expansion - biopharma

30 SIT Annexe - education

31 Hangar Complex - Changi East

32 Pasir Panjang Bus Depot

33 Ramp-Up Warehouse & Container Depot

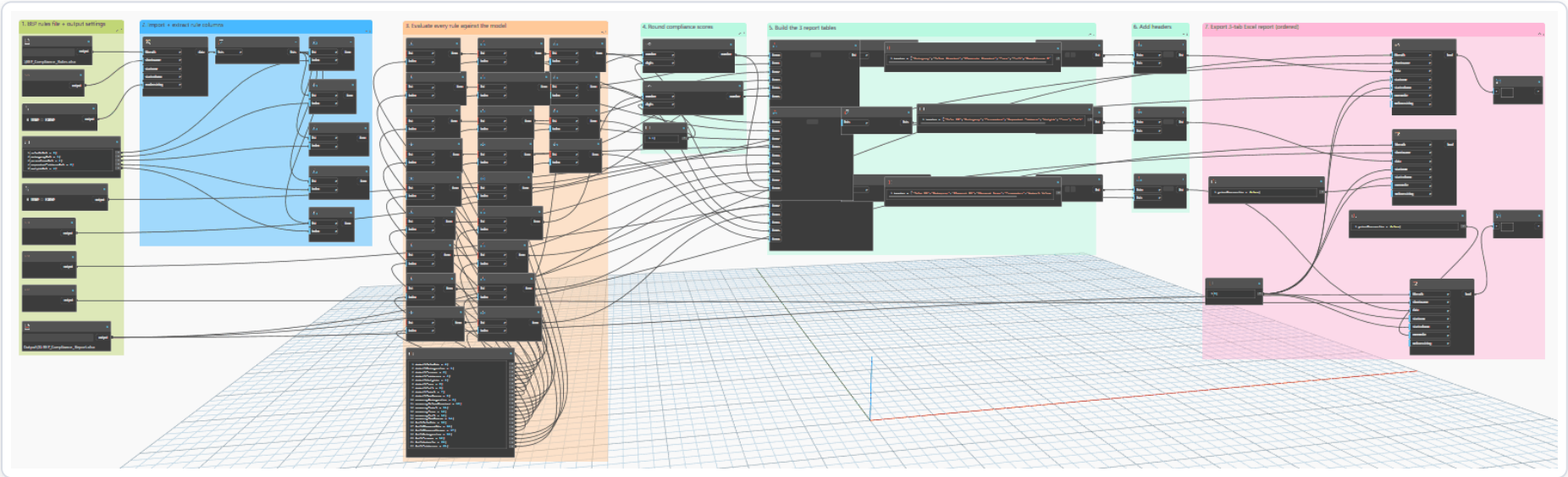
Automation Library - QA & Information

BEP COMPLIANCE CHECKER

ILLUSTRATIVE RUN-TIME COMPARISON 3 h manual → 7 min with Dynamo

Problem: BEP parameter requirements checked by hand · **Approach:** Dynamo reads rules from Excel and checks every element per category · **Benefit:** 3-tab report for model QA against BEP rules

01 Dynamo graph: 7 grouped stages



- 1 BEP rules file + output settings
- 2 Import + extract rule columns
- 3 Evaluate every rule against the model
- 4 Round compliance scores
- 5 Build the 3 report tables
- 6 Add headers
- 7 Export 3-tab Excel report

02 Input: BEP rules (Excel)

	A	B	C
1	R001	Duct Accessories	FireRating
2	R002	Sprinklers	Mark
3	R003	Ducts	Mark
4	R004	Air Terminals	AirflowRate_LPS
5	R005	Pipes	Material
6	R006	Plumbing Fixtures	FlowRate_LPS

03 Output: compliance report (Excel)

Category	Rules Checked	Elements Checked	Pass	Fail	Compliance %
Duct Accessories	1	0	0	0	NA
Sprinklers	1	16276	16276	0	100
Ducts	1	25	0	25	0
Air Terminals	1	0	0	0	NA
Pipes	1	29848	29848	0	100
Plumbing Fixtures	1	0	0	0	NA

25
ducts fail R003 (Mark empty):
the item to fix
Demo model: 3 of 6 rules matched
elements; rows with 0 elements read
as N/A.

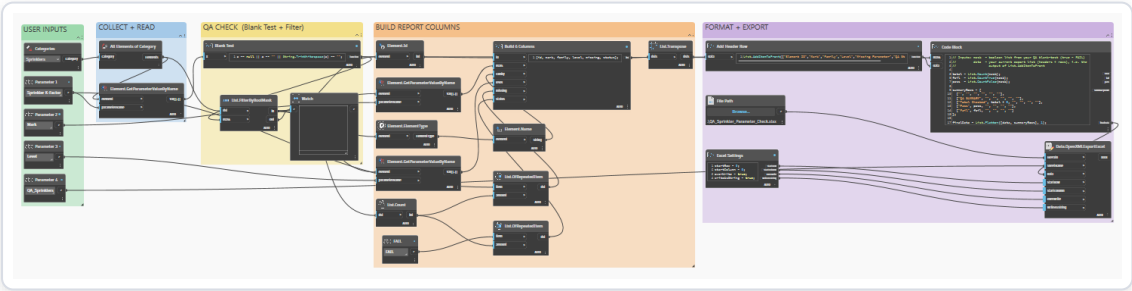
Automation Library - QA & Information

MISSING PARAMETER CHECKER

ILLUSTRATIVE RUN-TIME COMPARISON 2 h manual → 6 min with Dynamo

Problem: blank required parameters found late · **Approach:** Dynamo checks a category for a blank parameter and exports failures to Excel · **Benefit:** data completeness checked before sharing

01 Dynamo graph: 5 stages from inputs to Excel



16,276
sprinklers checked in
one run

29
missing Installation
Date

18
missing Sprinkler K-
Factor

02 Check 1: Installation Date → 29 fails exported

Dynamo Player

QA_Sprinkler_Parameter_Check
Description : QA_Sprinklers with missing Parameter.
Author : Tun Zaw Oo

Inputs

Categories ✓ Sprinklers

Parameter 1

Outputs

Data.OpenXMlExportExcel

Run complete

Back Run

A	B	C	D	E	F
Element ID	Mark	Family	Level	Missing Parameter	QA Status
1910320	13008	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910328	13010	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910330	13012	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910332	13014	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910336	13016	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910337	13017	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910372	13020	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910386	13022	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910396	13024	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910397	13025	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910412	13028	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910426	13030	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910436	13032	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910437	13033	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910452	13036	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910471	13039	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910547	13041	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910548	13042	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910551	13043	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910552	13046	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910553	13047	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910554	13048	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910565	13053	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910594	13054	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910596	13056	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910598	13058	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910634	13060	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910646	13062	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
1910746	13064	04.ROYAL FLUSH SPRINKLER HEAD	Level(Name=2ND STOREY,	Installation Date	FAIL
QA SUMMARY					
Total Checked	16276				
Pass	16247				
Fail	29				

03 Check 2: Sprinkler K-Factor → 18 fails exported

Dynamo Player

QA_Sprinkler_Parameter_Check
Description : QA_Sprinklers with missing Parameter.
Author : Tun Zaw Oo

Inputs

Categories ✓ Sprinklers

Parameter 1

Outputs

Data.OpenXMlExportExcel

Run complete

Back Run

A	B	C	D	E	F
Element ID	Mark	Family	Level	Missing Parameter	QA Status
1	1460802	11206 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
2	1460972	11207 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
3	1478921	11353 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
4	1479210	11354 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
5	1479218	11355 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
6	1479291	11356 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
7	1495771	11491 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
8	1497207	11497 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
9	1498326	11501 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
10	1498815	11505 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
11	1557540	11586 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
12	1557882	11587 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
13	1557890	11588 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
14	1557900	11589 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
15	1557908	11590 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
16	1557952	11591 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
17	1557960	11592 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
18	1557968	11593 TL_SK_SIDE WALL SPRINKLER	Level(Name=1ST STOREY,	Sprinkler K-Factor	FAIL
19					
20					
21	QA SUMMARY				
22	Total Checked	16276			
23	Pass	16258			
24	Fail	18			

Automation Library - QA & Compliance

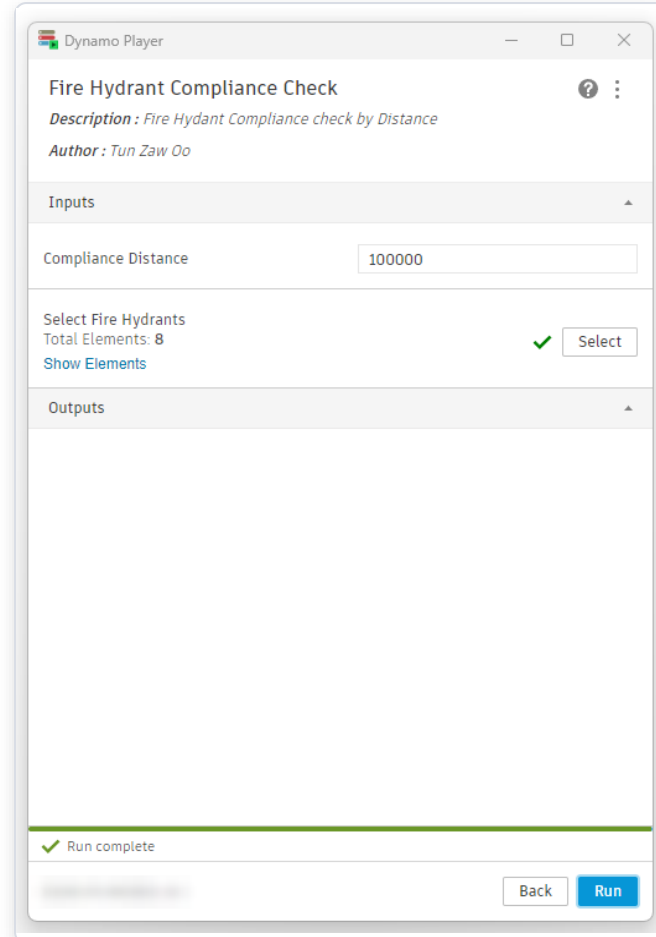
APPENDIX A

FIRE HYDRANT SPACING CHECKER

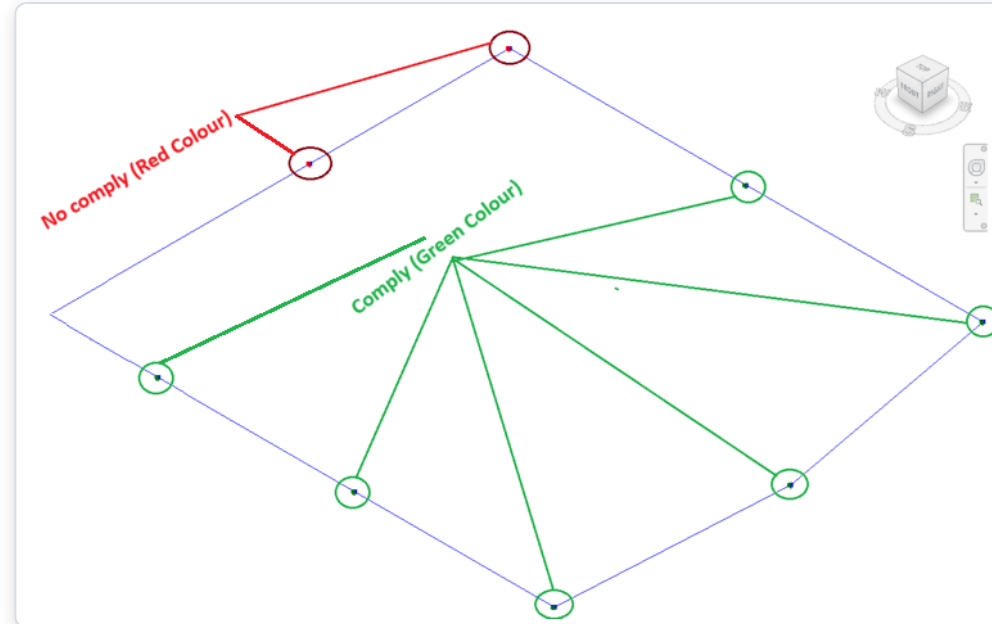
ILLUSTRATIVE RUN-TIME COMPARISON 40 min manual → 2 min with Dynamo

Problem: hydrant spacing measured manually · **Approach:** Dynamo measures straight-line spacing between consecutive hydrants against a set distance · **Benefit:** colour-coded for engineering review

01 Set inputs in Dynamo Player



02 Result: hydrants colour-coded in Revit



8

hydrants checked

6

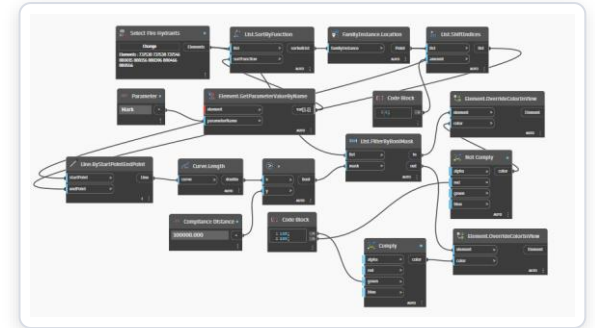
within set distance

2

exceed set distance

Screening check only - final hydrant compliance is measured along the fire-appliance access route, not in a straight line.

03 Dynamo graph logic



- **Sort** selected hydrants by their Mark parameter
- **Pair** each hydrant with the next one (List.ShiftIndices)
- **Measure** a line between each pair (Curve.Length)
- **Compare the length with the set distance** (100,000 mm, user input)
- **Colour** each hydrant in the view (OverrideColorInView)

Automation Library - Modelling Tools

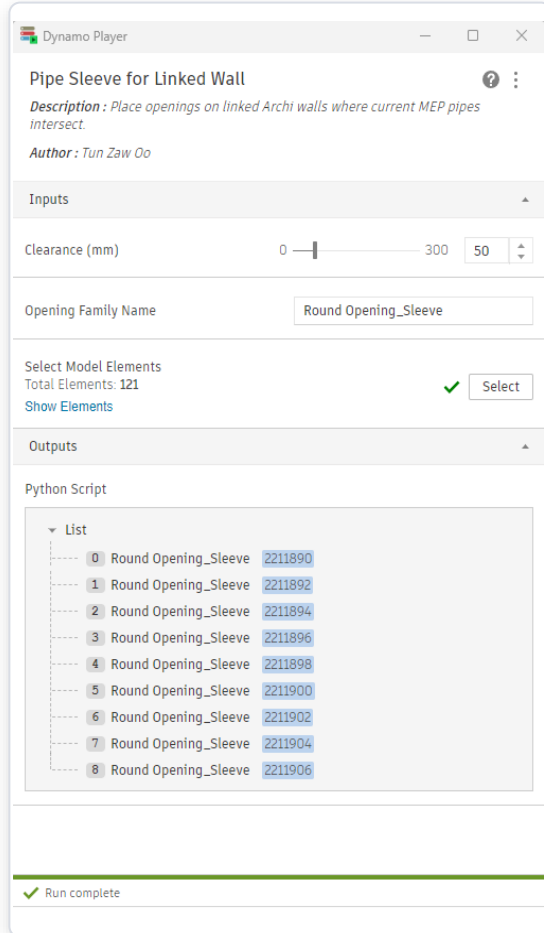
APPENDIX A

PIPE SLEEVE PLACEMENT

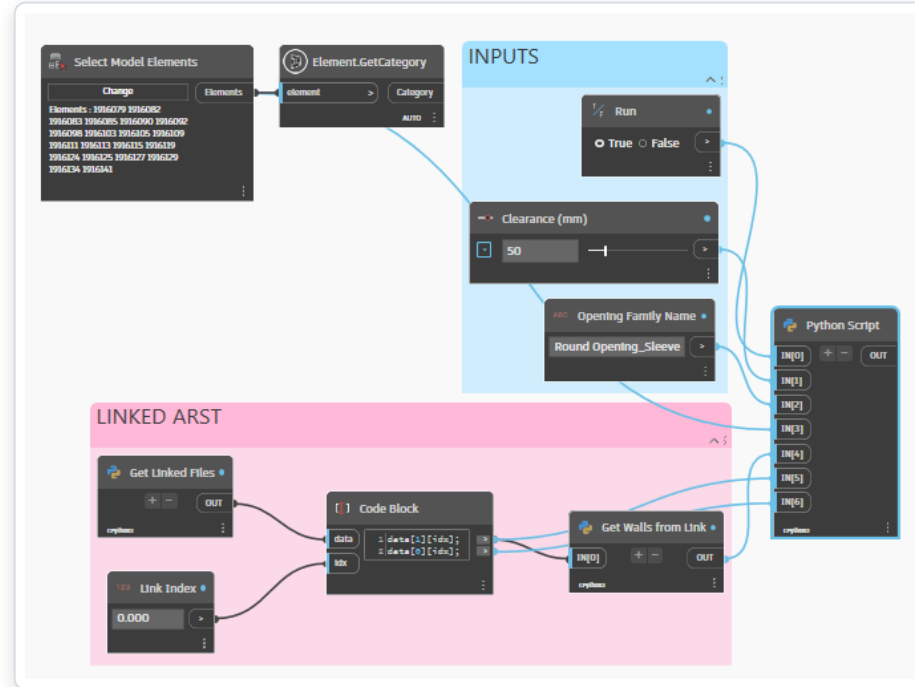
ILLUSTRATIVE RUN-TIME COMPARISON 2 h manual → 6 min with Dynamo

Problem: manual sleeve placement at pipe / linked-wall crossings · **Approach:** Dynamo / Python places round sleeves with a set clearance · **Benefit:** consistent, coordinated wall penetrations

01 Run in Dynamo Player



02 Dynamo graph: pipes + linked walls



121

MEP elements
selected

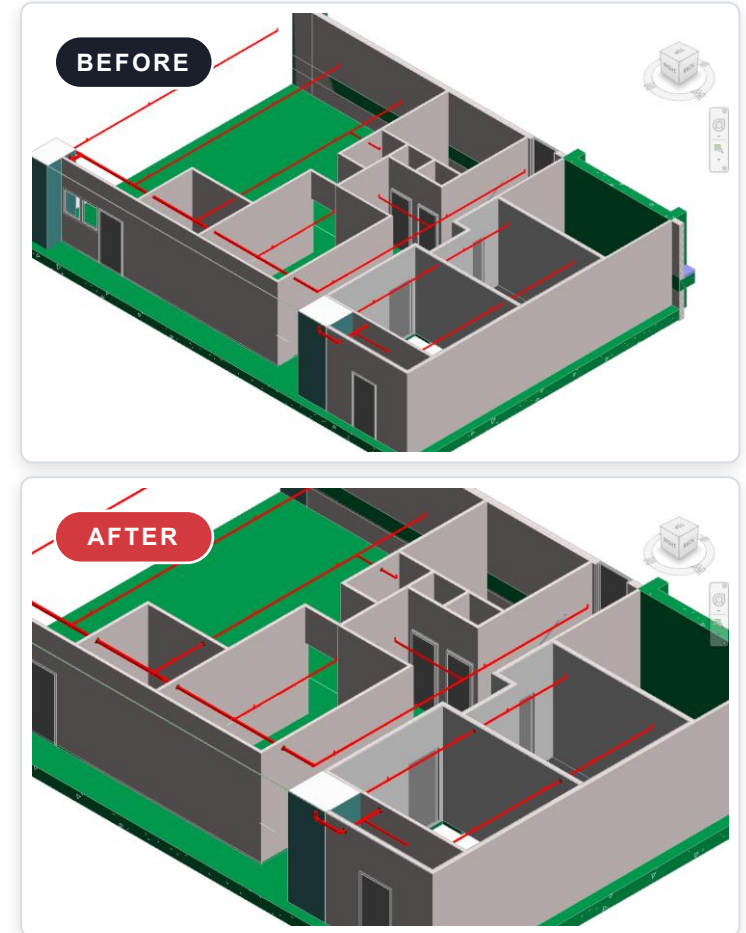
50 mm

50 mm user-defined
clearance

Linked

architectural model
walls

03 Before / after in Revit



Automation Library - Modelling Tools

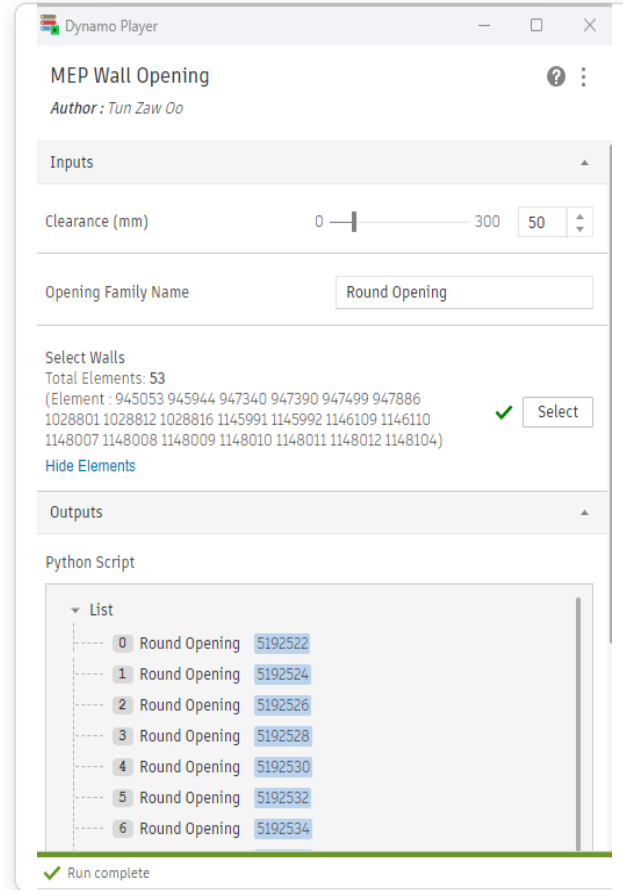
APPENDIX A

WALL OPENING

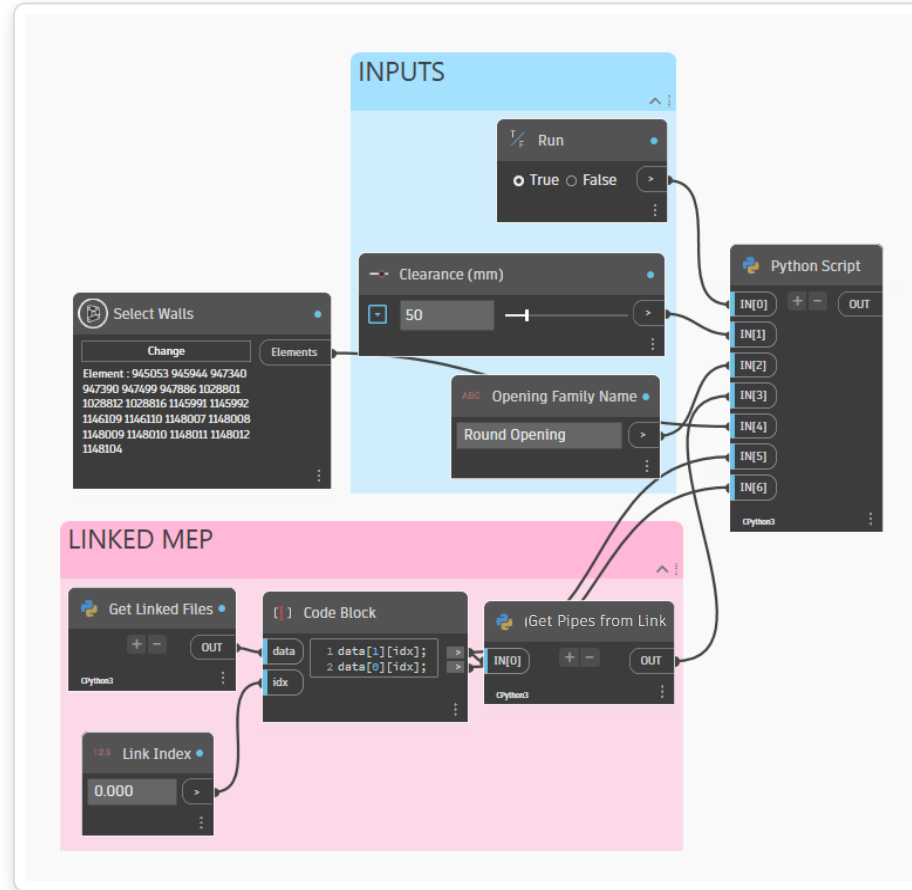
ILLUSTRATIVE RUN-TIME COMPARISON 2 h manual → 6 min with Dynamo

Problem: manual openings where linked MEP pipes cross walls · **Approach:** Dynamo / Python cuts round openings with a set clearance · **Benefit:** coordinated openings in the host walls

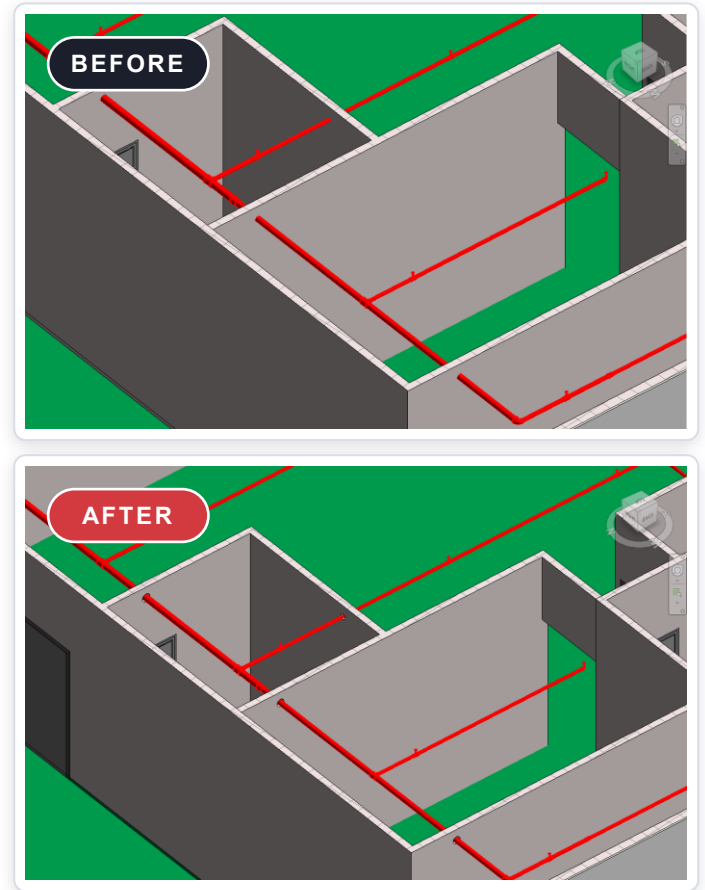
01 Run in Dynamo Player



02 Dynamo graph: walls + linked MEP



03 Before / after in Revit



Automation Library - Modelling Tools

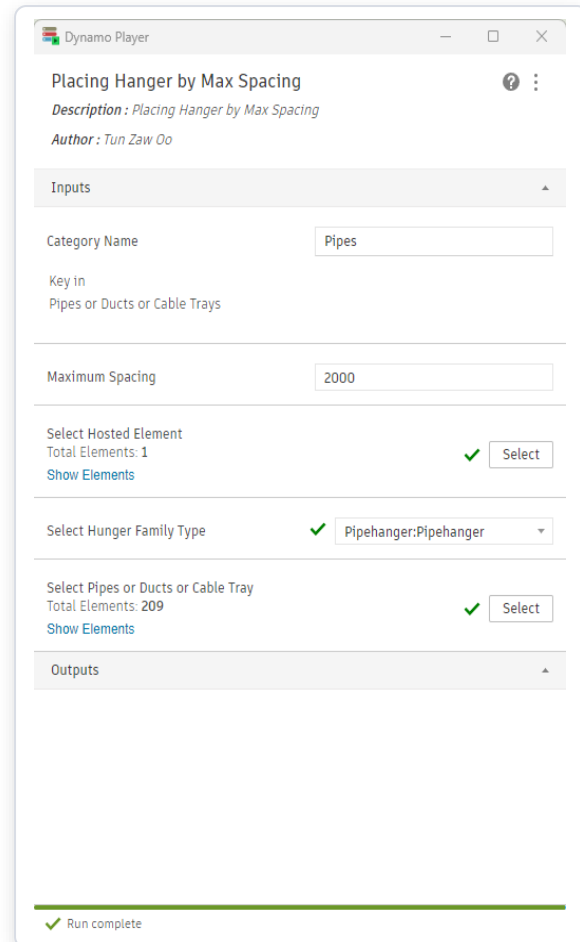
APPENDIX A

PIPE HANGER PLACEMENT BY MAXIMUM SPACING

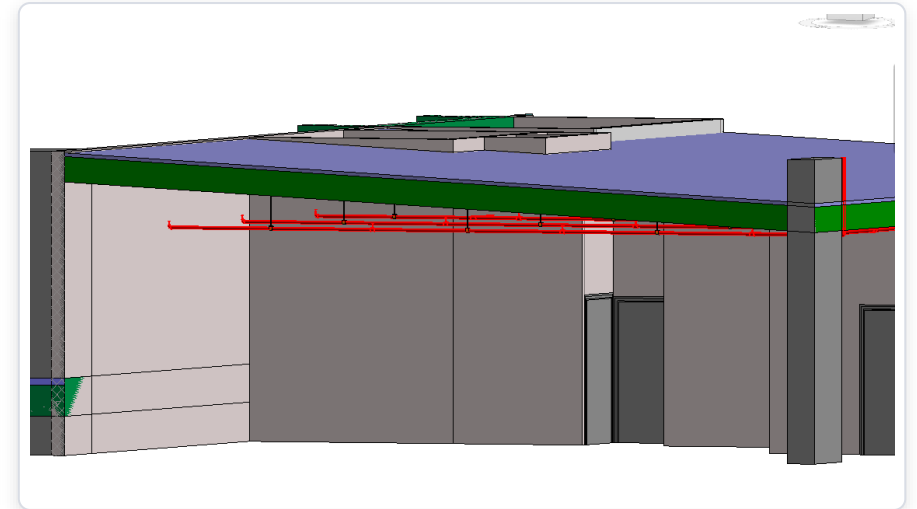
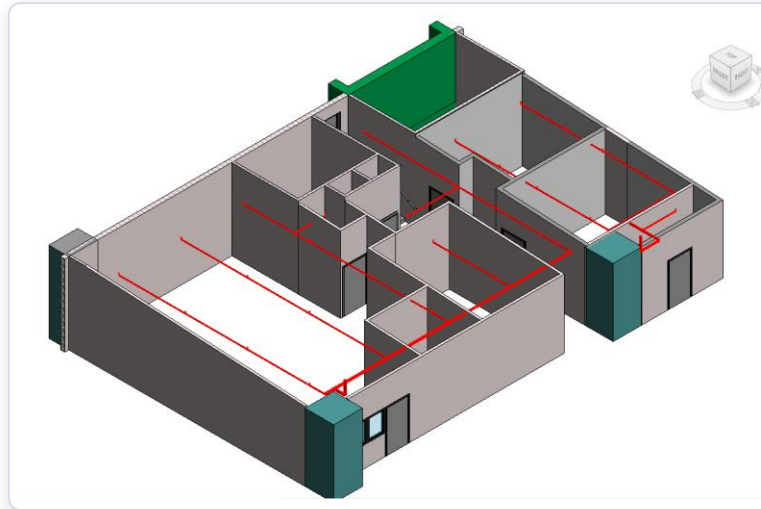
ILLUSTRATIVE RUN-TIME COMPARISON 2 h manual → 6 min with Dynamo

Problem: manual hanger placement along long runs · **Approach:** Dynamo places hangers at a set maximum spacing, extended to the slab · **Benefit:** supports modelled before installation

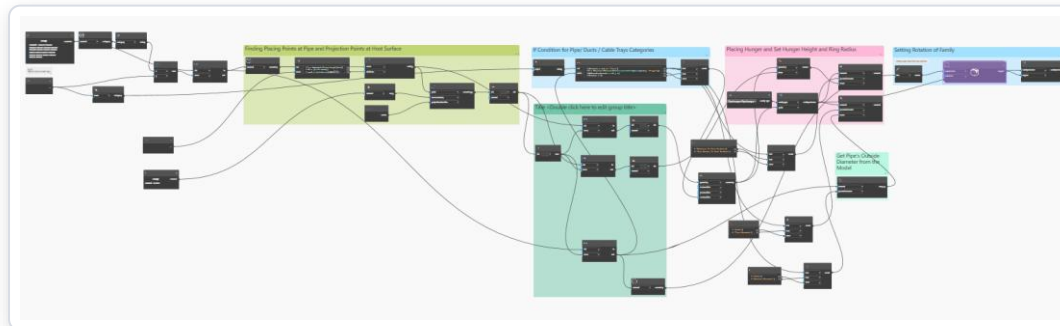
01 Run in Dynamo Player



02 Hangers placed along pipes and fixed to the slab



03 Dynamo graph logic



209 pipes processed in one run

2,000 mm maximum hanger spacing

3 categories: pipes, ducts, cable trays

Automation Library - Delivery Tools

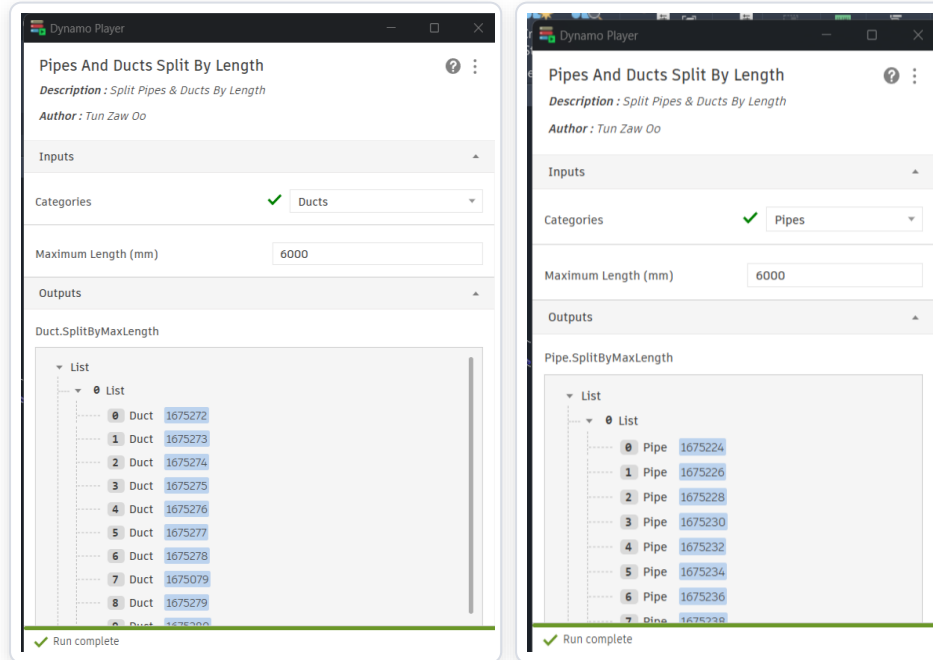
APPENDIX A

PIPE AND DUCT SPLIT BY LENGTH

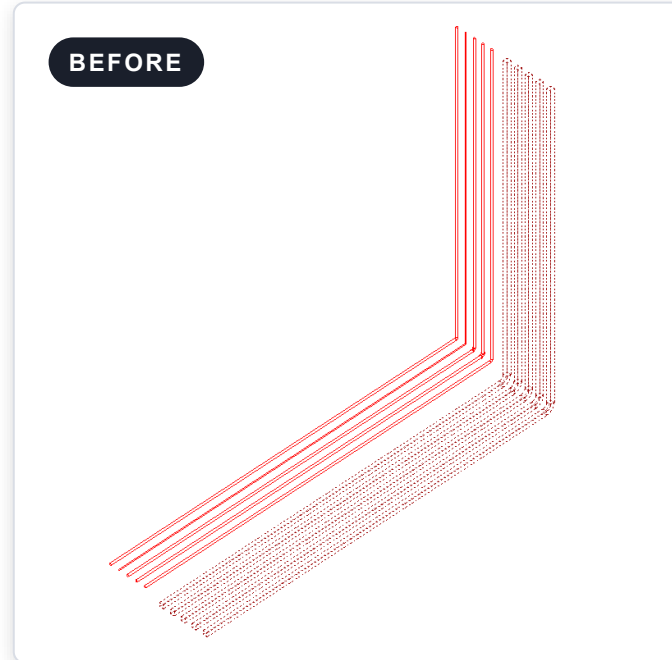
ILLUSTRATIVE RUN-TIME COMPARISON 1 h manual → 3 min with Dynamo

Problem: long runs not suited to fabrication · **Approach:** Dynamo splits pipes and ducts at a set maximum length · **Benefit:** 6 m stock-length segments for fabrication planning

01 Run in Dynamo Player: ducts or pipes



02 Before: one continuous run



03 After: split into 6,000 mm segments



6,000 mm

maximum length per
segment, set in
Dynamo Player

2

categories from one script: pipes
and ducts

1 run

per category splits every selected
run at once

Automation Library - Delivery Tools

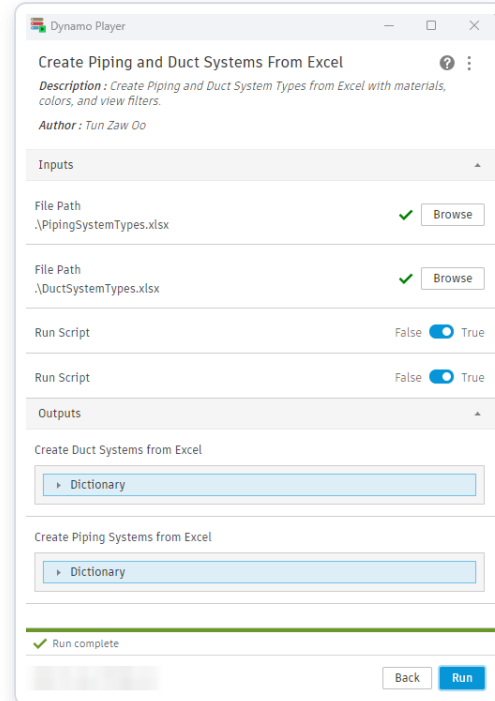
APPENDIX A

PIPE AND DUCT SYSTEM CREATION

ILLUSTRATIVE RUN-TIME COMPARISON 3 h manual → 5 min with Dynamo

Problem: slow, inconsistent system set-up · **Approach:** Dynamo creates pipe / duct system types, materials and view filters from Excel · **Benefit:** consistent project standards

01 Run in Dynamo Player

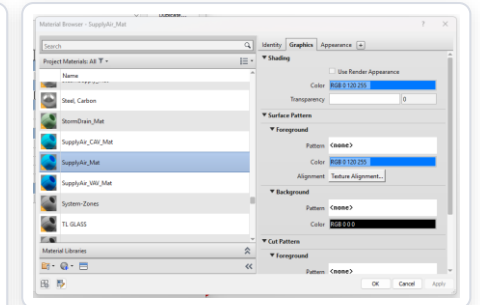
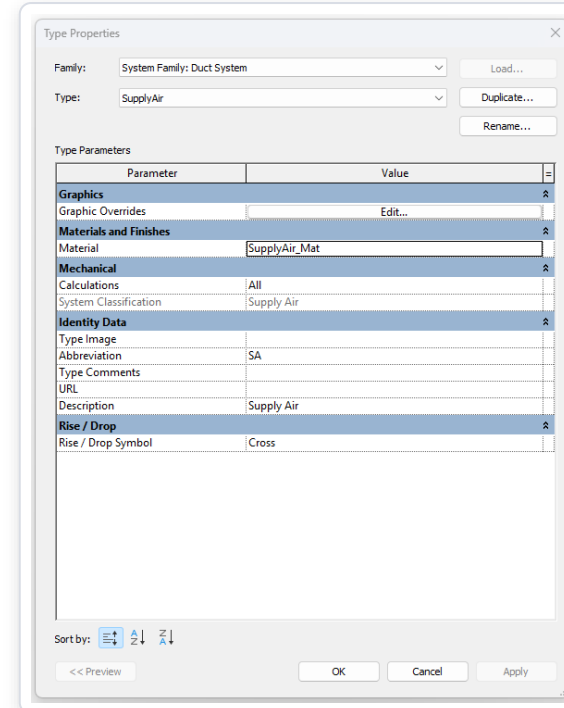


02 Excel lists: duct (top), piping (below)

	A	B	C	D	E	F	G	H
1	SystemName	Description	Abbreviation	R	G	B		
2	SupplyAir	Supply Air	SA	0	120	255		
3	ReturnAir	Return Air	RA	0	200	100		
4	ExhaustAir	Exhaust Air	EA	255	150	50		
5	FreshAir	Fresh Air / Outside Air	OA	100	200	255		
6	SupplyAir_VAV	Variable Air Volume Supply	VAV	0	80	200		
7	SupplyAir_CAV	Constant Air Volume Supply	CAV	0	150	220		
8	KitchenExhaust	Kitchen Exhaust	KEX	200	80	50		
9	ToiletExhaust	Toilet Exhaust	TEX	180	100	80		
10	SmokeExhaust	Smoke Exhaust	SMK	255	0	0		
11	Pressurization	Stairwell Pressurization	PRS	200	200	0		
12	TransferAir	Transfer Air	TA	150	200	150		
13	MakeupAir	Makeup Air	MAU	100	180	220		
14								

	A	B	C	D	E	F	G	H
1	SystemName	Description	Abbreviation	R	G	B		
2	ChilledWater_Supply	Chilled Water Supply	CHWS	0	120	255		
3	ChilledWater_Return	Chilled Water Return	CHWR	0	80	200		
4	HotWater_Supply	Hot Water Supply	HWS	255	80	80		
5	HotWater_Return	Hot Water Return	HWR	200	50	50		
6	Condenser_Supply	Condenser Water Supply	CWS	0	180	180		
7	Condenser_Return	Condenser Water Return	CWR	0	140	140		
8	DomesticCold	Domestic Cold Water	DCW	0	100	200		
9	DomesticHot	Domestic Hot Water	DHW	255	120	50		
10	FireProtection	Fire Protection	FP	255	0	0		
11	Sprinkler	Sprinkler System	SPK	255	50	50		
12	SanitaryDrain	Sanitary Drain	SD	100	80	60		
13	StormDrain	Storm Water Drain	SND	80	130	80		
14	Vent	Vent Piping	VP	180	180	180		
15	SteamSupply	Steam Supply	SS	200	200	200		
16	SteamCondensate	Steam Condensate Return	SC	150	150	100		
17								

03 Created in Revit



Each Excel row becomes:

- a duct or piping system type with its abbreviation and description
- a <Name>_Mat material coloured from the row's RGB values
- a view filter using the same colour

12 duct system types

15 piping system types

27 colour-coded materials

1 run systems, materials & view filters

Multi-User Food Factory

FOOD FACTORY · SINGAPORE

01 PROJECT OVERVIEW

- Proposed 6-storey ramp-up multi-user food factory (135 factory units + 2 warehouse units)
- 5 intermediate mezzanine levels, ancillary workers' living quarters (708 workers) & industrial canteen

02 FIRE PROTECTION SCOPE

- ❖ Automatic sprinkler system - OH III, K5.6 QR heads
- ❖ Dry riser, hose reel & fire hydrant systems
- ❖ Addressable fire alarm system
- ❖ Sprinkler pump room & water storage tanks
- ❖ Novec 1230 clean-agent gas suppression

6	137	32
Storeys	Units	FP As-Built Sheets

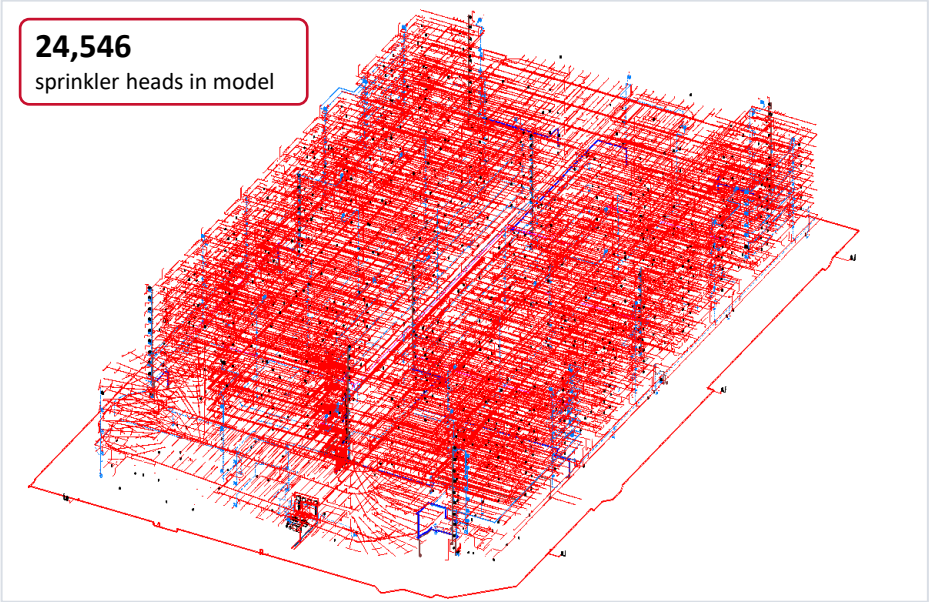
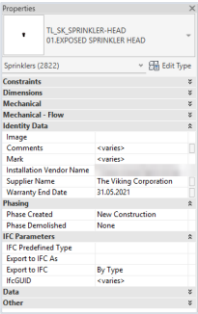


Fig. 1 Revit 3D isometric - combined fire protection model (sprinkler mains, branches & risers) across all storeys

03 MY ROLE & RESPONSIBILITIES

- ✓ **Coordination:** clash detection & resolution with MEP, architecture & structure
- ✓ **Design:** Fire Protection system design
- ✓ **Compliance:** checks against fire code & project standards
- ✓ **Facilities Management (FM) data:** asset parameters input; Dynamo QA check for missing values



- FM / ASSET DATA**
 - Installation Vendor
 - Supplier
 - Warranty End Date
 - IFC export parameters (IfcGUID)

Populated per sprinkler instance and audited with Dynamo before handover

Fig. 2 Revit properties - FM parameters

04 BIM / COORDINATION WORKFLOW



05 SOFTWARE & CDE



06 KEY TECHNICAL / COORDINATION CHALLENGES

- High sprinkler density across 6 storeys, mezzanines and ramp-up driveways
- Code-driven coverage: sprinklers in concealed ceiling voids, under wide ducts and in lift & escalator pits
- Routing FP mains and risers through congested ceiling voids shared with other MEP services

07 KEY OUTCOMES / DELIVERABLES

- Coordinated FP model supporting the as-built drawing set (TL/BDRC1/FP series, 32 sheets)
- FM asset data populated and Dynamo-checked for completeness before delivery
- Clashes tracked and closed out through Navisworks / Revizto, shared via BIM 360

Lonza 2KL Expansion

BIOPHARMACEUTICAL FACILITY · SINGAPORE

APPENDIX B

01 PROJECT OVERVIEW

- Expansion of Lonza's Tuas biologics site - fermentation, purification, inoculum lab, gowning & cold rooms, warehouse
- Includes UB building expansion: ethanol day tank (solvent tank area)

02 FIRE PROTECTION SCOPE

- ❖ Wet sprinkler zones - K8.0 / K5.6 heads
- ❖ K11.2 ceiling & in-rack sprinklers - warehouse, freezer
- ❖ 6 pre-action zones for process areas
- ❖ Deluge water spray - ethanol day tank
- ❖ Hose reel & dry riser; tie-in to existing ring main

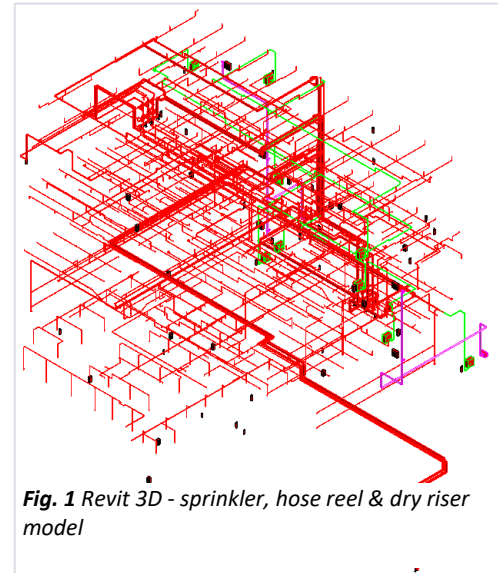


Fig. 1 Revit 3D - sprinkler, hose reel & dry riser model

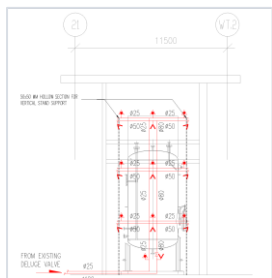


Fig. 2 Deluge section - ethanol tank

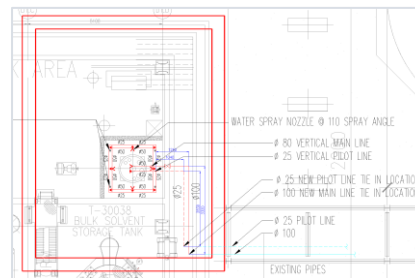


Fig. 3 Water spray nozzles & tie-in

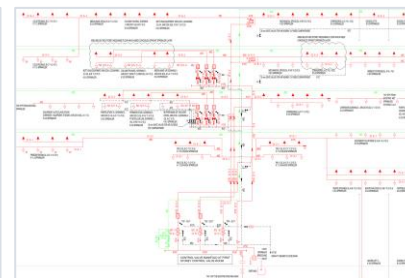


Fig. 4 Schematic - CV & pre-action risers

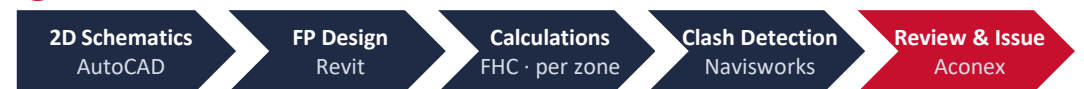
06 KEY TECHNICAL / COORDINATION CHALLENGES

- Tying new wet, pre-action & deluge zones into the existing fire ring main, pumps & tank
- High-hazard storage: K11.2 ceiling + in-rack protection at 12.5 mm/min
- Upright sprinklers required in the concealed space below the 3rd-storey mezzanine (process areas)

03 MY ROLE & RESPONSIBILITIES

- ✓ **FP design:** sprinkler, pre-action, in-rack & deluge layouts
- ✓ **Hydraulic calculation:** flow & pressure for 11 valve zones; demand vs existing supply
- ✓ **Coordination:** clash detection with MEP & structure in Navisworks; Aconex reviews
- ✓ **Drawings:** prepared FP installation & as-built drawings in AutoCAD

04 BIM / COORDINATION WORKFLOW



05 SOFTWARE & CDE



07 KEY OUTCOMES / DELIVERABLES

- Demand verified: 866.6 m³ (90 min) within 954 m³ existing tank
- Installation drawings revised Rev A → F to comments; as-built set issued Jul 2023
- Coordinated FP model supporting installation across 11 valve zones

Singapore Institute of Technology (SIT) - Annexe

EDUCATION · SINGAPORE

APPENDIX B

01 PROJECT OVERVIEW

- New 4-storey annexe - classrooms, meeting rooms, staff facilities & canteen with basement, attic & link bridge
- Alteration & addition (A&A) works to existing Level 1 canteen & Level 2 classroom

02 FIRE PROTECTION SCOPE

- ❖ Automatic sprinklers - OH II, K5.6 heads
- ❖ Basement sprinkler / hose reel pumps & RC tanks
- ❖ Fire hydrant, dry riser & hose reel systems
- ❖ Fire alarm; A&A (alteration & addition) to existing canteen sprinklers

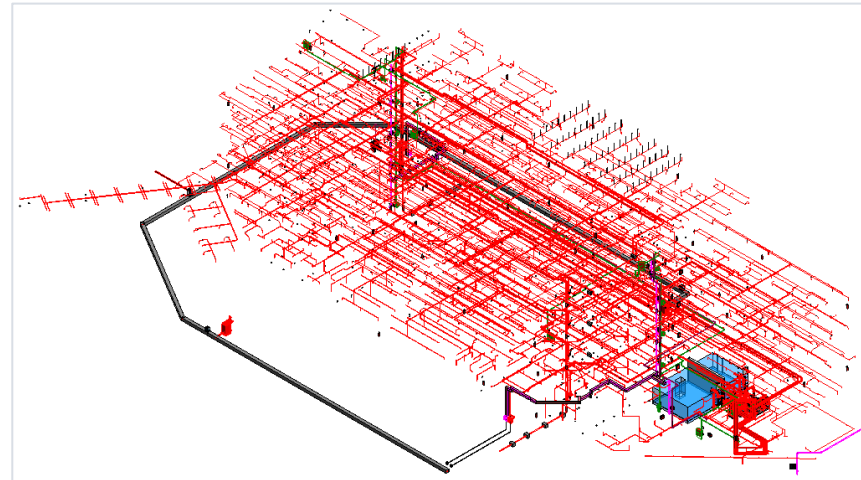


Fig. 1 Revit 3D - overall FP model: sprinkler mains, hydrant, risers & pump room

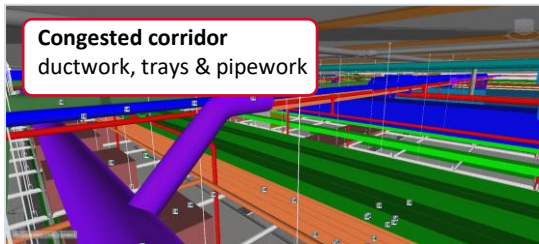


Fig. 2 Navisworks - FP routing in congested L2 corridor

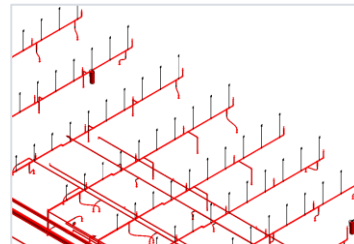
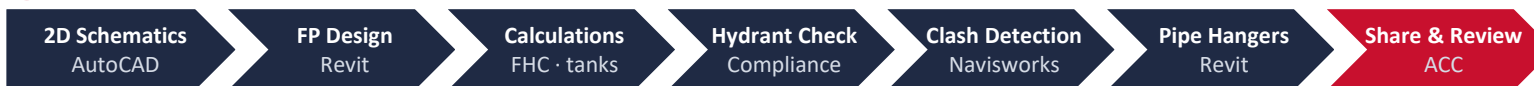


Fig. 3 Revit - branches & hangers

117 m³
effective tank capacity

82.1 m³
required (81 sprinkler + 1.1 hose reel)

04 BIM / COORDINATION WORKFLOW



06 KEY TECHNICAL / COORDINATION CHALLENGES

- Very congested corridor ceiling void - FP mains routed around ductwork, cable trays & other pipework
- Tie-in of new annexe systems to existing building (existing hydrant pipe, canteen sprinklers)

03 MY ROLE & RESPONSIBILITIES

Design & calculation

- ✓ FP system design; OH II demand & tank capacity

Compliance checking

- ✓ layouts checked against code requirements

Hydrant compliance checking

- ✓ fire hydrant system review

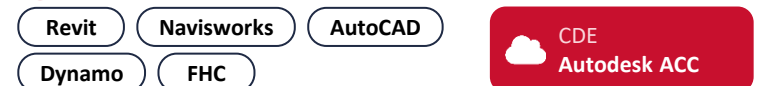
Coordination

- ✓ FP routing through congested MEP corridor

Pipe hanger placement

- ✓ hangers modelled on FP pipework in Revit

05 SOFTWARE & CDE



07 KEY OUTCOMES / DELIVERABLES

- Clash-coordinated FP routing with hangers modelled
- Tank capacity verified: 117 m³ vs 82.1 m³ required

Hangar Complex

AVIATION HANGAR · SINGAPORE

APPENDIX B

01 PROJECT OVERVIEW

- Hangar complex & ancillary works at Changi East - FP installation
- Hangar served from existing sprinkler pump room, foam tanks & RC tank

02 FIRE PROTECTION SCOPE

- ❖ Foam monitor system - 10 monitors on 5 deluge valves
- ❖ 3 pre-action sprinkler zones - K5.6 heads, 68 °C
- ❖ Foam hose reels; hose reel & dry riser
- ❖ Fire hydrant system (Ø250 DI underground)
- ❖ Addressable fire alarm & firefighters' intercom

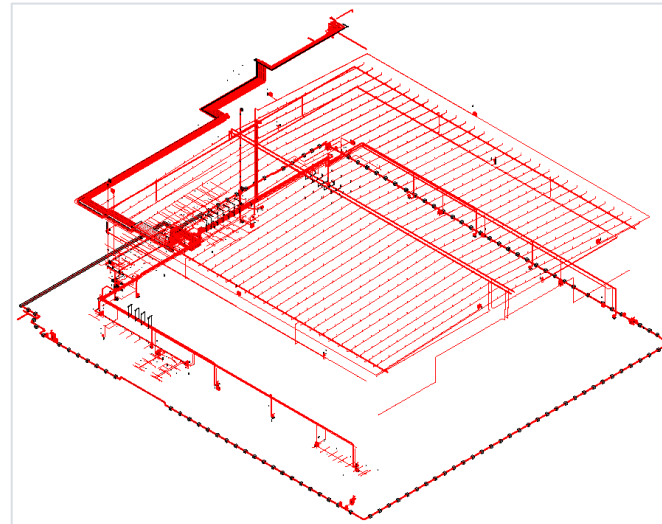


Fig. 1 Revit 3D - overall FP model: hangar mains, hydrant ring & risers

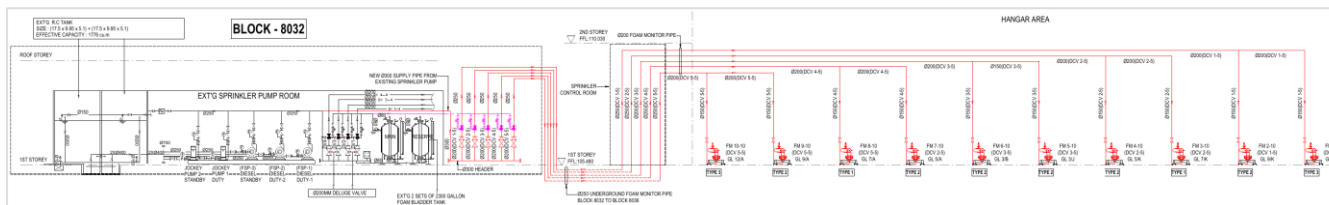


Fig. 2 Foam monitor schematic - existing pump room (Blk 8032) → 5 deluge valves → 10 foam monitors (Blk 8036)

04 BIM / COORDINATION WORKFLOW



06 KEY TECHNICAL / COORDINATION CHALLENGES

- Large-bore Ø200–Ø300 deluge / foam mains run from existing pump room to the hangar via underground pipe
- Supporting large mains & valve assemblies at hangar height - hanger and support placement

03 MY ROLE & RESPONSIBILITIES

Design & hydraulic calculation

- ✓ FP system design; pipe sizing revised to latest hydraulic calculation (Rev 1)

Compliance checking

- ✓ layouts checked against SS CP 52, SS 575 & SCDF Fire Code

Hydrant compliance checking

- ✓ fire hydrant, dry riser & breeching inlet provisions

Coordination

- ✓ FP mains coordinated with other services in Navisworks

Pipe hanger placement

- ✓ hangers & trapeze supports modelled in Revit

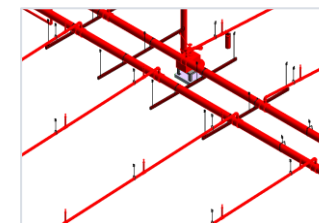


Fig. 3 Hangers & supports

1,776 m³

existing RC tank (effective)

3 × 15,800

L/min @ 8.5 bar diesel pumps

2 × 2,300 gal

existing foam bladder tanks

05 SOFTWARE & CDE



07 KEY OUTCOMES / DELIVERABLES

- Hydraulically sized FP network; schematic revised to Rev 1 calculation
- Coordinated model with hangers for the 17-sheet installation drawing set

Pasir Panjang Bus Depot

BUS DEPOT · SINGAPORE

APPENDIX B

01 PROJECT OVERVIEW

- Multi-storey bus depot with workshop & ancillary office, Harbour Drive
- 1st-storey depot workshop; bus parking on upper decks; admin at 3rd & 4th storey

02 FIRE PROTECTION SCOPE

- ❖ Wet sprinklers - 23 subsidiary control valves (SCVs); High Hazard bus parking
- ❖ Pre-action sprinkler zones
- ❖ Water curtain / drencher (WCS) - 110 deluge zones, LHD-activated
- ❖ Dry riser & hose reel systems
- ❖ Sprinkler/HR & water curtain pump rooms, RC tanks

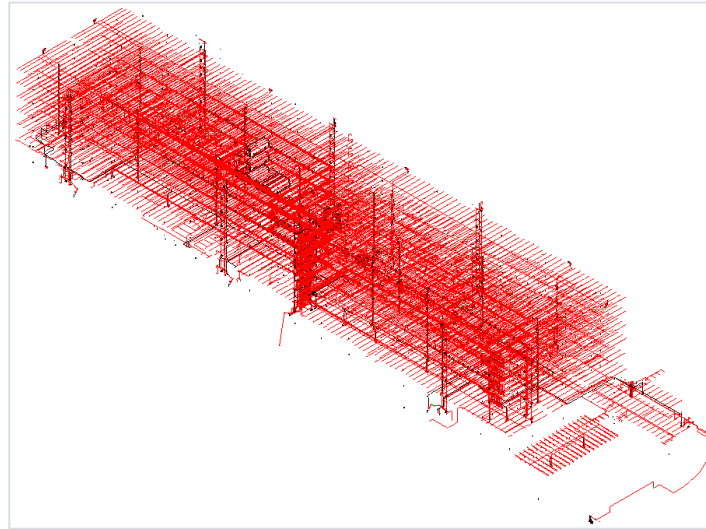


Fig. 1 Revit 3D - FP model: multi-level sprinkler & water curtain pipework

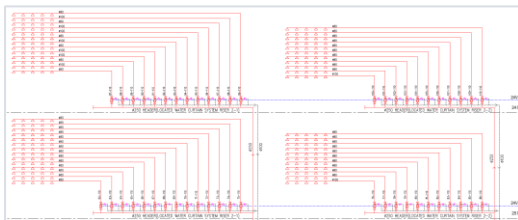


Fig. 2 Water curtain schematic - deluge headers

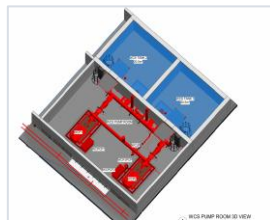
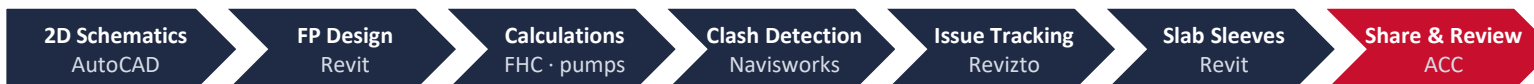


Fig. 3 Water curtain pump room 3D

PROJECT-SPECIFIC WCS LOGIC

- 1 LHD $\geq 68^{\circ}\text{C}$
WCS panel to standby
- 2 Sprinkler 79°C
flow switch $\rightarrow$ Main Alarm Panel
- 3 Both confirmed
deluge valve opens

04 BIM / COORDINATION WORKFLOW



06 KEY TECHNICAL / COORDINATION CHALLENGES

- Water curtain over multi-level bus parking - 110 deluge zones; project-specific LHD + sprinkler double interlock
- Two high-demand pump sets (sprinkler & water curtain); FP risers & mains penetrating slabs

03 MY ROLE & RESPONSIBILITIES

FP system design

- ✓ sprinkler & water curtain systems modelled in Revit

Design calculations

- ✓ system demand, pump duties & tank capacities

Compliance checking

- ✓ design checked against SCDF Fire Code & SS CP 52

Coordination

- ✓ clash detection in Navisworks; issues tracked in Revizto

Slab pipe sleeves

- ✓ sleeves placed for FP risers & mains through slabs

05 SOFTWARE & CDE



07 KEY OUTCOMES / DELIVERABLES

- Tank capacities verified vs requirement for both systems
- Coordinated model with slab sleeves; installation drawings revised to comments

Ramp-Up Warehouse & Container Depot

WAREHOUSE & LOGISTICS · SINGAPORE

APPENDIX B

01 PROJECT OVERVIEW

- 6-storey ramp-up warehouse with ancillary offices
+ 2-storey container depot

02 FIRE PROTECTION SCOPE

- ❖ ESFR K25.2 High Hazard warehouses; K5.6 OH III areas
- ❖ Water monitors - container depot (24 m, 360°)
- ❖ Fire hydrant system - warehouse & depot
- ❖ Wet riser & hose reel systems
- ❖ Fire alarm & firefighters' intercom
- ❖ Sprinkler / wet riser / hydrant pumps & RC tanks

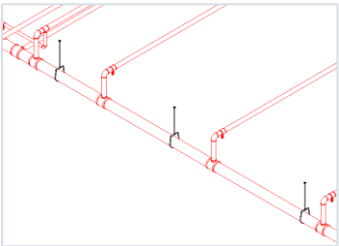


Fig. 2 Hangers on ESFR mains (Revit)

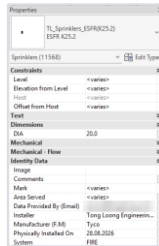


Fig. 3 ESFR asset data

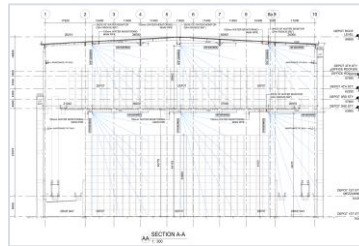
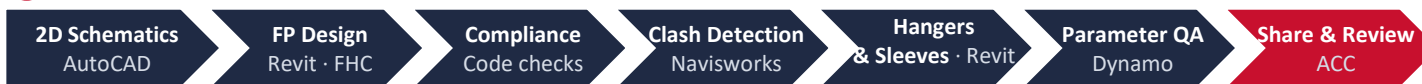


Fig. 4 Water monitors - Section A-A

04 BIM / COORDINATION WORKFLOW



06 KEY TECHNICAL / COORDINATION CHALLENGES

- Large-scale ESFR network across 6 ramp-up storeys - 31 control valves, dense mains to support & sleeve
- Container depot protected by roof-level water monitors (24 m radius) alongside warehouse sprinklers

03 MY ROLE & RESPONSIBILITIES

Design & calculation

- ✓ FP system design; pump duties & tank capacities

Compliance checking

- ✓ layouts checked against design criteria

Hydrant compliance checking

- ✓ warehouse & depot fire hydrant system

Coordination

- ✓ clash detection with MEP & structure in Navisworks

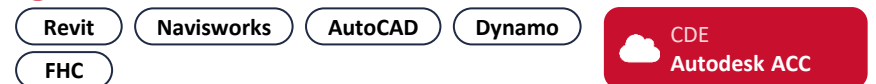
Pipe hangers & slab sleeves

- ✓ hangers and slab penetrations modelled in Revit

Parameter checking

- ✓ asset data on 15,007 ESFR sprinkler instances

05 SOFTWARE & CDE



07 KEY OUTCOMES / DELIVERABLES

- Sprinkler tank verified: 740.8 m³ vs 730.0 m³ required
- Coordinated model with hangers, sleeves & checked asset data