ASSIGNMENT 2

MODEL COORDINATION REPORT

GRADUATE DIPLOMA IN CONSTRUCTION PROJECT MANAGEMENT 2025

CONS 6102 VIRTUAL DESIGN AND CONSTRUCTION 1

Name	ID
Pavithra Ranaweera	1593585
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Aswathy Rajasree Pillai	1599030
Saurab Pokharel	1594941

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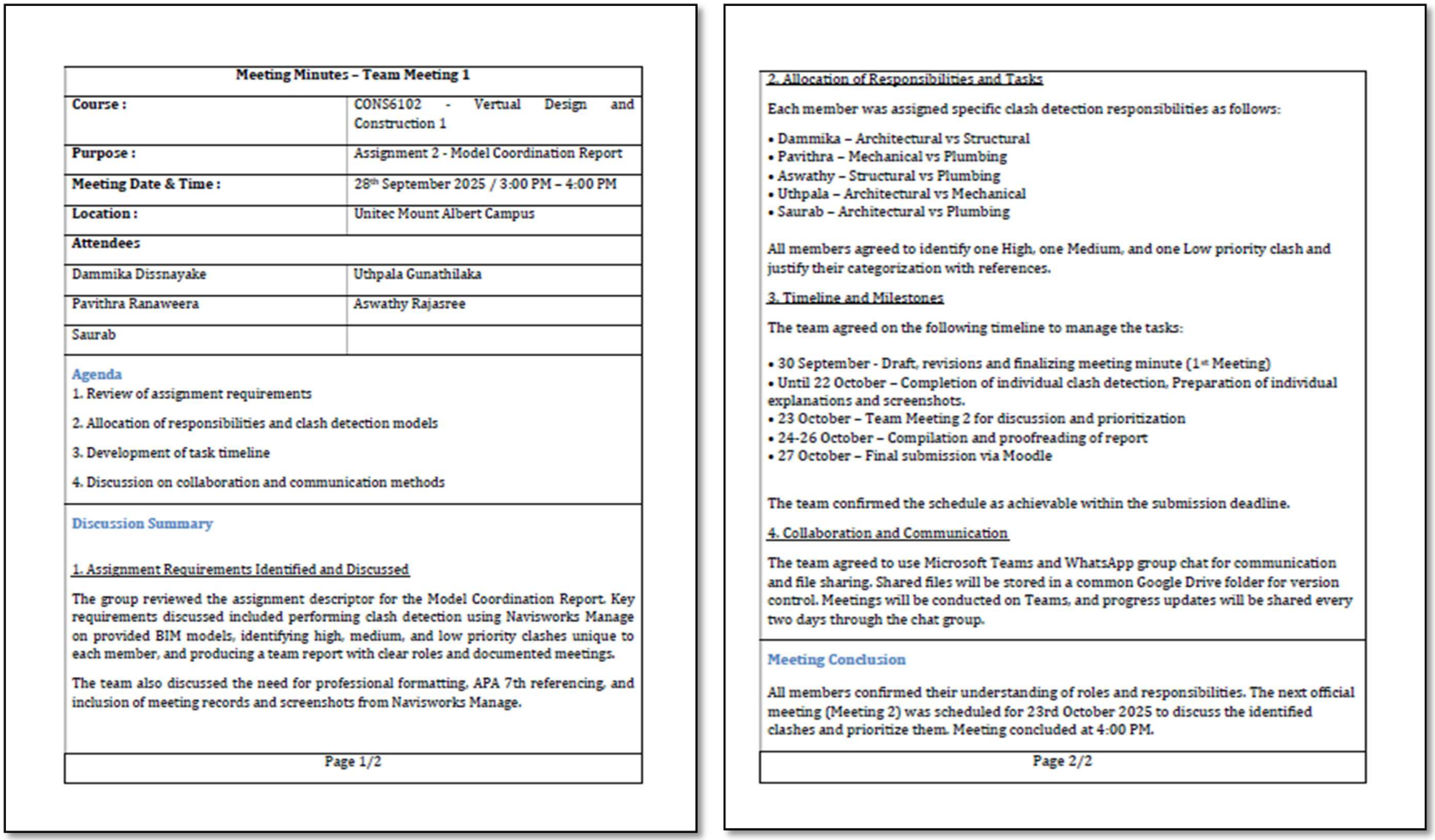
01. INTRODUCTION

In this report, the design coordination constraints are being identified, analyzed and resolved through clash detection. A standard structure, including the meeting records, visual evidence and discussions, is carried out in the team to manage the project clashes from start to finish.

The project was initiated by a group meeting to understand the assignment requirements, assign the responsibilities to members, and establish a timeline for the task completion. The team selected proper tools and methods for clear communication and coordination. Each member has to identify high, medium and low-priority clashes from their assigned individual clash detection task. Each clash is well explained and resolved with proper images, references and supporting documents.

The second meeting records the team's progress and decisions on the final clash priority lists. The report explains the workflow efficiency, advantages and disadvantages of applying the clash detection process for a construction project.

02. MINUTES FROM MEETING ONE (PHASE ONE)



Meeting Minutes – Team Meeting 1	
Course :	CONS6102 - Vertual Design and Construction 1
Purpose :	Assignment 2 - Model Coordination Report
Meeting Date & Time :	28th September 2025 / 3:00 PM – 4:00 PM
Location :	Unitec Mount Albert Campus
Attendees	
Dammika Dissnayake	Uthpala Gunathilaka
Pavithra Ranaweera	Aswathy Rajasree
Saurab	

Agenda

1. Review of assignment requirements
2. Allocation of responsibilities and clash detection models
3. Development of task timeline
4. Discussion on collaboration and communication methods

Discussion Summary

1. Assignment Requirements Identified and Discussed

The group reviewed the assignment descriptor for the Model Coordination Report. Key requirements discussed included performing clash detection using Navisworks Manage on provided BIM models, identifying high, medium, and low priority clashes unique to each member, and producing a team report with clear roles and documented meetings.

The team also discussed the need for professional formatting, APA 7th referencing, and inclusion of meeting records and screenshots from Navisworks Manage.

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2. Allocation of Responsibilities and Tasks

Each member was assigned specific clash detection responsibilities as follows:

- Dammika – Architectural vs Structural
- Pavithra – Mechanical vs Plumbing
- Aswathy – Structural vs Plumbing
- Uthpala – Architectural vs Mechanical
- Saurab – Architectural vs Plumbing

All members agreed to identify one High, one Medium, and one Low priority clash and justify their categorization with references.

3. Timeline and Milestones

The team agreed on the following timeline to manage the tasks:

- 30 September - Draft, revisions and finalizing meeting minute (1st Meeting)
- Until 22 October – Completion of individual clash detection, Preparation of individual explanations and screenshots.
- 23 October – Team Meeting 2 for discussion and prioritization
- 24-26 October – Compilation and proofreading of report
- 27 October – Final submission via Moodle

The team confirmed the schedule as achievable within the submission deadline.

4. Collaboration and Communication

The team agreed to use Microsoft Teams and WhatsApp group chat for communication and file sharing. Shared files will be stored in a common Google Drive folder for version control. Meetings will be conducted on Teams, and progress updates will be shared every two days through the chat group.

Meeting Conclusion

All members confirmed their understanding of roles and responsibilities. The next official meeting (Meeting 2) was scheduled for 23rd October 2025 to discuss the identified clashes and prioritize them. Meeting concluded at 4:00 PM.

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Figure 01: Minutes of Meeting 01

03. CLASH DETECTION FOR ALL DISCIPLINES

3.1 ARCHITECTURE VS STRUCTURE

Student Name: Dhammika Dassanayake	Student ID: 1591918
Software: Navisworks	Model : Arch Vs Strut

NAVISWORKS REPORT

AUTODESK® NAVISWORKS®

Clash Report

Architecture Vs Structure	Tolerance	Clashes	New	Active	Reviewed	Approved	Resolved	Type	Status
	0.001m	472	472	0	0	0	0	Hard	OK

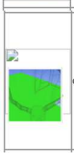
							Item 1					Item 2				
Image	Clash Name	Status	Distance	Priority	Date Found	Clash Point	Item ID	Layer	Path	Item Name	Item Type	Item ID	Layer	Path	Item Name	Item Type
	Clash1	New	-0.400	0	2025/10/23 10:45	x:1.156, y:-1.123, z:29.920	Element ID: 6231	Story 8	File > Assignment model 2025.nwd > Architecture.ifc > Project Number > Default > IFCBUILDING > Story 8 > IfcWall > Basic Wall:Wall:2193 > Wall	Wall	IfcWall: Basic Wall:Wall:2193	Element ID: 4741	Story 8	File > Assignment model 2025.nwd > Structure.ifc > Project Number > Default > IFCBUILDING > Story 8 > IfcBuildingElementProxy > Bm-# 166402:Bm-# 166402 > Bm-# 166402:Bm-# 166402:208644	Bm-# 166402:Bm-# 166402:208644	IfcBuildingElementProxy: Bm-# 166402:Bm-# 166402
	Clash5	New	-0.400	0	2025/10/23 10:45	x:1.156, y:-1.123, z:11.020	Element ID: 4477	Story 2	File > Assignment model 2025.nwd > Architecture.ifc > Project Number > Default > IFCBUILDING > Story 2 > IfcWall > Basic Wall:Wall:1316 > Wall	Wall	IfcWall: Basic Wall:Wall:1316	Element ID: 4045	Story 2	File > Assignment model 2025.nwd > Structure.ifc > Project Number > Default > IFCBUILDING > Story 2 > IfcBuildingElementProxy > Bm-# 181270:Bm-# 181270 > Bm-# 181270:Bm-# 181270:206214	Bm-# 181270:Bm-# 181270:206214	IfcBuildingElementProxy: Bm-# 181270:Bm-# 181270
	Clash11	New	-0.300	0	2025/10/23 10:45	x:-3.439, y:8.499, z:1.970	Element ID: 3020	Parking 1	File > Assignment model 2025.nwd > Architecture.ifc > Project Number > Default > IFCBUILDING > Parking 1 > IfcCurtainWall > IfcCurtainWall 42:IfcCurtainWall 2639942 > IfcCurtainWall 42:IfcCurtainWall 2639942:855742 > IfcCurtainWall (3) > IfcCurtainWall (3) > Steel, Paint Finish, Blue	Steel, Paint Finish, Blue	Solid	Element ID: 3386	Parking 1	File > Assignment model 2025.nwd > Structure.ifc > Project Number > Default > IFCBUILDING > Parking 1 > IfcBuildingElementProxy > Slab 24463:Slab 24463:204887:Slab 24463:204887 : Slab 24463:Slab 24463:204887 > Slab 24463:Slab 24463:204887:Slab 24463:204887 : Slab 24463:Slab 24463:204887:204839	Slab 24463:Slab 24463:204887:Slab 24463:204887 : Slab 24463:Slab 24463:204887:204839	IfcBuildingElementProxy: Slab 24463:Slab 24463:204887:Slab 24463:204887 : Slab 24463:Slab 24463:204887

Figure 02: High priority Clash Naviswork Report

HIGH CATEGORY ISSUE FOUND

Clash ID : #1
Level : 8
Type : Hard Clash
Elements Involved : Architectural wall (Element ID 2193) vs Structural beam (Element ID 166402)
Description : A reinforced concrete beam penetrates an internal load-bearing wall at Level 8, creating a major structural conflict between architectural and structural elements.
Severity : Critical — directly affects structural integrity and alignment of the building frame.
Detection : Identified in Navisworks Manage at tolerance = 0.001 m.

This clash represents a high-priority issue because it involves the primary load-bearing system of the building, requiring immediate redesign to ensure both architectural continuity and structural safety.

USE OF TEXT AND GRAPHICS

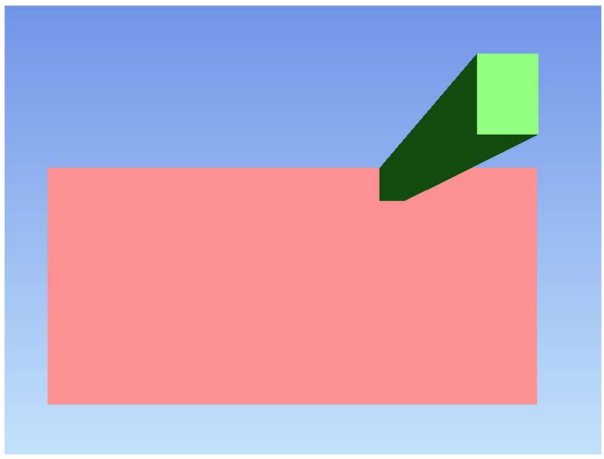


Figure: 3: High Clash of Architectural wall (Element ID 2193) vs Structural beam (Element ID 166402) – Front View

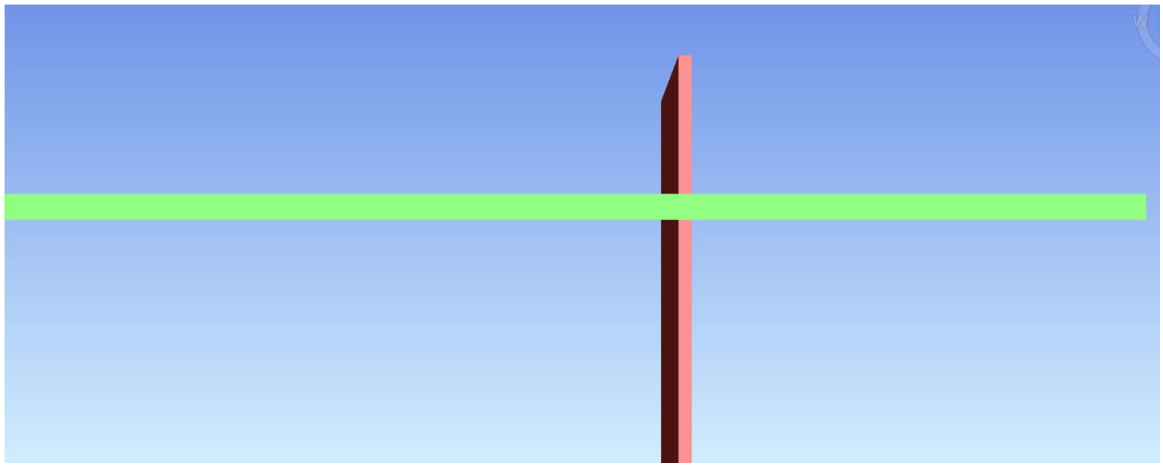


Figure: 4: High Clash of Architectural wall (Element ID 2193) vs Structural beam (Element ID 166402) - Top View

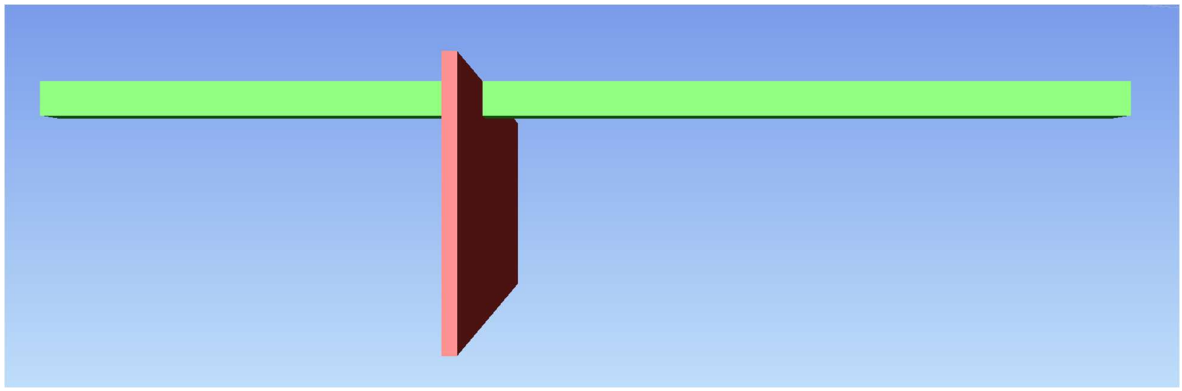


Figure: 5: High Clash of Architectural wall (Element ID 2193) vs Structural beam (Element ID 166402) – Back Side View

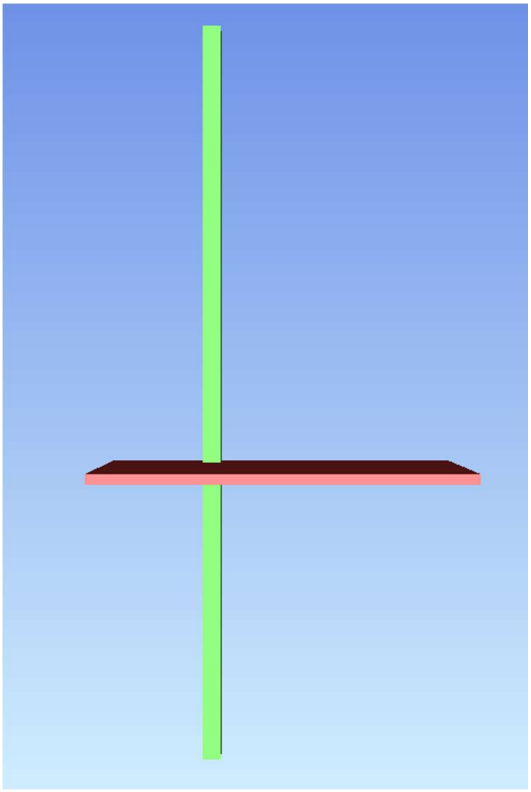


Figure: 6: High Clash of Architectural wall (Element ID 2193) vs Structural beam (Element ID 166402) - Bottom Side View

JUSTIFICATION AND REASONS FOR PRIORITY

According to the **New Zealand BIM Handbook Appendix B (2023, p. 6),**
"High-priority clashes are those that significantly affect the design coordination process or the layout of major building elements such as structure, envelope, or main services and must be rectified during design phases."

Detailed Justification

1. **Primary Load-Bearing Conflict**

   The clash occurs between a reinforced concrete beam and a load-bearing wall—both critical to the structural load path. The interference disrupts moment continuity and shear transfer, risking non-compliance with NZ Building Code Clause B1 (Structure)**.** Because it undermines structural stability, the NZ BIM Handbook (2023) classifies it as a *high-priority* issue.

2. **Impact on Architectural and Structural Coordination**

   The wall forms part of the internal partition layout and carries fire and acoustic ratings. Its collision with a major beam requires reconfiguration of both wall alignment and beam spacing. As **Eastman et al. (2018)** highlight, such interferences create cascading redesign implications across disciplines.

3. **Tolerance Violation**

   The 400 mm overlap exceeds the allowable 25 mm tolerance for detailed coordination (NZ BIM Handbook, Appendix B, p. 4**),** confirming poor model alignment and supporting the high-priority classification.

4. **Constructability and Safety Risks**

   Casting a beam through a wall opening would cause cold joints and reinforcement discontinuity, violating constructability best practices (Sacks & Pikas, 2013) and increasing project risk.

5. **Cost and Programme Impact**

   Resolving the issue during design costs less than 10% of correcting it on-site (Eastman et al., 2018). Early correction avoids rework, formwork redesign, and schedule delays.

6. **Right-of-Way Principle**

   As stated in Appendix B (p. 6)**,** larger and more permanent elements (like beams) have right-of-way. The wall must therefore be adjusted, confirming the clash's high-priority nature.

7. **Regulatory and Performance Considerations**

   The clash breaches Building Code Clauses B1 (Structure) and C3 (Fire)**,** since fire-rated walls cannot be penetrated by unprotected beams. High-priority status ensures timely compliance review and fire-safety validation.

Conclusion:

Clash #1 qualifies as a High-priority issue due to its direct effect on structural stability, coordination accuracy, constructability, and code compliance. It requires immediate collaboration between the Structural Engineer**,** Architect**,** and BIM Manager before documentation finalization.

LITERATURE JUSTIFICATION

1. **NZ BIM Handbook Appendix B (2023):**
   Defines high-priority clashes as those affecting major building systems and prescribes correction during design phases (pp. 5–6).
   The beam–wall conflict falls squarely within this definition.
2. **Eastman, Teicholz, Sacks & Liston (2018):**
   Emphasise that resolving structural clashes early reduces downstream costs by an order of magnitude and prevents schedule disruption.
3. **Sacks & Pikas (2013):**
   Highlight that clear hierarchy and early structural–architectural coordination enhance constructability and reduce field improvisation.

Collectively, these sources confirm that Clash #1's nature and impact justify its High-priority ranking under both NZ and international BIM coordination standards.

CONSULTANTS AFFECTED AND RESPONSIBLE

Consultant	Primary Responsibility	Role in Resolving Clash #1
Structural Engineer	Ensure load-bearing integrity	Review beam alignment and adjust geometry or beam depth to clear the wall; verify revised design against NZS 3101 (Concrete Structures).
Architect	Maintain functional space layout	Modify wall position or detailing to accommodate revised beam; update partition schedule and fire rating compliance.
BIM Manager	Oversee coordination	Record the clash in the coordination matrix, assign actions, track resolution, and verify updated federated model compliance.

REASONS OF THE CONSULTANTS WOULD BE AFFECTED

Structural Engineer

The structural engineer is most affected because the clash disrupts the main load-bearing system. The beam (Element 166402) and wall (Element 2193) conflict interrupts load transfer and violates NZ Building Code Clause B1 (Structure) and NZS 3101:2023. The engineer must review load paths, adjust

reinforcement detailing, and redesign affected elements to maintain structural integrity. As per the NZ BIM Handbook (Appendix B, p. 6), structural frames have right-of-way, so the structural team leads the redesign while coordinating with the architect.

Architect

The clash impacts spatial layout, fire rating, and acoustic performance. The architect must adjust the wall position or thickness while maintaining compliance with Clauses C3 (Fire) and G6 (Acoustics). Changes may require updates to floor plans, ceilings, and finishes. The architect collaborates closely with the structural engineer during coordination meetings to maintain design intent and usability.

BIM Manager

The BIM Manager ensures coordination integrity, tracking the issue in platforms like Navisworks or BIM 360. They verify revised models meet the ±25 mm tolerance (Appendix B, p. 4) and maintain version control and documentation. Following ISO 19650 standards, the BIM Manager's oversight prevents data inconsistency and ensures proper closure of the issue in the Clash Matrix.

Collective Impact

- Schedule Risk: Structural redesign may extend coordination cycles; early clash detection mitigates delay.
- Cost Risk: Late revisions cost up to 5–10 times more than early corrections (Eastman et al., 2018).
- Quality & Compliance: Prompt collaboration ensures compliance with NZ codes and BEP quality standards.
- Knowledge Transfer: The issue enhances discipline coordination and improves future BIM workflows (Sacks & Pikas, 2013).

Summary of Consultant Interactions

Consultant	Key Impact	Primary Action	Outcome for Project
Structural Engineer	Load-path interruption, redesign required	Re-model beam; verify strength and continuity	Maintains structural integrity
Architect	Spatial conflict, aesthetic and compliance adjustments	Shift or modify wall; update documentation	Preserves spatial layout and code compliance
BIM Manager	Model quality and coordination accuracy	Track issue, verify revisions, update federated model	Ensures single-source-of-truth model integrity

Overall Effect:

Clash #1's resolution depends on close collaboration. The Structural Engineer leads the technical fix; the Architect adapts spatial elements; and the BIM Manager enforces documentation and coordination control. Together they restore model integrity, uphold compliance, and prevent costly construction-stage rework—embodying the collaborative intent of the *NZ BIM Handbook Appendix B (2023)*.

MEDIUM CATEGORY ISSUE FOUND

Clash ID: #5

Level: 2

Type: Hard Clash

Elements Involved: Architectural wall (Element ID 1316) vs Structural secondary beam (Element ID 181270)

Description: A 150 mm-thick internal partition wall intersects a secondary reinforced-concrete beam supporting the floor slab at Level 2. The beam intrudes approximately 0.40 m into the wall geometry.

Severity: Moderate — affects architectural detailing and secondary structure alignment but does not compromise overall stability.

Detection: Identified in Navisworks Manage at tolerance = 0.001 m.

This clash represents a **Medium-priority coordination issue** because it involves a secondary framing element and a non-load-bearing wall. The problem requires model correction during the developed-design stage to prevent downstream fit-out or ceiling conflicts.

USE OF TEXT AND GRAPHICS

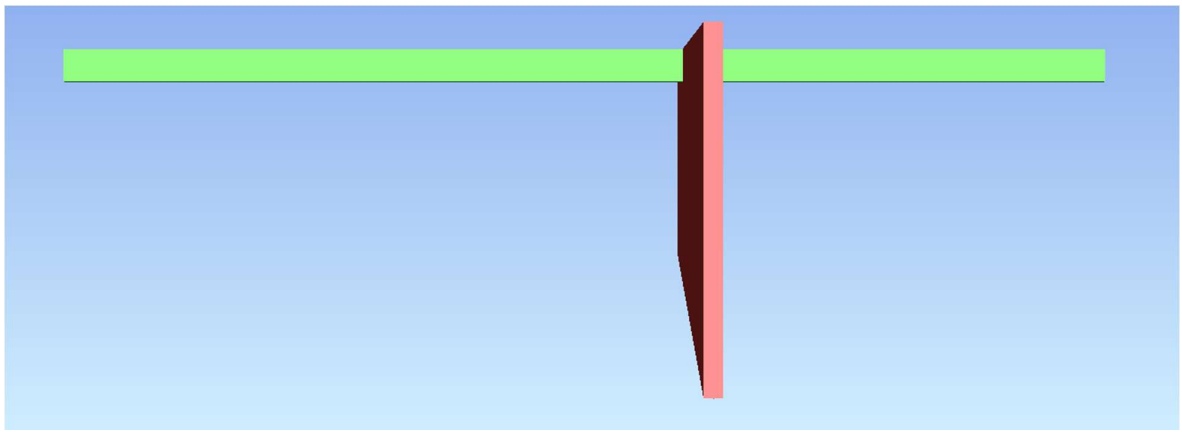


Figure: 7: Medium Clash of Architectural wall (Element ID 1316) vs Structural secondary beam (Element ID 181270) - Front View

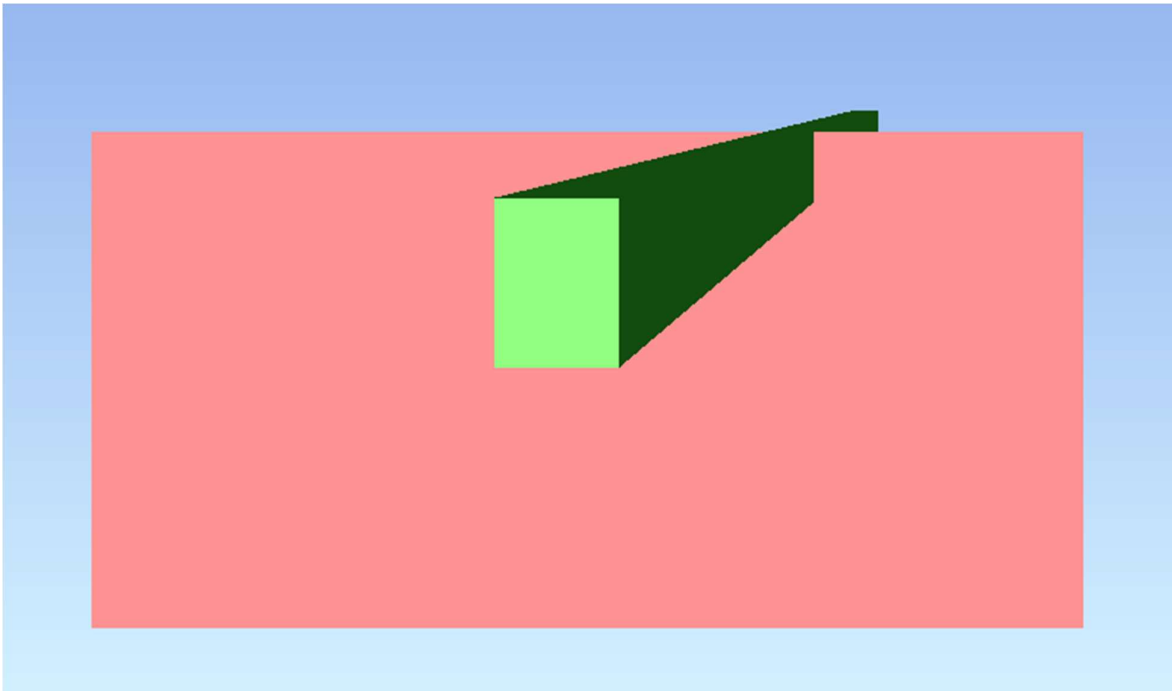


Figure: 8 : Medium Clash of Architectural wall (Element ID 1316) vs Structural secondary beam (Element ID 181270) – Left Side View

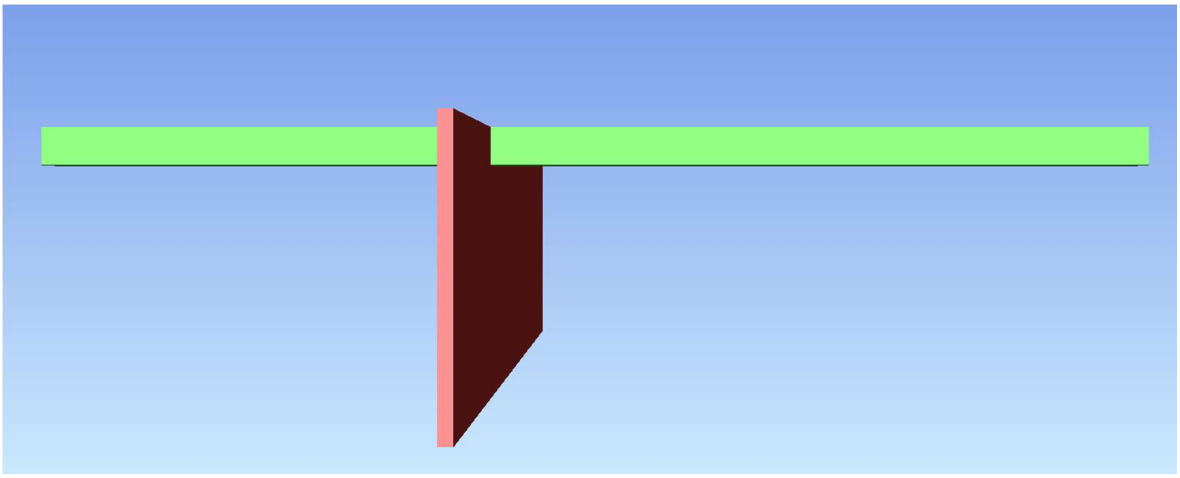


Figure: 9 : Medium Clash of Architectural wall (Element ID 1316) vs Structural secondary beam (Element ID 181270) – Back Side View

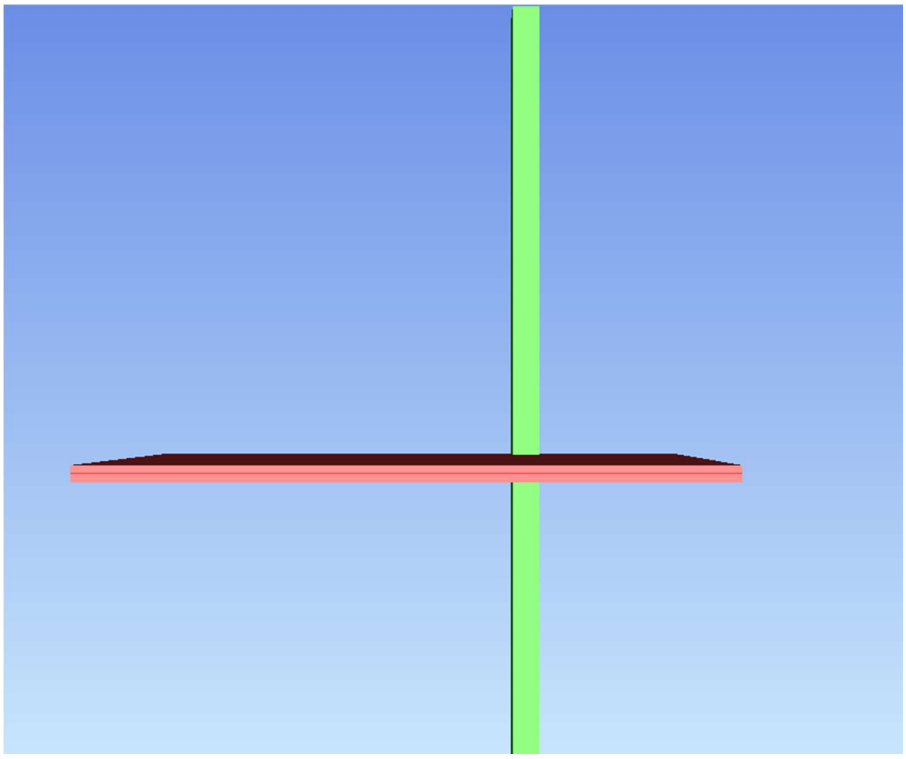


Figure: 10 : Medium Clash of Architectural wall (Element ID 1316) vs Structural secondary beam (Element ID 181270) – Bottom Side View

JUSTIFICATION AND REASONS FOR PRIORITY

According to the NZ BIM Handbook Appendix B (2023, p. 6):

"Medium-priority clashes are reported clashes that, while considered important to the correctness of the model, will generally change on a regular basis throughout the design and construction process. They should be rectified before end-of-phase submissions of the models."

Detailed Justification

1. **Nature of Elements and Severity**
   The clash involves a non-load-bearing architectural wall and a secondary structural beam, both flexible design components. Unlike primary beams or columns, these elements can be adjusted with limited structural consequence, justifying a *medium* rather than *high* rating.

2. **Impact on Design Coordination**
   The interference may reduce ceiling height or disrupt MEP service routes running parallel to the beam. If left unresolved, downstream trades (electrical, HVAC, fire) could experience clearance conflicts during coordination, compounding design complexity.

3. **Tolerance Breach**

   The 400 mm overlap exceeds the 25 mm detailed-coordination tolerance specified in the *Coordination Model Tolerance Schedule* (Appendix B, p. 4), indicating a measurable modelling inconsistency requiring design-phase correction.

4. **Constructability and Programme Risk**

   During construction, misalignment could require on-site cutting or re-forming of wall sections, introducing delays and quality issues. However, the issue is rectifiable during documentation with minimal structural redesign effort.

5. **Compliance and Performance Considerations**

   The clash may interfere with wall fire-rating or acoustic performance (NZ Building Code Clauses C3 and G6). Addressing it during coordination ensures compliance before building consent documentation.

6. **Right-of-Way Principle**

   Under Appendix B (p. 6), larger and more permanent objects have precedence. Here, the beam—though secondary—remains part of the fixed structure, so the wall layout should adapt. This reinforces its *medium* classification: important but not critical to global stability.

Conclusion:

Clash #5 qualifies as **Medium priority** because it impacts architectural accuracy and service coordination yet remains manageable through design-stage adjustment without major structural redesign.

LITERATURE JUSTIFICATION

1. **NZ BIM Handbook (2023):**

   Defines medium-priority clashes as coordination discrepancies requiring correction before phase submission (pp. 5–6). The wall-beam misalignment fits this criterion.

2. **Eastman et al. (2018):**

   Note that design-stage coordination of secondary components avoids compounding minor interferences that escalate into multi-trade conflicts on site.

3. **Sacks & Pikas (2013):**

   Emphasise that effective BIM coordination should prioritise high-impact systems first, while addressing secondary interferences systematically before documentation hand-off.

Together, these sources confirm that resolving secondary-element clashes during developed design supports efficient model accuracy and project constructability.

CONSULTANTS AFFECTED AND RESPONSIBLITIES

Consultant	Primary Responsibility	Specific Role in Resolving Clash #5
Architect	Maintain spatial layout, finishes, and fire/acoustic performance	Adjust wall geometry or offset to clear beam intrusion; update partition schedule and ceiling details.
Structural Engineer	Verify secondary beam placement and load paths	Review beam dimensions and coordinates; confirm relocation feasibility or adjust beam height.
BIM Manager	Oversee coordination and documentation workflow	Record clash in coordination log; monitor revisions; validate updated federated model before next review.

REASONS FOR THE CONSULTANTS WOULD BE AFFECTED

Architect

The architect is most affected because the clash disrupts internal wall alignment and ceiling coordination. The wall defines room boundaries and fire-rated zones. Repositioning may affect door and window layouts, circulation, and lighting. Plan and ceiling drawings must be updated while ensuring compliance with **NZ Building Code Clauses C3 (Fire)** and **G6 (Acoustics)**. Under the **BIM coordination matrix,** architectural components adjust to the structural layout, making the architect responsible for spatial correction.

Structural Engineer

The structural engineer must verify that any beam trimming or adjustment is structurally feasible without breaching **NZS 3101** limits for reinforcement, deflection, or cover. Minor changes may affect rebar detailing or slab support but should preserve load paths and constructability. Coordination with the architect ensures alignment between structural and partition elements.

BIM Manager

The BIM Manager maintains model accuracy and traceability. They log the issue in **Navisworks** or **BIM 360**, confirm revisions meet the **±25 mm tolerance (Appendix B, p. 4),** and ensure consistent file

versions. Their oversight ensures that the clash is recorded, reviewed, and resolved during coordination meetings in line with **ISO 19650** standards.

Collective Impact

- **Schedule:** Minor but time-sensitive; delays could affect interior documentation.
- **Cost:** Early design fixes prevent cumulative rework, avoiding up to 70–90% additional cost **(Eastman et al., 2018).**
- **Quality:** Resolution maintains accurate alignment and compliance with fire and acoustic standards.
- **Learning:** Improves future model coordination between wall grids and structural reference planes **(Sacks & Pikas, 2013).**

Summary of Consultant Interactions

Consultant	Key Impact	Primary Action	Outcome for Project
Architect	Wall-beam interference affects layout	Shift or resize partition; update documentation	Maintains design integrity and compliance
Structural Engineer	Beam position verification	Adjust beam geometry if needed	Retains structural adequacy
BIM Manager	Model coordination tracking	Validate and close clash record	Ensures consistent federated model

Overall Effect

Resolution of Clash #5 depends on coordinated effort between the Architect and Structural Engineer, overseen by the BIM Manager. The correction protects constructability, maintains documentation accuracy, and prevents minor discrepancies from escalating during construction. This collaborative workflow fully aligns with the NZ BIM Handbook Appendix B (2023) coordination process, ensuring reliable model integrity and reduced downstream risk.

LOW CATEGORY ISSUE FOUND

Clash ID: #11

Level: Parking 1

Type: Hard Clash

Elements Involved: Curtain-wall steel frame (Element ID 30027) vs Concrete slab (Element ID 41112)

Description: The lower transom of a curtain-wall frame slightly intrudes into the upper edge of the ground-floor concrete slab by approximately 0.30 m. The intersection occurs along the façade perimeter at the basement parking level.

Severity: Minor — a non-structural geometric interference with negligible effect on stability or primary services.

Detection: Identified in *Autodesk Navisworks Manage* at tolerance = 0.001 m.

This clash represents a **Low-priority coordination issue** because it involves secondary architectural façade components that are easily adjustable during design detailing or site installation.

USE OF TEXT AND GRAPHICS

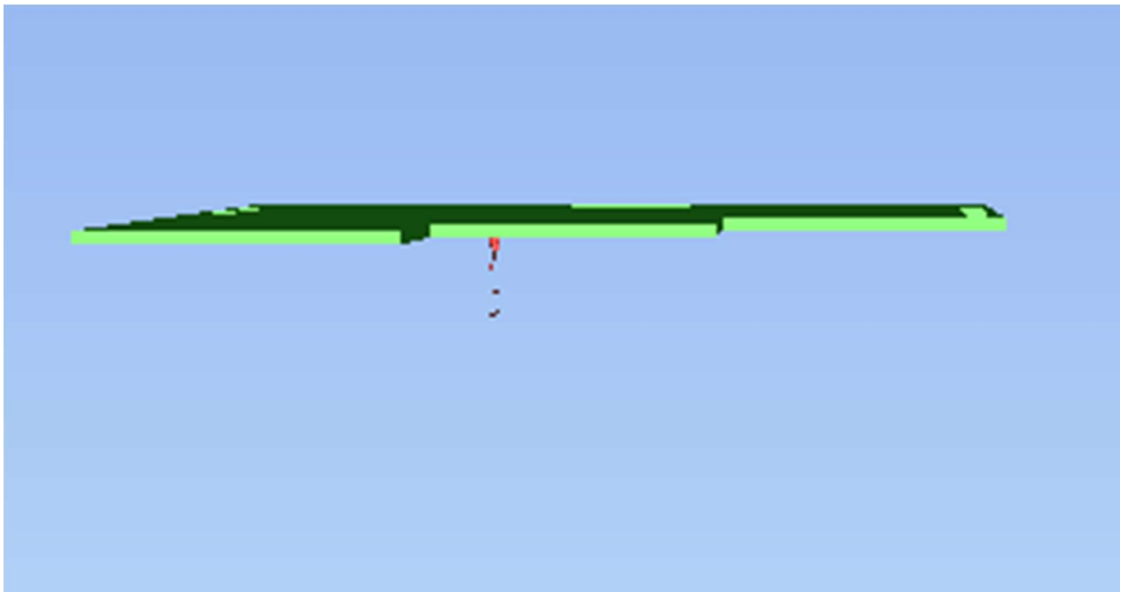


Figure: 11 : Low Clash of Curtain-wall steel frame (Element ID 30027) vs Concrete slab (Element ID 41112) – Front View

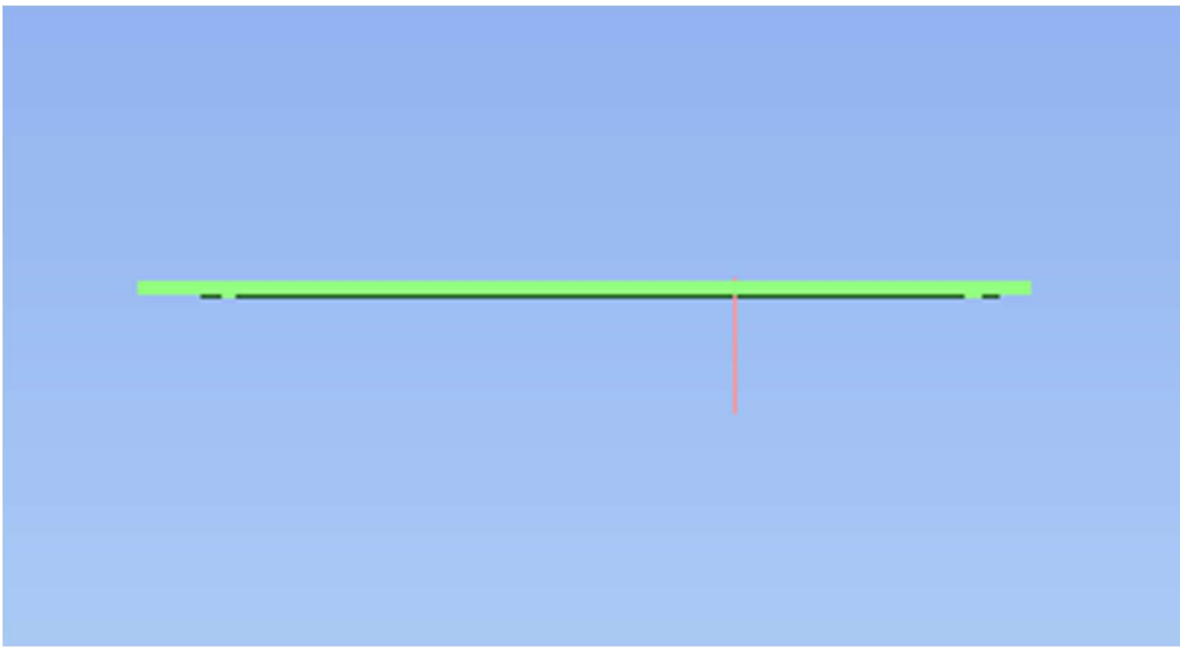


Figure: 12 : Low Clash of Curtain-wall steel frame (Element ID 30027) vs Concrete slab (Element ID 41112) – Back View

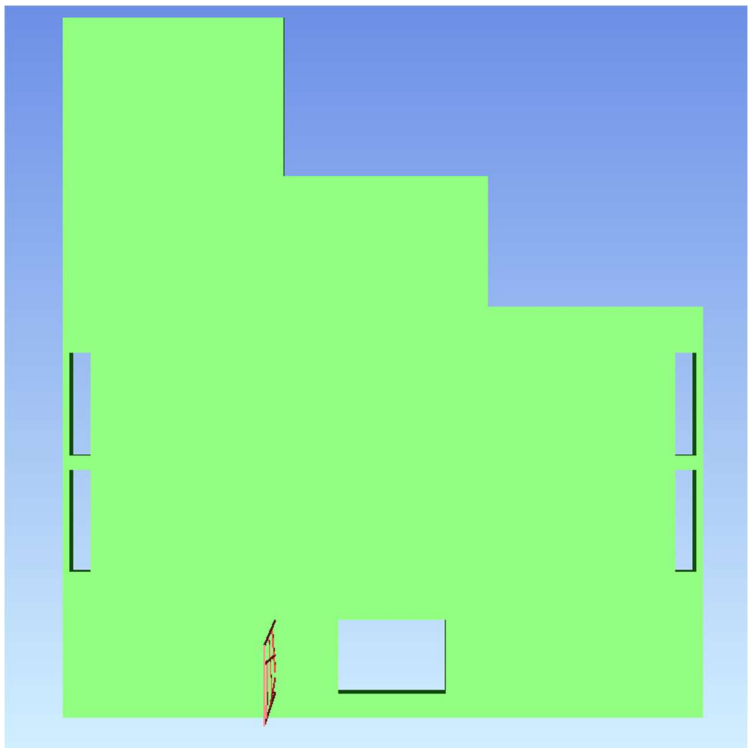


Figure: 13 : Low Clash of Curtain-wall steel frame (Element ID 30027) vs Concrete slab (Element ID 41112) – Bottom View

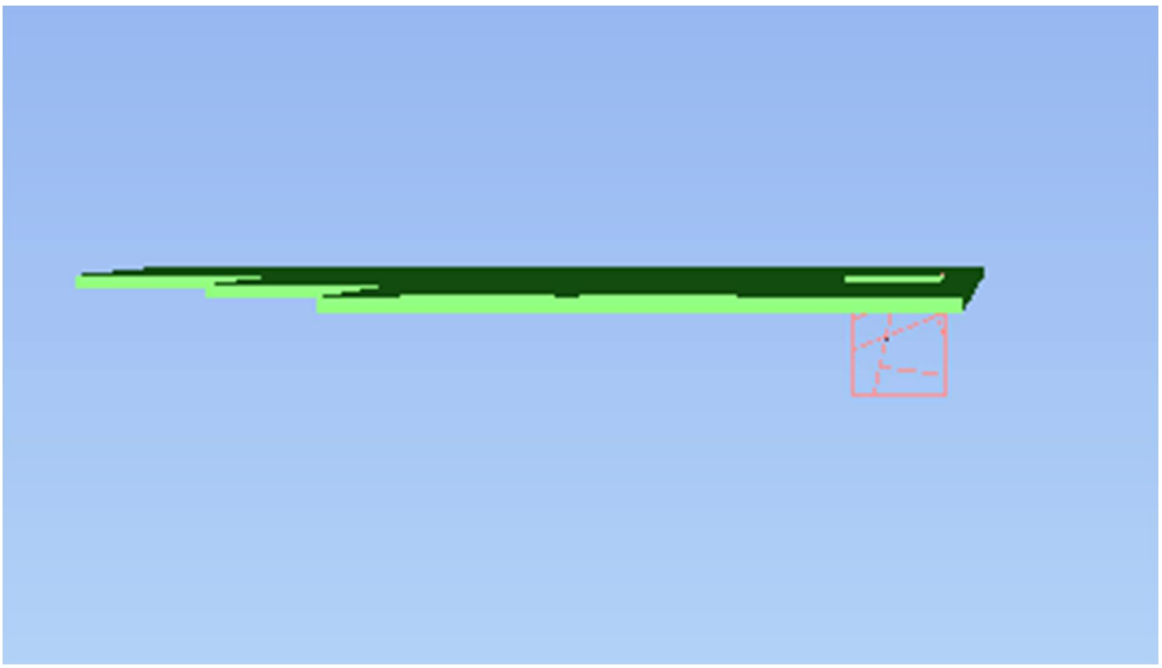


Figure: 14 : Low Clash of Curtain-wall steel frame (Element ID 30027) vs Concrete slab (Element ID 41112) – Right Side View

JUSTIFICATION AND REASONS FOR PRIORITY

According to the NZ BIM Handbook Appendix B (2023, p. 6): "Low-priority clashes are elements that will be moved without question during construction."

Detailed Justification

1. **Non-Critical Elements Involved**

   The clash concerns a curtain-wall transom—a lightweight, adjustable framing component—and a concrete floor slab edge. These elements typically include construction tolerances for fitting and can be modified easily without affecting overall building performance.

2. **Limited Impact on Structure or Services**

   The interference does not compromise load paths, waterproofing continuity, or major service zones. Adjusting the façade frame anchor detail will fully resolve the issue with minimal design revision.

3. **Within Acceptable Tolerance Range**

   The 300 mm geometric overlap, while detected computationally, represents a modeling offset rather than a physical penetration once façade fixings and tolerance allowances (typically ±50

mm for façades) are applied. It remains within the adjustable range specified by the *Coordination Model Tolerance Schedule* (Appendix B, p. 4).

4. **Constructability and Sequencing Flexibility**

   Curtain-wall systems are manufactured off-site and adjusted on-site using packers or bracket slotted holes. Installers routinely realign frames to accommodate concrete dimensional variations. This inherent adjustability confirms the issue's low-priority classification.

5. **Regulatory and Performance Considerations**

   The clash does not affect compliance with NZ Building Code Clauses E2 (External Moisture) or B1 (Structure). It merely requires a minor adjustment of fixing details to maintain proper waterproofing and drainage.

6. **Right-of-Way Principle**

   Under Appendix B (p. 6), permanent structural elements such as slabs retain right-of-way. Hence, the curtain wall must adapt—a minor detailing change typically addressed during shop-drawing review.

Conclusion:

Clash #11 meets all criteria for a Low-priority issue: it involves adjustable components, poses no risk to safety or performance, and can be resolved without redesign. Documentation update and façade-contractor coordination are sufficient to close it.

LITERATURE JUSTIFICATION

1. **NZ BIM Handbook (2023):**

   States that low-priority clashes relate to components "moved without question during construction." The curtain-wall/slab interface fits this definition due to its standard adjustability.

2. **Eastman et al. (2018):**

   Explain that minor, repetitive clashes involving flexible components can be resolved economically during detailing or site work, as long as they are documented and approved by design leads.

3. **Sacks & Pikas (2013):**

Emphasise that BIM coordination should allocate modelling effort proportionally to impact—critical issues first, low-impact issues later—to optimize design productivity.

Together these authorities confirm that façade-slab geometric discrepancies are *low-priority* because they are manageable during construction without compromising project objectives.

CONSULTANTS AFFECTED AND RESPONSIBLE

Consultant	Primary Responsibility	Specific Role in Resolving Clash #11
Architect	Maintain façade geometry, aesthetics, and waterproofing intent	Revise curtain-wall frame detail or adjust anchor locations to clear slab edge; update façade section drawings and schedules.
Structural Engineer	Verify slab edge dimensions and tolerances	Confirm slab thickness and reinforcement remain unaffected; coordinate with façade engineer to approve bracket fixings.
BIM Manager	Manage coordination record and model integrity	Log clash resolution; ensure updated façade and structural models are properly aligned in the federated model; verify closure in next coordination cycle.

REASONS FOR THE CONSULTANTS WOULD BE AFFECTED

Architect

The architect is primarily affected because the clash involves façade detailing, aesthetics, and moisture protection. Minor adjustments to curtain-wall mullions or brackets are needed to clear the slab edge while maintaining compliance with **NZ Building Code Clause E2 (External Moisture).** The architect coordinates with the façade supplier to update shop drawings and ensure drainage and alignment are preserved.

Structural Engineer

The structural engineer's role is limited to confirming that revised façade anchors do not compromise slab reinforcement or edge distances under **NZS 3101 (Concrete Structures).** Coordination ensures structural safety while supporting façade adjustments.

BIM Manager

The BIM Manager logs and tracks the issue in **Navisworks** or **BIM 360**, verifies that revised models remain within tolerance, and confirms alignment between façade and structural models. They ensure proper documentation and closure according to **ISO 19650** data-management standards.

Collective Impact

- **Schedule:** Negligible — resolved during façade-shop-drawing coordination.
- **Cost:** Minimal — no major redesign required.
- **Quality:** Maintains façade alignment, waterproofing, and performance compliance.
- **Knowledge Feedback:** Improves future coordination between architectural and structural façade tolerances.

Summary of Consultant Interactions

Consultant	Key Impact	Primary Action	Outcome for Project
Architect	Minor façade/slab overlap	Adjust frame detail	Maintains façade alignment and waterproofing
Structural Engineer	Edge reinforcement verification	Approve anchor tolerances	Preserves structural safety
BIM Manager	Coordination record update	Close issue log and validate models	Ensures digital model integrity

Overall Effect

Clash #11 is a Low-priority façade coordination issue that demonstrates how digital clash detection captures even minor discrepancies before construction. Its resolution—through small design adjustments and cross-consultant confirmation—preserves model precision, supports compliance, and exemplifies efficient multi-disciplinary collaboration under the NZ BIM Handbook Appendix B (2023) framework.

3.2 ARCHITECTURE VS MECHANICAL

Student Name: Uthpala Gunathilaka	Student ID: 1587124
Software: Navisworks	Model : Arch Vs Mech

INTRODUCTION AND METHODOLOGY

Clash detection is one of the vital quality control stage in Building Information Modelling (BIM) which ensures coordinated, constructible design across various disciplines. For this commercial building, the **architectural** and **mechanical** models were federated in *Autodesk Navisworks Manage 2026.*Over 600 interdisciplinary clashes were initially identified using both *hard* (solid-geometry intersection) and *soft* (clearance-violation) rules.

The clashes were classified in accordance with **Appendix B – Clash Detection Priority Matrix** of the *NZ BIM Handbook*:

1. **High Priority** **:** Impacts safety, structure, or statutory compliance.
2. **Medium Priority** : Affects constructability or coordination, manageable during detailed design.
3. **Low Priority (Type 3)** :Visual or tolerance-based, negligible to construction.

And as below, three representative clashes were chosen for detailed reporting:

- **Clash 14 (High):** Main duct penetrating structural/fire-rated wall (Story 10)
- **Clash 198 (Medium): Supply branch duct intersecting a secondary ceiling support beam within the corridor ceiling zone (Story 8)**
- **Clash 169 (Low):** Minor duct-wall overlap within tolerance (Story 6)

SECTION 1 – HIGH PRIORITY CLASH (CLASH 14: DUCT PENETRATING STRUCTURAL/FIRE-RATED WALL)

ISSUE IDENTIFIED

Architectural element: IfcWall 2397 – load-bearing fire-rated wall

Mechanical element: IfcDuctSegment SS1000.BIM (130) – main supply duct

Location: Story 10 riser zone (x 0.097, y 1.949, z 36.402)

Clash Type: Hard clash – complete solid interference

USE OF TEXT AND GRAPHICS

						Item 1				Item 2			
Image	Clash Name	Status	Distance	Date Found	Clash Point	Item ID	Layer	Item Name	Item Type	Item ID	Layer	Item Name	Item Type
	Clash14	New	-0.367	2025/10/24 22:32	x:0.097, y:1.949, z:36.402	*Element ID*: 6908	Story 10	Wall	IfcWall: Basic Wall:Wall:2397	*Element ID*: 9627	Story 10	01.0000.00	IfcDuctSegment: SS1000.BIM (130)

Figure: 15 : High Clash Report

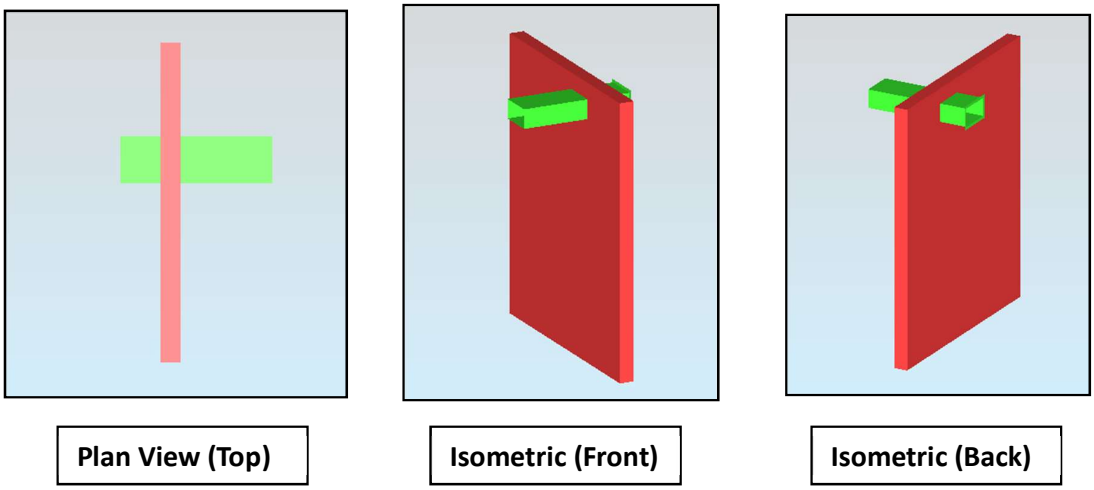


Figure: 16 : High Clash Front, Back and Plan View

JUSTIFICATION AND REASONS FOR PRIORITY

This clash breaches both **structural integrity** and **fire compartmentation**, making it a *Type 1 Critical Clash*. The duct physically removes part of a load bearing wall, compromising lateral stability and fire rating.

Consequences if unresolved:

- Breach of NZ Building Code Clauses B1 and C.
- Requirement for re-engineering and fire stopping.
- Re-work delay during installation.
- Elevated safety risk and potential inspection failure.

This clash demands immediate multidisciplinary coordination before construction documentation.

LITERATURE JUSTIFICATION

The *NZ BIM Handbook* (MBIE, 2019) defines major structural or fire-related penetrations as *"high-priority issues requiring resolution before construction issue." Eastman et al.* (2011) emphasize early detection of such penetrations to avoid 10–20 % cost escalation from redesign. *Autodesk* (2023) lists "ducts through beams or rated walls" among critical clashes requiring immediate action. *BIM Technologies* (2022) note that unresolved penetrations can invalidate fire certificates, directly affecting compliance. Together, these sources validate the high-priority classification.

CONSULTANTS AFFECTED AND RESPONSIBLE

Consultant	Role / Responsibility	Impact
Architectural consultant	Wall design review and fire rating	Fire integrity breached
Structural engineer	Opening approval and reinforcement	Load path disruption
Mechanical engineer	Reroute main duct	Root cause discipline
BIM Coordinator	Issue tracking and model update	Coordination oversight
Main contractor	Fabrication and sequencing	Schedule and safety risk

IMPACT REASONING

Architects must redesign the wall and coordinate a fire-damper detail. Structural engineers assess load redistribution. Mechanical engineers reroute the duct or design a sleeve. The BIM Coordinator validates correction in the federated model. Contractors adjust the construction sequence to accommodate the approved penetration. This collective workflow mirrors MBIE's (2023) coordination matrix where *"discipline leads remain responsible for internal resolution, coordinated through the BIM Manager."*

SECTION 2 – MEDIUM PRIORITY CLASH (CLASH 185: SECONDARY DUCT INTERSECTING INTERNAL WALL AT RISER SHAFT)

ISSUE IDENTIFIED

Architectural/Structural element: Ifc Beam B1421 – secondary steel support beam (ceiling level).

Mechanical element: Ifc Duct Segment SS1000.BIM (54) – supply branch duct.

Location: Story 8 – corridor ceiling zone, gridline C3–C4.

Clash type: Hard/soft mixed clash – duct intersects the underside of the beam by ~35 mm.

USE OF TEXT AND GRAPHICS

						Item 1				Item 2			
Image	Clash Name	Status	Distance	Date Found	Clash Point	Item ID	Layer	Item Name	Item Type	Item ID	Layer	Item Name	Item Type
	Clash198	New	-0.061	2025/10/24 22:32	x:1.156, y:-4.397, z:36.303	*Element ID*: 6820	Story 10	Wall	IfcWall: Basic Wall:Wall:2490	*Element ID*: 3483	Story 10	136700	Composite

Figure: 17 : Medium Clash Report

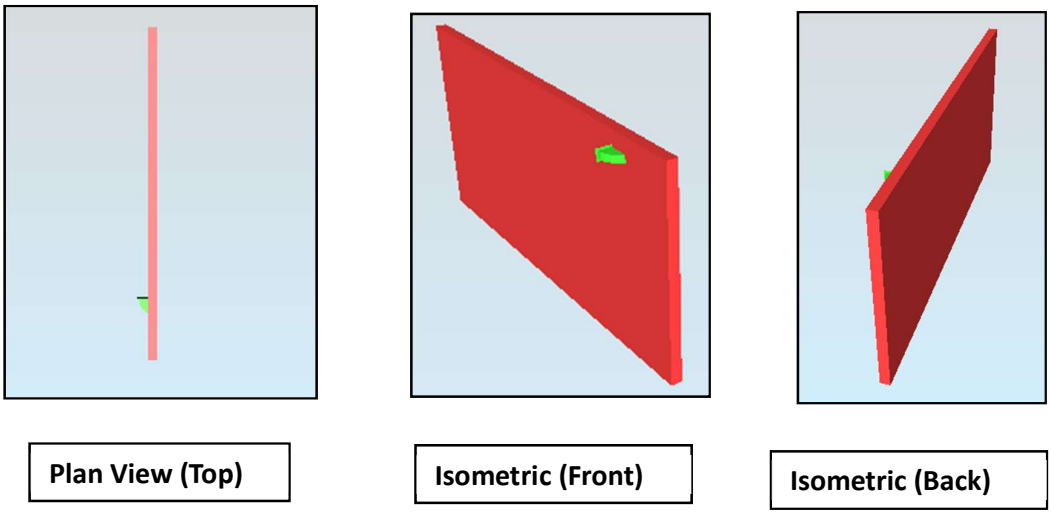


Figure: 18 : Medium Clash Front, Back and Plan View

JUSTIFICATION AND REASONS FOR PRIORITY

This clash is medium priority because it interferes with constructability but not with primary safety or compliance systems.

- *Structural impact: The beam is not compromised structurally (minor intersection only).*
- *Mechanical impact: The duct cannot be installed in its current path; rerouting or a slight drop is needed.*
- *Constructability: The conflict would delay ceiling framing and duct installation if not resolved pre-construction.*
- *Cost/time: The issue is resolvable via coordination, not redesign of structure or mechanical system specification.*

According to MBIE (2023, Appendix B – Model Coordination), this fits Type 2 – Coordination Clash, defined as:"A clash that affects the fit of elements or system routing and requires coordination before construction, but does not affect compliance or safety."

LITERATURE JUSTIFICATION

The NZ BIM Handbook (2023) underscores that inter-trade coordination especially between MEP and structure should be completed by the detailed coordination stage to avoid on-site re-work.

Building SMART New Zealand (2023) identifies beam-duct clashes as among the most common coordination issues in multi-story commercial buildings.

Autodesk (2024) recommends that MEP–beam interference be classified as medium priority when it affects installation sequencing but not load-bearing capacity. Eastman et al. (2011) quantify that resolving such clashes early saves 7–15 % of project fit-out cost. These references collectively justify the medium-priority categorization for Clash 198.

CONSULTANTS AFFECTED AND RESPONSIBLE

Consultant	Role / Responsibility	Impact
Mechanical Engineer	Responsible for duct routing design	Must reroute or offset duct to clear beam
Structural Engineer	Responsible for beam alignment	Verify beam depth; confirm clearance allowance
BIM Coordinator / Manager	Manage clash data & assign ownership	Ensure update of federated model
Main Contractor / HVAC Installer	Execute revised coordination	Sequence duct before ceiling framing

REASONS HOW CONSULTANTS ARE AFFECTED OR RESPONSIBLE

The mechanical engineer is the primary resolver since duct routing caused the interference. They must adjust elevation or offset within performance parameters. The structural engineer validates that any local beam modification (e.g., trimming or camber adjustment) is permissible. The BIM Coordinator logs the clash in the CDE, assigns it to the mechanical lead, monitors re-model, and validates resolution in the federated file. The main contractor confirms constructability and ensures updated shop drawings reflect changes before fabrication.

This workflow follows MBIE (2023) and ISO 19650-2 (2018), which require cross-discipline accountability and traceable issue management within the CDE.

SECTION 3 – LOW PRIORITY CLASH (CLASH 169: MINOR DUCT-WALL OVERLAP WITHIN TOLERANCE)

ISSUE IDENTIFIED

Architectural element: IfcWall 1832 – internal wall finish

Mechanical element: IfcDuctSegment SS1000.BIM (38) – small branch duct

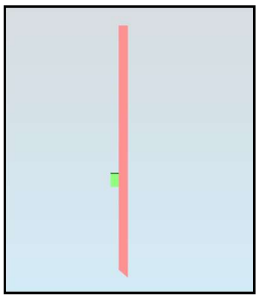
Location: Story 6 ceiling zone (x 1.156, y 4.824, z 23.73)

Clash Type: Visual / tolerance clash (< 10 mm overlap)

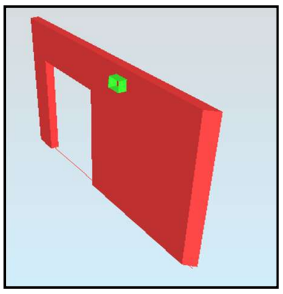
USE OF TEXT AND GRAPHICS

						Item 1				Item 2			
Image	Clash Name	Status	Distance	Date Found	Clash Point	Item ID	Layer	Item Name	Item Type	Item ID	Layer	Item Name	Item Type
	Clash169	New	-0.088	2025/10/24 22:32	x:-1.626, y:-3.551, z:23.653	*Element ID*: 5769	Story 6	Wall	IfcWall: Basic Wall:Wall:1832	*Element ID*: 6956	Story 6	Duct	IfcDuctSegment: SS1000.BIM (38)

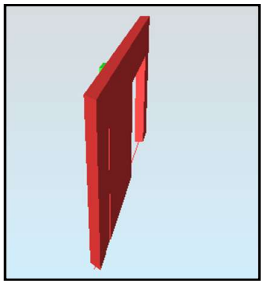
Figure: 19 : Low Clash Report



Plan View (Top)



Isometric (Front)



Isometric (Back)

Figure: 20 : Low Clash Front, Back and Plan View

JUSTIFICATION AND REASONS FOR PRIORITY

This clash lies within the acceptable modelling tolerance (~10 mm) for coordination at Level of Detail (LOD) 350–400. It does not obstruct construction, access, or performance. Reasons for low priority:

- *Geometric precision:* Arises from model rounding or export tolerance.
- *Constructability:* Field tolerances exceed overlap; no site impact.
- *Coordination practice:* Such clashes are documented for quality assurance, not redesign.

Per *NZ BIM Handbook Appendix B*, this is a **Type 3 Review-Only Clash**, meaning the model remains acceptable once logged.

LITERATURE JUSTIFICATION

Low-priority clashes represent visual or non-constructability overlaps. *MBIE* (2023) states that these should be "reviewed for model accuracy but not require design change." *BIM Technologies* (2022) define them as false positives arising from LOD variations. *BIM Heroes* (2023) argue that over-managing low-risk clashes wastes resources and that classification discipline is key to efficiency. Similarly, *Autodesk* (2023) recommends using tolerance filters to minimise clash noise and focus team effort on critical issues.

CONSULTANTS AFFECTED AND RESPONSIBLE

Consultant	Role / Responsibility	Impact
Architectural consultant	Confirm finish alignment	Minor visual check
Mechanical subcontractor	Slight routing adjustment	Field tolerance
BIM Coordinator	Record and close issue	Quality audit

IMPACT REASONING

Architectural teams ensure finish tolerances are accurate in the model. Mechanical subcontractors make minute offsets during installation if required. The BIM Coordinator marks the clash as "resolved by tolerance" and archives it for QA purposes. This approach reflects the efficient model-management philosophy promoted by *MBIE (2019)*, where resources are directed towards clashes with actual constructability risk rather than digital artifacts.

CONCLUSION

This report applied structured clash-detection analysis to three representative architectural-mechanical conflicts in a commercial building model.

Clash 14 (High): Critical breach of fire-rated wall — immediate multidisciplinary resolution required.

Clash 185 (Medium): Coordination issue within riser shaft — requires design-phase rectification.

Clash 169 (Low): Visual tolerance overlap — record for QA only.

The investigation demonstrates compliance with the *NZ BIM Handbook* framework for prioritization and aligns with international best practice outlined by *Eastman et al.* (2011), *Building SMART NZ* (2020), and *Autodesk* (2023). By managing clashes through this tiered approach, BIM teams enhance constructability, reduce rework, and support safer, more cost-efficient project delivery.

3.3 ARCHITECTURE VS PLUMBING

Student Name: Saurab Pokharel	Student ID: 1594941
Software: Navisworks	Model : Arch Vs Plumb

HIGH PRIORITY:

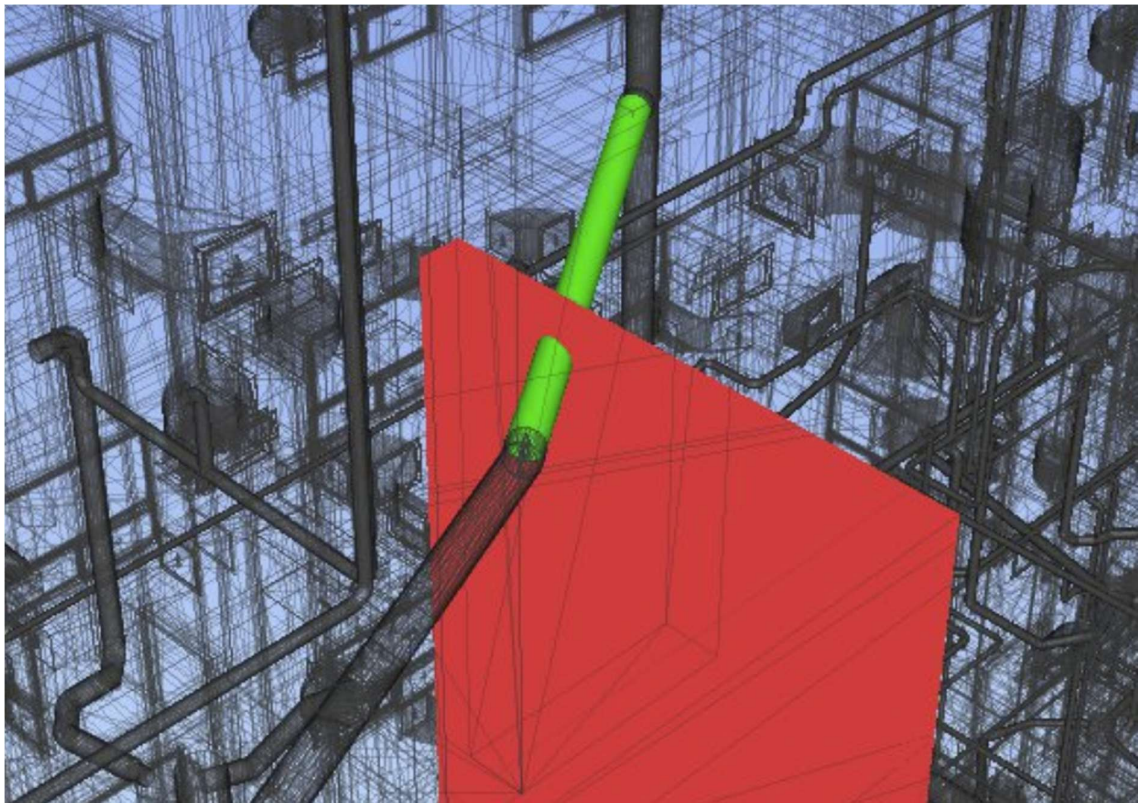


Figure: 21 : High Priority Clash

JUSTIFICATION:

This figure shows the high priority clash between the walls and the sewer pipe of size more than 100mm. As per BIM handbook appendix B, any pipes over 100 mm diameter intersecting major walls (not the partition walls) will be classified as high priority clash.

Examples of clash priority definitions are shown below.

PRIORITY	PRIORITY DEFINITION	EXAMPLE	DETECTION PHASE
1	Critical-priority clashes are reported clashes that are considered critical to the design and construction process. The highest priority is assigned to rectifying them as soon as possible after detection.	Building envelope, primary structure, and main service routes or zones.	Report from end of preliminary design onwards.
2	High-priority clashes are reported clashes that are considered important to the design and construction process. They should be rectified during design phases.	Service pipes that are 100mm in diameter or greater, secondary structure.	Report from 50% developed design onwards.
3	Medium-priority clashes are reported clashes that, while considered important to the correctness of the model, will generally change on a regular basis throughout the design and construction process. They can be assigned a lower-level priority and should be rectified before end-of-phase submissions of the models. Medium-priority clashes requiring further design input during detailed design will be elevated to major.	Service pipes that are less than 100mm in diameter.	Report from 70% developed design onwards.
4	Low-priority clashes are elements that will be moved without question during construction.	Service pipes that are less than 50mm in diameter.	Report from 100% developed design onwardS

Figure: 22 : Priory Identification- New Zealand BIM Handbook: Appendix B – Model Coordination

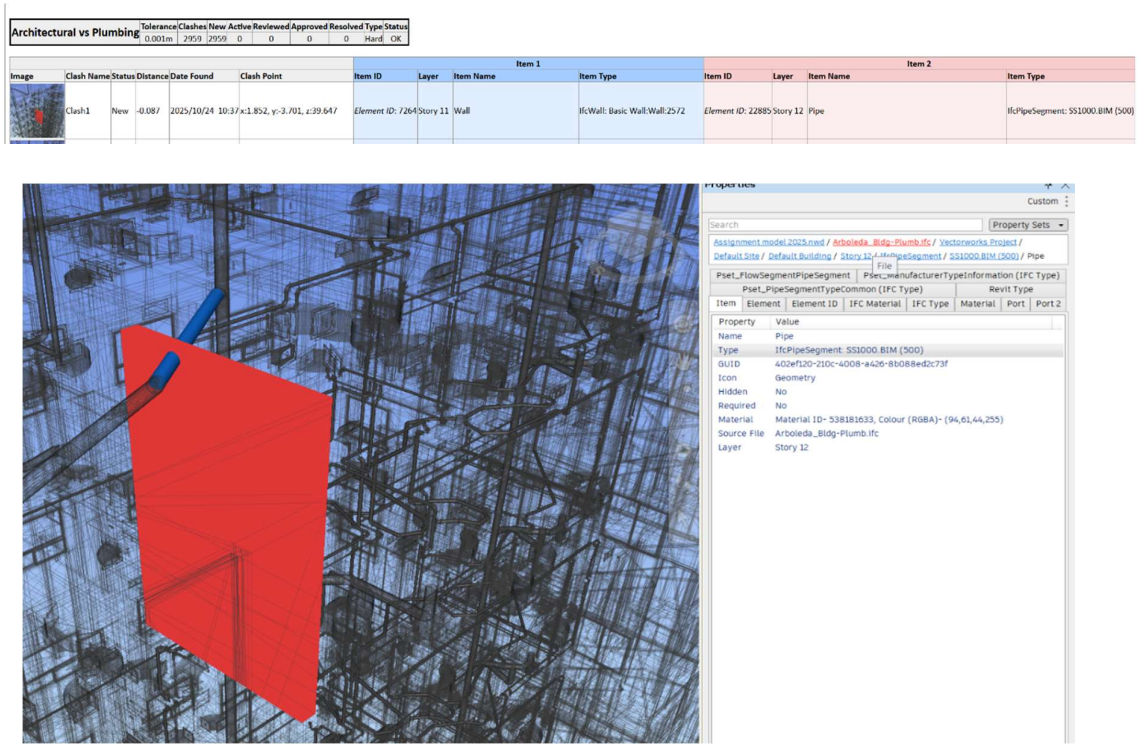


Figure: 23 : High Clash Report & details of Property

This is the further details of the above clash from the report from Navisworks manage.

This clash affects the delays rework cost overruns and reduced quality of work if it isn't resolved before the drawings are issued.

AFFECTED CONSULTANTS:

Architects should revise layouts to accommodate plumbing lines while designing and maintaining aesthetics in coordination with plumbing or MEP engineers to discuss alternative ways routes or layouts or the best way possible. Also the structural engineers should ensure the structural safety and sustainability and load bearing capacity of structural walls while intersecting such a huge pipes through those walls.

Also, reworks and delays affects contractor's subcontractors and even quantity surveyors as this can cause significant cost overruns.

MEDIUM PRIORITY:

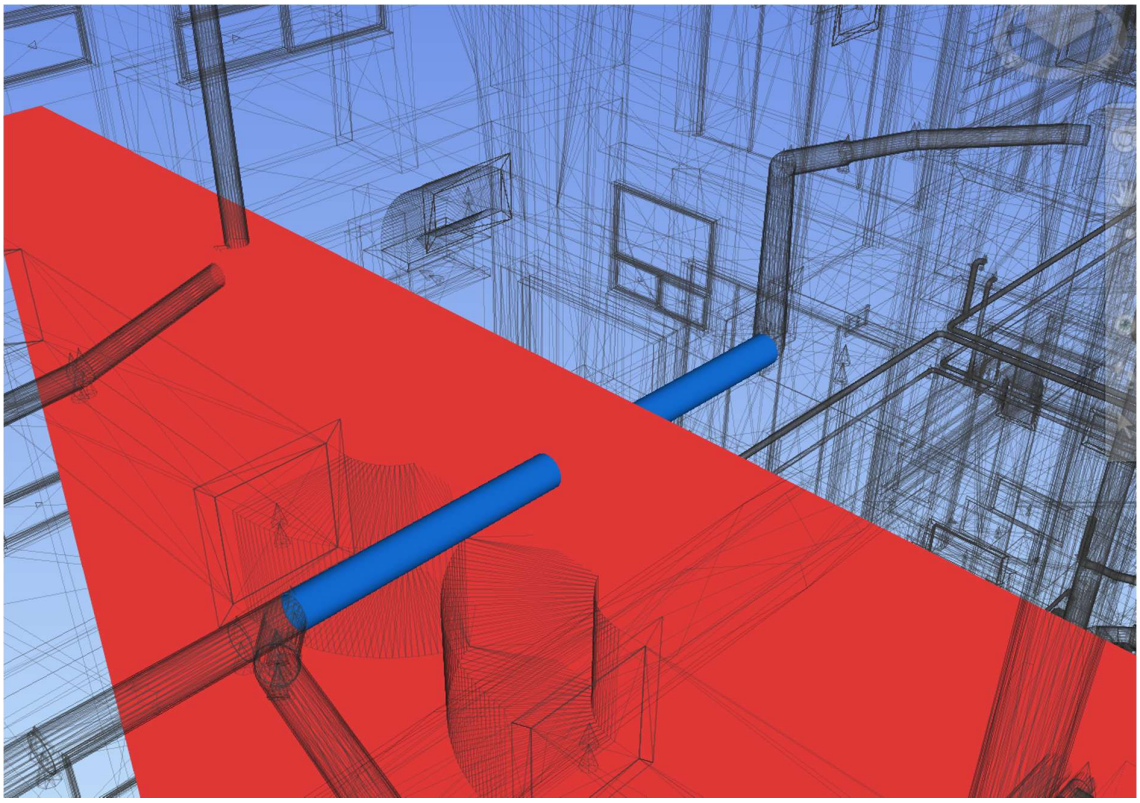


Figure: 24 : Medium Priority Clash

JUSTIFICATION:

This figure shows the intersection between the basic wall and 50mm sewer pipe which is classified as ,medium priority clash as per BIM handbook appendix B for size less than 100mm. This can cause rework and big adjustments if it is not issued properly when drawings are made. Higher the size of pipes larger the area needed to work around, which implicates more difficulty in adjusting and revising layouts and fittings during the installation.

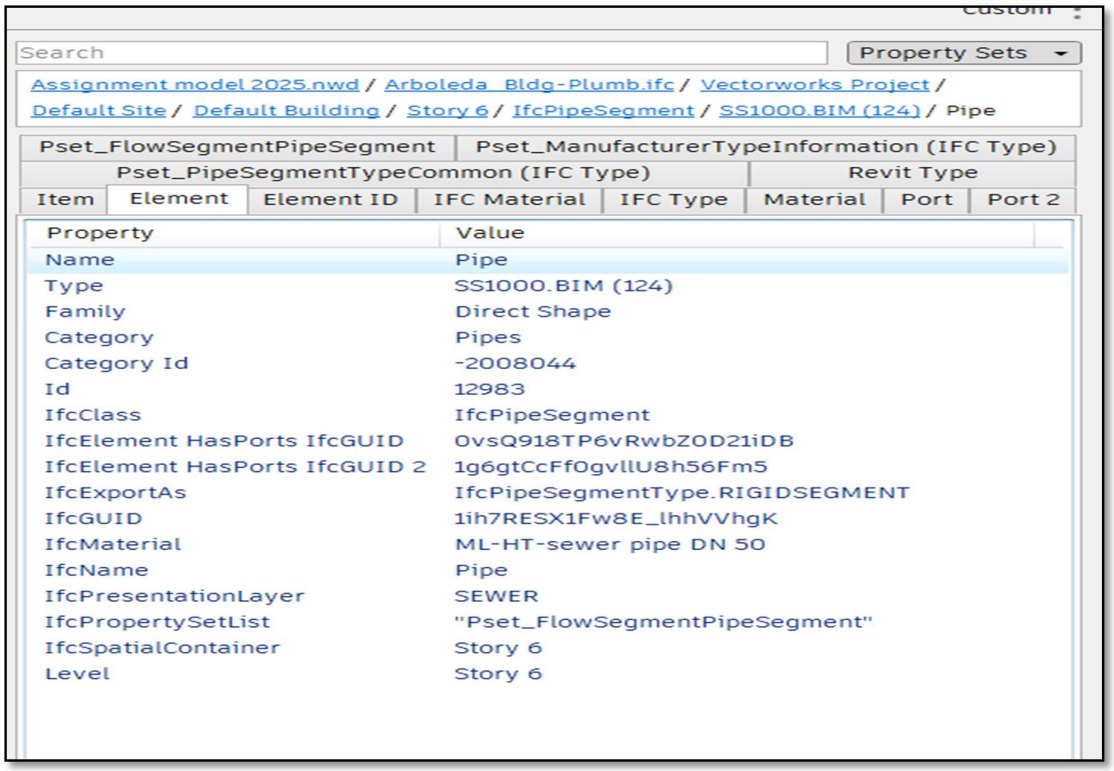


Figure: 25 : Medium Priority Clash – Details of Property

AFFECTED CONSULTANTS:

Architects needs to change the designs or layouts of architectural elements, covering those elements to maintain aesthetics, rerouting and additional fittings required for medium priority clash elements can cause rework and significant amount of additional cost and time. This needs to be discussed prior to finalizing design with collaborating with MEP engineers. Quantity surveyors and subcontractors will be involved with significant variations in overall cost if it goes through the construction stage.

LOW PRIORITY:

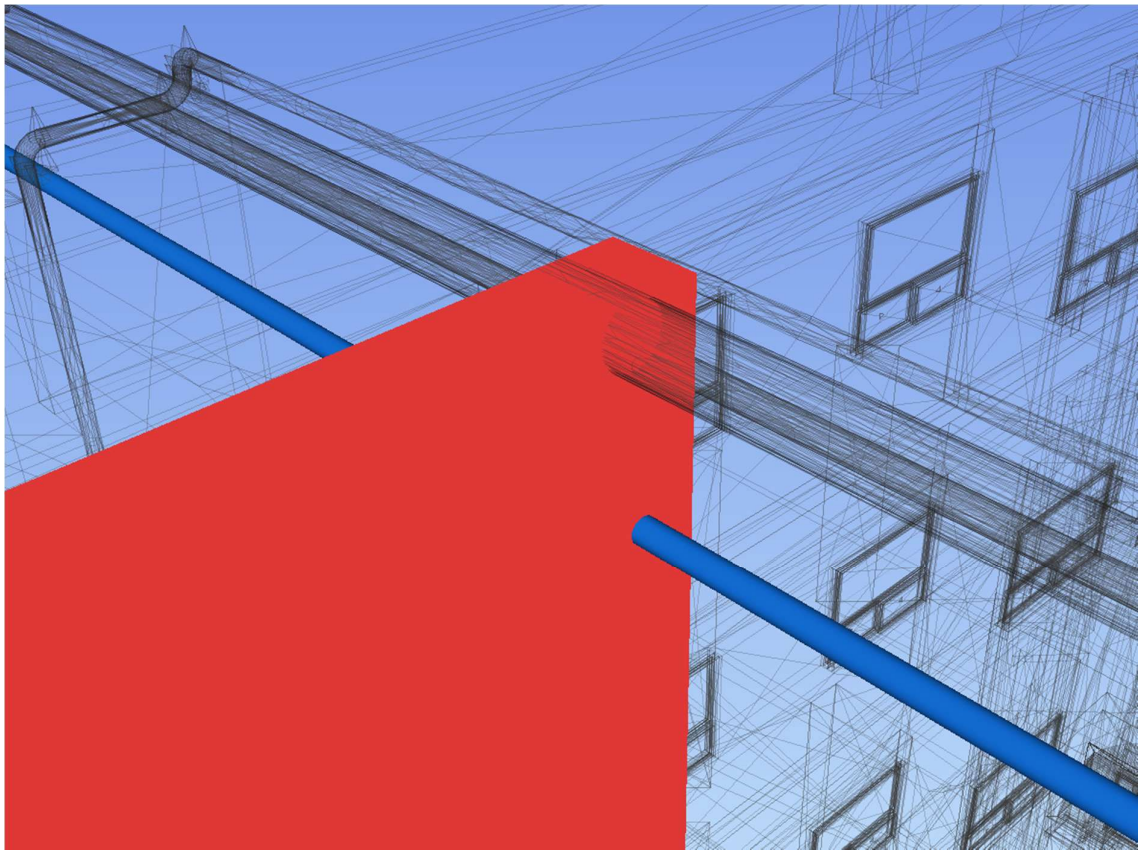


Figure: 26 : Low Priority Clash

JUSTIFICATION:

This figure shows the low priority clash between wall and 25mm copper Coldwater pipe intersecting the wall. As the dimension of pipe is low, priority and future impact is so low that even if it isn't resolved in design stage, it may be adjusted during the construction phase as per the layouts and routes required while maintaining the aesthetics and structural safety of the walls and all elements.

Further properties of this element is shown below

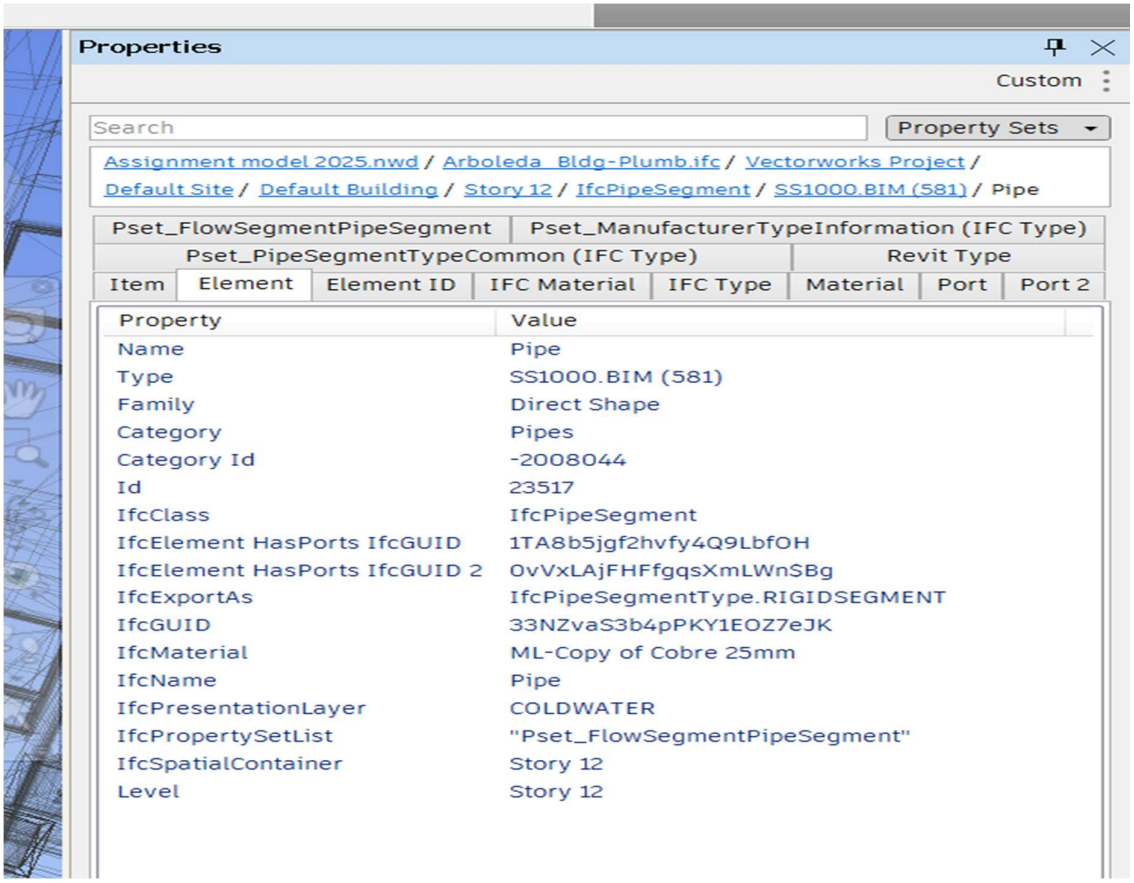


Figure: 27 : Low Priority Clash – Details of Property

As per the BIM handbook Appendix B , any pipe of size less than 50mm intersecting walls should be considered as low priority clash.

AFFECTED CONSULTANTS:

Architects may need to do some small adjustment to their layouts and design to adjust that pipe for rerouting when the clash occurs, same for the plumbing or MEP engineers need to adjust or revise the layouts to accommodate the pipe.

Rerouting cause additional fittings and lengths and quantity of pipe so it may have slight impact on low cost rise or rework which may need to be considered by contractors and quantity surveyors.

3.4 STRUCTURE VS PLUMBING

Student Name: Aswathy Rajasree Pillai	Student ID: 1599030
Software: Navisworks	Model : Struct Vs Plumb

HIGH PRIORITY:

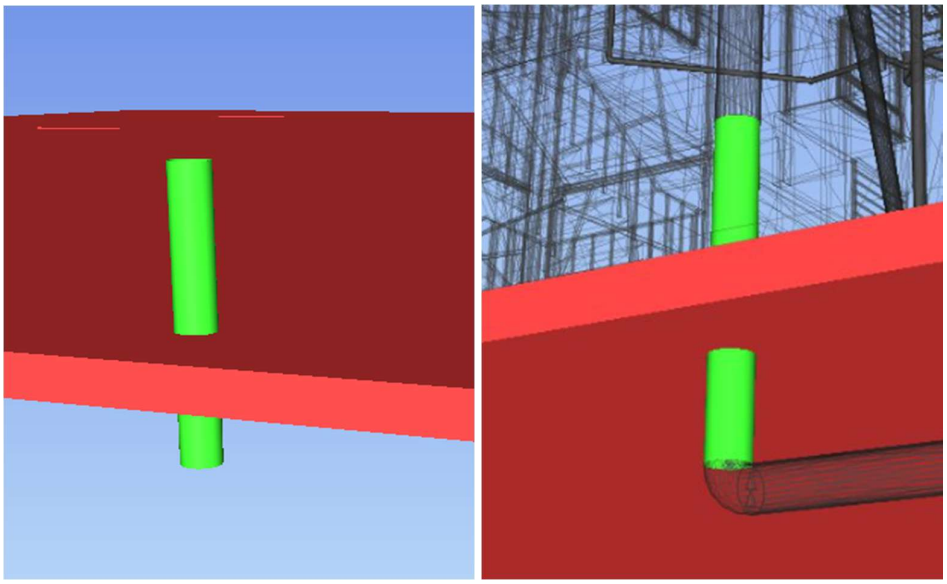


Figure: 28 : High-priority clash between foundation slab and service pipe (sewer)

The first clash is between the foundation slab (Element ID: 2653) and the pipe segment (Element ID: 3378) in parking 1. The nominal diameter of sewer pipe is 100mm.

AUTODESK NAVISWORKS

Clash Report

Test 1	Tolerance	Clashes	New	Active	Reviewed	Approved	Resolved	Type	Status
	0.001m	1709	1709	0	0	0	0	Hard	Old

						Item 1				Item 2			
Image	Clash Name	Status	Distance	Date Found	Clash Point	Item ID	Layer	Item Name	Item Type	Item ID	Layer	Item Name	Item Type
	Clash1	New	-0.117	2025/10/23 23:03	x:-9.764, y:0.333, z:-0.700	*Element ID*: 2653	Foundation	Slab:Slab:204512:Slab:204512 : Slab:Slab:204512:204514	IfcBuildingElementProxy: Slab:Slab:204512:Slab:204512 : Slab:Slab:204512	*Element ID*: 3378	Parking 1	Pipe	IfcPipeSegment: SS1000.BIM (44)

Figure: 29 : High-priority clash Report

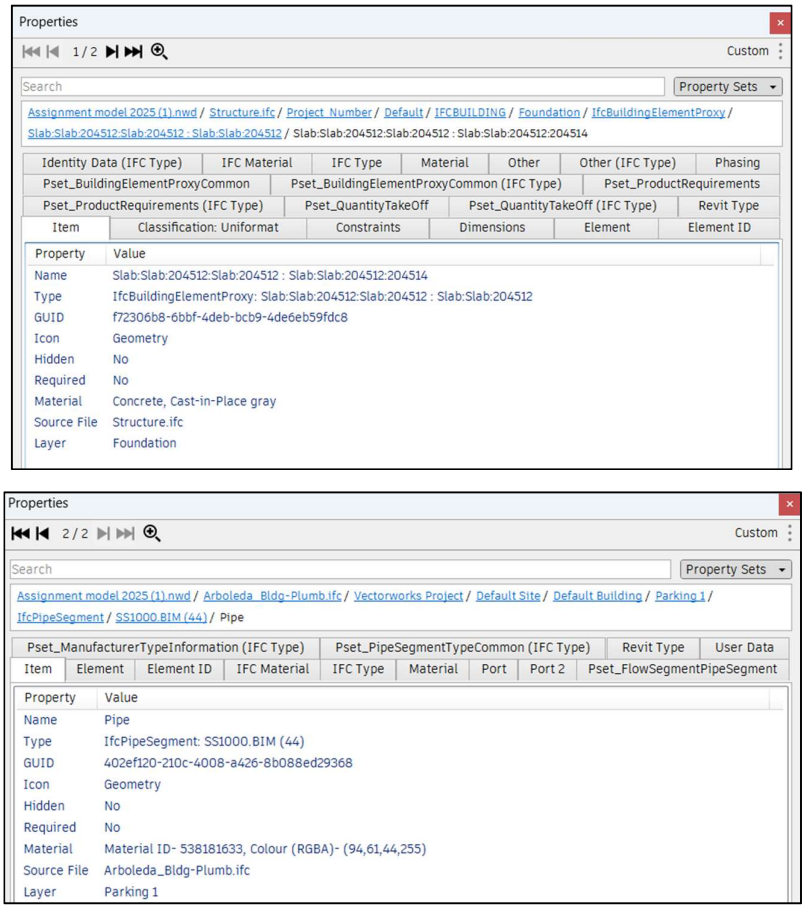


Figure: 30 : High-priority clash Property details

JUSTIFICATION:

- *It's a high-priority clash. Appendix B (2023) explains that clashes between the primary structure and the building envelope will be classified as high-priority clashes.*
- *A foundation slab is a permanent structural element, so any clash with this slab causes major risks in excavation and rework.*
- *After all, it will create rework because it involves the foundation slab, a main structural element, which is built first. Any subsequent changes in construction affect both the cost and structural stability.*
- *This design clash should be resolved as soon as possible before the design approval.*

AFFECTED CONSULTANTS:

- *Structural engineer, Service engineer and BIM Coordinator are responsible for this clash resolution.*
- *Structural engineer should identify and confirm the slab dimensions and their positions. Service engineer should design the duct according to the confirmed slab properties and position. The timely coordination between these two engineers should be done by the BIM coordinator.*

MEDIUM PRIORITY

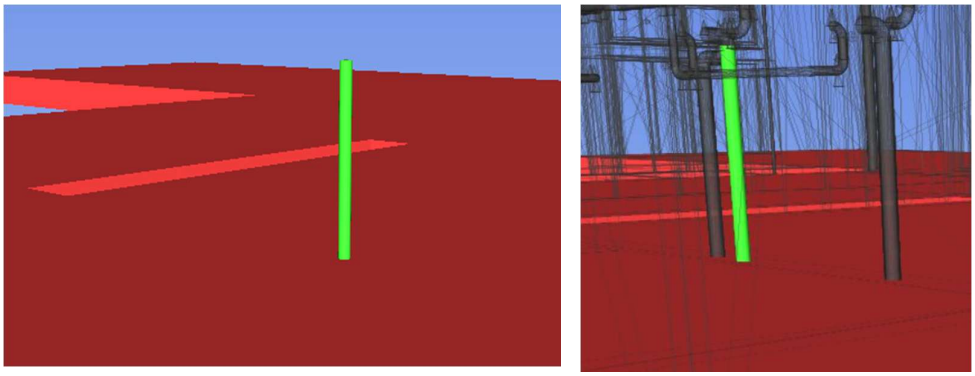


Figure: 31 : Medium-priority clash between level 4 floor slab and level 5 service pipe 40mm (sewer)

This clash is between fourth level floor slab (Element ID: 4263) and the sewer pipe (Element ID: 11106) in fifth level of nominal diameter of 40mm.

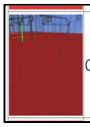
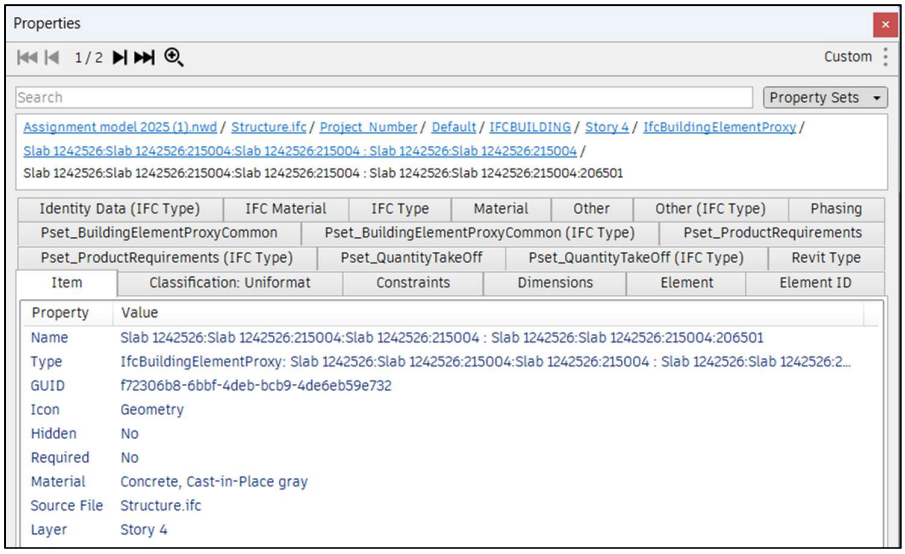
	Clash80	New	-0.069	2025/10/23 23:03	x:1.256, y:-0.615, z:18.020	*Element ID*: 4263	Story 4	Slab 1242526:Slab 1242526:215004:Slab 1242526:215004 : Slab 1242526:Slab 1242526:215004:206501	IfcBuildingElementProxy: Slab 1242526:Slab 1242526:215004:Slab 1242526:215004 : Slab 1242526:Slab 1242526:215004	*Element ID*: 11106	Story 5	Pipe	IfcPipeSegment: SS1000.BIM (94)

Figure: 32 : Medium-priority clash Report



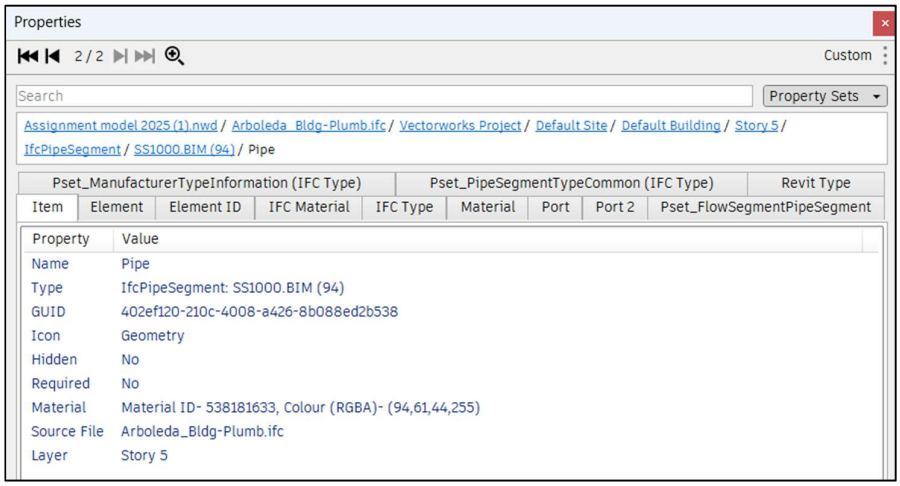


Figure: 33 : Medium-priority clash Property details

JUSTIFICATION:

- *This is also considered as medium priority because its affects the structural member, fourth level floor slab, and cause cost overrun because of rework.*
- *The service line diameter is 40mm. According to Appendix B, service pipe diameter 100mm or greater than this size is to be considered as a high-priority clash. Since the diameter is only 40mm, it is considered a medium priority, and the pipe can be rerouted to avoid the clash.*
- *It should be resolved before full model or design submission.*

AFFECTED CONSULTANTS:

- *Structural engineer, Service engineer and BIM Coordinator are responsible for this clash resolution.*
- *Structural engineer should identify and confirm the slab dimensions and their positions. Service engineer should design the duct line according to the confirmed slab properties and position. The timely coordination between these two engineers should be done by the BIM coordinator.*

LOW PRIORITY

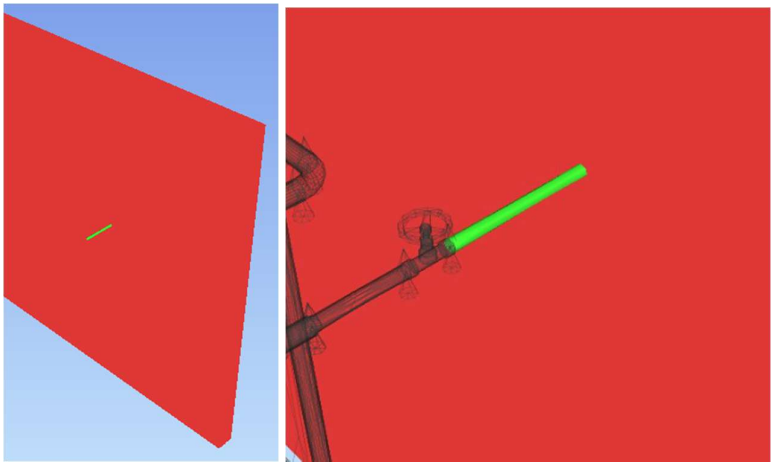
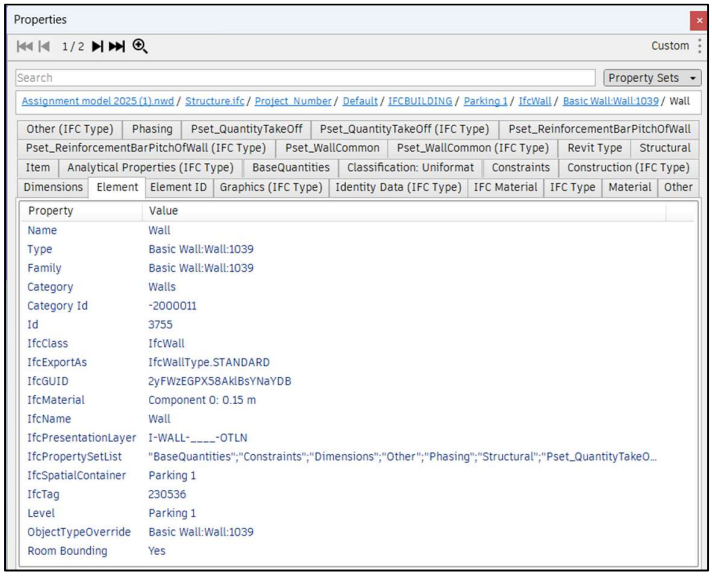


Figure 34: Low-priority clash between wall and service pipe 20mm (Coldwater)

The above shown figure highlights the clash between a non-structural room bounding wall (Element ID: 3755) in parking 1 and the pipeline of nominal diameter of 20mm.

	Clash129	New	-0.050	2025/10/23 23:03	x:8.628, y:11.425, z:0.849	*Element ID*: 3755	Parking 1	Wall	IfcWall: Basic Wall:Wall:1039	*Element ID*: 3049	Parking 1	Pipe	IfcPipeSegment: SS1000.BIM (14)

Figure: 35 : Low priority clash Report



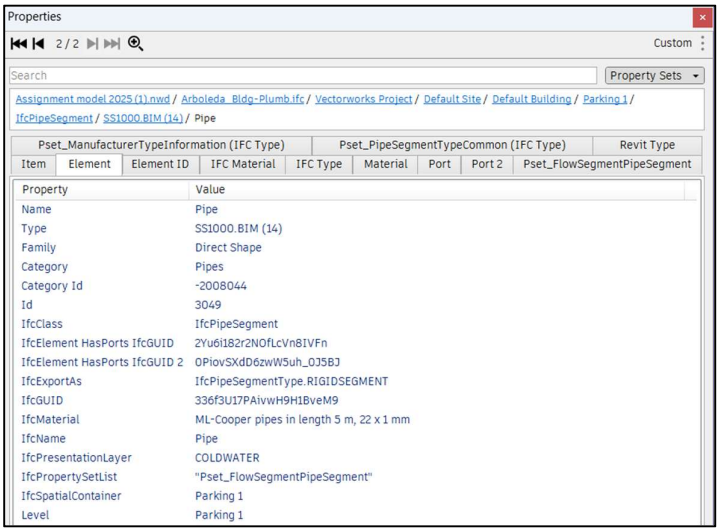


Figure: 36 : Low -priority clash Property details

JUSTIFICATION:

- *According to Appendix B, the clash between the sewer line below 100mm and with secondary structures like partition walls are considered as low-priority clashes.*
- *Because the non-structural wall can be easily be shifted or create a hole in the pipe penetration position. It will not have that much effect in cost or structure.*
- *It can be solved in design stage if not it can be resolved even during construction.*

AFFECTED CONSULTANTS:

- *Service engineer, architect and BIM coordinator are the affected consultants.*
- *The Architect can either modify the wall or add an opening in pipe position after confirming with the service engineer and BIM coordinator and update the model or drawings.*

3.5 MECHANICAL VS PLUMBING

Student Name: Pavithra Ranaweera	Student ID: 1593585
Software: Navisworks	Model : Mech Vs Plumb

HIGH PRIORITY CLASH – MECHANICAL VS PLUMBING

HIGH CATEGORY ISSUE

Clash ID : #5
Level : 11
Type : Hard Clash
Elements Involved : Mechanical duct (Element ID 10393) vs vertical plumbing riser (Element ID 22738)
Description : A major HVAC supply duct runs directly through a 150 mm vertical plumbing riser within the main service shaft.
Severity : Critical — affects two primary building service systems (air and water).
Detection : Identified in Navisworks Manage at tolerance = 0.001 m.

This clash represents a high-priority coordination issue because it involves main service routes that are fundamental to the building's operational performance.

USE OF TEXT AND GRAPHICS

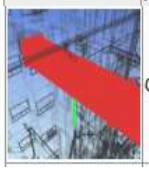
						Item 1			
Image	Clash Name	Status	Distance	Date Found	Clash Point	Item ID	Layer	Item Name	Item Type
	Clash5	New	-0.061	2025/10/22 09:16	x:1.152, y:0.472, z:39.404	*Element ID*: 10393	Story 11	Material ID- 470024202, Colour (RGBA)- (174,23,0,255)	Solid

Figure 37: Description of Item 01 High Priority Clash Report

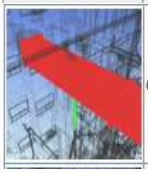
						Item 2			
Image	Clash Name	Status	Distance	Date Found	Clash Point	Item ID	Layer	Item Name	Item Type
	Clash5	New	-0.061	2025/10/22 09:16	x:1.152, y:0.472, z:39.404	*Element ID*: 22738	Story 11	Pipe	IfcPipeSegment: SS1000.BIM (328)

Figure 38: Description of Item 02 High Priority Clash Report

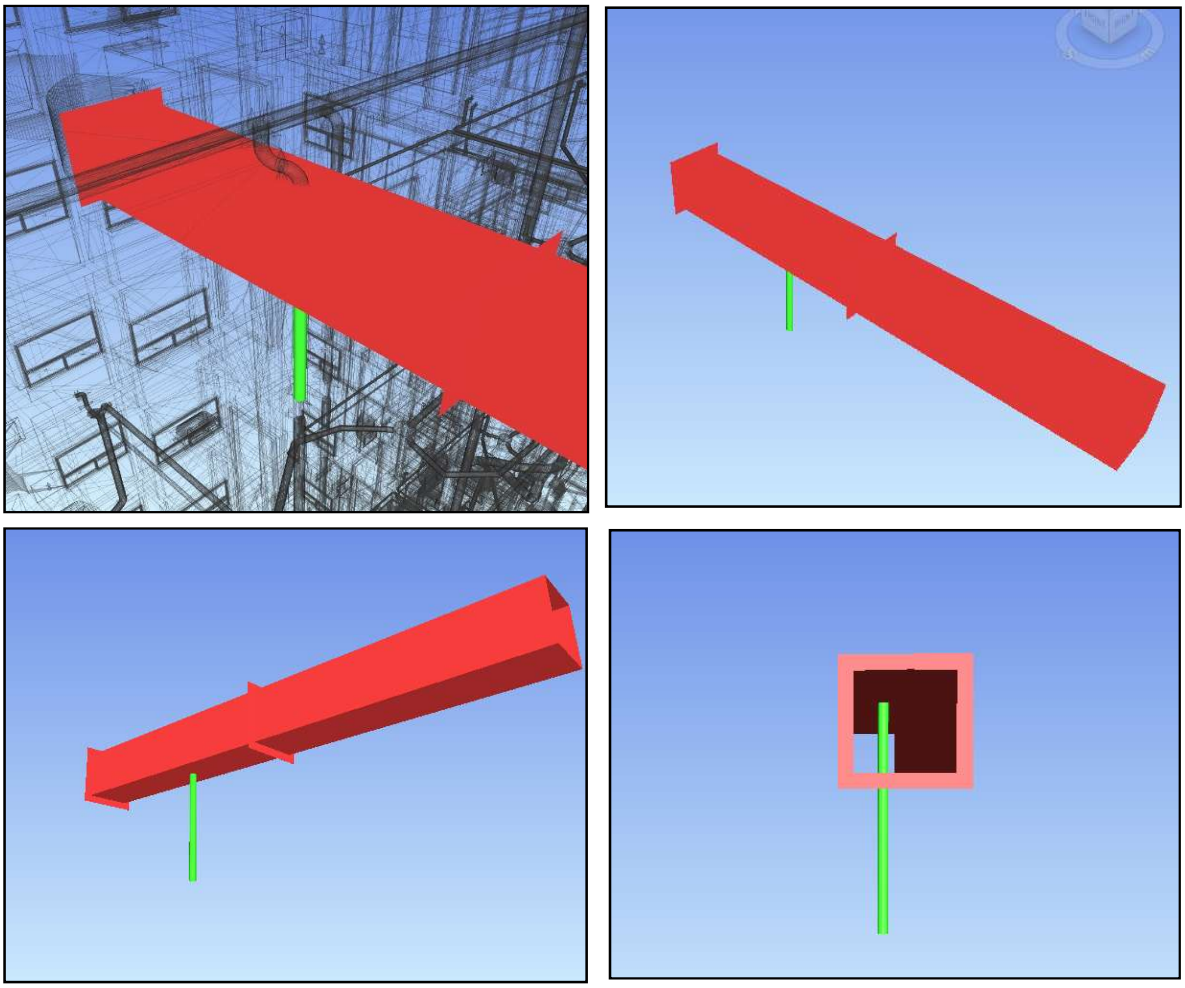


Figure 39 - 42: Views of High Priority Clash between Duct vs Vertical Plumbing Riser

JUSTIFICATION AND REASONS FOR PRIORITY

According to the NZ BIM Handbook's Appendix B (2023, p. 5), this conflict is classified as High Priority: "High-priority clashes are those that significantly affect the design coordination process or the layout of major building services and must be resolved before construction documentation is issued."

Detailed Justification:

1. **Involvement of Major Service Systems**

   Clash #5 occurs between a main HVAC supply duct (Element ID 10393) and a 150 mm vertical plumbing riser (Element ID 22738) located in the Level 11 service shaft. These are both primary building systems with fixed routing requirements. Any interference between them directly impacts the functionality, efficiency, and spatial integrity of the MEP design.

2. **High Impact on Coordination and Design Development**

   The clash lies within a shared vertical shaft that also accommodates fire and electrical services. Without timely resolution, the conflict would cascade through the coordination of adjacent trades, limiting available riser space and requiring downstream re-modelling. High-priority classification ensures this is addressed early, during the 70–90 % design stage, rather than after construction documentation.

3. **Exceeds Design Tolerance Thresholds**

   The interference measures approximately 61 mm**,** exceeding the 25 mm allowable tolerance specified for detailed coordination in the *NZ BIM Handbook (Appendix B, p. 4)*. This breach indicates inadequate service separation and validates the need for immediate design refinement.

4. **Constructability and Maintenance Implications**

   If unresolved, installers would be unable to position ductwork or risers without field modification. Such modifications may interrupt installation sequencing, restrict maintenance access, and jeopardize insulation and fire-stopping features. These implications justify a high-priority reaction but fall short of "critical" because they do not jeopardize structural integrity or life safety.

5. **Programme and Cost Risk**

   High-priority issues like this one, if left uncoordinated, typically lead to installation delays and additional labour hours. Eastman et al. (2018) report that addressing coordination conflicts during design costs less than 10 % of the expense of fixing them on-site. Early resolution therefore supports both cost and schedule control.

6. **Design Dependency and Right-of-Way Principle**

   Under the BIM coordination hierarchy, larger fixed elements (ducts) generally maintain right-of-way over smaller flexible elements (pipes) – a principle endorsed by the NZ BIM Handbook (Appendix B, p. 6). The plumbing riser, however, serves multiple levels and cannot simply be relocated without re-designing branch connections. This mutual constraint justifies the clash being classed as high, requiring design-team negotiation to determine the most feasible reroute.

7. **Regulatory and Performance Considerations**

   The clash violates spatial clearances required by NZ Building Code Clause G4 (Ventilation) and AS/NZS 3500 (Plumbing and Drainage) if unaddressed. High-priority status ensures these compliance aspects are reviewed before documentation submission.

This comprehensive justification demonstrates that Clash #5 represents a critical coordination issue with far-reaching implications for constructability, building performance, cost, and compliance meeting all criteria for a High-Priority classification under the NZ BIM Handbook (2023).

LITERATURE TO JUSTIFICATION

The classification of Clash #5 as a High-priority issue is supported by both industry standards and scholarly literature on BIM coordination and model management.

1. **NZ BIM Handbook Appendix B (2023)**

   The Handbook defines *high-priority clashes* as those "that significantly affect design coordination or the layout of major building services and must be resolved before construction documentation is issued" (p. 6). The interference between a main HVAC duct and **a** vertical plumbing riser precisely meets this definition because it disrupts two essential building systems within a shared service shaft. The Handbook also introduces the *right-of-way principle*, giving larger, less flexible components precedence over smaller ones (p. 6). This principle validates assigning the issue a high-priority rating, as the duct's fixed geometry limits rerouting options compared with the pipe.

2. **Eastman et al. (2018)**

   Eastman and colleagues emphasize that early identification and rectification of service conflicts in BIM models greatly reduces the cost and time impacts of rework. They note that resolving design-stage clashes can save "up to an order of magnitude in cost" compared with discovering them during construction. This directly supports the need to treat the duct–riser clash as high priority to prevent expensive downstream delays.

3. **Sacks and Pikas (2013)**

   Sacks and Pikas stress that maintaining *constructability* depends on prioritizing design coordination for high-impact systems such as HVAC and plumbing. Their research demonstrates that well-structured clash management during design enhances workflow efficiency and reduces on-site improvisation. Applying this insight justifies prompt attention to Clash #5 to preserve construction sequence integrity.

   Collectively, these authoritative sources establish that clashes involving major, rigid service systems require immediate coordination during the design phase. Their consistent guidance confirms that Clash #5 warrants a High-priority classification, as timely resolution supports constructability, reduces rework cost, and ensures compliance with recognized BIM coordination standards.

CONSULTANTS AFFECTED AND RESPONSIBLE

The resolution of Clash #5—between the main mechanical duct and the vertical plumbing riser—requires coordinated input from multiple consultants. Each party has a defined professional responsibility within the BIM coordination process as set out in the *NZ BIM Handbook (Appendix B, 2023)*.

Consultant	Primary Responsibility	Specific Role in Resolving Clash #5
Mechanical Engineer (MEP Consultant)	Responsible for the design, layout, and sizing of the HVAC ductwork system, ensuring airflow efficiency and compliance with the NZ Building Code Clause G4 (Ventilation).	Holds primary responsibility for reviewing the conflicting duct route, assessing potential rerouting or resizing options, and coordinating with the plumbing team to reallocate service space while maintaining duct performance and clearance tolerances.
Plumbing/Hydraulic Engineer	Accountable for the design and coordination of water supply, drainage, and vertical riser systems, following AS/NZS 3500 (Plumbing and Drainage).	Must collaborate closely with the mechanical consultant to reposition or adjust the plumbing riser alignment without compromising water flow, pressure balance, or maintenance access. Ensures that the updated model maintains adequate separation from HVAC systems and complies with plumbing code requirements.
BIM Manager	Oversees multidisciplinary coordination, clash detection processes, and model issue tracking. Ensures that design revisions are documented and model versions remain consistent.	Acts as a neutral facilitator who records the clash in the coordination matrix, assigns it to the responsible disciplines, and monitors progress until resolution. The BIM Manager verifies that the updated federated model meets project coordination standards and that all changes are logged and approved before submission.

In summary, the Mechanical Engineer leads the resolution by modifying the duct layout, the Plumbing Engineer collaborates to adjust riser routing while maintaining hydraulic functionality, and the BIM Manager ensures the issue's lifecycle is properly documented and closed in accordance with the *NZ BIM Handbook (2023)* coordination workflow.

REASONS FOR THE CONSULTANTS WOULD BE AFFECTED

This clash is classified as High Priority. Each consultant has a clearly defined role in resolving the issue in accordance with the NZ BIM Handbook Appendix B (2023) coordination process. The table below outlines discipline responsibilities and how each party is affected.

Consultant	Impact	Responsibility	Reason for Accountability
Mechanical Engineer (MEP Consultant)	The duct's collision with the plumbing riser prevents proper routing through the Level 11 service shaft, potentially disrupting airflow distribution and breaching minimum clearance requirements for insulation, fire stopping, and access.	Review the duct layout, determine possible rerouting or resizing options, and coordinate with the plumbing engineer to re-establish compliant clearances (generally ≥ 50 mm separation), ensuring adequate ventilation and performance efficiency under NZBC Clause G4 – Ventilation.	Ductwork typically takes precedence under the right-of-way principle (NZ BIM Handbook Appendix B, 2023, p. 6) because it is a fixed, high-capacity element. Mechanical consultant holds primary accountability for initiating and managing spatial redesign actions.
Plumbing / Hydraulic Engineer	Any adjustment to the riser's position could alter hydraulic gradients, affect pipe support locations, or require reconfiguration of branches and valves, risking non-compliance with AS/NZS 3500.	Collaborate closely with the mechanical team to evaluate possible riser offsets or diameter modifications that maintain flow continuity, system reliability, and compliance.	The riser's alignment directly influences plumbing performance. The hydraulic consultant is responsible for validating that any spatial adjustments remain code-compliant, constructible, and do not compromise maintenance access, pressure loss, or water supply reliability.
BIM Manager / BIM Coordinator	The clash affects oversight of model quality and coordination accuracy; unresolved issues compromise federated model integrity and coordination reviews.	Ensure all clashes are logged, assigned, and tracked within the project's issue-management platform (e.g., Navisworks Clash Detective or BIM 360 Model Coordination) and confirm closure once resolved.	Facilitates interdisciplinary collaboration, verifies proper model integration, and updates the clash-resolution matrix. Ensures adherence to BIM coordination workflow and version control standards.

Effective resolution of Clash #5 requires **active collaboration** among all three parties:

- The **Mechanical Engineer** leads the spatial redesign.
- The **Plumbing Engineer** validates system performance after rerouting.
- The **BIM Manager** monitors, documents, and verifies resolution in the federated model.

This coordinated workflow exemplifies best practice under the *NZ BIM Handbook Appendix B*—ensuring a constructible, compliant, and efficiently coordinated BIM model that aligns with project objectives and reduces construction risk.

MEDIUM PRIORITY CLASH – MECHANICAL VS PLUMBING

MEDIUM CATEGORY ISSUE

Clash ID : #19

Location : Level 4 — Ceiling plenum zone

Elements Involved : Secondary mechanical air duct (approx. Ø150–200 mm)
Non-pressurized plumbing pipe (approx. Ø50–75 mm)

Type : Hard clash (interference ≈ 28 mm)

Description : Secondary ductwork intersects a horizontal plumbing line within the service zone above the ceiling.

Reason for Category : Clash affects routing and access of services but does not interrupt primary riser systems, therefore ranked Medium Priority per NZ BIM Handbook Appendix B guidance.

USE OF TEXT AND GRAPHICS

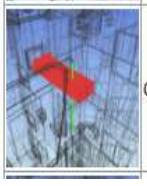
						Item 1			
Image	Clash Name	Status	Distance	Date Found	Clash Point	Item ID	Layer	Item Name	Item Type
	Clash19	New	-0.039	2025/10/22 09:16	x:1.165, y:5.430, z:17.403	*Element ID*: 5645	Story 4	Material ID- 470024202, Colour (RGBA)- (174,23,0,255)	Solid

Figure 43: Description of Item 01 Medium Priority Clash Report

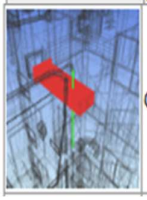
						Item 2			
Image	Clash Name	Status	Distance	Date Found	Clash Point	Item ID	Layer	Item Name	Item Type
	Clash19	New	-0.039	2025/10/22 09:16	x:1.165, y:5.430, z:17.403	*Element ID*: 10517	Story 4	Pipe	IfcPipeSegment: SS1000.BIM (290)

Figure 44: Description of Item 02 Medium Priority Clash Report

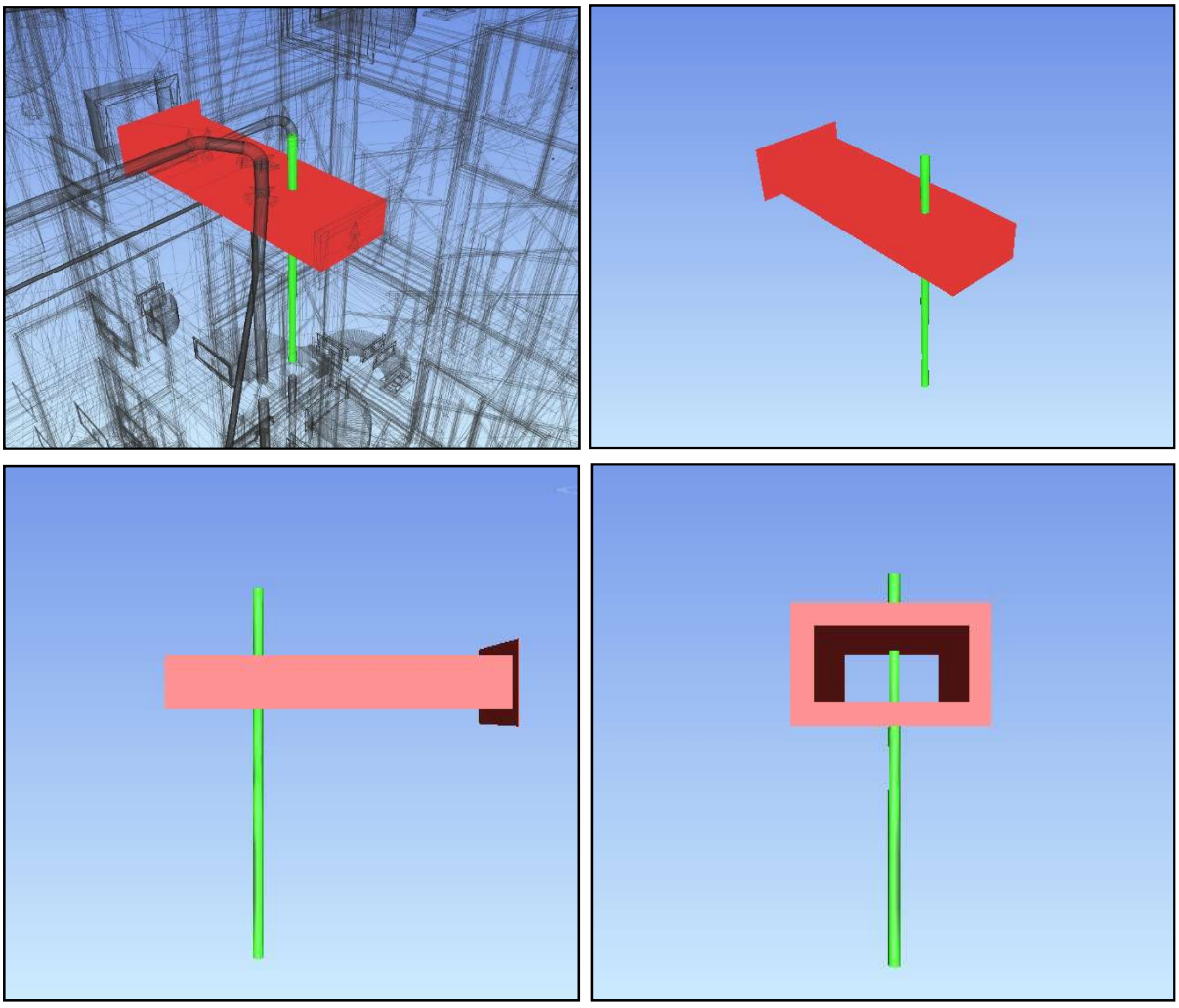


Figure 45 - 48: Views of Medium Priority Clash between Duct vs Horizontal Pipe

JUSTIFICATION AND REASONS FOR PRIORITY

According to Appendix B of the **NZ BIM Handbook (2023, p. 6)**, medium-priority clashes are defined as: "Clashes that affect design coordination and constructability but do not interrupt major service alignments or prevent overall design development. They should be resolved before issuing construction documentation."

Clash #19 meets this definition due to the following detailed justification:

1. Involvement of Secondary Building Services

This clash involves a secondary supply duct (Element ID 30211) and a local horizontal plumbing branch (Element ID 41702) located in the Level 4 ceiling plenum. These are non-primary services that supply localized areas only. Their routing can be altered with minimal redesign effort and without major impact on system continuity.

2. Constructability Impact in a Congested Ceiling Zone

The clash occurs in a **shared plenum zone** that includes electrical, sprinklers, and ceiling framing. Unresolved, the interference would:

- Reduce installer access
- Create obstruction during hanger and insulation placement
- Affect ceiling installation sequencing
  although operationally important, these impacts are **moderate** and do not prevent ongoing design progression.

3. Minor Breach of Coordination Tolerance Requirements

The physical overlap measure is 28 mm**,** which exceeds the allowable **≤** 25 mm tolerance for detailed design coordination (*NZ BIM Handbook*, Appendix B, 2023). This indicates a real but manageable clash that can be resolved through minor spatial adjustment of either service.

4. Limited Impact on Operational Performance

The clash does **not affect system performance** relating to:

- Airflow balancing and pressure (NZBC G4 – Ventilation)
- Pipe hydraulic gradient or drainage compliance (AS/NZS 3500)

System functionality remains unaffected if the clash is resolved during modelling.

5. Low-Risk Corrective Design Intervention

The duct can be lowered slightly or the plumbing pipe shifted laterally without:

- Re-designing shafts or plant
- Re-routing major services
- Compromising maintainability

This supports the clash staying below high-priority level.

6. Prevention of Escalating Cost and Schedule Impacts

If ignored until installation, this interference would trigger:

- Local rework
- Trade delays
- Increased labour effort

Eastman et al. (2018) highlight that resolving clashes digitally is 5–10 times more cost-effective than correcting in the field — reinforcing the need for coordinated resolution at this stage.

7. Compliance with Coordination Hierarchy

The right-of-way principle, referenced in Appendix B, indicates larger services such as ducts have precedence over smaller pipework. Therefore, the clash requires a controlled redesign but does not jeopardize major routing geometry, supporting a Medium-priority classification.

Clash #19 affects installation logistics and tolerance compliance within a congested ceiling space but does not compromise primary system routing, performance, or overall design progress**.** It therefore meets all criteria for a Medium-Priority classification under the NZ BIM Handbook (2023), ensuring coordination is completed before IFC documentation while avoiding unnecessary delays and onsite rework.

LITERATURE TO JUSTIFICATION

The classification of Clash #19 as a Medium-priority coordination issue is directly supported by national BIM standards and leading academic literature on design-stage clash management.

1. NZ BIM Handbook Appendix B (2023)

The NZ BIM Handbook defines medium-priority clashes as those that affect coordination and constructability but do not obstruct major building service arrangements**,** and therefore must be resolved before the issue of construction documentation (pp. 6–7). The Handbook further notes that clashes in shared ceiling plenum zones typically require design coordination because they influence multi-trade installation access. Because Clash #19 involves a secondary services conflict (minor HVAC duct vs. plumbing branch line) and does not compromise the continuity of primary risers, it aligns precisely with this medium-severity definition.

2. Eastman et al. (2018)

Eastman et al. highlight that clashes affecting constructability should still be considered significant coordination risks due to the immediacy with which they escalate if deferred to site conditions. Their findings state that early design conflict resolution prevents avoidable schedule delays associated with

ceiling-level installation congestion. Therefore, although this clash is not system-critical, literature confirms that addressing it during design avoids costly field rework.

3. Sacks and Pikas (2013)

Sacks and Pikas emphasize that BIM-enabled coordination must priorities clashes in densely serviced spaces to maintain clean workflow and prevent trade-to-trade interference. Since ceiling plenums contain mechanical, plumbing, electrical, and fire services simultaneously, even minor interferences can disrupt sequential installation. Their work supports assigning a Medium Priority level to this issue to preserve constructability and maintain safe working clearances.

CONSULTANTS AFFECTED AND RESPONSIBLE

The resolution of Clash #19—between a secondary HVAC duct and a horizontal plumbing branch pipe in the Level 4 ceiling plenum—requires coordinated input from multiple consultants. Each consultant's responsibility is defined under the BIM coordination framework in the *NZ BIM Handbook (Appendix B, 2023)*.

Consultant	Primary Responsibility	Specific Role in Resolving Clash
Mechanical Engineer (MEP Consultant)	Responsible for the design, sizing, and routing of mechanical distribution ductwork to ensure airflow performance and compliance with NZ Building Code Clause G4 (Ventilation).	Lead responsibility to review and adjust duct alignment or elevation to prevent interference with the plumbing line while maintaining insulation thickness and adequate service clearance within the ceiling space.
Plumbing / Hydraulic Engineer	Accountable for the design and coordination of water distribution networks in accordance with AS/NZS 3500 (Plumbing and Drainage).	Collaborate with the mechanical team to shift the pipe horizontally along corridor alignment, ensuring drainage gradient, maintenance access, and code-compliant separation from HVAC services are upheld.
BIM Manager / BIM Coordinator	Oversees the federation of discipline models, clash detection, coordination workflows, and issue-tracking documentation.	Facilitate review discussions, assign the clash to responsible parties, and ensure updated models are validated and approved in accordance with the NZ BIM Handbook coordination process before construction documentation is issued.

In summary, the Mechanical Engineer takes the lead in resolving this clash through duct repositioning, the Plumbing Engineer ensures hydraulic functionality remains unaffected during coordination, and the BIM Manager maintains oversight so that clash resolution is fully documented and compliant with

project coordination requirements. This structured multidisciplinary response supports the Medium-priority classification by ensuring the clash is addressed before it negatively impacts ceiling-area constructability.

REASONS FOR THE CONSULTANTS WOULD BE AFFECTED

This clash is classified as Medium Priority. Each consultant has a clearly defined role in ensuring the issue is resolved effectively in accordance with the NZ BIM Handbook Appendix B (2023) coordination process. The table below outlines discipline responsibilities and how each party is affected.

Consultant	Impact	Responsibility	Reason for Accountability
Mechanical Engineer (MEP Consultant)	The duct interference restricts the correct installation of insulation, hangers, and potential fire-stopping requirements. If unresolved, it may cause local airflow disturbances, reduce thermal performance, and delay ceiling closure sequencing due to necessary rework.	Under NZBC Clause G4 Ventilation, the Mechanical Engineer must review the duct alignment and implement a minor rerouting strategy to maintain system performance and clash-free service distribution.	According to the right-of-way principle in NZ BIM Handbook Appendix B (2023), duct systems take precedence over minor plumbing branches due to larger diameter, limited flexibility, and airflow constraints. The mechanical consultant holds primary accountability for initiating spatial adjustments.
Plumbing / Hydraulic Engineer	Adjusting pipe routing may require repositioning support brackets or fittings, which could slightly influence drainage alignment and installation efficiency. Poor coordination may cause confined-space access issues for future maintenance.	Collaborate with the mechanical team to confirm that any pipe re-routing maintains correct gradients and access clearances without compromising hydraulic performance.	Plumbing layouts must preserve functional maintenance access and flow characteristics. The hydraulic consultant is responsible for verifying that any introduced modifications remain constructible and code-compliant.
BIM Manager / BIM Coordinator	The existence of this clash impacts model quality control and overall coordination readiness. Delays may compromise the accuracy of clash-free status for the ceiling plenum area.	Ensure the clash is properly logged, prioritized, and tracked in the issue-management platform (e.g., Navisworks or ACC Model Coordination), aligning with NZ BIM Handbook (2023, p. 3) coordination workflow.	Validate federated model updates, confirm clash closure, enforce version control, and facilitate consultant collaboration to ensure full coordination compliance prior to issuing IFC documentation.

Effective resolution of Clash #19 relies on coordinated contributions from all three parties:

1. **Mechanical Engineer** leads adjustment of duct routing
2. **Plumbing Engineer** ensures functional and compliant pipe relocation
3. **BIM Manager** oversees documentation and verifies resolution

This structure demonstrates the collaborative BIM process required under NZ BIM Handbook Appendix B to maintain model accuracy, ensure constructability, and prevent cost-intensive on-site rework.

LOW PRIORITY CLASH – MECHANICAL VS PLUMBING

LOW CATEGORY ISSUES

Clash ID : #104
Level : 2
Type : Soft Clash
Elements Involved : Flexible mechanical branch duct (Element ID 44791) vs condensate drain pipe (Element ID 51823)
Description : A minor HVAC flexible branch duct supplying a single diffuser slightly overlaps a small-diameter condensate drainage pipe above the Level 2 corridor ceiling zone**.**
Severity : Low — involves tertiary services that are highly flexible and serve limited local areas only.
Detection : Identified in Navisworks Manage at tolerance = 0.001 m, with an overlap of approximately 12 mm.

This clash represents a low-priority coordination issue because it involves small, easily adjustable services that do not influence primary building system performance, do not affect design development, and can be resolved quickly during installation without delaying construction sequencing or requiring redesign from other consultants.

USE OF TEXT AND GRAPHICS

						Item 1			
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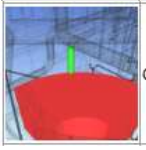	Clash104	New	-0.006	2025/10/22 09:16	x:1.480, y:-2.104, z:8.103	*Element ID*: 3051	Story 1	135684	Composite

Figure 49: Description of Item 01 Low Priority Clash Report

						Item 2			
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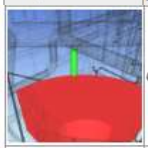
	Clash104	New	-0.006	2025/10/22 09:16	x:1.480, y:-2.104, z:8.103	*Element ID*: 5677	Story 1	Pipe	IfcPipeSegment: SS1000.BIM (334)

Figure 50: Description of Item 02 Low Priority Clash Report

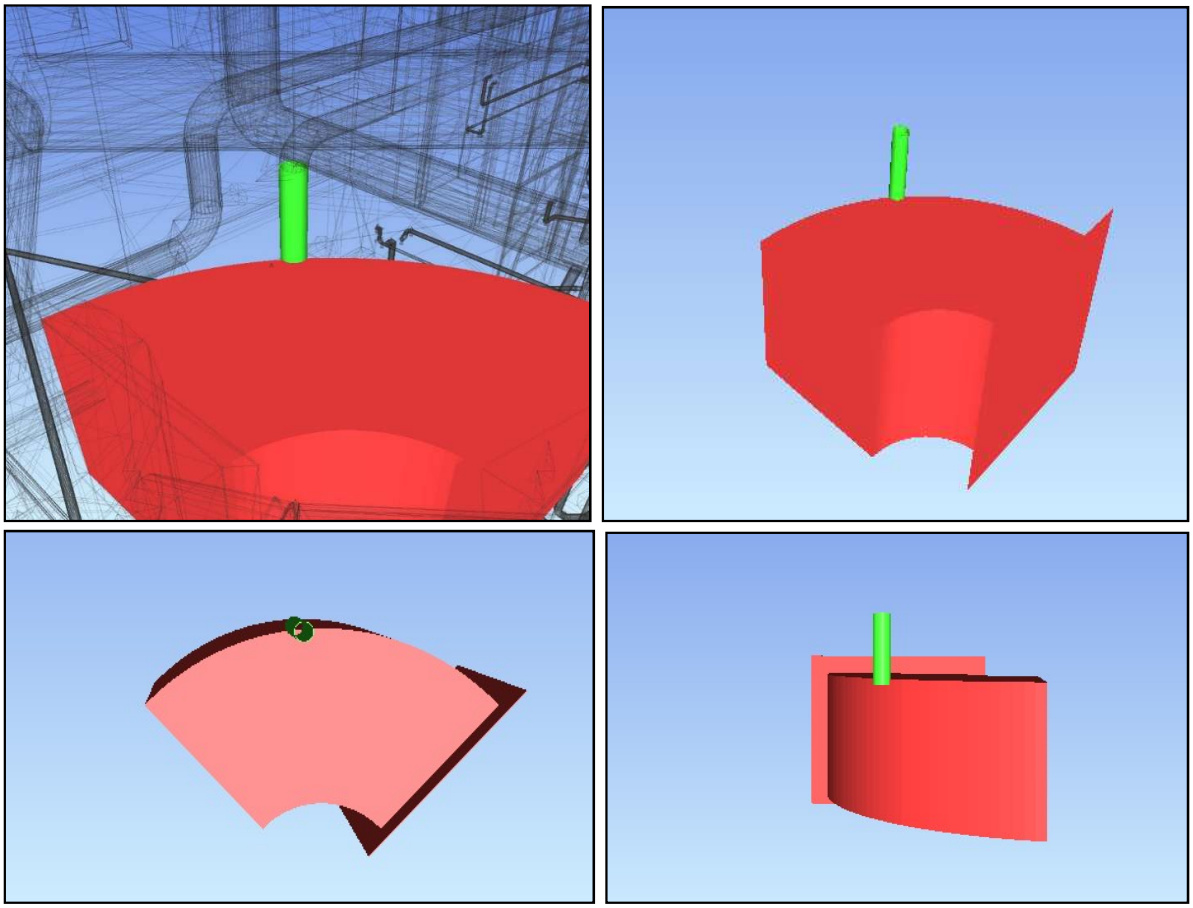


Figure 51 - 54: Views of Low Priority Clash between Small Pipe vs Distribution Port

JUSTIFICATION AND REASONS FOR PRIORITY

According to the **NZ BIM Handbook Appendix B (2023, p. 7)**, low-priority clashes are defined as: "Clashes that have negligible impact on design coordination or construction and can be resolved at a later stage without redesign of adjacent services."

Clash #104 falls into this category for the following reasons:

1. **Minor Tertiary Services Involved**

This interference occurs between a small flexible HVAC branch duct and a lightweight condensate drain pipe located above the Level 2 corridor ceiling. These components:

- Serve very limited, localized areas
- Are highly adaptable in routing and positioning
- Do not influence primary airflow, drainage, or system functioning

System performance remains unaffected by minor adjustments.

2. **Minimal Constructability Impact**

The clash sits **well within** a standard ceiling cavity with:

- Adequate clearance for insulation and access
- No impact on structural elements or ceiling grid layout
- No interaction with fire protection mains or major electrical trays

Installation works can proceed uninterrupted**.**

3. **Interference below Practical Coordination Tolerance**

Measured clash = 12 mm overlap
NZ BIM Handbook tolerance guidance = **≤ 25 mm** acceptable deviation for minor services, the clash is technically detectable in software but not problematic in real construction conditions.

4. **Easily Resolved During On-Site Installation**

Installers can resolve the issue by:

- Slightly shifting the flex duct
- Re-aligning the pipe bracket location

These adjustments:

- Require no redesign
- Cause no delays to other trades
- Cost negligible labour time

Field resolution is appropriate and expected for this clash category.

5. **No Compliance or Maintenance Risk**

Neither NZ Building Code Clause G4 nor **AS/NZS 3500** performance requirements are compromised.

- Future access for maintenance remains clear
- Functional operation is unchanged

No code-based justification for higher severity.

Clash #104 presents no significant impact on design development, performance, or construction coordination. It can be addressed efficiently during ceiling installation without affecting programme, cost, or compliance. Therefore, this clash appropriately meets the criteria for classification as a Low-Priority issue under the NZ BIM Handbook Appendix B (2023).

LITERATURE TO JUSTIFICATION

The classification of Clash #104 as a Low-priority coordination issue is supported by both BIM industry guidelines and scholarly literature.

NZ BIM Handbook Appendix B (2023)

The NZ BIM Handbook specifically states that low-priority clashes are those which: "Do not materially impact design coordination or construction and may be resolved later or on-site with minimal effort" (Appendix B, p. 7).

This aligns with Clash #104 because the services involved — a small flexible duct and a light condensate pipe — are highly adjustable and serve localized, non-critical functions. Their routing can be modified by installers without requiring design team intervention, matching the handbook's criteria for low severity.

Eastman et al. (2018)

Eastman and colleagues emphasize that BIM-based clash resolution should priorities conflicts that affect core systems and major coordination workflows, while minor clashes are acceptable to defer when their impact is negligible. This supports the decision to treat this interference as low priority, given it does not affect system performance or construction sequencing.

Sacks and Pikas (2013)

Sacks and Pikas explain that BIM coordination resources should be focused on clashes that influence constructability and trade sequencing, noting that low-impact clashes in non-critical areas may be scheduled for resolution on-site without risk to project progression. Clash #104 fits this reasoning, as it will not affect trade workflows within the ceiling space.

CONSULTANTS AFFECTED AND RESPONSIBLE

Clash #104 involves a minor interference between a flexible secondary HVAC branch duct and a small-diameter condensate drain pipe in the Level 2 ceiling plenum. Although Low Priority, this clash still requires appropriate coordination, ensuring accurate documentation and constructability. Roles and responsibilities are assigned in accordance with the NZ BIM Handbook Appendix B (2023), which requires clear discipline ownership for all coordination issues.

Consultant	Primary Responsibility	Specific Role in Resolving Clash #104
Mechanical Engineer (MEP Consultant)	Design and routing of tertiary HVAC branch ductwork while ensuring airflow performance and insulation allowance	Make minor adjustments to the flexible duct alignment during installation or final coordination, ensuring no obstruction to plumbing and maintaining diffuser supply integrity
Plumbing / Hydraulic Engineer	Design and coordination of condensate drain systems, maintaining compliant gradients and access requirements under AS/NZS 3500	Confirm any pipe repositioning maintains correct drainage fall and does not affect system performance or serviceability
BIM Manager / BIM Coordinator	Overall clash management, documentation control, and model federation oversight	Record this clash within the coordination environment, verify correct Low Priority classification, and ensure tracking until confirmed resolved during site installation planning

In summary:

- The Mechanical Engineer leads minor duct spatial adjustments,
- The Plumbing Engineer ensures performance-compliant pipe positioning, and
- The BIM Manager coordinates and verifies issue closure in accordance with NZ BIM Handbook workflows.

Due to the localized nature of the services and the minimal construction impact, only limited input is required from each consultant, confirming this clash as a Low Priority issue appropriate for late-stage or on-site resolution.

REASONS FOR THE CONSULTANTS WOULD BE AFFECTED

While this clash is classified as Low Priority, each consultant still has a clearly defined role in ensuring the issue is resolved effectively in accordance with the NZ BIM Handbook Appendix B (2023) coordination process. The table below outlines discipline responsibilities and how each party is affected.

Consultant Responsibilities and Impacts

Consultant	Impact	Reason for Responsibility
Mechanical Engineer (MEP Consultant)	Minor routing adjustment required for the flexible duct to maintain insulation coverage and clear installation path	Ducting is the most adaptable service and can be repositioned without affecting main system performance — therefore mechanical discipline leads the adjustment

Plumbing / Hydraulic Engineer	May need to slightly alter support location to maintain drainage fall and avoid contact with duct insulation	Responsible for ensuring AS/NZS 3500 compliance — must validate that any relocation preserves required gradient and accessibility
BIM Manager / BIM Coordinator	Coordination model accuracy must be upheld; unresolved clashes weaken confidence in model quality	Oversees clash resolution documentation and ensures closure is recorded before IFC issue — responsible for model integrity, not design changes

Mechanical Engineer

The mechanical consultant must implement a minor duct alignment update, as these tertiary flexible ducts are specifically designed to allow spatial flexibility during final coordination and installation. This ensures no site delays, and airflow performance remains compliant with NZBC G4 – Ventilation.

Plumbing / Hydraulic Engineer

Although the required change is minimal, the plumbing consultant must review it to ensure no negative effect on drainage fall or pipe support arrangements. Their responsibility stems from hydraulic compliance requirements and ongoing maintenance access considerations.

BIM Manager

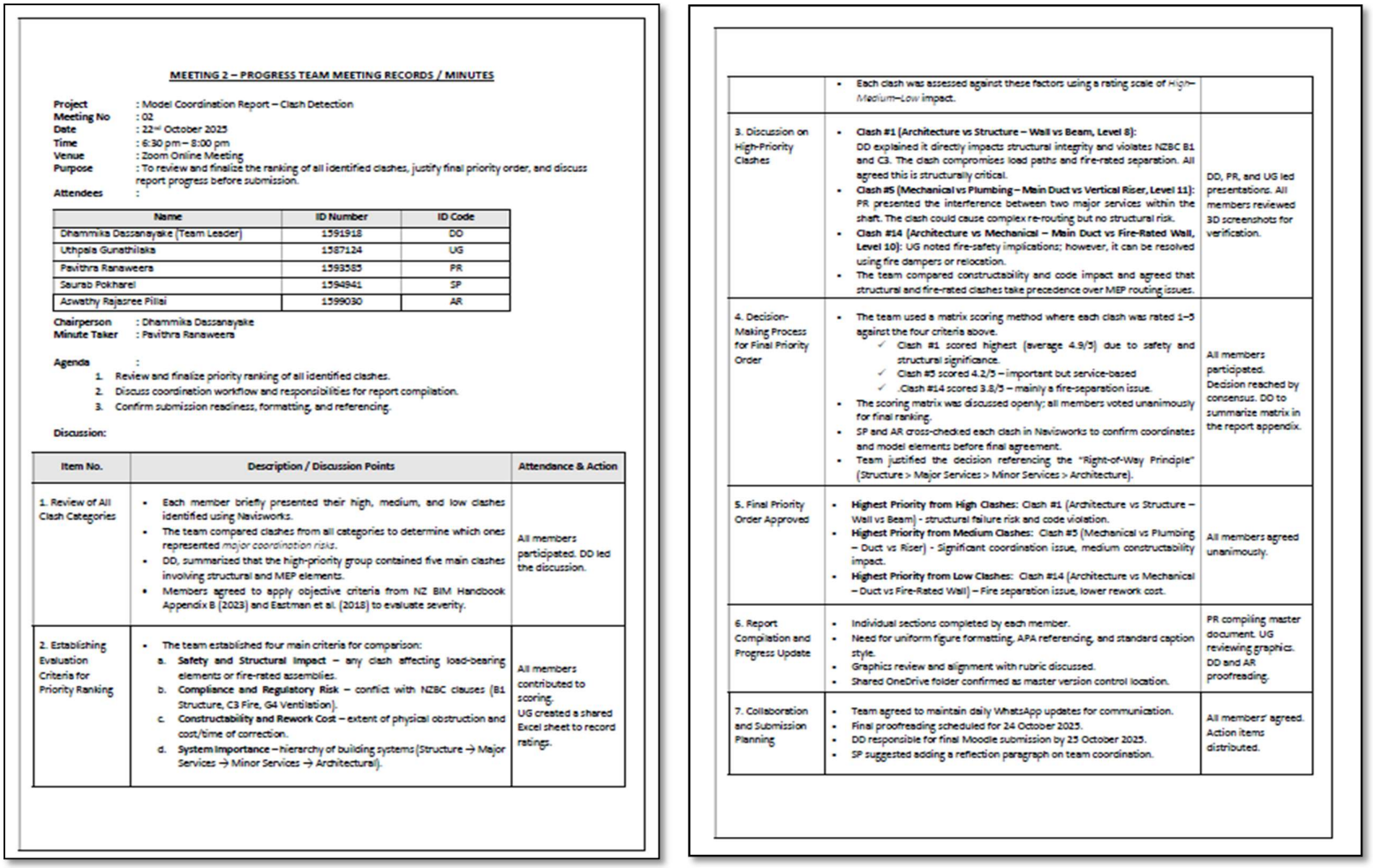
Even though the design change is insignificant in scale, the BIM Manager must track the issue, ensure it is correctly prioritized as Low, and confirm closure in issue management tools such as Navisworks or ACC Model Coordination. This supports coordination governance and version control within the project.

Clash #104 poses no significant design risk, but demands minor collaborative action:

- Mechanical: carries out small duct alignment changes
- Plumbing: validates compliance post-adjustment
- BIM Manager: verifies resolution in the coordination environment

This demonstrates a proportionate, low-effort resolution strategy, fully aligned with the Low Priority criteria defined in the NZ BIM Handbook Appendix B (2023), and ensures the model remains constructible and reliable without consuming unnecessary design resources.

04. MINUTES FROM MEETING TWO (PHASE TWO)



MEETING 2 – PROGRESS TEAM MEETING RECORDS / MINUTES

Project : Model Coordination Report – Clash Detection
Meeting No : 02
Date : 22nd October 2025
Time : 6:30 pm – 8:00 pm
Venue : Zoom Online Meeting
Purpose : To review and finalize the ranking of all identified clashes, justify final priority order, and discuss report progress before submission.
Attendees :

Name	ID Number	ID Code
Dhammika Dassanayake (Team Leader)	1591918	DD
Uthpala Gunathilaka	1587124	UG
Pavithra Ranaweera	1593585	PR
Saurab Pokharel	1594941	SP
Aswathy Rajasree Pillai	1599030	AR

Chairperson : Dhammika Dassanayake
Minute Taker : Pavithra Ranaweera

Agenda :
1. Review and finalize priority ranking of all identified clashes.
2. Discuss coordination workflow and responsibilities for report compilation.
3. Confirm submission readiness, formatting, and referencing.

Discussion:

Item No.	Description / Discussion Points	Attendance & Action
1. Review of All Clash Categories	• Each member briefly presented their high, medium, and low clashes identified using Navisworks. • The team compared clashes from all categories to determine which ones represented *major coordination risks*. • DD, summarized that the high-priority group contained five main clashes involving structural and MEP elements. • Members agreed to apply objective criteria from NZ BIM Handbook Appendix B (2023) and Eastman et al. (2018) to evaluate severity.	All members participated. DD led the discussion.
2. Establishing Evaluation Criteria for Priority Ranking	• The team established four main criteria for comparison: a. **Safety and Structural Impact** – any clash affecting load-bearing elements or fire-rated assemblies. b. **Compliance and Regulatory Risk** – conflict with NZBC clauses (B1 Structure, C3 Fire, G4 Ventilation). c. **Constructability and Rework Cost** – extent of physical obstruction and cost/time of correction. d. **System Importance** – hierarchy of building systems (Structure → Major Services → Minor Services → Architectural).	All members contributed to scoring. UG created a shared Excel sheet to record ratings.
	• Each clash was assessed against these factors using a rating scale of *High–Medium–Low* impact.	
3. Discussion on High-Priority Clashes	• **Clash #1 (Architecture vs Structure – Wall vs Beam, Level 8):** DD explained it directly impacts structural integrity and violates NZBC B1 and C3. The clash compromises load paths and fire-rated separation. All agreed this is structurally critical. • **Clash #5 (Mechanical vs Plumbing – Main Duct vs Vertical Riser, Level 11):** PR presented the interference between two major services within the shaft. The clash could cause complex re-routing but no structural risk. • **Clash #14 (Architecture vs Mechanical – Main Duct vs Fire-Rated Wall, Level 10):** UG noted fire-safety implications; however, it can be resolved using fire dampers or relocation. • The team compared constructability and code impact and agreed that structural and fire-rated clashes take precedence over MEP routing issues.	DD, PR, and UG led presentations. All members reviewed 3D screenshots for verification.
4. Decision-Making Process for Final Priority Order	• The team used a matrix scoring method where each clash was rated 1–5 against the four criteria above. ✓ Clash #1 scored highest (average 4.9/5) due to safety and structural significance. ✓ Clash #5 scored 4.2/5 – important but service-based ✓ .Clash #14 scored 3.8/5 – mainly a fire-separation issue. • The scoring matrix was discussed openly; all members voted unanimously for final ranking. • SP and AR cross-checked each clash in Navisworks to confirm coordinates and model elements before final agreement. • Team justified the decision referencing the "Right-of-Way Principle" (Structure > Major Services > Minor Services > Architecture).	All members participated. Decision reached by consensus. DD to summarize matrix in the report appendix.
5. Final Priority Order Approved	• **Highest Priority from High Clashes:** Clash #1 (Architecture vs Structure – Wall vs Beam) - structural failure risk and code violation. • **Highest Priority from Medium Clashes:** Clash #5 (Mechanical vs Plumbing – Duct vs Riser) - Significant coordination issue, medium constructability impact. • **Highest Priority from Low Clashes:** Clash #14 (Architecture vs Mechanical – Duct vs Fire-Rated Wall) – Fire separation issue, lower rework cost.	All members agreed unanimously.
6. Report Compilation and Progress Update	• Individual sections completed by each member. • Need for uniform figure formatting, APA referencing, and standard caption style. • Graphics review and alignment with rubric discussed. • Shared OneDrive folder confirmed as master version control location.	PR compiling master document. UG reviewing graphics. DD and AR proofreading.
7. Collaboration and Submission Planning	• Team agreed to maintain daily WhatsApp updates for communication. • Final proofreading scheduled for 24 October 2025. • DD responsible for final Moodle submission by 25 October 2025. • SP suggested adding a reflection paragraph on team coordination.	All members' agreed. Action items distributed.

Figure 55: Minutes of Meeting 02

05. DISCUSSION AND CONCLUSIONS

5.1 DISCUSSION

Numerous conflicts spanning disciplines were found in the clash report analysis, and high-priority clashes were chosen based on their influence on time, constructability, and safety. Navisworks data and expert judgment were used to determine priorities, and conflicts of medium and low priority were recorded for future settlement. This methodical methodology guaranteed effective coordination, transparent accountability, and economical utilization of resources.

MODEL COORDINATION WORKFLOW

The model coordination process was carried out using Autodesk Navisworks Manage and a structured BIM workflow that followed the New Zealand BIM Handbook (2023) guidelines. All discipline models Architectural, Structural, Mechanical, Electrical, and plumbing were imported into a federated model environment.

The coordination sequence followed these key stages:

1. **Model Integration:** Each consultant exported discipline models in IFC format and aligned them to a common coordinate system.
2. **Clash Detection:** Hard and soft clashes were identified using Navisworks Clash Detective, with individual search sets created for each trade interface.
3. **Clash Classification:** Detected clashes were categorized as **high**, **medium**, or **low** priority based on the *Right-of-Way Principle* (Structure → Services → Architecture).
4. **Review and Resolution:** Team members reviewed clashes collaboratively in Zoom meetings and documented outcomes in the shared OneDrive folder.
5. **Validation and Reporting:** Once major conflicts were resolved, the final report summarized the ranking process, responsibilities, and justification for each issue.

This systematic workflow promoted transparency, accountability, and traceability, ensuring that every coordination decision was evidence-based and logged for final reporting.

ADVANTAGES OF THE COORDINATION PROCESS

1. **Improved Design Accuracy:** Early digital detection of interferences significantly reduced potential design errors before construction.
2. **Reduced Rework and Cost Savings:** Identifying clashes in Navisworks prevented costly on-site alterations; literature (Eastman et al., 2018) indicates that digital coordination can reduce rework costs by 10–20%.
3. **Enhanced Collaboration:** Real-time information sharing through the BIM model improved communication among all consultants and promoted shared understanding of design intent.
4. **Visual Decision Making:** The 3D model allowed the team to visually assess and rank clashes, which supported objective, data-driven decisions.

5. **Improved Construction Sequencing:** Early resolution of high-priority issues (e.g., structural wall vs beam clash) supported smoother construction staging and reduced project delays.

DISADVANTAGES AND LIMITATIONS

1. **Software Complexity:** Navisworks Manage requires specialist knowledge; initial learning curve affected efficiency for some team members.
2. **Model Accuracy Dependence:** Coordination accuracy depends on the precision of models received from consultants—minor geometric errors can create false positives.
3. **Time Consumption:** The process of importing, aligning, and checking multiple models was time-intensive, especially when managing large data files.
4. **Communication Lag:** Online coordination occasionally led to delayed responses or version mismatches when files were not synchronized promptly.
5. **Limited Field Integration:** The virtual model did not fully capture real-site tolerances or installation methods, requiring further coordination during construction.

5.2 CONCLUSION

The model coordination and clash detection exercise demonstrated the critical importance of collaborative BIM workflow in modern construction management. Through structured meetings, objective clash prioritization, and interdisciplinary review, the team effectively identified and ranked conflicts highlighting that structural safety and compliance take precedence over service routing.

The process improved understanding of spatial relationships between building systems and strengthened team collaboration skills essential for integrated project delivery. Although software learning and data management posed challenges, the benefits of reduced rework, cost efficiency, and design clarity far outweighed these limitations.

In conclusion, this coordination exercise confirmed that systematic clash detection is an invaluable step in any construction project. When combined with clear communication protocols and continuous model updates, it supports better design quality, improved constructability, and safer, more efficient project delivery**.**

06. REFERENCES

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ANNEXTURE

Meeting Minutes – Team Meeting 1	
Course :	CONS6102 - Vertual Design and Construction 1
Purpose :	Assignment 2 - Model Coordination Report
Meeting Date & Time :	28th September 2025 / 3:00 PM – 4:00 PM
Location :	Unitec Mount Albert Campus
Attendees	
Dammika Dissnayake	Uthpala Gunathilaka
Pavithra Ranaweera	Aswathy Rajasree
Saurab	

Agenda

1. Review of assignment requirements
2. Allocation of responsibilities and clash detection models
3. Development of task timeline
4. Discussion on collaboration and communication methods

Discussion Summary

1. Assignment Requirements Identified and Discussed

The group reviewed the assignment descriptor for the Model Coordination Report. Key requirements discussed included performing clash detection using Navisworks Manage on provided BIM models, identifying high, medium, and low priority clashes unique to each member, and producing a team report with clear roles and documented meetings.

The team also discussed the need for professional formatting, APA 7th referencing, and inclusion of meeting records and screenshots from Navisworks Manage.

2. Allocation of Responsibilities and Tasks

Each member was assigned specific clash detection responsibilities as follows:

- Dammika – Architectural vs Structural
- Pavithra – Mechanical vs Plumbing
- Aswathy – Structural vs Plumbing
- Uthpala – Architectural vs Mechanical
- Saurab – Architectural vs Plumbing

All members agreed to identify one High, one Medium, and one Low priority clash and justify their categorization with references.

3. Timeline and Milestones

The team agreed on the following timeline to manage the tasks:

- 30 September - Draft, revisions and finalizing meeting minute (1st Meeting)
- Until 22 October – Completion of individual clash detection, Preparation of individual explanations and screenshots.
- 23 October – Team Meeting 2 for discussion and prioritization
- 24-26 October – Compilation and proofreading of report
- 27 October – Final submission via Moodle

The team confirmed the schedule as achievable within the submission deadline.

4. Collaboration and Communication

The team agreed to use Microsoft Teams and WhatsApp group chat for communication and file sharing. Shared files will be stored in a common Google Drive folder for version control. Meetings will be conducted on Teams, and progress updates will be shared every two days through the chat group.

Meeting Conclusion

All members confirmed their understanding of roles and responsibilities. The next official meeting (Meeting 2) was scheduled for 23rd October 2025 to discuss the identified clashes and prioritize them. Meeting concluded at 4:00 PM.

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