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# APPENDIX I
# MODEL COORDINATION

## THE NEW ZEALAND BIM HANDBOOK
## 2019 THIRD EDITION

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## 1. General

Successful model coordination relies on different BIM disciplines understanding their roles and modelling only what they are responsible for, according to the Model Elements Authoring (MEA) schedule. Coordination is much more than just clash detection – the key to successful coordination is to identify and prioritise issues, assign relevant project stakeholders to address them, and track the issues until they are resolved.

General coordination should take place when the model is visually inspected. Activity includes single discipline coordination, and coordination with other discipline models. Discipline BIM coordinators are responsible for general coordination.

3D coordination (if defined as a BIM use for the project) is the responsibility of the BIM manager, and should centre on the federated model. At intervals, as agreed in the project BIM execution plan, the BIM manager should create a federated model and undertake clash detection according to the agreed model coordination matrix and coordination model tolerances per design stage. The BIM manager should issue coordination reports to each discipline BIM lead before scheduled coordination meetings.

The BIM manager should facilitate project coordination meetings using the federated model. Major clashes and coordination issues should be highlighted during meetings to promote resolution. The federated model should be displayed on-screen to help visualise clashes.

Any outcomes, including minor clashes and other coordination issues, should be assigned to relevant project team members. The BIM manager should track the progress of each clash until it is resolved.

## 2. Coordination model tolerance schedule

3D coordination should follow preliminary design – because models are considered more fluid, and information provided within the BIMs is at a level of development, where 3D coordination is providing little tangible benefit.

A coordination model tolerance schedule should be developed and agreed during the development of the BIM execution plan. The schedule defines coordination tolerances to be used between each discipline, at each design phase. Note: this table does not infer design tolerances.

| Discipline | Preliminary | Developed | Detailed |
|---|---|---|---|
| Arch vs. Other | ~100mm | ~50mm | ~25mm |
| Structural vs. Other | ~100mm | ~50mm | ~25mm |
| Mechanical vs. Other | ~100mm | ~50mm | ~25mm |
| Mechanical vs Mech | ~100mm | ~50mm | ~25mm |

## 3. Model coordination matrix

Produce a model coordination matrix during the development of the BIM execution plan. The matrix defines the discipline models and elements that will coordinate with each other. Coordination requirements may differ at different stages of a project. For example, during preliminary and developed design, model coordination may be generalised per discipline. As design progresses, you may be required to coordinate specific discipline elements, as illustrated in the following diagrams.

*FIG 1.*
**EXAMPLE MODEL COORDINATION MATRIX – SPECIFIC ELEMENT COORDINATION**

| | 1– FACA | 1– STRL | 2– HY SANI | 3– ME DUCT | 3– ME PIPE | 4– HY WATER | 5– FIRE | 6– EL CONT | 6– SP | 7– EL FIX | 8– CEIL | 8– ARCH | Total Tests | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1– FACA** | | Y | Y | Y | Y | Y | Y | Y | Y | Y | | | 9 | Architectural Exterior Walls |
| **1– STRL** | | S | Y | Y | Y | Y | Y | Y | Y | Y | Y | | 9 | Structural Model |
| **2– HY SANI** | | | S | Y | Y | Y | Y | Y | Y | Y | Y | Y | 9 | Hydraulic Services Sanitary Services |
| **3– ME DUCT** | | | | S | Y | Y | Y | Y | Y | Y | Y | Y | 8 | Mechanical Ductwork |
| **3– ME PIPE** | | | | | S | Y | Y | Y | Y | Y | Y | Y | 7 | Mechanical Pipework |
| **4– HY WATER** | | | | | | S | Y | Y | Y | Y | Y | Y | 6 | Hydraulic Services Water Services |
| **5– FIRE** | | | | | | | S | Y | Y | Y | Y | Y | 5 | Fire Protection Services |
| **6– EL CONT** | | | | | | | | S | Y | Y | Y | Y | 4 | Electrical Containment (Inc. Equipment) |
| **6– SP** | | | | | | | | | S | Y | Y | Y | 3 | Specialty Services |
| **7– EL FIX** | | | | | | | | | | S | Y | | 0 | Electrical (Fixtures, Lighting, ETC...) |
| **8– CEIL** | | | | | | | | | | | | | 0 | Architectural Ceilings |
| **8– ARCH** | | | | | | | | | | | | | 0 | Architectural, Fire Rated – Walls & Doors |
| | | | | | | | | | | | | | 60 | |
| | | | | | | | | | | | | | 68 | including the self intersect tests |

**Key:**

Y = Selection/Search Sets are checked for clashes

= Selection/Search Sets are NOT clash checked against other

S = Selection/Search Sets are the same, self intersect check as required

**Notes:**

1. Self Intersect Clash tests are set to "10mm Hard (Conservative)"
2. All other Clash tests are set to "25mm Hard (Conservative)"

*FIG 2.*
## EXAMPLE MODEL COORDINATION MATRIX – GENERAL DISCIPLINE

| | 1– ARCH | 1– STRL | 2– HY SANI | 3– ME DUCT | 3– ME PIPE | 4– HY WATER | 5– FIRE | 6– EL CONT | 7– EL FIX | 8– ARCH | 0 | Total Tests | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1– ARCH | | | | | | | | | | | | 0 | Architectural Building Model |
| 1– STRL | | | Y | Y | Y | Y | Y | Y | Y | Y | | 8 | Structural Model |
| 2– HY SANI | | | S | Y | Y | Y | Y | Y | Y | Y | | 7 | Hydraulic Services Sanitary Services |
| 3– ME DUCT | | | | S | Y | Y | Y | Y | Y | Y | | 6 | Mechanical Ductwork |
| 3– ME PIPE | | | | | S | Y | Y | Y | Y | Y | | 5 | Mechanical Pipework |
| 4– HY WATER | | | | | | S | Y | Y | Y | Y | | 4 | Hydraulic Services Water Services |
| 5– FIRE | | | | | | | S | Y | Y | Y | | 3 | Fire Protection Services |
| 6– EL CONT | | | | | | | | S | Y | Y | | 2 | Electrical Containment (Inc. Equipment) |
| 7– EL FIX | | | | | | | | | S | Y | | 1 | Electrical (Fixtures, Lighting, ETC...) |
| 8– ARCH | | | | | | | | | | | | 0 | Architectural Building Model |
| | | | | | | | | | | | | 0 | Architectural Facade Model |
| | | | | | | | | | | | | 36 | |
| | | | | | | | | | | | | 43 | including the self intersect tests |

**Key:**

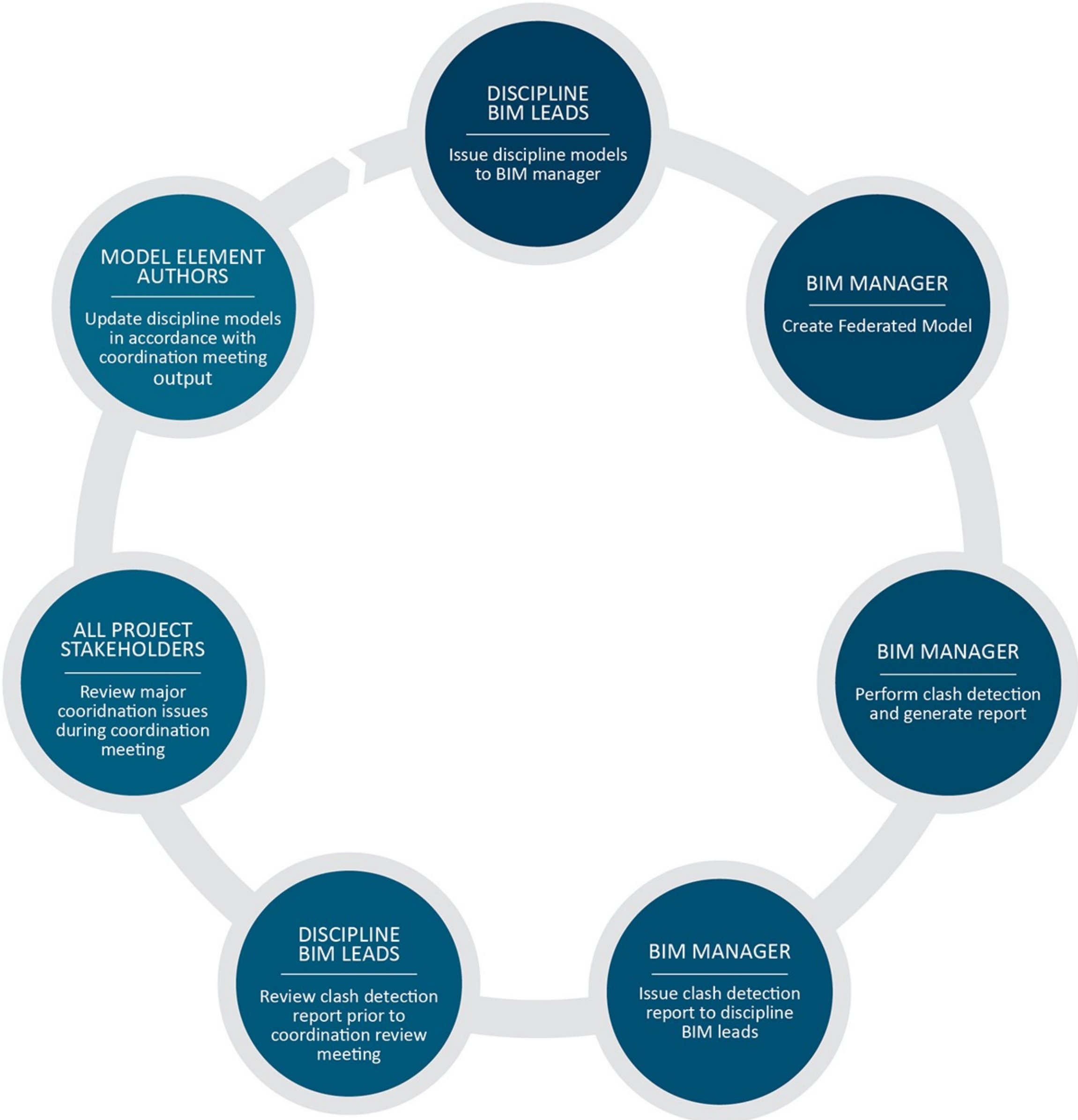
Y = Selection/Search Sets are checked for clashes

(blank) = Selection/Search Sets are <u>NOT</u> clash checked against other

S = Selection/Search Sets are the same, self intersect check as require

Unless there are client-specific requirements, the BIM manager will lead the development of the model coordination matrix, with input from discipline BIM leads and members of the wider design team.

*FIG 3.*
**TYPICAL MODEL COORDINATION AND REVIEW PROCESS**



## 4. Hard and soft clashes

A hard clash occurs when two objects are physically clashing or intersecting, such as a steel beam that intersects a mechanical duct.

A soft clash occurs when an object interferes with another object's defined clearance zone. Implement clearance zones to ensure accessibility. Consider maintenance and installation safety as part of the clash detection process.

## 5. Clash priority definition

As the BIM execution plan is developed, the BIM manager, discipline BIM leads, and design leads should define clash priority rules for each element within the model, including defining clash priority definitions and populating a clash priority table.

Clash priority considerations:

- Model discipline
- Component type/category
- Intersection orientation (parallel or crossing)
- Component size
- Construction state (proposed/existing)
- Construction sequencing and critical path

Examples of high-priority issues include:

- Duplicate components
- Components inside one another
- Intersections with doors, windows, columns, and beams
- Intersection orientation (parallel or crossing)

Examples of low priority issues:

- Crossing between small pipes
- Partition walls against architectural slabs
- Pipes penetrating partition walls, where penetrations haven't been modelled

Typically, larger fixed objects are harder to move or adjust than smaller components. A simple rule of thumb: the larger (e.g. cooling tower) or more permanent (e.g. foundation) the object, the greater its right-of-way in a clash scenario.

Some smaller objects might have right-of-way over others (e.g. fire sprinkler locations vs. cable trays), as other constraints, such as building regulations, come into play.

Examples of clash priority definitions are shown in the example 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.<br><br>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 |

## The New Zealand BIM handbook

This document is one of a suite of documents forming the New Zealand BIM handbook. You can download or view the remaining documents here:

**http://www.biminnz.co.nz/nz-bim-handbook**