Constructability Review Report

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Course: CE 5390 & CE 4377 – Building Information Modeling

Assignment: A3 – Constructability Review and Clash Detection

1. Clash Detection Overview

Clash detection was performed using Navisworks Manage on a federated model comprising mechanical, framing, foundations, electrical and columns. The tests aimed to identify major coordination issues that could affect the constructability of the design.

2. Effect of Tolerance on Clash Detection

All clash tests were initially conducted using a tolerance value of 0.01 meters (1 cm). To study the impact of tolerance, several tests were re-run test using a tolerance of 0.05 meters. Interestingly, the number of clashes detected remained the same in both tests (e.g. in Mechanical–Framing test). This indicates that the detected conflicts were substantial and not sensitive to small changes in tolerance. Thus, the selected 0.01 m tolerance was effective in identifying true constructability issues without generating noise.

3. Five Most Critical Clashes

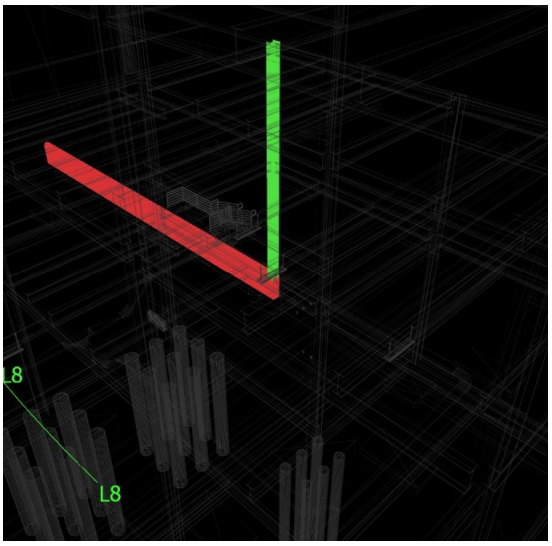
Clash 1: Structural Column vs Foundation Beam

Clash Type: Structural Column vs MEP Pipe

Why Critical: The column intersects with the foundation element at an incorrect position, likely off-center. This misalignment compromises load transfer, stability, and the effectiveness of the foundation system.

Suggested Solution: Adjust the column placement to align with the center of the foundation element, or redesign the footing/beam layout to accommodate the current column location. Ensure proper structural continuity and anchoring to avoid settlement or failure.

Snapshot of the Clash:



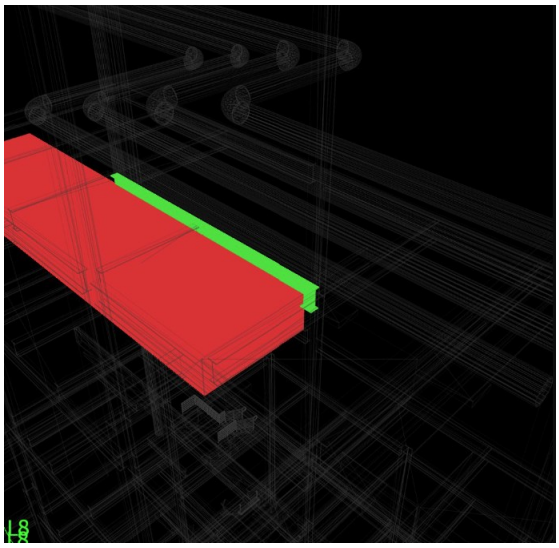
Clash 2: Duct vs Structural Beam (Center Penetration)

Clash Type: HVAC Duct vs Structural Beam

Why Critical: A large duct penetrates through the mid-span of a key structural beam, creating a direct conflict that compromises the beam's load-bearing capacity and obstructs the intended airflow path.

Suggested Solution: Reroute the duct to pass either above or below the beam. If routing through the beam is unavoidable, incorporate a structurally approved framed opening with appropriate reinforcement, as reviewed and approved by a structural engineer.

Snapshot of the Clash:



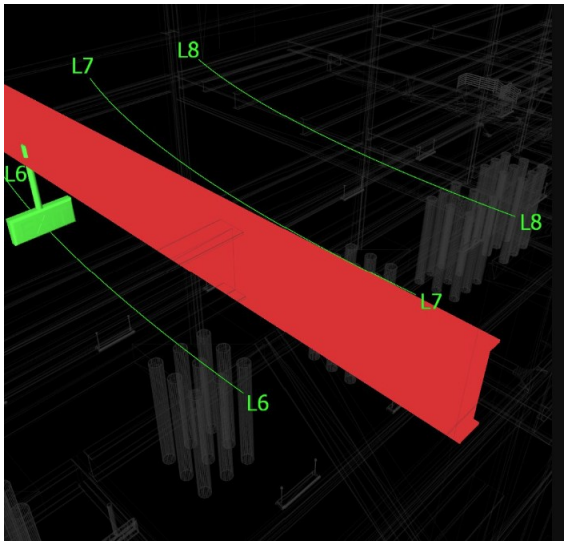
Clash 3: Electrical Box Embedded in Structural Beam

Clash Type: Electrical Component vs Structural Framing

Why Critical: An electrical box is positioned inside a structural beam, compromising the beam's structural capacity and violating clearance requirements. This can lead to safety risks.

Suggested Solution: Relocate the electrical component outside the beam envelope. If relocation is not feasible, consult a structural engineer to assess reinforcement strategies or design an approved opening.

Snapshot of the Clash:



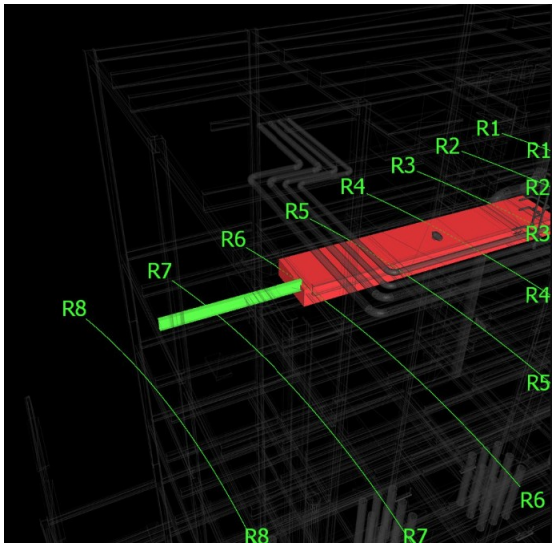
Clash 4: Duct vs Beam (Edge Conflict)

Clash Type: HVAC Duct vs Structural Beam (Angled Penetration)

Why Critical: The duct intersects the beam at an oblique angle, introducing complex stress conditions and alignment issues. This compromises both structural performance and the installation feasibility of the MEP system.

Suggested Solution: Reroute the duct to avoid the beam. If needed, coordinate with structural engineers to explore custom angled openings or alternate framing solutions that preserve both duct continuity and beam integrity.

Snapshot of the Clash:



Clash 5: Duct through Wide Beam

Clash Type: MEP Duct vs Structural Beam

Why Critical: A large duct penetrates a wide load-bearing beam, endangering both systems.

Suggested Solution: Redesign the duct path to run under or over the beam. If required, use a drop soffit to accommodate vertical space needs, or design a beam pass-through with load redistribution.

Snapshot of the Clash: