Case Study 5 – Structural – LGSF

Background

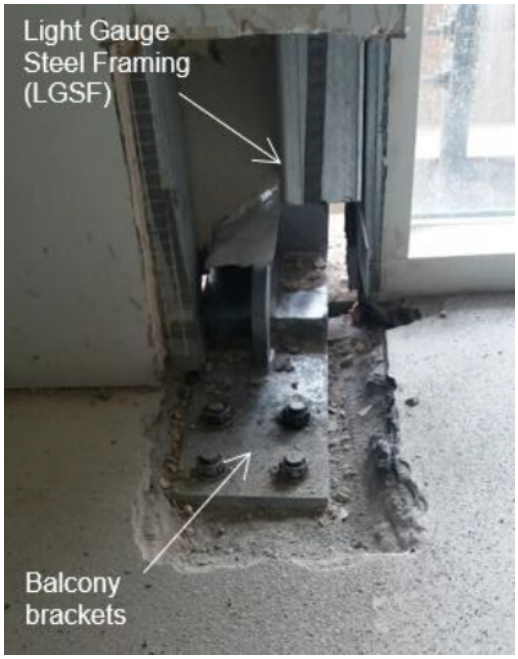
Light Gauge Steel Framing (LGSF) was utilised on a residential project as a sub-structure to support façades and glazing at the opening jambs in the main structure. Balcony frames were fitted to the main structure located at the first and second storey after installation of the LGSF jambs.

The LGSF was initially satisfactorily installed by the sub-contractor.

The Incident

Balcony frames required notches in the main structure and LGSF jambs. However, the requirement for notches was not coordinated with the designer or LGSF sub-contractor and as such there were none.

Figure 1 Balcony Frame Attachment and Main Structure / LGSF Notching



To connect the balcony frames to the main structure, both the main structures and LGSF jambs were modified by the installer as shown in Figure 1. These modifications resulted in all structural loads on the LGSF jambs being supported only by the plasterboard façades.

The LGSF sub-contractor was alerted to the occurrence and raised the issue with the supplier. A remedial design was produced to reconnect the LGSF jambs back to the main structure.

If unnoticed, this fault could have resulted in structural failure of the LGSF jambs causing glazing and other finishes to fall onto people in the surrounding area.

Findings

- There was a failure to recognise at the design stage that provision would be needed to accommodate the balconies.
- The Principal Contractor failed to refer the issue back to the relevant designer once the problem became known and before allowing notches to be made.
- There were multiple sub-contractors and suppliers without one overall guiding hand.
- In any structure, the Principal Designer MUST ensure there is a viable load path which all parties understand and respect across all structural parts - whoever supplies them.

Incident Review

Table 1 Activities (process/es) within an engineering management system, in relation to incident causation

Event	Applicable Engineering Process(es)	Discussion
Balcony frame mounts not included in the main structure and LGSF jamb designs	Design Specification	The Primary Contractor should have specified the **interface requirements** between the main structure and the balcony frame.
	Request for Information	Both designers should have **requested the interface data** between their respective designs.
	Design Review	Design review should have revealed the **incompatible interfaces**.
Unauthorized changes to the main structure and LGSF jamb	Design Change Control	Modifications to the LGSF frame altered the load path which **compromised the structural integrity**. The design change should have followed a defined Design Change Process. When the balcony brackets could not be fitted, they should not have been made without first **consulting the designer** and updating the LGSF design, **before any modifications** were made.

Note that the measures to prevent this failure are relatively inexpensive and simple in comparison with the results of the failure.

Additional Resources

Structural-Safety: Incorporating CROSS and SCOSS. (2018). Newsletter No 15. Retrieved from https://www.structural-safety.org/publications/view-report/?report=10380