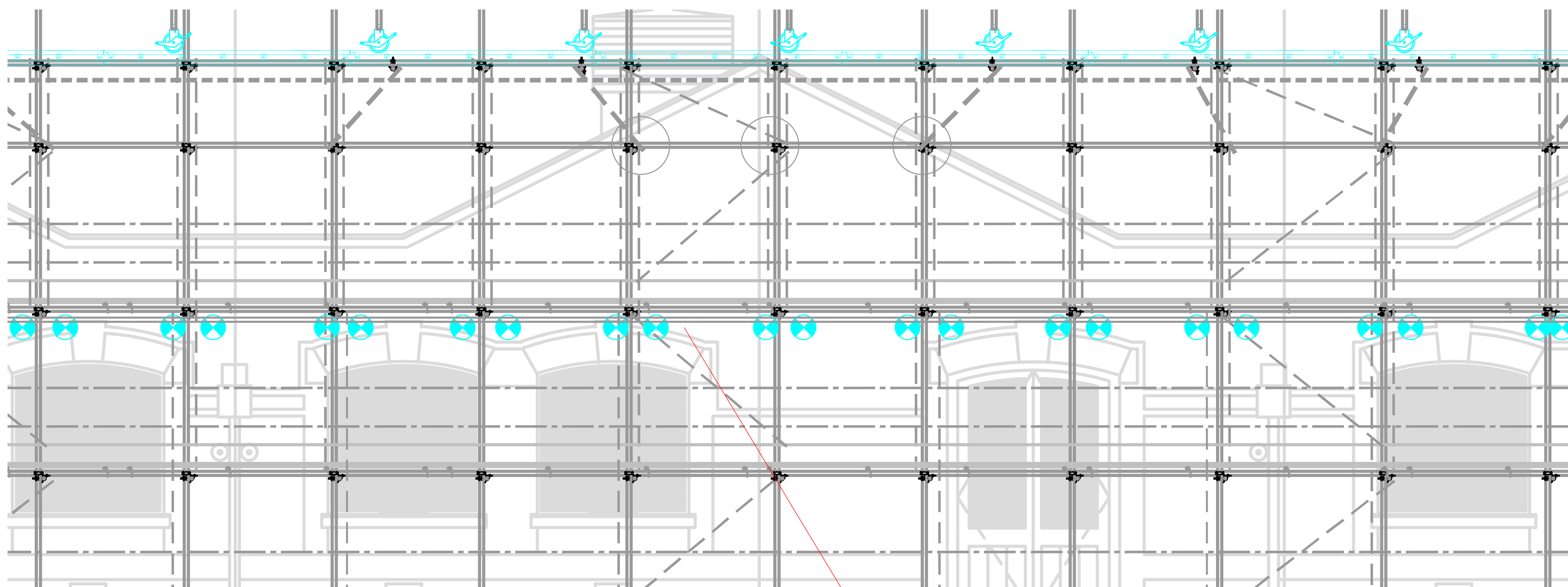
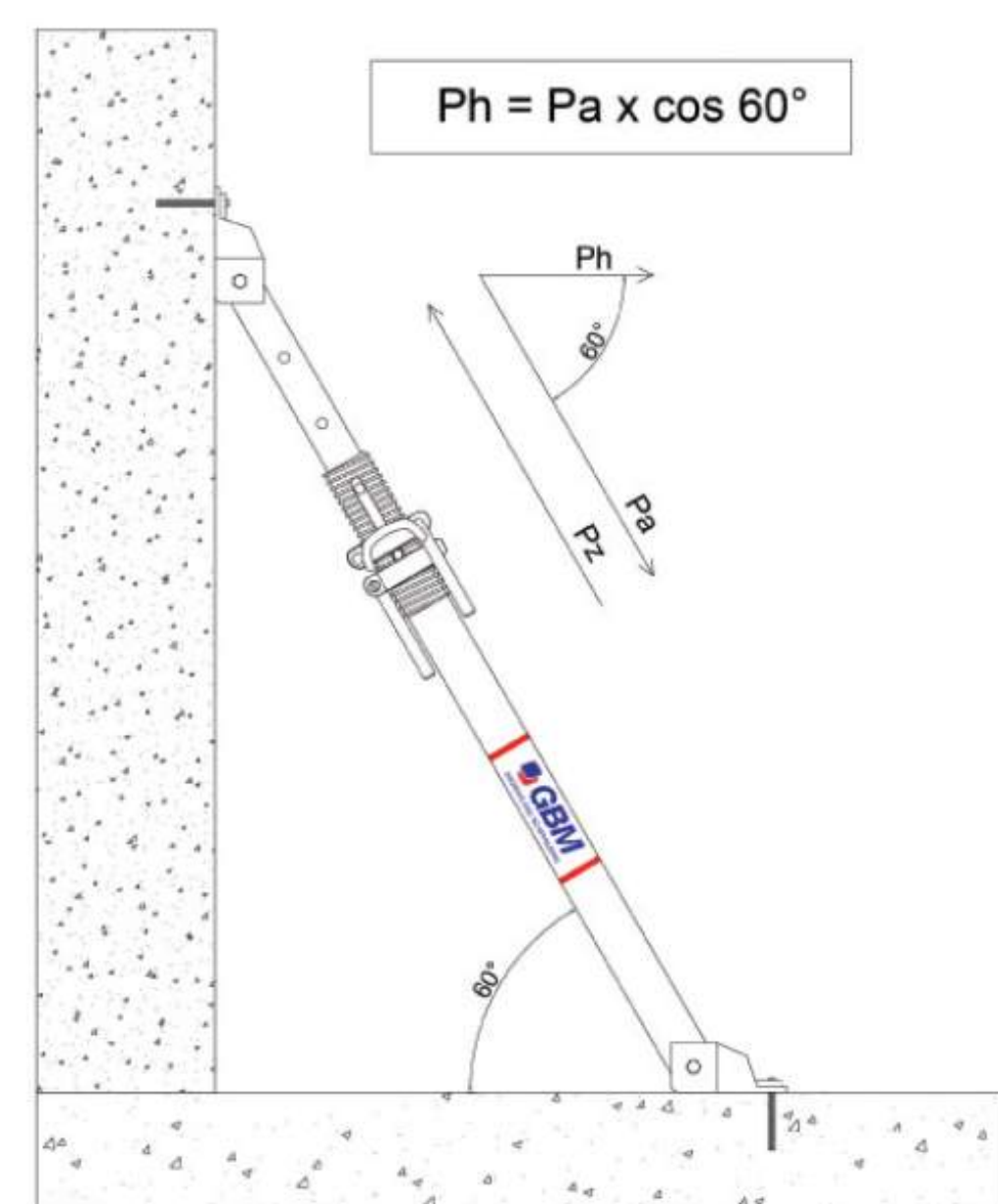
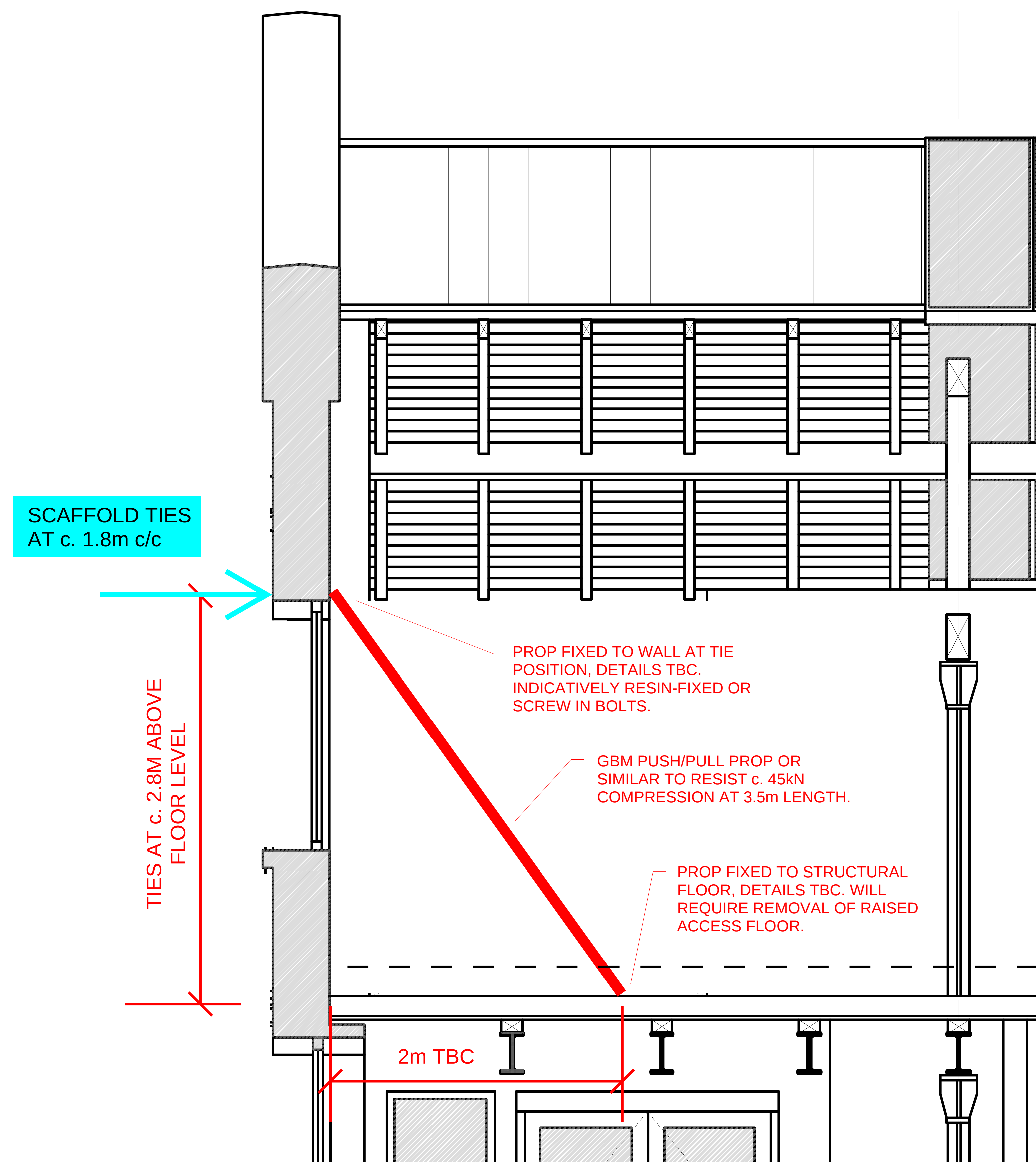


OPTION A - DISCOUNTED - DIAGONAL PROP AT TIE LOCATIONS



TIES REMAIN AT HEAD OF WINDOW POSITION

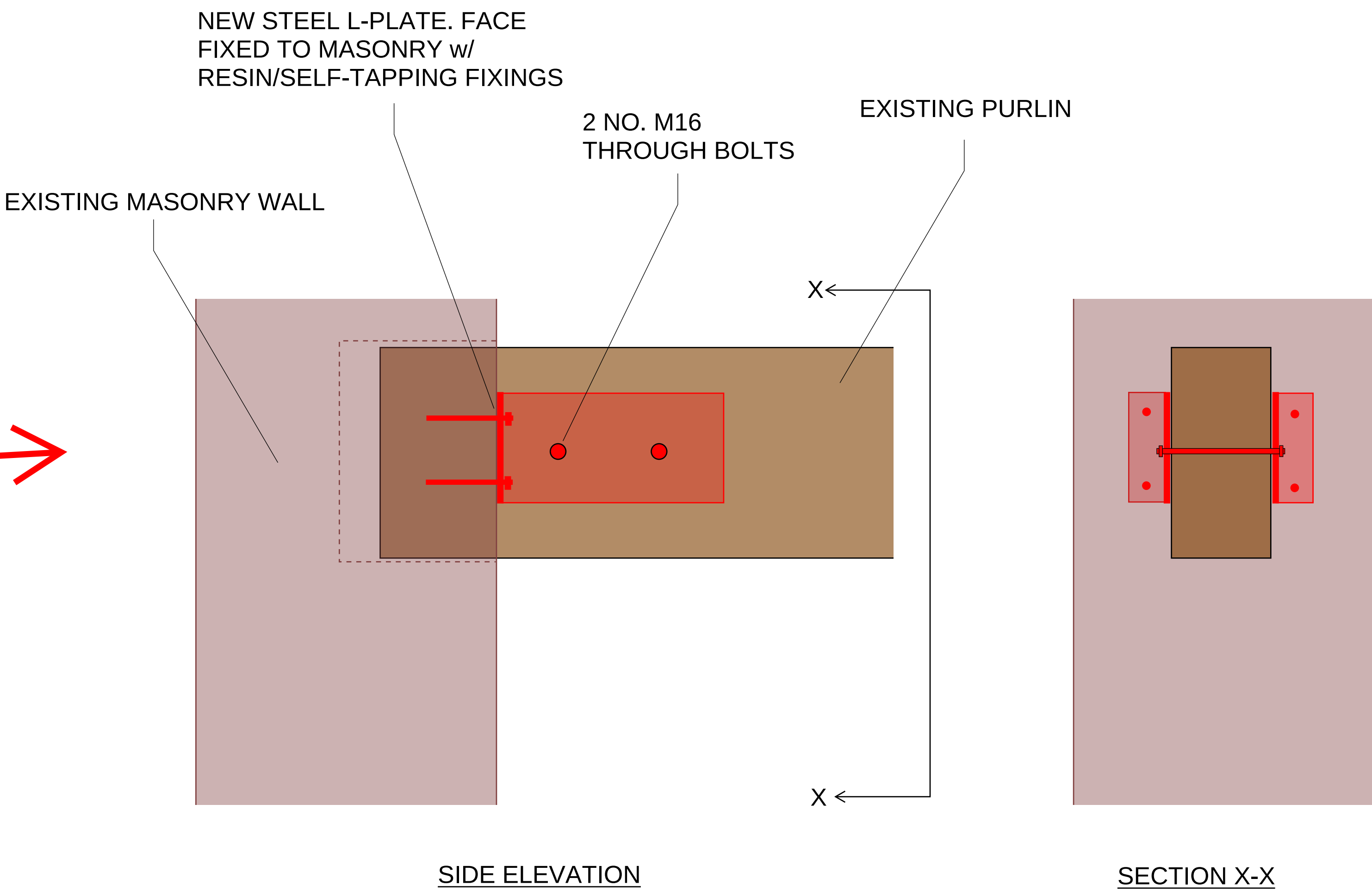
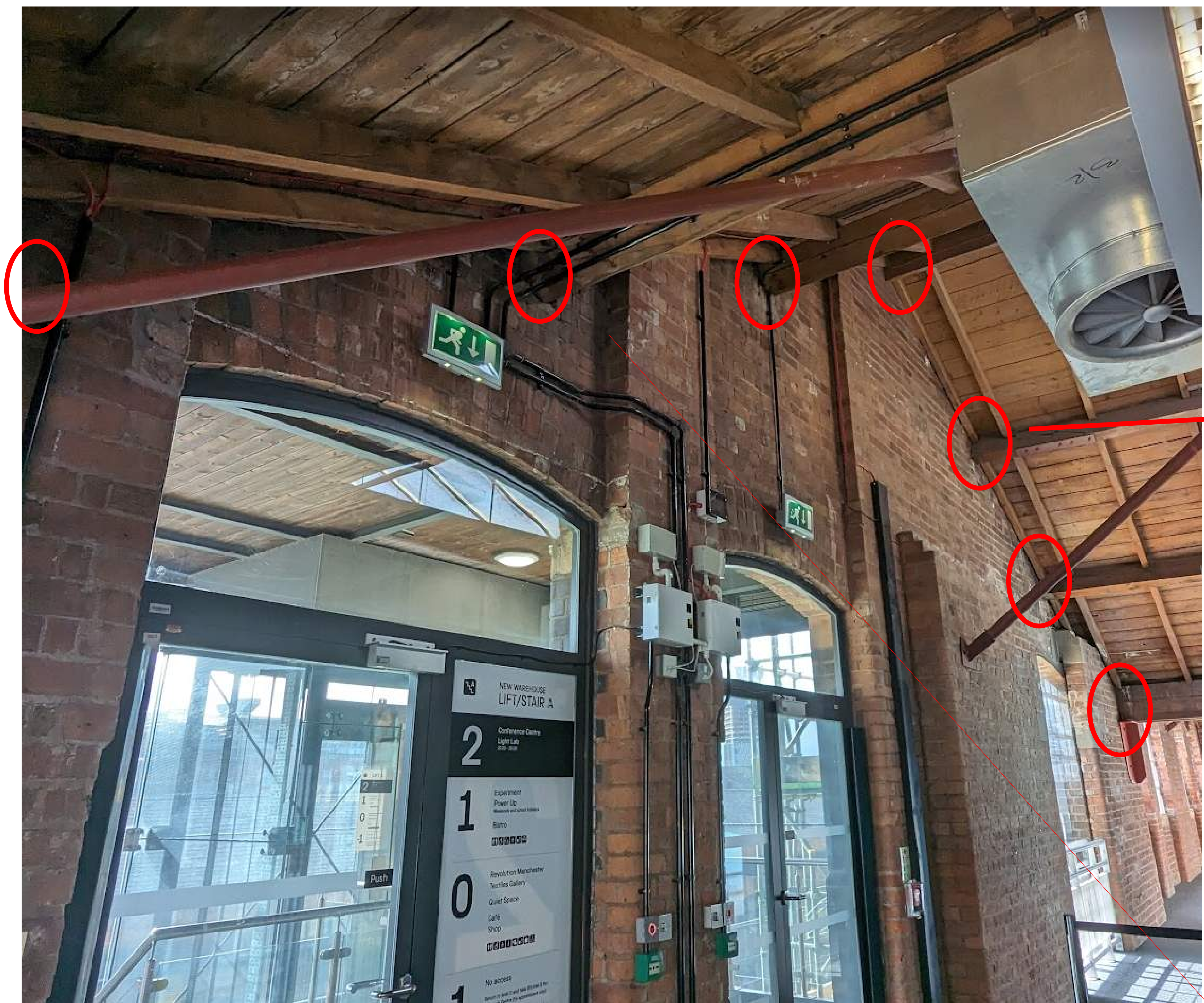
RELATIVE ADVANTAGES:

- Can likely be installed by scaffolding contractor.
- Props are available 'off the shelf', no fabrication required.

RELATIVE DISADVANTAGES:

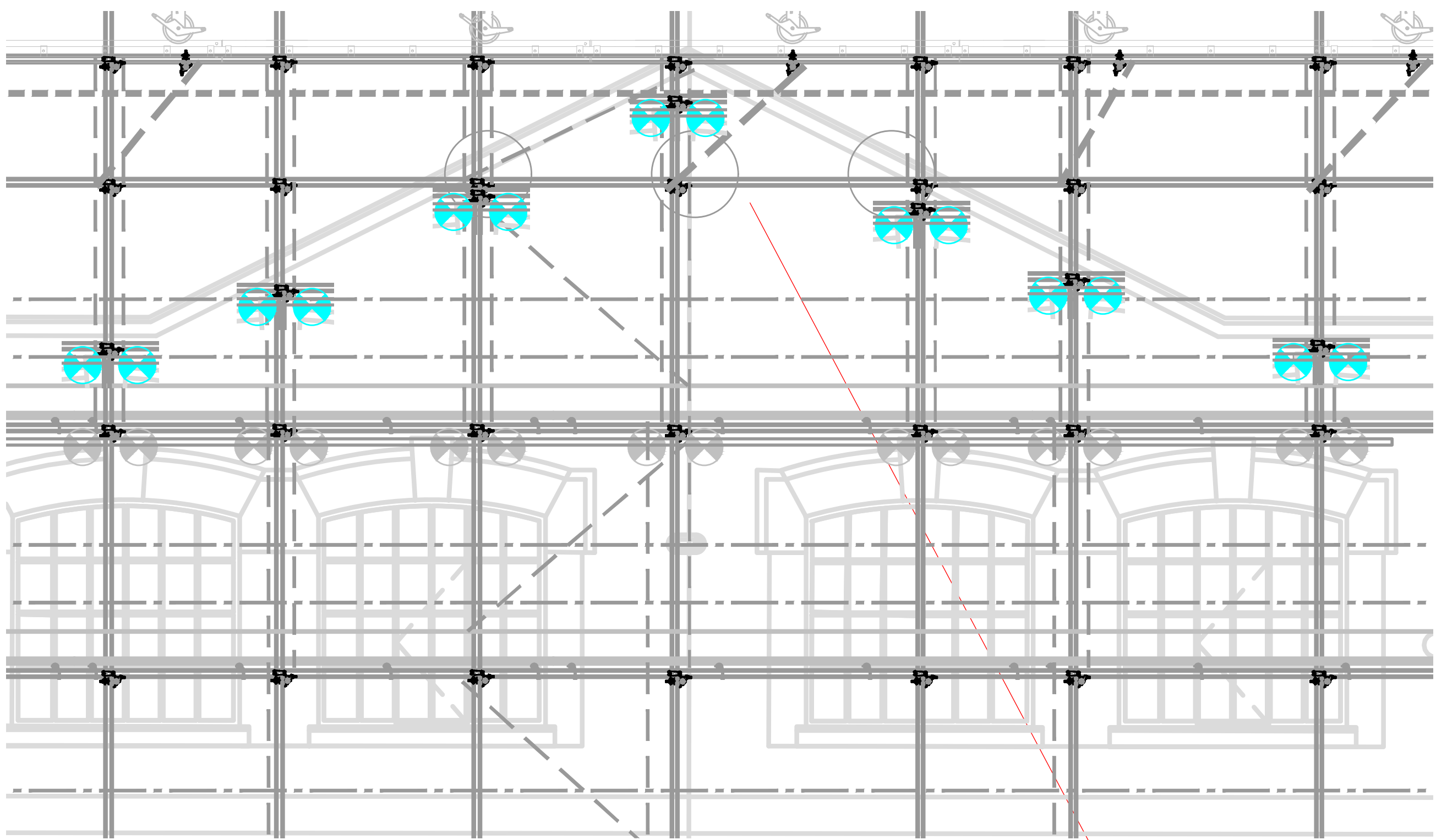
- Very challenging / infeasible to install in some spaces along northern edge of NW. Alterations would affect the the plant equipment in use and would affect the operation at lower levels spaces which are not intended to be decommissioned during the works. Removal/modification of existing plant would be required.
- Requires damage to floor finishes, including large holes through historic timber floor structure.
- Requires large fixings into historic masonry wall.
- Significant number of props required (100+) - significant cost & install time.
- Lack of certainty around connection to floor.

OPTION B - PREFERRED OPTION - MOVE TIES TO ROOF LEVEL, ADD INTERNAL BRACKETS



INDICATIVE BRACKET DETAIL

BRACKETS TO BE PROVIDE AT ALL PURLIN LOCATIONS - 7 NO. PER BAY

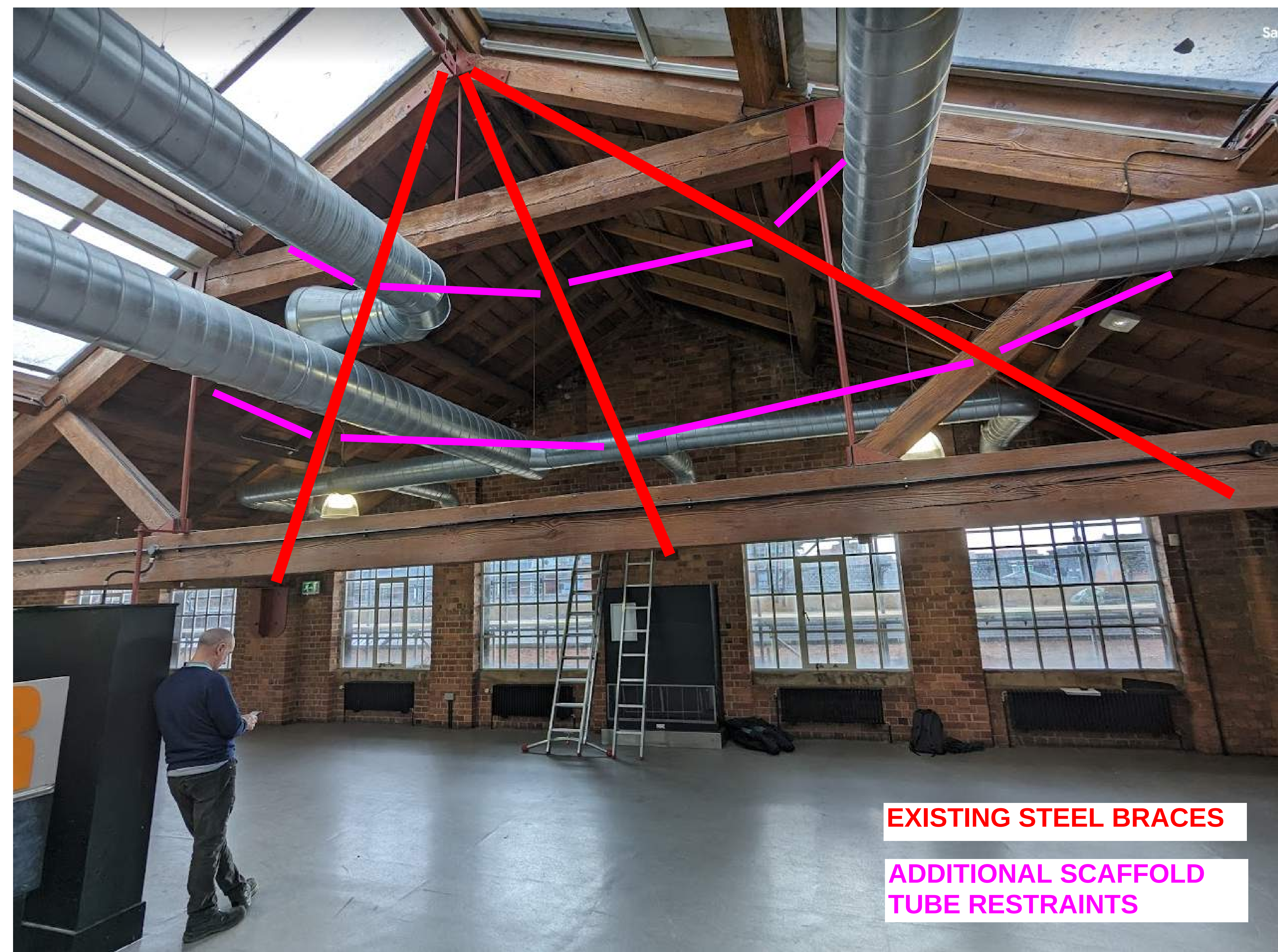


TIES MOVED TO FOLLOW LINE OF ROOF

- RELATIVE ADVANTAGES:**
- Installable option compared to other internal options, considering obstacles.
 - Interventions more in keeping with the design language of the building, and both historic materials and later interventions.
 - Brackets could remain in place to provide robustness for future works & prevent walls spreading.
- RELATIVE DISADVANTAGES:**
- Brackets to be installed at 86 number of locations - significant cost & install time.
 - Although still challenging to install on north elevation, it is possible to install without removing vital plant equipment.
 - Brackets require fabrication - need to consider procurement and lead time.

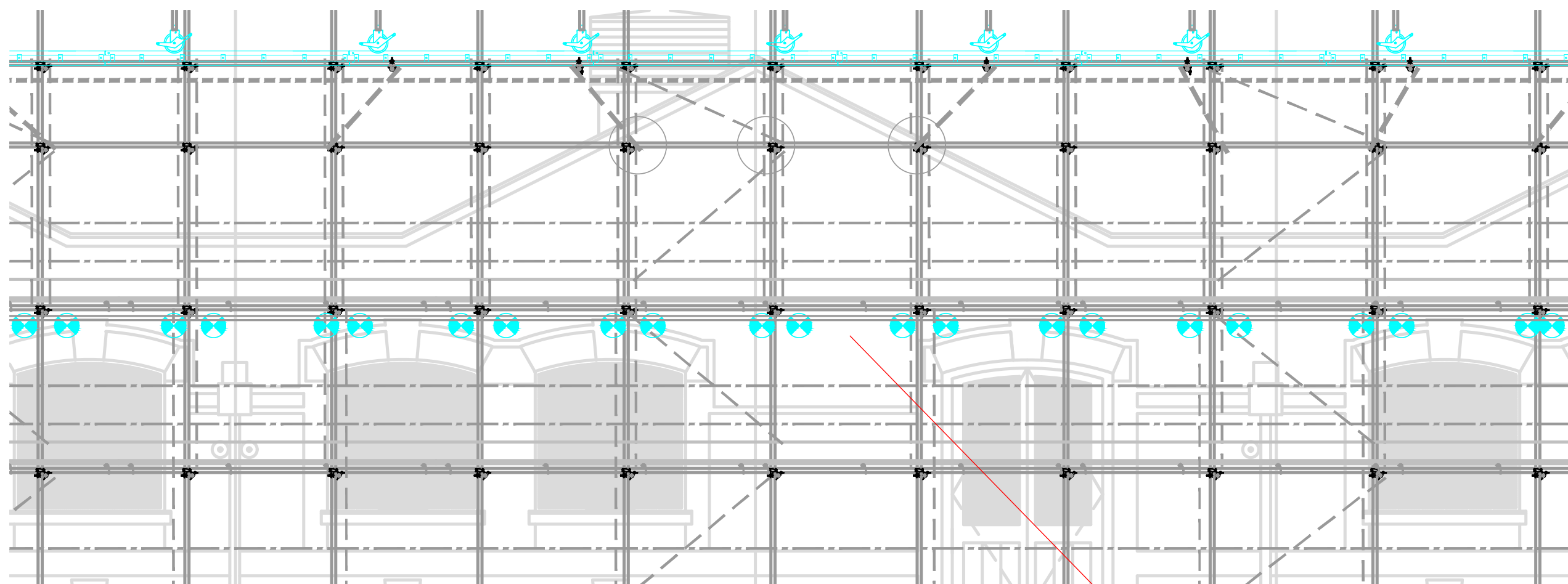
Project: Science and Industry Museum - Site wide Estate Capital Works 2	Project Number: 054704	Status: For Information		
	Sketch Title: Indicative options for temporary works to accommodate scaffolding	Sketch Number: SIM-BHE-NW-XX-S-0002	Date: 01/03/24	Initials: DJC
				Revision: P02

OPTION C - DISCOUNTED - STRENGTHEN EXISTING STEEL BRACING



EXISTING STEEL BRACES

ADDITIONAL SCAFFOLD
TUBE RESTRAINTS



TIES REMAIN AT HEAD OF
WINDOW POSITION

THIS OPTION REQUIRES THE EXISTING STEEL BRACES TO BE STRENGTHENED TO RESIST SIGNIFICANTLY INCREASED BRACING LOADS. THIS CONSISTS OF:

1. ADDITIONAL RESTRAINTS TO BE PROVIDED TO BRACES TO AVOID BUCKLING. LIKELY ACHIEVED VIA SCAFFOLD TUBES CLAMPED TO BRACES AND THEN SECURED TO EXISTING ROOF TIMBERWORK. SEE FIGURE TO LEFT.
2. STRENGTHENING OF EXISTING FIN PLATE CONNECTIONS BY REPLACING M16 GRADE 4.6 BOLTS w. NEW GRADE 8.8 BOLTS. POSSIBLE STRENGTHENING OF EXISTING FIN PLATES REQUIRED, TBC.
3. LIKELY TO REQUIRE ADDITIONAL VERTICAL SUPPORT FOR RESTRAINTS/PURLINS TO PREVENT SAGGING/BENDING. THIS COULD BE ACHIEVED THROUGH LIGHTWEIGHT CABLING OR SIMILAR.

NB - ULTRASONIC TESTING OF EXISTING STEEL BRACES IS RECOMMENDED TO CLARIFY SECTION SIZES & HOPEFULLY REDUCE NUMBER OF ADDITIONAL RESTRAINTS REQUIRED.

RELATIVE ADVANTAGES:

- Connections to existing steelwork are fully reversible and minimises impact to timber roof elements and masonry compared to other options.

RELATIVE DISADVANTAGES:

- Very challenging / infeasible to install in some spaces along northern edge of NW. Alterations would affect the the plant equipment in use and would affect the operation at lower levels spaces which are not intended to be decommissioned during the works. Removal/modification of existing plant would be required.
- Significant install time for braces, especially considering challenging access.
- Some connections to purlins are still required. Connection details to purlins are unclear - would likely require large fixings into historic purlins.