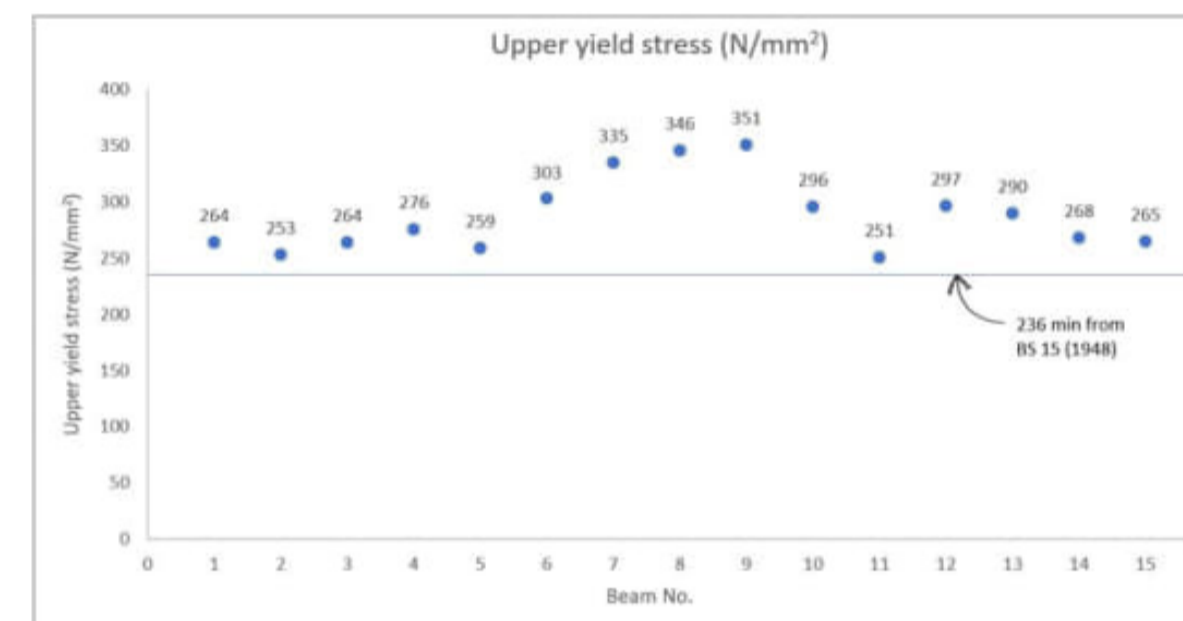
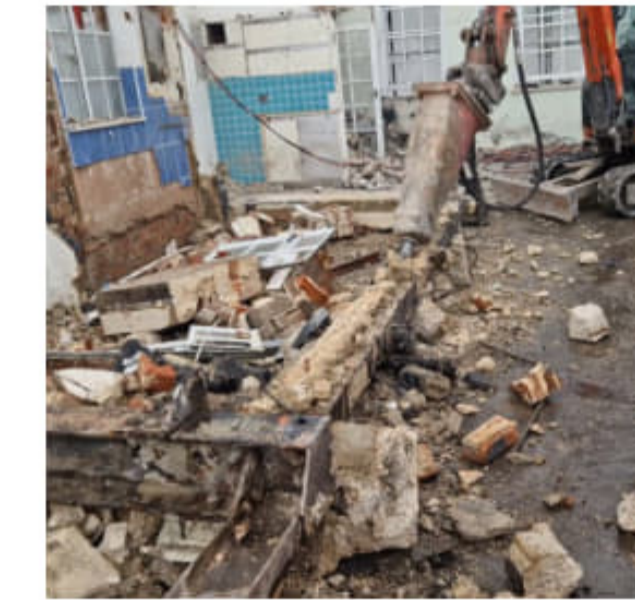


Testing 1950s concrete-encased steel for reuse

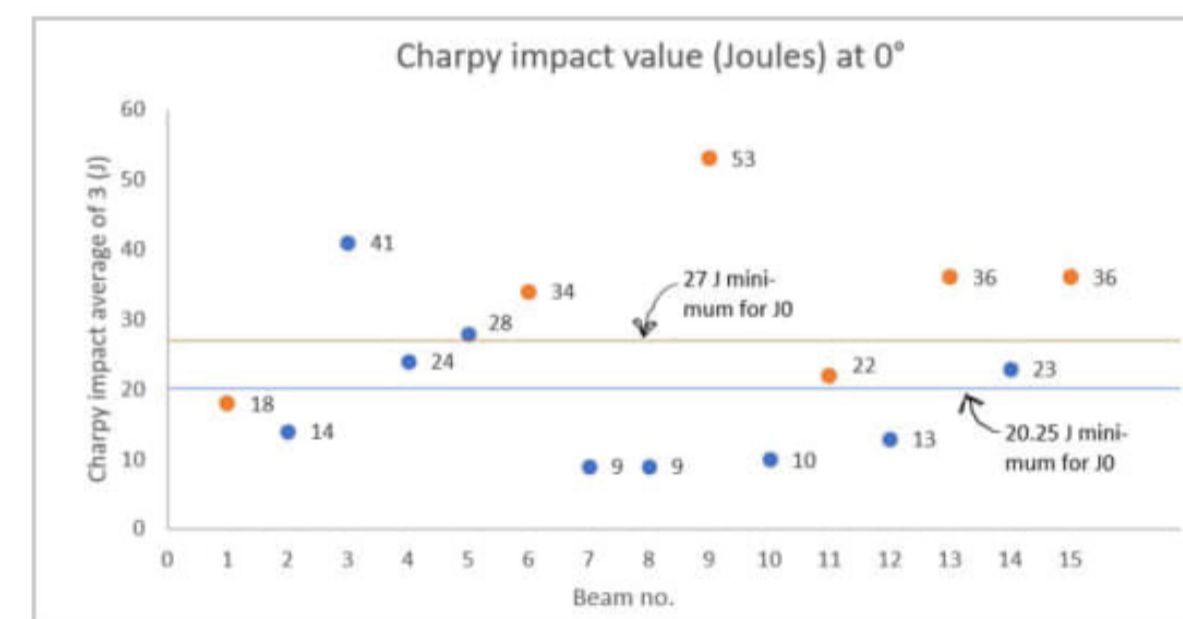


The Project

- + Innovate UK-funded project
- + Cundy Street Quarter, Belgravia, London
- + Salvage steel beams from 1950s building being demolished
- + Test according to SCI P427 Reuse of Structural Steel and SCI P440
- + Remove concrete encasement and assess damage
- + Validate for structural steel reuse



Phase 1 – Encasement removal in-situ



Phase 1 – Selection of results



Phase 1 – Samples after testing

Phase 2: Deconstruction

Concrete encasement removed by machine (for 9 out of 10 beams):

- + Encasement removed with a hydraulic hammer
- + Connection bolts / supporting column were cut with a flame cutting torch
- + The beams were lifted and placed on the floor or pulled and free dropped on the floor



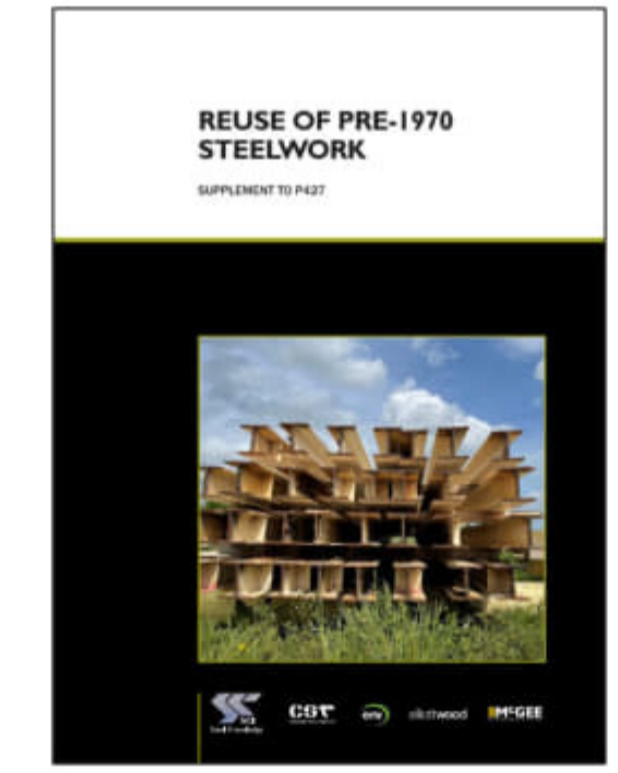
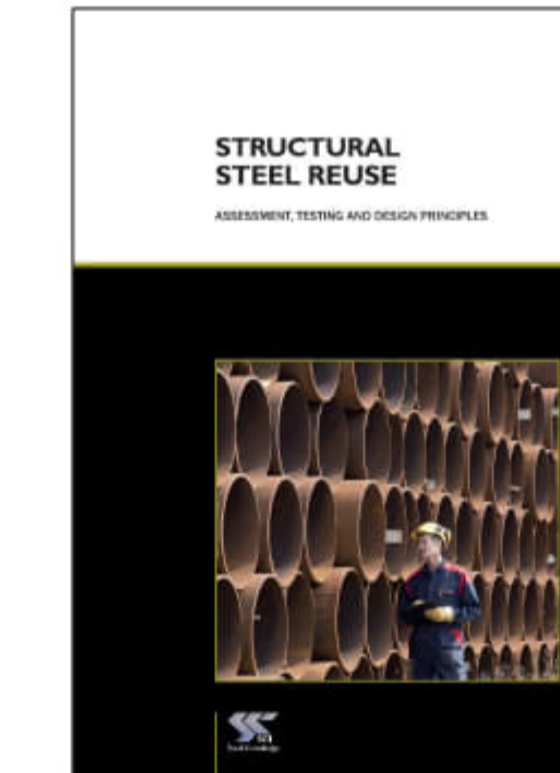
Phase 2 – Site photographs during deconstruction

Concrete encasement removal by hand (for 1 out of 10 beams):

- + Encasement was removed using an electric hammer
- + The connection bolts were cut with a flame cutting torch
- + The beam was lifted and lowered on the floor.

Current progress:

- + HTS+ visually supervised the deconstruction of part of the beams
- + All beams (10 no.) have been reclaimed and stored on site
- + Phase 3 to begin w/c 19th June



SCI P440 – Reuse of pre-1970 steelwork – Published 2023

A supplement to P427, extending the age of permissible steel back to 1932

- + Steel between 1932 and 1970
- + Main requirements of SCI P427 still apply unchanged
- + Specific to pre-1970 steel:
 - + Compression resistance = lower
 - + Lateral torsional buckling resistance = lower
 - + Chemical composition and weldability = more variable
 - + Impact properties = lower and more variable

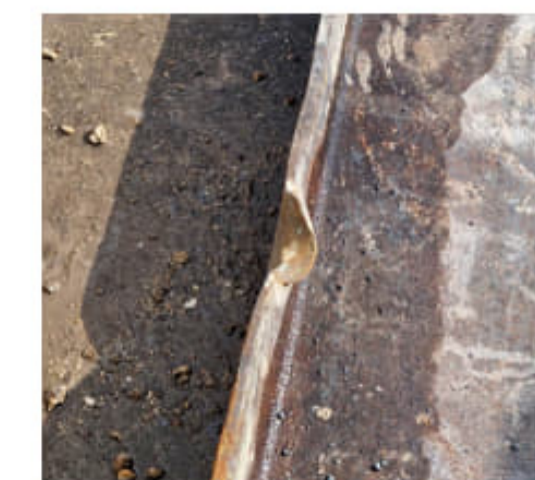
Design checks are to the steel codes applicable at the time

Results

Phase 1: Testing

- + Yield strength = 248 N/mm²
- + Tensile strength = 388 N/mm²
- + Elongation = min 25.8%
- + Charpy impact = not all samples met J0
- + Chemical content = P and S below max

Conclusion: S235 steel with a lower ultimate tensile strength (388 N/mm²) to be used where f_u controls the design (e.g. net tension)



Phase 3: Damage assessment and initial visual condition assessment

- + Most major damage occurred to the top flange due to concrete encasement removal with the hydraulic hammer.
- + Web and bottom flange damage is minor.