Greig Penman
Civil and Structural Engineering

Consulting Services
Civil & Structural Engineering
Principal Designer (CDM 2015)
Expert Opinion
Surveys, Investigations & Repair
SER Certifier & Auditor

4748/AA/tm

7th April 2023

Glasgow City Council
Development and Regeneration Services
229 George Street
Glasgow, G1 1JU
For the attention of A Roy

Dear Sirs

Initial Structural Inspection at 21 Garturk Street, Glasgow

Introduction

On 15th March 2023 Greig Penman Ltd (GPL) was appointed by Glasgow City Council (GCC) to undertake an inspection of the aforenoted property to comment on the general conditions structurally, and to advise on any structural repairs and remedial works that may be necessary and included in a potential statutory project.

Scope/Background

1. The results of our report are based on visual inspections carried out on 27th March 2023 without significant disruption to the fabric of the building.
2. Access was gained externally, to the front and rear elevations, and internally, to the common access closes and stairway.
3. There does not appear to be a basement or substantial solum area, below these properties.
4. This report mainly covers essential structural repairs and mentions some non-structural matters noted during our survey.

General Description of the Property

1. The property comprises of mainly a 'listed', four-storey, tenement property, located on the corner of Garturk Street and Allison Street, in the Govanhill area of Glasgow. (Greek Thomson). (Refer to pictures No.'s F1, F2, F23 and F27).
2. There are commercial premises at the ground floor level. (Grocers).
3. For the purposes of reporting, the front elevations will generally, be referred to as the West and South elevations. (West on Garturk Street and South on Allison Street).
4. External walls are formed from regular sandstone blocks ('blonde' ashlar to the frontages), and darker, more roughly hewn sandstone to the rear.
5. The internal structure is likely to comprise of timber floors and timber roof trusses, which most likely span front to rear. (West to East, in this case).
6. The common close stairway comprises of solid 'pen-check' steps, which appear to be supported on the masonry walls and steel stringer beams, internally.
7. There is also a steel balustrade with hardwood timber handrail, on the inside edge of the stairs.

External Observations

Front/ West Elevation (facing Garturk Street) (see pics F1, F26, F27)

- Four storey, blond sandstone with the style changing around mid-way in the block (i.e., stone features change around mid-way).

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- Greek Thomson style features noted on the return up to the close entrance. These take the form of ornate hoods above each of the windows and at the upper level, between windows together with an ornate cornice at the eaves position.
- An upstanding chimney is noted, just above the close entrance which looks as though it has perhaps been recently re-rendered.
- The condition of the windows on the right-hand part are relatively poor. The windows on the left-hand side appear reasonable at 3rd floor and poor at other levels (potential for water ingress/ rot)-(Pic F19).
- Condition of stonework at the right-hand side is generally in reasonable condition except for finishes blistering/ delamination, and discolouration (Pics F5, F6). Efflorescence also noted at the upper level in the stonework (possibly indicating gutter leakage) (Pic F4).
- General condition of stonework and pointing at the left-hand side appears reasonable throughout (Pic F19).
- Previous repairs noted on both sides (of entrance), need to verify integrity.
- Evidence of a previous fire at ground floor level with black staining and deposits on the stonework (Pic F2). It looks as though there has been an infill at this position as well. This infill is non-structural but is cracked within, at various locations in the render (Pic F22) (Repairs/ cleaning required).
- Evidence of recent movement at ground floor level to the left of the close above the boarded-up ground floor window. Also, recent movement noted up the building at this position.
- Crack to the left-hand side of the close entrance lintel, not significant structurally (Pic F3).
- Staining also noticeable from leakage, probably from the gutter with staining and efflorescence at the upper level and also at the projecting features which are at 1st and 2nd floor level.
- Looks like historical settlement noticeable with the drop in level on the sill course at 1st floor level from Allison Street up to the mid-point position. There is no evidence of historical movement at the LHS (Pic F2).
- The stonework alignment on Garturk Street seems reasonable at eaves position and also over the height when viewed remotely.
- Open joints in the stonework to the right-hand side of the close entrance and also within the infill doorway. Also, evidence of rising damp treatment with 'perforation' holes at ground floor level (Pics F7, F8). Service box adjacent to building face (Pic F9).
- Cracked and displaced stonework to the left of the entrance area which seems to continue into the adjacent spandrel (Pics F10, F12-F15 incl.). It would be prudent to carry out some stitch tying to link individual stones to the main stone spandrel as well as 'through-tying' into the close wall.
- No evidence of downpipes on the whole elevation therefore likely to be concealed downpipes within the wall fabric.
- 3rd floor lintels reasonably intact, 2nd floor lintels intact, 1st floor lintels also intact.
- There is a boarded-up window at ground floor level (Pic F16) and clearly failed (2 No. locations) lintels (Pic F17). There looks as though some form of propping may have been installed. In this instance, a replacement stone lintel would be more appropriate and also diagonal crack tie stitching should be carried out in the coursing above.
- There are one or two mullion replacements previously carried out on the left-hand elevation.
- Movement clearly continues up the building between 1st and 2nd floor and between 2nd floor and 3rd floor with open joints (Pic F18). Would suggest some form of stitch tying at each of the crack positions (formed diagonally) as well as re-pointing. Also, Helifix ties in the joints to strengthen, particularly above the replacement lintel.
- There is locally delaminating stonework at the 1st floor window jamb (Pic F20), which would benefit from stitch tying.
- The head of the mullion at the double window to the right of the ground floor would appear to require some form of repair. Also allow for angle strengthening across this double window (Pic F21).
- It would be prudent to externalise downpipes together with checking out the branch drainage from the face of the building out to the main sewer in the street (in view of recent movement).
- The adjacent building (No.19) has external downpipes fitted.

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Front/South Elevation (facing Allison Street) (Pics F23, F27)

- Upstanding chimneys, both at the mutual wall line and at intermediate positions. Appear in reasonable condition although condition of render might be suspect in the middle chimney.
- Greek Thomson features are again prevalent on this elevation, between windows at upper level and also between the window lintels at 2nd floor and 1st floor.
- External downpipe noted on this elevation emanating from a concealed or contained gutter.
- Lintels at roof level appear reasonably intact. Similarly, intact at 2nd floor, intact at1st floor.
- Condition of stonework on this elevation is reasonable throughout. Some localised areas of weathering (Pic F24) but nothing significant structurally. Pointing also in reasonable condition.
- Staining around features noticeable, particularly in 1st floor level at sill position and window hood position.
- Viewing Allison Street elevation remotely, it appears to be reasonably plumb throughout with no evidence of any bulges (Pic F25).
- No discernible historical settlement on Allison Street.

Rear Elevation

East Return

- Short return wall at the rear corner of the block, on the right-hand side (RHS). (Right, as viewed from the rear of the property). The North return wall appears to be the rear of the block to the adjacent property on Allison Street, and not part of the property being surveyed. (Pic R1).
- Small, splayed area at the LH corner of the east return wall, where the rear door is located (at ground floor level). (Pic R2).
- 'Blonde' sandstone to the rear wall. More roughly hewn stone (than that at front wall). Also, fairly, dark and discoloured in areas.
- Some signs of historic settlement at isolated areas, at window lintels and cills.
- Historic strengthening details at some lintels.
- Façade appears to be fairly plumb.
- Quite a bit of dampness to the rear, generally, below first floor level.
- Staining is also apparent between the ground floor windows and also below the windows at the lower level. (Due to dampness).
- Open joints between stonework, in some areas, most notably, at the splayed corner and also generally, at the lower level.
- Spalling/ weathered stone in various areas with multiple areas of repairs, (mainly, widespread re-pointing).
- <u>All significant structural defects or areas of concern, are noted</u>, as follows-
- <u>Ground Floor Level</u>
    - Very damp below ground floor windows. (Some vegetation growth and dark staining to stonework). Severely weathered cill. Window appears to have historically settled towards the left-hand side (LHS). (Pics R3 and R4).
    - Staining is most apparent between the windows (appears to be some electric/ telephone cables at first floor level, which are forming a ledge, where water is backing up and then shedding thereafter).
    - Lintels have been strengthened at both windows. (Mild steel angles have been installed at the underside of both lintels). Steelwork is now corroding. Crack repairs to the lintels at both windows. Crack repair extends above the lintel at the RH window. (Pics R4-R6).
    - Some areas of spalling finishes at ground floor level. Appears to be at some areas of repaired finishes rather than the original stone. However, where finishes are delaminated, they may be causing further spalling of stone, as well. (Finishes not truly compatible with the sensitive stone). (Pic R7).
    - Open joints at door. (Metal door).
- <u>First Floor Level</u>
    - Better conditions at this floor; (not as damp, as that noted at ground floor level).
    - LH window lintel has settled towards the LHS.
    - Rough infill below the RH window. Crack in cill. (Pic R8).

- Second Floor Level
    - Better conditions at this level, (not as damp).
    - LH window lintel has settled towards the LHS.
    - Coarse crack at the lintel over the RH window. (Pic R9). Allow for strengthening. Extensive stone repairs above the lintel.
    - Small void in wall, caused by former vent.
- Third Floor Level
    - Better conditions at the upper level, (not as damp).
    - Both window lintels have settled to the LHS. (Pic R10).
    - May be a slight bulge at the upper masonry spandrel, (RHS), just below the gutter. (Shared with the adjacent property). (Pic R11).
    - Window cill has settled to the RHS, (window in splayed corner of the rear wall). Wider, open joints above the window. (Pic R12).

Internal Observations

Common Access Stairway

- Formerly, 'pen-check' stairs now with remedial screed finishes. Stairs are 'U' shaped on plan and run from floor to floor (no half-landings). Originally, cantilever sections, the steps now span side to side from the close side or rear walls to internal steel stringers, ('tee' sections), at the free edge of the steps. Two of the stringers span front to rear, from the main landing to the rear wall. (Primary members). The central stringer spans between the other two sections. (Secondary member). The two main stringers appear to be affixed to a timber beam at the edge of the main landings. (See pics S6-S9).
- Third floor level
- Rooflight in central, raised/pitched area at ceiling level, at the upper floor of the stairwell. (Pic S1).
- Flat ceilings to three sides of the rooflight area. Plasterboard finishes to ceilings.
- Upper areas of walls also appear to have plasterboard finishes. (Above roof truss/ ceiling tie level).
- Plaster on hard at lower masonry walls (i.e. – below truss level).
- All significant structural defects or areas of concern, are noted, as follows-
    - Dampness noted in at least three areas of the pitched ceiling. Clearly, the roof is leaking in these areas. (Rooflight appears intact). (Pic S1).
    - 'Fine' cracks to ceiling on both sides of the raised area. (Left and right, as viewed from the front of the property). Likely to be joints in the plasterboard.
    - 'Fine' vertical crack to rear wall, directly below the rooflight area. (Also, likely to be a joint in the plasterboard). (Pic S2).
    - Similar 'fine' vertical cracks to both side walls. (Similar joints). (Pic S3).
      Note – these vertical cracks appear to extend to the head of the masonry wall, (where there is an obvious change in finishes/ construction).
    - At the lower level of the wall, the plaster appears to be cracked or crazing in some areas. (Delaminating). (See typical pic S4).
    - Landing appears to be even at the upper level.
    - Balustrade also appears solid at this level.
    - Stairs that lead down to second floor level appear to slope towards the side walls, in general; (to left at the top of the stair and to the right-side at the bottom of the flight).
- Second floor level
    - Central crack to the ceiling. (Pic S5).
    - 'Fine' diagonal and vertical cracks above the door to flat 2/2. (Pic S6). Door appears to have settled historically to the rear. Vertical crack at landing beam bearing may be a stress crack. (Unlikely to be a padstone, as existing, on the wall at the bearing, which would allow for a better spread of the load onto the masonry).
    - Lesser cracking above the door to flat 2/1.
    - Steel stringers (viewed below the upper stair flights) appear to be in reasonable condition. (No obvious signs of corrosion). (Pics S7-9).
    - Landing appears to be even at this level.

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- First floor level
    - Several 'fine' cracks to the ceiling. More severe over the door at flat 1/1. (Pic S10). Ceilings also appears to be damp in some areas.
    - Quite a coarse vertical crack is apparent at the wall above the door to 1/1 and also, below the landing beam bearing. (Stress crack/ no padstone). (Pic S11).
    - Door frame appears distorted. Cracks and door distortion appear to be most likely caused by historic movements.
    - Some cracking of steps on the flight to ground. (Pic S12).
- Ground floor level
    - Several cracks to the ceiling. Also, some signs of dampness. Ceiling may be delaminating. (Below first floor landing area). (Pics S13 and 14).
    - Also, some spalling finishes evident at one side of the downstand beam over the front close (at the junction with stairwell).
    - Very 'fine' vertical crack below the landing beam. (RH side wall).
    - The return wall below the stairs appears to be 'out-of-plumb'. (Pic S15). (Non-loadbearing).
    - Some cracking and slight bulging of finishes below the (upper) stair flight, adjacent to the return wall to the rear entrance. (Pic S15). (Appears to be delaminating finishes).
    - Both side walls appear to be 'off-plumb' in the aisle leading towards the rear door of the property. (Pics S16 and S17).
    - Note - Rear of close in need of some re-decoration, spalling finishes, flaking paint, etc. Also, a 'build-up' of refuse. (Window cleaner informed us that there were rats reported in the vicinity of these flats, mainly, to the rear of the premises).
    - Some ceiling repairs have already been carried out, to the rear (but unpainted).

Discussions/Conclusions

Front Elevations

1. The **property appears to be in reasonable condition,** considering its age. However, it has been subject to **historical settlement**, as well as **more recent movement**, particularly on Garturk Street elevation (from the Allison Street corner up to the close entrance). Allison Street elevation seems to be free of any significant historical movement. We do not consider historical movement is currently ongoing. although there were minor signs of slight recent movement, thought to be due to the possible effects of leaking below-ground drainage.

2. In terms of **more recent movement**, this is localised and seems to be vertical movement in the spandrel to the left of the boarded-up ground floor window. We suspect this has something to do with leaking **below-ground drainage** and there for, this needs to be fully **checked by CCTV survey**.

3. The **fabric condition on both elevations** is such that previous repairs have been carried out, however, there are other areas where residual delamination is present at adhoc locations throughout. Accordingly, all existing repairs should be checked by a 'tapping exercise' and any 'boss' areas should be removed and re-done. Similarly, all areas of existing stone delamination should be suitably repaired. Structural stich ties will require to be detailed/ specified where strengthening is needed to weakened areas of stonework, as noted in the preceding sections.

4. There is an area of **stonework** at ground floor level which has been subjected to **fire damage** resulting in cracked/ stained and blistering finishes. This needs a combination of structural and non-structural repairs.

5. To the **left of the close entrance,** there is evidence of the **ashlar stone delaminating** from the backing fabric. This will require a combination of fully stitch tying the spandrel from ground to first floor and also tying back to the close return wall.

6. **Lintels at ground floor** to the left of the close entrance are in poor condition and will require either replacements or strengthening with GMS steelwork.

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Rear Elevation

7. **Stonework and finishes** generally, appear to be in **better condition** at the rear walls, (compared with front elevations) with only some localised areas of weathering/ spalling, open joints, and repairs evident.

East Return Wall (rear of Garturk Street)

8. A **few window lintels (and cills) have settled** to the rear/ East return wall, generally, towards the LHS, at both the central and RH windows on the main wall spandrel, outwith the splayed area. Appears to indicate localised movement in the small spandrel at the splayed corner and in the wider spandrel nearer the RH windows. However, in both cases, the settlement appears to be **historic movement**. (Pics R8 and 10).

9. A **slight lateral bulge is apparent at the upper masonry spandrel** between the property and the adjacent tenement (No. 266). (Pics R11). This is an area quite close to eaves level and it may be that water has been able to permeate behind the backing, (downpipe and gutters in close proximity and either element could be damaged, leading to leaks). **Frost action** could then lead to expansion of any trapped water (within the stonework, joints or backing) and subsequent cracking or bulging of the stone. There may also be a **lack of restraint** of the rear wall in this area, adjacent to a main lateral support, (i.e. – the mutual wall between the two blocks). In any case, the area may benefit from the insertion of stainless-steel ties (external rods with internal straps and square steel 'pattress' plates). All the drainage should be checked for defects, as well. (See further comments re- CCTV checks of drains).

10. **Significant crack at the underside of the lintel** over the RH window, at the second-floor level. May need strengthening with galvanised mild steel angle. (Pic R9).

11. At least **two window lintels have been strengthened historically**. However, the mild steel angles used at both locations are starting to corrode. (Pics R4-6). Therefore, some **corrosion treatment** should be carried out, to the steelwork in both areas, ahead of re-painting. (Ground floor left and right). Alternatively, an allowance could also be made for **renewal of the angles**, (using galvanised mild steel sections) which would alleviate the need for continued and regular maintenance of the existing steelwork.

12. In general, any other defects appear to be associated with weathering, dampness, or inadequate repairs. **Open joints** are noted in various areas, particularly, below the ground floor windows, at the rear door and also at the eaves level, in the splayed area. In some areas the mortar appears to be loose, as well. (Most notably, between the ground floor windows, where the staining/ dampness is most obvious). All loose areas of mortar should be fully raked-out and re-pointing carried out to suit, (using a suitable lime:sand mortar). (GCC to comment further, in due course). (Pics R3, R7 and R12).

13. In terms of the major areas of spalling stone or finishes, **all loose parts should be removed asap, as these elements present an obvious danger to the public.**

14. All **other areas of stone repairs,** to be properly assessed by GCC, in due course.

Internal

Common Close/ Stair

15. **The main concern at the stairwell and common close areas are the buckled/ bulged walls** at ground floor level (below the stair and on either side of the aisle leading to the rear door).

    a. The **lateral movement of the return wall below the stair** appears to be caused by a lack of restraint at the head of the wall. The wall is clearly leaning towards the LH side, directly below the stair flight, (as viewed from the front of the property). (Pic S15). It is possible that there has been some load transfer from the stair flight local to the wall as well, which may have exacerbated the 'leaning-effect', although originally, this wall would be non-loadbearing and stair more likely to apply load in other direction. (More likely, that stair has settled in the same direction as the wall and then imparted some load thereafter).

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It may be prudent to **re-build the wall from about half-height** to the underside of the stair and **also install a head restraint**.

b. **Bulging walls in the aisle, leading to the rear stair**.
   i. The LH wall is bulging into the shop area, immediately adjacent to the door into the stairwell. (Pic S18). The RH wall bulges into the aisle, in an area nearer the rear door. (Pic S17). Both walls are likely to be slender elements, (100mm thick brick over 3m high), and are therefore susceptible to buckling. However, the RH bulge does not appear to be too excessive. The LH bulge is more significant.
   ii. It appears likely that the **LH wall may have to be partially re-built** in this area or the wall could be strengthened locally, within the shop and/ or in the aisle. (Re-build would involve some temporary works, therefore, strengthening may be better option). Further inspections will be required to accurately assess the bulging, within the shop, as well. All details to be developed in due course.
   iii. A proper **verticality check** should also be carried out to assess how far the wall is 'off plumb' and over what length or distance. (Will dictate length of re-build or strengthening support or restraint).

16. In terms of **cracking to the plaster (on masonry),** the close appears to be quite damp in some areas, with obvious leaks at roof level, but moisture can also permeate through the porous brickwork, (where there is a significant temperature difference, across the walls, i.e. – at side walls, between the 'warm' flats and the colder common areas) leading to plaster delamination and obvious cracking. This appears to be the case in most areas, where cracking (or crazing) is apparent. (Pics S1, S4 and S6). However, **the more severe cracks below the landing beam bearings** may indicate shear failure of the masonry and a proper repair is necessary. (Pic S11). Therefore, the crack repair should include for full removal/ cut-back of render locally, (say, over 1m2, below the beam), full re-pointing of the crack and brickwork in the area and also the installation of stainless-steel ties (at close centres, within each of the bed joints of the brickwork). (Helifix types, OEA).

17. **Several 'fine' cracks** are evident **to the ceilings and at the upper areas of the walls**, in the stairwell; (i.e. - in the areas above roof truss/ ceiling tie level). Generally, these appear to be the joints between differing panels of plasterboard. (Pics S2 and S3). (Non-structural defects and of no obvious concern). (GCC to comment on, at a later date).

18. The **ceiling is in poor condition in a few areas of the common close and stairwell** and may be delaminating. (Particularly, the ceilings below the first and second floor landing areas). Appears to be connected with dampness issues, as well, in some areas. (May need renewed). (GCC to comment on the finishes in the close, in general, in due course). (Pics S10, S13 and S14).

Recommendations

Based on the aforenoted, we would recommend the following structural works are carried out (some non-structural items are also noted):

1. **Repair the front elevations**; wall fabric and structural repairs, as outlined in the preceding section and as agreed with GCC/ Co-Owners.

Garturk Street

a. Fabric repairs; make due allowances for repairs, both to areas showing 'active' delamination together with areas previously repaired, if 'boss'. This should include removal of efflorescence stains, fire damage staining and delaminating finishes.
b. Stitch tying of stonework required to the left and right of the close entrance together with the recent cracks at the upper level (left side).
c. Lintels: replace and/ or strengthen lintels at ground floor level on Garturk Street.

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d. Check drainage below-ground on Garturk Street using CCTV survey; allow for drainage repairs accordingly.
e. Concealed down-pipes should be expressed externally and re-connected to the main drainage system.

Allison Street

f. As above regarding fabric repairs.

2. **Repair the rear elevation**; wall fabric and structural repairs, as outlined in the preceding section and as agreed with GCC/ Co-Owners.
   a. Installation of stainless-steel tie rods with 'pattress' plates (and internal straps) for better restraint of the upper (RH) spandrel wall to the inner mutual wall at the junction of No. 264 and 266 Garturk Street. (Details to be developed, in due course).
   b. Strengthening to cracked lintels. (One definite. Potentially, an additional 2No. renewals).
   c. Corrosion treatment to existing steelwork strengthening angles (ground floor window lintels). (Instead of provisional renewals noted in '2b' above).
   d. Removal of all loose spalled areas of stone or finishes for safety of tenants/ public.
   e. All other cosmetic repairs to fabric at rear wall to be specified by GCC, in due course; (includes minor crack repairs, making good of open joints, general re-pointing, etc).

3. Consider **repairs to common close and stairs**, as outlined in the preceding section.
   a. Verticality checks to rear aisle wall (RHS, as viewed from front of property), to determine length of partial rebuild of wall.
   b. Re-build or strengthening of RH aisle wall to the rear of block, (lengths based on checks noted in '3a' above). Will need further inspections at the rear of the close and access to the shop, to assess the movement internally. Also, to help develop a suitable scheme for potentially, strengthening the wall (instead of the re-build). (Temporary propping may be necessary, if wall is to be re-built, as wall may be loadbearing).
   c. Partial re-build of non-loadbearing wall below stairs (ground floor level), where leaning at head. Also, installation of suitable head-restraint, (details to be developed by GPL, in due course).
   d. Crack repairs to walls, (using Helifix stitch-ties OEA, at stress cracks below landing beams). May also include for the insertion of precast concrete padstones at beam bearings. TBD w aa
   e. Likely to be quite an extensive plaster strip to walls, in stairwell and close, due to dampness and delamination of finishes. (GCC to comment further, at later stage).
   f. Replace ceilings in two areas of the stairwell; (i.e. – below first and second floor landing slabs). (To be confirmed by GCC).
   g. Repair damaged areas of ceiling at roof level (at defective areas of roof, adjacent to rooflight). (To be confirmed by GCC).
   h. All other cosmetic repairs to fabric in common areas to be specified by GCC, in due course; (includes confirmation on full plaster strip to walls,).

4. Allow for a **specialist rot survey and report**. (To cover internal areas where dampness and distress noted externally or within common areas). May also include all flats and roof spaces when full access is available.

We trust the above meets with your requirements meantime and enclose selected photographs taken during the course our survey.

Yours faithfully

Thomas Moffat

For/ and on behalf of
Greig Penman Ltd
Encl:

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