Naba Knit Composite Ltd.

Zamgora EPZ Road Ashulia, Dhaka
(23.5609.7 N, 90.1711.2 E)

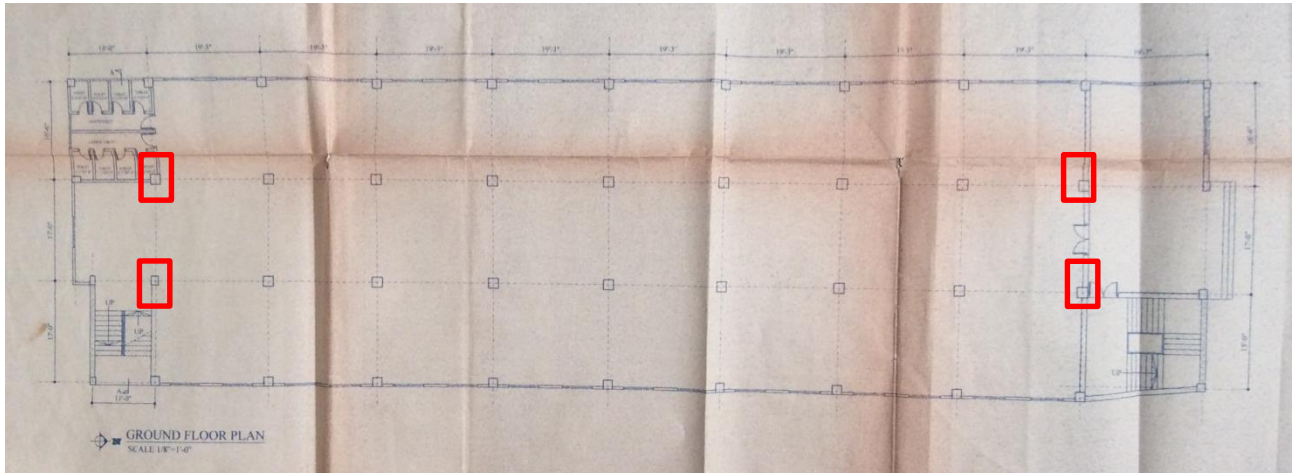
15th APRIL 2014

ACCORD on Fire and Building Safety in Bangladesh

ARUP

Observations

Areas with storage, masonry walls and increased floor finishes lead to significant axial stresses in columns.



Preliminary calculations show that finished garment storage and masonry walls around toilets lead to high columns stresses in columns marked.

Concrete aggregate was observed as being brick at the ground floor.

The column capacity should be verified once the concrete strength in the identified columns has been confirmed at ground floor level.

Stress in concrete columns

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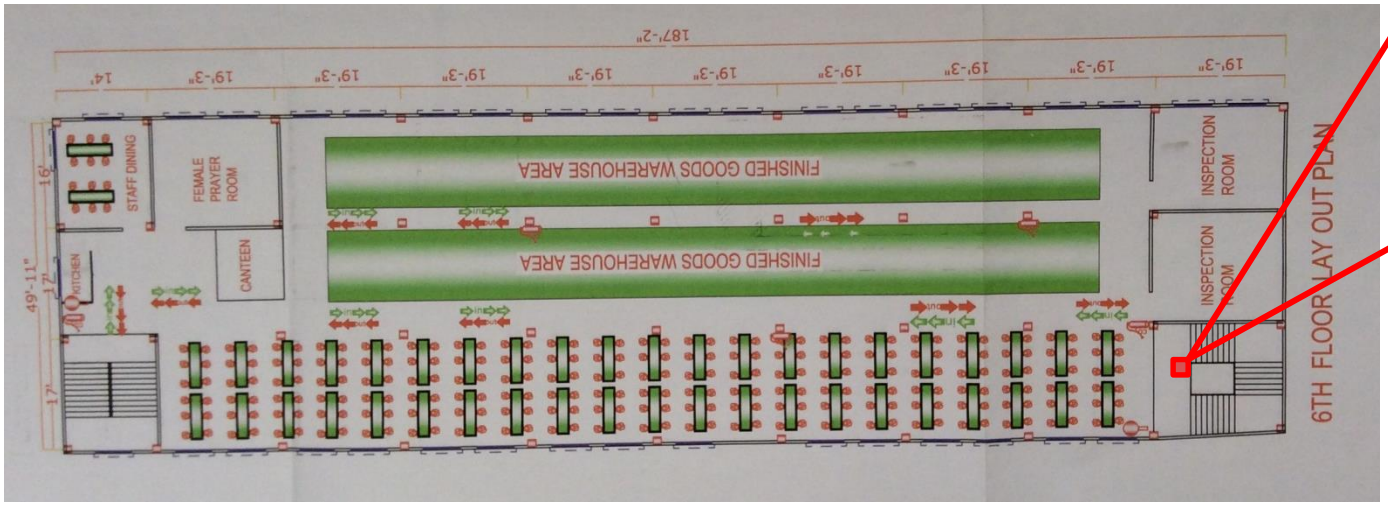
Additional column at sixth floor level

An additional column has been built between sixth floor and the roof over-run which is not shown on the layout drawings. This column is being supported by the stair landing at fifth floor only (no column below).

The column construction should be checked by removing the plaster finishes. The column design should be checked by the building engineer. The engineer should also confirm that the fifth floor slab is capable of supporting the column load.



Additional beam at sixth floor level

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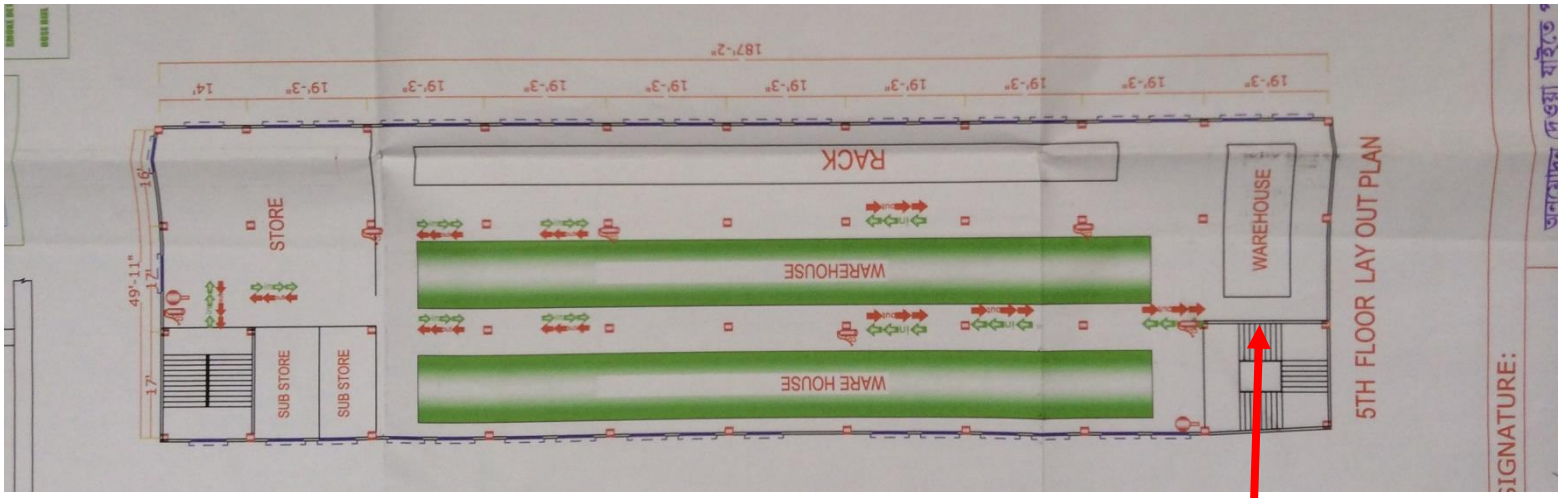
Masonry Wall Panel Cracking



Cracking was observed in a masonry wall panel at fifth floor in the location shown.

There were no signs of distress below in either the slab or other similar masonry walls.

Crack to be monitored to ensure it does not grow and repaired to prevent on-going maintenance issues.

Brick wall on 5th floor

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Conduits cast into beam

Conduits cast through third floor beam.

Building engineer to confirm that beam still has sufficient capacity for applied loads.

Conduit is not in use and could be grouted up.

Services cast through beams

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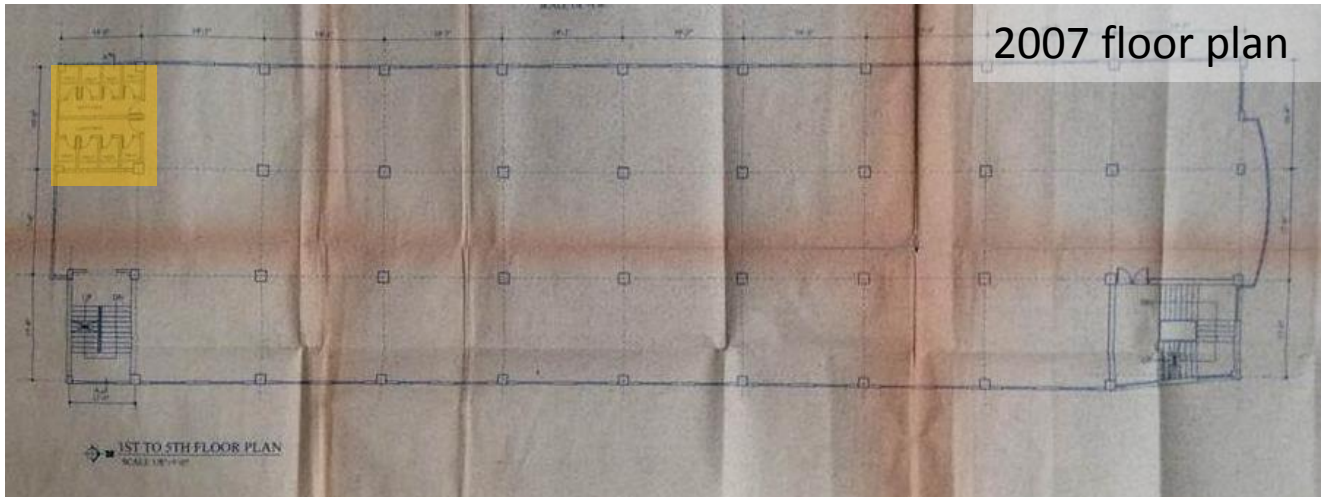
Drawing Inconsistencies



2007 floor plan

Recent floor plan showing toilets in as-built location

Toilets are located in a different position to that shown on layout drawings from 2007 (note that the location is shown correctly on recent factory layout drawings).

Building engineer to confirm that structure supporting toilets has been designed for increased finishes load and masonry walls.

Toilet locations

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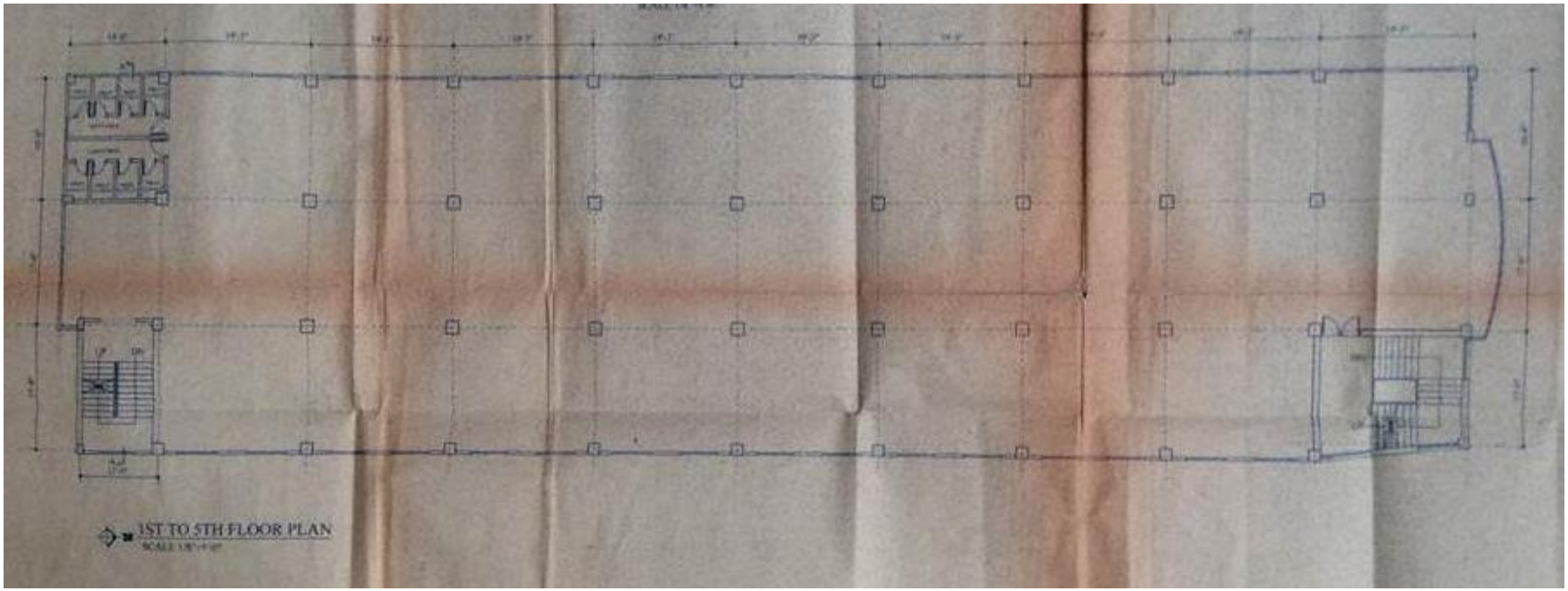

Structural drawings show total of 10x3 bays, frame constructed has 9x3 bays. Accurate as-built floor plans to be produced that reflect structural frame.

Drawings show additional bay

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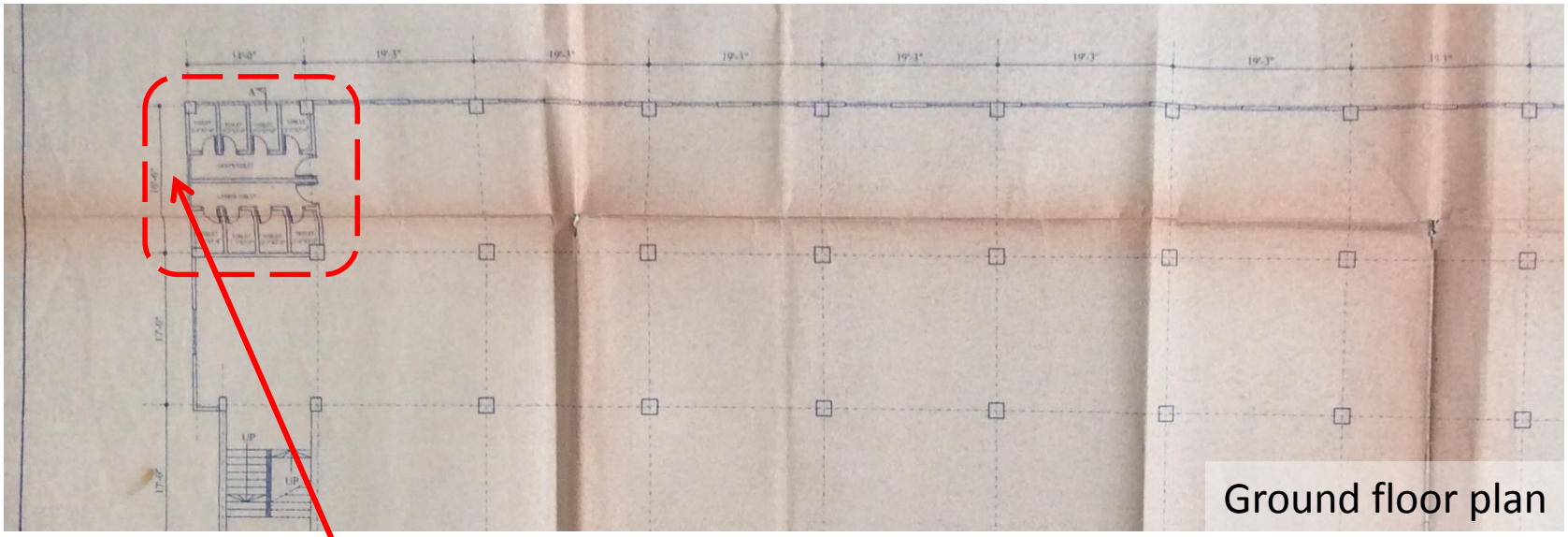

Ground floor plan

Access to water tank

There is a water tank below one bay of the ground floor slab. Water tank is reported to be approximately 4.5m sq., 4.5m deep

Engineer to confirm that excavation for water tank does no affect foundation design. Water tank should be recorded in accurate as built drawings that have been requested above.

No record of basement water tank

Removal of Lightweight Steel Roof

We understand that a lightweight steel structure that previously covered the sixth floor (roof) was recently dismantled following advice from a qualified engineer. The RC flat slab roof at either end of the sixth floor (highlighted) is undocumented.

The masonry façade is cantilevering above slab level. An engineering check should be carried out to check is has sufficient capacity under horizontal wind load.

The building permit is for 5 stories only. The roof should not be replaced unless an engineering assessment of the current structure is carried out and the relevant permits are granted. Rainwater Drainage and a protective barrier to be installed to prevent water damage to structure

Former tin shed roof

Actions

Problems Observed

ITEM 1; Concrete strength and column capacity
ITEM 2; Inconsistencies in record information.
ITEM 3; Lightweight steel roof removed
ITEM 4; Additional column at sixth floor
ITEM 5; Services cast through beam.
ITEM 6; Crack in masonry wall at 5th floor.

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Verify concrete strengths in columns and column capacity	Factory Engineer to review design, loads and columns stresses in columns identified previously. All live loading including storage to be limited to 1.5kN/m2 from level 1 upwards	**Immediate - Now**
2	Verify concrete strengths in columns and column capacity	Verify insitu concrete stresses either by 100mm diameter cores or existing cylinder strength data for columns previously indicated.	**Immediate - Now**
3	Verify concrete strengths in columns and column capacity	A Detail Engineering Assessment of Factory to be commenced, see attached Scope.	**Immediate - Now**
4	Verify concrete strengths in columns and column capacity	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	**6-weeks**
5	Verify concrete strengths in columns and column capacity	Detailed engineering assessment to be completed	**6-weeks**
6	Verify concrete strengths in columns and column capacity	Continue to implement load plan	**6-months**

Detailed Engineering Assessment

This Schedule develops a minimum level of information, Analysis and testing expected as part of a Detail Engineering Assessment.
The Building(s) have been visually assessed and it is deemed necessary that a detailed engineering assessment be carried out by a competent Engineering Team employed by the factory Owner.

This Request should be read in conjunction with the BUET developed Tripartite Guideline document for Assessment of Structural Integrity of Existing RMG Factory Buildings in Bangladesh (Tripartite Document), the latest version of this document should be referenced. T his document also gives guidance on required competency of Engineering Team.

We expect that the following will be carried out:

1. Development of Full Engineering As-Built Drawings showing Structure, loading, elements, dimensions , levels, foundations and framing on Plan, Section and Elevational drawings .
2. The Engineering team are to carry out supporting calculations with a model based design checks to assess the safety and serviceability of the building against loading as set out in BNBC-2006, Lower rate provisions can be applied in accordance with the Tripartite Guidelines following international engineering practice, justification for these lower rate provisions must be made.
3. A geotechnical Report describing ground conditions and commenting on foundation systems used/proposed.
4. A report on Engineering tests carried out to justify material strengths and reinforcement content in all key elements studied.
5. Detailed load plans shall be prepared for each level showing current and potential future loading with all key equipment items shown with associated loads.
6. The Engineering team will prepare an assessment report that covers the following:
    - As-Built drawings including
        - Plans at each level calling up and dimensioning all structural components
        - Cross sectional drawings showing structural beams, slabs, floor to floor heights, roof build-ups and Basic design information of the structure
    - Highlight any variation between As-built compared to the designed structure
    - Results of testing for strength and materials
    - Results of geotechnical assessment and testing/investigation
    - Details of loading, inputs and results of computer modelling
    - Commentary on adequacy/inadequacy of elements of the structure
    - Schedule of any required retrofitting required for safety or performance of Structure

Any proposals for Retrofitting to follow guidance developed in the Tripartite Document

Item No.	Observation	Recommended Action Plan	Recommended Timeline
7	Inconsistency in record information: - Toilets located in different to position to that shown on layout plans - RC flat slab at roof level not documented - Structural drawings show total of 10x3 bays, frame constructed has 9x3 bays. - No record of basement water tank.	Building engineer to commence calculations confirming that structure supporting toilets has been designed for increased finishes load and masonry walls. (Refer item 1 – DEA)	**Immediate - Now**
8	Inconsistency in record information: - Toilets located in different to position to that shown on layout plans - RC flat slab at roof level not documented - Structural drawings show total of 10x3 bays, frame constructed has 9x3 bays. - No record of basement water tank.	Building engineer to commence calculations confirming that RC flat slab at roof level (supporting water tanks) has capacity for applied loadings(Refer item 1 – DEA)	**Immediate - Now**
9	Inconsistency in record information: - Toilets located in different to position to that shown on layout plans - RC flat slab at roof level not documented - Structural drawings show total of 10x3 bays, frame constructed has 9x3 bays. - No record of basement water tank.	Calculations stated above to be completed	**6-weeks**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
10	Inconsistency in record information: - Toilets located in different to position to that shown on layout plans - RC flat slab at roof level not documented - Structural drawings show total of 10x3 bays, frame constructed has 9x3 bays. - No record of basement water tank.	Building engineer to confirm that excavation for basement water tank does not affect foundation capacity.	**6-months**
11	Inconsistency in record information: - Toilets located in different to position to that shown on layout plans - RC flat slab at roof level not documented - Structural drawings show total of 10x3 bays, frame constructed has 9x3 bays. - No record of basement water tank.	Building engineer to collect information and complete documentation.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
12	Lightweight steel structure covering sixth floor (roof) has been removed following professional advice	Confirm that cantilevering masonry wall has sufficient under horizontal wind loads.	**6-weeks**
13	Lightweight steel structure covering sixth floor (roof) has been removed following professional advice	Roof should not be replaced unless an engineering assessment of the current structure is carried out and the relevant permits are granted.	**6-months**
14	Lightweight steel structure covering sixth floor (roof) has been removed following professional advice	Install Rainwater drainage and adequate protective barrier to prevent moisture damage to the structure	**6-months**
15	Additional column between sixth floor and roof over-run	Column construction should be checked by removing plaster finishes.	**6-months**
16	Additional column between sixth floor and roof over-run	Column design should be checked by the building engineer.	**6-months**
17	Additional column between sixth floor and roof over-run	Engineer to confirm that the fifth floor slab is capable of supporting the column loads.	**6-months**

Item No.	Observation	Recommended Action Plan	Recommended Timeline
18	Services cast through beams	Building engineer to confirm that beam still has sufficient capacity for applied loads.	**6-weeks**
19	Services cast through beams	Conduit to be grouted up.	**6-weeks**
20	Services cast through beams	Repair or strengthening works as required to be carried out	**6-months**
21	Cracking in internal brick wall on ground floor and 5th floor	Crack to be monitored to ensure that is does no continue to grow	**6-weeks**
22	Cracking in internal brick wall on ground floor and 5th floor	Remedial works to be completed to prevent on-going maintenance issues	**6-months**