

New Era Fashions Mfrs (BD) Ltd

Plot 10,11 & 12
Sector 8, Road 3, CEPZ, Chittagong
(22.279298N, 91.776438E)

21st June 2014



Observations

Safety Hazard – Water ingress through unsealed expansion joint adjacent to electrical panels

Expansion joint has not been waterproofed resulting in water ingress at 1st Floor level. There are serious concerns over the proximity of electrical panels adjacent to the joint.



Water ingress penetrating construction joints where electrical panels are connected



Water ingress at expansion joint

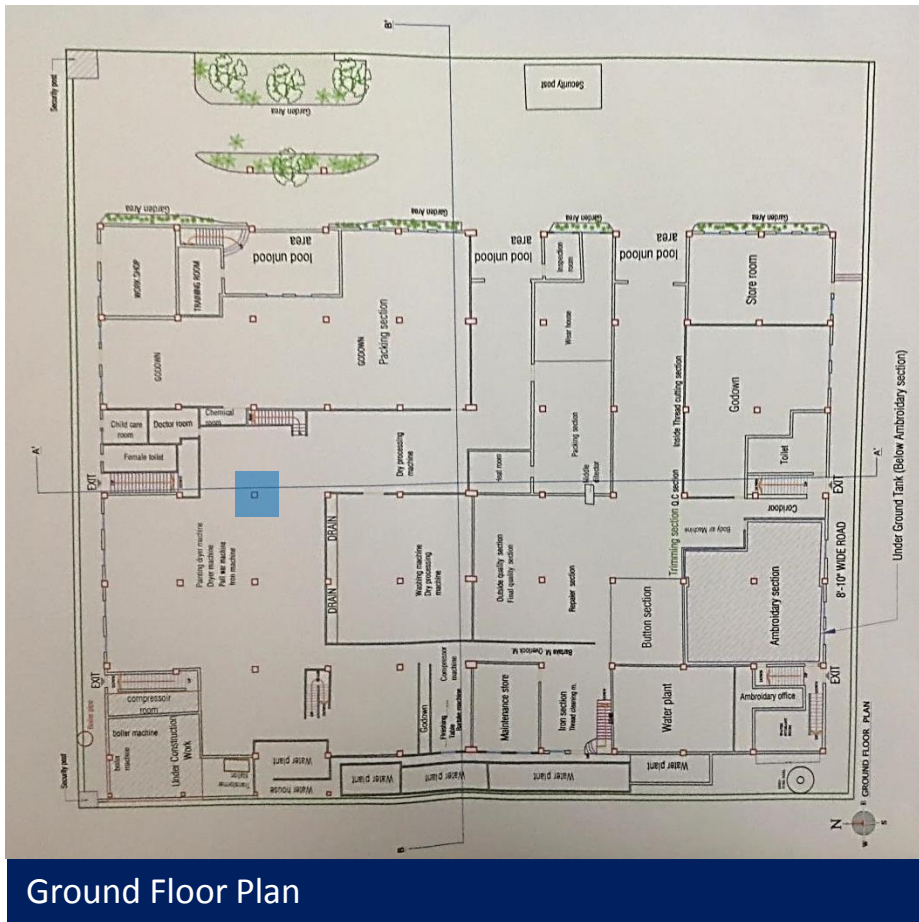


Collected water in a pail during heavy rainfall

Water Ingress

**Building columns appear to be stressed in
excess of normal design limits**

Cursory calculations indicate that the working stresses of the columns at Ground Floor level are above normal design limits.



Ground Floor Plan

Tested Column



- Construction of the 3 storey building (plus one mezzanine floor) began in 2011 and was part-completed to roof over 2nd floor level in 2013
- The drawings are in reasonably good agreement with the constructed building
- Stone aggregate was observed in the columns at ground floor level
- High yield (Grade 72) steel reinforcement bars are specified on the drawings, which coincides with the reinforcement observed at Roof level
- Steel reinforcement quantities observed at Ground floor level, using the Ferro-scanner, and at Roof level do not coincide with the drawings.



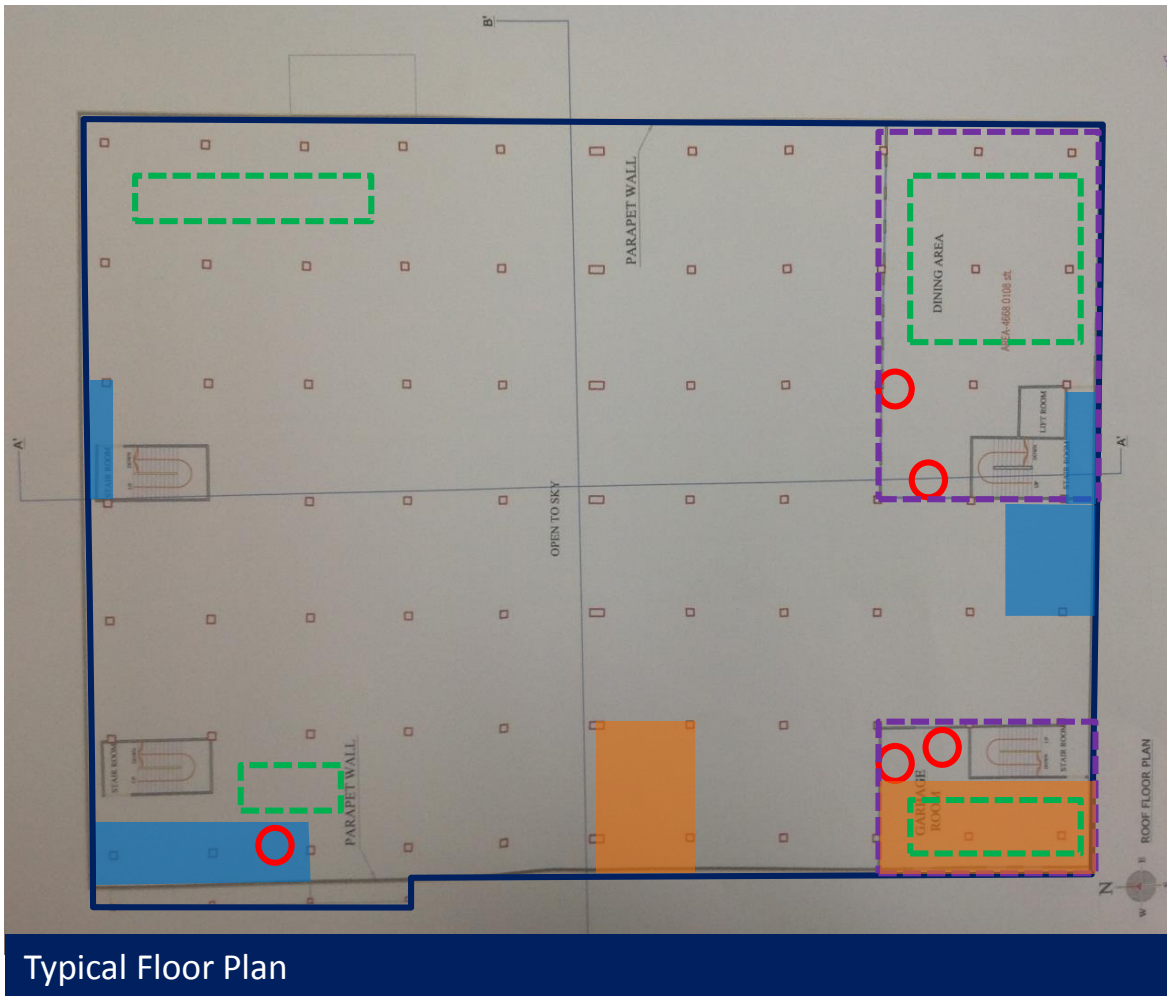
Stone Aggregate



12 no. high yield rebar

Heavy floor loading and lack of a Loading Plan

Areas of high loading were observed in the building, including Gazi water tanks and construction material storage at Roof level, fabric and boxed storage at 1st and Mezzanine Floor levels, and significant toilet build-up at 1st and Mezzanine floor levels. There was no loading plan for the factory building available on the day of the survey.



Gazi water tanks at Roof level
(above 1st and 2nd Floor levels –
3,000 to 10,000 litres capacity)



Construction materials at roof
level



Fabric / boxed storage at 1st and
Mezzanine floor levels



Toilets with significant floor
build-up at 1st and Mezzanine
Floor levels



Partially built 2nd Floor level



Building footprint





3,000 litre & 5,000 litre water tanks on roof (2nd Floor)



2 No. 10,000 litre water tanks on roof (2nd Floor)



Toilet floor build-up (430mm average)



Construction materials on roof (2nd Floor)



Storage room on Mezzanine floor



Storage room on 1st floor



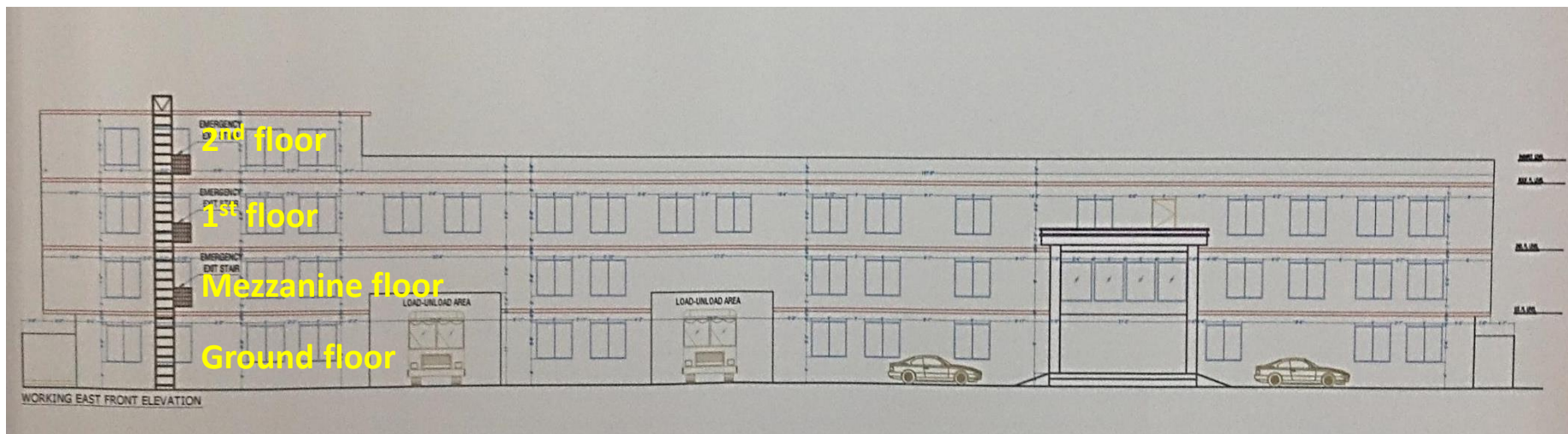
Construction materials on roof (2nd Floor)

Irregularities in design documentation

There were a number of inconsistencies between the design documents and the constructed building. The following is a non-exhaustive list of issues:

- The soil test report recommended a raft foundation for a structure greater than 3 storeys. The building is 4 storeys inclusive of Mezzanine floor, but the drawings show strip footing foundations. While there are no obvious signs of foundation settlement, cursory calculations indicate that the recommended pressures are being exceeded.
- The structural drawings indicate that all internal columns should have 14 reinforcement bars, whereas only 12 were observed using the Ferro-scanner.
- Flat slab construction was observed over a section of the Mezzanine Floor, while the drawings indicate beam and slab construction throughout.
- Toilet areas with significant floor build-up are larger than indicated on the design drawings.

Drawing Inconsistencies



East elevation showing a 3 storey building plus one Mezzanine Floor level (total of 4 storeys)

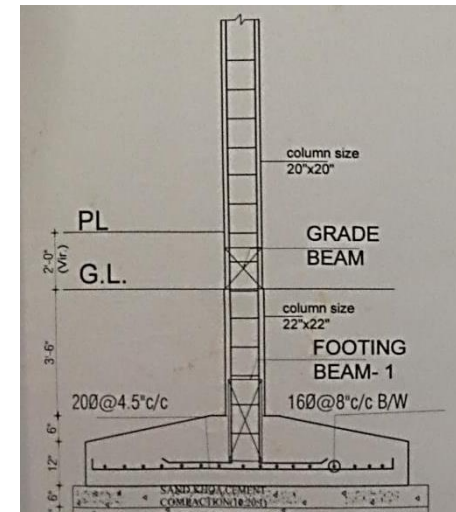
FOR 3 - STORIED STRUCTURES

1. **STRIP / SPREAD FOUNDATION AT CALCULATED DEPTH ON COMPACTED SAND & KHOA MIX BASE.**

FOR ABOVE 3 - STORIED STRUCTURES

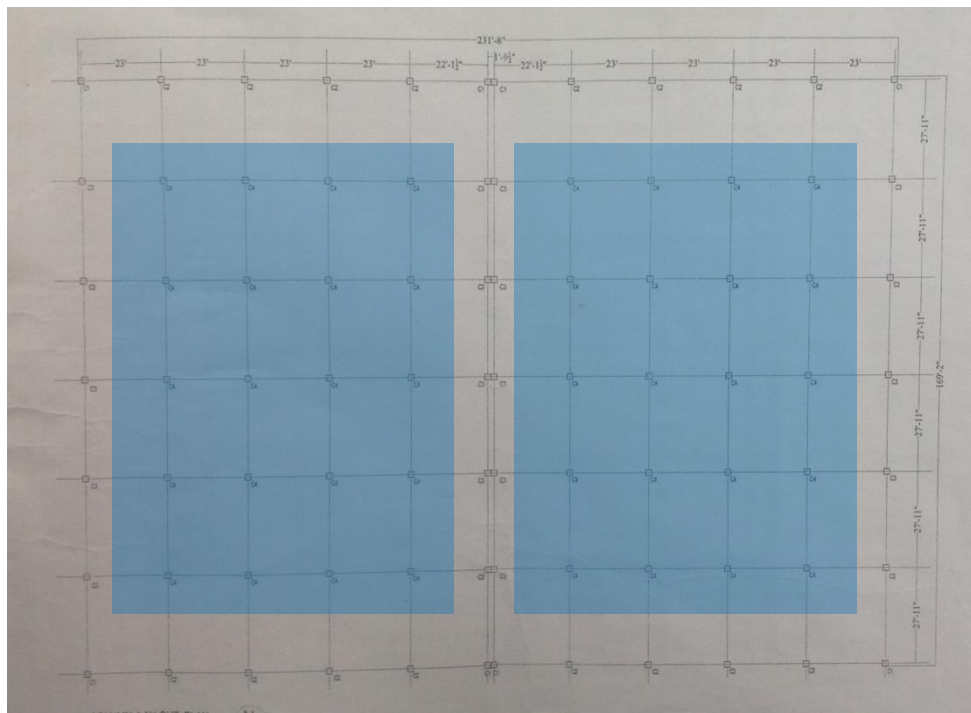
1. **RAFT FOUNDATION AT CALCULATED DEPTH ON COMPACTED SAND.**

Foundation type recommendations (extract from Soil Test Report):
For structures greater than 3 storeys a raft foundation is recommended



Strip foundation

Drawing Inconsistencies



Column layout highlighting extent of internal column C4

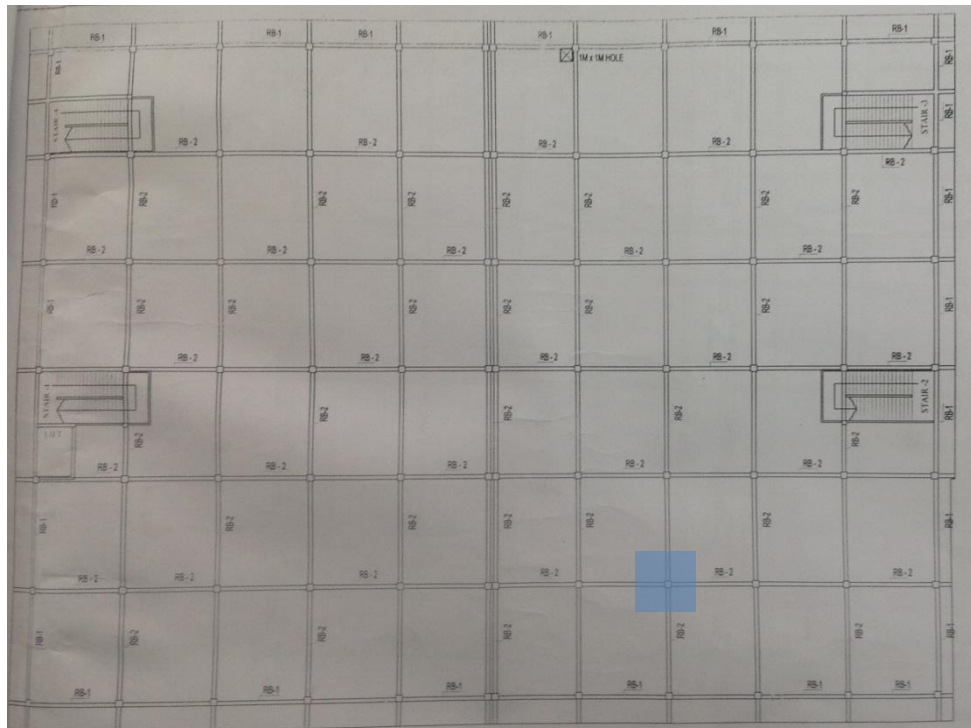


12 no. bars observed in internal column C4 at Roof level and confirmed at Ground Floor level using the Ferro-scanner

COL.NO.	C1	C2	C3	C4
BELOW G.L.	22"x22" 12 - 22 mm dia	22"x22" (4-25+8-22) mm dia	22"x22" (6-25+6-22) mm dia	22"x22" 14-25 mm dia
GROUND FLOOR				

14 no. bars shown on drawings for column C4

Drawing Inconsistencies



Typical floor beam layout

Mezzanine Floor column observed to be supporting flat slab



Column supporting flat slab

Drawing Inconsistencies

Lightweight Roof Structures

There are a number of lightweight roof structures. These structures appear to be non-engineered and not designed to resist uplift forces and lateral loads.



Canopy outside the dining room at roof level



Roof to Northwest stair core



Roof to North stair core

Lightweight Structures

Priority Actions

Problems Observed

1. Safety Hazard – Water ingress through unsealed expansion joint adjacent to electrical panels
2. Building columns appear to be stressed in excess of normal design limits
3. Heavy floor loading (storage and toilet floor build-up on all floors, water tanks at roof level) and lack of a Loading Plan
4. Irregularities in design documentation
5. Lightweight non-engineered roof structures

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Safety hazard – Water ingress through unsealed expansion joint adjacent to electrical panels	Building Engineer to advise on adequate waterproofing of expansion joint and to supervise works with immediate effect.	Immediate - Now
2	Building columns appear to be stressed in excess of normal design limits	Building Engineer to review design, loads and column stresses in building.	6-weeks
3	Building columns appear to be stressed in excess of normal design limits	Verify insitu concrete stresses either by 100mm diameter cores or existing cylinder strength data for cores from min. 4 columns.	6-weeks
4	Building columns appear to be stressed in excess of normal design limits	Verify existing reinforcement in columns.	6-weeks
5	Building columns appear to be stressed in excess of normal design limits	Produce and actively manage a loading plan for all floor plates within the factory, giving consideration to floor capacity and column capacity.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
6	Heavy floor loading and lack of a Loading Plan	Building Engineer to carry out a design check of floor slabs for loads associated with the water tanks, toilet build-ups and storage areas, and to advise on any necessary alterations taking account of floor capacity.	6-weeks
7	Heavy floor loading and lack of a Loading Plan	Factory Management to actively implement and manage Loading Plan.	6-months
8	Irregularities in documentation requiring clarification	Building Engineer to survey all areas of the building, collect information and prepare a full and accurate set of “as-constructed” drawings.	6-weeks
9	Irregularities in documentation requiring clarification	Building Engineer to review foundation design in relation to allowable bearing pressure.	6-weeks
10	Lightweight, non-engineered roof structures	Building Engineer to review the design of the lightweight roof structures regarding their ability to withstand wind loading pressure, suction and uplift forces, with special emphasis on connections and bracing.	6-months
11	Lightweight, non-engineered roof structures	Building Engineer to implement any actions / supervise any remedial works as identified following the review.	6-months