

# Fakir Knitwears Ltd.

Kayempur, Fatullah, Narayanganj-1400, Bangladesh

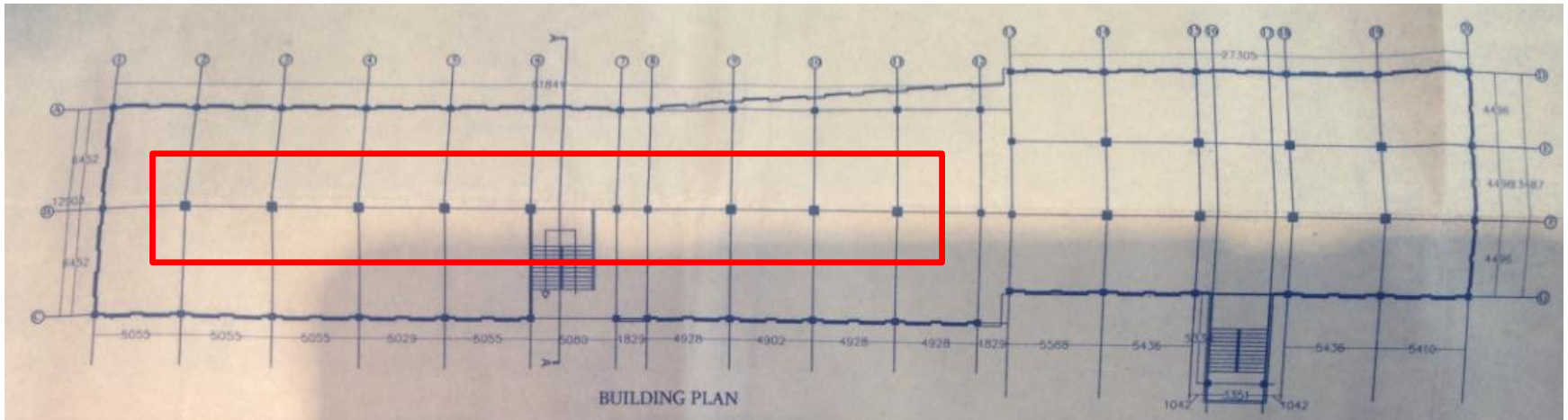
(23.64049N, 90.50106E)

19 December 2013



# Observations

# High Column Loads - Main Building Engineering Assessment Required



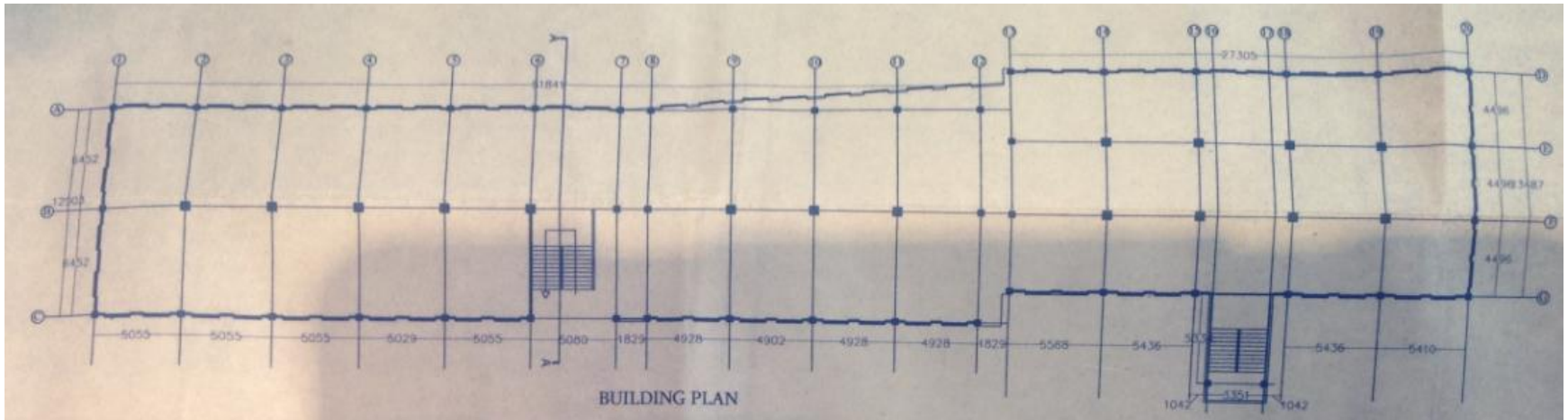
Cursory calculations indicate that internal and external columns working stress is at a high level in main building

A Detailed Engineering Assessment of the building is required (See attached Scope) . Engineer is to perform detailed calculations based on as constructed dimensions and concrete tests to prove column size and (if required) :

- Reduce loads by vacating floors and removing additional structures
- Reinforce columns

## Columns strength

# **Lateral Stability of Main Building Engineering Assessment Required**



Lateral stability of building to be assessed, considering movement joint locations and flat slab construction  
 A Detailed Engineering Assessment of the building is required (See attached Scope) .

## Lateral Stability

# Non engineered steel structure in Main building roof

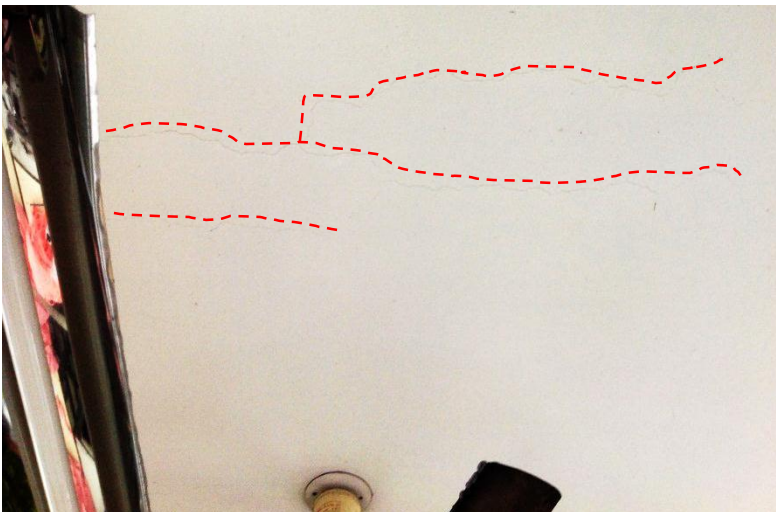
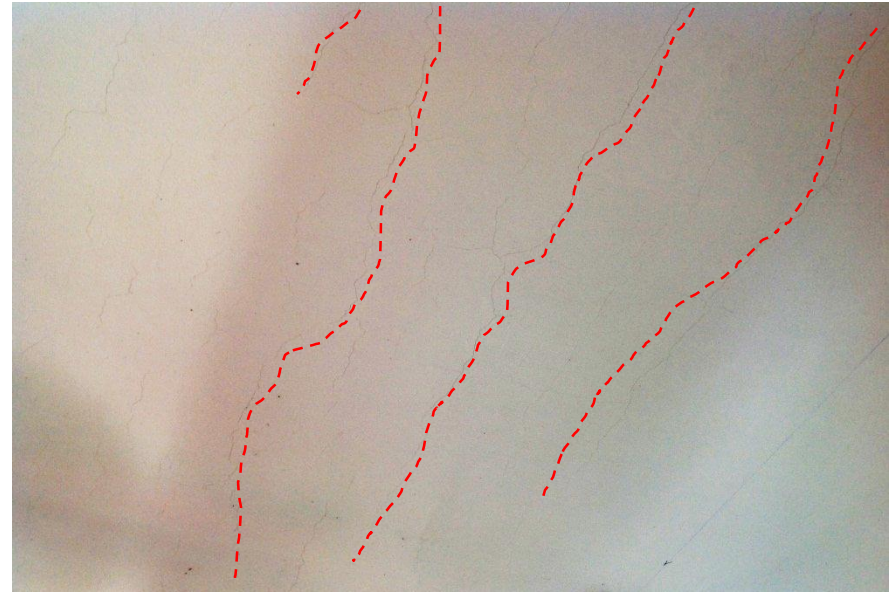


- One column missed in one of the frames without an obvious transfer element, this column is in all the frames except one.
- Connections do not appear to be designed.
- Connections do not appear to be constructed properly.

## Non engineered structure

## **Cracking in slabs:**

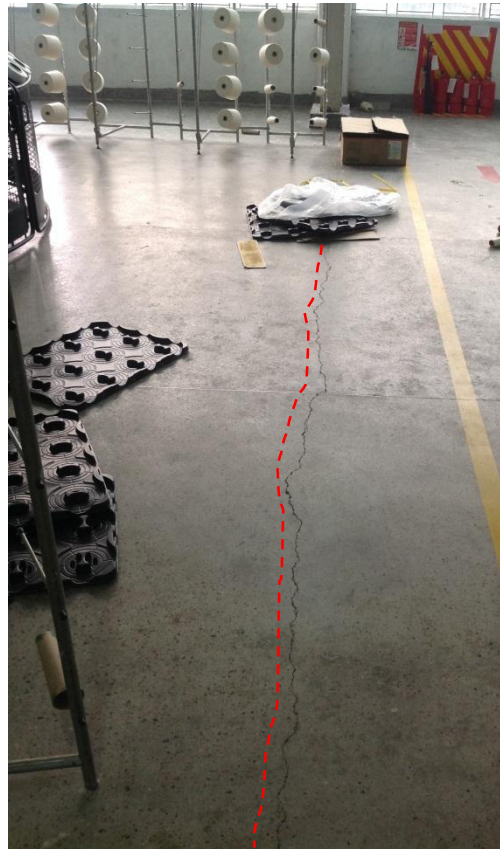
- **Main & Printing Building**
- **Floor slabs at Warehouse building 2nd floor and knitting building 1st floor**
- **Cantilever between Knitting building and Dyeing building**



Cracks parallel to longest span detected in several floors. Cracks appeared concentrated at midspan area.

Building Engineer to check cracks are only into the plaster and to ensure crack do not continue into concrete slab.

## Cracking in slabs – Main & Printing



Cracks parallel to longest span detected on several floors. Cracks appeared concentrated at support area, aligned with column gridlines. Building Engineer to check cracks are only into the finishes and to ensure cracks do not continue into concrete slab.

## Cracking in slabs Warehouse & Knitting



Cracks parallel to cantilever detected in slab between Knitting and Dyeing buildings. Cracks appeared concentrated at support area. Building Engineer to review support and check cracks are only in the plaster and to ensure cracks do not continue into concrete slab.

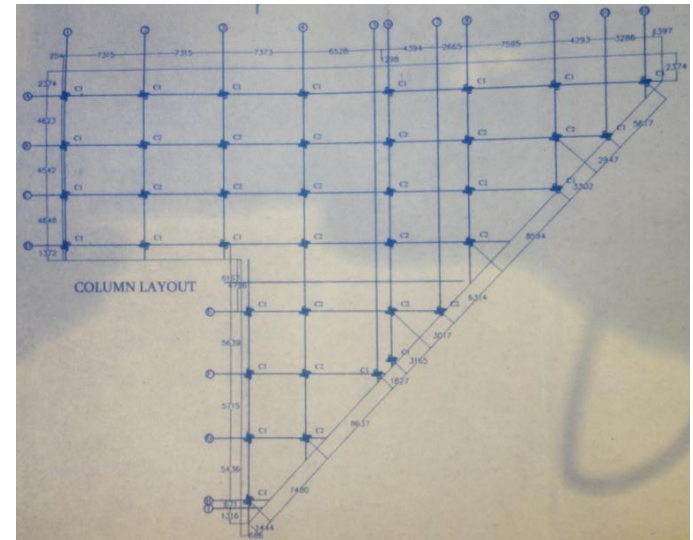
## Cracking in slabs Knitting & Dyeing

# Slender columns in Printing building ground floor



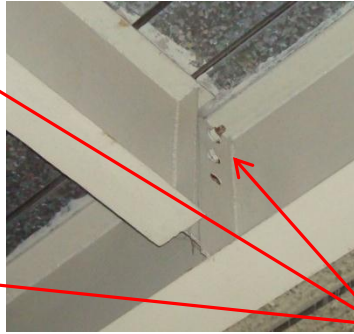
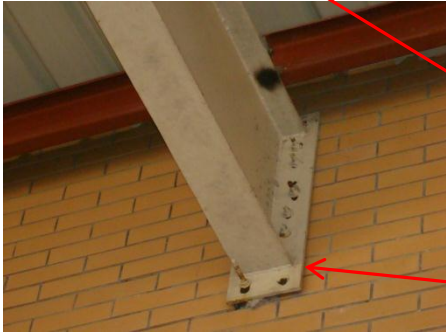
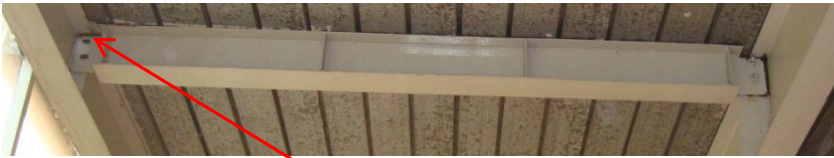
Column Number	1 <sup>ST</sup> FLOOR TO 2 <sup>ND</sup> FLOOR	3 <sup>RD</sup> FLOOR TO 4 <sup>TH</sup> FLOOR	7 <sup>TH</sup> FLOOR TO ROOF
C1			
	375x405	375x405	375x405
	12-25mm Ø	12-25mm Ø	8-25mm Ø
C2			
	590x600	400x400	400x400
	12-25mm Ø	10-25mm Ø	8-25mm Ø

**Slender Columns**  
 Columns with dimensions 450x450 mm and 5900 mm high has been observed in the Printing building at ground floor. These columns do not match with the dimensions shown on drawings.



## Slender columns

# Steel connections in Warehouse building



Connection missing bolts, Building Engineer to check if welds provided are adequate



Cantilever connections do not appear to provide moment capacity



Beam support is not clear

Building Engineer to review steel connections

# Steel connections

# Vertical stability in Warehouse building roof and Knitting building roof



**Knitting and Warehouse buildings**  
Vertical stability system may be required  
Horizontal stability system on the roof plane needs to be tensioned

## Vertical and Horizontal stability

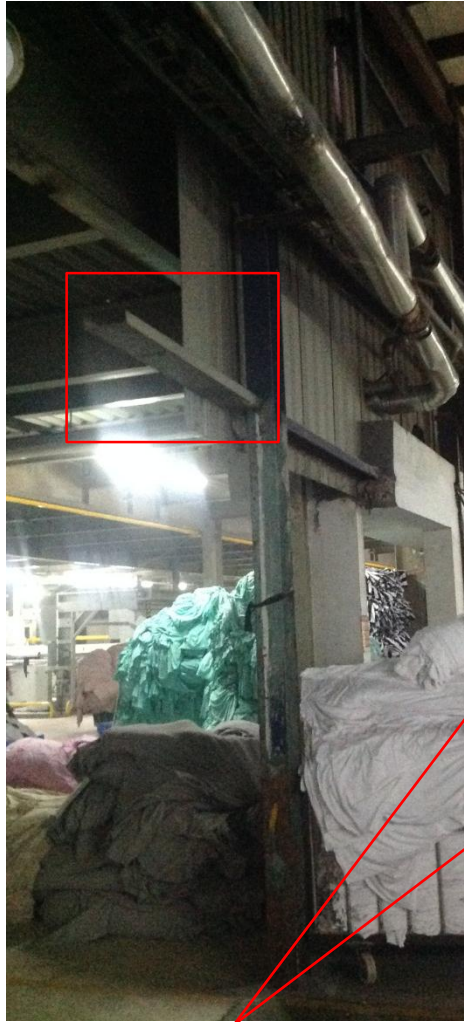
# Non engineered frame support in Knitting building roof



Non engineered support, the frame has been interrupted in the gutter zone

**Rafter support**

# Dyeing building internal structure



Internal structure partially removed, this structure serves to support some of the main structural elements of Dyeing building roof but does not appear to be a designed solution

## Internal structure

# High loads on bonded/storage areas on Warehouse 1<sup>st</sup> floor



Plan and height restrictions to be introduced to prevent future overloading.  
Limit stack height to 1.80 m (1.50x1.50 m area) and keep 0.60-0.75 m cleared strip around.

## Floor loading

# Documentation Issues



**Structural drawings were not shown for steel roofs of main and printing buildings, mezzanine between 5th floor and roof in printing building and steel walkways between buildings**

## **Documentation Issues**

**Concrete cantilever  
Between Knitting and  
Dyeing buildings**



**Warehouse building – external structure**

**Warehouse building – external  
cantilever**



**Warehouse building – additional internal  
structures**

**Structural drawings were not shown for specific areas of Knitting & Warehouse buildings**

## **Documentation Issues**

# Priority Actions

# Problems Observed

**ITEM 1:** Column capacity in main building

**ITEM 2:** Lateral stability of main building

**ITEM 3:** Column capacity in printing building

**ITEM 4:** Non engineered steel structure in Main building's roof

**ITEM 5:** Cracking in slabs:

- Main & Printing Building
- Floor slabs at Warehouse building 2<sup>nd</sup> floor and Knitting building 1<sup>st</sup> floor
- Cantilever between Knitting building and Dyeing building

**ITEM 6:** Slender columns in printing building's ground floor

**ITEM 7:** Steel connections in Warehouse building

**ITEM 8:** Vertical stability in roofs of warehouse building and knitting building

**ITEM 9:** Non engineered frame support in Knitting building roof

**ITEM 10:** Internal structure serves to support some of the main elements of dyeing building roof

**ITEM 11:** High loads on bonded/storage areas at warehouse 1<sup>st</sup> floor

**ITEM 12:** Documentation issues

Item No.	Observation	Recommended Action Plan	Recommended Timeline
1	Column capacity in main building	Maintain current use of the floors and don't change use or increase occupation, either of which could increase loading.	<b>Immediate - Now</b>
2	Column capacity in main building	Factory Engineer to review design, loads and columns stresses in area identified above.	<b>Immediate - Now</b>
3	Column capacity in main building	Verify insitu concrete stresses either by cores or existing cylinder strength data for cores from 4 columns.	<b>Immediate - Now</b>
4	Column capacity in main building	A Detail Engineering Assessment of this block to be commenced, see attached Scope	<b>Immediate - Now</b>
5	Column capacity in main building	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	<b>6-weeks</b>
6	Column capacity in main building	Detail Engineering Assessment to be completed	<b>6-weeks</b>

Item No.	Observation	Recommended Action Plan	Recommended Timeline
7	Column capacity in main building	Continue to implement load plan	6-months
8	Lateral stability of main building	Carry out assessment as part of Detailed Engineering Assessment (See Item 1)	6-weeks
9	Lateral stability of main building	Carry out any upgrade measures required	6-months
10	Column capacity in printing building	Factory Engineer to review design, loads and columns stresses in area identified above.	6-months
11	Column capacity in printing building	Verify insitu concrete stresses either by cores or existing cylinder strength data for the identified columns.	6-months
12	Column capacity in printing building	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	6-months

# Detail 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. This 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 Elevation drawings.
2. The Engineering team are to carry out supporting calculations with a model based design check 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
13	Non engineered steel structure in Main building's roof	Building Engineer to check the structure and connections and any required strengthening works to be implemented to ensure the proper functioning of the structure.	6-months
14	Cracking in slabs	Monitor cracks on slab. Conduct regular inspection of cracks. Investigate if cracks are only in the plastering/finishes.	6-weeks
15	Cracking in slabs	If cracks grow larger, removing all items above the slab and close working areas below the affected areas . Building Engineer to investigate, repair and strengthen the slab.	6-months
16	Slender columns in printing building's ground floor	Factory engineer to review design.	6-months
17	Slender columns in printing building's ground floor	If required, strengthen the columns.	6-months
18	Steel connections in Warehouse building. Connections not designed or executed improperly	Factory engineer to check connections.	6-weeks

Item No.	Observation	Recommended Action Plan	Recommended Timeline
19	Steel connections in Warehouse building. Connections not designed or executed improperly	Factory engineer to design and propose any required remedial works to be completed or additional reinforcements.	6-weeks
20	Steel connections in Warehouse building. Connections not designed or executed improperly	Any required remedial works to be completed	6-months
21	Vertical stability of frames in Knitting and Warehouse buildings	Building Engineer to ensure the current bracing is tensioned and carry out a stability analysis of the structure and design and specify any required additional stability members	6-weeks
22	Vertical stability of frames in Knitting and Warehouse buildings	Any required additional stability members or actions arising out of the assessment by the Building Engineer to be installed and implemented	6-months
23	Non engineered support, the frame has been interrupted to give way to the gutter	Factory engineer to carry out appropriate checks on the frame as constructed and specify any required remedial works.	6-weeks
24	Non engineered support, the frame has been interrupted to give way to the gutter	All required remedial works and actions to be implemented.	6-months

Item No.	Observation	Recommended Action Plan	Recommended Timeline
25	Internal structure partially removed, this structure serves to support some of the main elements of Dyeing building roof	Factory engineer to check the support between the internal structure and the main frame and propose additional reinforcements if required.	<b>6-weeks</b>
26	Internal structure partially removed, this structure serves to support some of the main elements of Dyeing building roof	All required remedial works and actions to be implemented	<b>6-months</b>
27	Limit density of loading in storage areas	Building Engineer to ensure the structure is not loaded beyond capacity. Limit stack height to 1.80m (1.50x1.50m area) and keep 0.60-0.70 m cleared strip around. Limit height to 1.80 m for loose clothing.	<b>Immediate - Now</b>
28	Limit density of loading in storage areas	Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.	<b>6-weeks</b>
29	Limit density of loading in storage areas	Continue to implement load management plan	<b>6-months</b>
30	Documentation issues	Building engineer to collect information and complete documentation.	<b>6-months</b>