Onshore Maintenance, Corrosion and Inspection Organisation (Civil/Struct Assets Integrity & Maintenance)

STRUCTURAL INTEGRITY ASSESSMENT OF BLAST PROOF DOORS AT OKOLOMA GAS PLANT

13th July, 2017

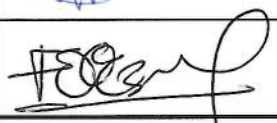
SPDC-2017-07-00000212 Document Revision: R02 ECCN: Not Applicable

Revision History

REVISION STATUS			SIGNATORIES		
Rev	**Date**	**Description**	**Originator**	**Reviewer**	**Approver**
R01	19.05.17	Issued for Review	Vitalis Mbachu	Tamunoemi Efebeli	Forster Ezenwelu
R02	20/07/17	Updated with comments	Vitalis Mbachu	Tamunoemi Efebeli	Forster Ezenwelu

- Preliminary issue will be issued as P01
- Revisions for review will be issued as R01, with subsequent come as R02 etc.
- Revisions approved for Implementation/Design Issue/Eng. will be issued as A01, with subsequent come as A02 etc.
- Revisions approved for Tender will be issued as T01, with subsequent come as T02 etc.
- Revisions approved for Construction (AFC)/Purchase will be issued as C01; with subsequent comes as C02 etc.
- Highlights of sections revised from previous approved issues or reasons for version change are to be listed in the description box
- All revisions to this document must be signed by the relevant Technical Authority (TA1, TA2 or TA3)

Signatures For This Revision

Role	Name	Signature	Date
Originator	Mbachu, Vitalis		20-7-17
Reviewer	Efebeli, Tamunoemi		20/7/17
Approver	Ezenwelu, Forster		20/07/2017

More field(s) could be added for signature if additional agreement/approval is required.

TABLE OF CONTENTS

STRUCTURAL INTEGRITY ASSESSMENT OF BLAST PROOF DOORS AT OKOLOMA GAS PLANT

EXECUTIVE SUMMARY

The Civil/Structural Asset Integrity and Maintenance Team carried out the structural integrity assessment of Blast Proof Doors at Okoloma Gas Plant. The buildings with Blast Proof Doors in the Gas Plant are; Control Room Building, Workshop Building and the Metering Skid Shed. The assesments were carried out on the 13th July, 2017 and the main objective was to assess the extent of structural degradation and design maintenance solutions in line with the Civil Reliability Centred Maintenance (RCM) Methodology.

A total of 42 Blast Proof Doors were assessed; 1 Sliding Door, 7 Double Leaf Doors and 34 Single Leaf Doors. The results of the assessments revealed that the Blast Proof Doors and accessories are in good condition except for some minor defects. The defects include, missing/damaged Door Latch, loose screw holding the overhead sliding Rail Door Closer, missing/shaky Door Handles and Mortise Locks, worn out and missing Synthetic Flexible Elastomeric Seal on the Door and Frame. These need to to be repaired urgently as they pose threats to the asset.

The defects are localised and the exact areas where they were identified are indicated in the report. The risks categorization table shows that most of the anomalies pose medium to high risks to People and Assets.

The estimated total cost of repairs based on rates in existing call-off contract is F$21,622.21 (including mobilization and demobilization costs).

The Asset Owners should source for budget offsets and engage Asset Engineering to carry out the remedial works.

GENERAL

1. INTRODUCTION

In a high hazard exposure facility, it is important to protect the buildings around the gas plant with a pressure and fire-resistance rating Blast Proof Doors, which are designed to successfully withstand peak blast pressures of 160psi (1103 KN/m^2) and reduce the spread of fire and smoke between separate compartments of a structure and to enable safe escape from a building or structure.

The Civil/Structural Assets Integrity/Maintenance Team was mandated to maintain focused attention on Civil/Structural & NOGI Assets, which make up 35-40% of Company Assets, based on the recommendations of a recent Global Asset Integrity Review (GAIR). The assets include Helipads, Jetties, Bundwalls (Flare and Diesel), Telecommunication Towers, Foundations of Supporting Structures, Structural Steel Supports, Buildings, Elevated Water Tanks, Walkways, Access Platforms, Roads and Pavings, Bridges etc.

The team carried out the integrity assessment of Blast Proof Doors in Okoloma Gas Plant on 13th July 2017. The components of the doors assessed include; door panels, blast latch and latching systems, hinges, rubber seal, sturdy security bolts and frame. The inspections/ assessments aimed at determining the condition status of the Civil/Structural Assets in the facility and aligning them with Shell Global Guidance Documents for Civil/Structural Engineering Assets as it applies to Steel and Concrete maintenance.

2. RESPONSIBILITIES & SCOPE

The integrity assessment was limited to General Visual Inspection of Civil/Structural elements and physical measurements of the components' dimension only. The inspection was carried out using the inspection guide in MJR for Blast Doors; Steel Structural Elements - GS.06.50620 for the Steel structures and Buildings at process Plant - GS-06-50651 and BS 8214:2008 Code of Practice for Fire Door Assemblies.

3. TEAM

Vitalis Mbachu	-	Civil/Structural Engineer
Harrison Okonkwo	-	Civil Engineer

4. TABLE FOR DEFECT CATEGORIZATION

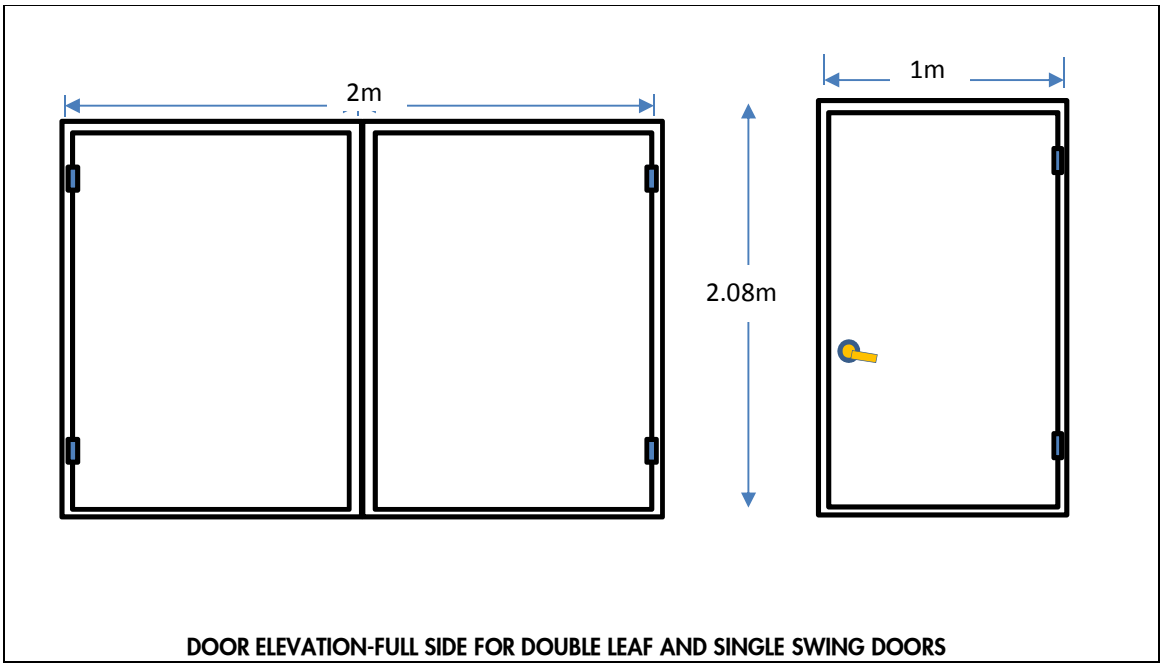
The observed defects would be categorized using the classification in table 6.1 of the Civil InfoBase below.

Priority	Action	Danger	Possible reasons	Examples
1	Immediate action required	High	Corrosion/deterioration, Construction error, Design error, Deficient repair, Missing parts, Mechanical damage, others.	Major corrosion, deterioration or damage, seriously effecting current structural integrity. Missing, damaged or seriously corroded parts which may affect personnel safety such as for instance missing or damaged floor elements, railings, and ladders/stairs.
2	Action required at short term, i.e. within 1-2 years	Medium	Corrosion/deterioration Construction/ Design error Deficient repair Missing parts Mechanical damage Other	Medium to serious corrosion or deterioration, which does not affect structural integrity at short term Ri 4Table 5.3. Deformed stair treads due to overloading. Missing bolt and/or nut. Limited damage to stair or ladder footing, not leading to instability. (Personnel safety not at risk).
3	Action required at longer term, i.e. 2-5 years	Limited	Corrosion Mechanical damage Other	Limited corrosion or deterioration up to Ri 3-4 Table 5.3. Minor mechanical damage or deformations. (Personnel safety not at risk).
4	No action required	Not existing		

5. BLAST DOOR INSPECTION SUMMARY

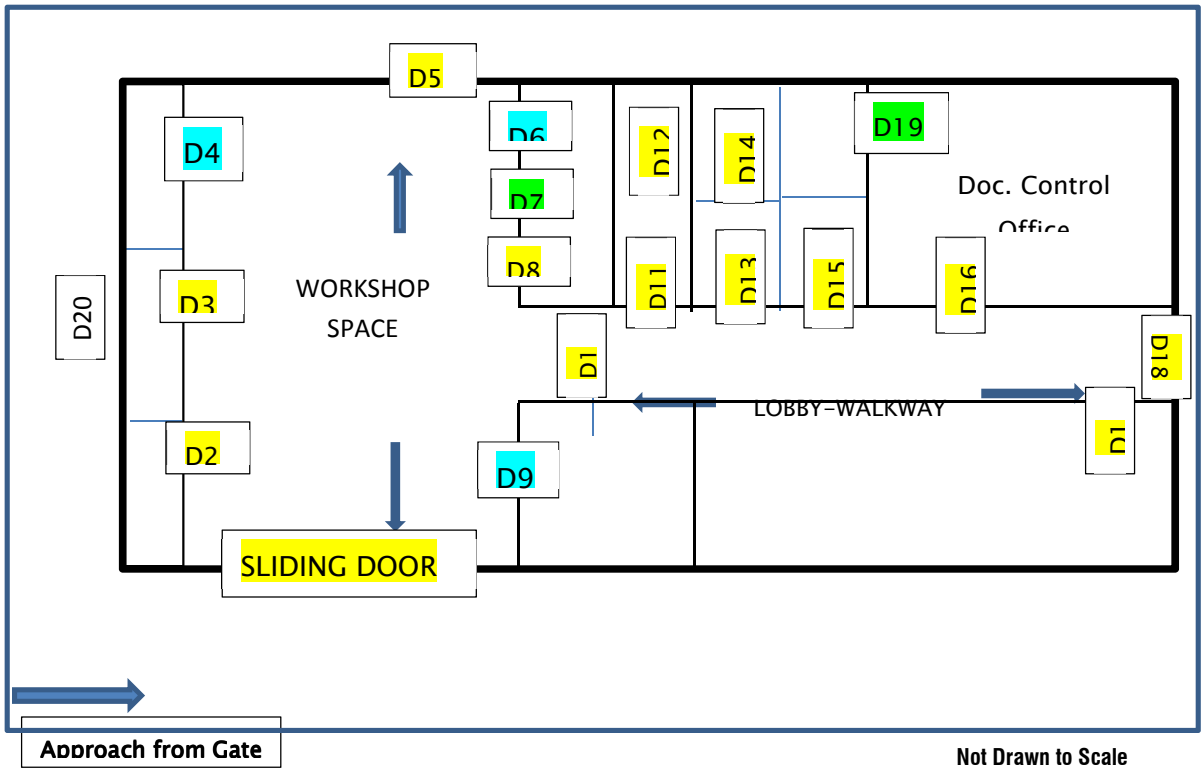
I. Workshop Building - 18 Blast Proof Doors
II. Control Room Building - 22 Blast Proof Doors
III. Metering Skid Platform - 2 Blast Proof Doors

6. DOOR ELEVATION



DOOR ELEVATION-FULL SIDE FOR DOUBLE LEAF AND SINGLE SWING DOORS

7. WORKSHOP BUILDING: BLAST DOOR PLAN LAYOUT



Not Drawn to Scale

Colour label description on Door layout:-

Inaccessible doors: Locked at the time of Inspection
Doors in good condition.
Doors with mild to moderate issues.

WORKSHOP BUILDING BLAST PROOF DOORS.

8. D1-PICTURES SHOWING SOME OBSERVED DEFECTS

1. Deformed rubber seal;

2. Approach view sliding door;

3. Faulty door

Shaky Overhead Rail Slider (D10)

D2 & D3-Deformed Door Seal

D15-Warped edge on door panel.

D12-Shaky Mortise Lock.

D8- Damaged Door Rubber Seal

D16- no door stopper

D5- Shaky Door Emergency Lever Handle

D15-mild crack

D15- Deformed Mortise Latch Bolts

D16- Shaky Door Handle

Warped edge

9. TABLE OF OBSERVED DEFECTS AND RECOMMENDATION

Asset	WORKSHOP BUILDING BLAST DOOR.		
ITEMS INSPECTED	**OBSERVED DEFECTS**	**REMEDIAL ACTION**	**URGENCY**
D1 MAIN ENTRANCE-Sliding Door	Warped edges along Sliding Doors. Height: 5m Width: 4m per Door slide. Thickness: 65mm	Correctly align warped edges along gate slide.	2
D2-	Deformed DOOR Rubber Seal	Replace deformed door rubber flap seal	1
D3 (ELECTRICAL)	Door Panel Not Flushing With Frame Deformed DOOR Rubber Seal	Replace mortise lock. Replace deformed door rubber flap seal	1
D4-(INSTRUMENT)	Not Accessible At time of Inspection	Re-schedule inspection	
D5	Shaky Overhead Slide Rail Door Closer. Shaky Emergency Lever Door Handle	Replace Overhead Slide Rail Door Closer (1 nos) Replace Emergency Lever Door Handle (1No.)	1
D6	Not Accessible At time of Inspection	Re-schedule inspection	2
D7	In Good Condition Height:2.06m Width:0.97m. Thickness: 50mm	No action required	4
D8	Damaged Door Rubber Seal on Top of Door Shaky Door Handle	Replace deformed Door Rubber Flap Seal Replace shaky Door Handle	1
D9(HSSE OFFICE)	Not Accessible At time of Inspection	Re-schedule inspection	2
D10	Shaky Overhead Slide Rail Door Closer - loose screws Shaky Door Handle	Replace Overhead Slide Door Rail Door Closer (1No.) Tighten all screws Replace shaky Door Handle	1
D11 (GENTS)	Warped Section at Base of Door Panel	Correctly align warped edges	1
D12	Mortise Lock not in position (Shaky)	Replace Mortise Lock and ensure that the spring bolt and dead bolt are in good condition	1

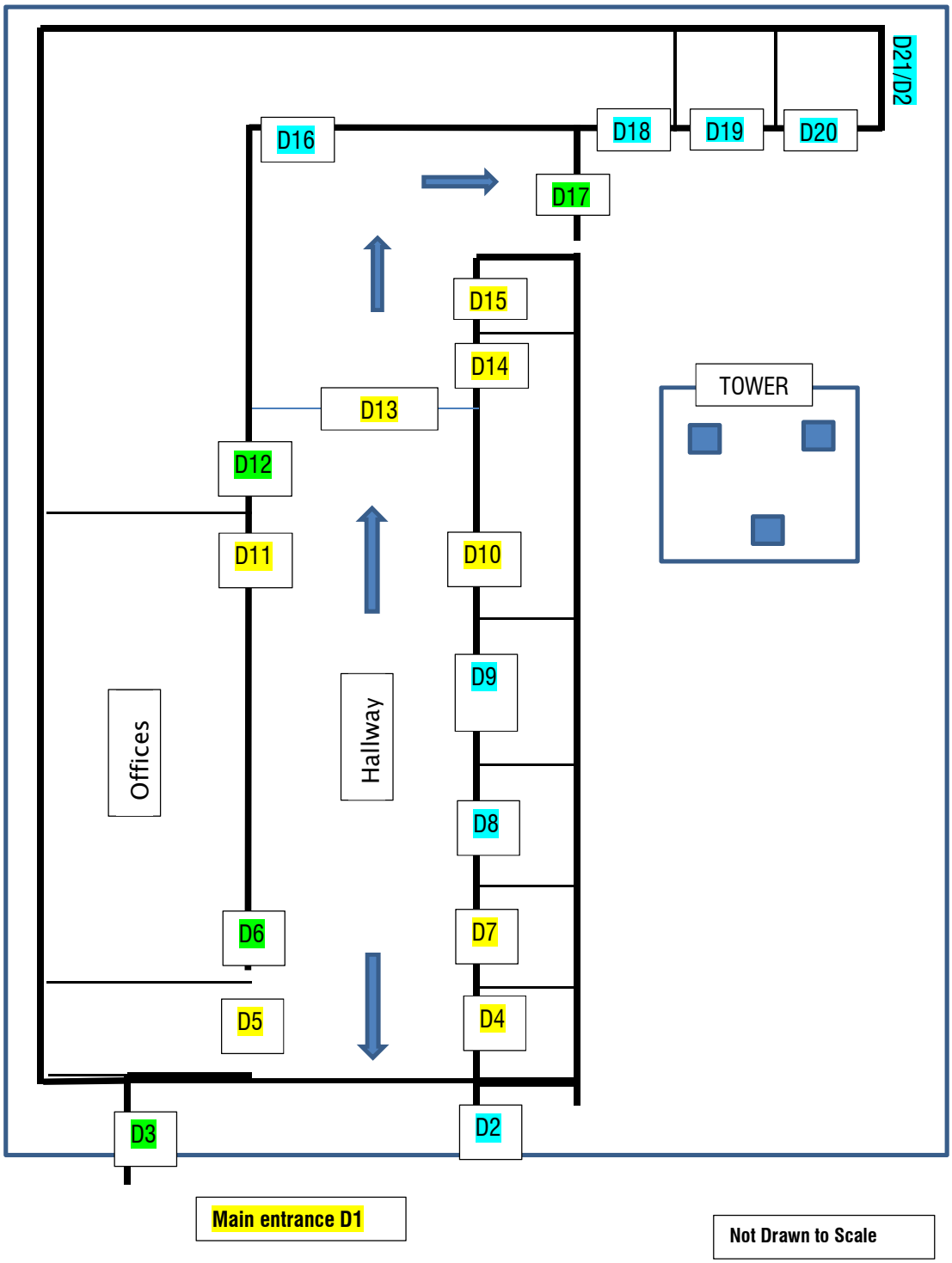
D13	Warped section at Base of Door Panel	Correctly align warped edges	1
D14	Deformed Door Handle	Replace shaky Door Handle	1
D15	Deformed Door Handle (Not Reurning) & Mortise Lock Slightly Warped Section at Base of Door Panel Mild Crack (0.2mm) in between D16 & D15, 200mm and 150mm offset from both doors	Replace mortise lock and ensure that the spring bolt and dead bolt are in good condition Correctly align warped edges Monitor cracks periodically - 6 monthly	1
D16 (DOCUMENT CONTROL ROOM)	Shaky Door Handle	Replace shaky Door Handle	1
D17	Shaky Door Handle	Replace shaky Door Handle	1
D18/D19	In Good Condition	No action	

Defect summary

3Nos. warped edges on Doors
4Nos. deformed perimeter Door Rubber Flap Seal
2Nos. Mortise Lock replacement
2Nos. Overhead Slide Door Rail Door Closer replacement
4Nos. shaky Door Handle and 1Nos Emergency Door Lever replacement

2Nos Blast Proof Doors in Metering Skid are in good condition.

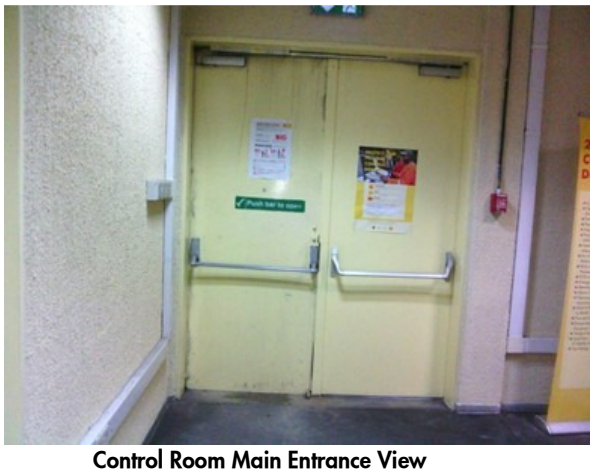
10. CONTROL ROOM BUILDING: BLAST DOOR LAYOUT



Colour label description on Door layout:-

Inaccessible doors: Locked at the time of Inspection
Doors in good condition:
Doors with mild to moderate issues:

11. MAIN ENTRANCE DOOR D1- PICTURES AND TABLES OF OBSERVED DEFECTS AND RECOMMENDATION



Control Room Main Entrance View

Emergency Door Lever not firmly held

Asset	CONTROL ROOM BLAST DOORS		
ITEMS INSPECTED	**OBSERVED DEFECTS**	**REMEDIAL ACTION**	**URGENCY**
D1 MAIN ENTRANCE	Door Rubber Seal broken. Lock and Latch not firmly in position	Replace deformed Door Rubber Flap Seal Replace Mortise Lock and ensure that the spring bolt and dead bolt are in good condition	1
D2-	Locked at inspection time	Re-schedule inspection	2
D3- T/L OFFICE	In Good Condition	No action	4
D4 - GENTS	Shaky Door Handle Missing Mortise Lock and Latch	Replace shaky Door Handle Replace Mortise Lock and ensure that the spring bolt and dead bolt are in good condition	1
D5	Missing Overhead Door Rail Slider	Replace 1No. Overhead Rail Slide Door Closer Tighten all screws	1
D6 (CONTROL ROOM)	In good condition	No action	4
D7- LADIES	Missing Door Rubber Seal on Entire Door Perimeter Shaky Overhead Rail Slide Door Closer	Replace Door Rubber Seal on Door Perimeter Replace 1No. Overhead Rail Slide Door Closer Tighten all screws	1
D8	Not Accessible at time of inspection	Re-schedule inspection	2

D9	Not accessible at time of inspection	Re-schedule inspection	2
D10 (CONFERENCE ROOM)	Shaky Overhead Rail Slide Door Closer - loose screws	Replace 1No. Overhead Rail Slider Door Closer. Tighten all screws	1
D11 (CONTROL ROOM ENTRANCE)	Missing Door Rubber Seal on Door Top Shaky Door Handle	Replace door Rubber Seal on Door perimeter Replace Mortise Lock and ensure that the spring bolt and dead bolt are in good condition	1
D11B (CONTROL ROOM EMERGENCY EXIT)	Deformed Rubber Seal Aluminium Unequal Angle Bar Missing on Door Top Door Panel not Air/Water tight, strands of water pm inner side of Door	Replace Rubber Seal on around the Door Replace Unequal Angle Bar on door top. 1m length of 75 x 50mm UA, 4mm thick Ensure air/water tight closure.	1
D12 (AUX.CCR)	In Good Condition	No Action	4
D13	Missing Door Handle	Replace Mortise Door Lock and ensure that the spring bolt and dead bolt are in good condition	1
D14	Deformed Door Handle	Replace Mortise Lock and ensure that the spring bolt and dead bolt are in good condition	1
D15	Missing Overhead Rail Slide Door Closer	Install Overhead Rail Slide Door Closer Tighten all screws	1
D16	Not Accessible At time of Inspection	Re-schedule inspection	2
D17 (CONTROL ROOM BUILDING EXIT)	In Good Condition	No action	4

Defect summary

4Nos. deformed Door Rubber Flap Seal
5Nos Mortise Lock replacements
4Nos Overhead Rail Slide Door Closer replacements
1No. shaky Door Handle replacement