AKS Ward

CONSTRUCTION CONSULTANTS

International Maritime Organsiation
London
SE1 7SR

Generator Replacement

Prepared for:
Faithful & Gould

March 2017
L161089

CONTENTS

Revision	Amendments	By	Checked	Date
P1	Draft issue for comments	SJG	GA	17/03/2017

1 INTRODUCTION

1.1 AKS Ward are appointed to provide structural engineering input upon the proposed generator replacement at the International Maritime Organisations (IMO), 4 Albert Embankment, London.

1.2 AKS Ward's scope of structural engineering services includes:

- Review and comment upon floor loadings associated with the installation of the new generator
- Provide advice in relation to alterations/temporary removal of the building fabric to facilitate the implementation of the new generator.

1.3 AKS Ward's review has been limited to non-intrusive visual inspections and record information archived on the site. No intrusive investigation have been undertaken to confirm construction details.

1.4 There was no record structural information archived on site which relates to the existing generator room.

2 EXISTING SITE

2.1 The IMO building was constructed in the late 1970's as the headquarters for the IMO. The main entrance to the building on Albert Embankment comprises 3 storeys with a faceted bronze clad façade. Beyond this the building is made up of taller blocks of various heights which step up to 9 storeys. These taller areas of the building are clad in a yellow brick, possibly integral to composite insulated cladding panels. Located to the rear of the site is the main conference room. It is understood there is a single storey basement which extend beneath the full building footprint.

2.2 The building structure is a framed construction. Architectural drawings would suggest the building is predominately RC framed although this has not been confirmed.

2.3 The generator room is located in the basement beneath the conference block, adjacent to the site boundary with Lambeth High Street.

2.4 Supply and extract air for the generator room is via an air shaft which is open to the air, and covered by open-grid metal flooring at ground floor level supported upon a steel grillage which span between the perimeter basement walls and ground floor structure.

2.5 It has not been possible to determine from the original architectural drawings whether the basement slab to the generator room is ground bearing or suspended.

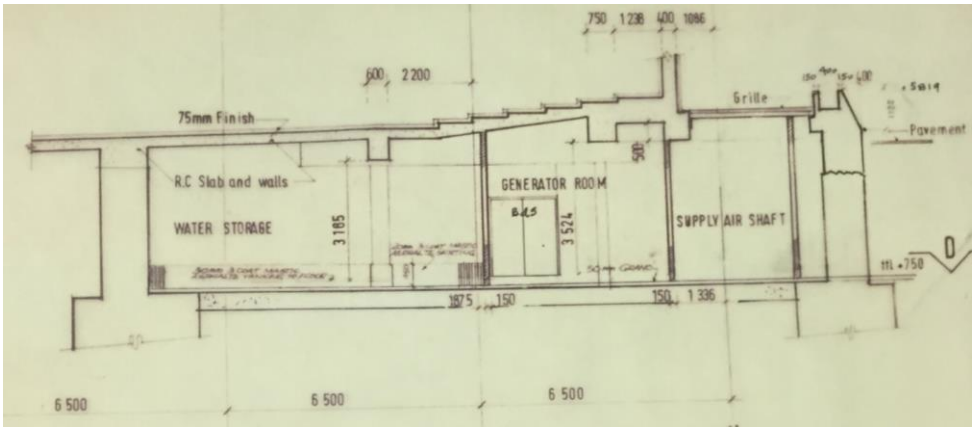


Figure 1: original architect's section through generator room & supply air shaft

3 GENERATOR FLOOR LOADS

3.1 It is understood that the existing generator installation weighs approximately 7000kg. The proposed new generator installation is a Volvo set which weighs 8500kg which will be positioned in the same location as the existing generator. The footprint of the proposed new generator measures 6.55m long x 2.0m wide.

3.2 The weight of the proposed new generator represents a local increase in floor load of 22%.

3.3 Structural details of the basement slab are unknown. On this basis we have assessed proposed increased floor loadings using a pragmatic approach.

3.4 The room in which the existing generator is located was originally intended as a generator/plant room and therefore one would expect the original floor to have been designed accordingly. Typically plant rooms are designed for a higher imposed floor load in the order 7.5kN/m^2.

3.5 Assuming the total load of the proposed new generator is uniformly distributed across its 6.55m x 2.00m plant footprint, the imposed load on the slab immediately beneath the generator is 6.5kN/m^2. This is less than the 7.5kN/m^2 imposed load that one would reasonably expect a generator/plant room to be design for.

3.6 The proposed imposed loading may be considered less if one accounts for a clear 1.0m circulation zone around three sides of the generator which provides access for maintenance. Assuming an imposed load of 1.5kN/m^2 in the clear circulation zone combined with the self-weight of the generator, the equivalent uniformly distributed load on the floor would be 4.0kN/m^2. This imposed load is more akin to design imposed loads for office floors and circulation areas.

3.7 It is AKS Ward's opinion that the existing basement slab in the generator room will be capable of sustaining the 8500kg load from the proposed Volvo generator set, assuming the load is uniformly distributed across it's base. This conclusion is based upon the above loading assessment, and that there are no obvious signs of distress to the existing base slab local to the existing generator.

4 PARTIAL REMOVAL OF BUILDING FABRIC FOR GENERATOR IMPLEMENTATION

4.1 It is understood that a mobile crane will be utilised to lift out the redundant generator and crane in the new generator via the open air shaft. It is assumed the mobile crane will be situated on Lambeth High Street adjacent to the open air shaft.

4.2 In order to facilitate the removal and installation of generators the contractor will be required to temporarily remove the open grate metal floor, and possibly some of the supporting steel grillage which covers the open air shaft

4.3 It is understood that the existing and new generator sets are segmental, thus comprising numerous sections that make lifting and manoeuvring operations associated with the decommissioning and installation more manageable. The generator parts will be craned in and out from the external air shaft. Transporting parts between the generator room and external air shaft will require partial removal of the block wall between the two areas. Please refer to AKS Ward drawing 30001-P01.

4.4 Upon completion of the generator installation, the contractor shall reinstate the block wall, incorporating new doors, louvred panels and duct penetrations in accordance with the mechanical engineers specification. Please refer to AKS Ward drawing 30001-P01.

4.5 The contractor shall be aware that the block wall is built off a concrete bund that shall remain during the project. The contractor shall account for this when developing their method statement for lifting operations.

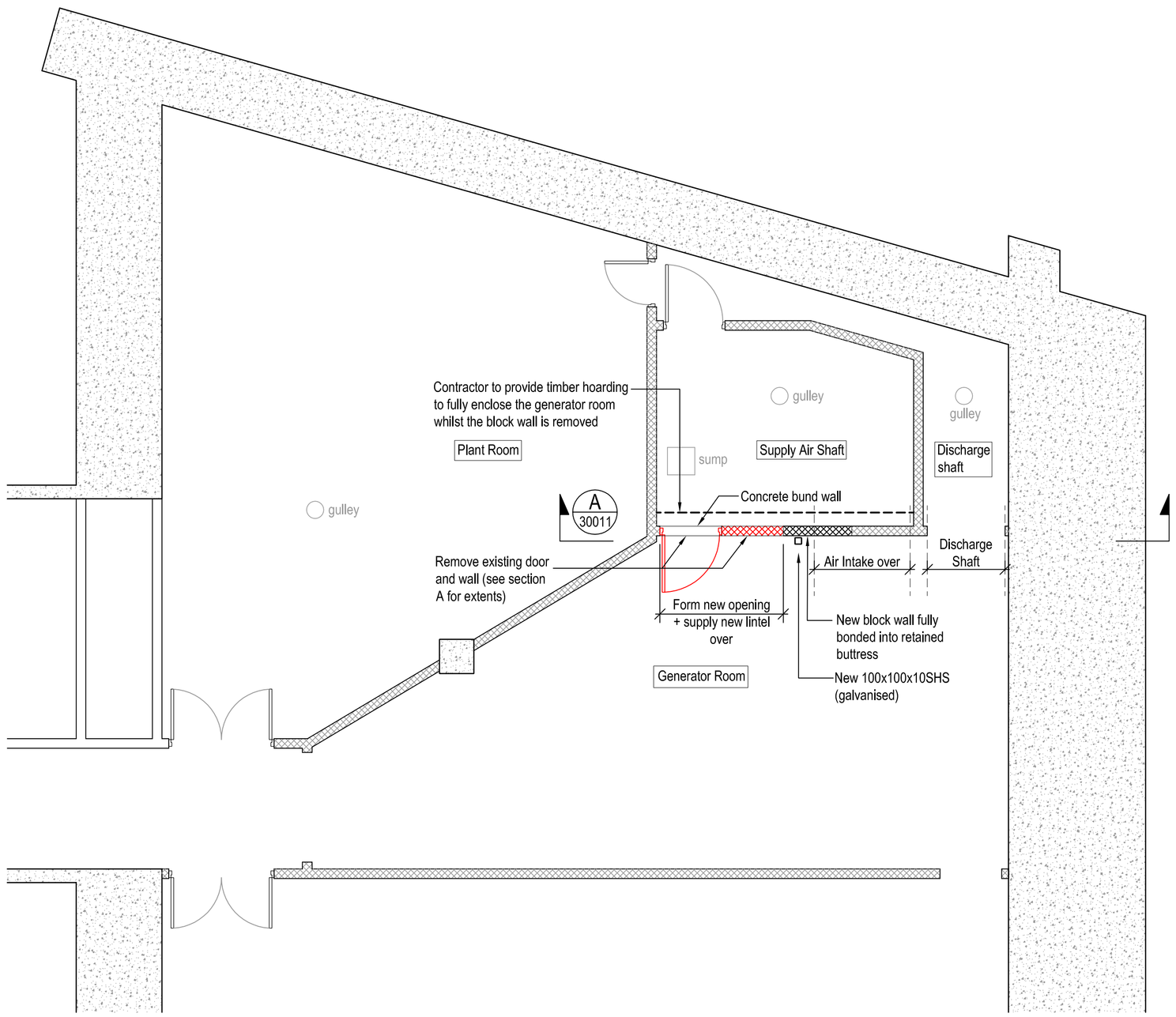
4.6 The contractor is responsible for installing temporary works/fall prevention systems during periods when the open grate flooring is temporarily removed.

4.7 During the project the contractor shall be responsible for making the site and building secure. This will include the erection of temporary timber hoarding enclosing the generator room during periods when the external block is removed. The level of security is to be agreed between the client and contractor.

5 Appendices

Appendix A – Drawing: Partial removal of building fabric
Appendix B – Risk Assessment

Appendix A
Drawing; Partial removal of building fabric



Part Plan of Existing Basment Plant Area

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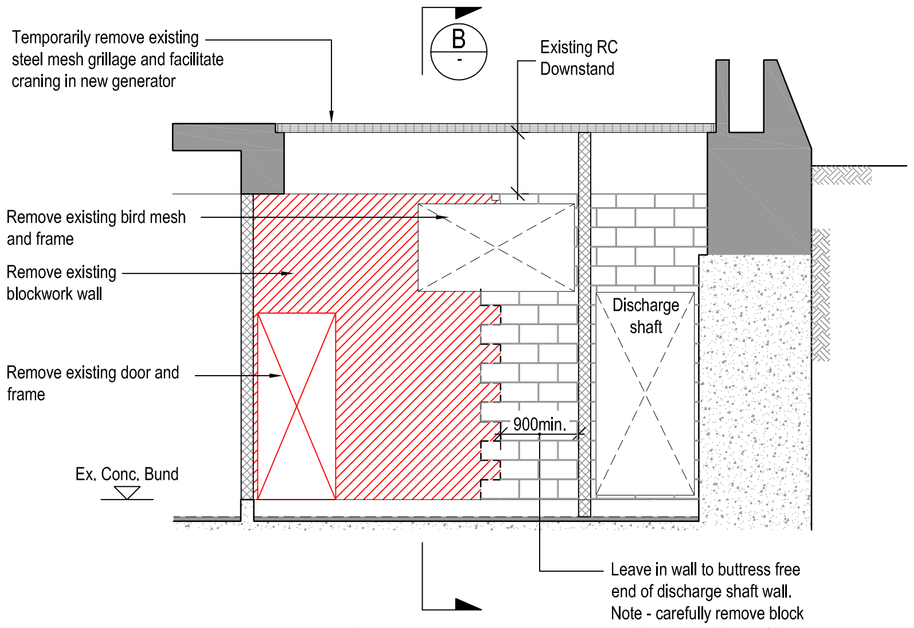

Existing Section A

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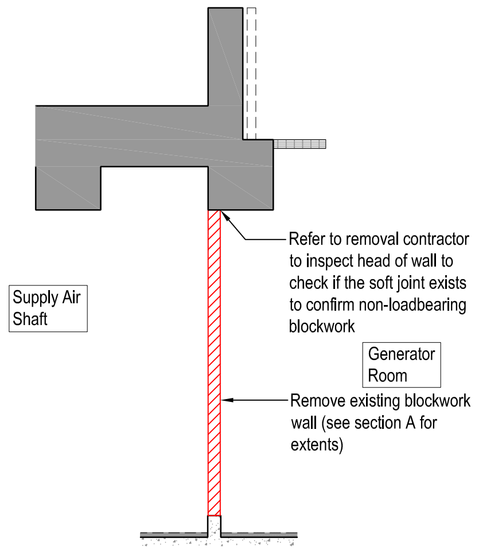

Existing Section B

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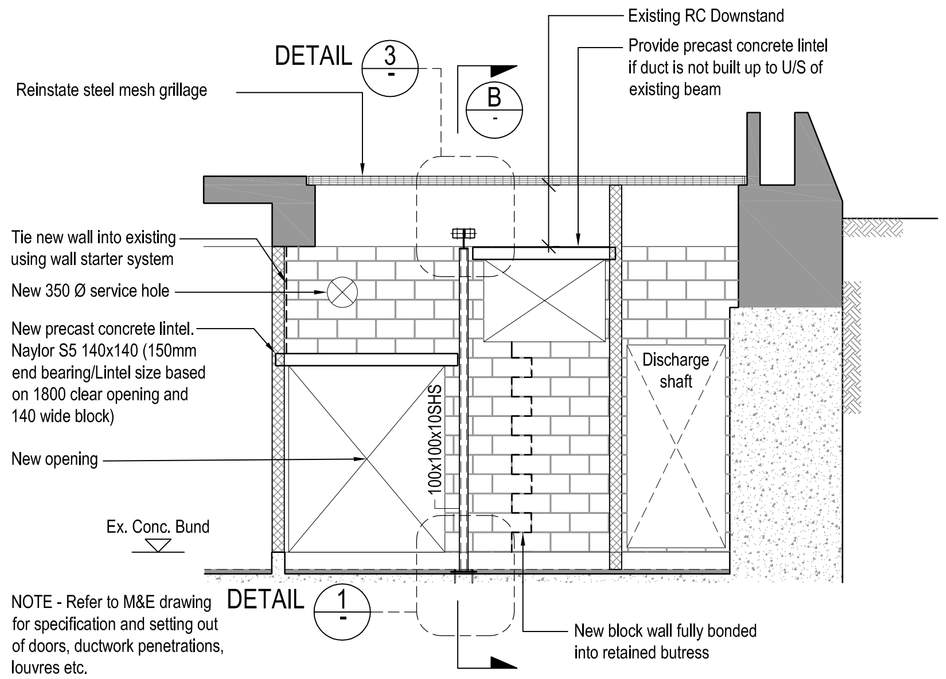

Proposed Section A

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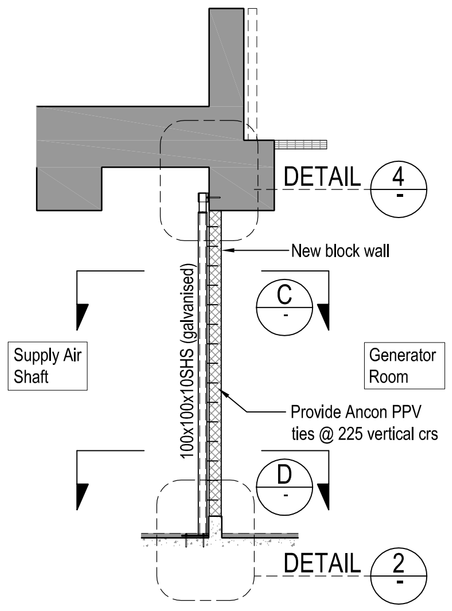

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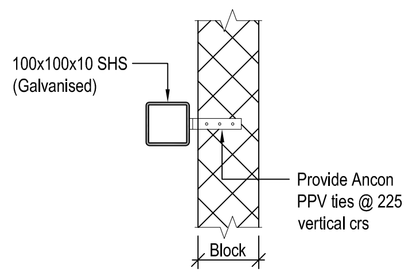

Section C

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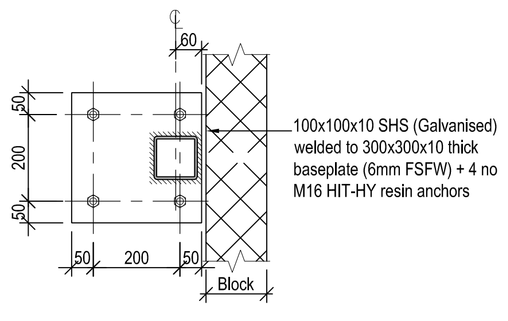

Section D

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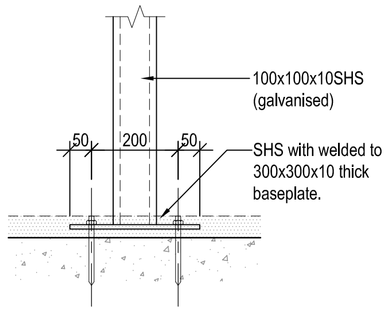
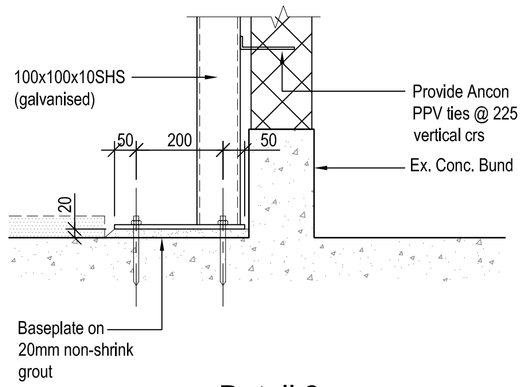


Detail 1

Scale 1:10 @ A1



Detail 2

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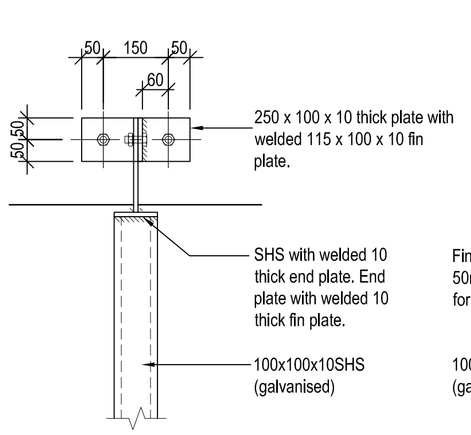

Detail 3

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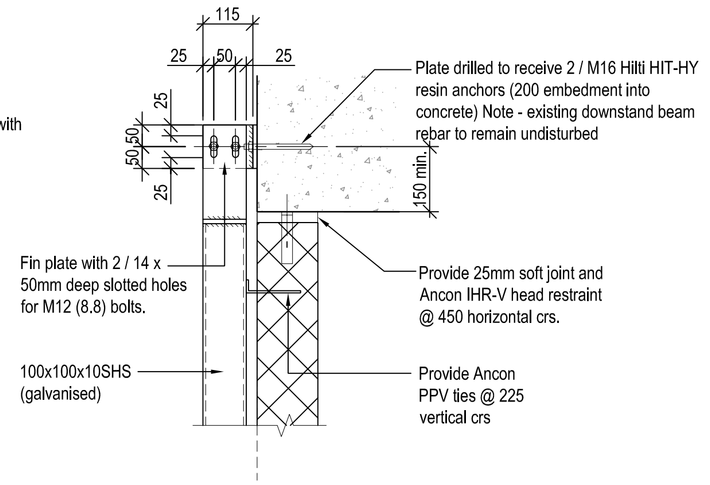

Detail 4

Scale 1:10 @ A1

NOTES

1. All setting out to be in accordance with the Architect's drawings. Any discrepancies between the Engineer's and the Architect's drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
2.

1. This drawing is to be read in conjunction with all Engineer's, Architect's or relevant drawings and specifications.
2. All dimensions and levels are to be checked on site by the contractor prior to preparing any working drawings or commencing on site.
3. The contractor must ensure and will be held responsible for the overall stability of the building/structure/excavation at all stages of the work.
4. All work by the contractor must be carried out in such a way that all requirements under the 'Health and Safety at Work Act' are satisfied.
5. All work is to be carried out in compliance with the requirements of the relevant statutory authorities and regulations.
6. Main Contractor to make sure a 'CAT' scan survey is completed prior to any demolition works to locate services.

MASONRY
All blockwork is to have a minimum characteristic strength of 10N/mm².
Mortar to be generally strength class M4.
Lintels to non-loadbearing walls are as follows:
Up to 1000 span: 100 deep prestressed lintel to suit width of wall.
1000 to 1800 span: 140 deep prestressed lintel to suit width of wall.
All lintels to have minimum 150mm bearing at supports. Lintels to be supplied by Naylor or a similar approved manufacturer.
End restraint of internal and inner leaf blockwork walls:
Stainless steel Ancon PPV wall tie with de-bonding sleeve at 225mm vertical centres. Tie fixed to RC elements using M6 expansion bolts or set in a stainless steel Ancon 21/18 Omega cast in channel (PP21 tie). Tie fixed to steelwork using set screws or self drilling screws with isolation sleeve. Tie fixed to masonry using plug and screw.
Wall head restraint:
Stainless steel Ancon IHR-V at 450mm horizontal centres.
Wall ties to be in accordance with the Architect's NBS F30.
Movement Joints:
Concrete blockwork 6m max. Spacing (3m from a corner)
Joints to be filled with a flexible cellular polyethylene material.
Provide a two part polysulphide sealant at all external joints.
Joint spacing to be in accordance with BS5628. All joint locations to be set out by the Architect.
New walls are to be fully toothed and bonded into existing masonry. Edges of all new openings are to be made good using fully bonded new blockwork.
Where new blockwork is to be stitched into existing, cut out blockwork, to the depth shown, where cracked and as indicated on the drawings or specified by the Engineer. Stitch in new blockwork to match existing set in m4 mortar. New brickwork is to be toothed into the existing providing as many fully bonded stretchers as possible. Ensure that the new blockwork is completed such that all voids within the depth of the wall are filled completely with mortar.

Rev.	Amendment	Drn	Chkd	Date
P01	Preliminary	MP	SG	17/03/17

Drg Status Preliminary Suitability S02

AKSWard
CONSTRUCTION CONSULTANTS
One West Smithfield
London
EC1A 9JU
Tel: 020 7236 0161
Fax: 020 7236 3239
e-mail: london@aksward.com
web: www.aksward.com
■ London
□ Hitchin
□ Oxford
□ Southampton

Client **IMO**

Project **IMO**
Generator replacement

Title **Partial removal of building fabric**

Scales A1 1:50, 1:20 Project No. **L161089**
Reviewed Scheme SG Date Mar2017
Reviewed Final Date

Project Ref Originator Zone Level Type Role Drg.No Rev.
IMO - AKSW-XX - XX- DR - S - 30001 - P01

Appendix B
Designers Risk Assessment

CDM Risk Assessment

	Severity of the Harm		
Probability ↓	*Minor*	*Moderate*	*Severe*
Remote	Low	Low	Medium
Possible	Low	Medium	High
Likely	Medium	High	High

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CONSTRUCTION CONSULTANTS

Project: IMO – Generator replacement

Project No: L161089

By	Date	Checked	Date	Source of revision	Rev.	Sheet No.	
SG	17th March 2017	SGr				Page1 of 1	PM9

Key to be used for A to L: No unusual hazards ♦ See below ♦ By others ♦ Not applicable

A Site and Site Layout
B Groundwork
C Demolition
D New Construction
E Cladding/ Brickwork
F Services
G Finishes
H Refurbishment/ Repair
J General Maintenance
K Final Demolition
L Other (state)

Ref.	Hazard	Risk L M H	Alternatives	Action
A1	Risk of fall from height during periods when the open grate metal floor above the basement air shaft is removed.	H	None	The contractor shall install temporary works and edge protection to prevent falls.
C1	Existing retained bund presents a trip hazard.	M	None	The contractor shall install temporary works and edge protection to prevent falls.
C2	Temporary instability of block wall between the supply air shaft and discharge air shaft	M	None	The contractor shall retain a portion of wall to act as a buttress to the end of the block wall between the supply air shaft and discharge air shaft
A2	Over loading existing gulley, manhole, inspection, service trench covers during lifting and manoeuvring operations	M	None	Protect as necessary. The contractor shall prepare and develop a method statement that identifies and addresses the issues. This shall be circulated for review and comment by the design team before undertaking the works.
A3	Over loading existing generator room floor.	M	None	Please refer to AKS Ward's assessment of the generator floor for proposed loading. The contractor shall seek further advice should the loads exceed those identified in AKS Ward's loading assessment.
A4	Over loading existing upper floors/lift that might otherwise form part of the route for manoeuvring parts/materials through the building.	M	Yes	Contractor to prepare method statement for transporting/lifting materials around the site. Heavy parts/materials to be craned down to basement via air/vent shaft. We would suggest that loading of upper floors is limited to 3kN/m^2.

Contractors are assumed to be aware of normal construction hazards. Only unusual hazards are identified by this risk assessment.