ADEPT

CIVIL AND STRUCTURAL CONSULTING ENGINEERS











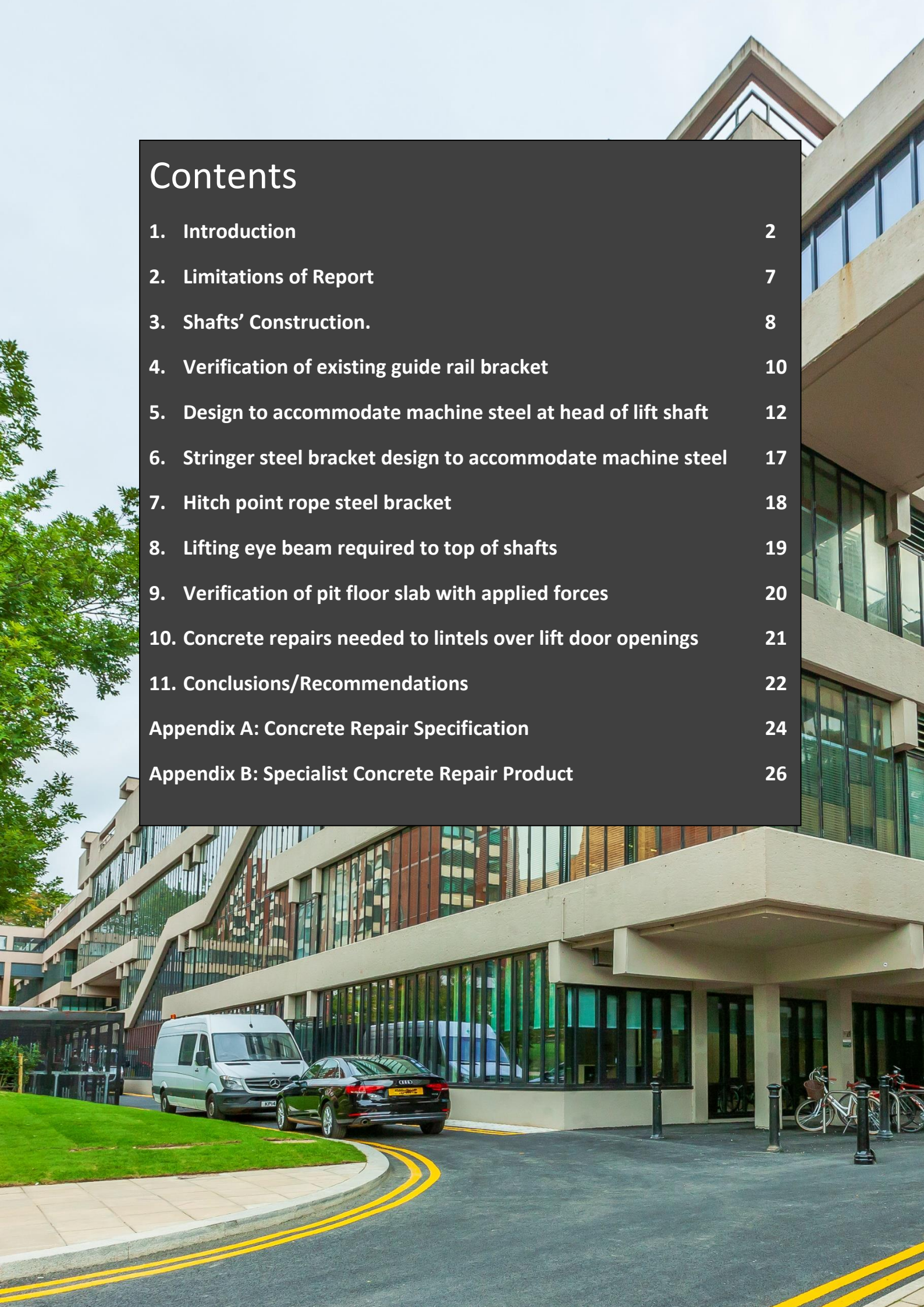



STRUCTURAL REPORT

4 NO LIFT INSTALLATION, SUNLIGHT HOUSE, MANCHESTER

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ENGINEERING BETTER TOGETHER



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ADEPT
CIVIL AND STRUCTURAL CONSULTING ENGINEERS

Client: Ansa Elevators Ltd

Project Name: 4 No Lift Installation, Sunlight House, Manchester

Report Title: Replacement Lifts Installation

Report Author: Stuart Walton

Document ref: 100.24113-ACE-ZZ-ZZ-RP-S-00001

Date: 27rd September 2024

Revision	Suitability	Date	Author	Checked	Approved	Description
P1		11/10/24	SW	NB	NB	1st Issue
P2		29/11/24	SW	NB	NB	1st Issue
P3		3/12/24	SW	NB	NB	1st Issue

1. Introduction

1.1. Ansa Elevators Ltd have a contract to replace the for lifts lift at this building.

1.2. Ansa Elevators have asked us to inspect the lift shafts to confirm that their structural fabric is adequate for the new lift installation fixings proposed.

1.3. Our specific original brief from their e mail of 23rd September is confirmed as follows: -

a) Verify the shafts' construction.

b) Verification of existing guide rail bracket

c) Design to accommodate machine steel at head of lift shaft

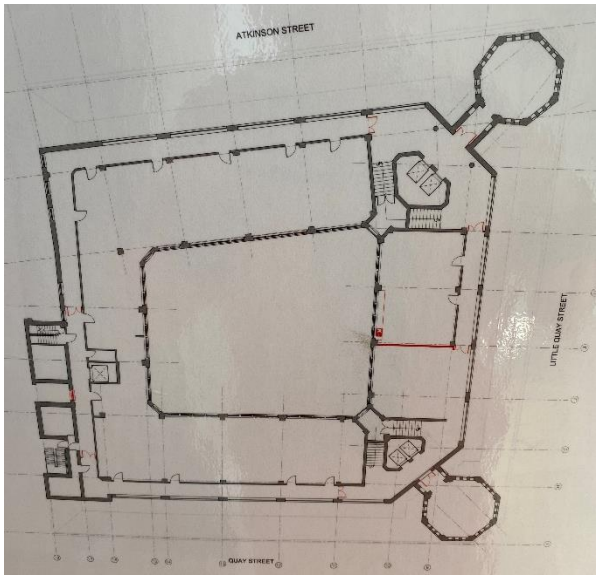
d) Stringer steel bracket design to accommodate machine steel

e) Design of hitch point rope steel bracket

f) Provide a design for a lifting beam on brackets or padstones

g) Verification of pit floor slab with applied forces

1.4. Additional brief: Whilst on site it was noted that builders' work undertaken for previous lift installations had damaged the concrete lintels over the lift door openings in almost all of the instances inspected. It was agreed with the Ansa engineer on site that we should therefore include a suitable concrete repair specification for these as part of this report.



Floor Plan showing Lift Positions

1.5. Our instructions were received via e mail in September 2024.

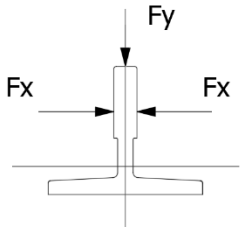
1.6. Our engineer attended site on 27rd September 2024 and undertook a non-intrusive visual inspection of the shaft, assisted by an Ansa Engineer.

1.7. Ansa have advised the forces to be resisted are as follows:

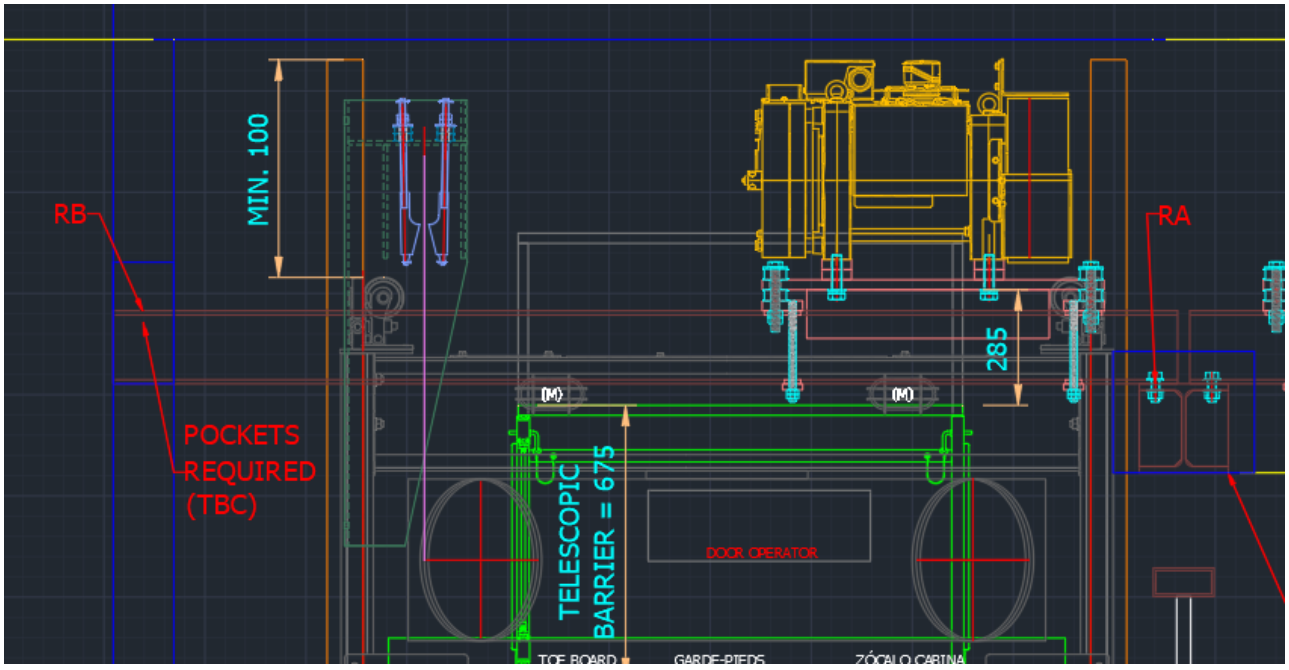
SUNLIGHT HOUSE Lifts 3 & 4

Pit layout;
CAR BUFFERS (x2) = 65 kN
CTW BUFFER (x1) = 100 kN
CAR GUIDES (On each) = 70 kN
CTW GUIDES (On each) = 60 kN

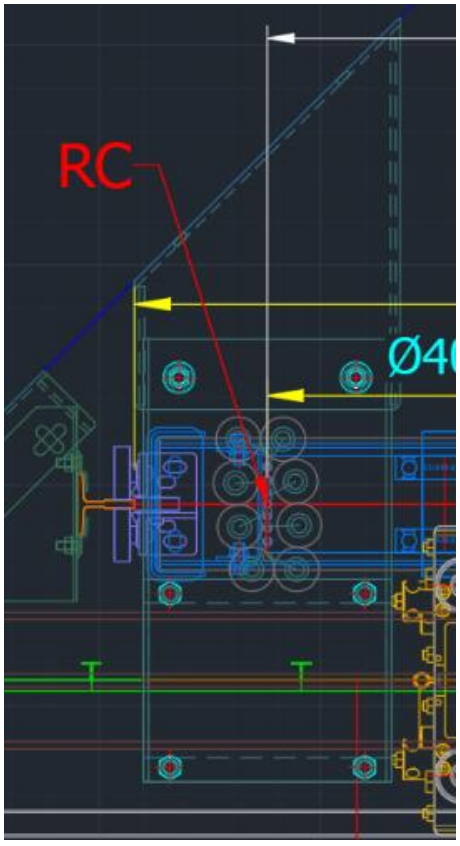
Wall brackets;
CAR BRACKETS; Fx = 1,5 kN / Fy = 2 kN
CTW BRACKETS; Fx = 0,5 kN / Fy = 1 kN



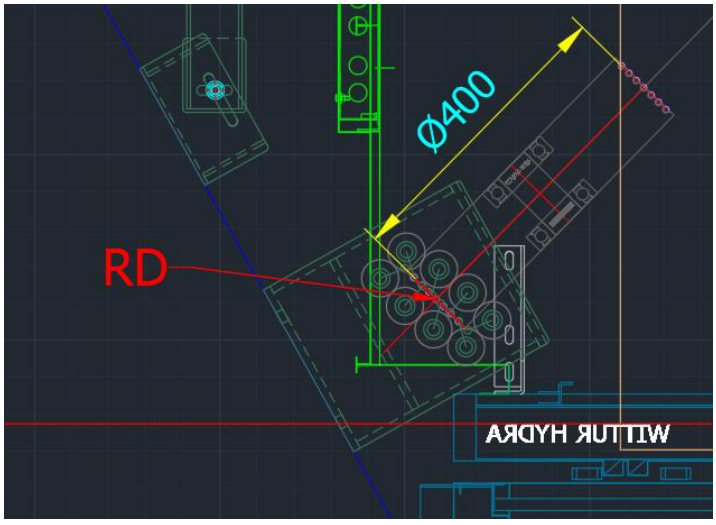
Machine beams;
RA = 50 kN
RB = 25 kN



Ctw rope hitch;
RC = 18 kN



Car rope hitch,
RD = 22 kN

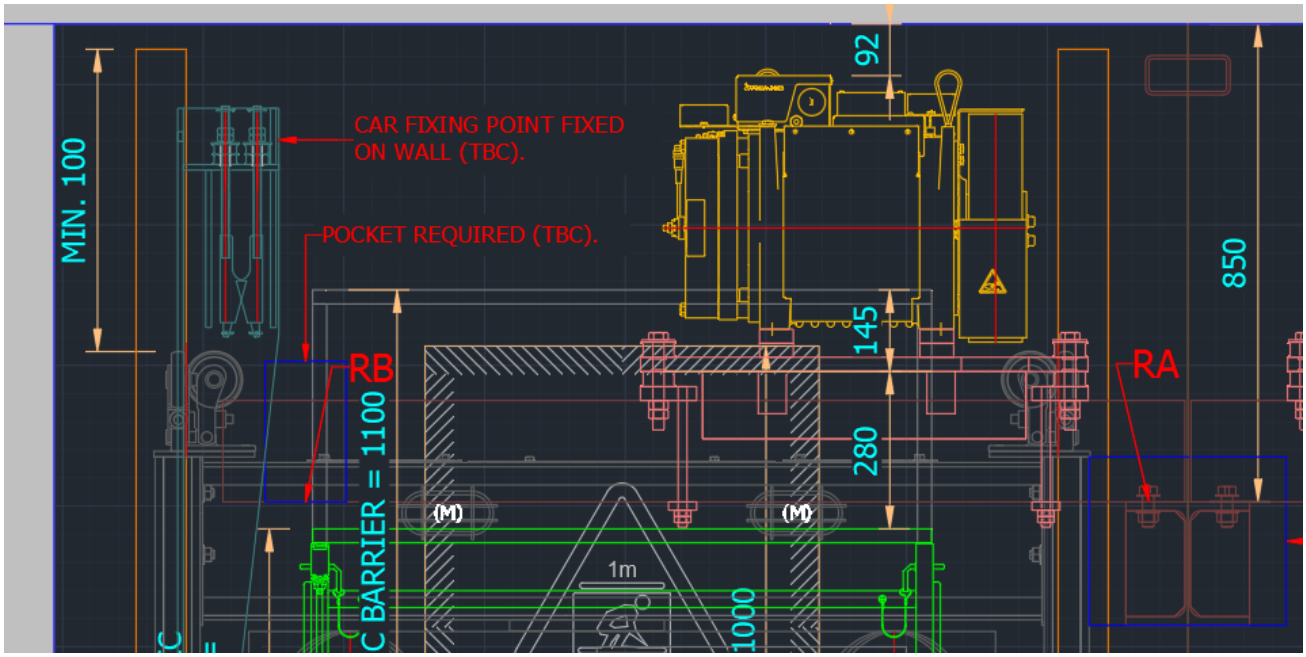


SUNLIGHT HOUSE Lifts 1 & 2

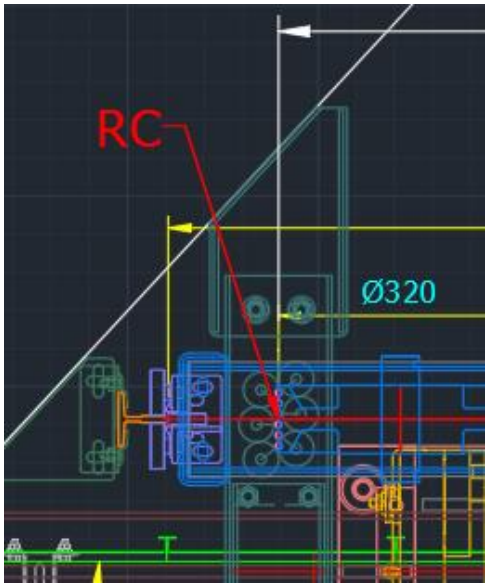
Pit layout; he incluido las reacciones que transmiten las bridas al foso por ser un ascensor de más de 40mt;
CAR BUFFERS (x2) = 40 kN
CTW BUFFER (x1) = 65 kN
CAR GUIDES (On each) = 55 kN
CTW GUIDES (On each) = 50 kN

Wall brackets;
CAR BRACKETS; Fx = 1 kN / Fy = 1,5 kN
CTW BRACKETS; Fx = 0,5 kN / Fy = 1 kN

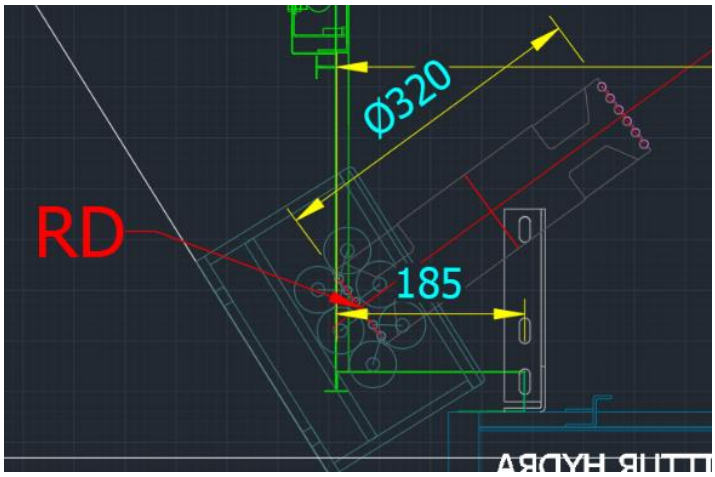
Machine beams;
RA = 30 kN
RB = 18 kN



Ctw rope hitch;
RC = 12 kN



Car rope hitch,
RD = 15 kN



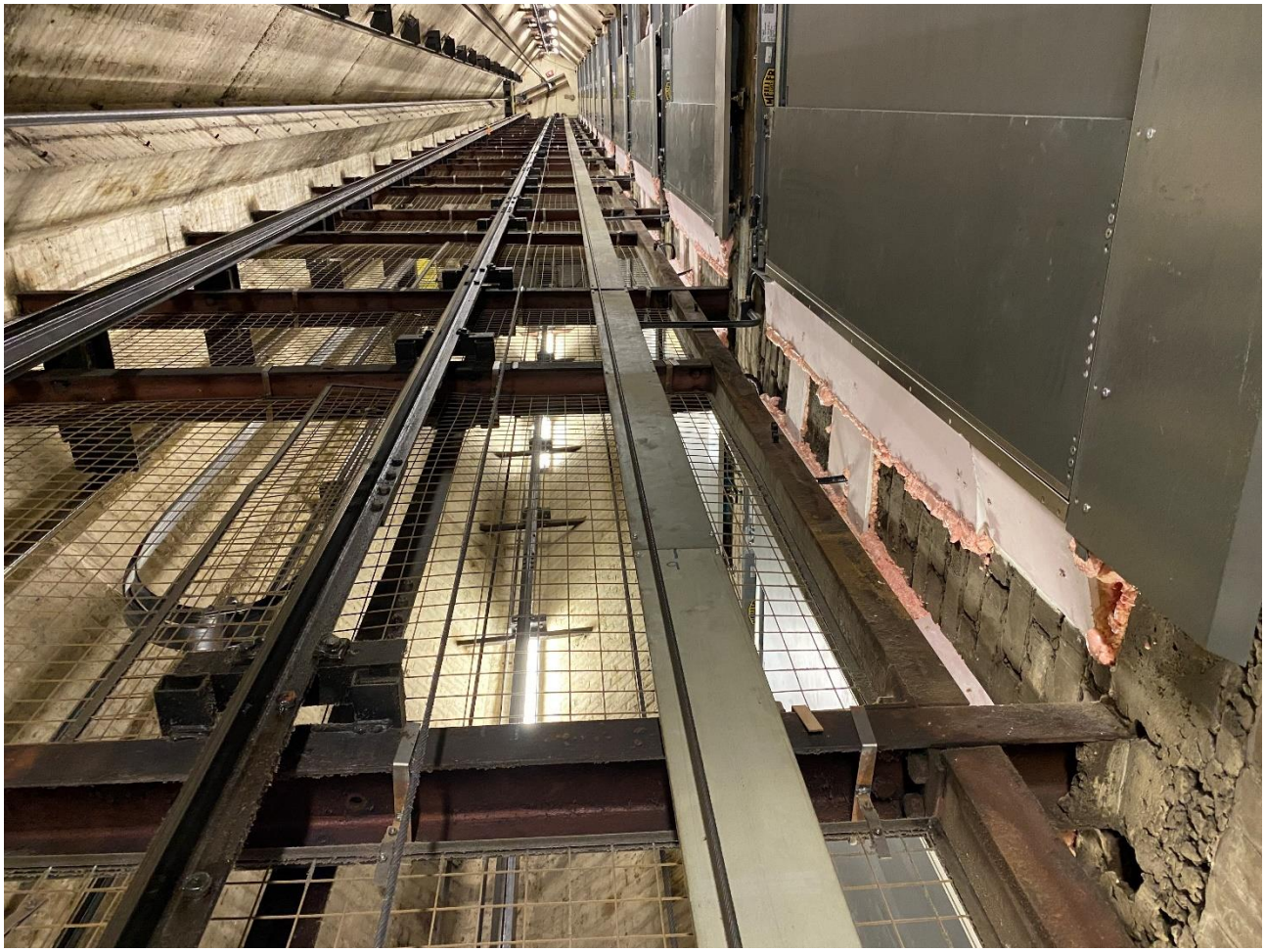
2. Limitations of Report

2.1. A copy of the limitations of our structural inspection report is attached.

3. Shafts' Construction.

3.1. All the four lift shafts have the same construction, with the lifts being in pairs.

3.2. These are masonry (brickwork) load bearing shafts with a secondary steel structure to the middle of the masonry shaft, separating each of the lifts, in the two locations.



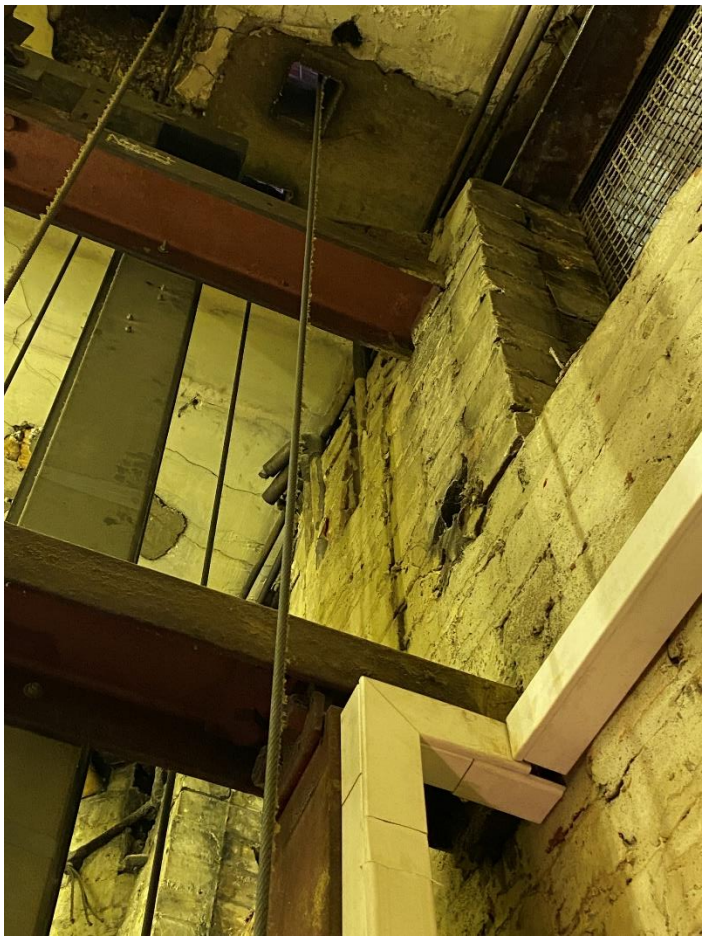
View up shaft showing secondary steel dividing structure between pairs of lifts

3.3. Although we were unable to confirm the shaft walls' thicknesses without intrusive inspection it was clear from the top of the shafts that the brickwork is a minimum of 317mm thick to the shaft walls.

3.4. The separating steel structure is carried from steel channels that span between the front and rear walls of the masonry shaft at each floor level.

3.5. These channels support a vertical channel near to the front of the shaft which, in turn, carries an intermediate steel channel that spans front to rear.

3.6. All the existing steel channels appeared to be 150 x 75mm x 18kg sections.



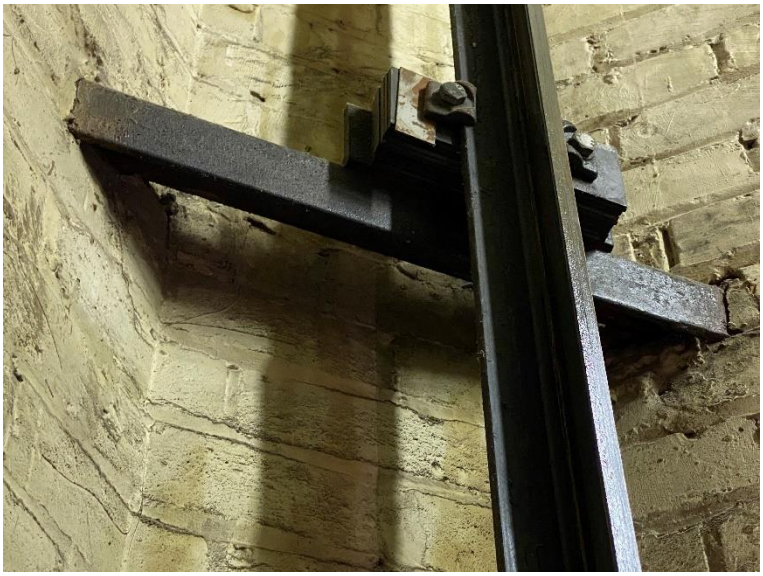
Masonry walls to shafts are 317mm thick

3.7. All the masonry shafts and steel members inspected were in good/fair condition.

3.8. There is no need for any structural work to be undertaken to make them suitable for the new lift installation, other than the alteration works described herein.

4. Verification of existing guide rail bracket

4.1. The existing guide rail brackets are carried from 65 x 65mm steel angle sections that span diagonally across between the masonry shaft walls and appeared to have been built in solid to both ends.



Typical guide rail bracket detail



Guide brackets at regular spacings

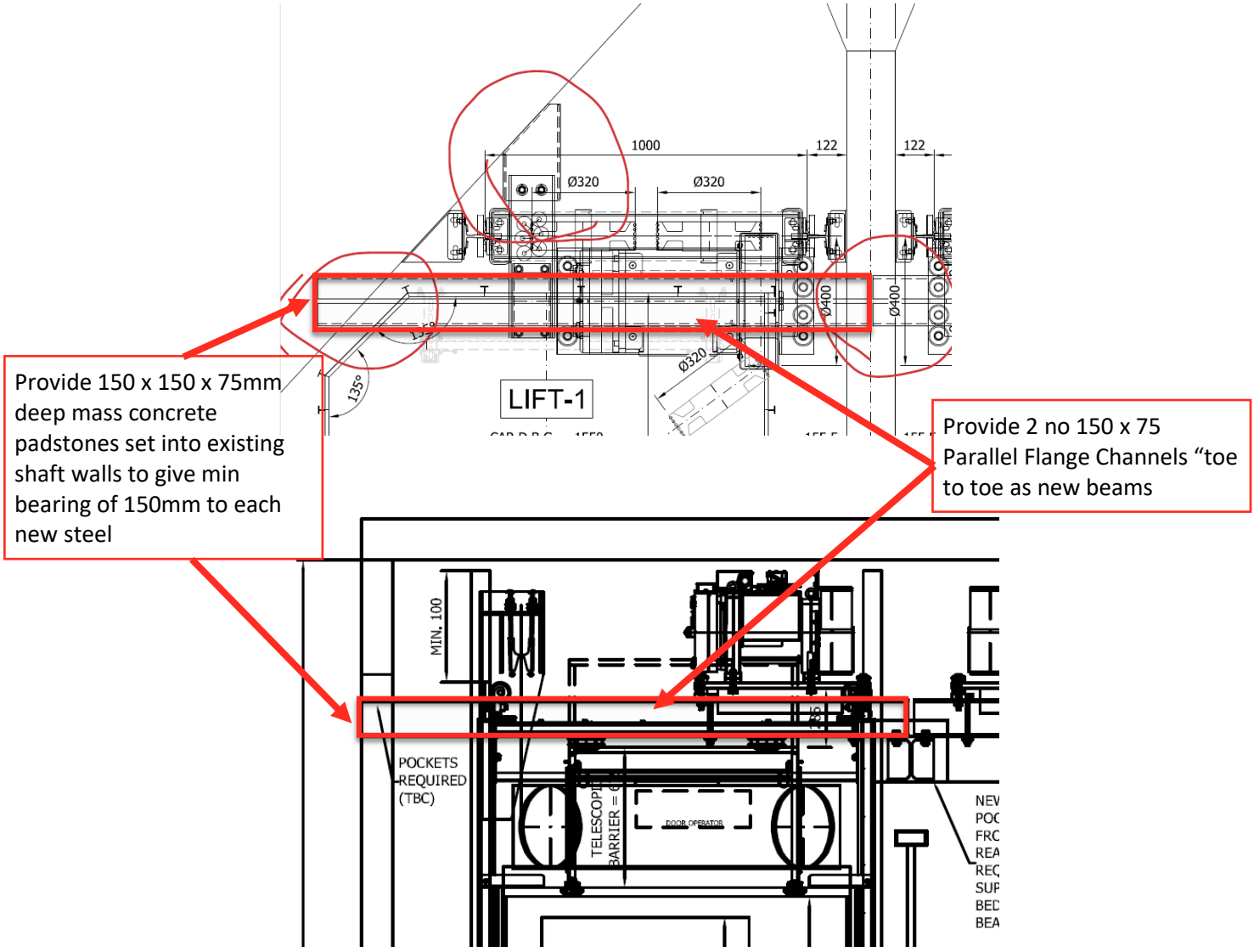
4.2. Although no intrusive investigations were carried out, all of the angles appeared securely built into the shaft walls at around 1.6m c/c vertically.

4.3. This arrangement should easily accommodate the guide forces for the proposed replacement lifts.

5. Design to accommodate machine steel at head of lift shaft

5.1. Parallel Flange Channels to support the lift motors above each shaft.

5.1.1. To the head of each of the shafts, new steel members are needed to support the lift machinery.



New steel beams plan and elevation showing arrangement at the top of each shaft

5.1.2. The new steel beams, as indicated, will span up to 2.1 metres between the shaft walls and the new central support beam.

5.1.3. The proposals from the lift manufacturer show each of these beams to be formed from a pair of Parallel Flange Channels, placed "toe to toe".

5.1.4. From the Machine Beam reactions provided it is clear that the loading onto these beams is a total of 48 KN (30KN + 18KN), at approximately 0.75 metres from one end of the beams.

5.1.5. Conservatively taking this as a point imposed load, and designing the new steel to BS5950, then the design of the new twin beams is as follows: -

ULS Design load onto beam = 1.6 x 48KN = 76KN

Bending Moment due to load = 76 x 0.75 x 1.35/2.1 = 37 KNm

Bending Moment to be resisted per channel is therefore 18.5 KNm

Parallel flange channels (PFC) Buckling resistance moment

Print design data Export to excel

Section designation Cross-section resistance (kNm) Classification	C_1 (1)	1.0	1.5	2.0	2.5	3.0
Class = 1	2.50	63.5	63.5	63.5	63.5	63.5
150x75 x18	1.00	43.5	36.8	31.8	27.9	24.9
	1.13	45.6	39.3	34.4	30.5	27.3
$M_{c,y,Rd}$ = 46.9	1.35	46.9	42.8	38.2	34.3	31.1
$M_{c,z,Rd}$ = 16.8	1.50	46.9	44.8	40.4	36.7	33.5
	1.77	46.9	46.9	43.8	40.3	37.2
	2.00	46.9	46.9	46.1	42.9	40.0
Class = 1	2.50	46.9	46.9	46.9	46.9	44.8

With reference to capacity tables from Tata Blue Book, as above, **2 No 150 x 75 PFCs** will suffice as they have a capacity of 27.9 KNm each at 2.5m span

5.1.6. Where the beams bear onto the masonry, the reaction given is 18KN.

5.1.7. Designing the bearing to BS6528, the ULS Design load is 1.6 x 18KN = 28.8KN

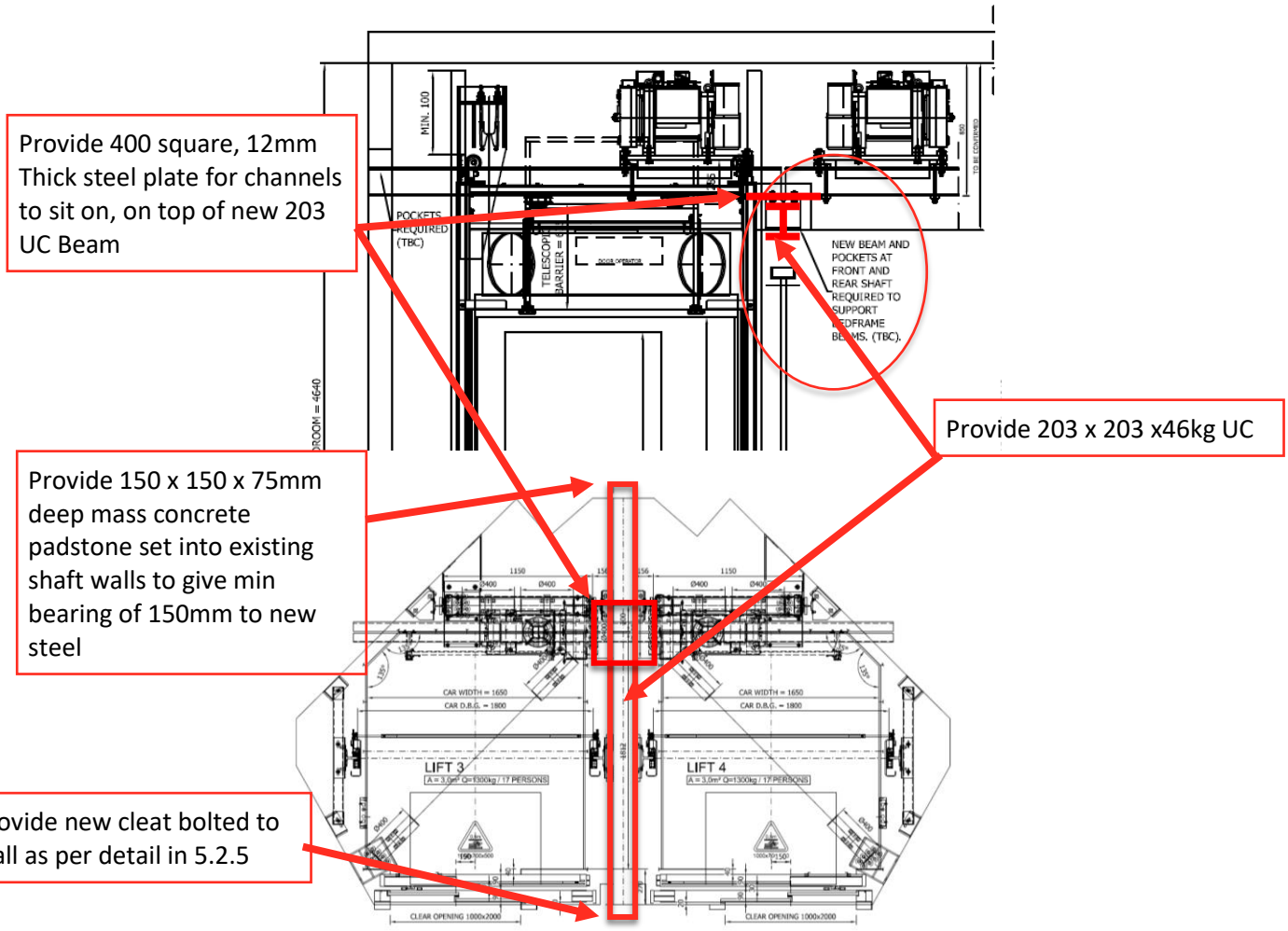
Assuming the lift shaft is constructed from 20 N/mm^2 bricks in a Class iii) mortar, giving f_k = 5.8 N/mm^2, then the permissible bearing capacity of the masonry (assuming Normal/Normal manufacturing and construction control) is: -

1.5 x 5.8/1.5 = 5.8 N/mm2

Area of bearing therefore required = 28800/5.8 = 4966mm^2

Therefore provide nominal mass **concrete padstones of 150 x 150 x 75mm deep** beneath the end bearing of the PFCs, with a minimum bearing of 150mm onto the padstoneS

5.2. New beam (if reqd) to carry above PFCs between shafts at high level



New Beam

5.2.1. A new steel beam is needed at high level to carry the PFCs above. This beam will need to span 3.4 metres between the front and rear masonry walls of the shaft.

5.2.2. The loading on the beam will be 30 KN point loads from each side, total 60 KN, acting at a point 2 metres from the front wall.

5.2.3. Conservatively taking this as an imposed load, and designing the new steel to BS5950, then the design of the new beams is designed as follows: -

ULS Design load onto beam = 1.6 x 60KN = 96KN

Bending Moment due to load = 96 x 1.4 x 2/3.4 = 79 KNm

Universal columns (UC) Buckling resistance moment with S355

Print design data Export to excel

Section designation Cross-section resistance (kNm) Classification	C_1[1]	1.0	1.5	2.0	2.5	3.0
203 x 203 x 46	1.00	176	176	173	166	158
	1.13	176	176	176	172	166
$M_{c,y,Rd}$ = 176	1.35	176	176	176	176	176
$M_{c,z,Rd}$ = 82.0	1.50	176	176	176	176	176
	1.77	176	176	176	176	176
	2.00	176	176	176	176	176
Class = 2	2.50	176	176	176	176	176

With reference to capacity tables from Tata Blue Book, as above, **a 203 x 203 x 46kg UC** will suffice as it has a capacity of 158 KNm each at 3.5m span

5.2.4. Where the beams bear onto the masonry, the maximum reaction is:

96 x 2/3.4 = 56KN

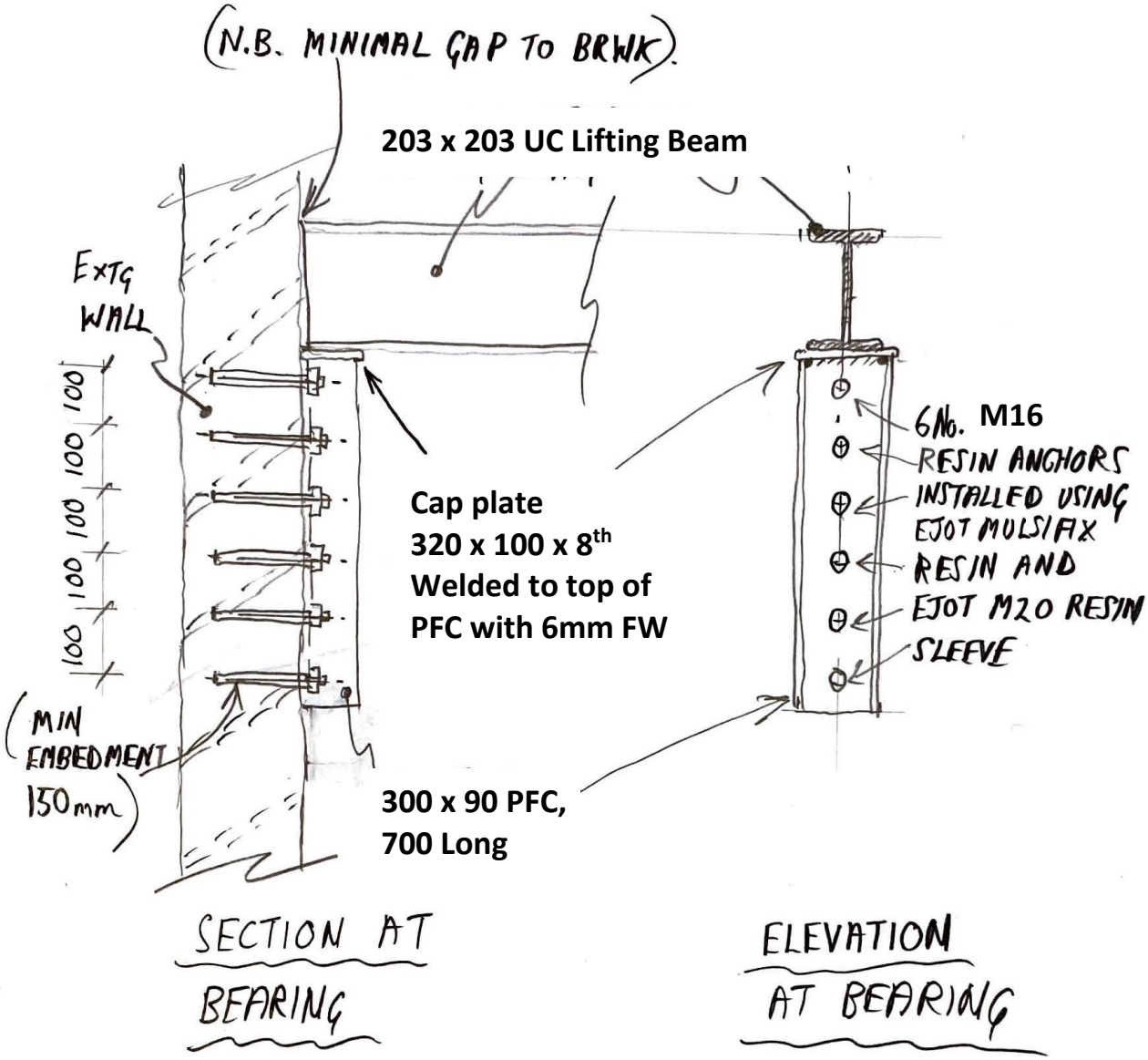
Designing the bearing to BS6528, Assuming the lift shaft is constructed from 20 N/mm^2 bricks in a Class iii) mortar, giving f_k = 5.8 N/mm^2, then the permissible bearing capacity of the masonry (assuming Normal/Normal manufacturing and construction control) is: -

1.5 x 5.8/1.5 = 5.8 N/mm2

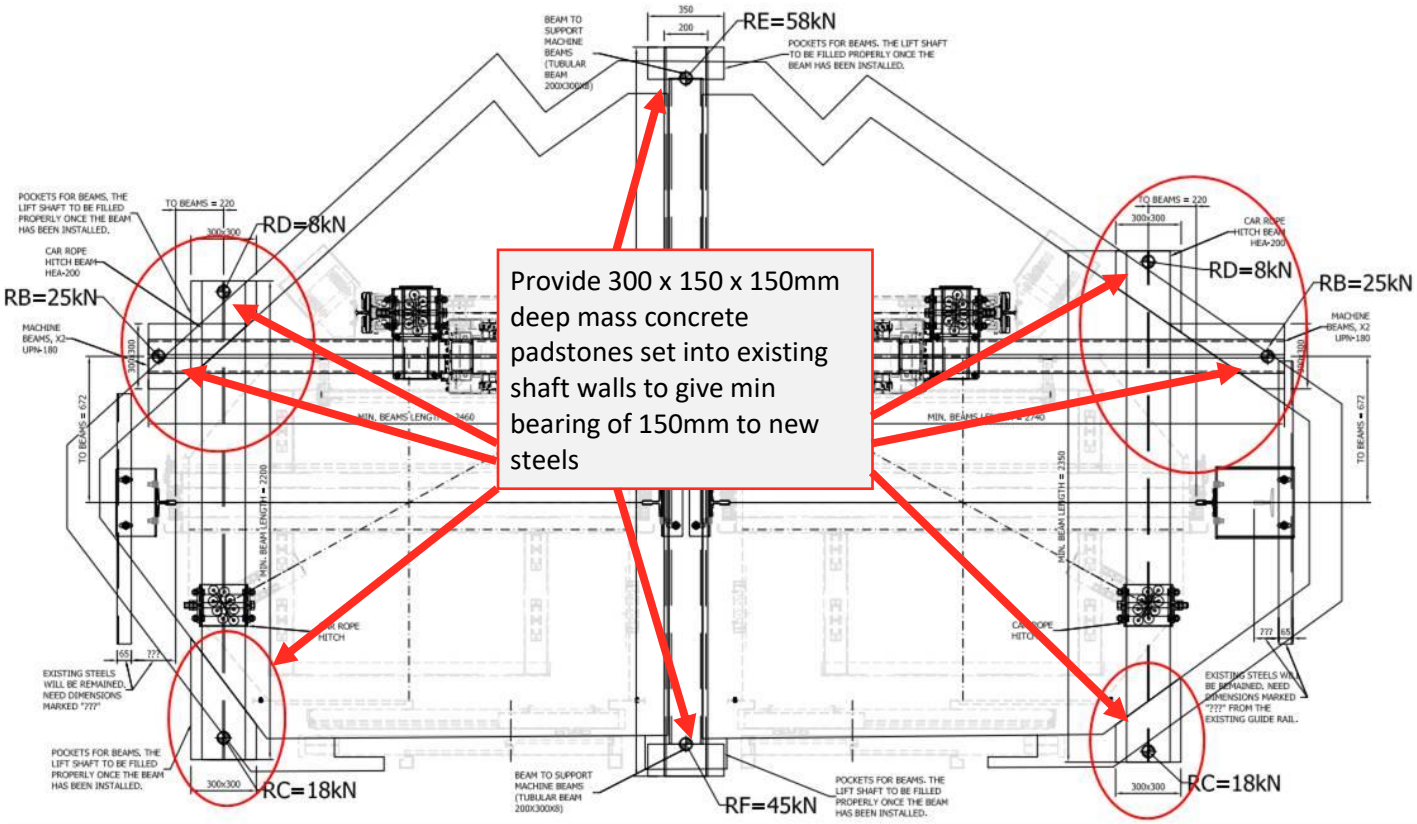
Area of bearing therefore required = 56000/5.8 = 9655mm^2

Therefore provide nominal mass **concrete padstones of 150 x 150 x 75mm deep** beneath the end bearings of the UC, with a minimum bearing of 150mm onto the padstones

5.2.5. Wherever it is not possible to use a padstone and a bracket is required to be bolted to the existing wall, the following detail should be used: -


(N.B. MINIMAL GAP TO BRWK)
203 x 203 UC Lifting Beam
EXTG WALL
100
100
100
100
100
(MIN EMBEDMENT 150mm)
Cap plate
320 x 100 x 8th
Welded to top of
PFC with 6mm FW
300 x 90 PFC,
700 Long
6No. M16
RESIN ANCHORS
INSTALLED USING
EJOT MULSIFIX
RESIN AND
EJOT M20 RESIN
SLEEVE
SECTION AT BEARING
ELEVATION AT BEARING

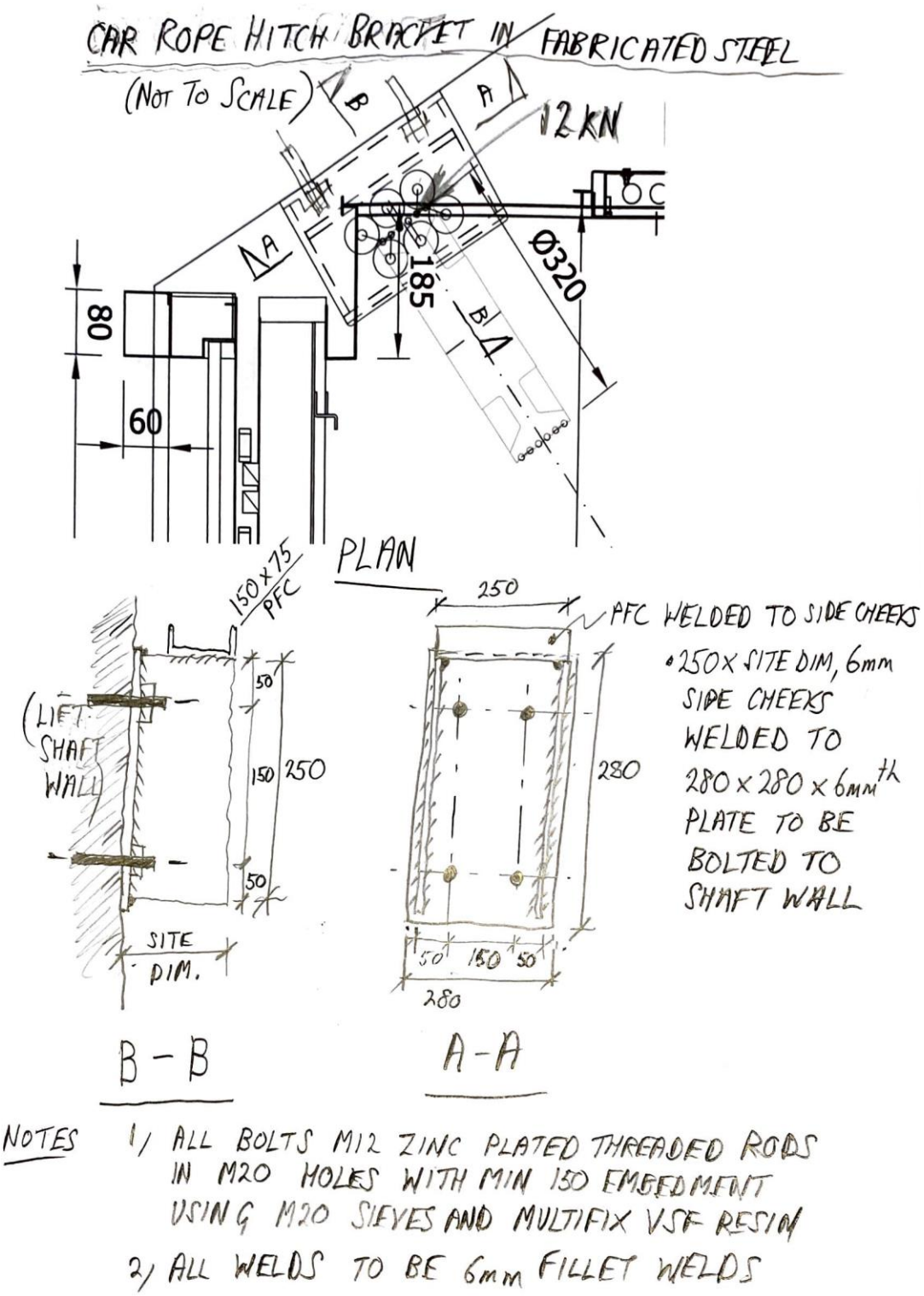
6. Stringer steel padstone/pocket arrangement to accommodate machine steels



New Padstones Required for Machine Steel Bearings

7. Hitch point rope steel bracket

7.1. A steel bracket should be fabricated in accordance with the following sketch detail:



8. Lifting eye beam required to top of shafts

8.1. Ansa have advised there will need to be 3 x lifting eyes installed to the top of each lift shaft to carry the load of the lift and the balance weight, capable of resisting a 3000 kg (say 30KN) load.



Top of lift shaft

8.2. A new steel beam will be required across the shaft, to be placed in the necessary appropriate position to carry these loads.

8.3. By inspection and comparison with the beams already specified:

Provide a 203 x 203 x 46kg UC Steel beam across the shaft, bearing onto mass **concrete padstones of 150 x 150 x 75mm deep** beneath the end bearings of the UC, with a minimum bearing of 150mm onto the padstones

9. Verification of pit floor slab with applied forces



Existing Lift Pit

9.1. From the manufacturer's information given the pit is required to accommodate the following forces: -

CAR BUFFERS (x2) = 40 kN
CTW BUFFER (x1) = 65 kN
CAR GUIDES (On each) = 55 kN
CTW GUIDES (On each) = 50 kN

9.2. Based upon experience we consider the pit construction should readily accommodate these forces.

10. Concrete repairs needed to lintels over lift door openings

10.1. There has been extensive damage to most of the reinforced concrete lintels over the lift door openings due to past builders' work undertaken to accommodate changes to the lift doors.



Typical damage to lintels from past builders' work

10.2. The damage has exposed steel reinforcement in many locations.

10.3. A repair is needed to all of the affected lintels to reinstate their structural integrity.

10.4. A specification for repair and suitable repair product data sheet are appended to this report.

11. Conclusions/Recommendations

11.1. Shafts' construction (Section 3)

11.1.1. The lift shaft is in good structural condition.

11.1.2. There is no need for any structural work to be undertaken to make it suitable for the new lift installation.

11.2. Existing guide rail brackets (Section 4)

11.2.1. All of the angles appeared securely built into the shaft walls at around 1.6m c/c vertically.

11.2.2. This arrangement should easily accommodate the guide forces for the proposed replacement lifts.

11.3. New machine steels required at head of lift shaft (Section 5)

11.3.1. Provide 2 no 150 x 75 Parallel Flange Channels "toe to toe" as new beams between the shaft wall and central support beam to carry the lift machinery.

11.3.2. Where these PFCs bear onto the existing walls provide 150 x 150 x 75 deep mass concrete padstones.

11.3.3. If new central support beam is required provide 203 x 203 x 46 kg UC on padstones set into the existing shaft walls.

11.3.4. Where this beam bears onto the existing walls provide 150 x 150 x 75 deep mass concrete padstones.

11.4. Padstone arrangement needed to accommodate machine steels (Section 6)

11.4.1. Provide mass concrete 300 x 150 x 150 deep mass concrete padstones set into pockets inn the existing walls to all machine steel bearings.

11.5. Hitch point rope steel bracket (Section 7)

11.5.1. Provide fabricated steel bracket bolted back to shaft wall as per detail.

11.5.2. The new steel beam support brackets should be fixed to the existing shaft walls to the details in this report using Ejot M12 Resin Anchors in 150mm deep holes using an M20 drill bit and M20 sieve. (The resin is EJOT Multifix VSF which is a fast cure resin. The anchor rods proposed are Gd5.8 M12 which should be available from stock.)

11.6. Lifting eye beam required to top of shafts (Section 8)

11.6.1. Provide 203 x 203 x 46 kg UC spanning between the existing shaft walls in a position to suit loadings to be applied.

11.6.2. Where this beam bears onto the existing walls provide 150 x 150 x 75 deep mass concrete padstones.

11.7. Verification of pit floor slab with applied forces (Section 9)

11.7.1. The lift pit construction should accommodate the forces required.

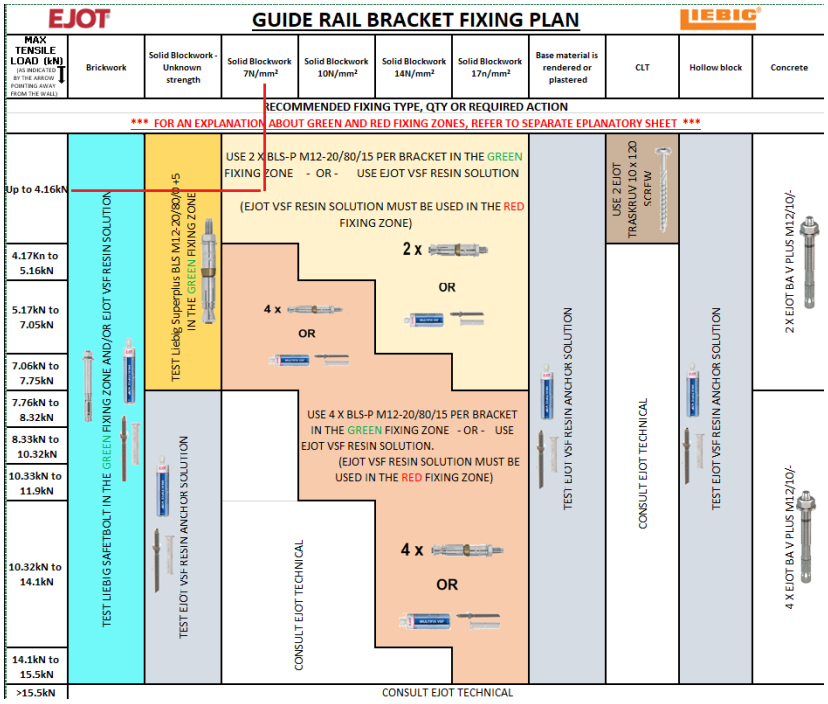
11.8. Concrete repairs needed to lintels over door openings (Section 10)

11.8.1. These should all be repaired in accordance with the appended specification.

11.9. General

11.10. Elsewhere, if necessary, any new installations should be fixed to the existing shaft walls using 2 No LIEBIG Safety Bolt B M16-20/100/15 Anchors per fixing in 25mm diameter by 125mm deep holes

11.11. More generally the following fixing guides should be used.



11.12. Further technical help with respect to fixings can be obtained from:

Paul Papworth

Specification Sales – Liebig
Mobile: 07538110145
EJOT UK Limited
Sherburn Enterprise Park
Hurricane Close
Sherburn In Elmet
LS25 6PB
Tel: 01977 687040
www.ejot.co.uk

Report prepared by
Stuart Walton BSc CEng MIStructE MICE
For and on behalf of Adept CSCE Ltd.
27th September 2024

Appendix A: Concrete Repair Specification

ADEPT
CIVIL AND STRUCTURAL CONSULTING ENGINEERS

Specification for repair of damaged concrete lintels

Client:	Ansa Elevators
Project Name:	4 No Lift Installation, Sunlight House, Manchester
Title:	Specification for repair of damaged concrete lintels over lift doors
Document ref:	100.24113-ACE-ZZ-ZZ-RP-S-00001
Date:	27th September 2024

Specification: -

This Specification covers the repair of concrete lintels that have been damaged by past builders works over lift access doors.

The term "Engineer" means Adept Consulting Engineers Ltd.

All materials used in the works shall be clean, new and fit for their purpose. Any materials stored on site shall be adequately protected from damage or deterioration from whatsoever cause. Any damaged material shall not be used in the works and shall be removed from site immediately.

Areas affected by damage shall be broken back to remove any loose concrete. Breaking out shall continue along the reinforcement until non-corroded steel is reached. Special care shall be exercised to ensure that any reinforcement exposed is not cut or damaged.

The depth of breakout on the edge of any repair area shall be a minimum of 10mm and feather edges will not be accepted. To achieve this the perimeter of the area to be repaired shall first be cut to a depth of 10mm using a suitable tool.

The preparation shall be such as to leave a sound exposed concrete substrate free from dust, loose particles and any deleterious matter.

All exposed reinforcement shall be cleaned of corrosion products to achieve a surface finish to comply with Swedish Standard SA2.5. Special care shall be taken to clean out properly any pits which have occurred in the steel bars.

Reinforcement damaged during the removal of concrete or the preparation process shall, if required by the Engineer, be repaired or replaced.

Before commencing to apply the concrete repair mortar, the prepared concrete substrate shall be thoroughly soaked with clean water in accordance with the manufacturer's instructions.

The choice of bonding agent will be determined by the final choice of repair mortar.

The bonding agent shall be well worked into the irregularities of the substrate according to the manufacturer's recommendations before commencing to apply the repair material.

The repair material must be applied before the bonding agent dries. The area coated at one time must be restricted to allow for this and any area where it becomes dry shall be re-coated as per the manufacturer's instructions.

In areas where the original concrete cover to the reinforcement was equal to or greater than 15 mm the repair material shall be a high build polymer modified cementitious shrinkage compensated repair mortar such as Renderoc HB or similar.

The repair material shall be applied by gloved hand or trowel to the prepared and primed surface of the substrate and will be compacted in, paying particular attention to packing behind and between the reinforcement.

Particular care shall be taken in the application of the repair material. Where necessary it shall be built up in successive wet on wet layers to the necessary profile. If sagging occurs the material must be completely removed prior to filling the void in two or more successive applications or by the use of formwork in accordance with the manufacturer's recommendations. After applying sufficient mortar to build the surface to the required level or to achieve the required cover to the reinforcement, the surface shall be trowelled smooth to the finished profiles.

All areas repaired using cementitious materials shall be fully cured in accordance with good concrete practice.

Appendix B: Specialist Concrete Repair Product

1
CI/SfB:
March 2010

Fosroc® Renderoc HB45

High performance fibre reinforced medium weight concrete reinstatement mortar conforming to the requirements of BS EN 1504-3 Class R4

Uses

For the reinstatement of reinforced concrete where low permeability characteristics are required and where higher compressive strength is a consideration. Where compatibility with lower strength concrete is required, Renderoc HB30 should be used.

Renderoc HB45 has been specificaly developed for the repair of columns and beams, but because of its medium fresh wet density, is also suitable for soffit repairs.

Renderoc HB45 is suitable for repair methods 3.1, 3.3, 4.4, 7.1, 7.2 as defined by BS EN 1504-3.

Advantages

- Maximum compatibility with concrete of compressive strength 35 - 60 N/mm²
- High-build applications possible while maintaining higher compressive strengths — fewer cold joints
- Frequently obviates the need for formwork
- Polymer-modification provides extremely low permeability to water, carbon dioxide and chlorides
- Exceptional system of shrinkage compensation provides long-term dimensional stability
- Can be applied quickly and efficiently by wet spraying
- One component, pre-bagged to overcome site-batched variations
- Contains no chloride admixtures

Description

Renderoc HB45 is supplied as a ready to use blend of dry powders which requires only the site addition of clean water to produce a highly consistent, medium-weight repair mortar.

It is based on Portland cements, graded aggregates, lightweight fillers and chemical additives providing a mortar with good handling characteristics while minimising water demand. The low water requirement ensures good strength gain and long-term durability.

Renderoc HB45 has been specifically engineered for vertical and overhead repair work. It can be applied in sections up to 40 mm thickness in vertical locations and up to 30 mm thickness in overhead locations in a single application without formwork. Thicker sections can be achieved by the use of formwork or can be built up in layers. Deep pockets can sometimes be filled in a single application dependent on the configuration of the pocket and the volume of exposed reinforcing steel.

Renderoc HB45 can be quickly and efficiently applied by the wet spray technique. Consult the local Fosroc office for further information.

The material should not be applied at less than 10 mm thickness.

Specification Clause

The repair mortar shall be Rendreoc HB45 a one component polymer modified high build cementitious mortar conforming to the requirements of BS EN 1504-3 Class R4.

The cured mortar shall achieve a compressive strength of 50 MPa at 28 days and a drying shrinkage of <300 microstrain at 7 days.

Standards compliance

Renderoc HB45 complies with the classification R4 according to EN 1504-3, repair methods 3.1, 3.3, 4.4, 7.1 and 7.2.

CE

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0370-CPD-0845

EN1504-3
Concrete repair products for structural repair PCC mortar (based on polymer modified hydraulic cement)

Compressive strength	Class R4 (≥45 MPa)
Chloride ion content	≤ 0.05%
Adhesive bond strength	≥ 2.0 MPa
Adhesive bond strength after freeze thaw thermal cycling	≥ 2.0 MPa
Carbonation resistance	d_k ≤ control concrete
Capillary absorption	0.5kg / m².h$^{0.5}$
Elastic modulus in compression	≥ 20 GPa
Reaction to fire	Class A2 s1 d0
Dangerous substances	Complies with 5.4

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Properties

The following results were obtained at a water: powder ratio of 0.13 and a temperature of 20°C unless otherwise stated.

Test method	Standard	EN 1504 R4 Requirement	Result
Compressive Strength	EN 12190:1999	≥ 45 MPa	@ 1 Day 20 MPa @ 28 Days 50 MPa
Bond strength by pull off:	EN 1542:1999	≥ 2.0 MPa	2.1 MPa
Chloride ion content:	EN 1015-17:2000	≤ 0.05 %	0.03%
Freeze thaw cycling:	EN 13687-1:2002	≥ 2.0 MPa	2.0 MPa
Resistance to carbonation d_k	EN 13295:2005	≤ ref concrete	Conforms
Capillary absoprtion	EN1305:2002	≤ 0.5 kg/ m^{-2}/h$^{0.5}$	0.09 kg/ m^{-2}/h$^{0.5}$
Elastic Modulus in Compression	EN 13412	≥ 20 GPa	25 GPa @ 28 days
Fire rating	EN 13501-1		Class A2 s1 d0 Non-Combustible
Flexural strength	BS 6319 Pt 3:1990	-	7.5 MPa @ 28 days
Tensile strength	BS 6319 Pt 3:1985	-	4.0 MPa @ 28 days
Setting time	BS 4551 Pt14:1980	-	Initial set: 3 hours Final set: 5 hours
Fresh wet density		-	Nominally 2000 kg/m^3
Shrinkage (25 x 25 x 285 prisms, 27°C, 55% RH		-	< 300 microstrain @ 7 days
Alkali reactive particles	Method TH-B 52	-	≤ 1.0 vol %
Chemical resistance		-	The low permeability of Renderoc HB5 severely retards chemical attack in aggressive environments. The cured mortar is impermeable to acid gases, waterborne chloride ions and oxygen.
Build Characteristics hand applied Minimum thickness: Overhead: Vertical:	- - -	- - -	10 mm Up to 30 mm Up to 40 mm

Clarification of property values: The typical properties given above are derived from laboratory testing. Results derived from field applied samples may vary.

Application instructions

Preparation

Saw cut the edges of the repair to a depth of at least 10 mm to provide a square edge. Break out the complete repair area to a minimum depth of 10 mm up to the sawn edge.

Clean the surface and remove any dust, unsound or contaminated material, plaster, oil, paint, grease, corrosion deposits or algae. Where breaking out is not required, roughen the surface and remove any laitance by light scabbling or abrasive-blasting.

Oil and grease deposits should be removed by steam cleaning, detergent scrubbing or the use of a proprietary degreaser. The effectiveness of decontamination should then be assessed by a pull-off test.

Expose fully any corroded steel in the repair area and remove all loose scale and corrosion deposits. Steel should be cleaned to a bright condition paying particular attention to the back of exposed steel bars. Abrasive-blasting is recommended for this process.

Where corrosion has occurred due to the presence of chlorides, the steel should be high-pressure washed with clean water immediately after abrasive-blasting to remove corrosion products from pits and imperfections within its surface.

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Reinforcing steel priming

Apply one full coat of Nitoprime Zincrich Plus and allow to dry before continuing. If any doubt exists about having achieved an unbroken coating, a second application should be made and, again, allowed to dry before continuing.

Concrete Priming

The concrete substrate should be saturated surface dry immediately before the application of the primer i.e. it should be thoroughly saturated with clean water and any residual surface water removed prior to applying Renderoc Primer.

Under severe drying conditions repeated soaking may be necessary to ensure the substrate is still saturated at the time of application of the primer.

Add 3 parts by volume of Renderoc Primer Part A to 1 part by volume Renderoc Primer Part B (4 to 1 by weight) in a clean mixing vessel and mix with a spatula or slow speed drill until a homogeneous smooth slurry is produced.

Scrub Renderoc Primer slurry into the surface.

Renderoc HB45 can be applied immediately to the primed surface. If the primer dries apply another coat of primer before continuing.

Open bags of Renderoc Primer Part A should be sealed and stored in a dry area. Use within 14 days.

In exceptional circumstances, e.g. where a substrate/repair barrier is required or where the substrate is wet or likely to remain permanently damp, Nitobond EP bonding aid should be used. Contact the local Fosroc office for further information.

Mixing

Care should be taken to ensure that Renderoc HB45 is thoroughly mixed. A forced-action mixer is essential. Mixing in a suitably sized drum using an approved Renderoc Spiral Paddle in a slow speed (400/500 rpm) heavy-duty drill is acceptable for the occasional one-bag mix.

Free-fall mixers must not be used. Mixing of part bags should never be attempted.

For normal applications, place 3.25 to 3.5 litres of drinking quality water into the mixer.

With the machine in operation, add one full bag of Renderoc HB45 and mix for a minimum of 3 minutes and a maximum of 5 minutes, until fully homogeneous.

The consistency may be adjusted by the addition of small amounts of water up to the maximum total water content of 3.5 litres.

Note that the powder must always be added to the water.

Mixing warning

As with other 'one pack' repair mortars, Renderoc HB45 may exhibit satisfactory handling characteristics even though inadequately mixed. This will result in a significantly lower level of performance or possible failure. It is therefore essential that mixing instructions are strictly adhered to with particular emphasis on the quantity of water used and the time of the mixing operation.

Application

Exposed steel reinforcing bars should be firmly secured to prevent movement during application.

Apply the mixed Renderoc HB45 by gloved hand or trowel, thoroughly compacting onto the primed substrate and around exposed reinforcement.

If sagging or slumping occurs Renderoc HB45 should be completely removed and reapplied at a reduced thickness to a correctly primed substrate.

Build-up

Additional build-up can be achieved by application of multiple layers.

The surface of the intermediate layers should be comb scratch-keyed and cured with Nitobond AR. Repriming with Renderoc Primer and a further application of Renderoc HB45 may proceed as soon as this layer has set.

Spray application

Renderoc HB45 can be quickly and efficiently applied by the wet spray technique. In circumstances where large areas of repair are required, the rapid placement and higher build attainable by this method offer economic advantages over hand-trowelling. The resultant repair also offers a generally more dense compound with enhanced mortar/substrate bond characteristics. For further details on wet spray techniques contact the local Fosroc office.

Finishing

Renderoc HB45 is finished by striking off with a straight edge and closing with a steel float. Wooden or plastic floats, or damp sponges, may be used to achieve the desired surface texture. The completed surface should not be overworked. After spray application, the mortar may need to be 'cut back' to the required profile using a steel float and then finished with damp sponges as described above.

Low temperature working

In cold conditions down to 5°C, the use of warm mixing water (up to 30°C) is advisable to accelerate strength development. Normal precautions for winter working with cementitious materials should then be adopted. The material should not be applied when the substrate and/or air temperature is 5°C and falling. At 5°C static temperature or at 5°C and rising, the application may proceed.

High temperature working

At ambient temperatures above 35°C, the material should be stored in the shade and cool water used for mixing.

Curing

Renderoc HB45 is a cement-based repair mortar. In common with all cementitious materials, it must be cured immediately

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after finishing in accordance with good concrete practice. The use of Nitobond AR, sprayed on to the surface of the finished mortar in a continuous film, is recommended. A low pressure atomising sprayer is essential for applying the Nitobond AR. Any excessive run-off on verticals or drips on soffits should be removed by brush before they harden.

Large areas should be cured as trowelling progresses (0.5 m² at a time) without waiting for completion of the entire area.

In fast drying conditions, supplementary curing with polythene sheeting taped down at the edges must be used. In cold conditions, the finished repair must be protected from freezing.

Overcoating with protective decorative finishes

Renderoc HB45 is extremely durable and will provide long-term protection to the embedded steel reinforcement within the repaired locations. The surrounding parts of the structure will benefit from the application of a barrier/decorative coating to limit the advance of chlorides and carbon dioxide, bringing them to the same protective standard as the repair itself. Fosroc recommend the use of the Dekguard range of protective, anti-carbonation coatings. These products provide a decorative and uniform appearance as well as protecting areas of the structure which might otherwise be at risk from the environment. Dekguard products may be applied over the repair area without prior removal of the Nitobond AR curing membrane. Other curing membranes must be removed prior to the application of Dekguard products.

Cleaning

Renderoc HB45 and Renderoc Primer should be removed from tools, equipment and mixers with clean water immediately after use. Cured material can only be removed mechanically.

Clean tools used with Nitoprime Zincrich Plus and Nitobond EP before material cures using Fosroc Solvent 102.

Estimating

Supply

Renderoc HB45:	25 kg bags
Nitoprime Zincrich Plus:	1.9 litre and 800 ml cans
Renderoc Primer	20 Kg Part A + 5 litres part B
Nitobond AR:	5 and 25 litre drums
Fosroc Solvent 102:	5 and 25 litre tins

Coverage and yield

Renderoc HB45:	Approximately 14 litres / 25 kg bag (approximately 1.4 m² at 10 mm thickness)
Nitoprime Zincrich Plus:	8 m²/litre
Nitobond AR:	6 - 8 m²/litre
Renderoc Primer	Approximately 13 litres- 2m²/ litre

Notes: the actual yield per bag of Renderoc HB45 will depend on the consistency used. The yield will be reduced if the material is applied by a spray technique.

Limitations

Renderoc HB45 should not be used when the temperature is below 5°C and falling. Do not mix part bags. Renderoc HB45 should not be used in areas subjected to traffic (in these circumstances, Renderoc S should be considered).
Renderoc HB45 should not be exposed to moving water during application. Exposure to heavy rainfall prior to the final set may result in surface scour.
If any doubts arise concerning temperature or substrate conditions, consult the local Fosroc office.

Storage

The Renderoc HB45 and Renderoc Primer have a shelf life of 12 months from the date of manufacture if kept in dry storage in the original, unopened bags. If stored at high temperatures and/or high humidity the shelf life may be reduced to less than 6 months.
Nitobond AR and Renderoc Primer Part B should be protected from frost.

Precautions

Health and safety

For further information refer to the appropriate Product Safety Data Sheet available at www.fosroc.com

Fire

Renderoc HB45 is non-flammable.
Nitoprime Zincrich Plus and Fosroc Solvent 102 are flammable. Keep away from sources of ignition. No Smoking. In the event of fire, extinguish with CO_2 or foam. Do not use a water jet

Flash points

Nitoprime Zincrich Plus:	41°C
Fosroc Solvent 102:	33°C

Important note
Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard Conditions for the Supply of Goods and Services, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification or information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products, whether or not in accordance with any advice, specification, recommendation or information given by it.

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Limitations of Report

a) Adept Consulting Engineers Ltd have prepared this report for the sole use and benefit of the client and/or his appointed agent only and no liability is accepted to any third party who may seek to rely on the whole or any part of this report. Should the client not act upon specific reasonable advice contained in the report, no responsibility is accepted for the consequences.

b) Comments are restricted to those elements of the structure which are loadbearing and/or provide stability to the buildings, and to the external envelope. Non-structural items of interior or exterior fabric are excluded, except where deterioration or damage to such items may have caused or may in the future cause, damage to or loss of integrity of the structure.

c) Comments are restricted to those elements of the structure which were readily available for visual inspection and exclude all items or elements which were covered in any way by, for example, fittings, fixtures, carpets, floor coverings, furniture, stored goods or plaster/finishes etc. or any items which are buried. No “opening up” of the structure or exposure of foundations took place and none of the above items were moved or disturbed.

d) The external inspection of the roof, chimneys and rainwater goods, was made from ground floor level. It should be noted that the efficiency of rainwater goods, which may appear in good condition, can only be assessed if there is heavy rain falling during the inspection.

e) Roof voids are only inspected from the access hatch, unless there are fully boarded walkways and adequate light available. Should it be felt necessary to make a more detailed inspection and walkways or light are not available, suitable access arrangements may need to be made, the costs of which would be the responsibility of the client.

f) Similarly basements or under floor voids will only be inspected if adequate light and safe access are available.

g) It is not practical to itemise every defect and minor defects which are obvious to the layman are not generally noted unless they are symptomatic of a more serious underlying structural fault.

h) The inspection does not include any services in or to the building and the services of appropriate experts should be sought if deemed necessary.

i) The detection and eradication of timber infestation and rising damp are specialist matters and as such are outside the scope of this report. We would, nevertheless, recommend that a firm of appropriate experts should be employed to carry out an independent survey and prepare a report.

j) Although mention may be made in this report, we have not carried out an exhaustive survey as to whether hazardous or deleterious materials such as asbestos is used in the construction of the buildings, neither have we carried out any tests or other investigation to determine the presence or otherwise of methane gases or other noxious substances of any kind whatsoever on the site. Appropriate experts should be consulted if deemed necessary.

k) It should be noted that further deterioration of existing defects, or the presence of any defects undetectable at the time of the inspection, cannot be ruled out.