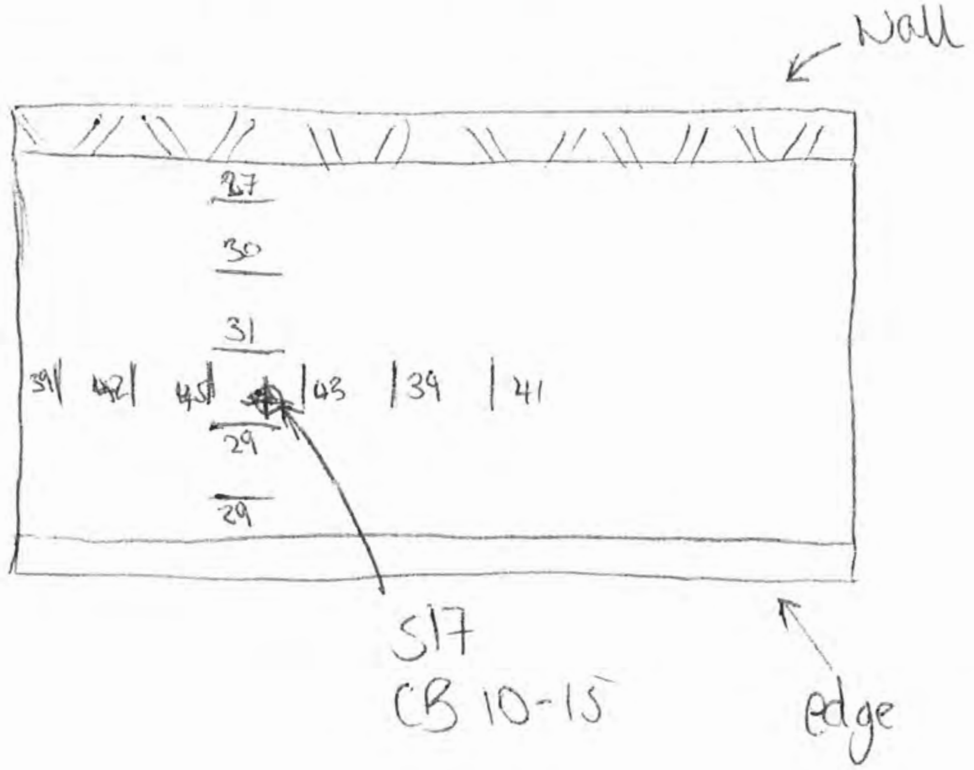
MARTECH

TA17 Soffit @ 1st floor



Project:	Location:	Report No:
Lister & Treves Houses	LISTER HOUSE TA Location	14093
Date:		Sheet No:

BWK 1 GROUND FLOOR GABLE

- HOLE DRILLED TO 260mm – NO CAVITY
- BONDED SOLID BRICKWORK
- SOME GAPS TO MORTAR JOINTS WITHIN

BWK 2 2ND FLOOR GABLE

- HOLE DRILLED TO 260mm – NO CAVITY
- BONDED SOLID BRICKWORK
- NO SIGNIFICANT GAPS WITHIN MORTAR

BWK 3 GROUND FLOOR GABLE.

- AS BWK 2

BWK 4 2ND FLOOR GABLE

- AS BWK 2

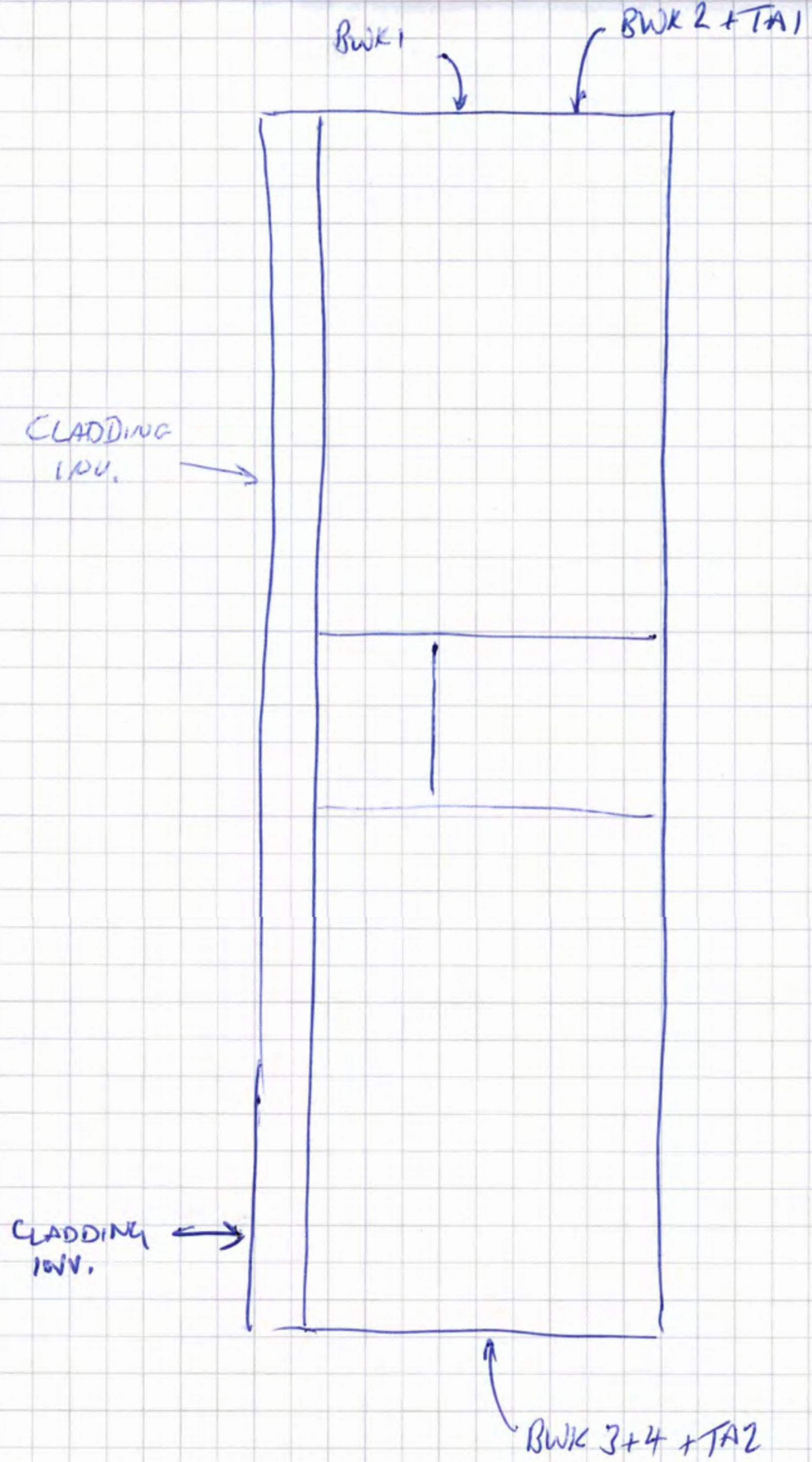
BWK 5 2nd Floor Gable (Walk Way Stairs)

- Hole drilled to 255mm – No cavity
- @ 230-240mm gap about 10mm

BWK 6 1st Floor Gable (Stair Way Walkway Wall)

- Hole drilled to 265mm – No cavity
- Solid Brickwork

MARTECH



Project: Lister + Treves Houses

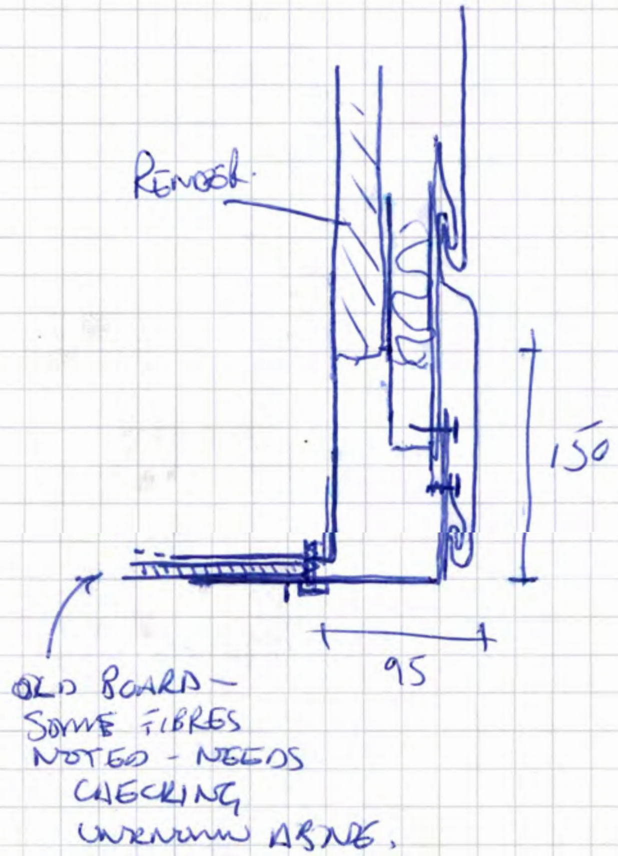
Location: BWK + CLADDING LOCATION TREVES HOUSE

Date:

Report No: 14093

Sheet No:

Consult rve



Project: LISTER + TREVES HOUSES

Location: TREVES HOUSE CLADDING SECTION

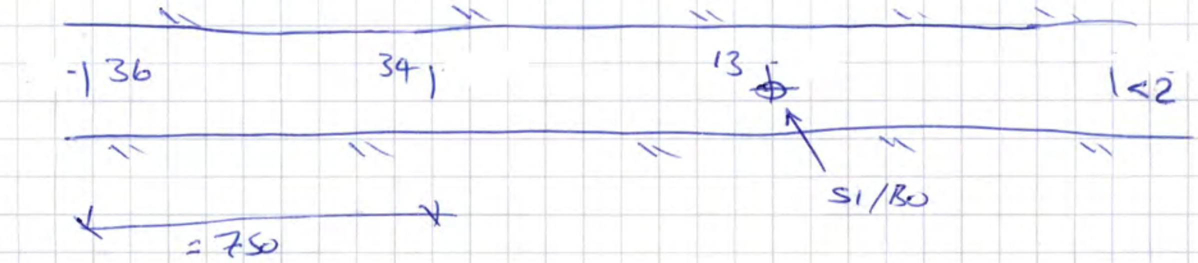
Date:

Report No: 14093

Sheet No:

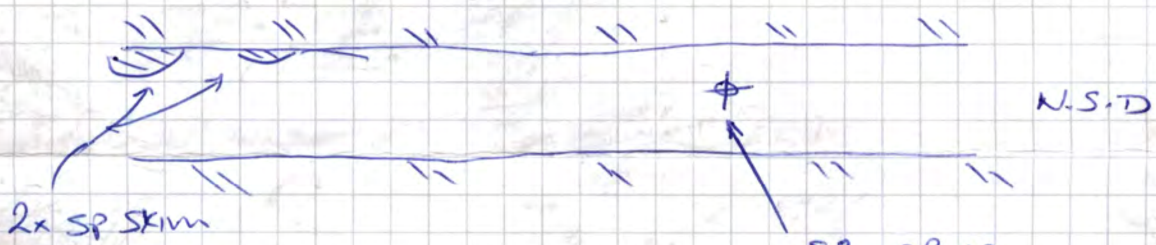
MARTECH

TA1 2ND FLOOR SLAB EDGE.



B0 – 18mm ϕ PLAIN B. F.
CV 2
CB 10–15
VSSC TO END CAP BEYOND.
10mm SKIM + RENDER, PAINTED.

TA2 2ND FLOOR SLAB EDGE



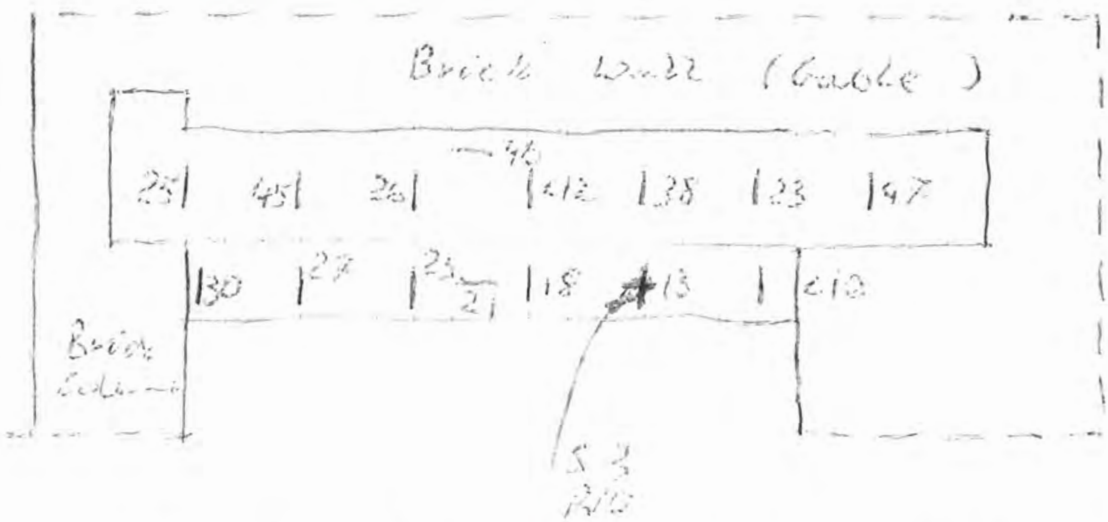
S2, CB 10
2mm ; SKIM.
PAINTED

Project	Location
Lister + Treves Houses	TREVES H
	TA Location
Date	
Report No 14093	Sheet No

Consult rve

MARTECH

TA 3 Walkway slab



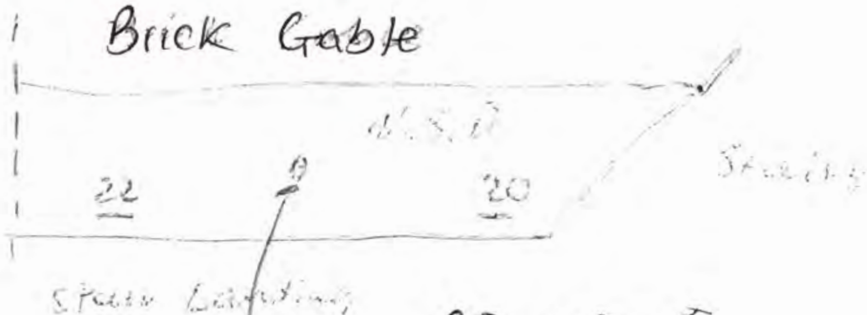
↔ 12mm Plain Bar CV 18 SSC

↕ 6mm plain bars CV 12 SSC

CB 15 - 25

1mm elastic paint

TA 4 2nd Floor Slab Edge



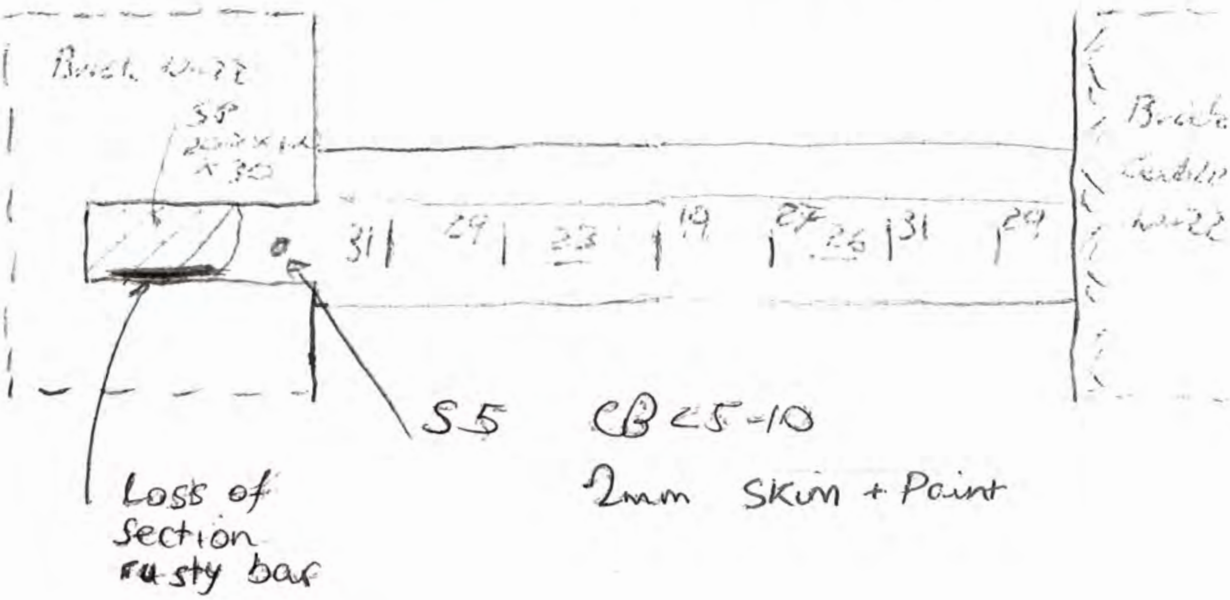
S 4 CB 25 - 5

3mm Skim + paints.

Project:	Location:	Report No:
Listers + thieves Houses	TA - Location	14093
Date:	TREVES H.	Sheet No:

MARTECH

TA 5 2nd Floor Walkway Slab edge

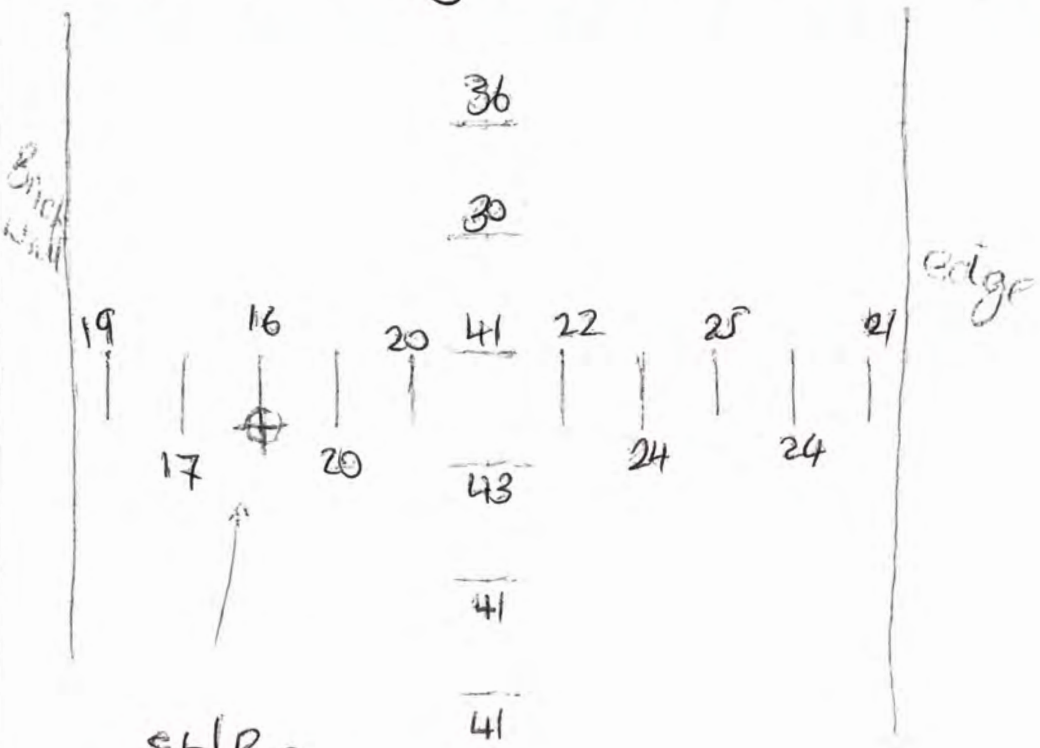


12mm Plain Bar, Rusty
Orig CV 22mm face
3-5mm CV from Bottom of Brick

Project:	Location:	Report No:
Lister + Treves House	TA Location	14093
Date:	TREVES H.	Sheet No:

MARTECH

TA6 Stairway Soffit 1st - 2nd Floor



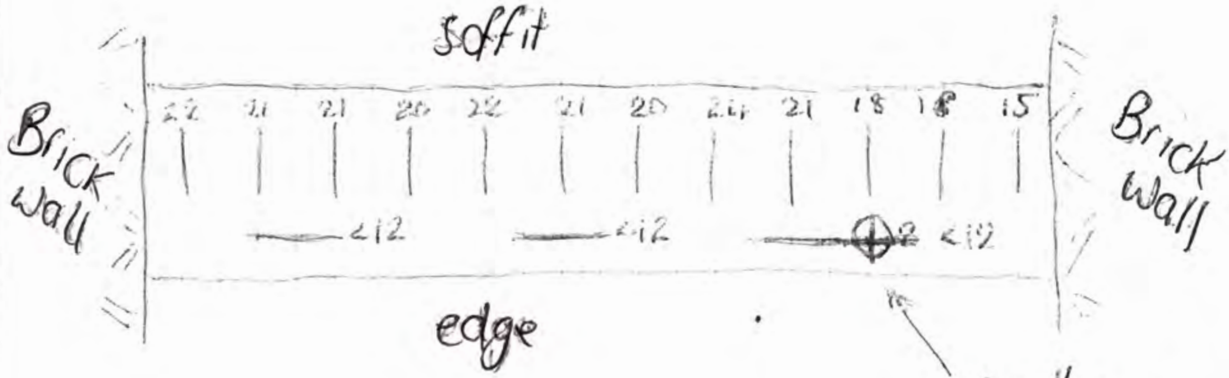
S6/B.0
20mm Plain Bar
CV 21
CB 25-30
SSC

1-2mm Skim and Paint

Project:	Location:	Report No:
Lister & Troves Horse	T4 Location	14095
Date:	[illegible]	Sheet No:

MARTECH

TA7 Stairway Beam Ground Floor

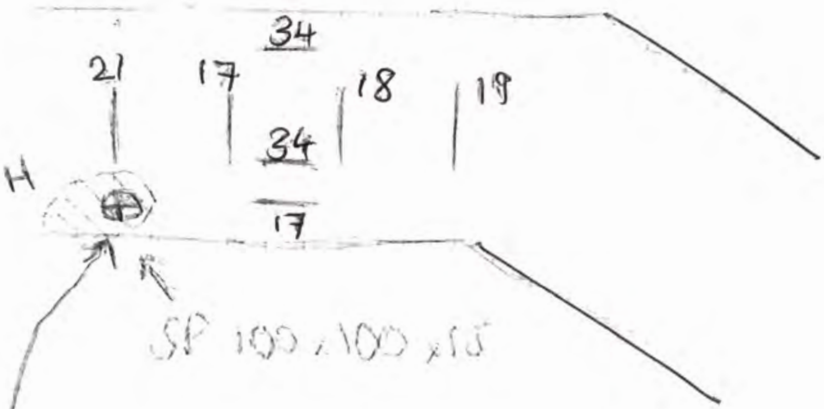


28mm Plain main Bar
CV 17
6mm link Bar
CV 11
CB >30
SSC

Project: Lister + Treves Houses	**Location:** TA Location TREVES H	**Report No:** 14093
Date:		**Sheet No:**

MARTECH

TA8 Stairway Landing edge Gr + 1st floor



2-3mm Skim + Elastic paint

S8/B.0
16mm Plain Bar
CV 19
End of link Bar Present
CV 4mm
SP link Bar
CV 11 mm

CB 25-15
C+P

Project: Lister + Trenes Houses	**Location:** TA Location	**Report No:** 14098
Date:	TRENGS H.	**Sheet No:**

MARTECH

lab results

REPORT

test

www.**consultrve.co.uk**

sample list

lab results

to select the section you require,
please click on the relevant heading

Consult rve

Sample List –
Lister & Treves Houses, London

Sample	Test Area	Element/Location
		Lister House
S1	1	Balcony Soffit 6th Floor
S2	2	Slab Edge 3rd Floor
S3	3	Slab Edge 1st Floor
S4	4	Stairway Wall 7th Floor
S5	5	Stairway Wall 5th Floor
S6	6	Soffit 1st Floor
S7	7	Column 8th Floor
S8	8	Slab Edge 8th Floor
S9	9	Column 6th Floor
S10	10	Column 3rd Floor
S11	11	Slab Edge 1st Floor
S12	12	Column 8th Floor
S13	13	Slab Edge 7th Floor
S14	14	Column 4th Floor
S15	15	Slab Edge 3rd Floor
S16	16	Slab Edge 1st Floor
S17	17	Soffit 1st Floor
S18	18	Column Ground Floor
		Treves House
S1	1	Slab Edge 2nd Floor
S2	2	Slab Edge 2nd Floor
S3	3	Walkway Slab Edge 3rd Floor
S4	4	Slab Edge 2nd Floor
S5	5	Walkway Slab Edge 2nd Floor
S6	6	Stairway Soffit 1st – 2nd Floor
S7	7	Stairway Beam Ground Floor
S8	8	Stairway Landing Edge Ground – 1st Floor

Quartz Scientific

7G Dukes Yard, Shakespeare Industrial Estate, Watford WD24 5AL
Tel: 01923 213983 Fax: 01923 247732
e-mail: mail@quartz-scientific.co.uk www.quartz-scientific.co.uk

Martech Technical Services Ltd
21 Church Street
Sawtry
Huntingdon PE28 5SZ

22 July 2014
MA/11130a/isj

CERTIFICATE of ANALYSIS

Lister House

Chloride content of concrete samples

Date received	:	15 July 2014
Mass received	:	13 to 55 g
Type of sample	:	concrete dust
Date of analysis	:	17 to 18 July 2014
Method of testing	:	B.S.1881:Part 124:1988.

Sample ref.:	Client's ref.:	Chloride content as % chloride ion by mass of sample	cement
7800	S1	0.14	0.97
7801	S2	0.16	1.15
7802	S3	0.13	0.94
7803	S4	0.02	0.11
7804	S5	0.02	0.11
7805	S6	0.16	1.12
7806	S7	0.09	0.66
7807	S8	0.03	0.24
7808	S9	0.04	0.31
7809	S10	0.21	1.52
7810	S11	0.04	0.32
7811	S12	0.07	0.50
7812	S13	0.08	0.55
7813	S14	0.11	0.77
7814	S15	0.03	0.21
7815	S16	0.03	0.19
7816	S17	0.01	0.08
7817	S18	0.02	0.17

Note: 14 % cement content was assumed for the calculations.

Iren S. Jasko MSc EurChem CSci CChem FRSC
Technical Manager

Quartz Scientific Computing Ltd.
Company No. 2126524 VAT Reg. No. 460 8231 61

Quartz Scientific

7G Dukes Yard, Shakespeare Industrial Estate, Watford WD24 5AL
Tel: 01923 213983 Fax: 01923 247732
e-mail: mail@quartz-scientific.co.uk www.quartz-scientific.co.uk

Martech Technical Services Ltd
21 Church Street
Sawtry
Huntingdon PE28 5SZ

22 July 2014
MA/11130b/isj

CERTIFICATE of ANALYSIS

Treves House

Chloride content of concrete samples

Date received	:	15 July 2014
Mass received	:	13 to 55 g
Type of sample	:	concrete dust
Date of analysis	:	18 July 2014
Method of testing	:	B.S.1881:Part 124:1988.

Sample ref.:	Client's ref.:	Chloride content as % chloride ion by mass of sample	cement
7818	S1	0.01	0.05
7819	S2	0.01	0.04
7820	S3	0.06	0.39
7821	S4	0.01	0.11
7822	S5	0.03	0.23
7823	S6	0.02	0.13
7824	S7	0.09	0.63
7825	S8	0.04	0.27

Note: 14 % cement content was assumed for the calculations.

End of report

Iren S. Jasko MSc EurChem CSci CChem FRSC
Technical Manager

MARTECH

summary tableq

jgqrcp

rpctcq

REPORT

t e s t

www.consultrve.co.uk

to select the section you require,
please click on the relevant heading

Consult rve

Summary of Test Results for Lister House - 14093

Element	Depth of Cover (mm)			Depth of Carbonation (mm)			Chloride Content (%) *		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Fire Escape Balcony Soffit	25	38	32	5	10	8	n/a	0.97	n/a
Slab Edge	17	59	34	<5	10	6	0.19	1.15	0.51
Stairway Wall	16	31	22	<5	10	6	0.11	0.11	0.11
Soffit	12	45	29	5	15	10	0.08	1.12	0.60
Column	14	32	22	<5	50	16	0.17	1.52	0.66

*Chlorides calculated assuming a cement content of 14%.

n/a = not applicable as sinlge test result

Summary of Test Results for Treves House - 14093

Element	Depth of Cover (mm)			Depth of Carbonation (mm)			Chloride Content (%) *		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Slab Edge	2	47	24	<5	25	11	0.04	0.39	0.16
Stairway Soffit	16	43	28	25	30	28	n/a	0.13	n/a
Staireway Beam	11	24	18	n/a	>30	n/a	n/a	0.63	n/a
Stairway Landing Edge	11	34	21	<5	15	9	n/a	0.27	n/a

*Chlorides calculated assuming a cement content of 14%.
n/a = not applicable as single test result

MARTECH

test REPORT

www.consultrve.co.uk

background

concrete

testing

concrete repair

to select the section you require,
please click on the relevant heading

Consult rve

BACKGROUND

CONCRETE

Concrete is a highly alkaline substance and it is this alkalinity that protects the reinforcement from corrosion, despite the almost inevitable simultaneous presence of oxygen and moisture - the fuel of corrosion. The air around us is however relatively acidic, mainly by virtue of the carbon dioxide content, and tends to neutralise any concrete it comes into contact with gradually from the surface inwards. A chemical reaction takes place in which alkaline hydroxide compounds are converted into carbonate compounds - hence carbonation.

Were the carbonation front to reach the reinforcement, the protective passive layer around the bars maintained by alkalinity would be lost and active corrosion would ensue. This occurs in the form of microcell corrosion, or generalised surface corrosion, which leads to latent (or incipient) damage, and later to the classic symptoms of reinforcement corrosion - cracking and spalling of the cover concrete. For this reason the steel should have adequate cover (say 40 mm+) when built.

The presence of free chlorides in significant quantities can lead to localised breakdown of the passive layer on reinforcement, often in otherwise sound alkaline concrete, which results in intensive localised pitting corrosion of the steel. This is often termed macrocell corrosion, and can occur irrespective of cover. This form of reinforcement corrosion has associated with it a considerable excess of cathode over anode area, and corrosion rates can be relatively high. Care is needed in the rare situations where the oxygen supply to the steel is limited, as a non-expansive form of corrosion (black rust) can occur, which could ultimately lead to dissolution of the steel in the absence of the usual surface manifestations.

TESTING

Visual Observations

Pertinent observations on the structure are generally recorded on a brief overall visual assessment, mainly on a walk around survey of accessible areas, supplemented by areas accessed during the course of the detailed testing.

Covermeter Survey

A representative portion of each detailed test area is generally subject to a covermeter survey, which measures the concrete cover, in millimetres, over the reinforcing steel. Measurements were carried out in general accordance with BS1881: Part 204.

The instrument used by us is a Protovale CM5, Protovale CM52, Protovale CM9, or Kolectric Micro Electronic Covermeter. In order to obtain precise results exact bar sizes need to be known or assessed, otherwise small errors in cover readings can result. This effect is however, much more marked with shallow depths of cover concrete, where there can be evidence of correct bar sizes. Multiple, parallel or intersecting bars, give incorrect readings unless identified and avoided, or adjusted for.

Carbonation Testing

The depth of carbonation of the concrete is generally assessed and measured in situ in all detailed test areas. This is carried out in general accordance with BRE recommendations, from information paper IP 6/81. We always carry out the test on freshly broken concrete surfaces, as it is our opinion that this gives the most accurate results. The broken surface is blown clean and sprayed with phenolphthalein indicator solution. The solution gives a vivid pink coloration on sound alkaline concrete, with no colour change on carbonated surfaces, which merely look wet.

The mean depth of carbonation is measured, within 30 seconds of spraying, as the distance from the concrete surface to the boundary of the uncoloured zone.

It is important to record any slow development of colour, or creep back of coloration towards the surface of the concrete, as either condition can be indicative of partially carbonated concrete.

Concrete Dust Sampling

Concrete dust samples are generally collected in the detailed test areas for laboratory analysis in respect of chloride content, plus in some instances sulfate and cement content. The samples are drilled using a heavy duty rotary-percussive drill and 20 mm bit from at least two holes per location, with the first 5 mm of sample from each hole discarded as being non representative. Sampling is carried out in general accordance with BRE recommendations, from information paper IP 21/86.

If the location of the structure is such that any chloride present in the concrete is likely to have been cast-in at the time of construction, the samples are obtained in single increments of 5-50mm.

Conversely the location and nature of the structure could be such that chloride is likely to have ingressed the concrete, from an external source, and subsequent to construction. In this instance the samples are collected in 3no. separate depth increments of 5-25, 25-50 and 50-75mm, and suffixed A, B, and C respectively.

The nature of a car park structure is such that chloride is likely to have ingressed the deck concrete surfaces, from vehicular traffic bringing in de-icing salts. The samples on these elements are therefore collected in 3no. separate depth increments of 5-25, 25-50 and 50-75mm, and again suffixed A, B, and C respectively. The other concrete elements on car park structures are generally such that any chloride present in the concrete is likely to have been cast-in at the time of construction. The samples in these areas are therefore obtained in single increments of 5-50mm.

Dust samples for chloride, sulfate, and cement content analyses are generally collected in plastic sample bags, labelled appropriately, and submitted to a UKAS accredited laboratory for analysis, in accordance with BS1881: Part 124.

Concrete Core Sampling

Concrete core samples, when required, are generally collected in a number of test areas, for submission to the laboratory for further analyses.

A UKAS accredited laboratory can be requested to analyse the cores in respect of a description and photograph, prior to compressive strength testing in accordance with BS1881: Part 120.

In addition a specialist laboratory can be requested to analyse the cores via petrographic techniques. This involves the vacuum impregnation of core slices with fluorescent resin, which are then further prepared. Generally polished slices are prepared for observation under a relatively low powered microscope. They also prepare thin section microscopy slides, in which a small but representative sub-sample of the concrete, often including the surface, is glued onto a glass slide. The concrete is then ground down until translucent and examined under a high-powered specialist petrological microscope.

This process enables exact detail of aggregate types, cement types, original mix, and so forth to be determined, but also details of all chemical changes, cracking and deterioration to be recorded. Photomicrographs at various magnifications are normally provided.

Corrosion Potential Measurements

Each detailed test area of 2 or $4m^2$ or so, or a whole element such as a car park deck, can be subject to corrosion potential measurements, also referred to as half-cell testing. Essentially this technique measures the electrical potential of the reinforcement in the concrete, in millivolts (mV), via a surface applied instrument coupled to a high impedance multimeter.

The measurements are generally carried out on every node of a 0.5m or 1.0m orthogonal grid, generally employing a Copper/Copper Sulfate half-cell.

Corrosion of the reinforcement is an electrical phenomenon, with a build up of electrical potential in corroding or anodic areas, and a negative charge by convention on the affected portion of steel.

The presence of chlorides, where associated with loss of passivation, results in the development of very active corrosion cells, often with intense localised pitting of the reinforcement.

Our corrosion potential measurements are carried out in general accordance with ASTM C-876, Standard Test Method for Half-Cell Potentials of Uncoated Reinforcing Steel in Concrete. We do however recognise that the method only gives corrosion potentials, i.e. the probability of corrosion occurring, as opposed to rates; and it must be understood that the method is empirical, or qualitative.

We additionally recognise that the given parametric criteria really only apply to an external chloride contaminated concrete. Any other application will require fresh criteria to be established by visual correlation.

Exploratory Breaking Out

In selected detailed test areas exploratory breakouts are generally made in order to gain further knowledge of reinforcement condition, and other detail.

This also allows correlation of other test data, and in particular physical checks on reinforcement size, plus of course correct measured concrete cover. Surface corrosion condition of the reinforcement is always recorded.

CONCRETE REPAIR

The concrete remediation and corrosion control process must generally ensure that the concrete becomes stable and the reinforcement passive. Clearly the original condition of the now deteriorated concrete was such that failures have occurred well within the designers projected life for the structure.

Successful concrete repair involves the treatment and control of all corrosion on the reinforcement, i.e. all the latent (or hidden), as well as the visible deterioration identified. It is not unusual for the latent damage element to be considerably more extensive than the visible damage.

Having identified the exact nature and the true extent of the corrosion problem, a method of concrete remediation and corrosion control must be arrived at by reference to BS DD ENV 1504:Part 9:1997, the European standard for concrete repair. This is done in accordance with the clients wishes and expectations as regards issues such as: life expectancy of the repair, life expectancy of the structure, intended use, as well as issues regarding cost and funding, in conjunction with the frequency and number of repair cycles desired. There is nowadays no reason why a durable repair should not be achieved straight away in the majority of cases.

The European Standard lists eleven repair principals, of which five are specifically related to reinforcement corrosion, as opposed to defects in concrete, and these five are as follows:

Principal 7 [RP] *Preserving or Restoring Passivity*

This involves creating conditions in which the surface of the reinforcement is maintained or is returned to a passive condition. This can be achieved via additional cover, replacing contaminated or carbonated concrete, or electrochemical remediation of concrete.

Principal 8 [IR] *Increasing Resistivity*

This involves increasing the electrical resistivity of the concrete, for instance by limiting moisture content via surface treatments, coatings or sheltering.

Principal 9 [CC] *Cathodic Control*

This involves creating conditions in which cathodic areas of reinforcement cannot drive an anodic reaction. It may be achieved by limiting oxygen content by saturation or surface coating.

Principal 10 [CP] *Cathodic Protection*

This involves corrosion control via the establishment of an external anode, and may be via an applied current (ICCP) or by galvanic means (GCP). The method is dealt with by BS EN 12696:2000, Cathodic Protection of Steel in Concrete.

Principal 11 [CA] *Control of Anodic Areas*

This involves creating conditions in which anodic areas of reinforcement are not able to take part in the corrosion reaction. It may be achieved by coating the reinforcement or applying corrosion inhibitors to the concrete.

General Note

The above is not reproduced verbatim from the standard, it is our précis. It is noted in the standard that the inclusion of methods does not imply their approval, and that the methods may make use of products or systems not covered by the EN 1504 series.

The principals are listed in full for completeness, some are rarely, if ever, used by UK concrete repair contractors.

The full range of successful concrete repair and remediation techniques that may be employed in corrosion control, are best viewed as a toolbox, and one must seek to select and apply techniques appropriate to the various parts of the structure, having given consideration to specific client requirements and expectations.

It is usual in concrete repair for a coating to be applied to the carefully repaired and prepared surface, being free of blowholes and other surface defects, which resists further carbonation, and the ingress of aggressive agents. It is often preferable for this product to be elastomeric and durable.

In our opinion the preferred route forward, in procuring the necessary repair services, is in the formation of partnerships and term contracts with a suitable contractor. It is important to seek a satisfactory outcome for all parties, in which the client's needs and wishes are fully encompassed. Negotiation and Construction Partnering, as advocated in the Egan Report, should really take a preference over the traditional method of competitive tendering, which in the final analysis can only serve to reduce every aspect of a job to its lowest common denominator.

MARTECH

glossary

REPORT

test

www.consultrve.co.uk

glossary

bibliography

to select the section you require,
please click on the relevant heading

Consultrve

GLOSSARY

COMMON TERMS

HEALTH CHECK

It is important to treat concrete to an occasional health check or MOT like one would a vehicle. Whilst properly designed and built concrete might be considered to be maintenance free, it is in practice an extremely rare commodity.

Just like other components of a structure the concrete should be periodically examined by an expert and if necessary subjected to a program of testing.

This would often include at least a detailed visual examination, aswell as tests for **cover depth**, **carbonation**, **chlorides**, and could possibly also include tests for **HAC**, **sulfates**, **ASR** and any other tests deemed necessary.

COVER DEPTH

This is a term applied to the depth or thickness of concrete over the layers of reinforcing steel that are closest to the exposed surface. It is important that this parameter is appropriate to the concrete quality and the degree of exposure of the concrete, in order in particular to prevent **carbonation** from reaching the steel.

In UK construction it is historically not uncommon for inappropriate cover to result from poor standards of design and/or build. Shallow covers lead to early deterioration.

PASSIVATION

This is a term that is applied to the protection of reinforcing steel in concrete by the high alkalinity of concrete as cast. This alkaline environment supports a film of passive oxides on the steel, which, despite the almost inevitable simultaneous presence of oxygen and moisture prevents reinforcement corrosion.

CARBONATION

Concrete as cast is highly alkaline which affords the reinforcing steel corrosion protection. The atmosphere around us, mainly by virtue of the carbon dioxide content, is slightly acidic which tends to neutralize the concrete from the surface inwards. This is the natural weathering process of concrete and is termed *carbonation*.

The carbonation process in no way harms concrete, in fact in many ways it enhances the physical properties, but it does reduce the high alkalinity that results in a loss of **passivation,** should the process reach the steel.

This in effect means that active corrosion of the steel will ensue with the all too familiar signs of corrosion in the form of cracking, spalling, and physical distress to the concrete cover.

The process of carbonation progresses into concrete as a somewhat irregular front, as concrete is not truly homogenous, in approximate reverse exponential advance in relation to time, at a true rate dependant upon concrete quality.

CHLORIDES

Chlorides in concrete are present either because they were *cast in* at the time of construction or because they have *ingressed* the concrete after construction.

Cast in chlorides tend to be present in the UK historically in precast concrete construction where they are derived from the use of calcium chloride based accelerating admixtures commonly used in the 1960's. They could also of course be present due to contaminated ingredients, such as for instance marine dredged aggregates. This form of chloride contamination tends to combine with the hydration products of cement, and hence tends to exist in a substantially chemically bound condition.

Ingressed chlorides can be present from a variety of sources such as deicing salts on trafficked surfaces, spray and leakage of deicing salts, marine environments, salt laden air in coastal areas, aswell as influences such as industrial processes. This form of chloride contamination tends to be present in a free ion form. The amount of chloride present in concrete from external contamination is ever increasing with time, as is the depth of penetration.

It should be noted that it is the *free* chloride ion content of concrete that dictates the vulnerability to chloride attack. The mechanism of attack is the localized break down of the **passivation** of the steel, which leads to often intensive pitting corrosion. It is not possible to easily specify a limiting chloride content below which corrosion will not be initiated, as there are so many other factors to take into consideration.

CARBONATION AND CHLORIDES

The process of **carbonation** in a concrete containing **chlorides** is potentially much more serious. This occurs because the carbonation process effectively releases the chemically bound chloride leaving it free to attack the reinforcing steel. It can be seen that the carbonation can thus be a trigger for chloride attack. This form of chloride attack frequently occurs just ahead of the carbonation front.

SULFATES

The presence of sulfates in above ground concrete construction in the UK is most frequently due to external contamination such as industrial sources. In sufficient quantity sulfates break down the binding qualities of cement by chemical attack, which will ultimately result in a dangerous loss of strength.

HIGH ALUMINA CEMENT

This HAC form of cement differs from ordinary portland cement (OPC) in that it has a higher alumina content. This results in cement that sets much more quickly, a property that was historically exploited in the manufacture of precast concrete construction in the UK.

It has more recently come to light that under certain conditions of temperature and moisture this type of cement undergoes certain chemical changes, often termed *conversion*, which results in a drastic and often unacceptable loss of strength. Some degree of, if not total conversion, tends to be the norm in UK HAC.

ALKALI SILICA REACTION

This is a form of alkali aggregate reaction, which was seized upon by the non-specialist press in the UK when it first came to prominence, and commonly termed concrete cancer by them. It is ironically only really found in limited geographical areas, most frequently in parts of the southwest and midlands.

The reaction requires a particular combination of cement and aggregate properties to coexist to trigger it, and consists essentially of a chemical attack on the aggregate leading to the formation of an expansive gel, which in sufficient quantity can disrupt the concrete matrix. The reaction is very much moisture dependant and frequently has a finite life.

Ironically there have been less than a handful of notorious cases in the UK, which have required demolition. The reaction is by no means common and can frequently be controlled by elimination of moisture. It is sometimes found microscopically that a degree of the reaction is present in a minor way, which may need some preventative measure.

It is however fairly common in UK aggregates to find types present in concrete under petrographic examination which are said to be classified as potentially reactive with alkali. This is not normally a cause for concern unless the reaction itself is observed to any significant degree.

MECHANICAL DAMAGE

Mechanical or physical damage to concrete is commonly seen due to vehicular or industrial plant impact. It could however include abrasion. On some precast concrete one can find physical damage, particularly on corners, as a result of erection damage.

This kind of damage requires to be treated like a proper concrete repair, particularly where the reinforcement has become exposed. It is also important to ensure that any repair includes protection from renewed damage.

FROST DAMAGE

This kind of damage is seen frequently on very exposed and often saturated components of concrete construction. It manifests itself in the form of lots of pop outs on a generally friable surface, often also including lineations of calcareous deposits. It is important to deal with these situations and install preventative measures.

LEAKAGE

Signs of leakage through concrete often manifest themselves in the form of calcareous deposits and stalactites, frequently on cracks in soffits. In the long term, particularly if salts are present, this can lead to significant durability problems. The continuous saturation and passage of water through concrete can lead to undesirable chemical changes. It is therefore important to deal with these situations and install remedial measures.

FIRE DAMAGE

The effects of fire upon a concrete surface will vary greatly dependant upon the proximity of the fire, the heat, and the physical qualities of the concrete. On the one hand the effects can be limited to severe soot contamination but on the other hand to extensive and deep physical damage.

The main effect of exposure of concrete to fire is the differential expansion of the constituent parts leading to physical distress. This can range from surface pop outs over aggregate particles, to a friable surface, to spalling, and ultimately possibly even to the permanent deformation of any exposed reinforcing steel. It is common for the surface layer of exposed concrete to exhibit a discoloration to pink, but this is dependent upon temperature reached.

Most frequent repair is in the form of removal of all loose, friable, and discolored concrete followed by reinstatement in an appropriate manner.

BIBLIOGRAPHY

1.	BS DD ENV 1504:Part 9:1997	Products and systems for the protection and repair of concrete structures- Definitions, requirements, quality control and evaluation of conformity. Part 9- General principals for the use of products and systems.
2.	BS EN 12696:2000	Cathodic Protection of Steel in Concrete.
3.	BS1881: Part 120	Testing concrete- Method for determination of the compressive strength of concrete cores.
4.	BS1881: Part 124	Testing concrete- Methods for analysis of hardened concrete.
5.	BS1881: Part 204	Testing concrete- Recommendations on the use of electromagnetic covermeters.
6.	ASTM C-876	Standard Test Method for Half-Cell Potentials of Uncoated Reinforcing Steel in Concrete.
7.	Concrete Society Technical Report No.32	Analysis of Hardened Concrete.
8.	BRE Digest 444, in 3 parts	Corrosion of Steel in Concrete.
9.	BRE IP 6/81	Carbonation of Concrete made with dense Natural Aggregates.
10.	BRE IP 21/86	Determination of the Chloride and Cement contents of Hardened Concrete.
11.	BRE Report BR 254	Repair and Maintenance of Reinforced Concrete.

MARTECH

company details

REPORT

test

www.consultrve.co.uk

to select the section you require,
please click on the relevant heading

Consultrve

COMPANY DETAILS

Martech Technical Services Ltd

21 Church Street
Sawtry
Huntingdon
Cambridgeshire, PE28 5SZ

Telephone: 01487 832288
Fax: 01487 832739

E-mail: technical@martech.uk.com
Web-site: www.martech.uk.com

MARTECH

contact us

REPORT

t e s t

www.consultrve.co.uk

to select the section you require,
please click on the relevant heading

Consult rve

CONTACT US

ADDRESS

Martech Technical Services Ltd
21 Church Street
Sawtry
Huntingdon
Cambridgeshire
PE28 5SZ

Telephone:	01487 832288
Fax:	01487 832739
E-mail:	technical@martech.uk.com
Web-site:	www.martech.uk.com

CONTACTS

Roel van Es – Managing Director roel@martech.uk.com	07798 768899
Jerry Nichols – Operations Director jerry@martech.uk.com	07798 768907
Andy Tuson – Senior Site Engineer andy@martech.uk.com	07771 845617
Mark Heales – Senior Site Engineer mark@martech.uk.com	07774 754436
Amanda Redhead – PA to Director mandy@martech.uk.com	01487 832288

or technical@martech.uk.com

MARTECH

web links

REPORT

test

www.consultrve.co.uk

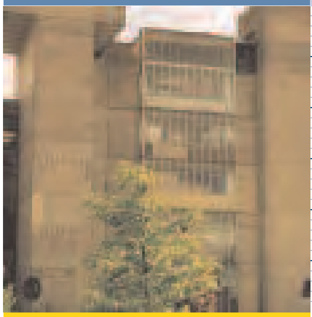
to select the section you require,
please click on the relevant heading

Consultrve

WEB LINKS

www.martech.uk.com

Please feel free to visit the company web site address above for up to date company information on Martech Technical Services Ltd.



MARTECH

Martech Technical Services Ltd
Church Street, Sawtry, Huntingdon
Cambridgeshire PE28 5SZ

Tel: **01487 832288**
Fax: **01487 832739**
Email: **technical@consultrve.co.uk**
www.**consultrve.co.uk**

Consult rve

APPENDIX C

M&E ENGINEER’S REPORT

PinnacleESP consulting engineers

Designing Our Future Together

Lister and Treves House

Mechanical and Electrical Services Condition Report

4th May 2016

CONTROLLED DOCUMENT

Pinnacle ESP No		**P3427**
Status:	For information	
	Name	**Date**
Prepared by:	Arthur Chong	May 2016
Checked:	Ed James	May 2016
Approved:	Dan Margetson	May 2016

Revision Record					
Rev	*Date*	*By*	*Summary of Changes*	*Checked*	*Approved*

INDEX

1.0 INTRODUCTION

PinnacleESP have been commissioned by John Rowan and Partners to obtain technical and strategic information on the existing mechanical and electrical services at Lister and Treves Houses, Vallance Road, London E1 5BG.

This report describes the visual condition of the existing mechanical and electrical services plant, equipment and systems and highlights the extent of remedial works envisaged to maintain the building and meet current legislation over the next 10 years. The survey report highlights any non-compliance issues and provides recommendations for remedial works with estimated costs. This report does not include potential operating and running costs within the cost matrix described. These costs would have to be considered separately.

The condition of each element was assessed and prioritised according to the seriousness of the condition revealed and the urgency associated with any breaches of legislation using the following classification system.

Condition Grading	
Grade A	Good. Performing as intended and operating efficiently.
Grade B	Satisfactory. Performing as intended but exhibiting minor deterioration
Grade C	Poor. Exhibiting major defects and/or not operating as intended.
Grade D	Bad. Life expired and/or serious risk of imminent failure.
Priority Grading	
Priority 1	Urgent work that will prevent immediate closure of premises and/or address an immediate high risk to the health and safety of occupants and/or remedy a serious breach of legislation.
Priority 2	Essential work required within one year that will prevent serious deterioration of the fabric or services and/or address a medium risk to the health and safety of occupants and/or remedy a serious breach of legislation.
Priority 3	Desirable work required within two to five years that will prevent deterioration of the fabric or services and/or address a low risk to the health and safety of occupants and/or remedy a minor breach of legislation.
Priority 4	Long-term work is required outside of the five year planning period that will prevent deterioration of the fabric or services.

For the purpose of clarity, it should be appreciated that although an element may be in need of urgent/immediate repair, it can still be in an overall sound condition. In such circumstances the elemental rating would be D1. Once the repair has been addressed however, the rating would revert to a more realistic A4.

Building Description

Lister House is a nine storey residential building consisting of 2 ground floor flats and 32 No. Maisonettes from 1st to 9th floor.

Maisonettes number 19 and 20 have being modified into one large maisonette.

Treves House is a four storey residential building consisting of 18 maisonettes.

The site address is:

Lister And Treves Houses,

Vallance Road,

London

E1 5BG

2.0 EXECUTIVE SUMMARY

LISTER HOUSE

Mechanical services identified within Lister House comprise centralised ventilation and cold water booster and storage equipment, cold water distribution pipework to flats, localised boilers and cylinders, heating distribution and hot and cold water services, gas meters and distribution, dry riser and foul public health services.

Gas pipework within the basement plantroom has been identified as badly corroded and would be recommended for immediate replacement.

The cold water storage tanks are incompliant with the Approved Code of Practice for water hygiene and legionella and are recommended for immediate replacement.

Extract ventilation systems and the plant room sump pump are nearing the end of their useful life expectancy and would be proposed for replacement within 2 to 5 years.

All other systems are in a satisfactory condition and if regularly services and maintained, would not be expected to require replacement or major remedial works within the next 5 years.

Electrical services identified within Lister House comprise mains, sub-mains, small power, lighting, fire alarm and access control systems.

All systems are within satisfactory condition and are not expected to require replacement or major refurbishment work within the next 5 years if regularly services and maintained.

TREVES HOUSE

Mechanical services identified within Lister House comprise cold water storage equipment, cold water distribution pipework to flats, localised boilers, heating distribution and hot and cold water services, gas meters and distribution and foul public health services.

All systems are in a satisfactory condition and if regularly serviced and maintained, would not be expected to require replacement or major remedial works within the next 5 years.

Electrical services identified within Treves House comprise mains, sub-mains, small power, lighting and fire alarm systems.

All systems are within satisfactory condition and are not expected to require replacement or major refurbishment work within the next 5 years if regularly services and maintained.

3.0 MECHANICAL SERVICES

3.1 LISTER HOUSE

3.1.1 Ventilation System

There are two extract fans located in the roof plant room serving internal bathrooms and toilets. The extract fans and duct work are in the region of 30 years of age, and while the systems appear to have been serviced and in a good condition for their age, they are breaching their useful life expectancy and as such would be recommended for replacement within 2 – 5 years. (Refer to photos L1 and L2).

Condition rating C3

3.1.2 Domestic Hot and Cold Water

There is a GRP central cold water break tank and booster pump set located in the basement plantroom. The system is in the region of 10 years of age and is in a satisfactory and serviceable condition. The CIBSE life expectancy is 20 years (Refer to photos L4 and L5).

Condition rating B4

There are two large galvanised cold water storage tanks of approximately 8m^3 in capacity, each located within the roof plantroom (refer to photo L6). The units are expected to be in the region of 30 years of age and are in a poor condition. The tanks are non-compliant with Approved code of Practice (ACoP) water hygiene and legionella L8 2001. They are uninsulated, fitted with insufficient access hatches and do not have adequate warning and overflow pipes fitted.

We would consider the current poor state of repairs to the galvanised water tank as a D1 condition rating. The inadequacies in the system could promote water temperature rise, which could encourage legionella bacteria and may cause a health risk to residence.

The cold water down service pipework to maisonettes is in galvanised steel pipework and is approximately 30 years of age (Refer to photo L7). Steel pipework is given an indicative CIBSE economic life expectancy of 35 years and as such would be recommended for replacement in between 5 and 10 years from now. The pipework currently shows no sign of rust or poor water quality.

Condition rating B4

Water pipework within the maisonettes are run in a mixture of copper and galvonised steel and are approximately 8 years of age. (Refer to photo L14). The water pipework is in a visually good condition.

Condition rating B4

3.1.3 Gas System

The steel gas main pipework enters the building in the basement and rises in builders work ducts to maisonette kitchens. The gas pipework in the ducts is generally in satisfactory condition but gas pipework within the basement plantroom floor duct is badly corroded externally and puddles of water have formed within the duct. This section of the pipework requires replacing and re-routing to high level (refer to photo L9). The pipework is approximately 10 years of age.

We would consider the current poor state of repairs to the steel gas pipework in the basement as D1 Condition rating, if a failure was to occur it could result in the residence being without heating and cooking facilities and in some instances they may also be without hot water.

The sump pump within the basement plant room appears to be working but the pit and floor duct is ingresses with water. The pump filter requires cleaning and appears to be serviceable (refer to photo L10). The sump pump is about 10 years of age and will require replacing within the next 5 years.

Condition rating C3

Central heating within maisonettes is via either Glow-Worm flexicom 18 SX boilers with a 1500x300 King Span indirect hot water cylinder complete with electric immersion heater or a MAIN combi Eco 24 HE combination boiler; serving steel panel radiators via two pipe copper pipework distribution systems. These are generally in good condition and have been installed within the last 8 years (Refer to photos L12 and L13). The CIBSE life expectancy is15 years

Condition rating B4

Steel gas main pipe within the maisonette is approximately 10 years of age and appears to be in satisfactory condition.

Condition rating B4

Gas meters within the maisonettes are approximately 10 years of age and are generally in good condition (Refer to photo L15).

Condition rating B4

3.1.4 Above Ground Drainage

Above ground drainage pipes are cast iron and appear to be original to the building and of approximately 30 years age (Refer to photo L8). These are in satisfactory and serviceable conditions but nearing the CIBSE end of it economic life expectancy of 40 years. Replacement within the next 10 years would be recommended.

Condition rating B4

3.1.5 Dry Riser

The Dry Riser main pipework, inlet breach and outlet valves all appear to be in satisfactory condition. The services are approximately 30 years of age but nearing the CIBSE end of it economic life expectancy of 35 years (Refer to photo L11). Replacement within the next 5-10 years would be advisable.

Condition rating B4

3.2 TREVES HOUSE

3.2.1 Ventilation System

There were no ventilation systems identified during the survey.

3.2.2 Domestic Hot and Cold Water

There are two GRP section central cold water storage tanks located in the roof plantroom on top of the staircase. These are in good condition and of recent installation (approx. 5 years of age) (Refer to photo T1)

Condition rating A4

Water pipework within the maisonettes are generally run in copper and are in good condition. The service is expected to be in the region of 10 years of age. (Refer to photo T5). Copper pipework CIBSE life expectancy is 45 years.

Condition rating B4

Cold water down service pipework to maisonettes is galvanised steel pipework and is approximately 30 years of age but shows no sign of rust or poor water quality (Refer to photo T2). Steel pipework is given an indicative CIBSE economic life expectancy of 35 years and as such would be recommended for replacement in between 5 and 10 years from now.

Condition rating B4

3.2.3 Gas System

Central heating is via a MAIN Combi Eco combination boiler serving steel panel radiators via two pipe copper pipework distribution system. These are generally in good condition and been installed within the last 8 years (Refer to photo T4). The CIBSE useful life expectancy for boilers is 15 years.

Condition rating B4

Gas meters are installed underneath sinks within maisonettes and are generally in good condition (Refer to photo T6). They are approximately 10 years of age.

Condition rating A4

3.2.4 Above Ground Drainage

Above ground drainage pipe is of cast iron and appears to be original to the building, approximately 30 years of age. The system is in a satisfactory condition (Refer to photo T3), but nearing the CIBSE end of it economic life expectancy of 40 years. Replacement within the next 10 years is recommended.

Condition rating B4

3.2.5 Dry Riser

There was no dry riser identified during the survey.

4.0 ELECTRICAL SERVICES

4.1 LISTER HOUSE

4.1.1 Mains and Sub-mains

The incoming electrical service is located in the basement switch room which appears to have been refurbished in 2008 with new landlord distribution board and sub-main cabling to tenant's consumer units. (Refer to Photos LE1 & 2)

Condition rating A4

Tenant's consumer units have also been replaced approximately at the same time as the incoming service. The old distribution board and containment has been left in situ. New Ryfield fuse boards have been installed within the staircase landing area and new containment installed to tenants consumer units in each maisonette. (Refer to Photo LE 3 & 4)

Condition rating A4

Each maisonette is served via a 60/80 amp series 7 type II HRC fuse from the Ryefield fuse board. (Refer to Photo LE 5)

Condition rating A4

4.1.2 Small power

Within each maisonette there is a Wylex consumer with miniature circuit breakers (MCBs). These have been installed at about the same time as all the landlord electrical work in 2008 approximately. (Refer to Photo LE8)

Condition rating A4

Wiring within the maisonette had been updated in 2008 and in satisfactory and serviceable condition. (Refer to Photo LE9)

Condition rating B4

Socket outlets were installed in approximately 2008 and are generally in satisfactory and serviceable condition.

Condition rating B4

4.1.3 Lighting

Lighting within the maisonette is generally of low energy high efficient pendants and 2D head fittings. These are general in satisfactory and serviceable condition. (Refer to Photo LE11)
Condition rating B4

External light fittings to the building appears to be recent replacements and in good condition.
Condition rating B4

4.1.4 Fire Alarm System

The smoke detection generally consists of local mains operated smoke detectors with battery backup. Smoke detectors are generally located within hallways and landing of each property. The system appears to be in satisfactory and serviceable condition. (Refer to Photo LE 11).
Condition rating B4

4.1.5 Access Control

The access control system comprises of voice only door entry control panel at the main entrance door and handsets within each of the properties. The system is working as designed, and in a satisfactory and serviceable condition.
Condition rating B4

4.2 TREVES HOUSE

4.2.1 Mains and Sub-mains

Each maisonette is served directly from the street. The landlords supply and equipment is located in the stair core and is in good and serviceable condition.

Condition rating B4

4.2.2 Small power

Within each maisonette there is a Wylex consumer with miniature circuit breakers (MCBs). These have been installed at about the same time as all the landlord electrical work in 2008 approximately. (Refer to Photo TE2)

Condition rating A4

Wiring within the maisonette had been updated in 2008 and in satisfactory and serviceable condition.

Condition rating B4

Socket outlets were installed in approximately 2008 and are generally in satisfactory and serviceable condition.

Condition rating B4

4.2.3 Lighting

External and roof plantroom light fittings to the building appears to be recent replacements and in good condition. Refer to Photo TE 1

Condition B3

Lighting within the maisonette is generally of low energy high efficient pendants and 2D head fittings. These are general in satisfactory and serviceable condition. (Refer to Photo TE3)

Condition rating B4

4.2.4 Fire Alarm

The smoke detection generally consists of local mains operated smoke detectors with battery backup. Smoke detectors are generally located within hallways and landing of each property. The system appears to be in satisfactory and serviceable condition. (Refer to Photo TE 4)

Condition rating B4

4.2.5 Access Control

There was no access control identified during the survey.

5.0 RECOMMENDATION

We would recommend the following to be undertaken:

5.1 LISTER HOUSE

- Replace cold water storage tanks and basement gas pipework at earliest opportunity.

- Replace centralised ventilation system and ductwork and plant room sump pump within 2-5 years.

- All other services are not envisaged to require replacement of major refurbishment works within the next 10 years if regularly serviced and maintained.

5.2 TREVES HOUSE

- All services are not envisaged to require replacement of major refurbishment works within the next 10 years if regularly serviced and maintained.

6.0 MECHANICAL AND ELECTRICAL SERVICES COST SUMMARY INFORMATION

The cost of the total package of Mechanical and Electrical services improvements as listed in Section 5 of this report are summarised below :-

Lister House

Year 1	£45,000
Year 5	£60,000
Year 10 +	£627,000

Treves House

Year 1	0
Year 5	0
Year 10 +	£440,000

A full breakdown of the above cost is contained within the cost matrix.

APPENDIX A – PHOTO GALLERY

L1 – Extract fan motor in roof plantroom

L2 – Extract duct work in roof plant room

L3 – Internal WC extract ventilation grille

L4 – Break Tank

L5 – Booster Pumps

L6 – Galvanised cold water storage tank