CDMS Sub-Surface Engineering Ltd

SURVEY REPORT

Client: ENGIE

CANAL WALL INSPECTION GRAND UNION CANAL HAYES - LONDON BOROUGH OF HILLINGDON

UNDERWATER SURVEY

CDMS SUB SURFACE ENGINEERING LTD.

ABOVE AND BELOW WATER INSPECTION OF 109M SECTION OF CANAL WASHWALL – GRAND UNION CANAL HAYES. MIDDLESEX.

JUNE 2021

DIVERS SUMMARY/ REPORT
CANAL WASHWALL – HAYES
GRAND UNION CANAL

Structure description – 109M length of Canal, Wharf and property boundary wall adjacent to the Grand Union Canal in the London Borough of Hillingdon.

Construction Materials – Reinforced Concrete, Blue, Red & Grey bricks, stone cills and Copings.

Client: - Engie

Clients Project Engineer- Mr. Christian Baxter

Date of survey: - 7th to 11th June 2021 inclusive.

Civil Engineering Inspection Diving Team members.

S. Fila – Diving Supervisor.

N. Cockerham - Diver.

J. Whinthrop – Diver

P. Vera - Diver

R. Elliff - Tender Linesman/ workboat Cox'n

Report Content: -

1. Report Summary

2. Ariel Photographs

3. Sketches & Bed profile information.

4. Photograph overlay of Datum

5. Condition, location & drains detail & Photographic Chainage reference sheets.

6). Photographs with captions.

HAYES CANAL WASH-WALL REPORT SUMMARY

Introduction and Preamble

The site as detailed is assigned for redevelopment into residential dwellings and the Canal wash-wall survey was sanctioned as part of the preparatory site plans and required a condition survey for the Client.
A 5 Man Civil Engineering Diving Team from CDMS Sub-Surface Engineering Ltd initiated the survey to ascertain the general condition which will assist in assessing the current situation, condition and suitability for the developments final facade.

During the survey the team encountered anomalies which initially were deemed "unusual" and therefore needed further investigation. These included very heavy duty mooring rings at regular intervals along the survey area Canal side, far in excess of those used for general modern recreational canal river craft. In addition railway tracks were recessed into the approaches to the Canal Wharf frontage at ground level which suggested past regular heavy loading of cargo onto large carrying capacity Barges moored along the Wharf. The boundary walls on the first 50M of the survey area also showed cills at lower and intermediate levels which have been bricked up, suggesting window openings or loading gantry doors from a past Warehouse or storage facility which has since been demolished.

On highlighting these observations with locals still currently working at the site and also carrying out some initial Historical investigation of the past use of the site reveals that during the periods covering the First and Second World Wars the site in Hayes had a vital and active Armament factory producing Guns Tanks and ammunition. These were transported to the Canal Wharf by Train and either loaded into Barges moored along the Wharf or Stored in the adjacent Warehouse, these would be then transported by Canal Barge to the desired strategic destinations.

This information proved useful in identifying the reasons for bricked up window openings and random cills appearing at varying levels on the Canal wall side, these are clearly from the now demolished warehouse structure and still remain remnants of that period.

Initiating the survey

The survey site has very restricted access. From the landward side a continuous row of storage Sea-containers are present which are backed up closely to a very secure canal wharf galvanised steel boundary fence making it too restrictive for functional access. In addition, access from the Canal side is also difficult as the "Towpath" (the only other alternative access point) is on the opposite side of the Canal to the wall. The only access therefore is by workboat. A workboat was used for the survey however launching and recovering the boat was also extremely difficult by having to manually negotiate concrete access steps and barrier rails.

From the pre-project meeting held on site at 08.00hrs on Monday 7th June with S.Fila – Diving Supervisor CDMS SSE Ltd and the Engie project Engineer Mr. Christian Baxter the site survey limits were identified and agreed and these are incorporated in the report as directed.

Once the workboat was launched and loaded with associated equipment an initial recce was carried out followed by setting out the site. The site was "Chained out" using a surveyors staff and surveyors spray paint . This method is used to identify specific locations for reporting criteria and also for relocation purposes if an anomaly needs to be re-visited in a specific location on a future occasion.

Chainage marks were positioned at 5M intervals with the associated numerals at 0m. 5m.10m,15m etc. etc. up to the survey end limit at 109m. In addition individual spot locating marks were added in-between each 5m section at 1m intervals. (All numerals and spot markings were applied so as to be functional yet to also recognise minimal visual impact and cosmetic appearance).
Numerous photographs are included within this report and the Chainage I.D. marks assist in location identification as detailed. These are included for general appraisal and reference.

Reporting of defects and detailing observations.

In order to establish an effective method of detailing defects, anomalies and observations, Individual Chainage/condition location detail sheets have been compiled in a progressive format from 0m – Start point to 109m end point. In this way it avoids massing text together which is ultimately difficult to follow.

Discharge Drains.

An appreciable number of discharge drains are located through the canal wall and are spaced along the entire survey length area. A separate drainage table has been compiled detailing the location Chainage, diameter and general condition of the individual drains. These may possibly be useful if consideration is being made to possibly link up with the development's new site top water system if linked into the existing drains, however a large number of these appear blocked approx 1m+ down the drain therefore re-use may not be practical.

Summary of wall construction- above water sections.

The general description of the wall construction falls into two distinctive area sections, i.e. 0m to 50m – This section in brief comprises of the remnants of the now demolished Warehouse frontage who's windows and door openings have been bricked up with mostly red brick. In order to level the wall to ground level grey bricks have been added in a number of locations, these are commonly displaced, missing or out of alignment. The top 21no. courses of grey brick between Chainage 26m to 30m are bulging out of alignment and the perpendicular by 170mm and has a 20mm wide overhang lip which has been created by established vegetation pushing the wall out towards the Canal. **This section is highly likely to collapse in the near future.** (See information sheets for detail, Figs 14,15&18)

Section 2 is from 50m to 109m. This is of reinforced concrete and slopes back at the top of the wall at a 101 degree angle (see Sketch 1 & fig 42). Storage Sea Containers are in position along this section also preventing access. (see figs 49,50 &51). This section is in a generally satisfactory condition. Construction joints have displaced expansion joint material missing principally on the lower sections and some vegetation is present. (see fig 35)
It was also noted that the return boundary brick wall at chainage109m is defective with structural cracking and some displacement of masonry from its emergence of the canal edge to the brick building on the site (see figs 43 & 44). A full assessment was not possible due to restricted access created by Sea Containers and needs further evaluation.

Underwater wall condition

The condition of the underwater sections of wall along the full 109m survey limits is generally satisfactory apart from some defective mortar joints (as detailed, see figs 13,16,17 & 24) in sections 0m to 50m and some displaced expansion material in the associated construction joints (see fig 35) in the concrete wharf section 50m to 109m. Some minor erosion is present also but not serious (see fig 39). Defective joints would benefit from underwater and "Splash-zone" re-pointing to prevent further deterioration.
No cavities, voids, cracking or major defects were located underwater and the entire wall is devoid of any scour, prop-wash or undercutting.

Vegetation on the site wall survey area

There is an appreciable quantity of trees at the site, some of which are established on top of the wall, some growing out of cracks and some from the discharge drains. The species of tree was un-identified but was exceptionally resilient to efforts to remove them to gain access to specific areas. Cutting the trunks in certain key areas was found to be very difficult. The established trees are responsible for almost all of the current wall defects. Roots are opening up the joints in the masonry creating gaps of up to 90mm

It is recommended that the site is "De-vegged" as the root growth is worsening an already significant defect situation. In some cases this will mean a rebuild rather than a repair. Access however to "de-veg" the ground level sections of the site is currently not possible whilst the line of Sea Containers are present as there is no access available between the boundary fence and container line (see figs 49,50 & 51). The through wall and drain growths however can be reached by workboat and the offending trees should be removed as soon as possible to prevent further deterioration and treated with poison pellets pre-drilled into the trunk to kill roots. (See general tree location photographs see figs 10,11, 22,23,28,32,37,41,42 43).

Canal bed compostion and debris

The Canal bed along the entire length of the survey area is very soft mud with some fine gravel content and is black in colour. Probing with a standard 2m long surveyors ranging pole with reasonable pressure applied saw the pole penetration depth of 1.5m+ .
Penetration tests were carried out at 10m intervals all of which had corresponding results.
There is debris in certain locations e.g. Chainage 55m -. i.e. rocks, bricks some tree branches – see fig 34).
The development facilities are currently unknown however this information could prove useful if mooring and berthing facilities are a consideration for private boats owned by residents in the future.

Depth soundings

Depth Soundings were taken at 1m intervals along the full length of the survey line, close to the wall and also 1m out from the wall. This information is detailed on the separate Depth Soundings Sheet.

Datum

Although this is a Canal location it is generally considered that water levels do not fluctuate very significantly. However, in order to have reliance to the depth sounding information a Datum must be selected from which depth soundings can be put against at any particular point in time. Selection of a suitable datum location was difficult as access to reliable elements of structure was exceedingly restrictive. Selection therefore for a suitable location needed to be easily relocatable, therefore the invert of the 300mm Drain at C hainage 55m to water level was selected. (See Datum sheet photograph and also fig 33 for detail).

Suggestions and Conclusions

From the information gathered by the team, commonly from 0m to 50m the wall is in poor condition and largely comprises of a "miss-match" of infill bricks in numerous locations with no real level of skill or quality evident. The upper wall sections (mostly in grey brick) have become loose and appreciable structural cracking is present. **At Chainage 26 to 30m the wall is close to collapse into the Canal due to vegetation root formations pushing the wall out of the perpendicular. (See fig 14).**

The parts of the original building closer to water level ("Blue Brick" construction) is still in a satisfactory condition requiring only some re-pointing and de-vegging to restore it to a satisfactory base from which to "face-lift" the remaining upper-wall sections, however this would involve removing the offending defective areas.
It is difficult to assess what could be deemed a suitable façade on a development of this type. Clearly the current condition of the upper wall from the 0m to 50m section (as detailed) does not enhance this location in the slightest and could be termed unsightly. On one hand only outsiders will see this elevation of the site, however this elevation could possibly deter would be buyers or similarly detract others from what possibly wants to be deemed a prestigious residential location.
To improve the cosmetic appearance and establish a sound structure the wall needs re-facing or similar, which could be built up from the "Blue Brick" levels, however cost is potentially an important consideration due to the access difficulties.
The Concrete section from 50m to 109m was satisfactory at the time of survey with only minor areas of small defects and/ or erosion. There is a covering of dead moss type vegetation which has formed a crust on the face. This is easily removable (See Figs 52 & 53).
If an improvement in this section is sought high pressure jet washing would create a visual improvement at relatively low cost.

Short term suggestions would be aimed at :-

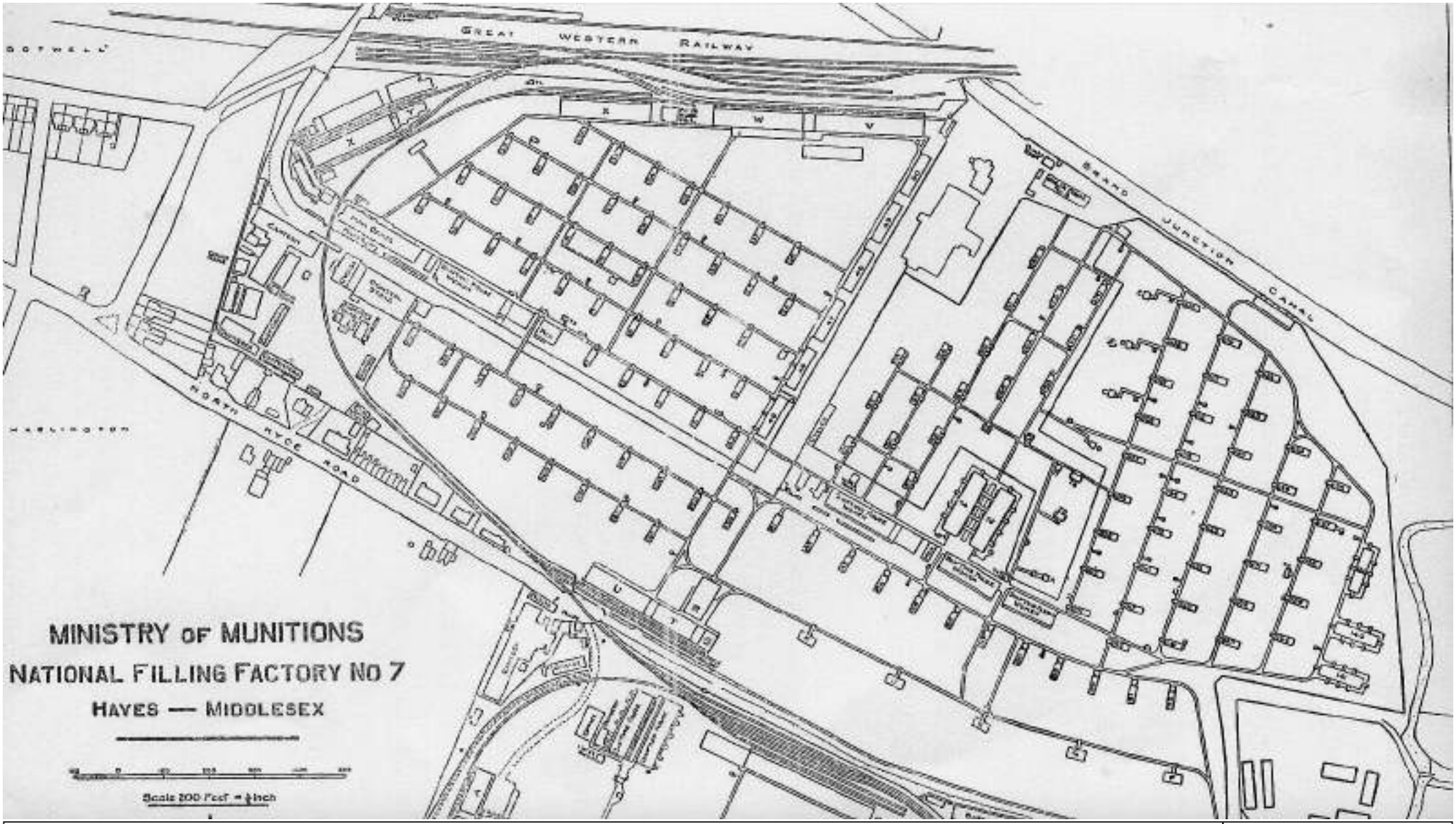
1). Securing the dangerous sections of wall from Chainage 26m to 30m as collapse into the water course is highly likely (Creating masonry and debris clear-up difficulties afterwards).

2). Remove all vegetation (where accessibly possible) and kill off the roots.

3). Repair/ pressure point defective joints where applicable below water and in the Splash zone from which all remaining defective areas will be easier to access and repair as all these then would be in the upper sections of wall.

SIGNED, for and on behalf of:
CDMS Sub- Surface Engineering Ltd.

S.R. Fila
Director of Technical Services



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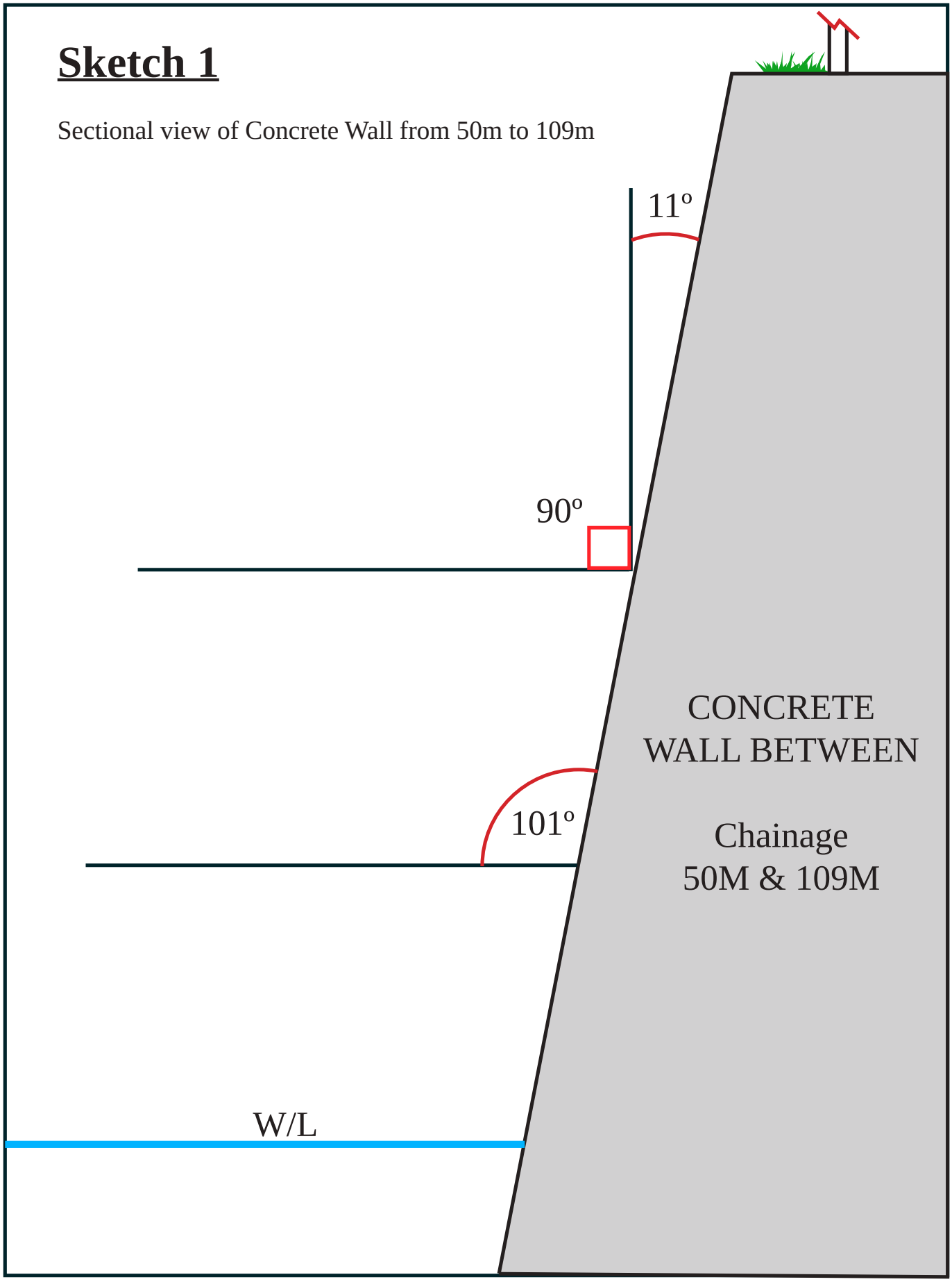
Sketch 1

Sectional view of Concrete Wall from 50m to 109m



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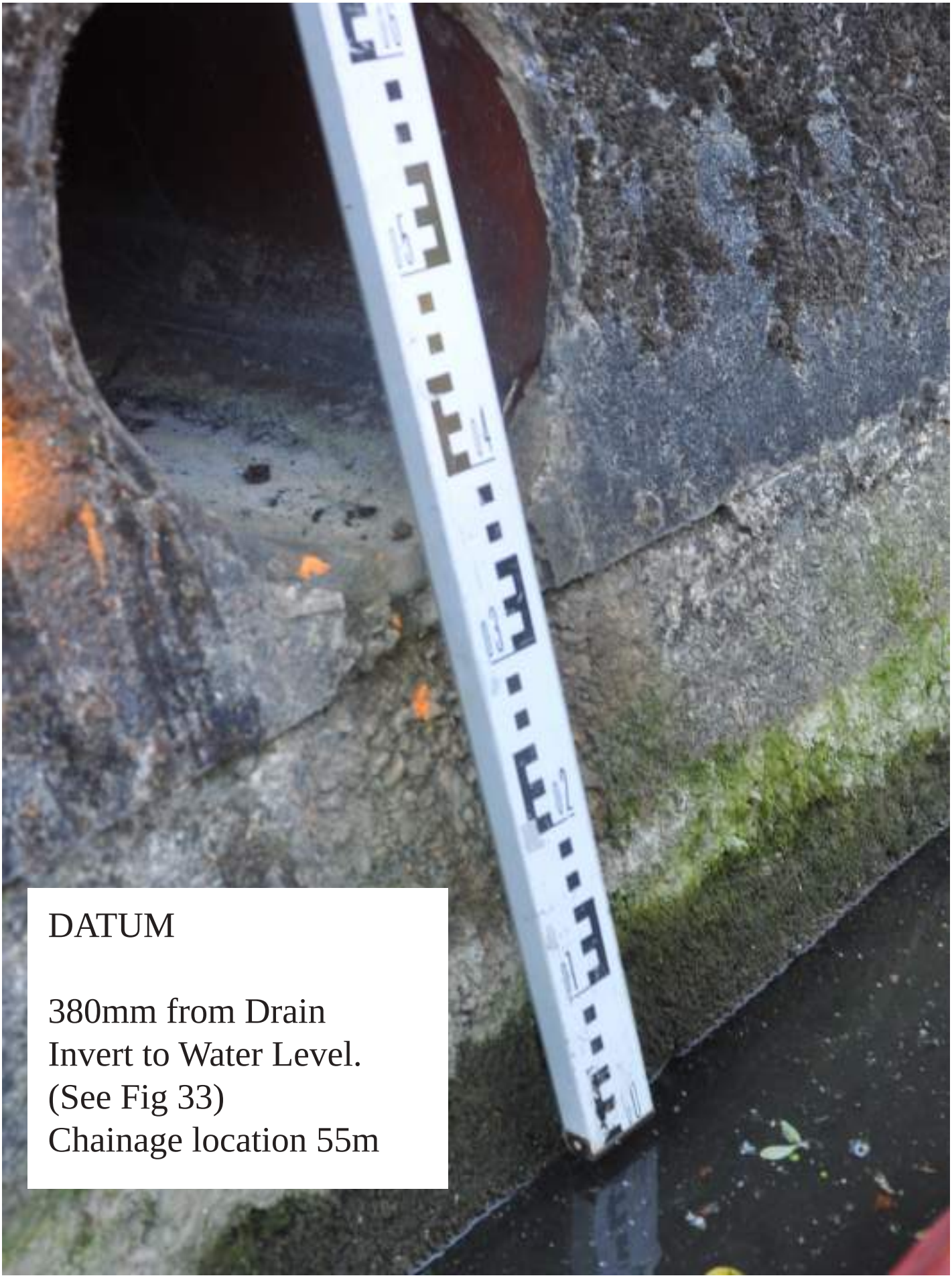

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Chainage	Condition Detail	Photography / Detail
0m	Large bush access difficult very soft mud on canal bed. 6.5 courses of blue brick from W/L up - concrete coping insitu 330mm thick from 0m back and forward to chainage 3m.	DSC_2879.JPG DSC_2880.JPG
3.5m	Mooring ring and steel member with round rivet heads (x8) purpose / function unknown (possible wall retaing column) vegetation growing from wall and steel component (Requires De-Veg). Wall loose concrete capping leaving 9 courses blue brick at W/L up to small ledge with erroded bricks - then 6 courses of grey bricks to protruding concrete cill (100mm thick concrete) window bricked up with red brick (erroded bricks) window aperture - back to grey brick 10 courses with brick capping, vegetation at capping level (x2 Bushes) at steel boundary fence. Wall base satisfactory 0m to 7m (progression). 6.6m to 8.5m Concrete cill erroded with bricked up aperture (Red Brick)	DSC_2879.JPG DSC_2880.JPG
9m	Small tree growing from between brickwork 9.m to 11.3m. Redundant window cill.	DSC_2879.JPG DSC_2880.JPG
10m	Discharge drain appears clear 200mm diameter 2 courses above W/L	DSC_2879.JPG DSC_2880.JPG
11.6m	Site of steel member suspect mooring points for barges 1.3m above W/L spalled concrete infill cover.	DSC_2879.JPG DSC_2880.JPG
11.7m	Erroded brickwork adjacent to steel. 12m from W/L to bed defective missing pointing 250mm x 650mm soft mud 12m to 13.8m redundant cill bricked-up window location. 14.8 to 16.75 concrete cill ledge redundant window bricked-up (vegetation needs removing) - Blue bricks present note origional wharfage.	DSC_2879.JPG DSC_2880.JPG

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Chainage	Condition Detail	Photography / Detail
17.7m	17.7m to 19.5 Redundant cill bricked up window red bricks	DSC_2881.JPG
19.6m	Tree growing from brickwork needs removal	DSC_2881.JPG
20m	Wall alignment change by 180mm out towards canal - blue brick	DSC_2881.JPG
21m	Mooring ring location tree growing out - Requires Removal Defective mortar joint at W/L 21m to 22m Top 10 courses of brickwork pushing out at the top and leaning in towards canal suspected cause tree pushing root formation. Also defective joints at W/L 450mm.	DSC_2881.JPG

Chainage	Condition Detail	Photography / Detail
19m	19m to 24m Redundant cill 6 courses above W/L bricked up window	DSC_2882.JPG
22.5m	22.5m to 22.65 Defective joints with errosion of brickwork 100mm high x 100mm long x 2 courses down from W/L	DSC_2882.JPG
24.9m	Defective mortar joints from 2 courses below W/L to 4 courses above W/L at site of 100mm diameter drain discharge blocked at 450mm	DSC_2882.JPG
25.7m	2 x capping / coping stones in position 21 courses from underside to W/L dangerous misalignment to 30m chainage.	DSC_2882.JPG DSC_3210.JPG DSC_3217.JPG DSC_3219.JPG
26m	Some petrification and discolouration in blue bricks 13 to 21 courses above W/L	DSC_2882.JPG Detail Fig 17.

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Survey: 109m of Canal Wall - Grand Union Canal - London

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Chainage	Condition Detail	Photography / Detail
29m	26m to 29m Some petrification and discolouration in blue bricks 13 to 21 courses above W/L	DSC_2883.JPG
30m	30m to 32.8m 2 x capping stones in position 21 courses above W/L (Blue Bricks)	DSC_2883.JPG
34m	Mooring ring (Eye Bolt) 17 courses of bricks above W/L - Tree present at backplate. 33m - 34m 9 -10 courses of bricks missing from top of wall. Wall steps down.	DSC_2883.JPG
34.7m	Site of bricked up redundant window and redundant cill (Concrete) patched up into adjoining blue brick section to 39m.	DSC_2883.JPG
35.2m	Misalignment of brickwork protruding 20mm recessed back 3 courses. Bricks on canal bed adjacent and to foot of wall to 36.9m.	DSC_2883.JPG
37m	Tree roots at W/L 2 courses below and 2 courses above W/L 2 bricks wide. 37m to 38m Irregular alignment - errosion damage face of bricks.	DSC_2883.JPG

Chainage	Condition Detail	Photography / Detail
40m	Missing Mortar 2 bricks at W/L.	DSC_2885.JPG
41.6m	Hole drilled into brickwork (possible mooring area) No Ring 0.4m only spalled face 100mm x150mm	DSC_2885.JPG
42.1m	Tree to 46m missing mortar at W/L and above 2 courses bel W/L 3 courses.	DSC_2885.JPG
43m	40m to 49.5m trees ontop of wall irregular brickwork (spalled).	DSC_2885.JPG
48m	48m to 43m trees pushing out of alignment and perpendicular section of wall and end coping at interface of (Change of construction - to Concrete).	DSC_2885.JPG
49.5m	Change of construction materials from brickwork (Blue Brick) to shuttered concrete - Definative vertical joint. No expansion material in place.	DSC_2885.JPG
49.7m	Mooring ring in position “U” Bolt 1m above W/L. Wide gap between construction materials 32mm to bed level.	DSC_2885.JPG
49.8m	6”(150mm) Drain through wall 550mm above W/L.	DSC_2885.JPG
50m	Alignment of wall frontage kicks out 320mm towards canal. Toe protruding 25mm from 50.5m onwards.	DSC_2885.JPG

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Survey: 109m of Canal Wall - Grand Union Canal - London

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Chainage	Condition Detail	Photography / Detail Fig Ref.
54.8m	300mm diameter Salt Glazed Drain. (Datum Point 380mm invert to W/L) at time of survey. 55m to 57.2m Boulder stones debris in water course at toe of wall (Wall Sat).	DSC_2887.JPG
55m	55m to 57.2m Boulder stones debris in water course at toe of wall (Wall Sat).	DSC_3234.JPG
59.2m	Construction joint (vertical) with expansion joint material displaced at W/L upto 400mm - (Below water material missing to bed level gap 65mm.	DSC_2887.JPG
60.5m	Ring in wall for grab chains. Wall toe sticking out - all satisfactory upto 63m small toe reduces to 10mm.	DSC_2887.JPG
71.2m	Vertical construction joint with tree in place 300mm at W/L growing in joint displaced expansion joint material - Gap from bed level up to 400mm above W/L to tree location.	DSC_2887.JPG

Chainage	Condition Detail	Photography / Detail Fig Ref.
78.6m	Ring in wall with detached chain in position to 109m upto this point all missing.	DSC_2888.JPG

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Chainage	Condition Detail	Photography / Detail Fig Ref.
83.3m	Construction joint (vertical) displaced expansion joint material from 150mm at W/L to bed level. From Construction joint at 83.5m to chain ring loop at 86m evidence of weepage at pour joint - slight spalling and petrification.	DSC_2889.JPG
85m	Debris steel tubing - on bed 10mm sticking out plinth along wall at base all satisafactory.	DSC_2889.JPG

Chainage	Condition Detail	Photography / Detail Fig Ref.
95.9m	Vertical construction joint (in centre of Bush) 150mm above W/L to bed level.	DSC_2892.JPG

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Chainage	Condition Detail	Photography / Detail Fig Ref.
106.9m	Wall angles back into banking 150mm towards Boundary end point.	DSC_2893.JPG
108.1m	Start of chain ring loops 35mm steel O bar. At corner tree growing from over boundary line pushing top 12 courses of bricks out of perpendicular - extension foundation block cast in site to accomodate boundary wall on concrete “Pad Stone” Boundary wall constructed of grey brick. Angle brackets at top carrying barbed wire boundary wall 29 courses of bricks and 4 inch (100mm) “Pad Stone”.	DSC_2893.JPG

Drain Locations

Chainage	Drain Information	Condition
2.2m	73mm Discharge pipe considerably blocked after 1.6m penetration cast in concrete capping.	Blocked
3.75m	Draw 135mm diameter - Blocked by tree roots completely.	Blocked
6.6m	Drain Discharge 500mm above W/L.	Blocked
10m	235mm diameter Drain discharge 2 courses above W/L. Clear upto 2m at time of survey.	Clear
11.3m	135mm diameter Drain (Blocked Debris) 10 courses above W/L	Blocked
19.5m	140mm Discharge Drain 9 courses above W/L Blocked after 300mm with Debris & Vegetation	Blocked
24.9m	100mm diameter Drain Discharge Blocked 450mm Drain Pipe.	Blocked
25.5m	100mm diameter Drain Discharge vegetation in place needs removal blocked after 700mm with Debris & Vegetation	Blocked
37.2m	1x 100 diameter Drain Discharge into canal 5 courses above W/L Blocked after 750mm with Debris & Vegetation	Blocked
49.6m	4 inch Drain Damaged 450mm abnove W/L Blocked	Blocked
49.8m	6 inch Drain 500mm above W/L. Clear upto 2m at time of survey.	Clear
53m	4 inch Drain Blocked after 1.2m	Blocked
54.8m	300mm diameter Salt Glazed Drain. Clear upto 2m at time of survey.	Clear
55.6m	4 inch Drain Blocked after 0.5m	Blocked
58.5m	4 inch Salt Glazed Drain Blocked after 1.1m	Blocked
61.6m	4 inch Drain 400mm above W/L Blocked after 1.1m	Blocked
64.8m	4 inch Drain Blocked after 1.1m	Blocked
67.9m	4 inch Drain Blocked after 1.1m	Blocked
70.8m	4 inch Drain Blocked solid with root formation and broken off flush	Blocked
74m	4 inch Drain Blocked after 1.1m	Blocked
77.1m	4 inch Drain Blocked after 1.1m	Blocked
80.1m	4 inch Drain Blocked after 1.1m	Blocked
83.1m	4 inch Drain Blocked after 1.0m	Blocked
86.5m	4 inch Drain Blocked after 350mm	Blocked
89.2m	4 inch Drain Blocked after 1.1m	Blocked
92.5m	4 inch Drain Blocked after 1.1m	Blocked
95.2m	4 inch Drain Blocked with large tree	Blocked
98.6m	4 inch Drain Blocked after 1.1m	Blocked
101.6m	4 inch Drain Blocked after 1.1m	Blocked
104.5m	4 inch Drain Blocked with tree growing from it.	Blocked
106.8m	400mm diameter “D’ Shaped (Half Round) Cast through slab 450mm cast into cement during construction phase. Supected Collision Damage or Faulty pour casting.	Blocked
107.5m	4 inch Drain 4 Blocked after 850mm	Blocked

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Fig.1

0m chainage - Large bush access difficult very soft mud on canal bed. 6.5 courses of blue brick from W/L up concrete coping insitu 330mm thick from 0m back and forward to chainage 3m. Arrow Indicates location of Steel Ring in Wall.

Fig.2

3.5m chainage -Mooring ring and steel member with round rivet heads (x8) purpose / function unknown (possible wall retaing column) vegetation growing from wall and steel compartment (Requires De-Veg). (Arrow Indicates Ring location in Fig.1)

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Fig.3

9m chainage - Small tree growing from between brickwork 9m to 11.3m. Redundant window cill. Drain at 10m chainage.

Fig.4

10m chainage - Discharge drain 200mm diameter appears clear - 2 courses above W/L.

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Fig.5

11.6m chainage - Discharge drain appears clear 200mm diameter. Site of steel member suspect mooring points for barges 1.3m above W/L spalled concrete infill cover.

Fig.6

11.7m chainage - Erroded brickwork adjacent to steel. 12m from W/L to bed defective missing pointing 250mm x 650mm soft mud 12m to 13.8m redundant cill brickedup window location. 14.8 to 16.75 concrete cill ledge redundant window bricked up (vegetation needs removing) - Blue bricks present note origional wharfage.

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Fig.7
17.7m to 19.5 chainage - Redundant cill bricked up window red bricks

Fig.8
19.6m chainage - Tree growing from brickwork needs removal.

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Fig.9
20m chainage - Wall alignment changes by 180mm out towards canal - blue brick

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Fig.10

21m chainage - Mooring ring location tree growing out - Requires Removal
Defective mortar joint at W/L 21m to 22m Top 10 courses of brickwork pushing out at the top and leaning in towards canal suspected cause tree pushing root formation. Also defective joints at W/L 450mm.

Fig.11

19m to 24m chainage - Redundant cill 6 courses above W/L bricked up window

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Fig.12

22.5m to 22.65 chainage - Defective joints with errosion of brickwork 100mm high x 100mm long x 2 courses down from W/L

Fig.13

24.9m chainage - Defective mortar joints from x 2 courses below W/L to x 4 courses above W/L at site of 150mm and 100mm diameter drain discharge pipe blocked at 450mm.

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Fig.14

25.7m chainage 2 x capping / coping stones in position
x 21 courses from underside to W/L dangerous misalignment to 30m chainage.

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Fig.15
25.7m - chainage Dangerous misalignment to 30m chainage.

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Fig.16
26m chainage - Missing Mortar and wide joints in bricks 2 courses above W/L & Splash zone

Fig.17
26m chainage - Missing Mortar and wide joints in bricks 2 courses below W/L

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Fig.18
26m chainage - Some petrification and discolouration in blue bricks 13 to 21 courses above W/L
Dangerous misalignment to 30m chainage

Fig.19
30m to 32.8m chainage - 2 x coping stones in position x 21 courses above W/L (Blue Bricks).

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Fig.20
34m chainage - Mooring ring (Eye Bolt) 17 courses of bricks above W/L - Tree present at backplate.
33m - 34m chainage - 9 -10 courses of grey bricks missing from top of wall . Wall steps down.

Fig.21
34.7m chainage - Site of bricked up redundant window and redundant cill
(Concrete) patched up into adjoining blue brick section to 39m.

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Fig.22
35.2m chainage - Misalignment of brickwork protruding 20mm recessed back x 3 courses.
Bricks on canal bed adjacent and to foot of wall to 36.9m.

Fig.23
Tree roots at W/L x 2 courses below and x 2 courses above W/L x 2 bricks wide.
37m to 38m chainage - Irregular alignment - errosion damage face of bricks.

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Fig.24
40m chainage - Missing Mortar x 2 bricks at W/L & Splash zone.

Fig.25
41.6m chainage - Hole drilled into brickwork (possible mooring area) No Ring 0.4m only spalled face 100mm x150mm

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Fig.26
42.1m chainage - Trees to 46m. Missing mortar at W/L and above x 2 courses below W/L x 3 courses.

Fig.27
40m to 49.5m chainage - Trees ontop of wall irregular brickwork (spalled).

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Fig.28
48m to 43m chainage - trees pushing wall out of alignment. Perpendicular section of wall - end coping at interface of (Change of construction - to Concrete).

Fig.29
49.5m chainage - Change of construction materials from brickwork (Blue Brick) to shuttered concrete - Definative vertical joint. No expansion material in place.

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Fig.30
49.7m chainage - Grab Chain ring in position “U” Bolt 1m above W/L.
Wide gap between construction materials 32mm to bed level.

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Fig.31
49.8m chainage - 150mm Drain through wall 550mm above W/L.

Fig.32
50m chainage - Alignment of wall frontage kicks out 320mm towards canal.
Toe protruding 25mm from 50.5m onwards.

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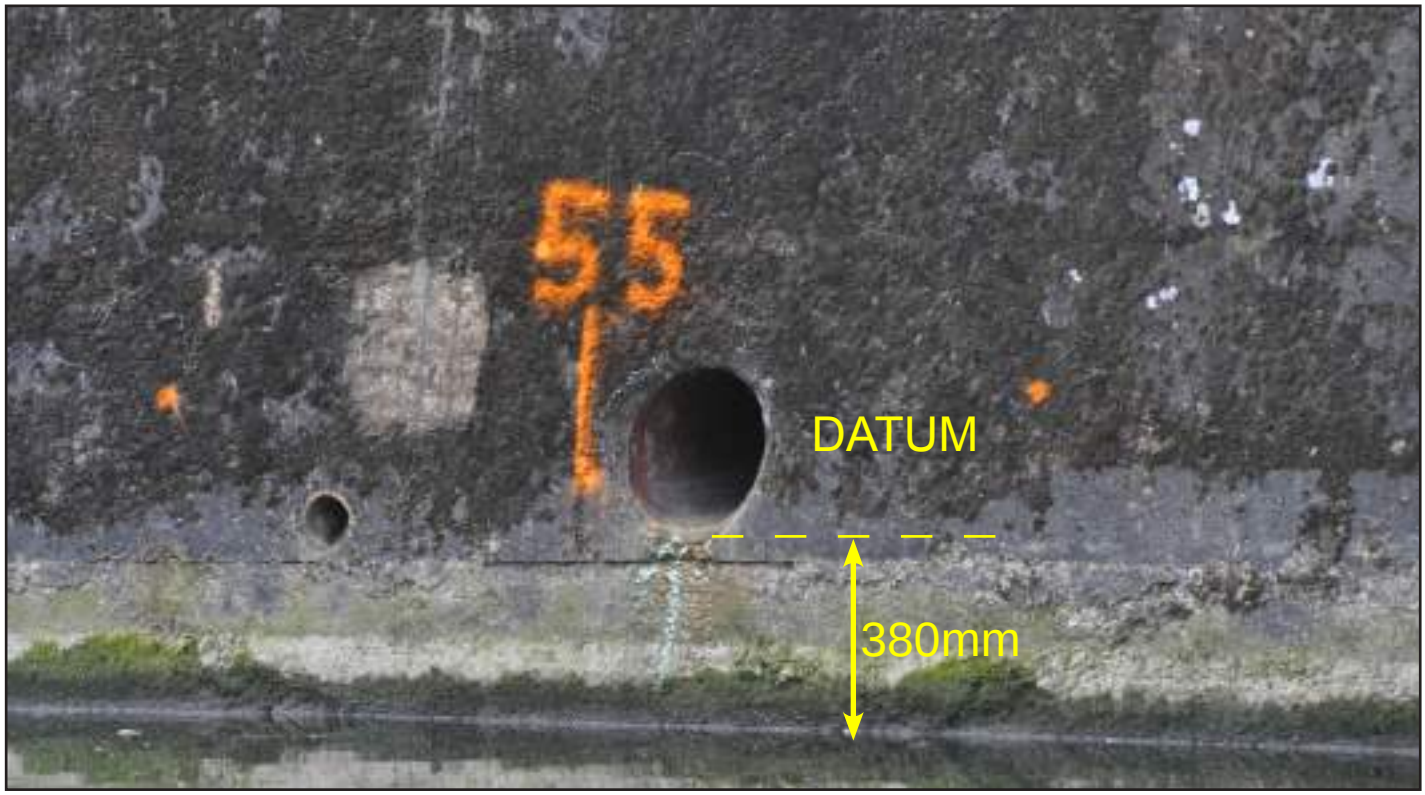

Fig.33
54.8m chainage - 300mm diameter Salt Glazed Drain. (Datum Point 380mm invert to W/L) at time of survey.
55m to 57.2m chainage - Boulder stones debris in water course at toe of wall (Wall Sat).

Fig.34
55m to 57.2m chainage - Boulder stones debris in water course at toe of wall (Wall Sat).

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Fig.35

59.2m chainage - Construction joint (vertical) with expansion joint material displaced at W/L up to 400mm
- Below water material missing to bed level gap 65mm.

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Fig.36

60.5m chainage - Ring in wall for grab chains. Wall toe sticking out - all satisfactory up to 63m small toe reduces to 10mm.

Fig.37

71.2m chainage - Vertical construction joint with tree in place 300mm at W/L growing in joint displaced expansion joint material - Gap from bed level up to 400mm above W/L to tree location.

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Fig.38
78.6m chainage - Ring in wall with detached chain in position to 109m up to this point all missing.

Fig.39
83.3m chainage - Construction joint (vertical) displaced expansion joint material from 150mm at W/L to bed level.
From Construction joint at 83.5m to chain ring loop at 86m evidence of weepage at pour joint - slight spalling and petrification.

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Fig.40
85m chainage - Debris steel tubing - on bed
10mm sticking out plinth along wall at base all satisafactory.

Fig.41
95.9m chainage - Vertical construction joint (in centre of Bush) 150mm above W/L to bed level.

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Fig.42A

50m to 109m chainage - General view of Wall angles back 101° into banking 150mm towards Boundary end point.

Fig.42B

50m to 109m chainage - Underwater photgraph shows typical condition. No defects or undercutting located at bed level.

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Fig.43

108.1m chainage - Start of chain ring loops 35mm steel O bar. At corner tree growing from over boundary line pushing top x 12 courses of bricks out of perpendicular - extension foundation block cast in situ to accommodate boundary wall on concrete “Pad Stone” - Return boundary wall constructed of grey brick.

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Fig.44

Secondary view of return boundry wall from top side showing angle brackets carrying barbed wire - Impact damage and some structural cracking present.

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Fig.45
65m chainage - Heavy duty mooring ring on top of wharf.

Fig.46
Detail of redundant railway lines at ground level on the wharfage.

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Fig.47
Secondary view of redundant railway lines at ground level on the wharfage.

Fig.48
Railway line and branch line used for loading Barges from the wharf for Bomb Factory Ammunition Distribution.

Fig.49
General view on wharf showing twin railway lines and restricted access due to storage containers.

Fig.50
Full row of storage containers along the fence boundary - restricting rear access.

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Fig.51
Back side view of containers as seen in Fig 50. Note trees growing on the reverse - canal side wall.

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Fig.52
General view of Moss type crust (marine growth) on face of concrete wharfage wall from chainage 50m to 109m

Fig.53
Removal of Moss type crust (marine growth) on face of concrete wharfage wall showing condition of concrete beneath.

DEPTH SOUNDINGS FROM 0m to 109m

											109m End			105m					100m				
											0.6	0.67	0.8	0.8	0.78	0.69	0.68	0.8	0.7	0.87	0.74	0.8	0.8
											0.6	0.72	0.75	0.9	0.7	0.79	0.88	0.71	0.8	0.82	0.8	0.8	Bush
95m					90m					85m					80m					75m			
0.82	0.71	0.68	0.65	0.75	0.7	0.68	0.68	0.68	0.72	0.78	0.78	0.68	0.65	0.62	0.68	0.6	0.65	0.62	0.6	0.68	0.6	0.62	0.5
0.7	0.81	0.82	0.71	0.7	0.7	0.78	0.72	0.8	0.75	0.9	0.68	0.7	0.76	0.62	0.58	0.66	0.6	0.7	0.65	0.6	0.6	0.55	0.78
	70m					65m					60m					55m					50m		
0.6	0.6	0.58	0.62	0.55	0.65	0.51	0.58	0.56	0.56	0.6	0.6	0.6	0.6	0.68	0.4	o.4	0.55	0.52	0.6	0.68	0.58	0.55	0.6
0.75	0.68	0.65	0.6	0.62	0.6	0.58	0.6	0.58	0.6	0.6	0.56	0.58	0.68	0.58	0.62	0.78	0.7	0.64	0.62	0.7	0.7	0.65	0.8
		45m					40m					35m					30m					25m	
0.6	0.6	0.65	0.55	0.6	0.6	0.6	0.55	0.58	0.5	0.55	0.55	0.6	0.6	0.54	0.55	0.55	0.55	0.5	0.5	0.5	0.5	0.5	0.5
0.7	0.6	0.58	0.6	0.62	0.55	0.58	0.5	0.55	0.62	0.6	0.5	0.55	0.6	0.5	0.53	0.5	0.5	0.52	0.5	0.55	0.5	0.48	0.5
			20m					15m					10m					5m					0m Start
0.52	0.5	0.5	0.48	0.5	0.55	0.55	0.55	0.6	0.58	0.52	0.45	0.65	0.6	0.55	0.52	0.52	0.6	0.49	0.5	0.58	0.57	0.65	0.48
0.48	0.65	0.6	0.61	0.5	0.54	0.5	058	0.68	0.5	0.4	0.5	0.7	0.6	0.6	0.5	0.5	0.6	0.5	0.55	0.65	0.45	0.5	0.51

KEY Wall | Toe of Wall | Im out from Wall

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