

Prepared by: Matt Barron

Date: 01st February 2023

DXH/45506 – Barrass Street - Structural survey of boundary wall

Address: Barrass Street, Manchester, M11 1WP

Property Type: Boundary wall to former Varna Street Primary School grounds

1.0 Introduction and Brief

An inspection was requested to be carried out to the boundary wall of the former Varna Street primary school grounds, where defects to the existing masonry had been observed. The wall forms the boundary between the school grounds and a public footpath to the north of Gorton railway station.

The structural inspection was carried out on 17th January 2023. The purpose of the site visit was to examine the nature of the existing defects and the existing wall construction, and to establish the required remedial works.

The structural inspection was visual only. The foundations were not inspected and there is no ground investigation for the site.

2.0 Existing Structure

The boundary wall runs along the south edge of the school grounds from Barrass Street to the east and the railway bridge to the west. The inspection was focussed on an 18m long section of wall as shown in figures 1 and 2 below, where existing defects had been observed. The boundary wall changes direction either side of the 18m long section inspected. The ground level along the footpath rises from west to east, with the wall height above ground level varying from 3.3m high to 2.5m high. The wall retains approximately 1.2 metres height of soil on the school side, and there are three trees behind the wall on the school side within 2 metres distance from the wall face.

The brickwork is 225mm thick with 325mm thick piers at approximately 2m centres on the school side of the wall. There are header courses at every fourth course typically. There are stone coping stones along the head of the wall and a steel mesh fence fixed to the rear of the wall extending above the wall. The foundations for the wall are not known.

Figures 1 and 2 below show the existing wall location.



Figure 1 – Existing wall location



Figure 2 – Boundary wall extent

3.0 Observations

The following defects were observed during the site visit. Please also refer to the site photos in **Appendix A** and the elevation drawing in **Appendix B**.

- Horizontal crack approximately 3 metres long at 900mm above ground level. **(Ref photo 3)**
- Stepped cracking with the cracks extending through the wall and visible on each side. The crack width varies from 20mm up to 50mm wide in places. **(Ref photo 4-7)**
- Horizontal crack approximately 2 metres long at 2250mm above ground level. **(Ref photo 8)**

- Horizontal crack at lower level with a 30mm step across the crack indicating lateral movement. **(Ref photo 11)**
- Visible bulge in the masonry at lower level adjacent to the cracking and vegetation behind. An out of plumb measurement of 70mm was noted in this area. **(Ref photo 12)**
- Settlement at ground level below the area of bulging brickwork, with rotation of the base course brickwork at ground level. **(Ref photo 13)**
- Visible bulge in the masonry at lower level at the west end of the 18m section of wall inspected, where the wall changes direction. **(Ref photo 15)**
- General Evidence of previous repairs to the wall with locally repaired brickwork and repointing. **(Ref photo 17, 9-10)**
- Spalling brickwork generally and crumbling mortar/defective mortar joints. **(Ref photo 20-23)**
- There is ivy growth on the footpath side of the wall from approximately 11m chainage to 18m chainage. **(Ref photo 24-27)**
- There is loss of render to the rear of the wall and as noted above the cracking seen on the footpath side is mirrored on the rear side brickwork. **(Ref photo 31-36)**

It is noted that the wall is over 3m high and 225mm thick, with 325mm thick piers at 2m centres. Rule of thumb design would typically require a thicker wall construction for a freestanding wall of this height, and as noted above the wall is also retaining soil and vegetation. The wall may be taking a degree of restraint from the change in direction of the wall each side of the 17m length inspected. The foundation construction is not known.

4.0 Recommendations

The existing wall is in poor condition with extensive cracking and significant deformation to the section adjacent to the vegetation within the playground. The movement evident has been caused by lateral pressure from the retained soil behind and pressure from adjacent tree roots. The cracking is visible on both sides of the wall with gaps of up to 50mm in places, such that it is not possible to repair the brickwork and a rebuild is required.

It is therefore proposed to take down and rebuild this section of the wall. As the wall is over 3 metres high and is also retaining soil and vegetation it would not be suitable to rebuild the wall using the same detail as the existing 225mm thick wall with 325mm thick piers, as this is not adequate to resist the lateral loads applied. It is therefore proposed to rebuild the wall as a 325mm thick grouted cavity wall with a reinforced cavity. The new grouted cavity wall will be supported on a new reinforced concrete strip foundation. The existing brickwork can be retained and reused where possible, with matching brickwork used where new brickwork is required. New coping stones will be required over the rebuilt wall and should be laid on bedding mortar.

Weepholes and a filter drain will be installed behind the wall to prevent groundwater build-up in the ground behind the wall.

It is also proposed to remove the trees and vegetation behind the wall, subject to confirmation that there are no tree preservation orders relevant, and agreement with planning. If the trees are required to be retained then a root protection membrane will be required behind the wall and a tree management plan put in place to mitigate the impact of the trees on the wall in the long term.

Over the remaining section of wall the vegetation should be removed to allow an inspection of the rest of the brickwork. Local replacement of spalling brickwork and repointing mortar joints will also be required.

The proposed structural details for the rebuilt wall are shown in **Appendix B**. A budget cost of £45,000 should be allowed for the dismantling of the existing wall and rebuilding of the new wall and foundation.

5.0 Next steps

As outlined in section 4.0 it is proposed to take down and rebuild the worst affected section of the wall. The new wall will be a grouted cavity wall on a new reinforced concrete strip foundation. The works to rebuild the wall should be carried out as soon as possible, and monitoring should be carried out regularly to check for ongoing movement until the work is complete.

In order to complete the construction information, the following steps are required:

Listed building consent - The former school building is a grade 2 listed building and therefore the boundary wall may also be protected and require consent to make alterations. The material alterations to the wall are limited only to changing the overall thickness of the wall from 225mm to 325mm due to the height of the wall and the soil retained. The wall will be rebuilt using the existing brickwork where possible and otherwise with new matching brickwork.

Tree removal - It is understood that there are no tree preservation orders for the trees adjacent to the wall on the school side. As the school building is listed the proposal to remove the trees within the school grounds should be agreed with planning prior to removal.

Ground Investigation - Local trial pits should be dug to confirm the ground conditions and bearing capacity assumptions for the new foundation design.

Temporary diversion for footpath – A temporary diversion will be required to prevent access to the adjacent footpath by the public until the wall has been remediated. It is also recommended for temporary shoring to be installed until the wall is remediated. The wall should also be monitored until the construction is complete to check for ongoing movement.

End of Report

Matt Barron Meng CEng
On behalf of Capital Programmes & Procurement

APPENDIX A – Photos



Photo No. 1



Photo No. 2



Photo No. 3



Photo No. 4



Photo No. 5



Photo No. 6

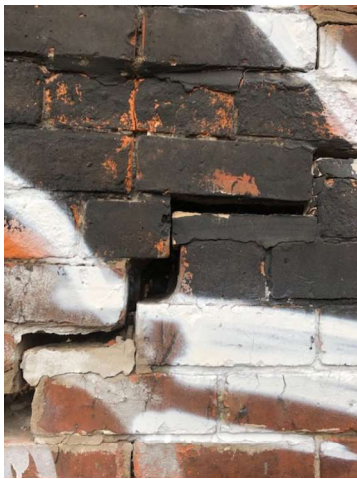


Photo No. 7



Photo No. 8



Photo No. 9



Photo No. 10



Photo No. 11



Photo No. 12



Photo No. 13



Photo No. 14



Photo No. 15



Photo No. 16

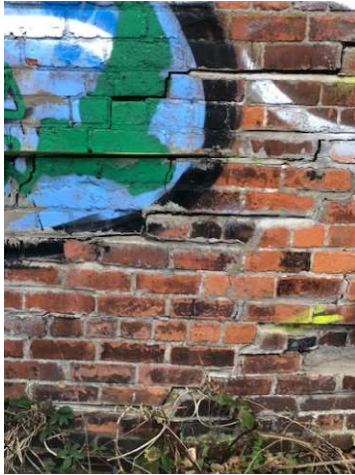


Photo No. 17



Photo No. 18



Photo No. 19



Photo No. 20



Photo No. 21



Photo No. 22



Photo No. 23

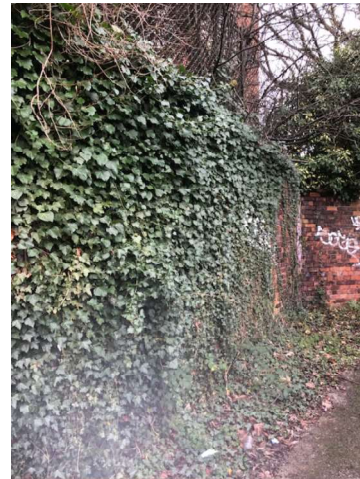


Photo No. 24



Photo No. 25



Photo No. 26



Photo No. 27



Photo No. 28



Photo No. 29



Photo No. 30



Photo No. 31



Photo No. 32



Photo No. 33



Photo No. 34



Photo No. 35



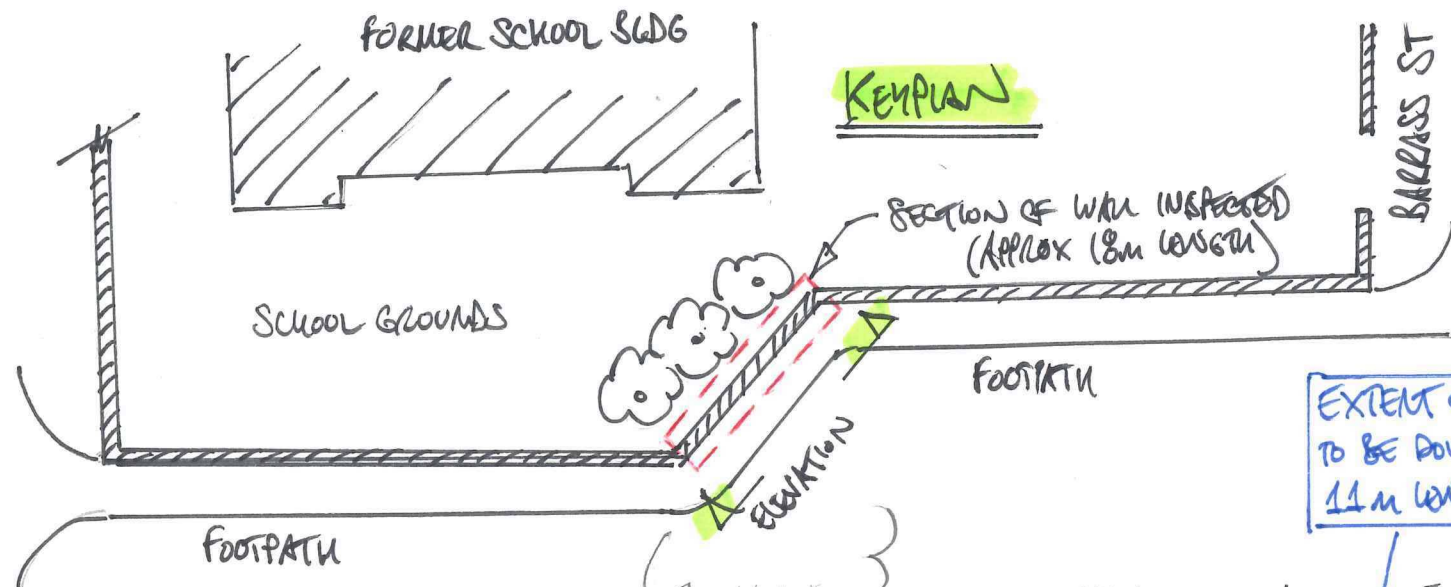
Photo No. 36

APPENDIX B – Existing and Proposed wall details

EXISTING WALL DETAILS

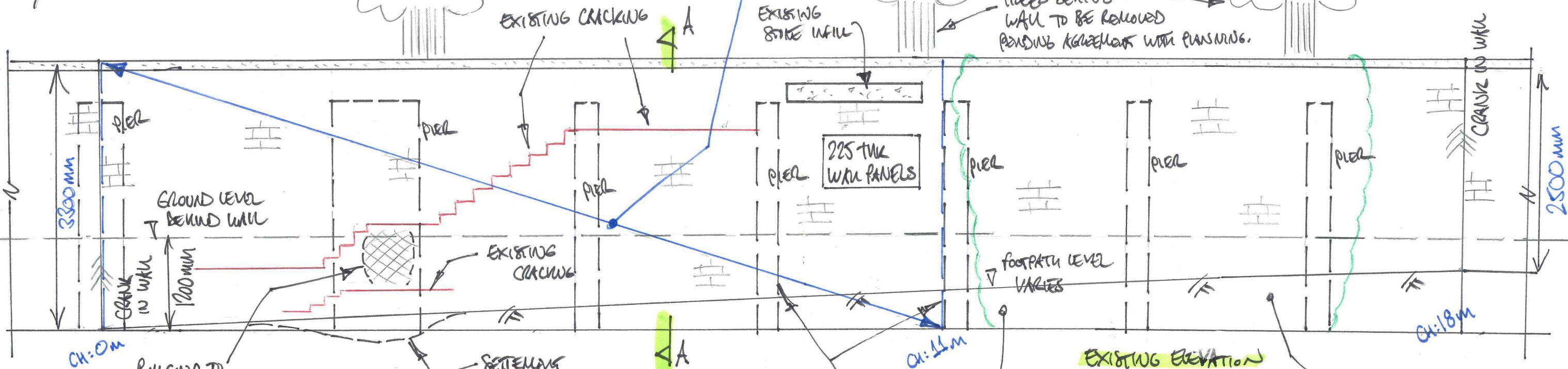
DXH/45506 BARRASS STREET

KEY PLAN



EXTENT OF EXISTING WALL TO BE DOWNTAKEN, APPROX 11m LENGTH

TREES BEHIND WALL TO BE REMOVED PENDING AGREEMENT WITH PLANNING.



EXISTING ELEVATION FROM FOOTPATH SIDE

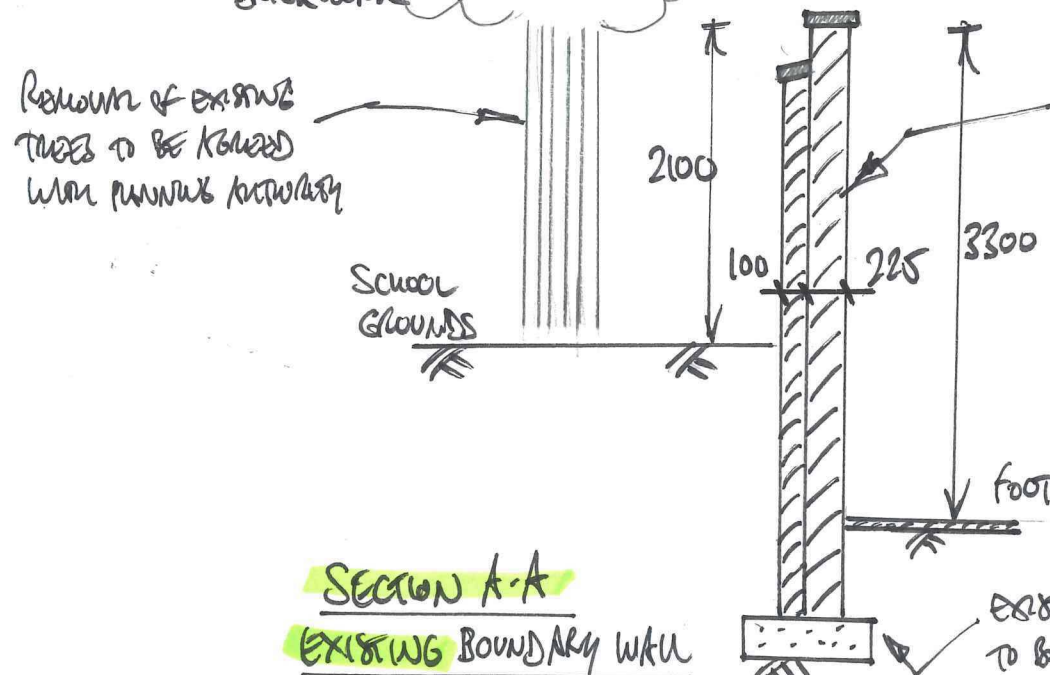
IVY GROWTH FROM CH 11m TO CH 18m TO BE REMOVED AND BRICKWORK BEHIND INSPECTED.

CONSTRUCTION TO PROVIDE TEMPORARY PROPPING TO ADJACENT SECTION OF WALL TO MAINTAIN WALL STABILITY DURING DOWNTAKING & CONSTRUCTION OF NEW SECTION OF WALL

EXISTING 225mm THK BRICK BOUNDARY WALL WITH 325mm THK PIERS AT APPROX 2m CENTRES TYPICALLY.
- EXISTING WALL DOWNTAKEN OVER 11m LENGTH AS SHOWN ON ELEVATION

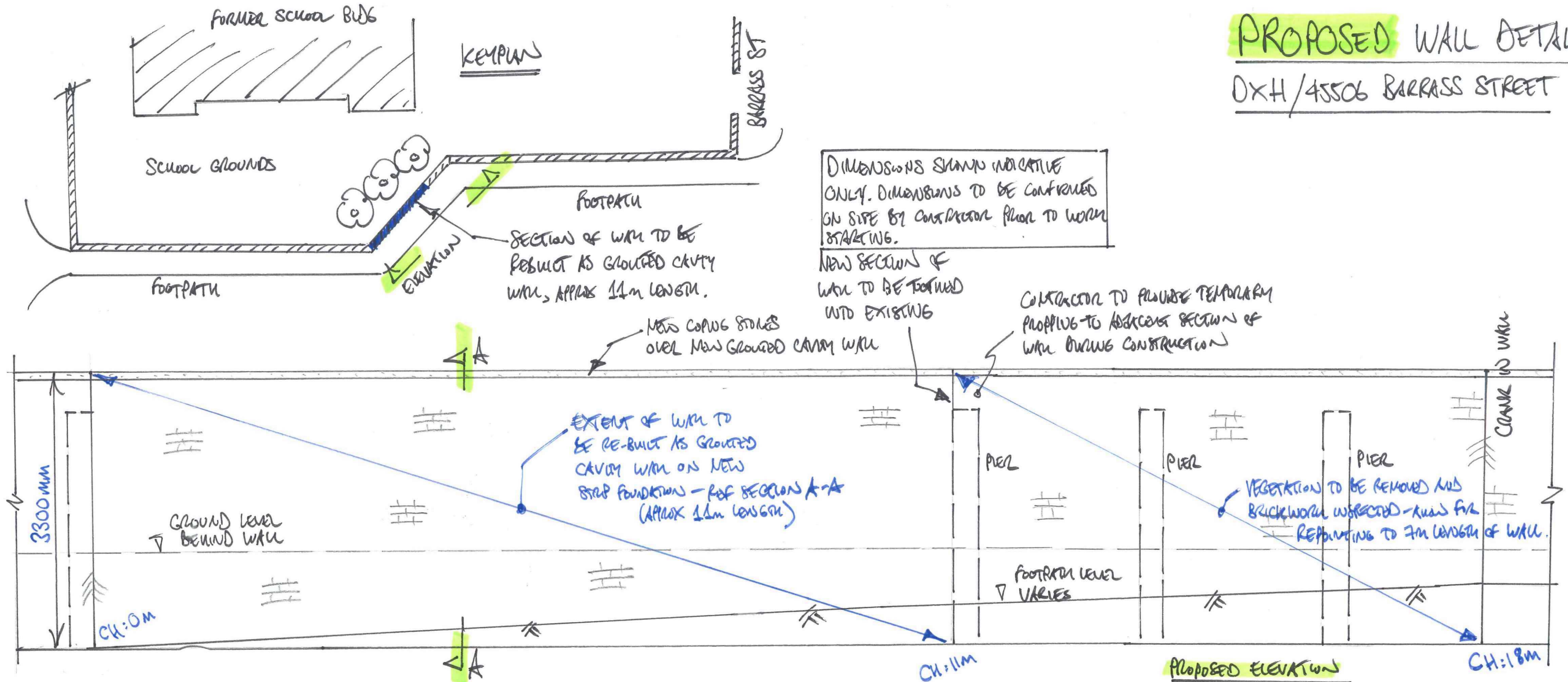
EXISTING FOUNDATION TO BE GRUBBED UP AND DISPOSED OFF SITE

SECTION A-A EXISTING BOUNDARY WALL



PROPOSED WALL DETAILS

OXH/45506 BARRASS STREET



PROPOSED ELEVATION FROM FOOTPATH SIDE

CONSTRUCTION TO ALLOW FOR MORTAR SAMPLING TO IDENTIFY A COMPATIBLE MORTAR FOR USE IN REBUILDING THE DAMAGED SECTION OF WALL

NEW COPING STONES ON MORTAR BED & FIXED TO WALL WITH ANCON COPING RESTRAINTS.

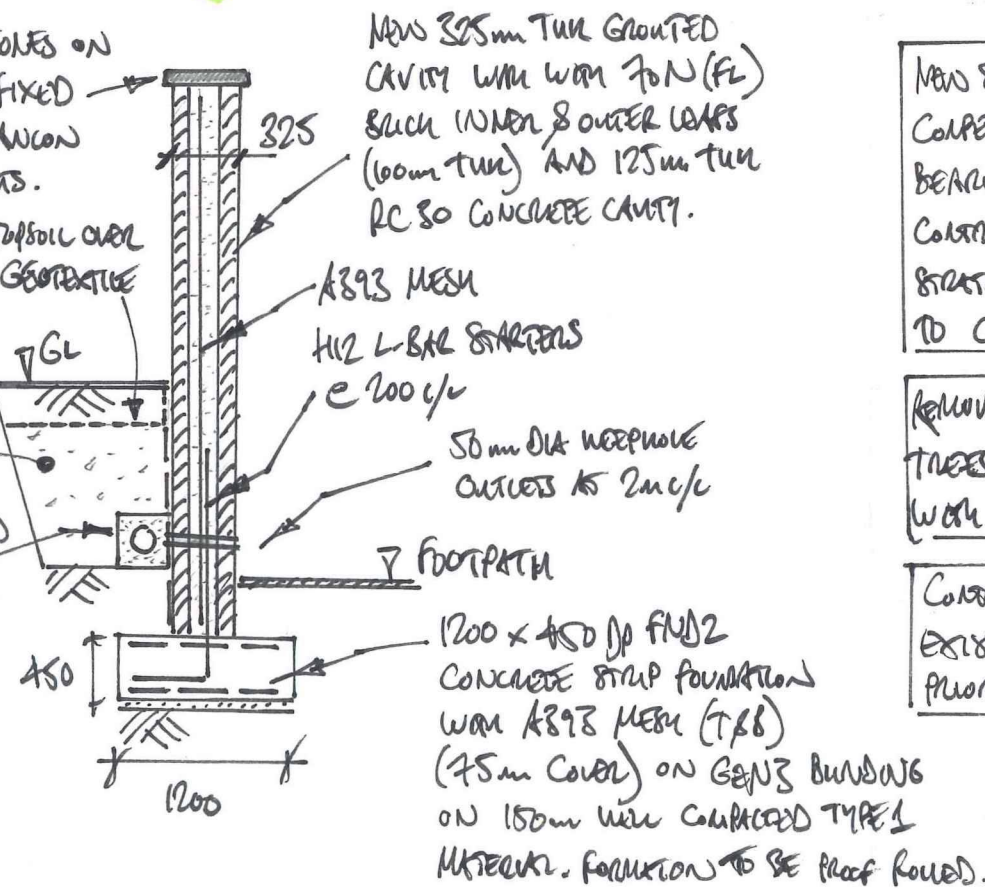
TOPSOIL OVER GEOTEXTILE

SCHOOL GROUNDS

GRANULAR BACKFILL

100mm Ø WAVE PERFORATED PIPE IN 20mm SINGLE SIZED AGGREGATE WRAPPED IN GEOTEXTILE

SECTION A-A PROPOSED BOUNDARY WALL



NEW STRIP FOUNDATION TO BEAR ONTO COMPETENT STRATA WITH MINIMUM BEARING CAPACITY OF 600 kN/m². CONSTRUCTION TO CONFIRM FOUNDATION STRATA WITH TRIAL PITS PRIOR TO CONSTRUCTION

REMOVAL OF EXISTING ADJACENT TREES SUBJECT TO AGREEMENT WITH PLANNING AUTHORITY.

CONSTRUCTION TO CHECK FOR EXISTING UTILITIES IN FOOTPATH PRIOR TO EXCAVATION

Outline Scope of Works

- Provide temporary propping to adjacent sections of wall to be retained.
- Contractor to obtain footpath closures necessary for the safe completion of the works.
- Carefully take down 11m long damaged section of 3.3m high wall to foundation level. Clean down brickwork and set aside for reuse. Extent of brickwork to be salvaged for reinstatement to be agreed with CA.
- Grub up existing foundations and dispose off-site.
- Excavate ground and form new reinforced concrete strip foundations to reinstate 11m length of wall, refer to section A-A for details.
- Rebuild wall as 325mm thick grouted cavity wall to match existing height, 11m long. Refer to section A-A for details. Reclaimed brickwork to be used where possible. Where new brickwork is required, brickwork to be 70N compressive strength and durability designation FL.
- Install new coping stones along 11m section of rebuilt wall.
- Include for removal of trees behind wall within school grounds subject to agreement with Manchester City Council.
- Allow for two number trial pits to be dug to establish existing foundation depths and ground conditions
- Contractor to allow for mortar sampling to identify compatible mortar for use in rebuilding the damaged section of wall.