AtkinsRéalis

BRICKWORK REPAIR SPECIFICATION

Transport for Greater Manchester

May 2025
S5 - Suitability

P16036-ATK-CCL1-DCF-SP-CE-0002

DEANSGATE-CASTLEFIELD ARCHES

ATKINSRÉALIS BASELINE - LOW RISK

Notice

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Client signoff

Client	Transport for Greater Manchester
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Brickwork and Masonry Repairs

1. General Details

1. This specification document is only intended to cover masonry repair works to the masonry elements and components at Deansgate-Castlefield Viaduct A53, A54 and A55, known as the Work(s) from here-on in.

2. The defects found at the structures have been identified from condition inspections and have been detailed in report P16036-ATK-CCL1-DCF-RP-CE-0001.

3. The contract documents, drawings and specification that form part of these Works contain indicative repair positions and methods. The Works to be conducted are to suit the actual site conditions and may not be limited to the locations and extents shown on the drawings. The Contractor is to carry out a pre-construction survey before an area of repair is carried out and findings are to be reported to the Client.

4. Photographs are required for all repair areas before during and after intervention. Selected photographs are to be submitted to the Client for their records.

5. The requirements in this specification are to ensure that sympathetic brickwork and mortar renovation and structural fabric cleaning are conducted. The Contractor is to engage with the Client to discuss the principles of conservation for these Works as presented in the contract documents.

6. The Contractor shall ensure site staff responsible for the supervision of the Works are appropriately experienced in the type of works involved, in techniques of consolidating and repairing historic masonry structures, in preparing and using lime mortars and in executing the required brickwork bonding replacement.

7. The Contractor shall prevent damage to brickwork and keep all brickwork clean during construction and until practical completion. New lime work shall be protected from wet conditions until adequately set, by means of full scaffolding with reinforced polythene sheeting or other methods as appropriate.

8. The Contractor shall ensure all materials are stored and used in accordance with the manufacturer's recommendations and requirements.

9. If repairs are to be carried out near to any fixings such as drainage pipes or cable attachments, then specific method statements shall be required prior to work taking place for approval of the Client.

10. All changes to engineering solutions identified in the contract documents and production of quality assurance, quality control and quality plans are to be approved in line with the contract format through the Client.

2. Testing and Sampling

11. Testing of 4No. existing historic lime mortar samples are to be conducted; 3No. samples from structure A55, 1No. from A54 (abutments) and none from A53. All samples are to be extracted in arch barrel soffits where possible and are not to include material within the initial 40mm of the external surface. The test is to be carried out in accordance with BS EN 459-2. The current test methods in BS 4551 do not contain the appropriate test methods for Lime Mortars. Structure A53 has some previous mortar testing results available from the Client.

12. Testing of samples of the grout or mortar, cured under identical conditions as the repair, shall be carried out to verify the setting, hardening and strength in line with BS EN 1015-11. If in-situ testing facilities are practicable, permeability shall be measured in line with BS EN 1015-18. A minimum of 6 No. 160 mm x 40 mm x 40mm prisms for every 150m^2 of wall shall be made with mortar of a consistency corresponding to that required on site should be made, cured and tested for compression strength at least 15 weeks before the Works. Half of the site samples should be tested at 28 days. Mortar should be sampled in accordance with BS EN 1015-2.

13. Pre-mixed fat lime mortars using non-hydraulic lime provided by specialist suppliers are to be tested by the Suppliers. The Supplier is to offer services to match mortar aesthetics for all variants of mortar required for the Works.

14. Samples of all new masonry together with particulars of the intended source of supply proposed by the Contractor shall be submitted to the Client for acceptance before any order is placed.

15. Reclaimed bricks are not classified in BS EN 771-1. The Contractor is to confirm with the Supplier with reliable assurance that brickwork has been taken exclusively from external walling. This is to improve confidence that bricks have been treated as frost resistant.

16. No freeze-thaw cycle testing is required for the reclaimed brickwork.

17. The Contractor shall retain material samples until Works completion for comparing with the actual material installed on the structure and dispose after completion.

3. Mortar

18. Lime for mortar shall be high calcium lime, semi-hydraulic lime or magnesium lime complying with BS EN 459-1:2015. Lime shall not be added to masonry cement. Masonry cement is not permitted for use for the Works detailed in this specification.

19. Sand for mortar shall comply with BS EN 13139:2013 and shall be washed sand or natural crushed rock. Sand from a marine source shall not be used. All sands used are to be clean and free from clay, salts and any other impurities.

20. Water should be taken from a Water Supply Company. If not, the water shall be tested according to BS EN 1008:2002 and the recorded levels of impurities submitted to the Client for agreement to use the water in the Works.

21. Mortars should be designed or prescribed. For designed mortars, the compressive strength of the mortar provides the control of the hardened mortar quality. When samples are taken from a designed mortar in accordance with BS EN 1015-2, and tested in accordance with BS EN

1015-11, the compressive strength of the mortar should not be less than the declared compressive strength.

22. A natural hydraulic lime mix and a non-hydraulic lime mix are provided in this report. The natural hydraulic lime mix is for external areas. The non-hydraulic lime mix is for internal areas. Specialist guidance is to be sought by Suppliers to improve the mix specifications.

The lime mortar mixes to be used are given below.

Natural Hydraulic Lime mix:

A feebly (NHL 2) hydraulic lime, ash and sand-based mix – 1-part NHL 2 Natural Hydraulic Lime: 1-part building sand: 1-part washed river sand: ½-part clinker coal ash and a controlled amount of black, iron oxide-based pigment (to match the various existing adjacent mortar colours in the structure).

The supplier of NHL products should be asked to provide typical strength data to ensure that the correct grade is being used.

Mortar shall be mixed in line with the Supplier or Manufacturer recommendations. It is expected that small quantities would be mixed on site.

Non-Hydraulic Lime mix:

A non-hydraulic lime, ash and sand-based mix – 1-part CL80 Non-Hydraulic Lime (fat lime/ mature lime putty): 1.25-part building sand: 1.25-part washed river sand: ½-part clinker coal ash and a controlled amount of black, iron oxide-based pigment (to match the various existing adjacent mortar colours in the structure).

The supplier is to be advised on the exact blend of grit and river sand up to 4mm sieve size based on the testing results found of the existing structure mortar.

Where damp or wet brickwork prevent the use of the specified non-hydraulic lime mortar in this specification, proprietary products should be used. Argical (metakaolin) pozzolan can be added to the non-hydraulic fat lime mortar. The amount to be added to the mortar is to create a mortar with characteristics between NHL 1 and NHL 2.

23. Admixtures containing calcium chloride shall not be used.

24. Site mixed mortars shall not contain set retarding admixtures.

25. Air entraining agents for mortar shall not be used.

26. Coloured mortar shall comply with BS EN 998-2 and shall be permitted by prior agreement with the Supplier for designated mortar only and within bedding and jointing only. It shall be compatible with the existing construction and the colour of mortar should match the existing varieties found at the Works.

27. Colouring pigments shall comply with BS EN 12878:2014 and is to be carefully added by measuring consistent quantities at the time of gauging with the mortar constituents. Colouring pigments shall be completely dispersed throughout the mix in accordance with the pigment manufacturer's instructions. The volume of black pigment based on carbon black shall not

exceed 4% by volume of the lime content of the mix. Leaking of waterborne colouring pigments out of the mortar is to be avoided.

28. Pre-mixed lime mortars shall comply with BS EN 998-2 and be suitable for solid wall construction. Various lime mortar samples are to be provided by a reputable supplier for approval by the Client.

4. Brickwork

29. New brickwork for the repairs shall be constructed from bricks with similar strength, size and aesthetic characteristics to match and bond with the existing adjacent brickwork. The use of compatible reclaimed brickwork with imperial dimensions is encouraged. Any bricks shall be in good condition with all old mortar removed.

30. Reclaimed brickwork shall be made of clay and shall comply with BS EN 771-1+A1. Calcium silicate brickwork is not found at these Works. The approximate details of the reclaimed brickwork to be used for the existing structure is to be as follows:

- Dimensions: 9" x 4-3/8" x 3" (229mm x 111mm x 76mm);
- Colour: red (various shades);
- Without holes or a frog.

31. Liaison with brickwork suppliers is required to match the size, colour and texture of the brickwork types in the structure with that of reclaimed brickwork types. The following are examples of possible suppliers:

    - https://www.hadley-reclaimed.co.uk/reclaimed-bricks/three-inch-manchester-bricks/
    - https://watlingreclamation.co.uk/product/victorian-3-wirecut-brick/

32. The Contractor is to obtain approval from the Client for use of the variety of brickwork and masonry to match the repairs required for the Works.

33. The moisture content of clay bricks shall be controlled before laying to ensure that the suction rate is not greater than 2kg/m²/minute. Suction tests are to be executed in accordance with BS EN 772-11 to meet the suction rate.

34. Imperfect bricks and over or under fired bricks shall not be incorporated in any part of the Work and should be removed from site.

35. Reclaimed brickwork is not expected to have a soluble salts content category or a freeze/thaw resistance category as detailed to BS EN 771-1.

5. Cleaning of Brickwork and Masonry Repairs

36. Areas to be cleaned have been identified in P16036-ATK-CCL1-DCF-RP-CE-0001.

37. All scale, encrustations, loose deposits and vegetation should be removed from the surface of the existing brickwork.

38. Cleaning and superficial repairs to brickwork and masonry shall be carried out in accordance with BS 8221-1. Underlying brickwork or masonry shall not be damaged. The method of cleaning of brickwork and masonry and carrying out superficial repairs including details of the nature of the staining or deposits shall be included in the detailed method statement for approval by the Client.

39. Details of the Contractor's proposals for surface treatment materials and process, including evidence of previous satisfactory performance shall be submitted for review by the Client. Where surface treatments are proposed, such treatments shall not:

    (i) increase water penetration into brickwork, particularly where the mortar or bricks are in a poor condition;

    (ii) inhibit drying out of wet walls;

    (iii) increase vulnerability to frost damage; or

    (iv) be used for filling of cracks.

40. On the removal of temporary support centring or ribs and timber slats, the faces of brickwork revealed shall be concurrently scraped and cleaned.

41. No washing down shall be allowed until such time as joints are fully set. Hydrochloric acid shall not be used for washing down without prior agreement from the Client.

6. Repointing of Mortar

42. Areas to be repointed have been identified in P16036-ATK-CCL1-DCF-RP-CE-0001.

43. Repointing shall be carried out with reference to the Heritage England publication: Guidelines for best practice: “Repointing brick and stone walls” (https://historicengland.org.uk/images-books/publications/repointing-brick-and-stone-walls/).

44. The Contractor is to ensure that joints are properly compacted on application and finishing of the mortar.

45. Where cementitious mortar joints are found they should be removed without causing damage to adjoining masonry. If cementitious mortar is found in wet areas, the mortar shall be repointed to at least 30mm deep using the natural hydraulic lime mix.

46. Prior to the main work of repointing commencing, a trial area of in a discreet location shall be repointed of an area 1.0 m². Client approval of the standard of finish shall be obtained. The trial area shall be kept in a condition which permits its use for comparative purposes.

47. Defective and open joints in the brickwork should be raked out to a depth of not less than 25mm and repointed. Where the mortar beyond this depth is unsound, the Client’s agreement shall be obtained before raking out to a greater depth. The stability of the structure shall be maintained at all times. Existing mortar shall not be removed by pressure water jetting.

48. Joints to arch barrels shall be flush pointed, cut and struck as work proceeds. When repointing, joints shall be filled without any voids. Joints shall not be buttered over.

49. Pointing shall be carried out as the work proceeds, while the mortar is still green. Pointing shall be either by hand or by any approved mechanical method (without damaging any brickwork).

50. For site made mortars, the mixing of the mortar should be in accordance with BS 5628-3.

51. Batched mixes shall be sheltered from rain and protected with a damp covering in dry, hot conditions to prevent rapid drying out.

52. Batched mixes shall be used within 2 hours of mixing or within the time specified by mortar suppliers or shall be discarded. The mortar may be reconstituted ('knocked up') within this time limit as specified by mortar suppliers to maintain a practical workability. Volume proportions shall be correctly gauged, and allowance made for bulking of damp sand.

53. During the hardening and curing of the mortar in the repair, adequate precautions should be taken to ensure that the temperature, environmental and weather factors do not cause any adverse effect on the performance of the mortar. These factors shall be monitored and recorded so that an assessment can be made of the actual strength gain of the mortar in-situ.

54. The sequencing of repointing shall ensure that previously repointed areas shall not be damaged by the repointing work in progress.

55. When repointing, provided the type of brick is suitable, the bricks shall be in a damp condition. This may be achieved, if necessary, by wetting the raked-out joints with clean water. The brickwork shall not be soaked.

56. Raked out joints shall be free from vegetation, dust and mineral particles. Brick edges shall not be damaged and are to be cleaned of old mortar.

57. Raking out of perished mortar is to be minimum 25mm deep from the face of brickwork or 15mm into sound mortar beneath, whichever is the deepest.

58. All brickwork installed shall be well 'buttered' with mortar (especially where thin joints less than 10mm are present). Gun application of mortar is not permitted in these circumstances.

59. Mortar which has begun to dry out or harden shall not be used for repointing and shall not be reconstituted by the addition of further water. Repointed brickwork or masonry shall be protected from frost damage.

60. Percolating water must be dealt with by redirecting through drainage channels and weep holes before attempting the repair.

7. Brickwork Replacement

61. Areas of brickwork to be repaired have been identified in P16036-ATK-CCL1-DCF-RP-CE-0001.

62. Details for the spot replacement of bricks in arch barrels and piers can be found on drawing P16036-ATK-CCL1-DCF-DR-CE-0034, contained in Appendix A of this specification.

63. Details for large scale arch barrel replacement of brickwork can be found on drawing P16036-ATK-CCL1-DCF-DR-CE-0032, contained in Appendix A of this specification.

64. The assumed arch barrel thickness shall be determined by measuring the number of rings on the arch face and are assumed to be constant for the full length of the arch, not including any backing.

65. Where brickwork recasing is required to the arch barrel greater than 1.0m² at a time, drilling should be carried out to understand the arch barrel thickness at the repair site. A method statement is to be provided to the Client for acceptance, before drilling commences.

66. Drilling shall not penetrate the arch barrel extrados, such that it could cause damage to the waterproofing. Archive information is available showing that backing is present above the arch barrel, but only at limited locations.

67. At areas where there is no structural backing (likely to be above the crown area), localised recasing more than 1.0m² is not permitted.

68. At areas where structural backing is proven to be present (likely above the lower haunch areas), localised recasing greater than 1.0m² is permitted, subject to structural assessment calculations and Client approval.

69. Brickwork recasing in arch barrels greater than 1.0m² at a time cannot be carried out under live loading conditions, unless structural assessment calculations and Client approval show such work can be carried out safely.

70. Brickwork recasing in arch barrels up to 1.0m² at a time can be carried out under live load conditions with the following restrictions:

    i) recasing cannot be carried out in the crown area (approximately the middle third of the barrel) within 2.0m of tram rails; and

    ii) recasing can be carried out beneath tram rails, in the haunches, but only where structural backing is proven to be present.

71. Where restrictions are in place, live loading should only commence after a minimum 12 hours has elapsed after the recasing has been completed. Temporary works should remain in place until the mortar has set (in line with sample mortar test results).

72. Repairs required to brickwork which is subjected to running water or seepage that causes continuous wetting is to be reported to the Client and approval obtained before commencement.

73. Repairs to brickwork and masonry shall not adversely affect the performance of the structure by the introduction of local stiffening or alteration of the load path through the structure.

74. Cutting away of decayed or defective brickwork, especially in the arch barrel rings, shall be carefully carried out to minimise disturbance to the adjoining brickwork or masonry, which should be supported or shored up in line with the temporary works requirements. Any existing adjacent brickwork shall be reset as required.

75. Brickwork reinstatement to the arch barrel shall be executed by installing brickwork in the bond as identified at the repair location. Brickwork bonding shall only be carried out between the first and second rings in 5No. (minimum) ring thick arch barrels as part of the Works.

76. Snapping of headers is not permitted, but where headers are broken between the second and third rings, this is to be reported to the Client and a technical query raised to find a solution for repair.

77. For any arch barrels, pocket arches or smaller spans with 4 No. or less brickwork rings, it is not permitted to break out into the second ring. Any broken headers are to be reported to the Client and a technical query raised to find a solution for repair.

78. Where no bond is found between rings in the arch barrel (header bond giving a continuous mortar joint between rings) anchor ties shall be used, and the Client shall be informed.

79. Anchor ties (only as required in accordance with clause 78 of this specification) shall be installed as the work proceeds in a diamond pattern with a nominal pitch of 400mm x 400mm. Anchors shall be fixed with resin bonding products suitable to achieve a pull-out force of 10 kN (minimum) into the masonry with approval obtained from the Client. Anchors shall be a minimum of 200mm long, embedded into the brickwork at least half of their length and shall not be cut. Anchors shall be heavy-duty formed safety ties or heavy-duty flat ties, manufactured from grade 304 stainless steel and have a service life of at least 60 years.

80. Recasing of the arch barrel at one location is restricted to a maximum base dimension of 1.2 metre or 5No. bricks at a time. It is permissible to carry out recasing on a hit and miss basis in arches, therefore at any one time there may be more than one area of recasing being executed in one arch barrel.

81. The locations of recasing are to be planned and submitted to the Client for approval. Only one area of recasing is permitted to be carried out in that portion from springer to springer. Each area of recasing along the length of the arch barrel must be 2.0m apart and along the arch curve there should only be 1 repair within a 1m strip of the arch barrel.

82. Ideally, all brickwork taken out during recasing is replaced in the same shift.

83. Recasing of walls (abutments and piers only) must not be carried out without further investigation. Defects on walls identified in the Works Schedule require investigation to identify the cause of the defect and any associated damage. Where recasing is deemed necessary, the Contractor must propose a method for recasing. Guidance can be found in the latest version of Network Rail's Standard Repair Drawing for Recasing Vertical Walls, NR/CIV/SD/116.

84. Where new brickwork is to be bonded to existing, the surface of the existing brickwork behind the repair shall be wetted to control the suction rate as far as reasonably practicable. If build-up of calcium deposits is found between the rings, these should be cleaned off.

85. Partial or cut bricks, closures, or special shapes shall not be used without prior approval from the Client.

86. The finished front face of new brickwork or masonry shall be flush and match the adjacent brickwork or masonry. Brickwork shall be built-up to the finished profile. No brickwork or pointing shall be built overhand.

87. For cold weather working, brickwork should not be laid when the air temperature is below 5ºC, when temperature is falling, or below 3ºC when the temperature is rising. Work shall not be carried out using frozen materials. During frost, danger of frost and inclement weather, brickwork shall be continuously protected until the mortar is thoroughly set. Brickwork damaged by frost, or any other cause, shall be taken down and replaced. BS 5628-3 (Appendix A.4.2.3.8) provides guidance on working at temperatures less than 5°C.

88. If more brickwork has been cut out than can be replaced in one shift, the opening must be sealed by dry lagging using timber laggings wedged into place. The top surface of unfinished brickwork shall be protected when work is not in progress, and special care taken to prevent any perforations, cavities and so on becoming filled with water or rainwater.

8. Repair to Hollow Brickwork

89. Areas of hollow sounding brickwork have been identified in P16036-ATK-CCL1-DCF-RP-CE-0001.

90. Grouting of hollow brickwork areas shall be in accordance with the details shown on drawing P16036-ATK-CCL1-DCF-DR-CE-0035, contained in Appendix A of this specification. Stitching bars shall not to be installed. Any drilling is to be through mortar joints only and the front face of the drill hole repointed accordingly.

91. Grout shall be a ready-made pure lime grout complying with BS EN 459-1:2015. Proprietary products should be considered by the Contractor to increase the setting time of the grout. The Contractor should consider using St. Astier ‘Coulinex’ or similar capable products. The Contractor must also take measures to reduce grout loss.

92. Brickwork or masonry in the area to be grouted shall be cleaned of all calcium or other deposits. Any defective brickwork or masonry, cracks and poor mortar joints in the area to be grouted shall be repaired in accordance with this specification prior to commencement of grouting operations.

93. New brickwork, and the bond between bricks and mortar and tie bars, shall not be damaged by the formation of holes.

94. Holes for pinning and grouting, other than trial drillings, shall not extend to within 100 mm of the rear face of the brickwork or masonry, as measured along the centreline of the hole. Trial drillings shall be carried out to determine the overall thickness of the brickwork or masonry to be grouted.

95. Before grouting, holes shall be clear of all water, dust and debris. The Contractor must also mark out the grid for grouting holes on the arch soffit.

96. Intersection holes shall be drilled at an angle of between 30° & 45° to a plane normal to the tangent of the arch intrados. Details are shown on drawing P16036-ATK-CCL1-DCF-DR-CE-0035 contained in Appendix A of this specification.

97. Pointing or mortar shall obtain sufficient strength prior to commencement of the grouting operation.

98. The method of grouting and the materials chosen shall ensure that the grout permeates into the brickwork or masonry while minimising leakage, taking into account the condition of the brickwork or masonry. The method, choice of materials, and anticipated grout-take, shall be included in the detailed method statement and submitted to the Client for approval.

99. The amount of grout-take shall be closely monitored and recorded. If grout-take exceeds that calculated or otherwise anticipated, grouting shall cease. The reason for the amount of grout-take shall be investigated, and the Client shall be advised of the Contractor's revised proposals. If leakage of grout is anticipated through porous brickwork, a thixotropic stabiliser for cementitious grouts may be used.

100. On completion of the grouting, grouting tubes shall be removed and the holes pointed up with mortar to match the existing structure.

9. Repair to Cracked Brickwork

101. Details for the spot replacement of bricks in arch barrels and walls due to brickwork fracturing can be found on drawing P16036-ATK-CCL1-DCF-DR-CE-0034, contained in Appendix A of this specification.

102. Bricks shall be replaced along the length of a fracture wherever a full crack through brickwork has occurred.

10. Temporary Works

103. Typical formwork comprises flat bar steel rib centring matching the profile of the arch and secured by anchors driven into the second or third ring depending on the number of rings to be recased.

104. The integrity of the brickwork surrounding the repair area should be maintained using 'retention laggings' supported with folding wedges on the centring ribs. This defines the spacing for the 'construction laggings'. Laggings should be placed parallel to the brick course and secured in place with timber packing and folding wedges.

105. The flat bar steel rib centring is only suitable for recasing repairs in the lower haunches within which the exerted forces are considered negligible by the Client.

106. Preformed and jointed steel ribs shall be used in the upper haunches and crown when a more robust centring arrangement is required.

107. Centring is not required in vertical walls.

108. Unless otherwise specified, holes must not penetrate the arch extrados to prevent damage to the waterproofing. Therefore, all holes shall stop 100mm (minimum) short of the arch extrados. Refer to Section 7 of this specification for the recommended method for determining arch barrel thickness.

109. All holes shall be drilled out and flushed clear of all dust and debris.

110. Temporary works details specified here, and related drawings are indicative only and are meant for guidance. The Contractor must satisfy themself and the Client that all temporary works are correctly designed for the expected loading conditions.

111. For temporary works items to be considered when recasing arch barrels, refer to Section 7 of this specification.

112. Generally small, isolated areas of repair would not necessitate the need for formwork support. Small wedges securing the perpendicular and bed joints should suffice until striking up of the joints can be achieved. Wedges should be removed and local spot repairs carried out.

113. Putlog and all other temporary holes are not permitted for these Works.

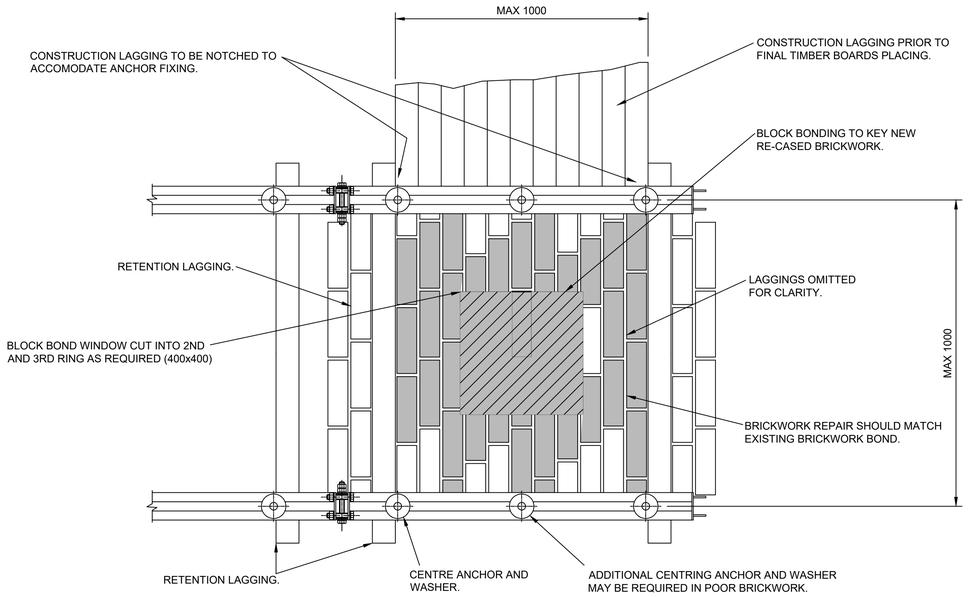
114. Sacrificial anchors used for securing temporary works centring ribs are to be stainless steel and shall be able to withstand a pull-out load of 10 kN (minimum). Where anchors are cut, they shall be recorded on the as-built drawings showing their positions.

115. Anchors shall be stainless steel high yield deformed reinforcing bar (Grade 1.4436) complying with BS 6744 and BS EN 10088-1.

APPENDICES

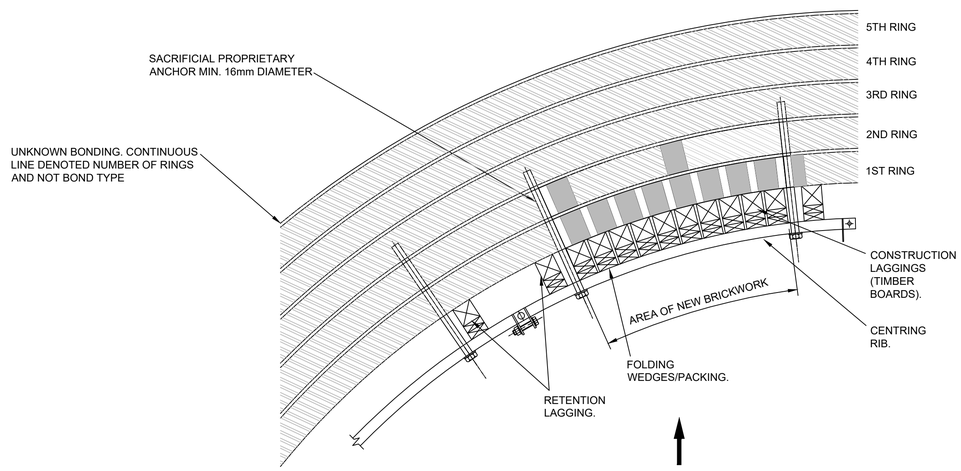
Appendix A. Repair Drawings

DO NOT SCALE



VIEW ON B - (BLOCK BONDING)

SCALE 1 : 10



PART SECTION THROUGH ARCH - (5 No. RINGS SHOWN)

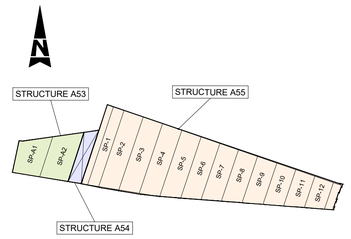
SCALE 1 : 10

SUGGESTED CONSTRUCTION SEQUENCE

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1. POSITION AND ERECT CENTRING (RIBS AND LAGGING) TO THE PROFILE OF THE ARCH TO BE REPAIRED.
2. SACRIFICIAL ANCHORS TO BE USED FOR SECURING CENTRING.
3. CAREFULLY BREAK OUT DEFECTIVE BRICKWORK IN FIRST RING ONLY.
4. INSPECT THE CONDITION OF THE SECOND RING.
5. INFORM THE CLIENT OF THE NEED FOR FURTHER BREAK OUT OR FOR THE NEED TO ANCHOR/TIE IN SECOND COURSES MORE EFFECTIVELY. NO BREAK OUT IS PERMITTED INTO THE THIRD RING UNDER ANY CIRCUMSTANCES.
6. WHERE NEW BRICKWORK IS TO BE BONDED INTO THE SURFACE OF THE EXISTING BRICKWORK, THE BRICKWORK IS TO BE WETTED TO CONTROL SUCTION RATES.
7. AS BRICKWORK RECASING PROGRESSES, THE CENTRING IS TO BE FIRMLY IN POSITION AND WEDGED INTO PLACE.
8. MOVE CENTRING LOCALLY BY TEMPORARILY MOVING LAGGING TO ALLOW GREEN MORTAR TO BE BRUSHED CLEAN AND STRUCK.
9. REMOVE THE CENTRING, LAGGING AND WEDGES IN THE APPROPRIATE ORDER WHEN THE RECASED BRICKWORK IS SET AND ABLE TO REMAIN IN PLACE UNDER ITS OWN STRENGTH.
10. ANCHORS TO BE CUT BACK AND ATTACHMENT HOLES MADE GOOD.

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. THIS DRAWING IS TO BE READ IN CONJUCTION WITH THE BRICKWORK REPAIR SPECIFICATION P16036-ATK-CCL1-DCF-SP-CE-0002.
3. THE DRAWING SHOWS THE NUMBER OF ARCH RINGS THAT IS TYPICAL OF THE MAIN ARCH BARRELS IN STRUCTURE A55. THERE ARE 6No. ARCH RINGS IN THE ARCH BARRELS OF STRUCTURE A53.
4. THE BOND OF THE BRICKWORK REPAIR SHOULD MATCH EXISTING.
5. REPAIR TO BE LIMITED TO MAXIMUM OF 2 No. RINGS ONLY WHERE THERE ARE 5No. RINGS OR MORE IN AN ARCH BARREL.
6. HEADERS ARE NOT TO BE REMOVED OR SNAPPED.
7. IF A BROKEN HEADER IS FOUND BETWEEN THE SECOND AND THIRD RINGS, IT IS TO BE REPORTED TO THE CLIENT.
8. RECASING SHALL BE RESTRICTED TO AN AREA OF 1000 x 1000 OR LESS, UNLESS OTHERWISE DIRECTED BY SECTION 7 OF THE SPECIFICATION.
9. RECASING WORKS SHALL NOT BE CARRIED OUT UNDER LIVE LOADING. REFER SECTION 7 OF THE SPECIFICATION.



KEY PLAN

Rev.	Date	Description	By	Chk'd	App'd
P02	21/03/25	Second Issue	PM	ND	KG
P01	04/02/25	First Issue	PM	ND	KG

Drawing Status: FOR INFORMATION

Suitability: S2

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Client: Transport for Greater Manchester

Project Title: TfGM Deansgate Castlefield Arches

Drawing Title: BRICKWORK REPAIR SPECIFICATION RECASING OF DEFECTIVE BRICKWORK

Scale	Designed	Drawn	Checked	Authorised
As Shown	ND	PM	KG	JI
Original Size	Date	Date	Date	Date
A1	15/01/25	11/03/25	12/03/25	21/03/25

Drawing Number: P16036-ATK-CCL1-DCF-DR-CE-0032

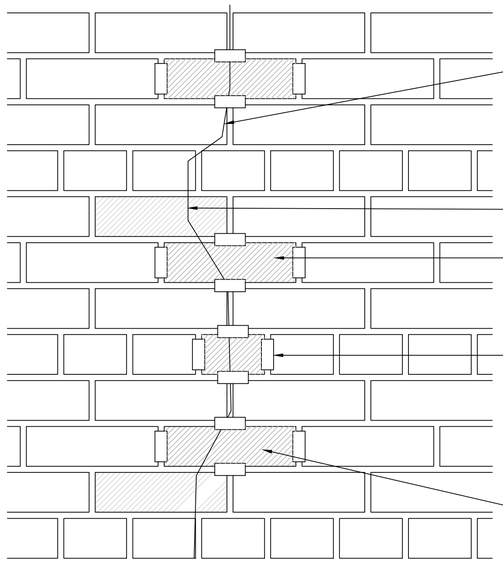
Revision: P02

Internal Project Number: 5225062

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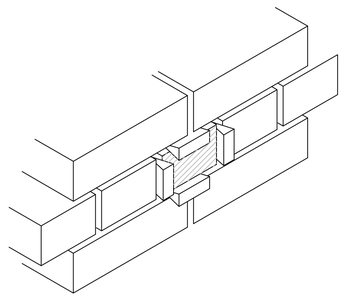
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DO NOT SCALE



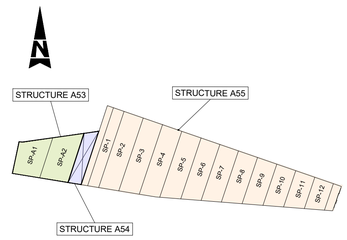
ELEVATION OF THE SPOT REPLACEMENT OF BRICKS IN ENGLISH BOND

SCALE 1 : 5



ISOMETRIC VIEW SHOWING TIMBER WEDGES USED TO SECURE SPOT REPLACEMENT OF BRICKS

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. THIS DRAWING IS TO BE READ IN CONJUCTION WITH THE BRICKWORK REPAIR SPECIFICATION P16036-ATK-CCL1-DCF-SP-CE-0002.
3. FOR GUIDANCE ON THE SPOT REPLACEMENT OF BRICKS REFER TO SECTION 7 AND 8 OF THE SPECIFICATION.



KEY PLAN

Rev.	Date	Description	By	Chk'd	App'd
P02	21/03/25	Second Issue	PM	ND	KG
P01	04/02/25	First Issue	PM	ND	KG

Drawing Status: FOR INFORMATION

Suitability: S2

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Client: Transport for Greater Manchester

Project Title: TfGM Deansgate Castlefield Arches

Drawing Title: BRICKWORK REPAIR SPECIFICATION SPOT REPLACEMENT OF BRICKS

Scale	Designed	Drawn	Checked	Authorised
As Shown	ND	PM	KG	JI
Original Size: A1	Date: 15/01/25	Date: 11/03/25	Date: 12/03/25	Date: 21/03/25

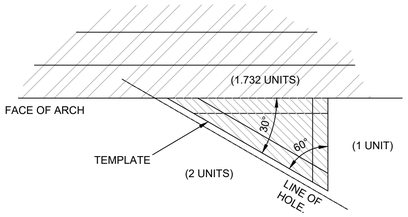
Drawing Number: P16036-ATK-CCL1-DCF-DR-CE-0034

Revision: P02

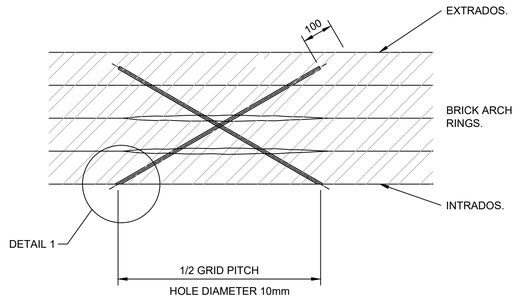
Internal Project Number: 5225062

USER: HICK2140 Date: 21/3/25 14:13:26 Filename: C:\projects\elevations_highways_v4.dwm\79157\P16036-ATK-CCL1-DCF-M2C-CE-0038.dwg

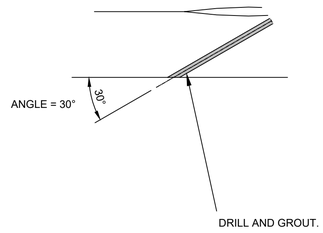
DO NOT SCALE



TYPICAL 30° TEMPLATE
SCALE 1 : 10



SECTION B - B
ARCH RINGS DRILLING AND GROUTING ARRANGEMENT
SCALE 1 : 10

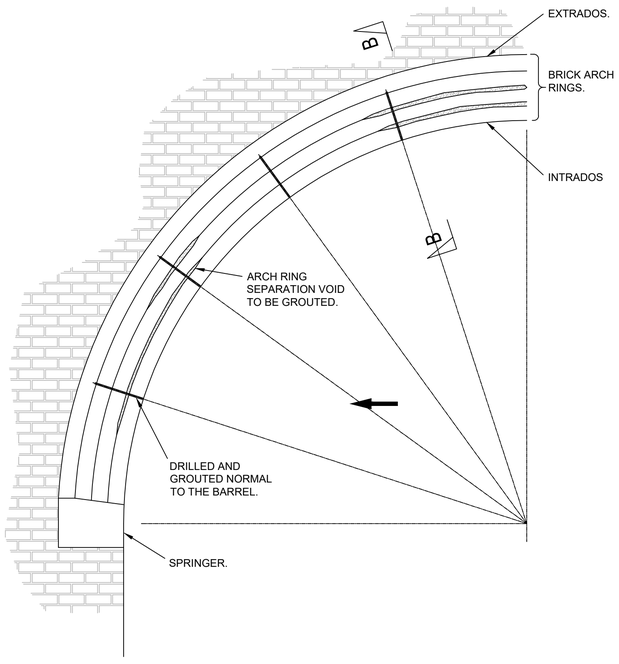


DETAIL 1
SCALE 1:5

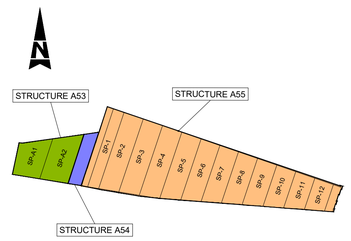
SUGGESTED CONSTRUCTION SEQUENCE

1. ADJACENT AREAS OF LOOSE OR SPALLED BRICKWORK TO BE REPAIRED BEFORE WORK TO GROUT COMMENCES.
2. MARK OUT THE DIAMOND PITCH GRID ON THE ARCH SOFFIT WHERE HOLLOW BRICKWORK OCCURS.
3. ALL HOLES TO BE DRILLED THROUGH BRICK AND MASONRY UNITS USING CONVENTIONAL DRILLS INTO THE TOP ARCH RING AND TO WITHIN HALF A BRICK WIDTH OF THE EXTRADOS (SHOW AS 100MM AT 45 DEGREES IN THE DRAWING).
4. SPACING BETWEEN GROUT HOLES IS TO VARY ACCORDING TO THE ARCH BARREL THICKNESS AND FOLLOW THE DIAMOND GRID PATTERN AS REQUIRED.
5. GROUT IS TO BE INJECTED FROM THE LOWEST HOLE FIRST UNTIL IT ISSUES FROM THE NEXT HIGHER HOLE OR NO FURTHER INJECTION PRESSURE CAN BE APPLIED.
6. PROCESS TO INJECT GROUT AT LOW AND VARIABLE PRESSURES UP THE ARCH BARREL TO MINIMISE LEAKAGE.
7. THE CONTRACTOR IS TO CLOSELY MONITOR THE WORK TO MINIMISE THE RISK OF 'BLOW-OUT'.
8. THE GROUT IS NOT TO INCLUDE STITCHING BARS, THUS A TEMPORARY PLUG OR BUNG IS TO BE INSTALLED AT EVERY GROUT HOLE TO PREVENT LOSS OF GROUT MATERIAL.
9. REMOVE THE BUNG AFTER THE SET PERIOD AND POINT UP WITH THE REQUIRED MORTAR.

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. THIS DRAWING IS TO BE READ IN CONJUCTION WITH THE BRICKWORK REPAIR SPECIFICATION P16036-ATK-CCL1-DCF-SP-CE-0002.
3. TO ENSURE THE CORRECT DRILLING ANGLE IS MAINTAINED DURING INSTALLATION OF THE GROUT A TEMPLATE SHOULD BE USED. THIS SHOULD BE CUT FROM SUITABLE PLYWOOD TO GIVE THE REQUIRED DRILLING ANGLE. THE ANGLE MAY VARY BETWEEN 30 - 45° DEPENDING ON THE NUMBER OF RINGS.



PART ELEVATION OF ARCH
SCALE 1 : 20



KEY PLAN

Rev.	Date	Description	By	Chk'd	App'd
P03	11/04/25	Third Issue	PM	ND	KG
P02	21/03/25	Second Issue	PM	ND	KG
P01	04/02/25	First Issue	PM	ND	KG

Drawing Status: FOR INFORMATION
Suitability: S2

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Client: Transport for Greater Manchester

Project Title: TfGM Deansgate Castlefield Arches

Drawing Title: BRICKWORK REPAIR SPECIFICATION ARCH CROSS GROUTING

Scale	Designed	Drawn	Checked	Authorised
As Shown	ND	PM	KG	JI
Original Size	Date	Date	Date	Date
A1	11/04/25	11/04/25	11/04/25	11/04/25

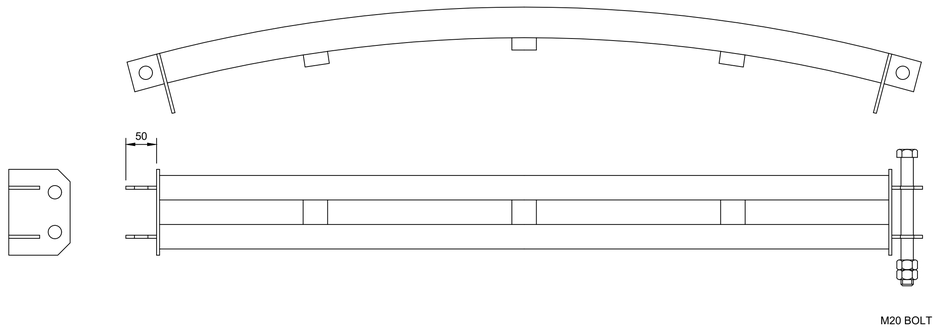
Drawing Number: P16036-ATK-CCL1-DCF-DR-DE-0035
Revision: P03

Internal Project Number: 5225062

USER: HICK2140 Date: 11/4/25 14:20:12 Filename: C:\projects\elevations_highway_skidmm\79157\P16036-ATK-CCL1-DCF-MD-CE-0038.dwg

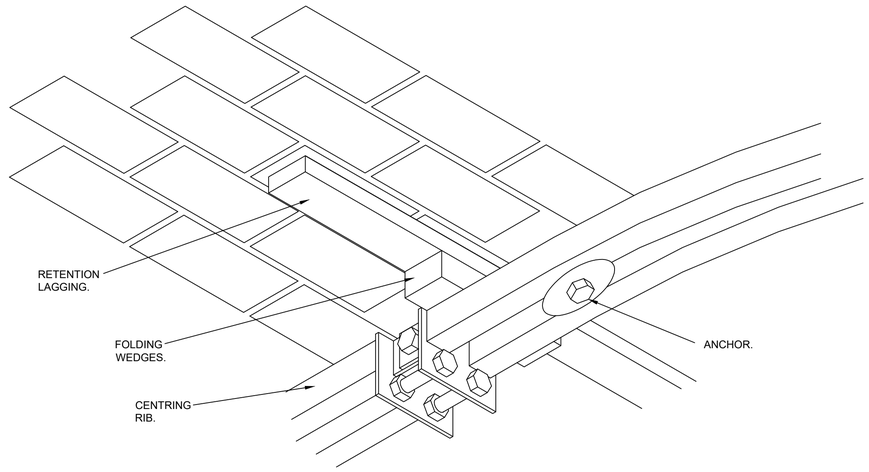
DO NOT SCALE

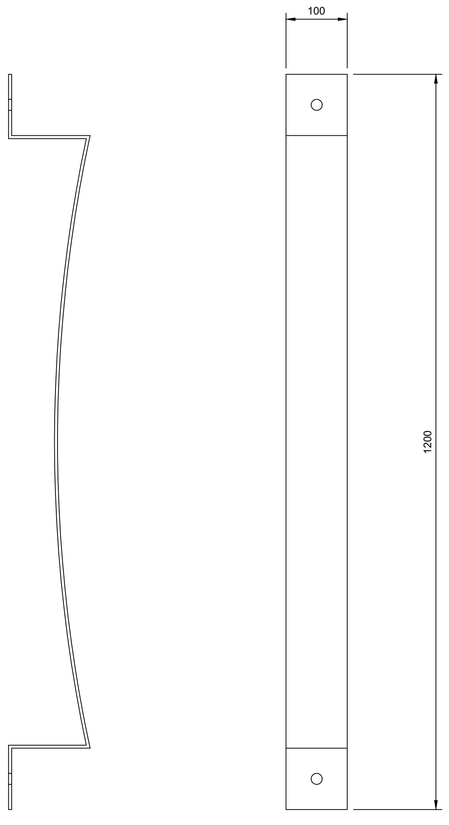




TYPICAL CENTRING RIB FOR UPPER HAUNCH AND CROWN REPLACEMENT

SCALE 1 : 5

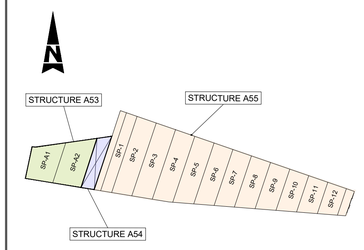




TYPICAL CENTRING FOR LOWER HAUNCH AREAS LESS THAN 1m

SCALE 1 : 5

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. THIS DRAWING IS TO BE READ IN CONJUCTION WITH THE BRICKWORK REPAIR SPECIFICATION P16036-ATK-CCL1-DCF-SP-CE-0002.
3. TYPICAL CENTRING FOR LOWER HAUNCH AREAS CAN BE USED ONLY IF STRUCTURAL BACKING IS PRESENT. REFER TO SECTION 7 OF THE SPECIFICATION.



KEY PLAN

Rev.	Date	Description	By	Chk'd	App'd
P02	21/03/25	Second Issue	PM	ND	KG
P01	04/02/25	First Issue	PM	ND	KG

Drawing Status: FOR INFORMATION

Suitability: S2

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Project Title: TfGM Deansgate Castlefield Arches

Drawing Title: BRICKWORK REPAIR SPECIFICATION TEMPORARY WORKS ARRANGEMENT

Scale	Designed	Drawn	Checked	Authorised
As Shown	ND	PM	KG	JI
Original Size: A1	Date: 15/01/25	Date: 11/03/25	Date: 12/03/25	Date: 21/03/25

Drawing Number: P16036-ATK-CCL1-DCF-DR-CE-0036

Revision: P02

Internal Project Number: 5225062

USER: HGK2140 Date: 21/3/25 14:14:30 Filename: C:\projects\estates_highways_ukdms\79157\P16036-ATK-CCL1-DCF-MD-CE-0038.dwg

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