C606/T3/92 (	Unknown)
C754/T3/93 (	Unknown)
C441/T3/94	Cross sections. Intermediate span.
C442/T3/95	Intermediate span. Elevation of inner & outer ribs (shore half)
C443/T3/96	Intermediate span. Quarter plan of flooring. Shore half.
C444/T3/97	Intermediate span. Elevation of inner & outer ribs (river half)
C445/T3/98	Intermediate span. Quarter plan of flooring. River half
C634/T3/99	(Cross bracing overview in a single span)
C635/T3/100	Arrangement of ribs. Cross girders & bottom chord bracing.
- (	Unknown)
C636/T3/101 (	Unknown)
C600/T3/274-57 (	Unknown)
C647/T3/102	(Details of inner ribs for intermediate spans)
C426/T3/49 (Gen	eral arrangement)
C647/T3/103 Part 1	Details of inner ribs for intermediate spans
C647/T3/103 Part 2	Details of inner ribs for intermediate spans
C648/T3/104	Details of inner ribs for intermediate spans
-	Details of inner ribs for intermediate spans
C648/T3/105	Details of inner ribs for intermediate spans - River end
C633/T3/106	Details of inner ribs - intermediate span - River end
C640/T3/107	Details of inner ribs - intermediate span - River end
C645/T3/108	Details of inner ribs - intermediate span - River end
C678/T3/109	Intermediate span - shore end of outer rib
C679/T3/110 Part 1	Details of outer ribs for intermediate spans
C679/T3/110 Part 2	Details of outer ribs for intermediate spans
C682/T3/111	Intermediate span - details of outer rib
C711/T3/112	(... of parapet girders for intermediate spans)
C641/T3/113	Arrangement of cross bracing for intermediate spans
C658/T3/114	Intermediate span - cross bracing at panel point 1
C659/T3/115	Intermediate span - cross bracing at panel points 2 & 3
C660/T3/221	Intermediate span - cross bracing at panel points 4, 5 & 14
C661/T3/117	Intermediate span - cross bracing at panel points 15 & 16
C662/T3/118	Intermediate span - cross bracing at panel points 17 & 18
C663/T3/119	Intermediate span - cross bracing at panel point 19
C663/T3/120	Intermediate span - cross bracing at panel point 20
C663/T3/121	Details of bottom chord bracing - Intermediate spans
C639/T3/122	Details of bottom chord bracing - Intermediate spans
C642/T3/123 (	Unknown)
C644/T3/124	(Details of cross girder in road ... Lambeth & Westminster Intermediate spans)
-	Details of inner rib for intermediate spans
C680/T3/125 (	Unknown)
C681/T3/126	Details of cross girders in footways - intermediate span
C702/T3/127	Proposed section of troughing for roadways
C704/T3/128	Intermediate span (Westminster) - Marking plan of troughing etc.

C705/T3/129	Intermediate span (Westminster) - Marking plan of troughing etc.
C712/T3/130	(Details of ... troughing under roadway)
C713/T3/131	(Lambeth intermediate spans - details for ... troughing under roadway)
C714/T3/132	Intermediate spans - details of roadway troughs
C715/T3/133	Details for bearing plates & trough stools
C706/T3/134 (	Unknown)
C707/T3/135	(Intermediate span - Details of ... plates under footways)
C708/T3/136	Intermediate spans - details of footway troughs
C709/T3/137	Intermediate spans - details of tramway conduit
C710/T3/138	Intermediate spans - detail of tramway conduit
C446/T3/139	Cross sections. Centre span.
C447/T3/140	Centre span. Elevation of inner & outer ribs
C448/T3/141	Centre span. Quarter plan of flooring
C449/T3/142	Details of cast steel bearings for outer ribs
C563/T3/143	Details for skewbacks for piers 1 & 4
C566A/T3/144	Proposed modification of bearings + skewbacks to inner rods & detail of jacking arrangements for positioning of bearings
C569/T3/145	Details of skewbacks in abutments
C570/T3/146 (Beari	ngs)
C667/T3/147	Screen plate for bearings
C450/T3/148	Details of parapet.
C760/T3/149	Sketches showing details of junction between cap of parapet and granite at piers 1 & 4 river side
C684/T3/ (	Unknown)
C550A/T3/	(... Westminster abutment, downstream)
C549/T3/	Westminster abutment, upstream side
C551A/T3/153	(Lambeth abutment ...)
C672/T3/154	Protective spikes on parapets at piers
C456/T3/155	Details of obelisks
C656/T3/156	Westminster approach - relative position of pylon & steps
RE/LB78/T3/	Approach steps at abutments. Detail of access and ventilation to voids
C454/T3/158	Retaining walls, parapet & steps. Downstream sides
C455/T3/159	Retaining walls, parapet & steps. Upstream side
C822/T3/161	Proposed waterproofing of conveniences and store Victoria Tower gardens
C782A/T3/162	Pile foundations to retaining wall, Millbank, conveniences & store. Victoria tower gardens.
C548/T3/164	Staircase at Lambeth end
C553/T3/165	Lambeth approach. Proposed new levels & details of walls to steps
C594/T3/166	Lambeth approach. Walls to steps.
C558/T3/167	Lambeth approach. Walls to steps.
C877/T3/166	New navigation lights
RE/LB83/T3/169	Bridge lighting. Layout of ducts & junction boxes.
RE/LB82/T3/170	Navigation lights. Detail of electric wiring tubes, spans 2, 3 & $.
RE/LB36/T3/171	Proposed permanent level reference points of piers and abutments
C881/T3/172	Plan showing position & details of level pins and record of levels taken
C874/T3/179	Proposed traffic signals at eastern approach. Fixing of detectors on bridge.

C457/T3/174	Drainage plan & roadway details
BA/162/6/T3/175	War damage 30th Nov. 1940
C677/T3/176 (	Unknown)
BY/202/1/T3-177 Propo	sed pedestrian crossing at West End Bridge
BY/202/1/T3-178	Carriageway paving maintenance plan
BY/202/3/T3-179 Gully	grating
BY/202/4/T3-180	Protective spikes at piers
BY/202/5/T3-181	Maintenance boundary at East approach
BY/202/6/T3-182 Plan	accompanying agreement for street cleansing
BY/202/1/T3/	Proposed access to piers
BY/202/2/T3/184	Repairs to parapet damaged 9th January 1951
/T3/184A	Portion of bridge shewing position for inscription
HC/202/A/5/T3/94	Services in footways - sections
HC/202/C/4/T3/186	Colour scheme for repainting
BY/202/6/T3/187	Damage to granite of pier no. 3 - downstream side
BY/202/7/T3-788	Repairs to carriageway
BY/202/8/T3-189	Proposed zone entry & exit sign at eastern end of bridge
BY/202/9/T3-190	White traffic lines
BY/202/10/T3-191	Existing Traffic Signs
HC/202/A/7/T3/	Details of soundings
HC/202/C/8/T3/	G.A. and details of support backers
HC/202/C/9/T3/	G.A. and details of hand-railing to piers
C770.C/T3/CALC-1	Centre span. Diagram showing relations between changes of span, rise and fall of crown, horizontal thrusts and maximum stresses at centre of rib
C770.B/T3/CALC-2	Intermediate span. Diagram showing relations between changes of span, rise and fall of crown, horizontal thrusts and maximum stresses at centre of rib
C770.A/T3/CALC-3	Shore span. Diagram showing relations between changes of span, rise and fall of crown, horizontal thrusts and maximum stresses at centre of rib
C770.A/T3/102	Shore span. Diagram showing relations between changes of span, rise and fall of crown, horizontal thrusts and maximum stresses at centre of rib
C645/T3/103	Test load diagram
C847/T3/CALC-5	Deflection load tests. Diagrams showing the movements of wires & plugs.
C845/T3/CALC-6	Deflection load tests. Sketch plans of the traction engines and trailers showing leading dimensions and traction loads
C845/T3/CALC-7	Diagrams embodying the results of the load-deflection tests carried out on the 30 June 1932
C818/T3/CALC-8	Thrusts on piers and foundation pressures

Table 3-3 Battersea Bridge

Drawing Number	Description
21466/02	Pier alterations. Piers 1 & 4: sheet 1
WEC/PJW/101441/02	Defects Location Plan
(Gen	eral arrangement)
IC/11276/J3/6 Structu	ral Elements
11276/J3/2	Computer model, centre span
11276/J3/3	Computer model, centre span

11276/J3/4	Computer model, centre span
11276/J3/5	Computer model, centre span
CD/2/T7_9 Longitu	dinal sections of bridge and approaches
BC/206/36	Bracings to Facia Girder, Upstream side
BC/206/37	General plan of steelwork, cross section and details
025884	Details of Piers
025885	Details of wrought iron work and of pier gully
025886	Details of Skewbacks and Arched ribs
025887	Centre span - ribs and cross bracing
025888	Centre span - ribs and cross bracing
025896	Intermediate spans - ribs and cross bracing
025897	Intermediate spans - ribs and cross bracing
025898	Intermediate spans - ribs and cross bracing
025899	Shore spans - ribs and cross bracing
025900	Shore spans - ribs and cross bracing
025894	Details of Ironwork for Centre Span
025895	Details of Ironwork for Centre Span
025890	Details of Ironwork for Centre Span
025891	Details of Coving (Centre Span)
025901	Details of Cast Iron Cornice
025902	Details of Cast Iron Parapet
025875	Longitudinal sections of bridge and approaches
025884	Details of Piers

3.3. Access

The Port of London Authority (PLA) is the custodian of the River, all river access must be booked via the PLA in alignment with their procedures, BAM Nuttall shall facilitate and liaise with the PLA for the purpose of inspections.

Approximately 50% of Vauxhall south abutment can be accessed via a secure gated area adjacent to MI5 building.

3.4. Restrictions

Table 3-4 Restriction imposed by various stakeholders

Stakeholder	Contact Details	Restriction
To be supplied by Atkins at a later date	To be supplied by Atkins at a later date	To be supplied by TfL at a later date

3.5. Hazards and Risks

In addition to the hazards and risks normally associated with the types of work detailed in this specification, the Principal Contractor and their subcontractors shall consider the following significant residual risks whilst planning and undertaking the works.

- Vehicular, pedestrian and river traffic
- Tidal changes and river flows
- Working at height, including roped access
- Bird droppings
- Confin ed spaces
- Dro wning
- Lead and heavy metal content in existing paint
- Interface with services
- Refer to TfL Asbestos management Plans where available.

The above list is not exhaustive and care should be taken to maintain the safety of the public, workforce, environment, security and infrastructure.

3.6. Statutory Undertakers Apparatus

The Contractor shall comply with the various statutory bodies' requirements.

A STATS plan is included in Appendix C. STATS returns can be made available on request

4. Survey Investigation and Testing

4.1. General

The works comprise Special Inspection and Non Destructive Testing (NDT). The works shall be carried out during the daylight hours unless specific restrictions are imposed by stakeholders (see Section 3.4). If works are to be carried out during night, appropriate lighting arrangements shall be put in place to facilitate works to be carried out effectively and safely.

Note: Works shall comply with the stakeholder requirements as listed in Section 3.4.

A method statement shall be submitted to the client in advance of the works being undertaken on site. It shall include the information listed below as a minimum:

- Means of access
- Details of welfare facilities
- Methodology of proposed works submitted for review and approval
- R isk assessment
- Emerge ncy plans

Table 4-1 Works Summary

Name of Bridge	Special Inspection	Testing
Vauxhall Bridge	Inspection of upper level bearings and pin bearings	NDT of pin bearing
Lambeth Bridge	Inspection of upper level bearing and pin bearings	NDT of pin bearing
Battersea Bridge	Inspection of upper level bearings	Not applicable

4.2. Special Inspection

Special Inspection shall be undertaken in accordance with BD 63/07 by competent bridge inspectors. Competency shall be demonstrated either through the Bridge Inspector Competency Scheme or through submission of CVs detailing relevant experience. The NDT will form part of the Special Inspection. The special inspection will include the following:

1. Visual inspection of the bearings to identify and defects by Atkins with access provided by BAM Nuttall.
2. BAM Nuttall or their appointed subcontractors shall undertake a survey to gather and record dimensions and details of the upper level elastomeric and guide bearings under supervision of Atkins via video and communications equipment. (Vauxhall and Battersea bridges)
3. Atkins to undertake a survey to record dimensions of the pin bearings where elements are physically measurable, prior to surface preparation and after the surface of the elements subject to inspection has been prepared. BAM Nuttall to provide access.
4. Atkins shall inspect to identify potential issues with connections (e.g. loose rivets, rusting of bolts). BAM Nuttall to provide access. Where there are access constraints BAM Nuttall or their appointed subcontractors shall undertake a survey to gather and record dimensions and details of the upper level elastomeric and guide bearings under supervision of Atkins via video and communications equipment.
5. BAM Nuttall or their appointed subcontractors shall undertake inspection and survey under supervision of Atkins via video and communications equipment to record any deformations of elastomeric bearings.
6. Upper level plate bearings at Lambeth bridge to be inspected by BAM Nuttall or their appointed subcontractors under supervision of Atkins via video and communications equipment
7. Where elements of the pin bearing and adjoining elements are not physically measurable BAM or their appointed subcontractor shall undertake testing as detailed in section 4.3 to record the thickness of plates, rivet shaft and bolt diameters.

A minimum of two hours per location shall be allowed for the bridge inspector to inspect the prepared surface and to record information.

4.3. Non-Destructive Testing

NDT shall be undertaken by a competent individual or company. Competency shall be demonstrated through the individual or the company holding certification from British Institute of Non-Destructive Testing or equivalent body.

- The location of tests are shown on the sketches in Appendix B. The exact bearings to be subjected to NDT will be determined on site by the Supervisor (Atkins).
- The areas subjected to testing are shown on the sketches included in Appendix B. The areas shall extend 750mm beyond the pin bearings. Interface of the skew backs at the abutment and piers shall

be subjected to NDT to identify the thickness and any defects (e.g. corrosion). In addition at Vauxhall bridge at the pier the box which the pin bearings are fixed to shall be subjected to NDT to identify the thickness and any defects (e.g. corrosion).

The NDT undertaken shall focus on gathering the following information:

1. Composition of materials in the pin bearing and casting.
2. The integrity of the pin, the casting, the skew back and the adjacent steel arch.
3. To determine presence of any cracks or flaws in the pin, the casting, the skew back and the adjacent steel arch.

Elements subject to testing (areas as shown in Appendix B) shall be prepared to facilitate NDT. On completion of testing the paintwork shall be reinstated in accordance with MCHW series 5000.

4.4. Deliverables

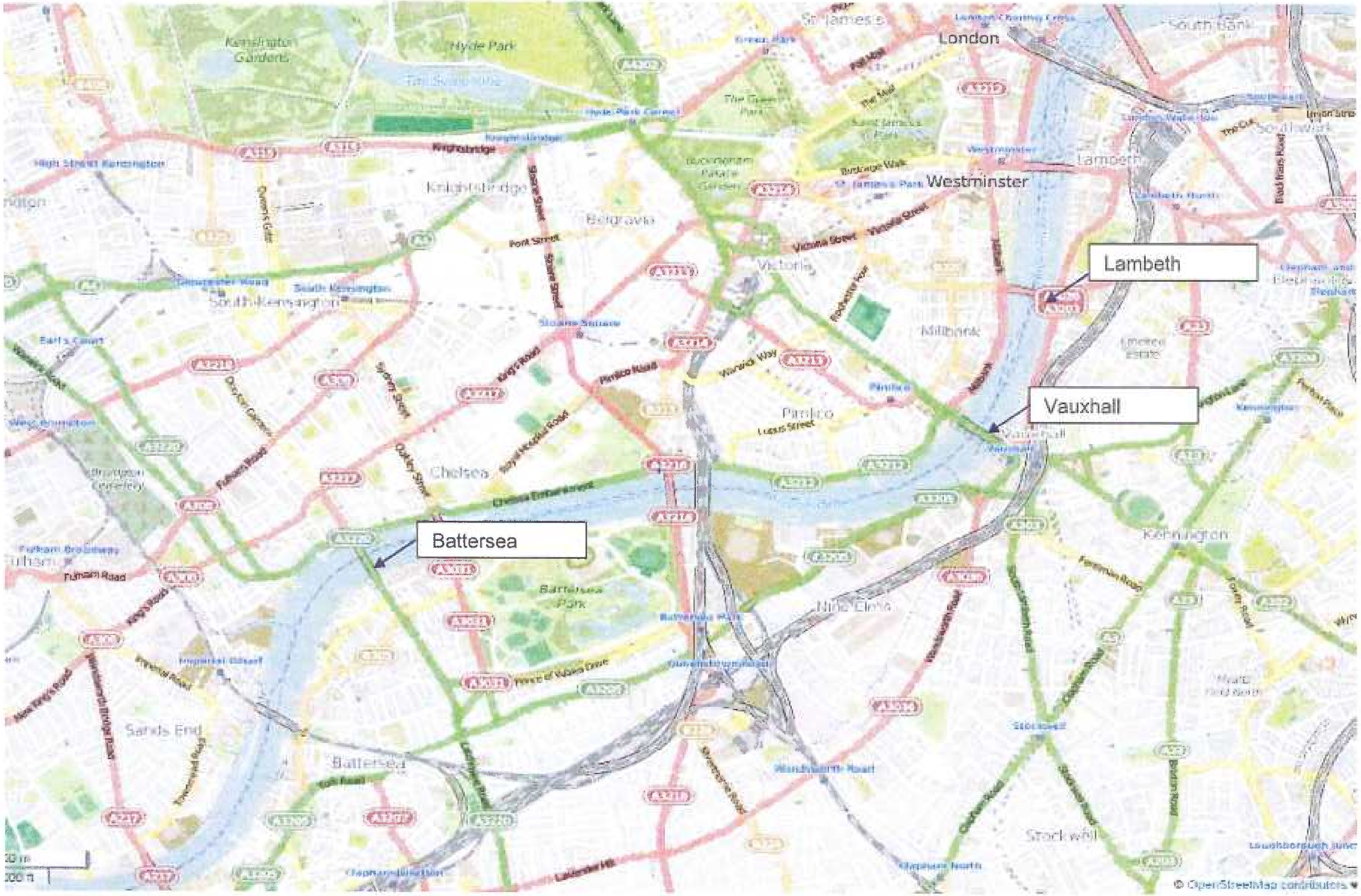
1. The Contractor shall provide a factual report for each of the investigated bridges.

   The factual report shall include the following as a minimum:

   i. Details of personnel involved with the survey, including qualifications and experience.
   ii. Details of locations of tests.
   iii. Photographs of the elements inspected, providing both an overview and close-up of investigated areas.
   iv. Dimen sioned sketches of all elements surveyed
   v. Results of all NDT
   vi. A commentary on the accuracy and limitations of the test methods employed.
2. Collect the paint samples removed from areas of NDT testing for future paint testing.

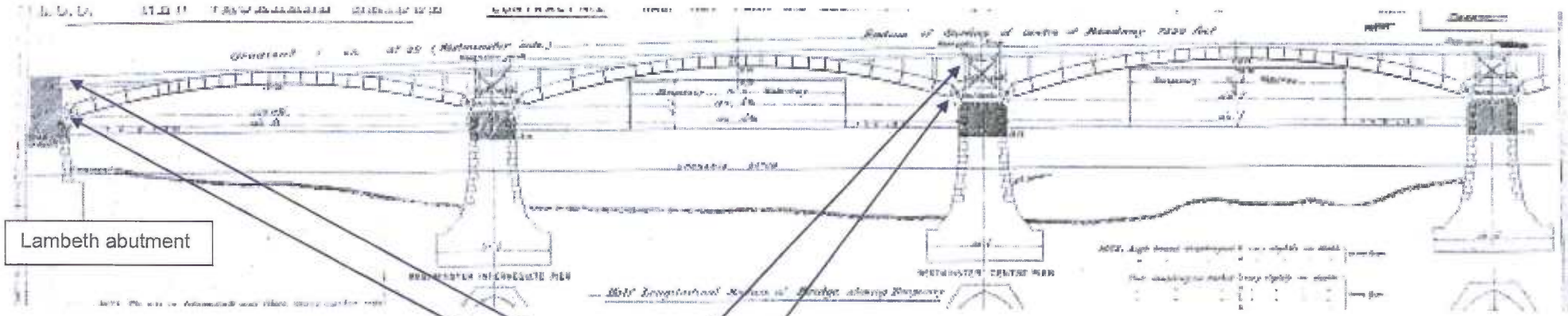
Appendices

Appendix A. Location Plan


Lambeth
Vauxhall
Battersea
London
Westminster
Hyde Park
Kensington Gardens
Knightsbridge
Belgravia
Victoria
Pimlico
Millbank
Chelsea
Battersea Park
Nine Elms
Kennington
Stockwell
Sands End
South Kensington
South Bank
Southwark
© OpenStreetMap contributors

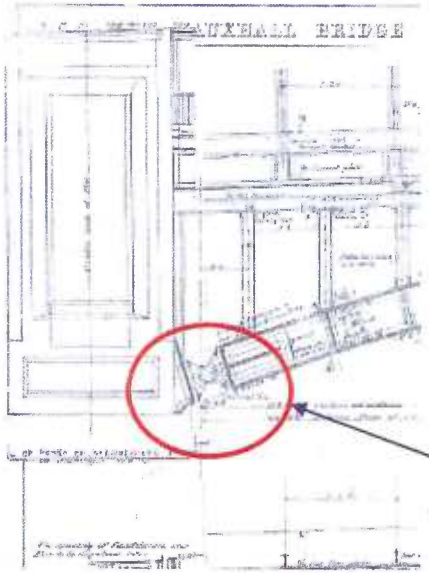
Appendix B. Selected Record Drawings and Sketches

Vauxhall Bridge Test, Inspection and Monitoring Location



Lambeth abutment

Pin bearing and upper level bearing inspection and test locations



Area of pin bearing to be tested