

Galway Bridge Rehabilitations

Salmon Weir Bridge



Volume A – Works Requirements Part 2: Specification

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Galway Bridge Rehabilitations Salmon Weir Bridge

Volume A – Works Requirements

Part 2: Specification

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Galway Bridge Rehabilitations Salmon Weir Bridge

Volume A – Works Requirements

Part 2: Specification

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PREAMBLE TO SPECIFICATION

Preamble to the Specification

The Specification referred to in the Contract shall be the Specification for Works (SPW) in TII Publications (Standards) published by TII as a collective group of documents under the Construction and Commissioning activity within the online TII Publications system (<http://www.tiipublications.ie/>), current on the date 10 working days prior to the tender returns date or, if applicable, the extended tender returns date and incorporating all amendments current on that date and as extended by the following:-

- (i) Appendix 0/1: Contract-specific Additional, Substitute and Cancelled Clauses, Tables and Figures;
- (ii) Appendix 0/2: Contract-specific minor alterations to existing Clauses, Tables and Figures;
- (iii) The Numbered Appendices listed in Appendix 0/3;
- (iv) Appendix 0/4 containing a list of the drawings referred to in the Specification.

An Additional Clause as indicated by a suffix 'AR' in Appendix 0/1 is a Contract-specific alteration.

A Substitute Clause as indicated by a suffix 'SR' in Appendix 0/1 is a Contract-specific alteration.

A Cancelled Clause indicated by a suffix 'CR' in Appendix 0/1 is a Contract-specific alteration.

Insofar as any of the Numbered Appendices may conflict or be inconsistent with any provision of the SPW the Numbered Appendices shall always prevail.

Any reference in the Contract to a part of the SPW or Appendix shall be deemed to refer to the corresponding Substitute part of the SPW or Appendix listed in Appendix 0/1 or 0/2.

Where a part of the SPW is altered, any original Table/Figure referred to in the part of the SPW shall apply unless the Table/Figure is also altered. Where a Table/Figure is altered, any reference in a part of the SPW to the original Table/Figure shall apply to the altered Table/Figure.

Where a part of the SPW relates to work goods or materials that are not required for the Works it shall be deemed not to apply.

Any Appendix referred to in the SPW that is not used shall be deemed not to apply.

References in the SPW to "NRA Road Construction Details" shall be taken to refer to Standard Construction Details (SCD) in TII Publications (Standards) published by TII as a collective group of documents under the Construction and Commissioning activity within the online TII Publications system (<http://www.tiipublications.ie/>), current on the date 10 working days prior to the tender returns date or, if applicable, the extended tender returns date.

Text shown in grey highlight applies only to Contracts where the applicable Conditions of Contract is the Public Works Contract for Civil Engineering Works Designed by the Employer, the Public Works Contract for Minor Building and Civil Engineering Works Designed by the Employer.

Text shown in square brackets immediately following text shown in grey highlight, if any, is deemed to replace the text in grey highlight for Contracts where the applicable Conditions of Contract is the Public Works Contract for Civil Engineering Work Designed by the Contractor.

Throughout the SPW and Appendices to the SPW, the following interpretations shall apply:

"Base Course" shall mean "Binder Course"

"Roadbase" shall mean "Base"

"Wearing Course" shall mean "Surface Course"

"UK Department of Transport" shall mean "UK Highways Agency"

APPENDIX 0/1
Contract Specific Additional, Substitute and Cancelled Clauses,
Tables and Figures Included in the Contract
*(i) List of **Additional** Clauses, Tables and Figures*

Clause/Table/ Figure Number	Title	Written on Page Number following
Clauses		
112.4AR	Setting Out	4
116.6AR	Privately and Publicly Owned Services or Supplies	4
116.7AR	Privately and Publicly Owned Services or Supplies	4
116.9AR	Privately and Publicly Owned Services or Supplies	4
116.11AR	Support of Existing Structures and Services	4
124.10AR	Substances Hazardous to Health	4
126.5AR	Damage to Roadways	4
132.3AR	Control of Dust	4
170AR	Protection of Water Quality	5
170.1AR	Protection of Water Quality	5
171AR	Other Contractors	5
171.1AR	Works by other Contractors	5
172AR	Protection of Existing Works and Amenities	5
172.1AR	Protection of Existing Works and Amenities	5
173AR	Cleanliness on Completion	5
173.1AR	Cleanliness on Completion	5
173.2AR	Cleanliness on Completion	6
176AR	Requirement for Working in the River Channels	6
176.1 AR	Water Quality Measures	6
176.2AR	General	7
176.3AR	Requirement for Working in the River Channel	7
177AR	Records	7
177.1AR	As Built Records Drawings	7
177.2AR	Manufacturer's Instructions, Catalogues	7
178AR	Waste Management	7
178.1AR	Waste Management	7
180AR	General Ecological Mitigation	7
180.1AR	General Environment – Habitats	7
180.2AR	Specific Mitigation for Bridges: General Ecology	8
180.3AR	Protection of Fishery Interests	8
181AR	Temporary Stability of Existing Structures During Construction	8
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183AR	Birds	8

Clause/Table/ Figure Number	Title	Written on Page Number following
184AR	Habitats	9
185AR	Requirement for Contractor Liaison with National Monument Service	9
1770AR	General	9
1770.1AR	Surface Preparation of Substrate to receive Waterproofing	9
1901AR	Protection of Steelwork against Corrosion – Introduction	9
1901.6AR	Protection of Steelwork against Corrosion – Introduction	9
2001.5AR	General	10
2470AR	Cleaning, Removal of Vegetation and Repair of Masonry	10
2470.1AR	General	10

APPENDIX 0/1

(i) Additional Clauses, Tables And Figures

Clause No.	Title and written text
112.4AR	Setting Out Notwithstanding the requirements of Clause 7.7 of the Conditions, the Contractor shall survey all the existing Galway Bridge Rehabilitation scheme, existing outfalls, manholes and existing services and submit the plan arrangement, dimensions and levels to the Employer's Representative 2 weeks prior to construction. The Contractor shall survey and record existing details of items (e.g. outfall) which he is required to extend.
116.6AR	Privately and Publicly Owned Services or Supplies <i>Gas Networks Ireland Pipelines</i> Where excavation or construction work is to be carried out in the vicinity of Gas Networks Ireland Pipelines, the Contractor shall apply, at least two weeks in advance of the works, for a Permit under the Gas Networks Ireland Permit to Work/Excavation Permit system. All works in the vicinity of Gas Networks Ireland Distribution Pipelines are to be carried out in accordance with the requirements of Gas Networks Ireland. Reference to Bord Gáis, Bord Gáis Networks, Bord Gáis Éireann and Bord Gáis Éireann Distribution shall be deemed to refer to Gas Networks Ireland.
116.7AR	Before commencing any excavation, the Contractor shall notify all relevant authorities including, Local Authority, ESB, Telephone Utility Companies, Gas Company, etc. so that all available information regarding the location of underground services and working restrictions imposed by same is ascertained prior to such excavation.
116.9AR	The Contractor shall consult the responsible authorities before commencing excavation about the position and type of underground service, including all drainage and water mains likely to be encountered. It remains the Contractor's responsibility to accurately locate all services on site. Electricity cables must be located using cable detection equipment and the Contractor shall not assume cables are located at a minimum depth.
116.11AR	Support of Existing Structures and Services The Contractor shall be responsible for maintaining all sewers, drains, pipes, gas mains, cables, other services and structures encountered during the works. All services shall be temporarily supported or diverted by the Contractor during the construction of the Works and subsequently shall be amended, altered or remade to the reasonable satisfaction of the Employer's Representative and the person, company or authority in whom they are vested.
124.10AR	Substances Hazardous to Health For specific requirements or restrictions and measures to be taken and monitoring refer to Appendix 1/23.
126.5 AR	Damage to Roadways All roads, accesses, drains, ditches and grips shall be kept clear of all dirt, mud and material arising from the execution and completion of the Works and suitable clearing equipment and labour shall be provided by the Contractor for this purpose. Particular attention shall be paid to the loading of lorries carrying bulk materials into the Site and spoil from the Site to ensure that these shall not be overloaded or loaded in such a way that spillage shall be unavoidable. Any dirt or mud adhering to the tyres or chassis of any vehicles shall be thoroughly cleaned off before the vehicle shall be permitted to leave the Site. In the case of delivery to the Site, vehicles shall be thoroughly cleaned before they leave the point of collection. The Contractor shall be equally responsible for the vehicles of his sub-contractors and suppliers and the like.
132.3AR	Control of Dust The Contractor shall submit a Dust Minimisation Plan to the Employer's Representative a minimum of 2 weeks in advance of the commencement of works which may cause the release of dust. The plan shall detail the Contractor's proposed methodology for complying with the requirements of the Contract with regard to the control of dust. The plan shall be updated regularly to reflect the changing nature of the works on site.

Clause No.	Title and written text
133	Protection of Watercourses from Pollution The Contractor shall ensure that waste products of whatever description associated with the execution and completion of the Works shall not enter watercourses, whether dry or not, which are adjacent to the execution and completion of the Works. The Contractor shall consult and comply with the requirements of relevant authorities in relation to measures to be implemented for the protection of watercourses from pollution in the execution and completion of the Works.
170AR	Protection of Water Quality
170.1AR	Protection of Water Quality The Contractor shall undertake the works in such a manner as to avoid degradation of water quality either by pollution from oil spills, or contamination due to operations, or by causing turbidity due to disturbance of silt or spoil from operations.
170.1AR contd.	Specific measures to be taken to prevent the above shall include the following: (i) Contractors plant, equipment etc. Shall be free of any mechanical defects, and be well maintained so as to prevent soil or fuel leaks into the river/canal. (ii) The Contractor shall so arrange that the cleaning out of vehicles and equipment does not cause run-off to enter into the watercourses or drainage networks. (iii) Measures to ensure no spillage of fuel or cement based material or any other leakages occur to the watercourse for the duration of the works. (iv) The Contractor shall notify the Inland Fisheries Ireland 4 weeks in advance of commencement of the works and within 7 days of completion of the works and issue method statements as required by Inland Fisheries Ireland. (v) All works will be undertaken in accordance with the following best practice guidelines for working alongside watercourses: • CIRIA Control of Water Pollution from Construction sites – Guidance for Consultants and Contractors (2001). • Eastern Regional Fisheries Board Guidance Notes 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Eastern Regional Fisheries Board, 2016); • NRA Guidelines (2006) NRA Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.
171AR	Other Contractors
171.1AR	Works by other Contractors Works to be undertaken by "Other Contractors" are outlined in Appendix 1/71. During the progress of the Works, the Main Contractor shall liaise with and take measures required by the other Contractors, for the support and full protection of the Works undertaken by the other Contractor. The Contractor shall include for the programming consequences of such activities of these Contractors in his construction programme to the satisfaction of the Employer's Representative.
172AR	Protection of Existing Works and Amenities
172.1AR	Protection of Existing Works and Amenities Prior to the commencement of the execution of the Works, the Contractor shall provide to the Employer's Representative complete records (photographic or otherwise) of existing structures and other properties, within a 50m offset along the route of the bridges, that shall or may be affected by the execution and completion of the Works.
173AR	Cleanliness on Completion
173.1AR	Cleanliness on Completion On completion of the Works, the Contractor shall leave the Site and any adjoining property affected by his activities, in a neat and tidy condition to the satisfaction of the Employer's Representative. Carriageway and footway surfaces shall be thoroughly swept and freed from mud and loose chippings. Boundary walls, fences and adjacent properties shall be cleaned of any splashing or dirt which may be attributed to the execution and completion of the Works, and paintwork shall be repaired to the satisfaction of the Employer's Representative where it has been damaged due to the Contractor's activities.

Clause No.	Title and written text
173.2AR	Cleanliness on Completion Notwithstanding any other provisions of the Contract, any of the Contractor's rubbish, debris, litter, equipment, tools and implements and the like deposited on adjoining property during this Contract shall be removed and the property reinstated as necessary.
176AR	Requirement for Working in the River Channels / Canals
176.1 AR	Water Quality Measures - Construction and operation shall be carried out in accordance with the TII Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA, 2006) and 'Requirements for the Protection of Fisheries and Habitats during Construction and Development Works at River Sites'. - Contractors will be in possession of, and familiar with the contents of: "Control of water pollution from construction sites - Guidance for consultants and contractors" published by the Construction Industry Research and Information Association (CIRIA 2001). - Contractors will be in possession of, and familiar with the contents of the Eastern Regional Fisheries Board Guidance Notes 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Eastern Regional Fisheries Board, 2016). - Throughout all stages of the construction phase of the project the contractor shall ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the freshwater environments and the requirement to avoid pollution of all types. This will be reflected in the Construction Management Plan for the site. - Any Site Compounds shall be located at least 10m from any watercourse. - Any machinery required to operate in-stream will be steam-cleaned in advance of in-stream works and routinely checked to ensure no leakage of oils or lubricants occurs. All fuelling of machinery will be undertaken on dry land. - The storage of oils, hydraulic fluids, etc shall be undertaken in accordance with current best practice for oil storage (Enterprise Ireland, BPGCS005). - Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice. - Fuelling and lubrication of equipment will be carried out in a bunded area and will not be carried out close to watercourses. - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling. - All machinery and plant used will be regularly maintained and serviced and will comply with appropriate standards to ensure that leakage of diesel, oil and lubricants is minimised. Such maintenance will be carried out in areas remote from watercourses. - Any foul drainage from site compound etc. will be removed to a suitable treatment facility or discharged to a septic tank system constructed in accordance with EPA guidelines. - An emergency-operating plan shall be established by the Contractor (and approved by the Local Authority) to deal with incidents or accidents during construction that may give rise to pollution of watercourses. This will include means of containment in the event of accidental spillage of hydrocarbons or other pollutants (including oil booms and soakage pads). - Any spillage of fuels, lubricants or hydraulic oils shall be immediately contained and the contaminated soil removed from the site and properly disposed of. - Chainsaws shall not be used within 10 m of a watercourse without prior agreement from the Employer's Representative. Reduction and Prevention of Suspended Solids Pollution - Sediment traps and interception channels shall be in place prior to felling to prevent sediment entering watercourses in the case of heavy rain. - Temporary fills or stockpiles shall be covered with polyethylene sheeting.

Clause No.	Title and written text
176.2AR	General The contractor shall apply in writing to the Employers Representative, the Inland Fisheries Ireland and the Office of Public Works at least 3 weeks in advance of any proposed works in or over any watercourse for approval of commencement work. Approval will be subject to agreement of Inland Fisheries Ireland and the Office of Public Works. The application shall include full method statement, layout drawings including minimum horizontal and vertical clearance, fabrication drawings, areas of channel that are proposed to be destocked, design calculations for temporary works, proposed Construction sequence.
176.3AR	Requirement for Working in the River Channel The Contractor shall carry out works in accordance with the Fisheries Consolidation Act 1959 as amended and by the Local Government (Water Pollution) Act 1977 as amended.
177AR	Records
177.1AR	As Built Records Drawings The Contractor shall submit as-built records drawings for the project upon completion of the Works in accordance with the requirements of Appendix 1/77.
177.2AR	Manufacturer's Instructions, Catalogues The Contractor shall supply to the Employer's Representative the following items, prior to incorporation into the works; i) Details of all proprietary current manufacturer's instructions and explanatory brochures to be used on the project. ii) Test results and certificates for all items and investigations whether the tests or investigations are carried out on Site or off Site. iii) Operating instruction for items. iv) References for all materials and processes used in the works. References shall include origin, comprehensive description, manufacturer, and supplier, copies of relevant parts of standards and specification and any other information necessary to reproduce the item. Details of all proprietary current manufacturer's instructions and explanatory brochures to be used on the project.
178AR	Waste Management
178.1AR	Waste Management The Contractor shall exercise due care in the handling and disposal of any potentially contaminating material. Appropriate site management control shall be demonstrated at all times to minimise the potential for pollution of the environment. The Contractor shall submit a Waste Management Plan to the Employer's Representative for approval, a minimum period of 2 weeks in advance of any works commencing on the site. This shall include details of the following items: All proposed methods of waste disposal (reuse, recycle, landfill, discharge to drain, etc). Details of the proposed licensed waste disposal contractors and licensed disposal sites, to be used by the Contractor. The Contractor shall maintain detailed records and receipts for all movements of waste materials from the site, for inspection by the Employer's Representative.
180AR	General Ecological Mitigation
180.1AR	General Environment – Habitats The Contractor must develop a Standard Site Management practice with Method Statement, so as not to, as a minimum disrupt banksides or cause pollution events at the works site.

Clause No.	Title and written text
180.2AR	Specific Mitigation for Bridges: General Ecology A Method Statement must be prepared and will provide precise details on methods to protect watercourses. It will include standard best practice control measures, including as a minimum: • Measures to protect watercourses from other pollutants: ○ There will be no mixing of concrete within 50m of any watercourse. ○ There will be no storage of fuels, oils, greases, hydraulic fluids, concrete, waste piles or other potential pollutants within 50m of the banks of any watercourses. ○ All fuels, oils, chemicals, cement (including cement mixing) or other potential pollutants will be kept within bunded containers / areas. ○ No re-fuelling of vehicles or concrete-mixing should take place within 100m of any watercourses. ○ Site compounds (if necessary) will not be located within 10m of any watercourse. On-site emergency spill kits will be of a suitable size for the works required.
180.3AR	Protection of Fishery Interests • Contractors will be required to establish contact with Inland Fisheries Ireland before works commence, and there will be ongoing liaison with them throughout the construction process. • Design and construction method statements will be submitted to Inland Fisheries Ireland for approval at least 3 weeks prior to commencement of construction. • In-stream works should be undertaken during the period July – September unless otherwise agreed by the Contractor with Inland Fishers Ireland. With regard to pressure-grouting and resin-injection of cracks/fissures/crevices in the bridge structure, particular attention shall be paid to the provisions in Paragraphs 10.4.1 to 10.4.7, inclusive, of IFI (2016). The following shall apply in relation to these elements of the works: • At least one member of the Contractor' personnel shall closely monitor for grout and/or resin losses to the river both upstream and downstream of the bridge structure; and, • The entirety of the area of water over which repair works are to take place shall be protected by a sealed, secure decking so as to ensure no losses of grout or resin to the water, and any captured material(s) shall be removed for safe disposal. The Contractor shall prepare and implement a Construction Erosion and Sediment Control Plan (CESCP). This plan shall include the following elements: • Limiting of site works to the minimum area and timescale required to undertake the necessary elements of the works; • Formulation of a Dust Minimisation Plan; • Direction of site drainage through a settlement facility prior to discharge and provision of temporary facilities to trap any accidental spillage; • A Method Statement for the works to be submitted to IFI to ensure that the proposed methods satisfy fisheries requirements; • Promotion of awareness of the importance of site management and the freshwater environment amongst site personnel; • Pouring of concrete, sealing of joints, application of water-proofing paint or protective systems, curing agents etc. to be completed in the dry; • Storage of oils, fuel, chemicals, hydraulic fluids etc. to be located at least 50 m from the stream on an impervious base within a bund and appropriately secured; • All machinery operating near the river to be steam-cleaned in advance of works and routinely checked to ensure that there is no leakage of oils or lubricants; and, • All fuelling of machinery to be undertaken a minimum of 50m from the stream.
181AR	Temporary Stability of Existing Structures During Construction
181.1AR	Temporary Stability of Existing Structures During Construction The Contractor shall make provision in his programming of the Works to ensure the stability of the existing bridges at all times during the Works. The Contractor shall carry out necessary structural investigation, structural assessments and forward detailed method statements including calculations 3 weeks in advance of carrying out any temporary or permanent works on or adjacent to existing structures.

Clause No.	Title and written text
183AR	Birds Clearance of vegetation on site should take place outside of the breeding bird season (1 st March to 31 st August) in accordance with the Wildlife (Amendment) Act (2000). To compensate for the loss of habitat for bird species, landscaping proposals shall primarily entail the use of locally native trees and shrubs.
184AR	Habitats Tree felling activities will occur outside the bird nesting season (March 1st – August 31st).
185AR	Requirement for Contractor Liaison with National Monument Service The Contractor shall notify the National Monument Service of proposed construction works at least 2 months prior to commencement of works.
1770AR	Concrete Repairs of Deck to Receive Waterproofing
1770.1AR	The general sequence of operations for waterproofing and concrete repair will be carried out in as follows for each traffic management phase; Waterproofing • Exposure of concrete substrate • Surface preparation and cleaning • Inspection and testing of concrete substrate • Confirmation by Employer's Representative if any areas require concrete repair measures • Carry out concrete repair including, where necessary, removal of damaged concrete, preparation of exposed reinforcement, crack injection, concrete reinstatement, provision of adequate surface finish. The surface finish is to be Class U4 in accordance with sub-Clause 1708.4 of the Specification. • Allow adequate time for curing prior to applying the waterproofing system to the concrete • Carry out testing as required
1901AR	Protection of Steelwork against Corrosion - Introduction
1901.6AR	Protection of Steelwork against Corrosion - Introduction Quality Plan Corrosion protection of steelwork shall be undertaken by a Contractor certified to EN ISO 9001:2008 for quality management related to the application of corrosion protection systems to structural steelwork. The Contractor shall submit to the Employer's Representative a Quality Plan. The Quality Plan shall include the following items as a minimum. 1. General Requirements 1.1. Definition of the product to be provided. 1.2. The Organisation's management strategy for undertaking corrosion protection works, including clear and sustainable performance objectives. 1.3. The structure of the Organisation describing delegated responsibilities, the line of command and stating the name of the Organisation's Manager responsible for the contracted work. 1.4. Identification of the relevant parts of the Organisation's documented quality system relevant to the product or service being provided. 1.5. The processes for the selection of staff. 1.6. The control, maintenance and selection of equipment. The processes for communications between Customer and Organisation.

Clause No.	Title and written text
2001.5AR	General Unless the manufacturer of the waterproofing membrane requires a higher standard of finish concrete, surfaces shall be finished as follows; The surfaces of the concrete to be waterproofed shall be vacuum blasted with a "Blastrac" (or approved equivalent machine) vacuum blasting unit to remove laitance/skin from top of deck and to produce a tough "fine sandpaper" type surface on the concrete. Vacuum blasting unit shall use suitable steel shot, automatically recirculated by the machine which shall also pick up all dust, laitance etc. (detached by the shot) by vacuum action. The finished surface shall be: • Finished to an accuracy such that, when tested with a 3m straight edge, the maximum depression does not exceed 6mm, height of any ridge shall not exceed 2mm. • Clean and dry before priming or waterproofing. • Free from membrane curing compounds, ice and projecting tying wires. • Free from honeycombing, surface cavities, laitance, mortar or other surface deficiencies.
2470AR	Cleaning, Removal of Vegetation and Repair of Masonry
2470.1AR	General All vegetation shall be removed from the masonry in such a manner as to avoid damage to the mortar and stonework in accordance with the below and Appendix 24/3. Ivy growth may be chemically sprayed with a product to be approved by the Employers Representative and left to wilt before removal. Mould/fungus/algae are to be removed by a combination of stiff brush, hand scraper and high pressure water hosing. On completion of removal of vegetation, the stonework shall be cleaned using a combination of high pressure water hose and/or stiff brush to restore the original condition as far as possible. Due consideration is to be given to run-off and the risk of contaminants entering water courses of affecting the surrounding flora and fauna. Where necessary, run-off shall be contained by water retaining barriers and disposed of at an approved disposal site. Any damage to masonry, mortar or other materials shall be repaired and repointed in accordance with Appendices 24/3.

APPENDIX 0/1
Contract Specific Additional, Substitute and Cancelled Clauses,
Tables and Figures included in the Contract.

*(ii) List of **Substitute** Clauses, Tables and Figures*

Not Used

APPENDIX 0/1
Contract-Specific Additional, Substitute and Cancelled Clauses,
Tables and Figures included in the Contract
(ii) List of Substitute Clauses, Tables and Figures

Not Used

APPENDIX 0/1
Contract Specific Additional, Substitute and Cancelled Clauses,
Tables and Figures included in the Contract.

*(iii) List of **Cancelled** Clauses, Tables and Figures*

Clause / Table / Figure Number	Title	Written on Page Number following
Not Used		

APPENDIX 0/2

Contract-Specific Minor Alterations to Existing Clauses And Tables Included In The Contract

Clause / Table / Figure No.	Title
117.1	Delete 'Guidance for the Control and management of Traffic at Road Works' and replace with 'Chapter 8 of the Traffic Signs Manual'.

APPENDIX 0/3

List Of Numbered Appendices Referred To In The Specification And Included In The Contract

Appendix 0/3 comprises two lists, A and B, of Numbered Appendices as follows:

List 'A' is a complete list of Numbered Appendices referred to in the Specification for Road Works with those not adopted marked 'Not Used'. Those identified by the letters to T or C shall be completed by the Tenderer or Contractor respectively.

Guide to types of numbered Appendices – who compiles/completes

Symbol

- (E) Employer's Representative compiles: Identified in the Notes for Guidance examples by the term 'Sample' included in their title.
- (E/C) Employer's Representative partially compiles, and Contractor completes and returns to the Employer's Representative
- (E/T) Employer's Representative partially compiles, and Tenderer completes and returns with Tender
- (C) Contractor completes and returns to the Employer's Representative
- (I) For Contractor's information only
- (P) This indicates the Appendix is a national pro-forma and format must not be altered

List "B" gives the List of Contract-specific Appendices devised for the Contract.

List 'A': List of Numbered Appendices Referred to in the Specification for Road Works

Volume No.	Completed By	Appendix No.	Title
			INTRODUCTION
A – Part 2	(E)	0/1	Contract-specific Additional, Substitute and Cancelled Clauses and Tables Included in the Contract
A – Part 2	(E)	0/2	Contract-specific Minor Alterations to Existing Clauses and Tables included in the Contract.
A – Part 2	(E)	0/3	List of Numbered Appendices Referred to in the Specification and Included in the Contract
A – Part 2	(E)	0/4	List of drawings included in the Works Requirements
			PRELIMINARIES
Not Used	Not Used	1/1	Accommodation and Equipment for The Employer's Representative
Not Used	Not Used	1/2	Vehicles for the Employer's Personnel
Not Used	Not Used	1/3	Communications System for the Employer's Personnel
Not Used	(E)	1/4	Working and Fabrication Drawings
A – Part 2	(E)	1/5	Testing to be Carried out by the Contractor
Not Used	Not Used	1/6	Supply and Delivery of Samples to the Employer's Representative
A – Part 2	(E)	1/7	Site Extent and Limitations on Use
Not Used	Not Used	1/8	Operatives for the Employer's Representative
A – Part 2	(E)	1/9	Control of Noise and Vibration
Not Used	Not Used	1/10	Principal Structures to be Designed by the Contractor
Not Used	Not Used	1/11	Structural Elements and Other Features to be Designed by the Contractor
Not Used	Not Used	1/12	Setting Out and Existing Ground Levels
A – Part 2	(E)	1/13	Programme of Design and Execution and Completion of the Works
A – Part 2	(E)	1/14	Monthly Statements
Not Used	Not Used	1/15	Accommodation Works
A – Part 2	(E)	1/16	Privately and Publicly Owned Services and Supplies
A – Part 2	(E)	1/17	Traffic Safety and Management
Not Used	Not Used	1/18	Temporary Diversions for Traffic
Not Used	Not Used	1/19	Routeing of Vehicles
Not Used	Not Used	1/20	Recovery Vehicles for Breakdowns
Not Used	Not Used	1/21	Information Boards
A – Part 2	(E)	1/22	Progress Photographs
A – Part 2	(E)	1/23	Substances Hazardous to Health
A – Part 2	(E)	1/24	Quality Management System
A – Part 2	(E)	1/25	Product Certification Schemes
A – Part 2	(E)	1/26	Irish Agrément Board Roads and Bridges Certificates
			SITE CLEARANCE
A – Part 2	(E)	2/1	List of Buildings, etc. to be Demolished
Not Used	Not Used	2/2	Filling of Trenches & Pipes
Not Used	Not Used	2/3	Retention of Material Arising from Site Clearance

Volume No.	Completed By	Appendix No.	Title
A – Part 2	(E)	2/4	Explosives and Blasting
A – Part 2	(E)	2/5	Hazardous Materials
			FENCING AND ENVIRONMENTAL NOISE BARRIERS
Not Used	Not Used	3/1	Fencing, Gates and Stiles
Not Used	Not Used	3/2	Fencing - NRA Road Construction Details
			ROAD RESTRAINT SYSTEM (VHICLE AND PEDESTRIAN)
Not Used	Not Used	4/1	Safety Barriers
Not Used	Not Used	4/2	Pedestrian Restraint Systems
Not Used	Not Used	4/3	Safety Barrier Terminals
Not Used	Not Used	4/4	Safety Barrier Maintenance
Not Used	Not Used	4/5	Anti-Glare Screens
Not Used	Not Used	4/6	Safety Barriers: NRA Road Construction Details
Not Used	Not Used	4/7	Vehicle Parapet Systems
			DRAINAGE AND SERVICE DUCTS
Not Used	Not Used	5/1	Drainage Requirements
Not Used	Not Used	5/2	Service Duct Requirements
Not Used	Not Used	5/3	Surface Water Channels and Drainage Channel Blocks
Not Used	Not Used	5/4	Fin Drains and Narrow Filter Drains and Geotextiles for Filter Drains
Not Used	Not Used	5/5	Combined Drainage and Kerb Systems
Not Used	Not Used	5/6	Linear Drainage Channel Systems
Not Used	Not Used	5/7	Drainage and Service Ducts – NRA Road Construction Details
Not Used	Not Used	5/8	Thermoplastics Structural Wall Pipes and Fittings
Not Used	Not Used	5/9	Attenuation
			EARTHWORKS
A – Part 2	(E)	6/1	Requirements for Acceptability & Testing of Earthworks Materials
A – Part 2	(E)	6/2	Requirements for Dealing with Class U2 Unacceptable Material
Not Used	Not Used	6/3	Requirements for Excavation, Deposition, Compaction (Other than Dynamic Compaction)
Not Used	Not Used	Not Used	Not Used
Not Used	Not Used	6/5	Geotextiles Used to Separate Earthworks Materials
Not Used	Not Used	6/6	Fill to Structures & Fill Above Structural Foundations
Not Used	Not Used	6/7	Sub-Formation, Capping, Preparation & Surface Treatment of Formation
Not Used	Not Used	6/8	Topsoiling, Grass Seeding and Turfing
Not Used	Not Used	6/9	Earthwork Environmental Bunds, Landscape Areas, Screening Mounds, Strengthened Embankments
Not Used	Not Used	6/10	Ground Anchorages, Crib Walling and Gabions
Not Used	Not Used	6/11	Swallow Holes & Other Naturally Occurring Cavities & Disused Mine Workings
Not Used	Not Used	6/12	Instrumentation & Monitoring
Not Used	Not Used	6/13	Ground Improvement

Volume No.	Completed By	Appendix No.	Title
			ROAD PAVEMENTS – GENERAL
A – Part 2	(E)	7/1	Permitted Pavement Options
A – Part 2	(E)	7/2	Excavation & Reinstatement of Existing Surfaces
Not Used	Not Used	7/3	Surface Dressing Product (End Performance)
A – Part 2	(E)	7/4	Bituminous Sprays
A – Part 2	(E)	7/5	Road Pavements: NRA Road Construction Details
A – Part 2	(E)	7/6	Breaking Up or Perforation of Existing Pavement
Not Used	Not Used	7/7	Not Used
Not Used	Not Used	7/8	Not Used
A – Part 2	(E)	7/9	Cold Milling (Planing) of Bituminous Bound Flexible Pavement
Not Used	Not Used	7/10	Microsurfacing
Not Used	Not Used	7/11	High Friction Surfacing
Not Used	Not Used	7/12	Low Energy Bound Mixtures
Not Used	Not Used	7/21	Recipe Surface Dressing
			KERBS, FOOTWAYS AND PAVED AREAS
A – Part 2	(E)	11/1	Kerbs, Footways and Paved Areas
Not Used	Not Used	11/2	Access Steps
A – Part 2	(E)	11/3	Kerbs, Footways and Paved Areas: NRA Road Construction Details
			TRAFFIC SIGNS
Not Used	Not Used	12/1	Traffic Signs: General
Not Used	Not Used	12/2	Traffic Signs: Reflective Markers
Not Used	Not Used	12/3	Traffic Signs: Road Markings & Studs
Not Used	Not Used	12/4	Traffic Signs: Cones, Cylinders, FTD's and Other Traffic Delineators
Not Used	Not Used	12/5	Traffic Signs: Traffic Signals
Not Used	Not Used	12/6	Traffic Signs: Special Sign Requirements on Gantries
Not Used	Not Used	12/7	Traffic Signs: Preparation and Finish of Metal and Other Surfaces
			ROAD LIGHTING COLUMNS AND BRACKETS
A – Part 2	(E)	13/1	Information to be Provided by the Designer for the Road Lighting Works when Specifying Lighting Columns and Brackets
Not Used	Not Used	13/2	Column & Bracket Data Sheets 1 & 2
Not Used	Not Used	13/3	Instructions for Completion of Column and Bracket Data Sheet
Not Used	Not Used	13/4	Certification for Lighting Columns
Not Used	Not Used	13/5	Road Lighting Column and Brackets: NRA Road Construction Details
			ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS
A – Part 2	(E)	14/1	Site Records
Not Used	Not Used	14/2	Location of Lighting Units & Feeder Pillars
A – Part 2	(E)	14/3	Temporary Lighting
A – Part 2	(E)	14/4	Electrical Equipment for Road Lighting
Not Used	Not Used	14/5	Electrical Equipment for Traffic Signs
Not Used	Not Used	14/6	Preparation and Finish of Metal and Other Surfaces

Volume No.	Completed By	Appendix No.	Title
			MOTORWAY COMMUNICATIONS
Not Used	Not Used	15/1	Motorway Communications
			PILING AND EMBEDDED RETAINING WALLS
Not Used	Not Used	16/1	General Requirements for Piling and Embedded Retaining Walls
Not Used	Not Used	16/2	Precast Reinforced and Prestressed Concrete Piles and Precast Reinforced Concrete Segmental Piles
Not Used	Not Used	16/3	Bored Cast-in-Place Piles
Not Used	Not Used	16/4	Bored Piles Constructed Using Continuous Flight Augers and Concrete or Grout Injection Through Hollow Auger Stems
Not Used	Not Used	16/5	Driven Cast-in-Place Piles
Not Used	Not Used	16/6	Steel Bearing Piles
Not Used	Not Used	16/7	Reduction of Friction on Piles
Not Used	Not Used	16/8	Non-Destructive Methods for Testing Piles
Not Used	Not Used	16/9	Static Testing of Piles
Not Used	Not Used	16/10	Diaphragm Walls
Not Used	Not Used	16/11	Hard/Hard Secant Pile Walls
Not Used	Not Used	16/12	Hard/Soft Secant Pile Walls
Not Used	Not Used	16/13	Contiguous Bored Pile Walls
Not Used	Not Used	16/14	King Post Walls
Not Used	Not Used	16/15	Steel Sheet Piles
Not Used	Not Used	16/16	Integrity Testing of Wall Elements
Not Used	Not Used	16/17	Instrumentation for Piles and Embedded Walls
Not Used	Not Used	16/18	Support Fluid
			STRUCTURAL CONCRETE
A – Part 2	(E)	17/1	Concrete – Classification of Mixes
Not Used	Not Used	17/2	Concrete – Impregnation and Coating Schedule
A – Part 2	(E)	17/3	Concrete – Surface Finishes
A – Part 2	(E)	17/4	Concrete – General
			STRUCTURAL STEELWORK
Not Used	Not Used	18/1	Requirements for Structural Steelwork
			PROTECTION OF STEELWORK AGAINST CORROSION
A – Part 2	(E)	19/1	(Specification for Road Works) Sheet No. Form BE/P1 (New Works) Paint System Sheet
Not Used	Not Used	19/2	(New Works) Requirements for Other Work
A – Part 2	(E)	19/3	(Specification for Road Works) Form BE/P2 Paint Data Sheet
Not Used	Not Used	19/3*	(Specification for Road Works) Form BE/P3 Paint Sample Despatch List: Sheet 1
Not Used	Not Used	19/3*	(Specification for Road Works) Form BE/P3 Paint Sample Despatch List: Sheet 2
Not Used	Not Used	19/4	(New Works) General Requirements
Not Used	Not Used	19/5	(Specification for Road Works) Form BE/PE1 (Maintenance) Paint System Sheet 1

Volume No.	Completed By	Appendix No.	Title
A – Part 2	(E)	19/6	(Specification for Road Works) Form BE/P1 (Maintenance) Paint System Sheet 2
Not Used	Not Used	19/7	(Maintenance) Requirements for Other Work
Not Used	Not Used	19/8	(Maintenance) General Requirements
			WATERPROOFING FOR CONCRETE STRUCTURES
Not Used	Not Used	20/1	Waterproofing for Concrete Structures
			BRIDGE BEARINGS
Not Used	Not Used	21/1	Bridge Bearing Schedule
			BRIDGE EXPANSION JOINTS AND SEALING OF GAPS
Not Used	Not Used	23/1	Bridge Deck Expansion Joint Schedule
Not Used	Not Used	23/2	Sealing of Gaps Schedule (other than in Bridge Deck Expansion Joints)
			BRICKWORK, BLOCKWORK AND STONEMWORK
A – Part 2	(E)	24/1	Brickwork, Blockwork and Stonemwork
Not Used	Not Used	24/2	Brickwork, Blockwork and Stonemwork: NRA Road Construction Details
A – Part 2	(E)	24/3	Requirements for Masonry Repointing and Reconstruction of Historic Structures
			MISCELLANEOUS
Not Used	Not Used	26/1	Ancillary Concrete
Not Used	Not Used	26/2	Bedding Mortar
Not Used	Not Used	26/3	Cored Thermoplastic Node Markers
			WATERMAINS, UTILITIES AND ACCOMMODATION WORKS
Not Used	Not Used	27/1	Requirements for Watermains
Not Used	Not Used	27/2	Watermains: NRA Road Construction Details
			TRENCHLESS INSTALLATION OF ROAD DRAINAGE & SERVICE DUCTS
Not Used	Not Used	28/1	Trenchless and Minimum Dig Techniques
			CCTV SURVEY OF ROAD DRAINAGE SYSTEMS
Not Used	Not Used	29/1	CCTV Survey of Road Drainage Systems
A – Part 2	(E)	31/1	Conservation Requirements
A – Part 2	(E)	55/1	Structural Concrete Repairs

List “B”: List of Contract Specific Numbered Appendices Devised for the Contract

Volume No.	Completed By	Appendix No.	Title
A – Part 2	E	1/71	Works by Other Contractors
A – Part 2	E	1/77	As Built Records Drawings
Not Used	Not Used	1/79	Independent Check Certificate for Temporary Works
A – Part 2	E	24/3	Requirements for Masonry Repointing and Reconstruction of Historic Structures

APPENDIX 0/4

List Of Drawings Included In The Works Requirements

Drawing No	Title
GBRF-ROD-SBR-S07-DR-CB-50000	Cover Sheet
GBRF-ROD-SBR-S07-DR-CB-50001	Location Plan
GBRF-ROD-SBR-S07-DR-CB-50005	Existing Utilities
GBRF-ROD-SBR-S07-DR-CB-50010	Site Clearance
GBRF-ROD-SBR-S07-DR-CB-50020	Structural Repairs - Sheet 1 of 7
GBRF-ROD-SBR-S07-DR-CB-50021	Structural Repairs - Sheet 2 of 7
GBRF-ROD-SBR-S07-DR-CB-50022	Structural Repairs - Sheet 3 of 7
GBRF-ROD-SBR-S07-DR-CB-50023	Structural Repairs - Sheet 4 of 7
GBRF-ROD-SBR-S07-DR-CB-50024	Structural Repairs - Sheet 5 of 7
GBRF-ROD-SBR-S07-DR-CB-50025	Structural Repairs - Sheet 6 of 7
GBRF-ROD-SBR-S07-DR-CB-50026	Structural Repairs - Sheet 7 of 7
GBRF-ROD-SBR-S07-DR-CB-50027	Roadworks Drawings
GBRF-ROD-SBR-S07-DR-CB-50030	Topographical Survey - Sheet 1 of 3
GBRF-ROD-SBR-S07-DR-CB-50031	Topographical Survey - Sheet 2 of 3
GBRF-ROD-SBR-S07-DR-CB-50032	Topographical Survey - Sheet 3 of 3

APPENDIX 1/5

Testing To Be Carried Out By The Contractor

Notes:

1. Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Contractor (See sub-Clause 105.4)
2. (IL) indicates that an Irish National Accreditation Board test report or certificate is required.
3. Unless otherwise shown in this Appendix tests for work or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
4. Cube strength tests are not required for concrete complying with Clause 2602.
5. Unless otherwise shown in this Appendix test certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
6. Testing to be carried out by the Contractor in accordance with this Appendix 1/5 shall be undertaken in a laboratory approved by the Employer's Representative. The Contractor shall provide details of his proposed laboratory / laboratories to the Employer's Representative within 1 week of the Starting Date. This is provided in lieu of the Appendix 1/5 provided in Volume A Part 2.

Specification Appendix Table 1/5/1					
Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
CC-SPW-00400					
3.2	Anchorage in drilled holes	On-site tensile load test	[As required (Appendix 4/1 and 4/7)]	Required	See sub-Clause 3.2.1 [Special requirements to be provided in Appendix 4/1]
	Ground Conditions	In situ testing (sub-Clause 3.2.2)	[As required (sub-clause 3.2.2)]		
CC-SPW-01100					
1101	Precast concrete kerbs, channels, edgings and quadrants	Bending strength	Minimum of 8 per 1000 units of each product (IS EN 1340)	Required	
1102	In situ asphalt kerbs	Grading	1 test per 500 metres laid	Required	
		Binder Content			
CC-SPW-01300					
1305	Anchorage for use in drilled holes	Tensile load (Manufacturer's tests)		Required	To provide well attested and documented evidence
1306	Anchorage in drilled holes to columns with flange plates	Loading test on site	[As required]		†
1310	Welding	Welding procedures (manufacturer's tests)	(Every seven years)		Quality management scheme applies
		Welding qualification (Manufacturer's tests)	(Every two years)		
		Production testing (Manufacturer's tests)	(Clause 1310 (7.1.4))		
	Welded joints	Destructive testing	[See sub-Clause 1310 (7.15)]		†† (IL) [See NG 1310]

Specification Appendix Table 1/5/1						
Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
1313	GFRP laminates		Loss on ignition	1 per 200 production columns		
			Colour fastness	1 per batch		
			Electric strength			
			Water absorption			
			Impact strength			
1314	Brackets for laminating GFRP lighting columns					
	Polyurethane foam	Bulk density	1 per batch			
		Surface hardness				
		Apparent bulk density	2 per batch			
		Impact strength				
Flexural stress						
CC-SPW-01400						
1421	Cable					Product certification scheme applies [Special sample tests to BS 6346 should be scheduled where appropriate]
1424	Lighting Units		Tests specified in Clause 1424	Each unit	Required	† Product certification scheme applies. Certification that the installation complies with the National Rules for Electrical Installations is required

Specification Appendix Table 1/5/1						
Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
	Networks		Tests specified in Clause 1424	Each network	Required	† Certification that the installation with the National Rules for Electrical Installations is required
CC-SPW-01500						
1533	Cable ducts					
		Mandrel test	Test specified in Clause 1533	Each duct	Required	† Certificate that each length of duct between chambers satisfies the mandrel test is required.
		Air test	Test specified in Clause 1533	Each duct	Required	† Certificate that each length of duct between chambers satisfies the air test is required.
CC-SPW-01700						
1702 1703 1704	Cement types as stated in sub-Clause 1702.1				Required	Certificate to be provided monthly* for each type of cement. Quality management and product certification schemes apply.
	Cements (all types)		Chloride content	Monthly*		Tests to be carried out by the manufacturer and results included on the test certificates required above
	Ground granulated blastfurnace slag		Sulphate content	Monthly*		
			Acid-soluble alkali content	Daily (PC) Weekly (PFA ggbs)		
	Aggregates		Grading and fines content	1 per delivery (min 1 weekly per source)		Results of routine control tests by the manufacturer/ supplier to be provided.

Specification Appendix Table 1/5/1					
Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
		Shell content (IL) (Only required where marine aggregates are used)	Monthly *		Product certification scheme applies
		Flakiness index (IL)	Monthly*		
		Resistance to fragmentation (IL)	Every 6 months*		
		Drying shrinkage (IL)	Monthly*		
		Chloride content (IL)	Daily*		
1702 1703 1704 (Contd)		Sulphate content (IL)	Monthly*		
	Blastfurnace slag	Bulk density (IL)	1 per 500 tonnes *		
		Stability (IL)	1 per 500 tonnes *		
		Sulphur content (IL)	1 per 500 tonnes *		
	Water	Tests specified in IS EN 1008	[As required].		
		Chloride content	Monthly*		
		Sulphate content	Monthly*		

Specification Appendix Table 1/5/1					
Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
	Admixtures	Acid-soluble alkali content	Weekly*		[See sub-Clause 1702.3]
		Chloride content	1 per consignment	Required (IS EN 934-2)	
		Sulphate content	1 per consignment	Required	
		Acid-soluble alkali content	1 per consignment		
1707	Concrete	Cube strength (IL)	Prestressed concrete – 2 cubes from 12m3 or 2 batches whichever represents the lesser volume	Required	Contractor to cast and test sufficient copies to demonstrate cube strength before transfer †
			Reinforced Concrete - 2 cubes from 24 m3or 4 batches whichever represents the lesser volume		
			Mass Concrete – 2 cubes from 50 m3 or 50 batches whichever represents the lesser volume		[See also Table NG 17/1]
			Additional cubes for special purposes		[Tests/samples should be scheduled as required See NG 1707.5]
		Cube strength identity testing as described in Appendix 17/4 (IL)	2 cubes from each of 2 samples of each batch		[Requirements should be given in Appendix 17/4 as appropriate] [See sub-Clause 1707.2 and Appendix 1/6]
		Density	[As required]		[Requirements should be given in

Specification Appendix Table 1/5/1						
Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
1707 (Cont'd)			Modulus of elasticity			Appendix 17/1 as appropriate]
	Fresh concrete		Consistence (IL) [The method should be stated in Appendix 17/1]	Each batch		[See sub-Clause 1707.2]
			Air content	Each batch		
			Cement content	[As required]		
			Water/cement ratio			
1709	Silane				Required for each delivery	Certificate that the silane complies with Clause 1709 is required (Cl 1709.2)
			Refractive Index	Three samples		[See sub-Clause 1709.2 (ii)]
			Trial panels			[See sub-Clause 1709.8]
1710	Concrete packing Mortar packing Epoxy resin bonding agent					[Appropriate tests/samples should be scheduled see NG 1710.9 (v)]
	Precast concrete manufactured off Site		Cube strength (Manufacturer's tests)			Contractor to make available records of tests by manufacturer
		Steel bars			Required (BS 4449 & IS EN 10080)	
		Steel wire			Required (BS 4482 & IS EN 10080)	

Specification Appendix Table 1/5/1						
Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
		Steel fabric			Required (BS 4483 & IS EN 10080)	
		Stainless steel			Required (BS 6744)	
1727	Inspection and testing of structures and components		As required by Appendix 17/4	As required in Appendix 17/4	Required	[Tests should be scheduled as appropriate and requirements given in Appendix 17/4]
CC-SPW-01800						
1805.2	Metallic products		Inspection documents to EN10204	All Metallic Products	Required according to IS EN 1090-2:2008+A1:2011, Table 1	[Give type of metallic product and document required, noting specific requirement for steel grade S355 JR and J0 described in 1805.2]
1805.3.4	Special properties of constituent products		Testing to identify internal discontinuities or cracks in zones to be welded as specified in Appendix 18/1	As required in Appendix 18/1		[Give specific testing requirements and frequency of testing in Appendix 18/1 with cross reference in Appendix 1/5]
1806.4.4	Check of the capability of cutting processes that are likely to produce local hardness		Testing in accordance with IS EN ISO 6507	As required		
1808.9	Use of special fasteners and fastening methods		Procedure tests for special fasteners and fastening methods as specified in Appendix 18/1	As required in Appendix 18/1		[Give specific testing requirements and frequency of testing in Appendix 18/1 with cross reference in Appendix 1/5]

Specification Appendix Table 1/5/1					
Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1810.1 (5)	Slip resistant connections	Slip factor test in accordance with IS EN 1090-2:2008+A1:2011, Annex G	As required in Appendix 18/1		[Give specific requirements in Appendix 18/1 with cross reference in Appendix 1/5]
1810.1 (10)	Verification of the preparation carried out before overcoating galvanized components	Test as specified in Appendix 18/1	As required in Appendix 18/1		[Give specific testing requirements and frequency of testing in Appendix 18/1 with cross reference in Appendix 1/5]
1812.2.1 (1)	Specific testing of constituent products not covered by standards.	Tests as specified in Appendix 18/1	As required in Appendix 18/1		[Give specific testing requirements and frequency of testing in Appendix 18/1 with cross reference in Appendix 1/5]
1812.2.1 (2)	Mechanical fasteners	Sample testing as specified in 1812.2.1 (2)	As required in 1812.2.1 (2)		Results to be reported in accordance with 1812.2.1 (2). Testing not required if mechanical fasteners supplied by a NHSS 3 registered Organisation. See 1800 5.2
1812.2.1 (3)	Mechanical fasteners	Suitability testing as specified in 1812.2.1 (3)	As required in 1812.2.1 (3)		Results to be reported in accordance with 1812.2.1 (3).
CC-SPW-01900					
1903	Abrasives	Grading	[As required]		†† [See NG 1903]
		Hardness			
1909	Galvanised Coatings	Test specified in IS EN ISO 1461	[As required]		
	Thermally sprayed aluminium metal coatings	Tests specified in IS EN ISO 2063	[As required]		

Specification Appendix Table 1/5/1						
Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
		Aluminium coating material			Required in accordance with IS EN ISO 14919	
1910	Thermally sprayed aluminium metal coating		Pull off adhesion test in accordance with IS EN ISO 4624, IS EN ISO 2063 or 'ASTM D4541-Type III'	At the start of the works and [specify subsequent intervals]		
	Thermally sprayed aluminium metal coating (excepted areas)		Grid test specified in IS EN ISO 2063	[As required]		
1911, Table 19/2B	Hot dip galvanised coating to fasteners		Tests specified in IS EN ISO 10684	[As required]		[Any additional tests should be scheduled in Appendix 19/5]
1912	Paints					
		'A' and 'B' Samples	Provision of samples for 'A' and 'B' sample tests			Samples selected in accordance with Clause 1912
			Specific gravity	As required by rate of 'A' and 'B' sampling		See NG 1912, 7; Appendix 19/4, Note 4;
			Colour match	As required by rate of 'A' and 'B' sampling		See NG 1912, 7
1914	Coating System					
		Minimum film thicknesses	Minimum dry film thickness measurements in accordance with IS EN ISO 2808	Required – representative testing		

Specification Appendix Table 1/5/1						
Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
		Adhesion	Pull off adhesion test in accordance with IS EN ISO 4624, IS EN ISO 2063 or ASTM D4541 – Type III	Required – representative testing		
		Defects	Visual assessment supplemented by appropriate testing	Required		[Any additional tests should be scheduled in Appendix 1/5]
		Defects – pin- holing or porosity	Low or high voltage detectors in accordance with ASTM G62-07	Required – representative testing excluding corners, bolted joints or welds		
1972	Abrasives		Grading	[As required]		†† [See NG 1972]
			Hardness			
1974	Thermally sprayed aluminium metal coatings		Tests specified in IS EN ISO 2063	[As required]		
		Aluminium coating material			Required in accordance with IS EN ISO 14919	
1975	Thermally sprayed aluminium metal coating		Pull off adhesion test in accordance with IS EN ISO 4624, IS EN ISO 2063 or 'ASTM D4541- Type III'	At the start of the works and [specify subsequent intervals]		
	Thermally sprayed aluminium metal coating (excepted areas)		Grid test specified in IS EN ISO 2063	[As required]		
1978	Paints					

Specification Appendix Table 1/5/1						
Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
		'A' and 'B' Samples	Provision of samples for 'A' and 'B' sample tests			Samples selected in accordance with Clause 1978
			Specific gravity	As required by rate of 'A' and 'B' sampling		See NG 1978, 7; Appendix 19/4, Note 4;
			Colour match	As required by rate of 'A' and 'B' sampling		See NG 1978, 7

Specification Appendix Table 1/5/1					
Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
CC-SPW-02400					
2401	Masonry cement			Required (IS EN 413-2)	Quality management scheme applies
		Chloride content	Monthly		Test to be carried out by the manufacturer and results included on the test certificate
2402	Sand			Required per consignment (IS EN 13139)	
		Chloride content	Monthly		Test to be carried out by the manufacturer and results included on the test certificate
2404	Mortar admixtures			Required (IS EN 934-3)	Product certification scheme applies
2405	Lime			Required (IS EN 459-1)	
2406	Bricks				Product certification scheme applies
	Clay	Active soluble salt content (IS EN 772-5) Compressive strength (IS EN 772-1) Water absorption (IS EN 772-7) Freeze/thaw resistance			<i>[Tests/samples (in accordance with IS EN 771-1 should be scheduled as required)]</i>
	Calcium silicate			Required IS EN 771-2)	
	Concrete			Required (IS EN 772-2)	
2407	Blocks				

Specification Appendix Table 1/5/1						
Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
		Concrete			Required (IS EN 772-2)	
2408	Manufactured Stone		In accordance with IS EN 771-5		Required	
2410	Stainless Steel					
2411		Wire/fabric			Required (IS EN 10088-1)	
		Bars			Required (BS 6744)	
2412	Stone		In accordance with BS EN 13755:2008	3 samples		Test to BS EN 13755:2008. New stone porosity to match ±10% of the existing stone porosity.
			In accordance with BS EN 1926:2007	3 samples		Test to BS EN 1926:2007. New stone crushing strength shall equal or exceed the existing stone.

APPENDIX 1/7

Site Extent And Limitations On Use

Extent of the Site

1. The extent of the Site shall include the lands made available as shown on the Contract Drawings. The extent of the site does not include for temporary traffic management required for the execution of the works.
2. The contractor is to make his own arrangements in relation to identifying a suitable site compound.

Limitations on the Use of the Site

1. The Contractor is not permitted to move personnel, plant or machinery across any of the National Primary or Secondary routes or Regional roads without approval of the Local Authority.
2. The Contractor shall undertake the Works in such a manner as to avoid degradation of the water quality of any of the watercourses affected by the Works by pollution as a consequence of site operations as required by Clause 133, 170AR, 176AR, 180.1AR and 180.3AR of this Specification.
3. The Contractor shall undertake the Works in such a manner as to avoid degradation of any stream or watercourse (including canal) water quality by pollution as a consequence of site operations.
4. During the completion of the Works, the Contractor shall maintain an equivalent level of access service for pedestrians and cyclists through the Site. Equivalent parking facilities are required to be maintained during the works and access for pedestrians, cyclists and vehicular traffic is to be maintained to all properties along the route and along each carriageway.
5. The Contractor shall keep open and maintain access facilities to properties during the course of the Works. The Contractor shall attend monthly progress meetings and assist the Employer in all dealings with property owners.
6. The Contractor's attention is drawn to Appendix 1/9 of the Specification concerning limitations on noise and vibration. The normal working hours shall be Monday to Friday between 08.00 and 19.00 hours and Saturday between 08.00 and 16.30 hours, with no working on Sundays and public holidays. Exceptionally, the Employer's Representative's consent for work outside these hours may be given after necessary consultation and written approval. Seven days' notice shall be required from the Contractor when seeking such consent.
7. The Contractor shall liaise with the Office of Public Works in relation to the operation of the Galway Sluice Barrage. OPW control the flows in the river Corrib at the Galway Sluice Barrage upstream of the Salmon Weir Bridge. The Sluice Barrage is made up of 16 gates that they open/close as required. The Contractor shall liaise with OPW prior to undertaking the inspections so that the OPW avoid opening additional gates without warning while the contractor has staff in the river. Opening gates can have a sudden and dramatic effect on water levels and velocities.

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Oifig na nOibreacha Poiblí
Office of Public Works
An tSráid Mhór, Áth Cinn, Co na Gaillimhe, H91 RX79
Main Street, Headford, Co Galway, H91 RX79

8. The Contractor shall contact IFI to provide advanced notification of their arrival onsite; Contact details as follow:

david.harrington@fisheriesireland.ie , Inland Fisheries Ireland, Teach Breac, Earl's Island, Galway, H91 E2A2, 091 563118.

9. During previous works undertaken at Salmon Weir Bridge, it was not possible to deploy an underbridge unit on the Courthouse side at the southeast corner, alternative access for works will be required at that location. Additionally, an underbridge unit may have difficulty deploying in the location of the disused eel trap.

10. The Contractor shall be responsible for all access to the structure to undertake the proposed works. Access through the Office of Public Works' Galway Sluice Barrage platform, and all Inland Fisheries Ireland's platforms on the western bank of the river are prohibited. Distillery Mill Race is at a lower level to the River Corrib and access may be difficult.

Access via the Eastern Conduit Bridge approximately 55m north of the structure on Waterside Road may be permitted, if required, upon liaising with the Office of Public Works' Galway Office. Wading upstream from the Eastern Conduit Bridge to Salmon Weir Bridge may not be permissible as this could cause issues with fish movement. There is a strip of land between the two bridges which might provide suitable access. However, this is currently overgrown and may need to be cut back to allow access.

11. Works within the river for Arches / Spans 2 and 3 are not permissible until August 1st, 2026.

12. The Contractor shall be responsible for ensuring all works are programmed considering the following ecological and conservation time periods:

- Bird nesting season: 1st March to 31st August
- Fisheries season: 1st July to 31st September.
- Angling season: 1st March to 31st September.
- Peak angling season: June - July.

Construction Compounds

1. The contractor shall be responsible for making all arrangements for providing any land required for offices and other temporary site facilities.

Other Site Constraints

1. The heritage lighting columns shall be installed and fully operational prior to the removal of the temporary parapet lighting.
2. Existing cast iron balusters to be re-used if discovered and in salvageable condition.

APPENDIX 1/9

Control of Noise and Vibration

Noise

1. The Contractor shall decide whether to seek the Local Authority's formal consent to his proposed methods of work and to the steps he proposes in order to minimise noise.
2. The normal working hours within the site shall be Monday to Friday between 08.00 hours and 19.00 hours and Saturday between 08.00 and 16.30 hours with no working on Public Holidays. Exceptionally, the Employer's Representative's may give consent for work outside these hours. 7 days' notice is required from the Contractor when seeking same.
3. The noise levels (see Note (i) below) for periods outside the normal working hours will only be permitted when consent has been given to exceptional working.
4. The ambient noise level, L_{Aeq} (see Note (ii) below) from all sources when measured 2.0 metres above the ground at 1m from the façades of residential properties in the vicinity of the Works, shall either not exceed the appropriate level given in the schedule below, or not exceed by more than 3dB(A) the existing ambient noise level, L_{Aeq} (see Note (iii) below), at the control station measured over the same period, whichever level is greater. The maximum sound level at any noise control station shall not exceed the level given in the Schedule. Exceptionally the Contractor may be given permission to carry out works which exceed the noise levels in the Schedule, provided that 14 days' notice of the date and timing of these works is given to the Employer's Representative and the Contractor demonstrates that he intends to take all reasonable measures to mitigate the noise nuisance. After consultations with the Local Authority and any other interested bodies a decision will be given within 7 days of receipt of the notice. The Contractor shall provide 4 No. noise monitoring stations continuously during the works.
5. The Contractor shall employ the best practical means to minimise noise produced by his operations including plant maintenance, and shall comply with the recommendations in BS 5228 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.
6. All vehicles and mechanical plant used on the works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order for the duration of the works. Machines in intermittent use shall be shut down in the periods between work or throttled down to a minimum. The Contractor shall remove from the works any item of plant, which in the opinion of the Employer's Representative is ineffectively silenced. All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers and shall be kept closed whenever the machines are in use. All ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers. Pumps and mechanical static plant shall be enclosed by acoustic sheds or screens where directed by the Employer's Representative.
7. Any plant such as generators and pumps shall be surrounded by an acoustic enclosure to the approval of the Employer's Representative which shall restrict the noise level to not less than 5dB(A) below levels quoted in the schedule to this Appendix.
8. The Contractor shall organise his operations with regard to the positioning of plant, etc., so it minimises construction noise to adjacent properties.
9. The Contractor shall carry out noise monitoring in accordance with the standards referenced in this Appendix.
10. The period referred to as "night" shall be from 2200 hrs to 0500 hrs.
11. The use of explosives is not permitted.

12. When permitted by the Employer's Representative any work on Sundays and all work on official public holidays shall take place only between the hours of 0900 hours and 1600 hours.

Table 1/9/1 Schedule of Total Noise Levels at Building Facades

Period	Hours	Permitted Ambient Noise Level, L_{Aeq} , measured at Building Facades [dB(A)]	Period of Hours over which L_{Aeq} is applicable.	Maximum Sound Level (see note (iv) below) measured at Building Facades [dB(A)]
Monday to Friday	08.00hrs to 19.00hrs	70	1 hour	80
Saturday	08.00hrs to 16.30hrs	65	1 hour	75
Sunday and Public Holidays	09.00hrs to 16.00hrs	60	1 hour	65
All unattended plant outside normal working hours.		60	1 hour	65
Night-time Working		50	1 hour	55

Notes:

- (i) Noise levels relate to free field conditions. Where noise control stations are located 1 metre from façades of buildings, the permitted noise levels can be increased by 3dB(A).
- (ii) The ambient noise level, L_{Aeq} , at a noise control station is the total L_{Aeq} from all the noise sources in the vicinity over the specified period.
- (iii) The existing ambient noise level, L_{Aeq} , at a control station is the total L_{Aeq} from all the noise sources in the vicinity over the specified period prior to the Commencement of the Works.
- (iv) Maximum sound level is the highest value indicated on the sound level meter which meets the requirements of IS EN 61672.

Vibration Control

13. Vibration generated by the Contractor's activities shall not adversely affect the structural and serviceability performance of any building or structure outside the boundaries of the site. In addition, the maximum permitted peak particle velocity generated by the construction of the Works shall not exceed the peak particle velocities at locations described and for the frequencies given in Tables 1/9/2 and 1/9/3 below.

Table 1/9/2: Limits for Intermittent Vibration

Structure Type	Max PPV (mm/sec) – Intermittent Vibration		
	Frequency <10 Hz	Frequency 10 – 50 Hz	Frequency 50 – 100 Hz
Residential Properties and similar Structures (unoccupied) / Existing Structures	5	10	15
Residential Properties (occupied)	4	8.5	10
Steel and Reinforced Concrete Structures	15	30	40
Robust Underground services	15	30	60
Elderly & Dilapidated Services	10	20	40

Table 1/9/3: Limits for Continuous Vibration

Structure Type	Max PPV (mm/sec) – Continuous Vibration		
	Frequency <10 Hz	Frequency 10 – 50 Hz	Frequency 50 – 100 Hz
Residential Properties and similar Structures (unoccupied) / Existing Structures	2.5	5	7.5
Residential Properties (occupied)	2.0	4.5	5.0
Steel and Reinforced Concrete Structures	7.5	15	20
Robust Underground services	7.5	15	30
Elderly & Dilapidated Services	5.0	10	20

14. Groundborne vibrations shall not be permitted at sites of freshly placed concrete, i.e. concrete less than 48 hours old.
15. The Contractor shall employ the best practical means to minimise vibration produced by his operations, including plant maintenance, and shall comply with the recommendations in BS 5228 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.
16. The Contractor shall provide complete records (photographic or otherwise) of existing structures and other properties, within a 50m offset along the bridge route.

Property Condition Surveys

Property Condition Surveys shall be carried out in accordance with Clause 136 of the Specification for Works.

Condition surveys shall include external surveys of each building and shall also include external boundary walls, piers, gates, driveways, paths and other paved areas.

APPENDIX 1/13

Programme of Design And Execution And Completion Of The Works

1. The Works Programme

- 1.1** The Contractor shall submit his programme of works in accordance with the Conditions and in accordance with the following specific requirements of this Appendix 1/13.
- 1.2** The Contractor shall provide the programme in the form of a Microsoft Project Gantt chart (or similar approved) derived from a “critical path analysis” and shall abide by the constraints stated or implied in the Contract. The programme shall show the level of detail appropriate to each stage of the Works and all activities and restraints, each of which shall be given a short title. All events shall be numbered and annotated with earliest and latest event dates. The critical path shall be clearly shown on the programme. The programme shall be supported by Bar Charts for particular activities or time scales at the request of the Employer's Representative.
- 1.3** The Contractor shall submit updated programmes to the Employer's Representative as necessary in accordance with the Conditions. All revision/updates to the above stated programme shall be supplied in hardcopy and digital formats.

2. Schedule of Stated Constraints

This list of Constraints is not exhaustive, and all other constraints suggested or implied by the Contract Documents or considered prudent by the Contractor following his inspection of the Site shall be taken into account by him in formulating his programme.

- i. The Contractor is required to effectively secure the Site;
- ii. Limitations on the use of the Site described in Appendix 1/7;
- iii. Approval and setting up of noise and vibration monitoring stations as described in Appendix 1/9;
- iv. The work to Privately and Publicly Owned Public Services and Supplies in Appendix 1/16 of the Specification. Many of the proposed alterations to existing services require ducting or other works to be undertaken by the Contractor prior to undertaking such **alterations**. In some cases, the services need to be altered temporarily for a period before the permanent alterations can be undertaken;
- v. Constraints in relation to Substances Hazardous to Health described in Appendix 1/23;
- vi. Constraints in relation to the submission and approval of Independent Design Check Certificates described in Appendix 1/71;
- vii. The Contractor shall liaise with the conservation architect as required by this Specification;
- viii. Tree felling and Clearance of vegetation activities shall occur outside the bird nesting season (March 1st – August 31st).
- ix. The Contractors is to be aware of limitations associated with working in a tidal environment. The Contractor shall submit method statements for all works to be carried within the tidal zone;
- x. Management, treatment and disposal of U2 Material contaminated with invasive species as per Clause 185AR.
- xi. The heritage lanterns may not be available for the full duration of the construction period. The Contractor shall allow for their installation during the last month of the construction period;
- xii. Maintenance of access for traffic, pedestrians and cyclists during the works.
- xiii. Constraints in relation to the use of an underbridge unit, if required, on the Courthouse side at the southeast corner, alternative access for works will be required at that location. Additionally, an underbridge unit, if used, may have difficulty deploying in the location of the disused eel trap.

- xiv. Access through the Office of Public Works' Galway Sluice Barrage platform, and all Inland Fisheries Ireland's platforms on the western bank of the river are prohibited Use of any Inland Fisheries Ireland steel gangways will not be permitted.
- xv. Constraints in relation to OPW's operation of the Galway Sluice Barrage. It will be necessary for the Contractor to liaise directly with the Office of Public Works in relation to the operation of the Galway Sluice Barrage. OPW control the flows in the river Corrib at the Galway Sluice Barrage upstream of the Salmon Weir Bridge. The Sluice Barrage is made up of 16 gates that they open/close as required. The Contractor shall liaise with OPW prior to undertaking the inspections so that the OPW avoid opening additional gates without warning while the contractor has staff in the river. Opening gates can have a sudden and dramatic effect on water levels and velocities.

3. Monthly Programme

- 3.1** Each month the Contractor shall submit a programme (the Monthly Programme) to the Employer's Representative not later than 5 days following the end of the period being reported. The data date for each reporting period shall be as agreed with the Employer's Representative and shall be strictly adhered to by the Contractor.
- 3.2** The Monthly Programme shall be in exactly the same format, contain the same level of detail as the Works Programme, be accompanied by a narrative report of the same detail as that submitted with the Works Programme while also giving an accurate representation of the current status of the Works.
- 3.3** The Monthly Programme shall include and clearly define actual start and finish dates, percent complete and remaining durations for all activities including any new or additional activities or omissions, variations to the Works as instructed by the Employer's Representative in accordance with the Contract and any extensions of time granted by the Employer's Representative.

4. As Built Programme

The Contractor shall within two weeks of practical completion of the Works provide an As Built Programme of the Works which shall contain a similar level of detail as the Works Programme and shall accurately reflect the actual start and finish dates of each activity, all works instructed by the Employer's Representative and any other information necessary to properly record the actual construction history of the Works.

5. Acceptance by the Employer's Representative

Acceptance by the Employer's Representative of changes to the approved or version of the Works Programme shall not constitute approval of any Extension of Time.

6. Instructions, Drawings etc.

Submission of the programmes and reports specified herein shall not relieve the Contractor of his responsibility to separately make application for instruction, drawings etc. in accordance with the Contract.

7. Format of Reports

7.1 All programmes and reports specified herein shall be submitted to the Employer's Representative, unless expressly stated otherwise.

7.2 The size, number of copies and electronic format of copies of the programmes and reports to be submitted by the Contractor as specified herein shall be as agreed with the Employer's Representative.

7.3 All programmes shall be submitted electronically by the Contractor together with a paper copy at a size that is appropriate to the information contained on such programmes.

8. Submittal Schedule

The Contractor shall within 7 days of notification of acceptance of his tender issue to the Employer a schedule of all items to be furnished for review and or approval by the Employer's Representative.

APPENDIX 1/14

Monthly Statements

The monthly statements shall be submitted to the Employer's Representative in accordance with Sub-Clause 11.1.1 of the Conditions by the Contractor.

APPENDIX 1/16

Privately And Publicly Owned Services And Supplies

1. The Contractor shall make arrangements with the Statutory Undertakers and others concerned for the co-ordination of his work with all work, which needs to be done by them or their Contractors concurrently with the Works.
2. The Contractor only with the prior consent of the Authority concerned shall remove disconnected service/apparatus.
3. The Contractor shall consult with all the relevant Public Utility and Private Service owners before commencing any work in their vicinity, and shall satisfy himself as to the exact position of existing services which may affect or be affected by the construction of the Works.
4. The Contractor shall agree, in advance of any works, the exact location of any service diversion requirements on site with the relevant Local Authority, Public Utility and Private Utility Service bodies.
5. The Contractor shall take all measures required by any statutory undertaker for the support and full protection of all services or supplies in accordance with the relevant code of practice or special requirement. He shall keep the Employer's Representative informed of such liaison and measures.
6. Disconnected apparatus shall be removed by the Contractor only with the prior consent of the Authority concerned.
7. Should any leakage or damage be discovered, the Contractor shall immediately notify the Employer's Representative and the owners of the service, and the Contractor shall afford every facility for repair or replacement of the apparatus affected.
8. Construction traffic, including all traffic at site accommodation areas, shall only be permitted to transverse buried services after protective measures to be agreed with the Employer's Representative have been implemented.

Table 1/16-1: SCHEDULE OF WORKS TO SERVICES AT SALMON WEIR BRIDGE

Service Provider	Description	Group	Drawing No.	Notice Required to Commence*	Time for Completion ⁺
1 no. watermain fixed to the southern elevation of the Salmon Weir Bridge	Liaise with Uisce Éireann and agree proposals for: • Surface preparation and painting • 3 no. hangers to be replaced.	F	As shown on Contract Drawings	4 weeks	4 weeks

APPENDIX 1/17

Traffic Safety And Management

Traffic Safety and Management Requirements

- 1.1** The Contractor shall be responsible for the planning, consultation, implementation, maintenance and removal of traffic safety and management measures required in order to facilitate the work. This includes the costs associated with road closures, speed restrictions and advertisements as required.
- 1.2** The Contractor shall comply at all times with the requirement of the Department of Transport Traffic Signs Manual, Galway City Council, the Garda Síochána, “Guidance for the Control and Management of Traffic and Roadworks” prepared by the Local Government Management Services Board.
- 1.3** The Contractor, as a minimum, shall provide the following at all times during the construction of the Galway Bridge Rehabilitation Scheme.

1. R863 (University Road)

A minimum 3.0m carriageway lane with 1 no. footways

The Contractor shall agree all footway, lane closures in writing with the Employer's Representative, An Garda Síochána and Galway City Council.

- 1.4** The Contractor shall be responsible for maintaining existing Parking Spaces.
- 1.5** The Contractor shall be responsible for maintaining the running traffic on the R863 and any pedestrian routes adjacent to the Works in a clean and safe condition at all times.
- 1.6** The Contractor shall employ a barrier system to delineate and segregate the Contractor's working area during construction with a suitable level of containment. The Contractor shall programme the works with the aim of ensuring the safety of pedestrians / cyclists at all times and keeping disruption to pedestrians / cyclists to an absolute practical minimum and shall submit to the Employer's Representative a method statement to demonstrate how this will be achieved.

Details of this barrier system shall be submitted to the Employer's Representative with the detailed Traffic Management Plans.

- 1.7** The Contractor shall, within two weeks of the commencement of work on Site provide the Employer's Representative with detailed traffic management plans showing the sequence of Construction including the following information as a minimum:

Phasing of the Works at each location;

The Contractor shall develop detailed construction and Traffic Management Plans. The PSDP shall be consulted prior to the inception of any traffic management plans.

The Contractor shall provide drawings 3 weeks in advance of each traffic management plan showing temporary traffic management layouts, details shall include inter alia the following:

- (a) Area wide plan showing details of signs to be erected in advance of the works. These signs are to give details of the start date, duration and the restriction in place with an 'x height' appropriate for the classification of the road e.g. Single Carriageway 100mm "x" height etc.
- (b) Drawings showing traffic management layout (min. scale of 1:500) including as appropriate:
 - (i) extent of existing trafficked road being interfered with;
 - (ii) location and width of temporary traffic lane;
 - (iii) duration of interference with traffic flows;

- (iv) provision for emergency services;
 - (v) provision for pedestrians and cyclists;
 - (vi) provision for buses including set down;
 - (vii) turning movements using Autotrack or similar;
 - (viii) sequence of construction at junctions
 - temporary lighting
 - geometric design
 - taking up and reinstatement of road markings
 - (ix) geometric design
 - (x) working areas
 - (xi) safety zones
 - (xii) access and existing locations for construction vehicles
 - (c) Temporary Signals / flagman;
 - (d) Timing of operations;
 - (e) All temporary traffic signs, cones and traffic control signals necessary for the safe direction and control of public traffic, pedestrians or cyclists;
 - (f) All temporary measures to provide traffic management including, but not limited to, the following:
 - Safety Barriers and Pedestrian Guardrails;
 - Temporary Drainage & Service Ducts;
 - Pavements;
 - Kerbs, Footways & Paved Areas;
 - Traffic Signs;
 - Temporary Road Lighting including Electrical Work;
- 1.8** The works length should be kept as short as practicable, including the length of the tapers. In urban areas it will be necessary to limit the works' site to shorter lengths.
- 1.9** The Contractor shall appoint a Chartered Engineer, suitably experienced in Traffic Management and who is to be approved by Galway City Council and the Employer's Representative to prepare traffic management plans.
- The Contractor shall phase the construction of any work which affects traffic in a manner acceptable to the Galway City Council.
- 1.10** Drawings showing the Contractor's temporary traffic management schemes shall be to a scale not less than 1/2500, supplemented by drawings at 1/1000 or 1/500 scales as necessary, or as required by the Employer's Representative.
- 1.11** The Contractor shall keep a daily record of all defects, the times when they were identified or reported, the action taken to correct the defects, and the times when they were successfully corrected. A copy of this record shall be forwarded to the Employer's Representative on the following day, until the completion of those Works requiring the lane or carriageway occupation.
- 1.12** In the event of a traffic accident occurring adjacent to any of the Works, the Contractor shall immediately contact the Gardaí and the Employer's Representative informing them of the following:
- Location of the accident; and
 - The seriousness of the accident and whether any persons are trapped, whether the collision involves vehicles carrying inflammable, corrosive or hazardous substances, whether there is a possibility of ignition from leaking fuel or chemicals.

- 1.13** Heavy commercial vehicles used on Site and off-site areas by the Contractor, its sub-contractors or suppliers shall be fitted with an audible reversing warning device and have roof mounted amber flashing lamp, as required by sub-Clause 117.14 of the Specification for Road Works.
- 1.14** The Contractor shall organise, facilitate and attend regular traffic management meetings with the Employers Representative throughout the duration of the works. The Contractor shall distribute a proposed agenda 10 days in advance of each meeting and agree with the Employers Representative which relevant interested parties including inter alia, the Gardaí, Galway City Council should be invited to attend. On agreement the Contractor shall invite the relevant interested parties to attend.

Site and Off Site Areas Vehicles, Personnel and Plant

- 1.15** No vehicles shall exceed 30kph when travelling within the working areas of the Site and off site areas and a maximum 15kph speed limit is to be observed adjacent to works in progress, accommodation or standing plant. Temporary site speed limit signs are to be erected as appropriate.
- 1.16** No vehicles are permitted to drive against the normal flow or to face oncoming traffic, except when agreed in writing in advance by the Employer's Representative for the performance of essential activities.
- 1.17** Vehicles shall only enter or leave the working areas of the Site and off-site areas via approved accesses and egresses. Construction vehicles, or the vehicles of the Contractor's sub-contractors or suppliers, shall not be permitted to use roads, accesses or temporary carriageways within the Site and Off-site areas while they are open to use by public vehicles.
- 1.18** Non-essential vehicles, particularly private cars, shall not enter the working areas. The Contractor shall make provision for parking of employees' cars, and other non-essential vehicles, at a location away from the working areas and shall provide transport to the Site and off-site areas as necessary.
- 1.19** Contractor's vehicles shall not be permitted to park on public roads adjacent to the works. All Contractors vehicles shall park in designated parking areas.
- 1.20** All vehicles and plant engaged in the Works, or entering/exiting the working areas shall have roof mounted amber flashing lamp, as required by sub-Clause 117.14 of the Specification for Road Works. The lamp shall be used in the circumstances stated in sub-Clause 117.14 of the Specification, or as otherwise approved in writing by the Employer's Representative or the Garda Síochána. Hazard warning lights shall not be used as an alternative to the roof mounted amber flashing lamp.

Roads, Private Roads and Other Ways Affected by the Works

- 1.21** The contractor shall provide pedestrian/cyclist access at all times for the period of the construction works for members of the public.

- 1.22** Details of roads, private roads and other ways affected by the works are provided in the table below:

Description	Predicted AADT Values	Speed Limits (kph)	Special Facilities	Whether to be Kept Open or Closed
R863 (University Road)	N/A	30	-	Open

Two lanes of traffic shall be maintained for the duration of the Works. In limited circumstances, the Contractor can apply to GCC for the installation of a single lane shuttle (one-way stop and go) system for undertaking particular tasks. A single 3.5m or wider carriageway lane shall be maintained on R863 (University Road) for the duration of any single lane shuttle arrangements, with due allowance for vehicle turning, curves, junctions and sightline requirements.

- 1.23** The Contractor shall assist An Garda Síochana in moving wide/abnormal loads through the Works by modifying the signing/coning as necessary.
- 1.24** The Contractor shall carry out an inspection of all proposed access routes to the site in conjunction with the Employer's Representative. He shall prepare a photographic record demonstrating the existing condition of the road on commencement of the Contract. Any damage caused to the public road network during construction shall be reinstated by the Contractor to the satisfaction of the Employer's Representative.

APPENDIX 1/22

Progress Photographs

1. General

- 1.1 Record photographs shall be taken to record progress of the Works. The requirements for progress photographs of the Works shall be as follows.
- 1.1.1 As directed by the Employers Representative, progress photographs shall be taken from the ground or from bridges as indicated in Table 1/22/1 of this Appendix.
- 1.1.2 Progress photographs shall be obtained using a professional industrial photographer approved by the Employers Representative.

2. Ground/Hoist Progress Photographs

- 2.1 A set of progress photographs shall comprise 20 photographs in digital format. A set of progress photographs shall be taken prior to commencement of the Works and thereafter at 1 month intervals and as directed by the Employers Representative.

Each set shall be delivered to the Employer's Representative within one week of being taken with an introduction describing the detail on progress of works at the time when the photographs were taken.

Table 1/22/1: Progress Photographs

Location	Type	No.	Aerial/Ground	Frequency
Siteworks	Digital Photographs	20 per set	Ground	Prior to commencement of Works and at monthly intervals until completion

APPENDIX 1/23

Substances Hazardous To Health

1. General

The Contractor shall be required to provide temporary screening to protect members of the general public, including motorists and other road users, in close proximity to the works.

The screening shall be of sufficient construction to protect the public from any substances potentially hazardous to health, which are either being used by the Contractor or are a result of the works.

Once erected, the screening shall reduce the concentrations of these substances within the air to levels which are below European Union guidelines. Any monitoring necessary shall be the responsibility of the Contractor.

It is anticipated that screening may be required in the vicinity of the Galway Bridge Rehabilitation Project (e.g. access points).

The following list details materials which may require such particular precautions:

- Dust generated by surface preparation of the existing cast iron balusters for maintenance painting (the presence of lead paint is unknown);
- Concrete and masonry dust;
- Cement dust;
- Bituminous dust arising from planing;
- Siloxane, Silane and coatings;
- Lime;
- Weed killers/Chemicals for cleaning;
- Volatile materials (i.e. primer, paints, sealants, etc.);
- Biological hazards from in-stream works (i.e. foul sewer overflows);
- Contaminated Land (Hydrocarbons, fill material etc.).

This list is not fully comprehensive and further materials will fall within the scope of this requirement.

The Contractor shall submit to the Employer's Representative his proposals for complying with the above requirements 14 days in advance of the use of the potentially hazardous material.

All work shall be carried out with due regard to the Safety, Health and Welfare at Work (Construction) Regulations 2013.

The Contractor shall provide the Employer's Representative with a copy of his Safety Statement and shall revise it as necessary in the light of any revised or additional obligations required by law. The statement shall include the Contractor's detailed procedures to be followed in the event of any accident including minor incidents.

APPENDIX 1/24

Quality Management System

The Contractor shall prepare method statements as required by various appendices to the Specification. Each method statements shall be submitted to the Employer's Representative a minimum of four weeks prior to commencement of the relevant Works.

The following is a list of accepted quality management schemes referred to in sub-Clauses 104.3 and 104.4.

Scheme

1. Description: Manufacture of Industrial Fasteners and Associated Items

Certification Bodies:

British Standards Institute
389 Chiswick High Road, London W4 4AL, UK

Llyod's Register Quality Assurance Ltd.
Hiramford, Middlemarch Office Village, Siskin Drive, Coventry CV3 4FJ, UK

Specification:

Nuts, bolts and fixings shall be in accordance with the 1800, 2200 and 2500 Series of Specification and shall be manufactured to the requirements of the following Standards.

BS 4320	Specification for metal washers for general engineering purposes;
IS EN 14399 Pts 1 to 10	High-strength structural bolting assemblies for preloading;
IS EN ISO 898	Mechanical properties of fasteners;
IS EN ISO 4014	Hexagonal head bolts Product Grades A and B
IS EN ISO 4016	Hexagon head bolts Product grades C
IS EN ISO 4017	Hexagon head screws Product grades A and B
IS EN ISO 4018	Hexagon head screws Product grades C
IS EN ISO 4032	Hexagon nuts, style 1 Product grades A and B
IS EN ISO 4034	Hexagon nuts Product grades A and B

Alternatively nuts, bolts and fixings shall be manufactured to the dimensions and tolerances of the Standards listed above, using materials to the following Standards:

BS 6105	Specification for corrosion resistant stainless steel fasteners
ASTM A325-89	Specification for high strength bolts for structural steel joints

Note 1: Where the Contractor can demonstrate that the fastener required is made by fewer than three firms within this scheme, the requirement to conform with the scheme shall not apply.

Note 2: Where the Contractor obtains fasteners from a stockist, the stockist shall be registered under Part 1 of the BSI Registered Stockist System, or equivalent. The system requirement shall be 'Level A, Quality Assured Material with Lot Traceability (P00012)'. Where the Contractor can demonstrate that the fastener required is supplied by fewer than three stockists within this system, the requirement to comply with the System shall not apply.

2. Description: Manufacture of Portland Cement

Certification Body:

British Standards Institute
389 Chiswick High Road, London W4 4AL

Or
The Certification & Inspection Department
National Standards Authority of Ireland, Eolas, Glasnevin, Dublin 9

Specification: Cement shall be in accordance with the 1700 and 2400 Series of the Specification and shall be manufactured to comply with all of the appropriate requirements of one of the following Standards.

IS EN 197-1	Composition, specifications and conformity criteria for common cements
IS EN 197-4	Cement. Composition, specifications and conformity criteria for low early strength blastfurnace cements
BS 1370	Specification for low heat Portland cement
BS 4027	Specification for sulphate – resisting Portland cement
BS 4246	Specification for high slag blast furnace cement
BS 6588	Specification Portland pulverised fuel ash cements.

3. Quality Plan

The Contractor shall establish and implement quality assurance procedures for establishing quality assurance systems for himself and any sub-contractors.

The Contractor shall submit a Quality Plan to the Employers Representative for acceptance not later than 21 days after the Contract date. The Quality Plan shall include inter alia the following details:

- (i) Contractor's Organisation and Management.
Including the organisation of the Contract, line command and communication links between parties involved in the Contract on and off site.
Names, roles, responsibilities and authority of principals and key personnel.
- (ii) Identification of the parts of the Contractor's Quality Management System relevant to the Works.
- (iii) Supply Chain Management.
Including details of control and communication processes, assessment of the supplier's and sub-contractor's quality management systems and quality control capabilities, monitoring arrangements, review and acceptance of work items being undertaken by the sub-contractor or supplier.
- (iv) Document Control
Controls relevant to the Works, including the control and processing of testing results, materials and workmanship certification and quality records.
The management of quality records in accordance with IS EN 9001.
The control and scheduling of all documentation to be submitted to the Employers Representative as required by the Specification throughout the Works.
- (v) Resource Management
Including details of relevant skills and experience of personnel involved in the Works.
The relevant training and/or competency assessment certificates and/or registration/skills cards.
- (vi) Method Statements
Method Statements for initial items of work and scheduling for all other method statements required.

APPENDIX 1/25

Product Certification Schemes

The following is a list of both marked and unmarked product certification schemes accepted in the Contract and referred to in Clause 104 of the Specification.

1. Marked Schemes

	a. Kitemark	b. Irish Standard Mark ISM
Certification Body:	British Standards Institute 389 Chiswick High Road, London W4 4AL	National Standards Authority of Ireland Glasnevin Dublin 9

BS No., Equivalent Irish Standard or Euronorm	Title	Specification Series
IS EN 197	Cement: - Composition, Specifications and Conformity Criteria for common cements	500 900 1000 1600 1700 2400 2600
IS EN 12620	Aggregates for concrete	500 900 1000 1600 1700 2400
IS EN 1790	Road markings materials – performed road markings	1200
BS 1370	Specification for low heat Portland Cement	1700

2. Other Marked Schemes

i) Reinforcing and Prestressing Steel

Certification Body:	UK Certification Authority for Inspecting Dept Reinforcing, Steels (CARES), Pembroke House, 21 Pembroke Road, Sevenoaks, Kent TN13 1XR	or The Certification & Inspection Dept, National Standards Authority of Ireland. Eolas, Glasnevin, Dublin 9
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BS No., Equivalent Irish Standard or Euronorm	Title	Specification Series
BS 4449	Specification for carbon steel bars for the reinforcement of concrete	1700 2500
BS 4482	Steel wire for the reinforcement of concrete - Specification	1700
BS 4483	Specification for steel fabric for the reinforcement of concrete	1700
BS 5896	Specification for high tensile steel wire and strand for the prestressing of concrete	1700
BS 6744	Stainless steel bars for the reinforcement and use in concrete requirements and test methods	1700

BS No., Equivalent Irish Standard or Euronorm	Title	Specification Series
BS 8666	Specification for scheduling, dimensioning, bending and cutting of steel reinforcement for concrete. (Except that the Contractor or the manufacturer of pre-cast concrete products may opt to obtain straight bars from a firm within the Scheme and cut and bend them on the Site or at the pre-casting works respectively provided the levels of inspection and quality assurance specified in BS 4466 are maintained)	1700
IS EN 13391	The production and supply of Prestressing Anchorages for Post-tensioning Systems	1700

3. Non-Marked Schemes

i) Ready Mixed Concrete

Certification Body: The Quality Scheme for Inspection Dept, Ready Mixed Concrete, Wolsey House, 3 High Street, Hampton, Middx TW12 2SQ or The Certification & Inspection Dept, National Standards Authority of Ireland, Eolas, Glasnevin, Dublin 9

Specification: The supply of ready mixed concrete shall comply with the Specification for Road Works, in particular the 1700 Series Specification.

BS No., Equivalent Irish Standard or Euronorm	Title	Specification Series
IS EN 197	Part 1: Cement: - Composition, Specifications and Conformity Criteria for common cements. Part 2: Cement Conformity evaluation Part 4: Cement composition, specifications and conformity criteria for low early strength blastfurnace cements	1700
IS EN 12620	Aggregates for concrete	1600 1700 2400 2600
IS EN 12878	Pigments for the colouring of building materials based on cement and/or lime. Specifications and methods of test	1600 1700 2400 2600
BS 1305	Specification for batch type concrete mixers	1600 1700 2400 2600
IS EN 12350-7	Testing fresh concrete. Air content. Pressure methods	1600 1700 2400 2600
IS EN 1008	Mixing water for concrete. Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete	1600 1700 2400 2600
IS EN 13055-1	Lightweight aggregates. Lightweight aggregates for concrete, mortar and grout	1700

BS No., Equivalent Irish Standard or Euronorm	Title	Specification Series
IS EN 450	Fly ash for concrete	1700
BS 4027	Specification for sulphate-resisting Portland cement	1600 1700 2400 2600
IS EN 480	Admixtures for concrete, mortar and grout. Testing Part 1: reference concrete and reference mortar for testing Part 2: Determination of setting time Part 3: Determination of water soluble chloride content Part 11: Determination of air void characteristics in hardened concrete Part 12: Determination of the alkali content of admixtures	1600 1700 2400 2600
IS EN 206	Concrete Specification, Performance, Production and Conformity	1600 1700 2400 2600
IS EN 15167	Ground granulated blastfurnace slag for use with concrete, mortar and grout Part 1: Definitions, specifications and conformity criteria Part 2: Conformity evaluation	1600 1700 2400 2600

APPENDIX 1/26

Irish Agrément Board Roads and Bridges Certificates

1. Table 1/26 contains a list of types of work, goods or materials for which proprietary products are required to have an NSAI Agrément Certificate or equivalent.

Table 1/26: Requirements for Agrément Certificates

Description	Specification Series
Road Restraint Systems	400
Prefabricated Temporary Road Marking Material	1200
Reflecting Road Studs	1200
Traffic Signal and Control Equipment	1200
Concrete Coating Material	1700
Waterproofing for Bridge Decks	2000

Details of products conforming with the above requirements are listed in the Index of Current Publications which may be obtained from the Publications Department, Irish Agrément Board.

Where types of work, goods or material for which proprietary products are required to have an NSAI Agrément Certificate, a British Agrément Board certificate or equivalent shall be acceptable.

APPENDIX 1/71

Works By Other Contractors

1. Maintenance works on the surrounding road network at the structures may be ongoing. The Contractor shall liaise with other Contractors and provide unrestricted access to allow ongoing maintenance works.
2. Utility providers may need to access the site to carry out maintenance work. Refer also the requirements of Appendix 1/16.
3. The Contractor shall liaise with the other Contractors and provide unrestricted access to facilitate works.

APPENDIX 1/74

TEMPORARY CONSTRUCTION PLATFORMS

1. Temporary construction access platforms shall include any temporary works required to support any plant or part or all of the Works.
2. The Contractor shall design, construct and maintain temporary construction access platforms, which shall be designed to resist the loads from the Works requiring support during on site refurbishment works of the bridge.
3. The Contractor shall maintain temporary construction access platforms in a condition fit for the onsite refurbishment activities occurring at the time. The Contractor shall remove temporary construction access platforms and reinstate the area to its original condition as soon as is reasonably practicable following completion of onsite activities.
4. The Contractor shall supply details, fabrication drawings, drawings, calculations and method statements for construction and removal of temporary Construction Platforms to the Employers Representative at least 4 weeks prior to the construction of temporary platforms for approval. The Contractor shall fully take into account the existing tide levels, topography and ground conditions and limit the differential settlement between points of permanent support of the structural steelwork to less than 5mm.
4. The Contractor is required to submit Independent Temporary Works Check Certificates in accordance with Clause 174AR.

The Contractor shall undertake the works in such a manner as to avoid degradation of water quality at the River either by pollution from oil spills, or contamination due to concreting or grouting operations, ensure there is no generation of suspended solids or other deleterious matters to the river channel or by causing turbidity due to disturbance of silt or spoil from construction operations.

Specific measures to be taken to prevent the above shall include the following:

- (i) The appointed contractor will have in his possession, be familiar with and adhere to the relevant measures detailed within the 'Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors (SP156) (CIRIA 2002);
- (ii) Construction method statements will be submitted to NPWS and Inland Fisheries Ireland for approval prior to commencement of construction.
- (iii) Contractors plant, equipment etc. shall be free of any mechanical defects, and be well maintained and serviced so as to prevent oil or fuel leaks into the river;
- (iv) Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice;
- (v) Fuelling and lubrication of equipment will not be carried out close to the river;
- (vi) Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling;
- (vii) Throughout all stages of the construction phase of the project the contractor shall ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the river environment and the requirement to avoid pollution of all types;

APPENDIX 1/77

As Built Records Drawings

The contractor shall maintain and submit as built records and drawings of the works in accordance with the requirements of Clause 177AR and as described below:

1. Deliverables

The Contractor shall be responsible for supplying a detailed set of scalable as-built record drawings. All as-built drawings shall be submitted in A1 format.

Drawings shall include but not be limited to:

- All standard, typical and specific details pertaining to the design;
- All configuration plans and wiring diagrams;
- Component drawings;
- General arrangement details;
- Detailed sections and profile drawings.

Plan layouts, general arrangement and plan location drawings shall be drawn in context with the surrounding environment, to demonstrate how newly constructed elements tie in and link with the adjacent works.

The Contractor shall maintain and issue to the Employer's Representative interim as-built drawings of the works on request.

2. As-built drawing submissions

The following as-built information shall be issued by the Contractor to the Employer's Representative:

One electronic drawing file (including reference files and any drawings referred to within the main body of the as-built drawing) and one hard copy of interim as-constructed drawings shall be submitted to the Employer's Representative on request.

On completion of the works, one electronic drawing (including reference files and any drawings referred to within the main body of the as-built drawing) and two full size hard copies of the as-constructed record drawings shall be issued to the Employer's Representative.

On acceptance of this data a further signed full size hard copy shall be issued to the Employer's Representative.

3. Drawings

3.1 General

The Contractor shall create and maintain drawings within the specifications as laid out in this Appendix.

A brief description of the drawing requirements will include but not be exclusive to:

- All design data to be drawn at a scale of 1:1;
- All master design files will be submitted at agreed intervals;
- All files must be named in accordance with the drawings in the Contract;
- All drawings numbers must be in accordance with the drawings in the Contract;
- Working units must be set to 1000mm per m and 1 pos unit per mm;
- Drawings shall not contain any additional contractor's address or telephone number other than that shown on the standard drawing sheet;
- Transmittals will accompany all submittals of drawing data, itemising each individual item, submitted CD's to be labelled and have cross reference of transmittal clearly on it;

- Where drawings are included within reports they are not deemed to have been officially submitted;
- All submittals will include hard copy, design files and drawing files;
- Email submittals must be accompanied by a formal transmittal.

4. Electronic Data

This section details the mechanism and modes for electronic data transfer of drawings between all parties. The following drawing submittal specifications shall be used unless directed otherwise by the Employer's Representative.

All drawings submitted for formal review shall be provided in the following formats, to be agreed with the Employer's Representative:

- AutoCAD DWG 2018 and Microstation V8i (Select) Series 2

The following standards shall also apply:

- Each transfer shall be fully documented to detail items such as layer use, cross-referenced files, necessary directory structure, etc.
- Data transfers shall be readable using equipment currently employed by the Employer's Representative.
- Generally the current version of all application software shall be deemed to be standard, as long as it is compliant with the operating characteristics of the Employer's Representative's computer systems.

APPENDIX 2/1

LIST OF STRUCTURES TO BE PARTIALLY DEMOLISHED

1. The location of all items to be demolished and disposed off-site are identified on Drawings GBRF-ROD-SBR-S04-DR-CB-50010.
2. All items to be disposed of are to be disposed in a certified landfill in accordance with DOEHLG guidance.
3. The Contractor shall be aware the Contract requires improvement/upgrade/replacement works to inter alia existing public roads, accessways, cycle tracks and footpaths. The Contractor's programme for Site Clearance shall be phased to ensure, as far as is reasonably possible, there is no reduction in the level of service provided by the public roads and footpaths during the completion of the Works.

Description	Drawing No.	Requirements
Architectural Lighting	GBRF-ROD-SBR-S07-DR-CB-50010	Existing architectural lighting to be taken down and removed to tip off site.
Concrete Baluster	GBRF-ROD-SBR-S07-DR-CB-50010	Existing concrete baluster to be taken up and removed to tip off site.
Damaged Cast Iron Balusters	GBRF-ROD-SBR-S07-DR-CB-50010	Existing damaged cast iron baluster to be taken up and removed to tip off site.
Existing kerbs	GBRF-ROD-SBR-S07-DR-CB-50010	Existing kerbs to be taken up and removed to tip off site.

APPENDIX 2/4

Explosives And Blasting

1. Explosives and blasting shall not be permitted.

APPENDIX 2/5

Hazardous Materials

1. The appropriate measures must be taken to safeguard the health of the Contractor's operatives and the general public.
2. Hazardous materials arising from site clearance and/or excavations shall be disposed of only at sites licensed by the City Council of the area for the arising or other licensing authorities.
3. Reference should also be made to Appendix 1/23.
4. A desktop study and ground investigation was undertaken for the Site. No Asbestos was found on Site. However, the underlying strata of the Site consist of alluvial and made ground. In the event asbestos material is identified within the Site the Contractor shall comply with legislation and best practice for the handling, transportation and disposal of asbestos materials.

Safety with Asbestos published by the Health & Safety Authority.

Working with Asbestos Cement and Asbestos Insulating Board published by the Health & Safety Executive UK (Guidance Note EH 71)

5. All site staff and visitors to the site shall be briefed on the dangers and the correct usage of hazardous materials on site.

APPENDIX 6/1

REQUIREMENTS FOR ACCEPTABILITY & TESTING ETC. OF EARTHWORKS MATERIALS

1. Acceptable Limits

The permitted classes, acceptable limits and material properties required for acceptability for the fill materials are given in Tables 6/1 and 6/2 of the specification.

Drawings showing the locations of zoning of general and selected fills are as follows:

Element	Drawings
Salmon Weir Bridge – Filling of riverbed scour hole	Refer to Design Drawings

The Acceptable Limits for the classification of materials in addition to those described in Table 6/1 of the specification are shown on Table 6/1 in this Appendix.

Table 6/1 Acceptable Earthworks Limits

Class	Property	Acceptable Limits	
		Lower	Upper
1A	Grading	Table 6/2	Table 6/2
	Uniformity Coefficient	10	-
	mc	omc – 3%	Omc + 2%
1B	Grading	Table 6/2	Table 6/2
	Uniformity Coefficient	-	10
	mc	omc – 3%	Omc + 2%
1C	Grading	Table 6/2	Table 6/2
	Uniformity Coefficient	5	-
	Los Angeles Coefficient	-	50
1C(1) Improvement Layer	Grading	Table 6/2A	Table 6/2A
	Uniformity Coefficient	5	-
	Los Angeles Coefficient	-	50
	Slake Durability	95%	-
	Ø'	40°	-
2A	Grading	Table 6/2	Table 6/2
	MCV	8	14
	Undrained shear strength	75kPa	200kPa
2B	Grading	Table 6/2	Table 6/2
	MCV	8	14
	Undrained shear strength	75kPa	200kPa
2C1 & 2C2	Grading	Table 6/2	Table 6/2
	MCV	8	14
	Undrained shear strength	75kPa	200 kPa
2D	Grading	Table 6/2	Table 6/2
	MCV	8	14

Class	Property	Acceptable Limits	
	Undrained shear strength	75kPa	200kPa
4	Grading	As for Class 2 Table 6/2	As for Class 2 Table 6/2
	MCV	5	15
	Undrained shear strength	40kPa	-
5A	Grading	-	Clause 618
5B	Comply with BS3882		
6C	mc	omc-1.5%	omc+0.5%
6C(1)	Grading	Table 6/2A	Table 6/2A
6H	mc	omc-1.5%	omc+0.5%
6I	mc	omc-1.5%	omc+0.5%
	ϕ'	36°	-
	c'	0	-
	Coefficient of friction and adhesion	0.7	-
6J	mc	omc-1.5%	omc+0.5%
	ϕ'	36°	-
	c'	0	-
	Coefficient of friction and adhesion	0.7	-
6N1	As Class 6N with:		
	mc	omc-1.5%	omc+0.5%
	ϕ'	35°	45°
	c'	0	-
6N2	mc	omc-1.5%	omc+0.5%
	ϕ'	35°	-
	c'	0	-
6P	mc	omc-1.5%	omc+0.5%
	ϕ'	35°	-
	c'	0	-
	Slope stability	1:1.5 h/v	
6P(i)	As Class 6P with:		
	mc	omc-1.5%	omc+0.5%
	ϕ'	35°	45 °
	c'	0	-
	Slope stability	1:1.5 h/v	
8	MCV	8	14

Note 1: Moisture content shall be determined on portion of material passing 20mm sieve.

Note 2: Optimum moisture content by vibrating hammer method and moisture content shall be determined on portion of material passing 20mm sieve.

Note 3: N/A indicates no value applied in this specification.

Note 4: Compaction Requirements are defined for additional material classes only; all other requirements are given in Table 6/1.

Note 5: Refer to Appendix 6/1 Clause 2.

2. Requirements for Determining Acceptability

The Designer will be responsible for Classifying earthworks materials. The Contractor will be responsible for the testing of earthworks materials. The testing types and frequency for Earthworks Materials are given in Appendix 1/5. Facilities shall be provided to allow the Designer to supervise any or all tests. The procedure for submission of test results shall be as follows.

At least one week prior to excavation of imported materials intended for use as Acceptable Material on site, the Contractor shall give 48 hours notice to the Designer of his intention to obtain samples of materials at the source location for the purpose of earthworks classification.

The location of the Trial Pits shall be agreed with the Designer and shall be generally at a spacing to give one Trial Pit per 5,000 m³ of proposed Acceptable Material. Facilities shall be provided for the taking of duplicate samples by the Designer.

Laboratory testing shall be carried out to show compliance of material with Tables 6/1, 6/2 and Appendix 6/1. Laboratory testing shall be carried out with regard to maximising the use of materials encountered on site.

Earthwork materials shall be tested and classified at the site of deposition and excavation as required by the testing schedule of Appendix 1/5.

Trial Pit sampling shall be in accordance with BS 5930:1981 Code of Practice for Site Investigations (British Standards Institution).

Acceptable Material Classifications Hierarchy (in order of decreasing importance):

- Topsoil (5A)
- Starter Layer Materials
- Selected Granular Fill Classes
- Class 1 Materials
- Class 2 Materials
- Class 4 Material
- Other classes not covered above

Materials won on site shall be separated according to this classification hierarchy and used for the specific purpose to which that class of material has been allocated in the specification and on the earthworks design drawings. The Contractor will be responsible for ensuring the maximum use of materials encountered on site.

3. Processing of Unacceptable Material Class U1

Where a particular class of material required in the earthworks construction is proven to the Designer not to be available from areas of cutting or where there is a proven shortfall in the quantity of a particular class of material required the Contractor may process Unacceptable Material Class U1 so that it complies with the permitted constituents and material properties of Table 6/1 for the required class of material. The use of other classes of Acceptable Material in the processing of unacceptable material (e.g. in mixing) shall only be allowed with the permission of the Designer.

4. Groundwater

Pumping or discharge of groundwater or surface water run-off into existing watercourses or sewers shall only be permitted upon provision of a detailed Method Statement which addresses the requirement of Inland Fisheries Ireland, the Office of Public Works and all other relevant authorities to the Designer and its subsequent approval.

APPENDIX 6/2

REQUIREMENTS FOR DEALING WITH CLASS U2 UNACCEPTABLE MATERIAL

General

For the purposes of this Contract, Unacceptable Material Class U2 shall be as defined in Clause 601.3 of the Specification, where hazardous chemical properties shall include in its definition material containing biodegradable (putrescible) material (i.e. capable of producing landfill gas) or containing leachate or capable of producing leachate or containing asbestos or containing petroleum products or contaminated with hydrocarbons i.e. existing road pavement.

8. Provisional Measures for Dealing with Unacceptable Material Class U2

The Contractor shall advise the Designer immediately and make arrangements to have an approved Sub-Contractor, specialising in the investigation of such material, to carry out sampling and testing of suspected hazardous material.

Where this material is identified as Class U2, the Contractor shall liaise with the Designer and make arrangements for this material to be excavated temporarily stockpiled on site and removed off site by a specialist waste-disposal sub-Contractor approved by the Designer and disposed of to a properly licensed landfill site subject to the approval of the Environmental Protection Agency. No material shall leave the site without the approval of the Designer. The Contractor shall keep records of the materials removed and shall obtain the Designer's authentication of the records.

Any material that is required to be temporarily stockpiled on the site will be stockpiled at a location agreed by the Designer. Protective measures shall include placing and covering the material with an impermeable polyethylene membrane minimum thickness 1.5mm. The stockpile will be made watertight to the satisfaction of the Designer.

Excavations into or adjacent to landfill wastes may encounter concentrations of landfill gas or other hazardous substances. The Contractor shall take all measures necessary to protect site staff, adjacent landowners and members of the public from any harmful effects arising from his operations.

Groundwater / Leachate from contaminated areas shall not be discharged to public or private surface water or foul sewers, nor to watercourses without prior approval from the appropriate authority. Should groundwater or leachate be found in contaminated areas, it shall be contained so as to prevent contamination of uncontaminated ground, prior to disposal off site.

The Contractor shall prepare appropriate Method Statements and safety plans to cover any such operations which will be subject to the approval of the Designer.

APPENDIX 7/1

PERMITTED PAVEMENT OPTIONS

1 General

- 1.1 The Contractor shall refer to Drawing No. GBRF-ROD-SBR-S07-DR-CB-50027 for locations and extents of road pavement to be constructed.
- 1.2 Where planing and re-surfacing is required in accordance with Appendix 7/9, the existing surface course and/or regulating courses shall be thoroughly removed by cold milling prior to the new surface course being laid.
- 1.3 All longitudinal surface course joints shall be under the line of proposed road markings unless otherwise directed by the Employer's Representative.
- 1.4 The Contractor shall undertake pavement condition surveys of both the new build and the existing Binder Course following planing to ensure that the requirements of Clause 702.5 of CC-SPW-00700 are satisfied in advance of resurfacing.

Sheet 1 – Treatment T1 – Surface Inlay

1	Location: As shown on GBRF-ROD-SBR-S07-DR-CB-50027 Drawing Ref: GBRF-ROD-SBR-S07-DR-CB-50027	General Requirement
2	Grid for checking surface levels of pavement courses, if different from the requirements of CI 702.4: Long dim: Trans dim:	N/A N/A
3	Surface regularity (CI 702.7 and CI 702.8): Category of Road Long Reg.: Trans Reg.:	A Each wheel track of each lane Every 10m per lane
4	Requirements for coarse aggregates - Polished Stone Value (PSV), Aggregate Abrasion Value (AAV) (CC-SPW-00900 CI 3.2.2, 5.2.2, 6.2.2, 8.4.1.1, 8.6.1.1):	65 PSV 12 AAV
5	Requirements for pre-coated chippings - Polished Stone Value (PSV) for general use mixtures, PSV for mixtures for roundabouts, Aggregate Abrasion Value (AAV) (CC-SPW-00900 CI 4.2.4):	N/A
6	Requirement for testing for Polished Stone value using the friction after polishing test (DN-PAV-03074 Clause 2.3.6)	Yes
7	Freezing and thawing (soundness) category if different from the requirements of CC-SPW-00900 Tables 1, 4, 7, 10 and 17:	N/A
8	Compaction control and extraction of cores if different from the requirements of CC-SPW-00900 CIs 10.1.9, 10.1.9.1, 10.1.9.2, 10.1.9.3, 10.1.9.4.	N/A
9	Sealant to be applied to the whole of any freestanding edge on the outside of the finished pavement on the low side of the camber (CI 10.1.8):	Yes
10	Any tests additional to those required by IS EN 13108–20, IS EN 13108–21 or the relevant SRW (CC-SPW-00900 CI 1.2 and 1.3):	N/A
11	Whether subbase material may be spread in more than one layer (CI 802.4)].	No

Pavement Course	Clause	Mixture Designation / Material	Thickness (mm)	Particular Requirements
Surface Course	CC-SPW-00900 Cl. 5.1.3	SMA 14 surf PMB 65/105-60 des	40	Min. PSV 65
Binder Course	CC-SPW-00900 Cl. 3.1.5	AC 20 dense bin 70/100 des	60	
Total Pavement Thickness (excluding sub-base)			100	

Notes:

- (i) Bond coat shall be applied to all surfaces in accordance with Cl. 10.1.4 of CC-SPW-00900.

APPENDIX 7/2

EXCAVATION & REINSTATEMENT OF EXISTING SURFACES

1. For tie-in areas of new road surfacing with the existing roadway, reference should be made to the details described in TII Standard Construction Detail Publication Nos. CC-SCD-00703 and CC-SCD-00704.
2. Prior to excavation, the bound pavement is to be cut using a saw.
3. Excavation and reinstatement of existing surfaces shall be in accordance with following requirements, unless otherwise agreed with the Employer's Representative. The trench shall be backfilled with foamed concrete to clause 1043 in accordance with the requirements for immediate permanent reinstatement as per the **"Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads"**, Second Edition (Revision 1) published by the Department of Transport, Tourism and Sport 2017, to the underside of the binder course. The Binder Course and Surface Course shall be reinstated in accordance with Appendix 7/1.
4. The locations of existing paved surfaces to be excavated in accordance with Appendix 7/6 are shown on GBRF-ROD-SBR-S07-DR-CB-50010 and GBRF-ROD-SBR-S07-DR-CB-50027.
5. If reclaimed asphalt contains more PAH's and/or phenol than 0.1%, it is considered as "asphalt containing tar" and should be regarded as hazardous waste. In the case of asphalt containing tar, if the milling waste is considered hazardous, disposal of material is required in accordance with Appendix 2/5.
6. The disposal of Class U2 material is to be in accordance with Appendix 6/2.
7. Testing of coal tar is to be in accordance with BS EN 15529:2007 'Derivatives from coal pyrolysis Terminology'. If the material is deemed to be coal tar, the material must be exported to a suitable plant.
8. **Temporary Trench Reinstatement**

Trenches which are to be excavated in the existing carriageway or temporary pavement, for the laying of drainage or service ducts, as required during the works shall be reinstated in accordance with the TII Specification for Works clause 706.12 and the following requirements:

- Prior to excavation, the sides of the trenches are to be marked out and any bituminous bound pavement cut to clean, straight lines with a saw;
 - Existing pavement shall be broken out with reasonable care and attention not to damage the existing pavement being retained alongside;
 - The temporary re-instatement of these trenches, once the service has been laid, shall consist of ST2 mix concrete backfilling to within 50mm of the existing surface;
 - Immediately prior to the laying of the surface course material, the joints of the existing pavement shall be cleaned of all loose material and coated with a hot bituminous binder in accordance with CC-SPW-00900 Clause 10.1.8 of the TII Specification for Works;
 - The final 50mm is to be finished with close graded Asphalt Concrete surface course to CC-SPW-00900 Clause 3;
 - The joint formed between the reinstated pavement and the existing pavement shall also be sealed with a hot bituminous binder as before;
 - The requirements of TII Specification for Works Clause 706.3, 706.4 and 706.10 shall also apply;
 - The use of delay set bituminous material shall not be permitted.
9. The existing pavement is to be milled to a minimum depth of 45mm. Milling shall comply with CC-SPW-00900 Clause 2.1 and Appendix 7/9

APPENDIX 7/4 BITUMINOUS SPRAYS

1. All bituminous layers (to include existing surface and freshly laid surface) shall receive a bond coat prior to inlay/overlay. Bond coats are to be Cationic Bitumen Emulsion in accordance with CC-SPW-00900 of the TII Specification for Works and IS EN 13808 and shall be applied as per the TII Specification for Works.

Table 7/4.1: Bituminous Sprays

Location	All bituminous layers (to include existing surface and freshly laid surface) are to receive bond coat prior to inlay/overlay. All cold milled surfaces shall be sprayed with a bond coat prior to inlaying/overlaying.
Type of binder	C65BP 3 Bond Coat in accordance with CC-SPW-00900 and IS EN 13808.
Rate of Spread	In accordance with CC-SPW-00900.

APPENDIX 7/5

ROAD PAVEMENTS: TII STANDARD CONSTRUCTION DETAILS

Clause No	TII Standard Construction Details (SCD) Drawing No.	Drawing Title
701 & 706.13	CC-SCD-00703	Transverse Joint Between New Construction and Existing Road
701 & 706.13	CC-SCD-00704	Longitudinal Joint Between New Construction and Existing Road

APPENDIX 7/6

BREAKING UP OR PERFORATION OF EXISTING PAVEMENT

1. Areas for breaking up or perforation of existing pavement are shown on drawing no. GBRF-ROD-SBR-S07-DR-CB-50010. Such existing pavement shall be broken out and removed to the level of the underside of the bound materials.
2. Where pavement is to be perforated, the Contractor shall conduct a CAT scan to ensure there are no detectable live services under the pavement prior to the works commencing. Where no services are detected, or shown on any of the service drawings, or advised by the landowner/utility company, the Contractor shall proceed to perforate the pavement by the use of a rockbreaker that shall form holes in the pavement that shall protrude through all bituminous bound or cement bound layers. The holes shall be formed over a grid of 2.5m centres over the extent of the area indicated on the drawings. Perforation shall only be carried out where the existing pavement lies beneath a proposed embankment.
3. Where the pavement is to be broken out the Contractor shall conduct a CAT scan to ensure there are no detectable live services under the pavement prior to the works commencing. Where no services are detected, or shown on any of the service drawings, or advised by the landowner/utility company and the pavement is not considered “asphalt containing tar” in accordance with Appendix 7/2, the Contractor shall ensure that the pavement is broken out in such a size as to be reusable on site in another part of the works, either as general fill or other function deemed acceptable by the Employer's Representative. The broken pavement shall be reduced to pieces no larger than 100mm in size. The operation shall be carried out in a manner so as not to damage the adjacent pavement where it is to be retained. The interface between the pavement to be broken up and the pavement to be retained shall be cut using saws for the depth of the bituminous material prior to the commencement of breakout.

APPENDIX 7/9

COLD MILLING (PLANING) OF BITUMINOUS BOUND FLEXIBLE PAVEMENT

1. Location

- 1.1** Locations of profile planing for Pavement Treatment T1 is shown on GBRF-ROD-SBR-S07-DR-CB-50010. Planing is to be carried out in all locations of Pavement Construction where plane and inlay is required, in accordance with Clause 2.1 of CC-SPW-00900.
- 1.2** All areas of existing pavement which is to be removed as shown on GBRF-ROD-SBR-S07-DR-CB-50010 shall be removed through planning.

2. Sweeping

- 2.1** All areas prior to cold milling shall be swept with a mechanical sweeper.

3. General

- 3.1** Transverse joints between new road construction and existing roads shall be in accordance with TII Standard Construction Detail Publication No. CC-SCD-00703.
- 3.2** Longitudinal joints between new road construction and existing roads shall be in accordance with TII Standard Construction Detail Publication No. CC-SCD-00704.
- 3.3** All planed areas shall receive a bond coat in accordance with Clause 10.1.4 of CC-SPW-00900 and BS 594987 prior to resurfacing.

APPENDIX 11/1

KERBS, FOOTWAYS AND PAVED AREAS

1 General

- 1.1 Kerbs, footways and paved areas which are required to be taken up shall be reinstated by the Contractor to match the existing markings and in accordance with the requirements of Series 1100.
- 1.2 Kerbs shall be in accordance with CC-SCD-01101. Refer to drawing GBRF-ROD-SBR-S07-DR-CB-50027 for location and extents of kerb types.
- 1.2 Concrete footways shall be in accordance with CC-SCD-01105. Refer to drawing GBRF-ROD-SBR-S07-DR-CB-50027 for location of the footway.

APPENDIX 11/3
KERBS, FOOTWAYS AND PAVED AREAS: TII STANDARD
CONSTRUCTION DETAILS

Clause No	TII Standard Construction Details (SCD) Drawing No.	Drawing Title
1101.1 & 1101.2	CC-SCD-01101	Precast Kerbs
1106	CC-SCD-01105	Concrete Footways

APPENDIX 13/1

LIGHTING COLUMNS & BRACKETS

1. General

- 1.1. The Contractor shall be in attendance during the works of the Novated Contractor.
- 1.2. The Contractor shall make provision for the design, supply and installation of all lighting columns and brackets.
- 1.3. The Contractor shall erect and fix in place, in accordance with the Manufacturer's instructions, the replacement heritage lighting and lanterns, numbering six in total, on the bridge parapets.
- 1.4. The Manufacturer shall be quality assured to ISO 9001:2008. Proof of certification shall be provided to the Employer where required.

2. Removal of Existing Equipment

- 2.1. The Contractor shall accurately establish the location of all existing lighting equipment, including columns, distribution pillars, cables, etc., before any work is undertaken, and provide record drawings and a programme of works for the approval of the Employer's Representative.
- 2.2. All removed lighting columns, brackets and lantern shall be removed to tip off site. Surplus and obsolete equipment shall be disposed of safely by the Contractor.
- 2.3. No existing lighting shall be switched off, dismantled or removed without the prior approval of the Employer's Representative.
- 2.4. Adequate temporary lighting, to the satisfaction of the Employer's Representative, shall be provided when it is necessary to remove existing lighting from any area still open to vehicular or pedestrian traffic. The Contractor shall make arrangements with the ESB to disconnect and permanently isolate redundant electrical services.

3. Installation of Proposed Heritage Lighting

- 3.1 The 6 no. heritage standards shall be erected on the locations set out in the drawings.

New lighting standards to be erected in position on bridge balustrade using existing holes in base plate with anchors provided as shown on drawings.

Code 6 lead separating course shall be provided under baseplates.

- 3.2 The lighting column shafts and ladder bars shall be assembled and erected on the anchorage bolts provided, torquing the anchor nuts beneath the column base as specified by the Employer. The anchor nuts and bolts shall be masked with a decorative domed cover above the base plate.
- 3.3 Cable shall be threaded up through the column shafts during the erection process and connected to the lanterns.
- 3.4 Lanterns, incorporating the optical unit, shall be fixed in position, cabled and connected. Lantern top shall be closed and sealed.

APPENDIX 14/1 SITE RECORDS

1. General Requirements

- 1.1.** The Contractor shall ensure that as-built records are produced in accordance with Clause 1402 of the TII Specification for Road Works.
- 1.2.** The Contractor shall supply two printed copies and an electronic version of each of the as-built record drawings to the Employer's Representative within four weeks of the date of completion of the electrical work.
- 1.3.** Information to be provided on the drawings shall be as specified in Clause 1402, and include locations and numbers of lighting columns and feeder pillars, and positions of ESB and public lighting supply cables and equipment within the site boundary.

APPENDIX 14/3

TEMPORARY LIGHTING

1. General Requirements

- 1.1.** Temporary lighting shall be provided where an existing installation is to be disconnected during the Works.
- 1.2.** The standard of lighting shall be appropriate to the speed and volume of traffic during construction.
- 1.3.** Any temporary lighting installation shall be approved by the Employer's Representative as part of Traffic Management. The Contractor shall submit details of any proposed temporary lighting installations a minimum of 4 weeks in advance of disconnection of existing lighting.
- 1.4.** Temporary lighting shall not be removed or disconnected until the permanent installation is operative.

APPENDIX 14/4

ELECTRICAL EQUIPMENT FOR ROAD LIGHTING

1. General

1.1. This section of the Specification covers the supply, delivery, erection, putting into operation and testing of all equipment, materials and plant necessary for the supply and installation of electrical service to and within lighting units comprising the scheme.

1.1.1. The installation shall comply in all respects with the National Rules for Electrical Installations, Fourth Edition (ET101:2008) published by the Electro Technical Council of Ireland.

1.1.2. The Contractor shall provide RECI certificates to the Employer's Representative for the completed Public Lighting installations.

2. Contract Drawings and Specification

2.1. The Electrical Services Installation for the scheme shall be in accordance with this Specification and the drawings.

3. Scope of Work

3.1. The main works included are listed below. Other works not listed are detailed elsewhere within the document.

1. The supply and installation of all electrical connections from the existing public lighting to proposed lighting columns and parapet downlighters.
2. Provision and erection of all new lighting columns, brackets and luminaires, including heritage lighting.
3. Provision and erection of architectural striplighting.
4. Provision of all cables and all earthing and bonding.
5. Provision of all temporary lighting.
6. Provision of 'as-built' drawings.

4. Bridge Elevation Striplighting

4.1. Striplights shall be manufactured in accordance with the European Directive on Waste Electrical and Electronic Equipment. All units shall be supplied complete, tested and ready for working, and shall be fitted with all necessary starters, terminal blocks and power factor correction to give a minimum power factor of 0.95 lagging.

4.2. All electrical equipment shall be securely fixed so as to ensure good earthing continuity.

4.3. Component parts, attachments, fixings and mountings, shall be free from sharp edges and projections which might cause injury.

4.4. High efficiency twin LED white light striplights shall be provided on the traffic face of the bridge parapet structure, as indicated on the drawings. The strip shall be angled downwards at 45 degrees to illuminate the balustrade. The striplighting shall be manufactured with all stainless steel structural and fixing components, and the individual strips shall be designed by the Supplier to match the bridge geometry and the electrical supply layout, while producing a bespoke continuous light affect along the bridge elevation. The striplights shall operate at 24 VDC, approximately 10 watt per metre, at colour temperature 3000K. The striplight system shall be type PLM Uniled Light Lines, or approved equal.

4.5. The module shall be sealed to IP66 minimum.

4.6. Fixing to bridge structure shall be by proprietary adhesive, as provided by PLM.

4.7. Power supplies and controllers for the striplights shall be located in the existing supply pillars in the bridge vicinity. There shall be a means incorporated in the power supplies of adjusting the light output on site.

- 4.8. Cable tails to individual light strips shall be factory-manufactured and tailored to the bridge geometry. A cable management and protection facility shall be incorporated in the striplight mounting system.
- 4.9. All items of control gear are to be totally enclosed to minimise leakage of internal compounds and fitted with shrouds over all terminals to prevent accidental contact by persons.
- 4.10. Each item of control gear shall have a clearly marked circuit diagram or other marking to show the terminal connections in relation to all other components. A separate earth terminal shall be provided on all components which carry mains voltage.
- 4.11. Gear losses in lamp control circuitry shall not exceed 5% of rated lamp wattage.
5. **Photometric Testing**
 - 5.1. The Contractor shall verify the performance of the installation after all lamps have operated for a minimum of 100 hours by taking illuminance (Lux) measurements on the track surface after dark over not more than 10% of the total road length at locations to be agreed with the Employer's Representative. The Contractor shall take a range of representative measurements at each location chosen, and record the results in an agreed format. The calculated values for Average illuminance, and Uniformities U_0 shall meet or exceed those in the computer generated design plots submitted by the Contractor.
 - 5.2. All measurements shall be taken on the track surface using a high quality illuminance meter approved by the Employer's Representative. The meter shall have a valid calibration certificate. The Employer's Representative may witness the taking of these measurements, and the Contractor shall give 7 days notice of his intention to undertake testing. These measurements should preferably be taken when the road is not open to traffic.
6. **Solar Time Switch**
 - 6.1. A seven day programmable timer control type SET45-18 from Solar Enterprises, or approved equal, shall be provided in each supply pillar, to switch the architectural striplighting.
7. **Radio Interference**
 - 7.1. Control equipment shall be designed and installed so that the operation of the lighting installation does not produce an unacceptable level of radio interference. Limits of interference given in BS 800 shall not be exceeded. The recommendations of BS 5489 for the control and suppression of radio interference shall be adhered to.

APPENDIX 15/1

MOTORWAY COMMUNICATIONS – HOUSING OF ELECTRICAL CABLES

1. Conduit, including flexible and pliable conduits, shall be either steel or non-metallic as indicated, and comply with to BS 4568 / BS EN / IEC 61386-1:2008 Class 4 finish hot dipped galvanised inside & outside. Steel conduits and fittings shall be screwed classification unless otherwise indicated or approved by the Project Manager.

For use at bridge structures and canal approach walls, the protection shall be Class 4.

2. The materials from which the duct and fittings are made shall be treated so that they are protected from the deleterious effects of short-term exposure to ultra violet light and shall be resistant to degradation by acids, alkalis, common chemicals, bacteria, fungi and moulds occurring in soils. The Contractor shall protect the duct and fittings on site in accordance with the suppliers' recommendations.

APPENDIX 17/1 CONCRETE – CLASSIFICATION OF MIXES

These mixes shall be supplied as designed mixes in accordance with the relevant clauses of I.S. EN 206-1.

These mixes shall be supplied designed mixes in accordance with the clauses of IS EN 206-1 and Series 1700 of the Specification for Road Works, taking the most onerous requirements as appropriate.		
1. Mix reference	C40/50 MIX I	C25/30 MIX II
2. Compressive Strength class	C40/50	C25/30
3. Nominal max size of aggregate, mm(D)	20	10
4. Type of aggregate		
Coarse		IS EN 12620
Other	IS EN 12620 N/A	N/A
Fine	IS EN 12620 N/A	IS EN 12620
Other		N/A
5. Sulphate class	X0	X0
6. Cement type(s) or combination types complying with: CEM I N – (Ordinary early Strength) IS EN 197-1 CEM I R – (High Early Strength) IS EN 197-1 CEM I SR – (Sulphate Resisting Portland Cement) BS 4027 Combination of Portland Cement to IS EN 197-1 with GGBS to BS 6699	CEM I N CEM I R CEM III/A	CEM IIB-V CEM III/A
7. Exposure Class (As in IS EN 206-1 or combinations)	XC4 XD1 XD1	XC4 XD1 XD1
8. Chloride Class EN 206-1 2000 – Table 10, adjusted to NA.2.8 referring to table NA.4	0.4% max	0.3% max
9. Minimum cement content (kg/m ³).	400	340
10. Maximum free water/ cement ratio.	0.45	0.45
11. Quality assurance requirements	Third Party Certification	Third Party Certification
12. Rate of sampling intended by the purchaser for strength testing	See Clause 1707 of the Specification	See Clause 1707 of the Specification
13. Other requirements		
(a) Air Content %	---	---
(b) Minimum % ggbs by weight of total cement	-	-
(c) Minimum % pfa	---	---

by weight of total cement		
(d) Other	Coarse and fine aggregates, and cement type to be from similar sources for all concrete mixes	Slump flow, tested in accordance with EN 12350-8, Class SF3 to be provided. Sieve segregation resistance, tested in accordance with EN 12350-11, Class SR2 to be provided. Viscosity and passing ability shall be Contractor defined Coarse and fine aggregates, and cement type to be from similar sources for all concrete mixes

Notes

- Concrete Mix II shall be self compacting concrete (SCC):
 - SCC to be in accordance with IS EN 206 and to conform to *The European Guidelines for SCC*, May 2005, Annex A.
 - Unless noted otherwise, slump flow class, passing ability, and segregation resistance to be selected by the Contractor to suit the application.
 - Superplasticisers/high range water reducing admixtures are an essential component of SCC.
 - Viscosity modifying admixtures may be required to modify the cohesion of SCC without significantly affecting fluidity.
 - For each application or point of production, admixtures to be from a single source.
 - There is to be no adjustment of SCC mix on site (cl 1706(2) refers).

APPENDIX 17/3

Concrete – Surface Finishes

1. Surface finishes shall be as detailed on the drawings.

APPENDIX 17/4

Concrete – General

1. Sampling and Testing

Sampling and testing of fresh and hardened concrete shall comply with Clause 1707.1. Identity testing is not required.

2. Construction Joints

The positions of construction joints are shown on the Contract Drawings. Additional positions may be proposed by the Contractor subject to submission of details to the Employer's Representative and subject to the additional positions not compromising the integrity, durability or aesthetics of the structure.

3. Inspection and Testing

The Contractor shall submit a Structural Concrete Works Quality Plan to the Employer's Representative within 21 days of the Contract Date or a minimum of 20 working days in advance of the any preparatory works for structural concrete construction, whichever date occurs earlier. The Structural Concrete Works Quality Plan may be separate from or part of the Quality Plan described in Appendix 1/24, but shall, in either case, be consistent with the Quality Plan described in Appendix 1/24.

The Structural Concrete Works Quality Plan shall include:

- (a) An inspection plan for all structural concrete as detailed in I.S. EN 13670 Clause B.4.3.2 and B3.3.3.
- (b) A pro forma for a Pre-Pour Inspection Report which makes provision for recording inspection as per the requirements of I.S. EN 13670 Clause 4.3.2 and Clause 4.3.3.
- (c) A pro forma for a Post-Pour Inspection Report which makes provision for recording inspection as per the requirements of I.S. EN 13670 Clause 4.3.2 and Clause 4.3.3.
- (d) Details of the items to be included in the execution record documentation for each structural component, including those listed in I.S. EN 13670 Clause A.4.2.3.

For the purpose of these requirements, all structural concrete shall be considered significant for the load-bearing capacity and durability of a structure.

4. Fairing coat to be Renderoc ST 05 or equivalent.

APPENDIX 19/1 (SPECIFICATION FOR ROAD WORKS) SHEET NO. 1 FORM BE/P1 (NEW WORKS) PAINT SYSTEM SHEET

Sheet 1 – Proposed Lighting Standards

1. CONTRACT TITLE: STRUCTURE NO.: GRID REF.:	Galway Bridge Rehabilitations – Salmon Weir Bridge N/A 53.275493, -9.056341			
2. DATE OF ISSUE OF DOCUMENTS TO TENDERERS: 2026				
3. ENVIRONMENT AND ACCESSIBILITY: Urban area in marine environment, easy access.				
4. REQUIRED DURABILITY OF SYSTEM: NO MAINTENANCE: up to 12 YEARS MINOR MAINTENANCE: from 12 YEARS MAJOR MAINTENANCE: after 20 YEARS		5. COLOUR OF FINISH: To match Existing		
6. PAINT SYSTEM TO BE APPLIED OVER: AREA REF:AREA DESCRIPTION: PROTECTIVE SYSTEM TYPE: (i.e. I, II etc):				
7. DETAILS	1 st Coat	2 nd Coat	3 rd Coat	4 th Coat
Registered Description Item No. and Colour NSAI Agrément, BBA HAPAS Road and Bridges Certificate or equivalent Certificate Reference Brand Name and Manufacturer's Ref. No. Manufacturer's Data Sheet No. Where applied How applied Min dry film thickness (mdft) Max local dft (See Cl. 1914.7) Estimated total volume of paint likely to be used. (litres) 'A' type testing required? (YES/NO) (See Cl 1912.4) 'B' type testing required? (YES/NO) (See Cl 1912.11)				
8. STRIPE COAT DESCRIPTION (Including Item No. and colour) Workshop: Site:		9. PAINT MANUFACTURER'S OFFICIAL STAMP:		
10. Mdft (µm) NOTE. The minimum total dry film thickness of the paint system, neglecting primers and sealers under 30 microns, shall not be less than the minimum value for the paint system in Tables 19/2B, 19/3B or 19/4C as appropriate.		11. APPROVED BY: DATE		

APPENDIX 19/3 (SPECIFICATION FOR ROAD WORKS) FORM BE/P2 PAINT DATA SHEET

NSAI Agrément, BBA HAPAS Road and Bridges or equivalent Certificate Reference and Date :

Manufacturer :

Item No. :

Registered Description :

Brand Name and Reference No. :

Consistency and Method of Application :

Weight per 5 Litres (kg) :

Specific gravity : Colour:

For two-pack paints :

Base: Activator : Mixed components:

Volume Solids % :

For two pack paints volume solids % for mixed paint:

VOC content g/l (mixed):

Manufacturer's Minimum Dry Film

Thickness Range

Recommended lower mdft:

Recommended upper mdft:

Full Application Instructions:

Mix ratio:

Flash Point:

		5°C	10°C	20°C	30°C
Drying Times (hours)	Surface Dry				
	Hard Dry				
Overcoating Times (hours)	Minimum				
	Maximum				
Pot Life (hours)					

Cleaning Solvent State effects on Drying Times of Temperatures below 20°C :

Manufacturer's Application Restrictions, e.g. for Temperatures or Humidity :

Manufacturer's General Recommendations :

APPENDIX 19/6 (Specification for Road Works) Sheet No. 1 Form BE/P1 (Maintenance) Paint System Sheet

Sheet 1 - Existing Steelwork Requiring Maintenance Painting

1. CONTRACT TITLE: Galway Bridge Rehabilitations – Salmon Weir Bridge STRUCTURE. NO.: N/A GRID REF.: 53.275493, -9.056341										
2. DATE OF ISSUE OF DOCUMENTS TO TENDERERS: 2026										
3. ENVIRONMENT AND ACCESSIBILITY: Urban area in marine environment, easy access.										
4. EXISTING PROTECTIVE SYSTEM(S): Metal Coatings: None Paint coatings: 3 No. layers typically (note that lead may be present in these historic paint coatings) Average total thickness (microns): 320										
5. REQUIRED DURABILITY OF SYSTEM: NO MAINTENANCE: up to 12 YEARS MINOR MAINTENANCE: from 12 YEARS MAJOR MAINTENANCE: after 20 YEARS					6. COLOUR OF FINISH: Steelwork– TBC					
7. BILLED AREA							8. PROTECTIVE SYSTEM TYPE: (i.e. I(M),II(M), III(M), etc.):			
REF: AREA DESCRIPTION:			SURFACE PREPARATION METHOD							
A2: Areas of local failure or mechanical damage or other defects			High pressure freshwater washdown to remove surface salts etc. (8000-10,000 psi). Spot blast cleaning to affected areas to ISO 8501-1: 2007 SA 2 ½ Standard.				I (M)			
A3: Unsound paint down to sound paint			High pressure freshwater washdown to remove surface salts etc. (8000-10,000 psi). Abrading to sound undercoat.				I (M)			
A4: Sound finishing coat			High pressure freshwater washdown to remove surface salts etc. (8000-10,000 psi).				I (M)			
9. PAINT COAT SUMMARY			CONDITION OF SURFACES OF EXISTING SYSTEM AFTER SURFACE PREPARATION							
			Condition: Sa 2½ Area Ref. A2		Condition: Sound paint Area Ref. A3		Condition: Sound paint Area Ref. A4		Condition: Area Ref.	
			mdft	B or AS	mdft	B or AS	mdft	B or AS	mdft	B or AS
COAT & ITEM NO.										
1st Coat: Item 115			125	B or AS						
2nd Coat: Item 115			125	B or AS						
3rd Coat: Item 116			125	B or AS	125	B or AS				
4th Coat: Item 169			50	See Table 19/5	50	See Table 19/5	50	See Table 19/5		
MIN TOTAL DFT TO BE OBTAINED			425		175		50			

APPENDIX 24/1

Brickwork, Blockwork and Stonework

Masonry Facework

1. Where stainless steel fixings are used to provide the exterior of concrete elements with a stonework exterior finish, Clause 2416 will be followed to ensure the correct application of materials used.
2. The type of fixing which is deemed to be of satisfactory performance is the Ancon CFA/S/15/5.76/M150 continuous angle support system. It shall be fixed using the M12 FAZii expansion anchor with brackets fixed at maximum 500mm centres. This product specification shall be used, or equivalent.

APPENDIX 24/3

Requirements For Masonry Repointing And Reconstruction Of Historic Structures

1. Vegetation shall be removed from existing stonework prior to the commencement of masonry work.
2. Where identified on the drawings, existing masonry shall be de-vegetated, cleaned, repointed, and repaired. Repointing shall be in accordance with Clauses 2450 to 2465.
3. Stone masonry shall be constructed and/or repointed using lime mortar to Clause 2405, NHL5 Mix reference (a).
4. Following removal of vegetation, the Contractor shall complete a comprehensive photographic record of the existing masonry walls. The Contractor shall complete further comprehensive photographic records at a maximum of 1-week intervals during masonry works. The Contractor shall complete a final comprehensive photographic upon completion of masonry works. Photographic records shall be submitted to the Employer's Representative a minimum of 1 week after the photographs are taken.
5. Coursing of new or replacement stonework shall match the remaining neighbouring stonework coursing.
6. Mason skills and knowledge – only stone masons shall be used that are experienced in the repair and rehabilitation of historic masonry with lime mortar and are members of the National Guild of Master Craftsmen – Stone Masonry Restoration.

Extent of Cleaning

All surfaces of the stonework to be de-vegetated, repointed, and repaired will be cleaned in accordance with the appropriate standards and with this Specification. This shall entail the use of a mild abrasive blast to all the stone surfaces, using chemicals and other mechanical methods where the mild abrasives are unsuccessful as specified below. The Contractor shall note that there may be a variety of different stone types used at each structure and shall propose a suitable method of cleaning for each of the material types for the approval of the Employers Representative.

Removal of Vegetation, Growths etc.

The Contractor will be required to cut back and remove all plants and other vegetation within the extent of the works and shall submit his proposals for so doing for the approval of the Employers Representative.

The Contractor shall allow for all necessary cutting, spraying etc. to kill existing vegetation. The removal of all vegetation shall be undertaken with great care and on no account should any such plant with invasive roots be removed with force, which would dislodge or otherwise damage the stone. In all cases, any plants that are still alive and growing shall be treated by cutting and spraying to stop the growth and sufficient time allowed elapse for the woody stalks, roots, tendrils etc. to dry and contract before any attempt is made to remove them unless otherwise agreed with the Employers Representative. No debris shall be allowed to fall into the River Corrib, Friar's River Canal, or Distillery Mill Race.

Where masonry joints have become embedded with larger roots (30mm or greater) the method of vegetation removal shall be by use of 'Ecoplug' glyphosate weed killer, or equivalent, with the agreement of the Employer's Representative. In terms of the removal of ivy vegetation, there are two approaches to solving the issue. Ivy that has growth from a main stem, shall be slowly cut and be pulled from the masonry, while avoiding destabilising any stonework. The ivy shall be removed, and herbicide applied to the main stems, preventing re-growth. Adventitious roots of ivy growing across the fabric of the masonry, meanwhile, will require removing roots by pulling from the joints without loosening any masonry.

Cleaning Stonework

The Contractor shall note the nature and extent of the various carbon, calcite and other deposits on the surface of the stone and on the underside of bridge deck – cleaning is not required of the bridge deck soffit. These deposits can be hard and firmly bonded to the surface of the stone. The cleaning specified below will be required to remove all these deposits and the Contractor will be expected to make all necessary allowances for this work.

All works associated with the cleaning of stonework shall comply with this Specification and the requirements of BS8221 and BS EN 1996-1-1:2022.

Chemicals for cleaning stone shall be approved by the Employers Representative. Trials must be completed in advance of the cleaning programme to determine the appropriate times for application of chemicals. As chemical cleaners differ slightly in their effectiveness on differing substrates, the Contractor shall allow for the Employers Representative to select whichever chemical he deems most effective to be used on the works. The Contractor should keep in mind that these materials contain injurious chemicals and the manufacturer's safety precautions must be prominently displayed, and adhered to at all times. The chemicals must be applied in accordance with the manufacturer's recommendations. The recommended safety first aid kit should be maintained on site and readily available during operations.

The abrasive to be used shall be approved stone grit free of all siliceous particles, the actual grit to be determined by test. In addition, the Contractor shall include for the use of other abrasives such as copper slag or glass bead if tests indicate that such are appropriate and shall allow for the use of differing grits in differing locations as may be determined as the most appropriate for the removal of the dirt and encrustations without damage to the stone following testing of the proposed abrasives by the Contractor.

As far as practical, the finer grades of abrasive shall be used, but the Contractor's attention is drawn to the fact that heavy encrustations of dirt etc. may have to be removed using the coarser grades to reduce the necessary contact time and prevent damage to adjoining fragile stonework.

Before work commences, the Contractor shall undertake sample panels to determine the grade abrasive, the contact time and the optimum pressure for the operations and submit proposals to the Employers Representative for approval. Abrasives used for cleaning shall not be permitted to enter the watercourse and should be recirculated, collected and disposed off site.

Areas that have particularly heavy or stubborn accumulations, such as calcareous deposits, shall be cleaned in accordance with the provisions of the following paragraphs. Where mild abrasives failed to remove the contamination to necessary standard the Contractor shall:

- (i) Pre-wet the masonry with water
- (ii) Apply chemical by brush, contact time to be determined by prior test, but not exceeding 1 hour. When 50% of the contact time has elapsed, the chemical shall be agitated and additional material added as necessary.
- (iii) Rinse off with water, using warm water if available, at 1,500 p.s.i. in quantities recommended by the manufacturer.
- (iv) Repeat steps ii and iii as necessary to achieve a clean visual appearance – in all instances the chemical must never come in contact with dry masonry.
- (v) Apply the litmus test after 3 days as specified.

The Contractor shall note that, if the results of the test cleaning so indicates, the methodology shall be reversed to undertake the cleaning by chemicals initially and to subsequently use mild abrasives in situations where the chemical is unable to remove the soiling without damage to the stone surface.

As an alternative, or in addition to the liquid chemical cleaning, AB57 Poultice may be used on Calcareous materials. Of particular significance is the precise type, strength, chemical composition and use of the constituents of the poultice shall be strictly followed and no

deviations will be permitted. Only laboratory quality constituents shall be used. The poultice shall be prepared as recommended and allowed to cure for 24 hours. The material shall be applied by brush, wooden trowel or spatula etc. to all surfaces of the stone, care being taken to ensure that all surfaces are fully coated and shall be a minimum thickness of 12mm. The poultice shall be covered to exclude air and left for 24 hours. After the 24 hours has elapsed, the cover shall be removed and the residue of the poultice carefully removed without damage to the stone.

It shall be rinsed as specified for the chemical cleaning operations, particular care being taken to control the run-off as previously specified. Repeat applications shall be made until a clean, even appearance is achieved. The litmus test as previously specified shall be undertaken in these areas.

Use of Mechanical Cleaning Equipment

Where so approved by the Employers Representative, the Contractor may utilise mechanical tools such as Jason guns, needle punches, scribes etc. to remove stubborn accumulations and deposits, particularly where formed of carbon, calcite or a compound of both. The Contractor will be required to undertake demonstrations of the type of tools he proposes to use and the skill of his operatives in operating such tools for the Employers Representative.

Masonry Repair

Stone for Repair

The repair of stones shall match the existing as regards type, colour, texture, porosity, crushing strength etc. It shall be free of all vents, cracks, fissures, soft beds, etc. or other defects that may affect durability. The Contractor shall note that stone can exhibit many variations of colour, texture, wining, particle size and distribution, type, void, cherts, stylolites, fossils, calcite veins etc.

Removal of Damaged / Weathered Stone

All damaged stone, substandard repairs etc. shall be carefully removed, either in part or in total as directed by the Employers Representative. Temporary support shall be provided, as required and care shall be taken to ensure that no damage occurs to any adjoining stone etc. Where large amounts of any course are to be removed, great care shall be taken to ensure that the support for the structure above is maintained, this may demand the work to be undertaken in a series of short lengths or other methods approved by the Employers Representative. As far as possible and wherever relevant the removals shall comply with the requirements of BS 6187, Code of Practice, for Demolitions. Full and detailed method statements including calculations, drawings and Design and Check Certificates shall be submitted by the Contractor for approval in advance of commencement of the works.

The Contractor shall note that the areas of the damaged / weathered stonework to be removed shall be marked for review before any work of removal is initiated. When cutting out is being undertaken, all cuts shall be carefully made, being square and at right angles to the surface of the stone being repaired. No damage shall occur to the original stone being repaired or to adjoining stone. The Contractor shall note that in this respect, the use of mechanical cutting tools will have to be carefully controlled by the operative. In circumstances where damage occurs, the Contractor will be required to make good the damage at his own expense as directed by and to the satisfaction of the Employers Representative. The Contractor should note that this may involve either enlarging the repair or the complete replacement of the stone.

For piecing, incidents or mortar repairs, all damaged stone shall be cut back until strong, stable strata is achieved and in such a manner to ensure that the minimum thickness for any repair shall not be less than 30mm unless otherwise permitted by the Employers Representative.

Inserting New Stone

Where a complete new stone is to be inserted the area shall be carefully cleaned and all loose or deleterious material removed. The stone shall be laid on a full bed of mortar, using

lead or slate “skids” or timber wedges as required, and all joints fully filled, including the back and sides of the stone. It is imperative that the top bed is filled with mortar, well rammed home, so that the loadings within the wall are correctly transferred to the masonry below. If deemed necessary by the Employers Representative, the work shall be carefully grouted by hand to ensure all cavities around the repair are fully filled using a method and material approved by the Employers Representative. Mortar, grout or other substances shall not come into contact with adjoining masonry. All mortar or grout splashes shall be immediately washed off and not allowed to dry or stain the masonry. All faces of joints shall be raked out for pointing. It is imperative that the stone is inserted on the line of the original, and that the correct spacing, geometry etc. of the original design is maintained by the new stone.

The Contractor shall provide for all necessary non-ferrous metal fixings, cramps, dowels, armatures etc. that may be required by these repairs.

General Workmanship

All natural stone for incorporation into the works shall match the existing and be of proven durability and weather resistance and shall be selected with regard to its suitability to local atmospheric conditions and the nature of the work to be carried out.

Stone shall be free from vents, cracks, fissures, objectionable irregularities of colour or particle size and any other defects that would adversely affect its strength or appearance, and shall be of the best quality in relation to its use.

All stone shall be set with its natural bed at right angles to the direction of the load and supports, except cornices where deeply undercut and where otherwise directed in writing. The natural bed of the voussoir stones in the underside of arches shall be cut to shape and inserted in such a manner so that the natural bed is at right angles to the curve of the angle of compression within the arch. The direction of the natural bed shall be clearly marked at the quarry.

All stonework shall be protected as it is unloaded and stored on site with sacks, straw, or other approved material. No damaged stone shall be fixed. All stonework shall be carefully protected from staining and shall be left clean from stains and all other defects to the approval of the Employers Representative.

The stones shall be level, plumb, square and true, and free from hollow or rough surfaces. Stones shall be of the full dimensions required with back joints square and regular.

The stones shall be wetted (except if frosty weather) to control suction, set in full bed of mortar and all vertical joints filled. No hollow beds will be allowed. The bed and joints shall be square with the face, arranged to bond with the masonry of the backing or hearting. Joints shall be raked out as the work proceeds and pointed on completion.

The Contractor shall submit in duplicate all working drawings and sketches for review, showing his proposals for the cramping and supporting of stones.

All works shall be thoroughly cleaned or rubbed down at the completion to the satisfaction of the Employers Representative.

Mortar shall be NHL5 Mix. All mortar beds shall be of a thickness to match adjacent stonework as closely as possible. The colour of the mortar shall match the existing.

APPENDIX 31/1 CONSERVATION REQUIREMENTS

INTRODUCTION

The guiding philosophy for these works will be to conserve as found.

Programming and sequence of work should be discussed between all parties including the conservation consultant, prior to works commencing.

Inland Fisheries and NPWS (National Parks and Wildlife Service) should be consulted regarding the proposed works. It may be necessary to obtain derogation licenses for the use of herbicides and biocides and strict measures for the control of waste from the works will be required. See ecological assessment report.

Health and Safety legislation must be followed. Health and Safety procedures are to be set out by others. Issues which may arise include exposure to dust, lead paints, toxic chemicals which may be required during works.

VEGETATION REMOVAL

1. Vegetation should be carefully removed by hand. Where roots are deeply embedded and their removal might dislodge the masonry, they should be left in place and dealt with as part of the stonework re-pointing and consolidation work. It may be necessary to use 'ecoplugs' as a herbicide to treat roots which cannot be removed without damaging the masonry. Whether the use of any herbicide or biocide is permitted should be checked with the relevant Waterways body, Inland Fisheries, NPWS.

CLEANING

1. Test panels
To determine the type of cleaning system to be used, test panels must be undertaken in discreet locations to determine the effectiveness of the system and to ensure no damage to the fabric of the structure.
2. Manual brushing
Some dirt may be effectively removed by manual brushing with a bristle or nylon brush. Plain steel wire brushes should not be used, though stainless steel or phosphor-bronze wire brushes in the hands of skilled operatives may sometimes be useful.
3. Water washing
Water washing may provide an effective way to remove dirt. Photographs suggest it may be present on some parts of the bridge arch faces and on the bridge vaults. This should be checked when access is in place. Water washing is generally useful for removing sulphate crusts from limestone. Note that if pressure washing is proposed it may be necessary to re-point stonework prior to washing in order to avoid deep saturation of the stonework, though this problem may be more applicable to buildings.
4. Algae removal
Algae may be effectively removed by manual brushing or, if necessary, by steam cleaning.
5. Calcite staining
These calcite deposits are not generally harmful to the structure. They may be considered unsightly, but they may not be easy to remove without damaging the stone background itself. If removal is successful, the deposits are likely to reform though if ingress of water into the structure and movement of water within the structure can be minimised this should reduce the build-up of calcite on the underside of the bridge. Attending to surface drainage on the bridge and re-pointing of the bridge faces and the parapets should reduce water ingress.

If atmospheric pollution has caused the formation of calcium sulphate (gypsum) deposits, water-based cleaning may be useful, as noted above in (3). Gypsum is much more soluble in water than limestone.

6. Low-pressure mild abrasive calcium carbonate wet blast system
Subject to a test panel being successful, a low-pressure mild abrasive calcium carbonate wet blast system as proposed by ROD would be acceptable if other methods did not prove suitable.
7. Removal of graffiti
The medium used for the graffiti must be identified. Tests are essential to determine the best method for removal of graffiti. Cleaning trials should always start with the least aggressive method, usually water, and stop once a successful method has been found. Test results and methodology should be noted for future reference. Various proprietary solvent-based graffiti removers are available, but these should be used with caution and only after tests have been carried out to establish that they are appropriate for the substrate. If the graffiti medium is aerosol paint, then solvent-based poultices are likely to be the only method that can be used if damage to the surface is to be avoided. Abrasive and other mechanical systems will only ever successfully remove the graffiti from a porous substrate by first removing a layer of the substrate material.

REPAIR TO CUT STONES

Some areas may be suitable for repair using mortar mixes, others may require stone indents. These repairs must be done by skilled craftspeople with established experience in the techniques. Sands for mortar mixes must be carefully chosen to provide suitable colour and texture. Stone for indents must match the original as closely as possible.

There is much chipping of the stone capping of the balustrade parapet and how much of this it will be practical to repair must be decided. Mortar repairs may be suitable for this repair and other minor repairs. See Michael Scott's (Galway City Council Conservation Officer) recommendations for the extent and type of repair to the parapet coping.

1. Repair with mortar
Damaged, decayed or friable stonework should be cut back to a sound substrate with the perimeter slightly undercut to avoid feather edges on the repair. Repairs deeper than 50mm would usually require an armature. These are likely to be of austenitic stainless steel or phosphor bronze, or ceramic may also be used. Armature should be set at least 10mm back from the surface of the repair. Armatures are fixed by making holes at least 10mm deep and slightly wider than the diameter of the armature using a non-percussive drill. Holes are flushed out with water and the armature is fixed in place with polyester or epoxy resins. Stone should be thoroughly dampened before the mortar is placed, and mortar should be built up in layers usually no thicker than 10mm. Layers should be allowed to stiffen to leather-hard consistency and then scored to provide a key for the next layer. Subsequent layers of mortar must be applied to pre-wetted substrate.

The repair should be built up until it stands slightly proud of the final surface. When the last layer is leather-hard it can be scraped back to the correct profile using a wooden tool or float.⁴

The mix for the mortar repair should be designed by the specialist craftworker in discussion with Galway City Council conservation officer and conservation advisor and for approval of colour and texture. The mix should not contain Portland cement, but the use of Prompt (roman cement) may be appropriate.

2. Repair using stone indents
Where larger pieces of cut and dressed stone are missing and where mortar repair is not suitable, new stone should be introduced as a stone indent. Stone should match original as closely as possible, and external faces should be finished by hand. The broken stone may have to be carefully cut back to receive the new indent, but the maximum amount of original material must be conserved. The new indent stone must be cut very accurately. The joint between the indent and the original stone should not exceed 2mm. If the indent requires the support of

austenitic stainless steel dowels or cramps these should be of a size appropriate to the loads and inserted on hidden faces. They should be secured preferably with a lime-based grout. The indent itself should also be set in a suitable lime putty (may be hydraulic lime). See page 248 of English Heritage Practical Building Conservation: Stone.

8. Replacement of whole cut stones
Stone should match original as closely as possible, and external faces should be finished by hand and follow the profile of the original exactly. Joints should match the original in width and the new stone should be set flush with adjoining surfaces. The cavity for the new stone must be thoroughly brushed out and wetted down and prewetting of the new stone is essential before it is placed. Mortar is introduced onto the bed, sides and back of the cavity and the new stone placed in position. When the placement is satisfactory the mortar can be compressed and the top bed dry packed with mortar. The finished stone will then need to be pointed. See page 247 of practical Building Conservation: Stone, for further informative photographs and text.

EXTENT OF REPAIRS TO CUT STONES

The following guidance should be used to inform on the extent of repairs to the parapet coping.

1. Between coping stones, a repair should be provided to allow for pointing to the joints.



Figure 1 Example of Coping Repair at Joints

2. Infill sections should be repaired by indenting with a Galway limestone to match the existing host coping.



Figure 2 Example of Infill Section repair

3. Minimal joints should be maintained and repointed; relaying with large joints, which have been poorly repointed, or utilising mortar to fill out sections of missing stone as on the right should be avoided.



Figure 3 Example where joints should be repointed (Left), and poorly repointed joint (Right)

4. 'Plastic' repairs may be appropriate for small areas at junctions between copings (purple), assumed stone indenting (green), and mid-section damage (red) can be left as is.



RE-POINTING AND CONSOLIDATION OF STONEMWORK

5. Raking out of joints and re-pointing should be done with great care. Much of the stonework is cut and dressed with tooled faces. Hand held tools of appropriate narrow width should be used. A hand-held pump may be used to deep fill joints but the outer 25mm of mortar must be inserted and finished by hand. The work must be revisited when the mortar is 'leather-hard' and the joints 'beaten' with a stiff bristle brush to consolidate the mortar.
6. Specification for re-pointing should generally follow TII publication's Specification for Road Works Series 2400 – Brickwork, Blockwork and Stonework, Masonry Repointing of Historic Structures, as relevant. As much of the stonework is at or very close to water level, or is partially retaining, the use of an NHL3.5 lime and sand mix will be necessary. In specific circumstances and conditions, the use of NHL 5 may be permitted but it must be agreed with the conservation advisor and conservation officer. Sand should be sharp well graded plastering sand 2.5mm down, or finer when joints are less than 7mm wide. Where the width of joints allows, a proportion of coarser 6mm chip (about 10%), may be added to the mix. It is preferable to treat mortar which is to be inserted with a pump as a 'grout' rather than making the mortar liquid by the addition of excessive water. Casein added to the mix will help to make it sufficiently liquid. Casein is available from lime suppliers who will advise on suitable proportions.

Note the following general advice regarding temperature and mortar curing:

Moderately hydraulic lime mortars and renders (NHL 3.5) moist cured at +15° C developed reasonable frost resistance after 14 days. Those cured at 10° C took 28 days and those cured at 5-10° C took up to 56 days. Feebly hydraulic lime (NHL 2:0) and lime putties are inclined to fare worse. **Curing is negligible below 5 degC. Eminently hydraulic lime mortar (NHL5) also requires consistent temperatures of at least 5 degC to cure.**

7. Consolidation of roughly dressed stonework under the bridge vaults should be done by re-pointing including the use of pinning stones to match original stonework style. New stone should be introduced where occasional stones have fallen out/are missing. Stones should be of a suitable shape and size. Mortar and pinning stones should be used to make a secure fit. Mortar as (2) above.

BALUSTERS

ROD have identified flaking paint and corrosion on the cast iron balusters. Some balusters / half balusters are missing, and a few have fractures or pieces completely broken away. One baluster has been replaced in concrete. All replacement / new balusters shall be cast iron.

1. **Repair of cast iron**
Repair of cast iron is a specialist process and advice from a specialist should be obtained as to whether repair is feasible in this case. Very minor flaws may be repairable using epoxy-based products, but a specialist must be used to make the repair. It seems likely that missing and badly damaged balusters / half balusters will have to be replaced to match with new castings from a specialist workshop.
2. **Fitting new balusters**
The balusters are set in specially formed grooves in the stonework and the contractor or specialist fitter should supply a method statement for approval of conservation advisor regarding the fitting of new balusters. It may be necessary to lift parapet capping stones to allow the fitting. The new balusters should be set in a lime-based grout, or a resin compound may be acceptable. Exact product should be agreed with conservation advisor.
3. **Sealing around balusters**
It is not immediately apparent what compound has been used to seal the junction around the base and top of the cast iron balusters and the stone plinth and capping. Where the seal is intact it should be left as is. Where it is defective (defects seem to be widespread), the sealant should be carefully removed, and the junction should be sealed with lime-based mortar to spec. It may be necessary to prop the balusters while the mortar sets. The vertical junctions between the half balusters and the stone 'balusters' should also be sealed. A burnt sand mastic may be suitable in that situation.
4. **Painting of cast iron**
New elements should come primed, ready for undercoating and finish coats.

The level of cleaning for existing balusters should be agreed with Galway City Council conservation officer and conservation advisor. Blast cleaning in-situ of balusters may be problematical due to the need for protection of the public and workers, health and safety issues, and waste disposal issues. Previous paint layers would have contained lead and would be classed as hazardous material.

Therefore, it is likely to be preferable not to propose removing all paint layers. Excellent rust inhibitors and primers are available which mean that effective treatment can be undertaken without full removal of historic paint layers. Loose paint and rust can be scraped away manually. Steel brushes must NOT be used. Use bronze wire brushes or bristle brushes and sandpaper as necessary. Scrape back loose and defective material on previously painted surfaces to a firm edge, feather and edge by sanding. Mild detergent and water may be used to remove oils and grease. Excessive amounts of water should not be used, and high-pressure power hoses should not be used. (Driving water into cracks where it cannot dry out should be avoided.) Health and safety guidelines must be followed.

Following cleaning, use Jotun “Jotamastic 87” primer or Owatrol Oil rust neutralising primer or other equal and approved product. Follow with further primer coat and oil based finish coats as per spec from chosen manufacturer.

It was noted during correspondence with Jim Higgins, Heritage Officer for Galway City Council, several missing half-balusters are now likely to be in the river. Existing cast iron balusters to be re-used if discovered and in salvageable condition

WORK SETTING OUT AND TRIAL PANELS

Prior to commencement of works the contractor will be asked to mark up drawings of locations where the following repairs are to be carried out, for the approval of the Design Team;

- Repair mortar build-out to damaged stone (note previous repair mortars to be removed).
- Stone indents with similar stone where damage is greater than 40mm.

Allow 2m² of panel of raking out / repointing for design team inspection and approval.

MIXING OF MORTARS / HYDRAULIC LIME (NHL)

The specification is to follow manufacturer's instructions for hydraulic lime NHL 3.5 if this is to be preferred to mature putty lime.

A conventional cement mixer can be used although a roll pan or paddle mixer may be preferred. The mix should be 1 lime to 2.5 sand. Measuring of material must always be with a gauging box or bucket. A shovel is not acceptable since quantities are too inconsistent. Lime mortars mixed in drum mixers can be prone to balling, use of particular mixing techniques can reduce this. We recommend the following procedure;

Start with an empty mixer.

Add 1 part sand.

Followed by 1 part lime.

Followed by 1.5 parts sand.

Mix dry for at least 5 minutes.

After 5 minutes slowly add water until the desired consistency is reached, it is very important not to drown the mix by adding too much water.

Once the desired consistency is reached mix for a further 20 minutes.

The mix, to begin with, should appear rather dry but as mixing time increases the mortar will become much 'fattier'. If too much water is added the risk of shrinkage will increase and the final strength reduced. Do not use any Plasticisers.

APPENDIX 55/1

Structural Concrete Repairs

Location of Repairs	Construction Activity	Component	Repair Method	EN 1504-3 Performance requirements for structural and non-structural repair products
Salmon Weir Bridge	Scour apron repair works	Concrete scour apron surrounding the piers on the River Corrib spans.	Method 3.3 apply spray or flowable mortar and Method 11.3 applying corrosion inhibitors to concrete	Class R4

The following requirements are in addition to the requirements of Series 5500 of the TII Specification for Roadworks CC-SPW-05500 – Structural Concrete Repairs.

General

The Contractors proposed method shall be such that no damage is caused to sound concrete. All necessary measures shall be taken to provide protection to the general public, services, street furniture and the fabric of the structure during surface preparations. The Contractor shall make good or rectify any damage caused. Where abrasive blasting is being performed adjacent to a lane occupied by traffic, the residue including dust shall be contained and removed immediately after contact between the abrasive and the surface being treated. Removal of the residue shall be performed by a vacuum attachment operating concurrently with the abrasive blasting operation. Effective means of clearing dust and debris away from the working area shall be continuously implemented. All necessary precautions shall be taken to ensure that dust or falling debris does not constitute a hazard to personnel, equipment, the existing structure, and the general public.

Prior to carrying out any repairs to the concrete the Contractor and the Designer's supervisor shall carry out a survey of the damaged concrete surfaces to determine the location and extents of defects requiring repair. This survey will include visual inspection and a sounding survey. The survey shall include a description of existing defects together with photographs.

All products used by the Contractor for the repair of the structure shall be approved by the Employer's Representative before the commencement of works. Contractor shall provide to the Employer's Representative the BBA HAPAS certification.

Concrete Removal

Where concrete removal is considered necessary the power and size of the equipment shall be appropriate to the scale of the individual repairs and shall be subject to the approval of the Designer. Where percussive equipment is used particular care shall be taken that damage is not caused to concrete substrate and reinforcement which is to remain in place.

The amount of concrete to be removed at any time shall be subject to approval of the Employer's Representative. The extent of the concrete removal shall be agreed by the Employer's Representative before any reinstatement works commence. The extent and depth of concrete removal required shall be measured and recorded on drawings by the Contractor as the work proceeds.

In areas where damage has led to more widespread exposure of reinforcement, hydro-demolition represents the preferred method of concrete removal. The process, which utilises high pressure water jetting allows concrete to be removed at a reasonable rate, without damage to reinforcement. The resulting concrete substrate should be smooth and regular to provide a good bond to the repairing concrete.

Where steel reinforcement is exposed, as part of the works the reinforcement shall be thoroughly cleaned of all deleterious material and coated with a suitable protective coating system proposed by the Contractor and agreed with Employer's Representative.

Preparation

Immediately prior to reinstatement, all dust debris and loose material shall be removed from the area of the repair by air blasting with oil-free air, vacuuming or vigorous wire brushing. Water jetting or brushing may be permitted subject to compatibility with the selected repair material.

Where required the concrete surface substrate shall be thoroughly soaked with water in accordance with the manufacturer's recommendations to obtain a saturated surface dry condition. Any surplus water shall be removed before reinstatement begins.

Exposed reinforcing steel must be cleaned of heavy rust deposits by sand blasting.

Contractor shall restore bent and severed reinforcing steel. Deep saw cuts should be made in sound concrete to provide a minimum depth of patch.

The limits of each repair area shall be cut as a series of straight lines at right angles to the surface to a depth of approximately 10mm (5mm for repairs using epoxy mortar) using a disc cutter or similar. The disc cut surfaces shall be roughened prior to reinstatement. Feather edging shall not be permitted.

Prepared areas must be cleaned, and sand blasted free of contaminants immediately prior to priming and patching with epoxy mortar. All loose materials must be removed by dry sweeping and blowing out with clean, dry compressed air at 0.6 MPa.

When the clean and dry areas have been approved by the Employer's Representative, they must be primed with an approved epoxy resin binder forming a 10 to 15 mil thickness.

The concrete surface to be patched must have a temperature of at least 10°C and rising. The epoxy surface should appear shiny and be tacky just before new concrete is placed against it. If the concrete has absorbed the adhesive, as evidenced by a dull appearance, apply another coat.

Once the surface is prepared the repair mortar shall be placed as quickly as possible as flowability decreases with time. Concrete should be poured from one side only to avoid entrapped air and ensure continual free flow of material.

Priming

Concrete surfaces within the repair area shall be treated with a bonding agent, such as Sika MonoTop-610 or equivalent approved. The bonding agent shall be applied in accordance with the manufacturer's instructions and comply with BS EN 1504-4 subject to compatibility with the selected repair material.

Priming coats or bonding agents shall be thoroughly worked into all hollows and crevices in the prepared surface and around the reinforcement if required.

Repair mortar shall be applied "wet on wet" when using a bonding agent or primer unless the manufacturer of the repair system specifies that the bonding agent or primer must dry out before the repair mortar is applied.

If at any time the primer or bonding agent completely dries out before overlaying except as permitted above the repair surface shall be re-prepared generally by complete removal of the dried primer or as specified by the manufacturer of the repair materials.

Filling – Curing

Performance of structural repair mortars shall comply with property materials of class R4 of BS EN 1504-3, such as Sika MonoTop-612, Sika-Dur 31 or equivalent approved in accordance with the manufacturer's instructions and comply with BS EN 1504-3.

In general, the curing time of strengthening systems for repair materials is 3-4 days. The Contractor shall provide relevant technical performances of the materials to be used to the Employer's Representative for approval prior to work commencing on site.

The repair shall be cured by the method and for the period recommended by the manufacturer of the repair system. During this process the surface of the concrete mortar repair shall be protected from

strong sunlight and drying winds and the temperature of the material shall not be allowed to drop below the temperature specified in the manufacturer's instructions or 5 degrees Celsius, whichever is higher. Curing membranes shall not be permitted.

Repair mortar shall be built up in layers not greater than 30 mm.

The Contractor shall discuss with the Investigation Supervisor methods proposed in order to achieve the surface finish required.

Concrete Repairs

The areas of cracked, honeycombed, delaminated spalled, cracked, damaged or otherwise defective concrete to the existing scour aprons shall be repaired in accordance with Series 5500 of the TII Specification for Roadworks and the requirements of this Appendix.

Defective concrete shall be broken out by handheld drill / impact hammer taking due care to avoid damage to sound concrete and reinforcement. The concrete shall be broken out to a depth equal to the maximum size of aggregate plus 5mm beyond any reinforcement. The exposed surfaces shall be primed and an approved, proprietary prebagged repair mortar, complying with the requirements of AM-STR-06052 (BD 27/16), shall be placed by hand ensuring a flush finish with the adjoining surfaces. The repair mortar shall be prepared and placed in accordance with the manufacturer's requirements. It is important that the concrete repairs do not span the nominal joints or impede its function in any way.

Materials

Structural concrete for repair shall be a proprietary concrete repair product with a minimum characteristic cube strength of 50 N/mm² and shall comply with the requirements of AM-STR-06052 (BD 27/16) "Material for the repair of concrete highway structures", and BS EN 1504 "Products and systems for the protection and repair of concrete structures".

The Contractor shall submit his proposals in relation to the repair concrete that he intends to use to Designer at least 2 weeks prior to works commencing for approval.

Finish

Unformed concrete repairs shall achieve a U2 surface finish or better, formed surfaces shall achieve an F3 finish. Small expansion bolts may be used to help hold the patch in place, provided they can be located to avoid strands. Strands and reinforcement may be present to engage larger amounts of concrete.