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OCSC

O'CONNOR · SUTTON · CRONIN
MULTIDISCIPLINARY CONSULTING ENGINEERS

**G558: BALLINASLOE R446 BRIDGE ST. TO HARRIS RD. ACTIVE
TRAVEL SCHEME**

VOLUME A PART A – WORKS REQUIREMENTS & SPECIFICATION

**For
Galway County Council**

4 September 2026

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2. WORKS SPECIFICATION

WORKS REQUIREMENTS

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**G558: BALLINASLOE R446 BRIDGE ST. TO HARRIS RD. ACTIVE
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WORKS REQUIREMENTS SCOPING DOCUMENT

**For
Galway County Council**

4 September 2026

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1 WORKS REQUIREMENTS

The following are listed items considered to be included in the Works Requirements.

- This Works Requirements Scoping Document
- The Appendices to the Specification (Volume A Part A)
- The Contract Drawings (Volume A Part B)
- TII's Specification for Roadworks
- TII's Standard Construction Details
- Irish Water Specification and Standard Details
- Guidelines for Managing Openings in Public Roads – Guidelines for the Openings, Backfilling and Reinstatement of Openings in Public Roads, Second Edition (Rev 1), April 2017

2 PRELIMINARY PARTICULARS

2.1 NAME, NATURE AND LOCATION OF THE WORKS

Galway County Council (The Client) has appointed O'Connor Sutton Cronin (OCSC) to lead a multi-disciplinary team to design and deliver the Ballinasloe R446 Bridge St. to Harris Rd. Active Travel Scheme.

The Active Travel Scheme aims to connect with existing and proposed active travel provisions in the town centre which will be developed in line with the overall objectives of Ballinasloe Local Transport Plan, to improve connectivity and promote walking, wheeling and cycling as safe and attractive means to get around the area. by “making active travel an attractive and realistic choice for short journeys”.

The Ballinasloe R446 Bridge St. to Harris Rd. Active Travel Scheme proposes to deliver high-quality pedestrian and cycling facilities along the R446 in Ballinasloe between Bridge Street, along the Marina, Harbour Road and Dunlo Hill, and through Harris Road Junction to Brackernagh. These works will improve connectivity between key recreational and commercial destinations and support the provision of a safe, coherent and sustainable transport corridor within Ballinasloe.

The works include, but are not limited to the following elements:

- The provision of 2-way cycle track along one side of R446 with footpath upgrades along the scheme.
- The construction of new & upgrades to existing pedestrian crossings along R446 with belisha beacons, with exception to existing upgraded crossing on Dunlo Hill and new proposed crossing at Bridge Street as signal-controlled crossing.
- Upgrades to side road junctions including raised pedestrian and cyclist crossings and to the Grand Canal Roundabout.
- The construction of a new roundabout at the R446 – L4604 Harris Road junction.
- The construction of two new Bus Stops with Shelters at the Marina, and new Bus stops at Dunlo Hill.
- Provision of new drop-off area along Creche at Brackernagh and formalised parking in suitable locations along R446.
- Road surfacing works;
- Drainage works;
- Provision of road markings;
- Provision of road signage;
- Installation of fencing and associated items;
- Installation of public street lighting;
- Landscaping and planting works, rain gardens, and other visual improvements.

Refer to the full drawing package within Volume A Part B for specific details and requirements.

2.2 NAME AND ADDRESSES OF THE EMPLOYER AND CONSULTANT

Below are the name and address of both the Employer and the Consultant.

Client Name: Galway County Council
Address: Galway County Council, Áras an Chontae, Prospect Hill, Galway City.
Contact: Kasia Garvey
Email: kasgarvey@galwaycoco.ie

Consultant Name: O'Connor Sutton Cronin & Associates Ltd
Address: 9 Prussia Street, Dublin 7
Contact: Colin Wilson
Email: colin.wilson@ocsc.ie

Employer's Rep: O'Connor Sutton Cronin & Associates Ltd
Address: 9 Prussia Street, Dublin 7
Contact: Colin Wilson
Email: colin.wilson@ocsc.ie

2.3 CONSENTS, PLANNING AND OTHER CONSENTS OBTAINED OR TO BE OBTAINED BY THE CONTRACTOR

Below is a list of the consents, planning and other consents obtained or to be obtained by the Contractor in order to execute the works:

- Third Party Access Agreements
- Road Opening Licences
- Road Closures / Lane Restrictions
- Site / Compound Set-Up
- Tree Felling licence
- Consents and Licences in relation to Utility Diversions from relevant Utility Providers

3 THE SITE

3.1 SITE LOCATION

The site extends along the R446 road through Ballinasloe starting at Bridge Street and finishing at Brackernagh and incorporates Harbour Road, Dunlo Hill as well as the junctions with Dunlo and Jubilee Street.

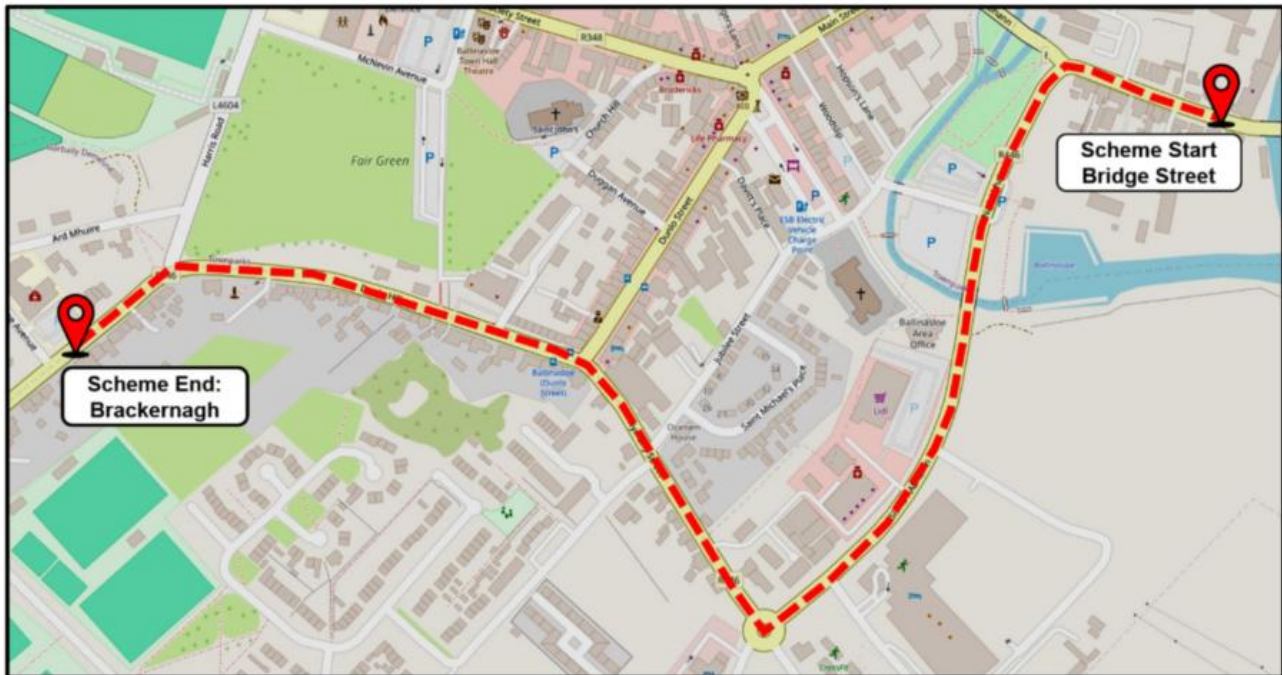


Figure 1: Site Location

3.2 RESTRICTION ON ACCESS

Access to third party land will be by agreement with Landowners, the Employer, and the Employer's Representative. The Contractor must liaise with all parties and reach agreement on conditions of entry prior to commencing any works.

The Contractor shall ensure that safe access to and egress from all business premises is maintained at all times during the works and shall take all reasonable measures as may be necessary to plan and execute the works in such manner that minimises any disruption to businesses and the general public. The Contractor is advised that maintaining continuous, safe, and unhindered access for commercial operations, Articulated Heavy Goods Vehicles (HGVs), and employee shift traffic is a fundamental requirement of this Contract. It will be the responsibility of the contractor to liaise with all business owners in advance and during the works in this regard.

The contractor is to provide traffic management in accordance with Appendix 1/17 Traffic Safety and Management of the specification.

3.3 INFORMATION ON ADJACENT / ABUTTING STRUCTURES

The Contractor shall ensure that the works do not have a global detrimental impact on the public road or any nearby or adjacent structures.

A property condition survey must be carried out on all structures adjacent (within 50m) of the scheme prior to works commencing in accordance with Appendix 1/15 of the Specification.

3.4 LIMITATIONS (IF ANY) ON USE OF THE SITE

Access to the sites is limited to the scope of the Contract; no other works are to be carried out unless instructed by the Employer's Representative.

Access to third party land will be by agreement with Landowners, Employer, and the Employers Representative. The Contractor must liaise with all parties and reach agreement on conditions of entry prior to commencing any works.

Access and Egress must be maintained to all businesses and industrial premises along the scheme during the operating hours of each specific business. The Contractor must obtain written agreement from each owner/occupier prior to restricting access to that premises.

The Contractor must, during the course of the Works, liaise with the businesses and premises along the Works.

The Contractor should allow for and provide a suitable barrier/fence to the works boundary. These barriers/fences should not be to the detriment of the adjacent properties, and the Contractor must liaise with each landowner prior to erection of the barriers/fencing that may affect either vehicular, pedestrian and / or cyclist access to the premises. Allow for moving adapting throughout the various phases of the project.

The Contractor may not use the roads or footpaths open to the public for the parking of vehicles, storage of materials or location of plant and temporary buildings; these areas shall be maintained in a clean condition with unrestricted access for the Public at all times.

Secured, non-slip access cover plates shall be provided at the entrances to all premises where the footway has been excavated. Vehicular gangways consisting of 25mm thick steel platers on packers should be provided at vehicular entrances spanning newly paved areas during the 14-day curing period.

Any in-stream works requirements can only be completed July to September inclusive and only with the agreement of Inland Fisheries Ireland.

The Contractor will be responsible for the provision, erection and maintenance of all traffic management equipment required to facilitate the works.

3.5 OTHER WORK ON SITE TO BE CARRIED OUT CONCURRENT WITH THE WORKS BY THE EMPLOYER'S PERSONNEL OR OTHER

The following relate to Works by Statutory Undertakers and / or Utility Providers

The Contractor will be required to make provision for working and assisting with works carried out by the following non exhaustive list of Statutory Undertakers and or Utility Providers.

- Electrical renewal, renovation and relocation work by ESB.
- Communications renewal, renovation and relocation work by Eir.
- Communications renewal, renovation and relocation work by other relevant telecommunication services, provider or asset owner.
- Works to infrastructure carried out by Irish Water or Galway County Council.
- Galway County Council Road and Storm Sewer Maintenance works.
- Works by Inland Fisheries Ireland (IFI).
- Works by OPW (Flood relief scheme) in lands owned by Waterways Ireland.

The following relates to the Works Requirements the Contractor shall provide for.

The Contractor shall be deemed to have within his tender price have provided for:

- a) Consultation and liaison with the relevant Local Authority, Public or Private Utility Undertakers, Service Provider, or Private Owners and other Contractors as necessary, particularly in respect of the timings or phasing of the Works and furnishing such details as the Works may require.
- b) Restrictions of and hindrances to the Works arising from the requirements and activities of Local Authority, Public or Private Utility Undertakers, Service Provider, or Private Owners and other Contractors.
- c) Restrictions of and hindrance to the Works arising from the activities of other Contractors who are engaged in alteration, renewals, provisions for future requirements or other Works authorized by the Clients Representatives in respect of the Services or Undertakings belonging to the Local Authority, Public or Private Utility Undertakers, Service Provider, or Private Owner either on or in the vicinity of the site.
- d) Ascertainment of the location of existing utility services and compliance with all requirements of the Local Authority, Public or Private Utility Undertakers or Private Owners, Service Provider in respect of Accommodation Works involving or affecting their services or Undertakings.

- e) All losses arising from the activities of the various Local Authority, Public or Private Utility Undertakers or Private Owners, Service Provider, and other Contractors.
- f) Excavations to ascertain the locations of existing underground utility services including excavations by hand and provision of working space.
- g) Excavations around unchartered and unknown services to ascertain the locations and extents of underground services including excavations by hand and provision of working space;
- h) Completing required excavations by hand digging around existing services and protection of same.
- i) Provision for all necessary watching and artificial lighting and everything necessary by day and night for the due protection and security of the works and the public.
- j) Compliance with the relevant Clauses of the Conditions of Contract.
- k) Attendance including working outside of normal working hours, lighting, traffic control, signing and backfilling with approved materials for Local Authority, Public or Private Utility Undertakers or Private Owners, Service Provider, and other Contractors.
- l) Support and protection of existing utility pipes, ducts, cables and other apparatus during the progress of the Works.
- m) Taking measures to ensure that no existing services are interrupted without the written consent of the Local Authority, Public or Private Utility Undertakers, Service Provider, or Private Owners.
- n) Awaiting the Employers Representatives consent to proposals.
- o) Restrictions and hindrances to the Works from the activities of other Contractors of the Employer including the activities for water connections, traffic and public light installation, plantings and other landscape works to be carried out by the Local Authority and their agents.
- p) Keeping the Employers Representatives informed of arrangements made with the owners of public and privately owned services.
- q) Providing a Public Liaison Officer for the duration of the scheme. The Public Liaison Officer should ensure all business, owners and occupiers are informed of the works and any disruption that may be caused by the Works.

3.6 FACILITIES OF THE EMPLOYER TO BE OPERATED AND MAINTAINED BY THE CONTRACTOR;

All existing service connections must be maintained by the contractor for the duration of the works.

3.7 SPECIFIC SITE RULES AND REGULATIONS.

Mon to Friday 08:00 to 18:00

Saturday 08:00 to 14:00

Sunday Restricted Working

-
- Works outside of normal hours or during restricted periods are subject to prior notice and agreement by the Employer and Stakeholders.
 - Access and Egress must be maintained for all businesses throughout the duration of the works. The Contractor must obtain written agreement from each owner/occupier prior to restricting access to that premises.
 - Agreement required from both Galway County Council, Employer's Representative, Local Authority and An Garda Siochana where relevant prior to any relaxation of working hours.

4 SECTIONS

4.1 DEFINITION OF SECTIONS INTO WHICH THE WORKS ARE DIVIDED FOR PURPOSES OF SECTIONAL COMPLETION

There is no sectional completion in relation to this scheme, and all sections must be completed and handed over within the timeframes stated in the Form of Tender & Schedule.

5 DRAWINGS, SPECIFICATIONS, SCHEDULES, REPORTS, GENERAL ARRANGMENTS, WORKING AND CONSTRUCTION DRAWINGS

5.1 PROJECT DRAWINGS

Refer to Volume A Part B for the Contract Drawings.

NOTE: Additional information drawings are supplied for information only and do not form part of the contract. No reference to them shall include them as a contract document.

5.2 MATERIALS AND WORKMANSHIP SPECIFICATIONS

For the avoidance of doubt, the documents listed are those current at date of tender.

- Transport Infrastructure Ireland (TII) Specification for Roadworks,
- Transport Infrastructure Ireland (TII) Standard Construction Details,
- Irish Water Code of Practice and Standard Details,
- Guidelines for Managing Openings in Public Roads – Guidelines for the Openings, Backfilling and Reinstatement of Openings in Public Roads, Second Edition (Rev 1), April 2017
- Works Requirements Volume A, Part A
- Works Requirements Volume A, Part B

6 PERFORMANCE SPECIFICATIONS APPLICABLE TO CONTRACTOR-DESIGNED OR SPECIALIST- DESIGNED ELEMENTS OF THE WORKS

6.1 TRAFFIC MANAGEMENT

All traffic management works shall be in accordance with the current published version of the Traffic Signs Manual, Chapter 8 “Temporary Traffic Measures and Signs for Road Works” and shall be submitted to the Employer’s Representatives for agreement prior to commencement of any works. Any Traffic Management that affects the public roads must be issued to the Employer’s Representatives and the Local Authority for agreement prior to commencement of any works.

The Contractor shall consult with Galway County Council, the relevant Local Authority/Road Authority/TII in relation to requirements for works in roads and public areas. The Contractor shall employ either directly or through a sub-contractor a suitably qualified Temporary Traffic Management (TTM) designer to design and/ or implement the Construction Stage Traffic Management Plan, which will fulfil these requirements, particularly in relation to road opening licenses, consultation with Galway County Council, Gardaí, public relations and notifications, general traffic management, and provisions for pedestrians.

The plan shall be prepared (and reviewed as required) by a competent Designer (TTM) with experience in traffic management and road construction or civil engineering works and having regard to the nature and complexity of the Works. As a minimum, the Designer (TTM) shall hold an accredited Level 7 Engineering Qualification, shall have a minimum of 5 years post graduate experience in an engineering role and shall have a Certified qualification in Temporary Traffic Management Design i.e. have successfully completed the LASNTG Temporary Traffic Management Design Course (Levels 1 – 4) or an approved equivalent. The Contractor should note that a further Certified course, LASNTG Temporary Traffic Management Design Course (Levels 5 & 6) or an approved equivalent, is required for the designers of Temporary Traffic Management arrangements on Level 5 and 6 roads.

The Construction Stage Traffic Management Plan shall be developed in accordance with the current published version of the following documents:

- Temporary Traffic Management Design Guidance (Department of Transport, Tourism and Sport 2019),
- Temporary Traffic Management Operations Guidance (Department of Transport, Tourism and Sport 2019),
- Traffic Signs Manual, Chapter 8 – Temporary Traffic Measures and Signs for Road Works (Department of Transport, Tourism and Sport 2019),
- Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads (Department of Transport, Tourism and Sport, Second Edition (Rev 1) April 2017),
- Specification for the Reinstatement of Openings in National Roads (TII, Issue 2 2013),
- Guidelines for Working on Roads (HSA, 2008).

A Temporary Traffic Operations Supervisor (TTOS) appointed by the Contractor shall be responsible for the implementation of the plan. The TTOS shall carry out site inductions and routine inspection of traffic arrangements and assess whether or not the Site is operating within the traffic management parameters specified in the plan. Inspections shall be documented. Completed inspection sheets (including providing details of traffic accidents, dangerous occurrences, and corrective actions) shall be submitted to the PSCS and Employer's personnel on site at the end of each working day. No work shall take place without the presence of a suitably qualified TTOS.

In addition, the Contractor shall maintain the requisite number of accredited personnel within his workforce with their site activities related to their relevant accreditation. The Contractor must nominate an appropriately trained and accredited (CSCS, or equivalent) Signing, Lighting and Guarding gang member, where required, to be responsible for the installation, modification, maintenance, and removal of appropriate traffic management arrangements at all times. STOP/GO arrangements require that operatives have a CSCS Card for Signing, Lighting and Guarding.

A communications plan is to be agreed in advance by the Contractor with the Employer's Representative and Galway County Council. The Contractor shall make allowance for providing ongoing information on traffic management arrangements were required to AA Road Watch, through public notices in local papers, website updates, local radio notices etc.

The Contractor shall also note the requirements of the Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads in respect of notifications to residents and businesses where works are due to continue outside the normal working hours.

The Contractor shall, after consultation with Galway County Council any statutory or other authorities concerned Submit in writing to the Employer's Representative for his approval a programme showing the scheme of traffic management he proposes before commencing any work which affects the use of a public road and thereafter furnish such further details as the Employer's Representative may require. Particular details shall be given to lane closures, road closures and associated diversions that may be required.

Where works are proposed on public roads, Temporary Traffic Management Plans will have to be submitted with all Road Opening Licence applications and will be subject to approval by Galway County Council. Road Opening Licence applications will be through the MapRoad Licencing (MRL) System. The Contractor will be required to apply for multiple T2 and T5 Licences in accordance with the requirements of the Guidelines for Managing Openings in Public Roads: Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads (DTTAS, Second Edition (Rev 1) April 2017).

The Contractor shall ensure minimum disruption to vehicular and pedestrian traffic, in accordance with Local Authority Road opening/road closure licences.

The Contractor shall not commence any work, which affects a public road until all necessary traffic safety measures are fully operational.

6.2 UTILITIES AND 3RD PARTY PROVIDERS

The Contractor must comply with any requirements and / or specification related to each individual utility provider and 3rd Party providers.

6.3 PUBLIC LIGHTING

Refer to Volume A Part A - Specification/ Appendix 13.

6.4 TRAFFIC SIGNAL INSTALLATION

The Contractor is referred to Volume A - Part A Appendices to the Specification for further details on the requirements for Traffic Signals.

7 SPECIALISTS

7.1 DESIGNS TO BE PREPARED AND / OR WORKS TO BE UNDERTAKEN BY SPECIALISTS

The following are deemed to be elements of works for which the Contractor must proposed a Specialist Designer:

- Bridge Construction
- Sign Foundations
- Public Lighting
- All Electrical Works
- Traffic Management
- Property Condition Surveys

7.2 NOVATED SPECIALISTS INCLUDING DETAILS OF THE ORIGINAL APPOINTMENT AND FORM OF NOVATION AGREEMENT

None known at time of tender.

7.3 PROPERTY CONDITION SURVEYS

The Contractor will be required to provide an experienced engineer or chartered surveyor to carry out the property condition surveys connected with the completion of the Works. The Condition Surveyor shall hold a degree or an equivalent professional qualification in Engineering or a relevant field, have chartered or equivalent status with at least ten years' satisfactory experience of which five years shall be of a similar nature to the services required as part of this Contract.

The Employer's Representative reserves the right to reject the proposed Structural Condition Surveyor if the experience and qualifications provided do not match the above requirement.

8 RESTRICTIONS & OBLIGATIONS

8.1 LIMITATION ON WORKING HOURS

The normal working hours within the site shall be Monday to Friday between 08.00 hours and 18.00 hours.

Mon to Friday	08:00 to 18:00
Saturday	Restricted Working
Sunday	Restricted Working

- Works outside of normal hours or during restricted period are subject to prior notice and agreement by the Employer and Stakeholders.
- Access and Egress must be maintained to all businesses throughout the duration of the works. The Contractor must obtain written agreement from each owner/occupier prior to restricting access to that premises.

A relaxation on the permitted working hours may be obtained from Galway County Council roadworks control division subject to the agreement from the statutory authority. It is anticipated that the relaxed working hours would additionally allow for:

- Saturday between 08.00 hours and 14.30 hours, with no working on Sundays or Public Holidays.

Exceptionally, the Employer's Representative's consent for work outside these hours may be given after any necessary consultation. Seven days' notice is required from the Contractor when seeking such any consent. Working hours are to be confirmed with Galway County Council prior to commencement.

8.2 MAINTENANCE AND PROTECTION OF EXISTING SERVICES ON, UNDER OR OVER THE SITE

The Contractor is required and deemed to have accepted responsibility for the maintenance and protection of existing utility services.

The Contractor will not damage or cause any interference including but without limitation, gas, drainage, electronic, electromagnetic or otherwise with or to any telecommunications services or signals that may be transmitted by or through the cabling or any services passing through the Utilities.

The Contractor shall at all times comply with the requirements of the owners of the Utilities ("the Service Providers") in the carrying out of the Works insofar as the same shall or may affect the Utility Services. The Contractor shall inform the Employer Representative of any conditions imposed by the Service Providers

relating to the Utilities affected by the Works. For the avoidance of doubt the Contractor shall be responsible for the establishment and maintenance of appropriate communication with appropriate personnel of the Service Providers.

The Contractor is to take into account the risks posed by the existence of the Utility Services in establishing the Contract Sum.

The Contractor shall comply at all times with the provisions of all statutory enactments, rules, orders and regulations for the time being in force relating to or affecting the Cabling and/ the Utilities and with the requirements of any statutory, local or other relevant authority and with any notice, order or proceedings that may be issued or served by any such authority and/or the Service Providers in relation to the Cabling and/or the Utilities.

The Contractor shall as part of the Works Requirements provide for Service Providers their workmen, contractors, sub-contractors and agent's access to the Site for the purposes of installation, inspection, maintenance, repair, upgrading and renewal as the case may be of the Cabling and/or the Utilities.

The Contractor shall as part of the Works Requirements Consult and liaison with the relevant Local Authority, Public or Private Utility Undertakers, Service Provider, or Private Owners and other Contractors as necessary, particularly in respect of the timings or phasing of the Works and furnishing such details as the Works may require.

The Contractor shall as part of the Works Requirements provide for restrictions of and hindrances to the Works arising from the requirements and activities of Local Authority, Public or Private Utility Undertakers, Service Provider, or Private Owners and other Contractors.

The Contractor shall as part of the Works Requirements provide for restrictions of and hindrance to the Works arising from the activities of other Contractors who are engaged in alteration, renewals, provisions for future requirements or other Works authorized by the Clients Representatives in respect of the Services or Undertakings belonging to the Local Authority, Public or Private Utility Undertakers, Service Provider, or Private Owner either on or in the vicinity of the site.

The Contractor shall as part of the Works Requirements provide for ascertainment of and compliance with all requirements of the Local Authority, Public or Private Utility Undertakers or Private Owners, Service Provider in respect of Accommodation Works involving or affecting their services or Undertakings.

The Contractor shall as part of the Works Requirements provide for all losses arising from the activities of the various Local Authority, Public or Private Utility Undertakers or Private Owners, Service Provider, and other Contractors.

The Contractor shall as part of the Works Requirements provide for excavations to ascertain the locations of underground services including excavations by hand and provision of working space.

The Contractor shall as part of the Works Requirements provide for compliance with the relevant Clauses of the Conditions of Contract.

The Contractor shall as part of the Works Requirements provide for attendance including working outside of normal working hours, lighting, traffic control, signing and backfilling with approved materials for Local Authority, Public or Private Utility Undertakers or Private Owners, Service Provider, and other Contractors.

The Contractor shall as part of the Works Requirements provide for support and protection of ducts, pipes, cables, and other apparatus during the progress of the Works.

The Contractor shall as part of the Works Requirements provide for taking measures to ensure that no existing services are interrupted without the written consent of the Local Authority, Public or Private Utility Undertakers, Service Provider, or Private Owners.

The Contractor shall as part of the Works Requirements provide for awaiting the Employers Representatives consent to proposals.

The Contractor shall as part of the Works Requirements provide for restrictions and hindrances to the Works from the activities of other Contractors of the Employer including the activities for water connections, traffic and public light installation, plantings and other landscape works to be carried out by the Local Authority and their agents.

The Contractor shall as part of the Works Requirements provide for keeping the Employers Representatives informed of arrangements made with the owners of public and privately owned services.

The Contractor shall as part of the Works Requirements provide for the provision of reinforced concrete protection to all exposed service utility duct or pipe in accordance with CC-SCD-02751.

8.3 EXECUTION OF WORK IN A SPECIFIC ORDER

The works shall be executed as set out in the works program. The section completion order may be subject to change based on site access availability, site location, presence of services, social constraints etc. The Contractor will agree any changes to program with the Employer and the Employers Representative prior to commencement.

8.4 PROPERTY CONDITION SURVEYS

The Contractor is required to provide Property Condition Surveys to determine the condition of existing structures potentially affected by the construction of the Works. The surveys are to be carried out in two distinct stages, namely pre- and post-construction of the Works.

The external survey shall consist of the following:

- Survey of property boundary (including walls, fences, gates, footpaths etc.);
- External condition survey and record photographs of all structural elevations affected by the works in sufficient detail to identify cracks and structural defects. Photographs shall be referenced on maps, plans and elevations as appropriate. All cracking and other defects shall be identified, measured or quantified, recorded using photographs and logged in tabular or drawing format;
- Identify to the Contractor any structures which would require crack monitoring, propping or special monitoring during the construction phase or prior to the commencement of construction work;
- Identify any additional premises requiring internal surveys;
- Report on same.

A property condition survey must be carried out on all structures adjacent (within 50m) of the scheme prior to works commencing in accordance with Appendix 1/15 of the Specification.

The survey will involve, as a minimum, the following:

- Taking digital photographs of all visible defects such as wall cracks, out of plumbs, bows and distortions.
- Using crack width scale in photographs where appropriate.
- Making note of defects which are not readily recorded in photographs and any other notes considered appropriate.

The survey reports shall include as a minimum:

- Hardcopy and softcopy of a drawing with the background mapping of the scheme on A4 format, locating the surveyed structures in plan and distinguishing between the different survey types. Sketches, drawings & plans shall be of sufficient scale that defects noted can be clearly seen.
- Hardcopy and softcopy of a report, detailing the survey carried out of each structure in hardcopy and softcopy format with relevant photographs and site notes.
- The report shall include recommendations for the further monitoring of structures deemed necessary as a result of the survey.
- The survey shall be stamped, dated, and signed as a record of the survey.

8.5 ANY OTHER OBLIGATIONS OR RESTRICTIONS

- The contractor is responsible for providing adequate resource to safely execute and secure the Works.
- All existing equipment is to be maintained during the course of the works. Where public lighting and or traffic signals are to be relocated, renewed, or replaced the existing systems are to remain operational until such time as the relocated, renewed, or replaced items are operational and have been tested and commissioned.
- All existing services and or utilities are to be maintained during the course of the works. Where existing services and or utilities are to be relocated, renewed, or replaced the existing systems are to remain operational until such time as the relocated, renewed, or replaced items are operational and have been tested and commissioned.
- The Contractor shall in accordance with the Works Requirements afford free access to and free movement in the Site to all other contractors employed by the Employer (together with their sub-contractors) and any other contractor's sub-contractors or authorities of any kind.
- A liaison officer is to be appointed by the Contractor for the duration of the works. The role of the Liaison Officer is to provide a point of contact for the stakeholders.
- All works which impact on the entrance to a business must be completed at times agreed with the relevant property owners and the ER.
- A 24-hour emergency contact number must be provided and maintained by the Contractor.
- The Contractor must provide and maintain an alternative means of access for both pedestrian and vehicular movements.
- Where access/egress is restricted, suitable signage is to be provided by the Contractor. Signage should indicate alternative routes, Working Hours, and Contact details.
- The contractor should take suitable measures to protect all trees not being removed during the works.
- The contractor shall limit all non-necessary site activities such as contractor's vehicles and equipment to that specifically required to execute the works.
- No materials may be stored outside of the agreed Contractor's yard
- Cleanliness of roads – All approach roads (including any temporary access roads) to the site must be kept clear at all times of all dirt and debris accruing from vehicles coming to or returning from the site or originating in any other way from the site.
- The contractor must maintain and make good damage to any roads, footpaths, services etc. caused by or attributable in any way to the delivery or removal of personnel, plant, materials, or the like to the site or as a result of the execution of the works.

9 HEALTH AND SAFETY

9.1 APPOINTMENT OF PROJECT SUPERVISOR FOR THE CONSTRUCTION STAGE

As part of the works the contractor is deemed to have accepted the appointment of the role of Project Supervisor for the Construction Stage and that the cost of this role is included within the tender value of the works.

Prior to the issue of substantial completion, the Contractor must provide all information required for a completed Safety File incorporating a full set of as-built drawings (both PDF and AutoCAD Civil 3D) to the approval of the Employers Representative.

10 CONTRACT

Note: All Model Forms are deemed to be included in the Contract

10.1 FORM OF PERFORMANCE BOND

Refer to Form of Tender & Schedule.

10.2 FORM OF PARENT COMPANY GUARANTEE

Refer to Form of Tender & Schedule.

10.3 FORM OF APPOINTMENT OF CONTRACTOR AS PROJECT SUPERVISOR CONSTRUCTION STAGE (PSCS)

To be completed by the successful tenderer prior to commencement of Works.

10.4 CERTIFICATE IN RESPECT OF PROFESSIONAL INDEMNITY INSURANCE

To be provided where applicable and in accordance with the Conditions of Contract.

10.5 OWNER CONTROLLED INSURANCE

To be provided where applicable and in accordance with the Conditions of Contract.

10.6 CERTIFICATE IN RESPECT OF PAY AND CONDITIONS OF EMPLOYMENT

To be completed by successful Tender prior to commencement of works in accordance with Conditions of Contract and submitted with each valuation.

10.7 FORM OF COLLATERAL WARRANTY

To be provided where applicable and in accordance with the Conditions of Contract.

10.8 FORM OF BOND FOR PAYMENT IN RESPECT OF MATERIALS OFF-SITE

To be provided where applicable and in accordance with the Conditions of Contract.

10.9 TERMS OF APPOINTMENT OF CONCILIATOR

In accordance with the Conditions of Contract.

10.10 FORM OF CONCILIATION PAYMENT BOND

In accordance with the Conditions of Contract.

10.11 ARBITRATION RULES

In accordance with the Conditions of Contract.

11 CONTRACTOR'S DOCUMENTS TO BE PROVIDED

The following documents need to be provided by the Contractor during the Construction Period:

- Project Programme indicating phasing, critical path and key delivery dates.
- Traffic Management Plan(s).
- Stakeholder Liaison and Communication Plan.
- Methodology & Method Statements for carrying out the works.
- Health & Safety Management Procedures.
- Key Personnel & Contact Details.
- Quality Management Procedures.
- Proposed Specialist/Subcontractors.
- Construction and Demolition Waste Management Plan.
- Construction Safety & Health Plan.

12 REPORTING

The following documents need to be provided by the Contractor during the Construction Period:

- All correspondence to be provided in both written and digital format.
- Contractor to provide on a weekly basis to the Employers Representative a 2 week look ahead programme which should indicate main areas of works, specialist activities and works required outside of normal working hours.
- The Contractor will attend fortnightly progress site meetings with the ER et al as may be required.
- The Contractor will submit monthly progress reports indicating progress to date, monthly programme, resources on site, payments & valuations, change orders, health & safety etc.
- The monthly report shall also include details of the noise and vibration levels shall be submitted to the Employer's Representative in a suitable format for issuing to Galway County Council.
- The Contractor is to provide safety statistics in the following format within the monthly progress report:
 - Name of Project:
 - Date:
 - Date of Commencement of Project:

Table 1: Progress Report Format

	Month	Total
No. of Reportable Accidents to HSA		
No. of 1st Aid Incidents		
No. Lost Time Incidents		
No. of Dangerous Occurrences		
No. of Environmental Incidents		
Accident Frequency Rate		

- Information supplied digitally to be windows based and compatible with Office 2010, Acrobat Adobe 8.0, and or Microsoft Project 2013
- As built drawings to be provided on AutoCAD Civil 3D 2018 or later format.
- As built to include x, y, z coordinates (in ITM format) of all buried services, intersections, manholes kerb lines, road surface and sub surface features, major and minor features, connection and or termination points, road markings, fixtures and fitting, street furniture or any other element as directed by the Employers Representative.



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THE ROAD WORKS SPECIFICATION

PREAMBLE TO THE SPECIFICATION

1. The Specification referred to in the Contract shall be the 'Specification for Works', published by Transport Infrastructure Ireland on the TII Publications website (<http://tiipublications.ie/>) 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.
2. An Additional Clause as indicated by a suffix 'AR' in Appendix 0/1 is a Contract-specific alteration.
3. A Substitute Clause as indicated by a suffix 'SR' in Appendix 0/1 is a Contract-specific alteration.
4. A Cancelled Clause indicated by a suffix 'CR' in Appendix 0/1 is a Contract-specific alteration.
5. Insofar as any of the Numbered Appendices may conflict or be inconsistent with any provision of the Specification for Works the Numbered Appendices shall always prevail.
6. Any reference in the Contract to a Clause number or Appendix shall be deemed to refer to the corresponding Substitute Clause number or Appendix listed in Appendix 0/1 or 0/2.
7. Where a Clause is altered, any original Table/Figure referred to in the Clause shall apply unless the Table/Figure is also altered. Where a Table/Figure is altered, any reference in a Clause to the original Table/Figure shall apply to the altered Table/Figure.
8. Where a Clause in the Specification relates to work goods or materials that are not required for the Works it shall be deemed not to apply.
9. Any Appendix referred to in the Specification that is not used shall be deemed not to apply.
10. References in the Specification to "TII Standard Construction Details" shall be taken to refer to "Standard Construction Details" as published by Transport Infrastructure Ireland on the TII Publications website (<http://TIIPublications.ie/>) current on the date 10 working days prior to the tender returns date or, if applicable, the extended tender returns date.
11. Throughout the Specification and Appendices to the Specification, the following interpretations shall apply:
 - (i) "Base Course" shall mean "Binder Course" "Roadbase" shall mean "Base"
 - (ii) "Wearing Course" shall mean "Surface Course"
 - (iii) "UK Department of Transport" shall mean the UK's "Highways England".
12. Any reference to the "Engineer" within the Works Requirements or any of the other Contractor Documents or Drawings shall mean "Employer's Representative."

APPENDIX 0/1: CONTRACT SPECIFIC ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES

(i) List of Additional Clauses and Tables

Clause/Table Figure No.	Title
112.4 AR	Setting out
115.2AR	Accommodation Works
115.4AR	Accommodation Works
116.6 AR	Privately and Publicly Owned Services or Supplies
116.7 AR	Privately and Publicly Owned Services or Supplies
116.8 AR	Privately and Publicly Owned Services or Supplies
116.9 AR	Privately and Publicly Owned Services or Supplies
116.10 AR	Privately and Publicly Owner Services or Supplies - Support of Existing Structures and Services
117.20AR	Traffic Safety and Management
117.21AR	Traffic Safety and Management
117.22AR	Traffic Safety and Management
117.23AR	Traffic Safety and Management
117.24AR	Traffic Safety and Management
117.25AR	Traffic Safety and Management
117.26AR	Traffic Safety and Management
117.27AR	Traffic Safety and Management
117.28AR	Traffic Safety and Management
126.4AR	Damage to Roadways
137 AR	Supply of Information for the Safety File
142.1 AR	Materials and Quality
142.2 AR	Materials and Quality
142.3 AR	Materials and Quality
143 AR	Disposal of Surplus Material and Demolition Rubble
144AR	Wheel Washing Facilities
145AR	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction
170AR	Control of Dust
170.1AR	Control of Dust
170.2AR	Control of Dust
171AR	Protection of Watercourses from Pollution
171.1AR	Protection of Watercourses from Pollution
171.2AR	Protection of Watercourses from Pollution

Clause/Table Figure No.	Title
172AR	Protection of Existing Works and Amenities
172.1AR	Protection of Existing Works and Amenities
173AR	Cleanliness on Completion
173.1AR	Cleanliness on Completion
173.2AR	Cleanliness on Completion
175 AR	Records
175.1 AR	Records – Record as Built Drawings
175.2 AR	Records – Manufacturer's Instructions, Catalogues
179 AR	Independent Check Certificate for Temporary Works & Structural Elements and Other Features to be Designed by the Contractor.
179.1 AR	Independent Check Certificate for Temporary Works & Structural Elements and Other Features to be Designed by the Contractor.
1202.10AR	General Requirements for Permanent Traffic Signs
1210.9AR	Reflective Markers
1210.10AR	Reflective Markers
1210.11AR	Reflective Markers
1470AR	Inspection and testing to be carried out by the Contractor – Photometric Testing
1470.1AR	Inspection and testing to be carried out by the Contractor – Photometric Testing

(i) Additional Clauses and Tables

Clause No.	
112.4 AR	Setting Out Notwithstanding the requirements of clause 7.7 of the Conditions, the Contractor shall survey all tie-in sections of existing roads and drainage systems and submit the levels to the Employer's Representative prior to construction. The Contractor shall also survey and record existing details of items which he is required to remove and subsequently replace. The level of survey information to be recorded is described in Appendix 1/12.
115.2AR	Accommodation Works All agreements made by the Contractor with landowners or occupiers shall be confirmed to the Engineer in writing.
115.4AR	Accommodation Works (i) The Contractor shall be aware that all landowner Accommodation Works are identified in this Contract as specified in Appendix 1/15 of the Specification. (ii) The Contract shall be deemed to include for putting all instructed Accommodation Works arrangements in place. The Contractor shall confirm pre-entry requirements with each individual landowner in writing and inform the Engineer.
116.6 AR	Privately and Publicly Owner Services or Supplies 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.
116.7 AR	Privately and Publicly Owner Services or Supplies No interference with the services of the Local Authority or any other utility bodies shall be carried out without the prior notification and approval of these bodies.
116.8 AR	Privately and Publicly Owner Services or Supplies 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 Contractors responsibility to accurately locate all services on site by means of tracing equipment and trial holes. For the purposes of this Clause the Contractor shall provide in his initial Contract Sum for pipe and cable detection equipment for his own use on site. Electricity cables must be located using cable detection equipment and the Contractor shall not assume cables are located at a minimum depth.

Clause No.	
116.9 AR	<i>Privately and Publicly Owner Services or Supplies</i> Overhead services are present within the site of the Works. It shall be deemed that the Contractor has made note of these overhead services during his inspection of the site and made due allowance for all temporary diversions necessary for construction of the Works.
116.10 AR	<i>Privately and Publicly Owner Services or Supplies</i> <i>Support of Existing Structures and Services</i> The Contractor shall be responsible for maintaining all sewers, drains, pipes, cables, other services, and structures encountered in excavations. All services shall be temporarily supported or diverted 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.
116.11 AR	<i>Privately and Publicly Owner Services or Supplies</i> <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 Transmission Pipelines are to be carried out in accordance with the following document 'Code of Practice for Working in the Vicinity of Transmission Pipelines' which is available from Gas Networks Ireland.
117.20AR	<i>Traffic Safety and Management</i> Where required in Appendix 1/17, the Contractor shall provide, erect, maintain and remove Driver Information Signs and temporary variable message signs in accordance with sub-clauses 21 to 26 of this clause.
117.21AR	<i>Traffic Safety and Management</i> Sign face layouts shall be in accordance with Chapter 8 of the Department of the Transport Traffic Signs Manual (2010). Variable message sign messages shall be provided at locations agreed by the road's authority and the Engineer.
117.22AR	<i>Traffic Safety and Management</i> The Driver Information Signs shall be located within road works when part of the road is coned off, for any length of time.
117.23AR	<i>Traffic Safety and Management</i> Signs located within road works shall only be used where they can be located in advance of a taper and in a position which does not prejudice traffic safety.

Clause No.	
117.24AR	<i>Traffic Safety and Management</i> Driver information signs shall be sited at the beginning and end of the works. They shall not be placed where they may distract drivers negotiating traffic management provisions.
117.25AR	<i>Traffic Safety and Management</i> The Contractor shall provide adequate storage facilities clear of any safety zone.
117.26AR	<i>Traffic Safety and Management</i> Information signs shall only be displayed within road works where they accurately reflect the reason for the traffic restrictions.
117.27AR	<i>Traffic Safety and Management</i> All necessary traffic safety precautions shall be taken by the Contractor to ensure the safety of all traffic and pedestrians using the existing roads adjacent to the Site and connecting minor roads during the execution and completion of the Works, and all precautions shall be taken to minimise disruption to the local residents.
117.28AR	<i>Traffic Safety and Management</i> The Contractor shall ensure that no item of plant, goods or equipment (including stores or offices) shall be placed or parked on the public roadway or its verges in a manner which shall / may result in danger to the personnel on the Site or members of the public, or which shall / may restrict sight distances on all accesses to the Site or on public roads.
126.4AR	<i>Damage to Roadways</i> 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.

137AR	Supply of Information for the Safety File Supply of Information for the Safety File The Contractor shall maintain throughout the duration of the contract composite record drawings to show details of all civil works constructed including but limited to kerb lines, gullies, manholes, drainage, sewers, water mains, rising mains, public lighting, traffic signals and temporary and permanent utility services installed/constructed during the works. The Contractor shall provide the information as per the following requirements: Within 28 days prior to or following the proposed Date of Substantial Completion of the Whole of the Works, the Contractor shall prepare and submit to the Employer, a complete set of As-Built Drawings in both hard and soft-copy formats in accordance with Appendix 1/31 and the details hereunder. Similar provision applies to Substantial Completion for Part of the Works, or equivalent, where such applies. The works or any part of the works shall not be considered complete for the purposes of substantial completion until such as-constructed drawings have been submitted to and accepted by the engineer. Such As-Built Drawings shall include, but be not limited to, the following drawing Series: <u>General Arrangement Drawings: (Scale 1:500)</u> Road Layout illustrating all kerb lines and different paving types, road signs, road markings, traffic signals, lighting columns and all above ground street furniture. Services (other than water & wastewater) illustrating all pre-existing and newly placed services as a combined services drawing with clearly distinguishable line types for each individual service; pre-existing services remaining in the ground shall be x-ed out if decommissioned. Individual service drawings for each utility (water, gas, esb, etc.) shall also be produced. Services (water & wastewater) illustrating all pre-existing and newly placed drainage and watermains with clearly distinguishable line types for each individual service; all new and pre-existing manholes and valve chambers shall be identified with an appropriate schedule placed on the drawing. All general arrangement drawings shall be to national grid co-ordinates and datum levels. The Contractor may make use of digital information for the scheme supplied by the Employer's Representative. [The road layout drawing may be replaced by a detailed topographical survey of the finished scheme with appropriate text notes and shading to clearly illustrate the
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surface formation of the new scheme.

Cross Section Drawings & Details (Scale 1:250)

Cross Sections shall be prepared at 20 metre chainage intervals along the route of the scheme and across the full width depicting the works conducted and locations of below ground services.

Construction details shall be clearly referenced and related to the general arrangement and cross section drawings.

The Contractor may make use of digital drawing information prepared for the scheme by the detailed designer and supplied by the Employer's Representative.

Series 500: All pre-existing and newly placed services (combined services drawing); pre-existing services remaining in the ground shall be x-ed out if decommissioned. Individual service drawings for each utility (water, gas, esb, etc., etc.) shall also be produced.

Drainage: drainage pipes shall be distinguished by line style to show separate storm water, separate foul, and combined sewers.

Series 1100 Traffic Signs and Road Markings. Series 1300 Public Lighting.

Series 1400 Traffic Signals and Ducting Layout.

All service drawings shall include above ground and below ground features.

All service drawings shall be constructed based on on-site co-ordinates.

The combined as-built services drawings shall adopt the following standards:

Colour Codes

The colour codes for services shall be as follows:

- Water – Dark Blue
- Sewers - Brown (different sewer types will have different shades of brown)
- Public Lighting – Purple
- Traffic - Orange (different Traffic cable types, e.g. CCTV, Fibre Optic, other telemetry, etc. will have different shades of orange)
- ESB - Dark red
- Other Electricity Suppliers - Other shades of red
- BGE - Yellow
- Eircom - Dark green
- Other Telecoms - Other shades of green

Line Styles

Line Styles shall include varying combinations of dots-and-dashes of varying length and frequency. The line style for services shall also include the following code letters format in the line styles:

SERVICE	LINE STYLE LINE	STYLE MEANING
Water	---Water (dia)---	Water main (diameter of main)
Sewers	---SWS (dia)---	Storm water sewer (diameter of sewer)
Sewers	---FWS (dia)---	Foul water sewer (diameter of sewer)
Sewers	---CWS (dia)---	Combined sewer (diameter of sewer)
ESB	---ESB HV (x by y by z)---	ESB High Voltage (qty. horz. by qty. vert. by
ESB	---ESB MV (x by y by z)---	ESB Medium Voltage (qty. horz. by qty. vert. by
ESB	---ESB-LV (x by y by z)---	ESB Low Voltage (qty. horz. by qty. vert. by
Public Lighting	---PL (x by y by z)---	Public Lighting (qty. horz. by qty. vert. by
BGE	---BGE-HP (dia)---	BGE High Pressure main (diameter of main)
BGE	---BGE-MP (dia)---	BGE Medium Pressure main (diameter of main)
BGE	---BGE-LP (dia)---	BGE Low Pressure main (diameter of main)
Eircom	---Eircom (x by y by z)---	Eircom (qty. horz. by qty. vert. by
Telecoms	---Name (x by y by z)---	Name of Telecom (qty. horz. by qty. vert. by
Traffic	---Traffic (x by y by z)	Traffic (qty. horz. by qty. vert. by

Other line-styles, line-style-codes, and colours, may be similarly created to cover other additional services. These additional styles should be agreed in advance with the Employer's representative.

Drawing Records

The Contractor shall maintain all records necessary for the preparation of as manufactured, as-installed, and as-constructed drawings. All such drawings shall

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	be endorsed by the Contractor as true records of the manufacture, installation and construction of the works. <u>Drawing Size</u> All drawings shall be A1 in size and prepared at a scale of 1:500 (except for cross sections etc.). All drawings shall be duly numbered, dated, and signed off as being checked by the Contractor. Drawing File Types All drawings shall be submitted in the following e-file formats: - AutoCAD Civils 3D, Version 2018 or Later - Acrobat Adobe (.pdf) Drawing Submission <i>Hard Copies:</i> One bound volume in A1-size and one bound-volume in A3-size of all drawings for each section outlined above shall be duly submitted to the Engineer. One A3 size set of utility- specific drawings shall also be produced, and submitted to the Engineer, for each individual utility service; i.e. one set of drawings showing drainage, one set of drawings showing water, etc., etc. <i>Soft Copies:</i> Two CD-ROM copies for each section containing all drawings shall also be duly submitted. E-drawing files shall be grouped under sub-folders by Utility name Note: The Contractor shall: - during the detailed design phase, and while liaising with each individual utility regarding the design of the works, consult with each individual utility regarding their own specific as-built drawing specification, and - Provide; - Manufacturers' certifications, specifications, maintenance information and health and safety information on all materials used, drainage and service features. - Complete as built level information Photographs of all underground services before they are covered.

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142.2 AR	Materials and Quality All works and materials required under the Contract shall comply with the requirements of this Specification and the Standards referred to therein. Any material or product used in the work for which compliance with a Standard is specified shall be certified as complying with that Standard by the National Standards Authority of Ireland. Any material or product for which compliance with an Irish Standard Specification is specified shall be certified as complying with that Irish Standard Specification and shall bear the Irish Standard Mark. Nothing in this Clause prevents the use of a material or product that is certified to an International Standard of a National Standard of another member State of the European Community which provides an equivalent guarantee of safety and suitability to that required in this Specification and the Standards referred to therein - certification to be by the National Standards Authority of Ireland. Manufacturers or suppliers' certificates of compliance with the Standard shall be provided when requested by the Employer's representative. Regarding the list of suppliers required under Clause 105 the Contractor shall obtain and submit to the Employer all those certificates specified in the relevant Standards and satisfy the Employer that they relate to the materials being delivered to the works. Compliance with this Clause does not relieve the Contractor from any of his obligations under the Contract.
142.3 AR	Materials and Quality In every case where, in the Specification, materials of special design or manufacture, patented or otherwise, are described, or the names of manufacturers or agents are given, it is to be clearly understood that such references are only inserted for the guidance of Tenderers with regard to the nature and quality of the articles and services required, which must, in all cases, be subject to the approval of the Engineer.
143AR	Disposal of Surplus Soil and Demolition Rubble The materials to be disposed off site are classified as "wastes" and are subject to the provisions of the "Waste Management Act" 1996. The facilities at which such materials are discarded must have a waste license from the EPA or where the EPA decides, must have a waste permit from the Local Authority.

Clause No.	
144AR	Wheel Washing Facilities The Contractor shall allow for the installation and maintenance of an automatic wheel- washing unit on the entrance to the site, this must be always available for use. Maintenance will include the cleaning of the equipment and disposal of any material gathered within. The Contractor must ensure that the required equipment for supplying water and power to the wheel washing facility are available and in good working order. At the end of the Contract, the Contractor must remove the wheel washing facilities in total from site.
145AR	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction All aggregates proposed for use on this scheme shall meet fully the requirements of the Contract Specification and in addition the requirements of Standard Recommendation S.R. 21:2014 Guidance on the use of I.S. EN 13242:2002 +A1:2007 – Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction. The Contractor shall provide certification from the supply quarry in the first instance and provide follow up test samples of all materials placed within the works.
170AR	Control of Dust
170.1AR	Control of Dust The Contractor shall take all necessary steps to control dust caused by construction traffic to the satisfaction of the Engineer.
170.2AR	Control of Dust This shall include measures such as: I. Wetting of haul road and storage areas; II. Covering or dousing of any dry, imported or excavated material; III. Reducing the duration for stockpiling in fill materials; IV. Introduction of a wheel wash for construction traffic. V. Work methods during the cutting of granite and concrete paving
171AR	Protection of Watercourses from Pollution

Clause No.	
171.1AR	<i>Protection of Watercourses from Pollution</i> 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.
171.2AR	<i>Protection of Watercourses from Pollution</i> 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.
172AR	Protection of Existing Works and Amenities
172.1AR	<i>Protection of Existing Works and Amenities</i> Prior to the commencement of the execution of the Works, the Contractor shall provide to the Engineer complete records (photographic or otherwise) of existing structures and other properties that shall or may be affected by the execution and completion of the Works.
173AR	Cleanliness on Completion
173.1AR	<i>Cleanliness on Completion</i> 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 Engineer. 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 Engineer where it has been damaged due to the Contractor's activities.
173.2AR	<i>Cleanliness on Completion</i> 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.
175	Records
175.1AR	<i>Records</i> Record As Built Drawings The Contractor shall be required to provide as-built records drawings for the project upon completion of the Works as detailed in Appendix 1/31.

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175.2 AR	Records <i>Manufacturer's Instructions, Catalogues</i> The Contractor shall supply to the Employer's Representative the following items, prior to incorporation into the works; Details of all proprietary current manufacturer's instructions and explanatory brochures to be used on the project. Test results and certificates for all items and investigations whether the tests or investigations are carried out on Site or off Site. Operating instruction for items. References for all materials and processes used in the works. References shall include origin, comprehensive description, manufacturer, supplier, copies of relevant parts of standards and specification and any other information necessary to reproduce the item.
179 AR	<i>Independent Check Certificate for Temporary Works & Structural Elements and Other Features to be Designed by the Contractor</i>
179.1 AR	<i>Independent Check Certificate for Temporary Works & Structural Elements and Other Features to be Designed by the Contractor</i> In addition to the requirements of the Conditions of Contract, the Contractor shall submit independent check certificates for the significant elements of temporary works Structural Elements and Other Features to be Designed by the Contractor. The checking organisation shall be independent of the works design organisation. The check shall be carried out by or under the close supervision of a Chartered Engineer with relevant experience. The checker may not refer to the temporary works designer's calculations in order to fulfil his/her duties. With the exception of the Contract Documents, the Independent Checker shall not be provided with any design information by the Employer. The Provision of Independent Check Certificates does not relieve the Contractor of his obligations under the Contract to provide design calculations, fabrication drawings, method statements, working drawings etc. The following elements of work require independent check certification: ☐ Traffic management ☐ Temporary Works Design A pro forma of the Independent Check Certificate for Temporary Works is given in Appendix 1/70. The Contractor shall submit Independent Check Certificates to the Engineer and the Project Supervisor Design Process a minimum of four weeks in advance of works listed above.

Clause No.	
502.2AR	<i>Excavation for Pipelines and Chambers</i> Trenches and pits shall be kept free from water until any concrete therein is sufficiently set. The Contractor shall construct any necessary sumps or temporary drains or puddle clay dams and provide all necessary pumping to keep trenches and pits free of water.
521AR	<i>Ducting, Chambers, Covers and Frames</i> The ducting and chamber construction as detailed in Appendix 5/2 and on the drawings shall be carried out by the Contractor. For this purpose, no materials, including ducting, chamber covers and frames, will be supplied free gratis by the various Public and Private Utility Companies, unless stated otherwise in the Contract.
571.1 AR	<i>Lowering of Existing Service Ducts or Cables</i> Lowering of existing services shall include for hand digging around the ducts and the undermining of the ducts to attain the level of cover required in the Contract. Temporary support to the relevant utility company's apparatus may be required. The Contractor shall liaise with all the utility companies during the works and provide any temporary supports and make good any damage caused to the ducts or cables.

946AR	<i>Resin Based Coloured Surface Treatment (Cold Applied)</i> Coloured surface treatments, made with aggregate and resin-based binders, shall consist of a film of binder sprayed on to a sound substrate and covered with aggregate to provide a coloured textured, durable matrix of the required skid resistance. The binder shall contain an epoxy or other approved resin component. When cured the binder shall comply with sub-Clause 14 of this Clause The chippings shall be crushed rock complying with BS 63: Part 2, cold or hot, as described in Table 9/2A. When determined in accordance with BS 812: Parts 113 and Part 114, the chippings shall have the minimum polished stone value and maximum aggregate abrasion value described in table 9/2A. The binder shall be mixed by a metered machine that accurately and continuously batches together the components of the binder; intimately mixing them before discharge. A control mechanism shall maintain each component within 5% by mass of the normal proportion specified by the resin manufacturer and a calibrated flow meter (or other approved means) shall be provided for each component. If the components of the binder are heated to facilitate mixing or application, the temperature shall not exceed the maximum recommended by the resin manufacturer. A temperature gauge accurate to $\pm 2^{\circ}\text{C}$ shall be used with all binders that require heating. The vessels containing the components shall each be provided with an approved method of measuring the volume of material used. The machine shall spray the binder, such that the amount collected on any longitudinal stretch of the surface 50mm wide within the width of the spray shall not be less than 90% of the overall minimum requirement for the surface being treated (see sub-clause 8 of this Clause). The mean amount of binder collected on any four adjacent 50mm wide strips shall be not less than 95% of the overall minimum requirement. Before work commences, and thereafter at intervals not exceeding one month or as otherwise required by the Employer's representative, the Contractor shall provide evidence that the sprayer and all metering gauges complies with the requirements of the Specification. If required, the test to measure the spray pattern shall be made in the presence of the Employer's representative. The surface shall be vigorously brushed to remove dust, laitance and other loose matter. Any oil visible on the surface shall be removed by washing and scrubbing with a detergent solution followed by flushing with clean water or by another
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	approved method. The surface shall be allowed to dry before application of the binder. Unless otherwise directed by the Employer's representative, existing road markings, ironwork and road studs shall be suitably masked. All existing thermoplastic road markings not required in the new road layout shall be removed by burning from the area to be surfaced. The binder shall be sprayed on to a dry surface at a rate which will vary according to the texture and porosity of the surface. On a smooth close textured surface, the amount of binder shall be not less than 1.35kg/m² or such rate specified by the resin manufacturer; on a more rugged surface a greater rate of spread may be required. Heated binders shall be allowed to cool before application of the aggregate. A mechanically metered plant shall be used to cover the binder uniformly with an excess of aggregate. Rolling of the aggregate is not permitted. Hand application of the binder, will be permitted if the Employer's representative approves the proposed methods of batching, mixing and application of binder to the road surface. Similarly, hand application of the aggregate will be permitted with the approval of the Employer's representative. The material used as masking shall be removed together with the binder sprayed upon it and the remainder of the binder allowed to cure. During the curing period no disturbance or trafficking of the treated surface will be permitted. Before opening to traffic at the end of the curing period the excess aggregate shall be removed by vacuum sweeper or other approved means. The Contractor shall have regard to the increase in cure time of the resin binder with decrease in temperature to allow sufficient time for the resin binder to cure between the end of the spray operation and the time when the road is to be opened to traffic. The resin manufacturer shall supply details of the cure time variations of the resin with respect to temperature. A check shall be made by the Contractor at the end of each working shift to determine the quantities used of each binder component. The check shall be made by means of dipsticks or other approved devices. The measured volumetric quantities of the components shall be converted to mass units to estimate the average rate of spread of binder upon the surface, by dividing the total mass of the components by the measured area of the surface treated. The net aggregate coverage rate shall also be recorded, and all details given to the
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Clause No.	
	Employer's representative. The average accuracy of batching shall be determined from the known used masses of the components. The relative proportions of components so determined shall fall within the limits specified in sub-Clause 4 of this Clause. Resin based coloured surface treatments shall have a consistent colour throughout the length of the project. The Contractor shall provide the Employer's representative with samples of the binder, from the spray bar of the sprayer, at a rate of not less than two samples for each shift worked for each 1,000 sq.m completed, whichever is the lesser. Each sample shall be poured to a depth of $3.2\text{mm} \pm 0.4\text{mm}$, into a shallow tray of a least $150\text{mm} \times 150\text{mm}$ which shall be supplied by the Contractor. The binder shall be cured, with no further mixing, at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and after 7 days tested as described in BS 2782: Part 3, Method 320A: 1976 (1986) except that the rate of grip separation shall be 5mm per minute with a tolerance of 20%. Although the test piece shall be cut to the dimensions shown in Figure 1, Method 32A, the requirement that the narrow parallel portion shall nowhere deviate by more than 2% from the mean shall be deleted. The conditioning period at $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$ shall be at least 2 hours immediately before testing takes place. The tensile strength of the specimens shall be not less than 10.5 N/mm^2 and the elongation at break not less than 30%. On completion the areas shall be swept immediately to remove all excess grit prior to trafficking.
1111AR	Footways and Paved Areas (Red and Buff Tactile Concrete Flags) Tactile concrete flags are to be provided in accordance with BS 7263, Part 1: 1994. The flags shall be Type "F 65" $400\text{mm} \times 400\text{mm} \times 50\text{mm}$ in locations as indicated and laid to an approved pattern on a bedding mortar with compressive strength more than 30 N/mm^2 to BS7533. Any mortar which has been mixed for more than two hours should be discarded unless a suitable retarder has been added.
1202.10AR	General Requirements for Permanent Traffic Signs All posts, brackets, sign frames and the reverse side of signs shall be coloured grey, unless otherwise specified.

Clause No.	
1210.9AR	Reflective Markers Where specified, the reflective markers shall be mounted on barriers including safety barriers, concrete barriers, and bridge parapet railings. The support brackets for the markers shall consist of either aluminium or steel to the dimensions shown on the drawings in the Contract. A rubber isolation pad shall be provided where two different metals are in contact. The market brackets shall be securely shot fixed to the supporting surface, and the Contractor shall submit details of the proposed fixing method to the Engineer at least 6 weeks prior to the planned commencement of the execution of these Works.
1210.10AR	Reflective Markers Reflective markers shall be mounted at a minimum height of 600-millimetre above road level. On bridge parapet railings the nearest rail above the 600-millimetre level shall be used. The alignment and levels of the post mounted reflective markers on the approaches to the barrier mounted section shall be adjusted to ensure a smooth line as viewed by drivers on the road.
1210.11AR	Reflective Markers All details relating to the reflectors shall be as specified in Clause 1210, except that a rectangular shape of equivalent area may be used.
1470AR	Inspection and testing to be carried out by the Contractor - Photometric Testing
1470.1AR	Inspection and Testing to be carried out by the Contractor - Photometric Testing The Contractor shall verify the performance after all lamps have operated for a minimum of 100 hours by taking luminance [Lux] measurements on the road surface after dark over not more than 10% of the total road length at locations to be agreed in writing by the Engineer [Specialist responsible for the design of road lighting]. The Contractor shall take a range of the representative measurements at each location chosen and record the results in an agreed format.

(ii) Substitute Clauses and Tables

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101.2 SR	Accommodation and Equipment for the Engineer
101.4 SR	Accommodation and Equipment for the Engineer
101.6 SR	Accommodation and Equipment for the Engineer
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103.1 SR	Communication System for the Engineer
104.3 SR	Standards, Quality Assurance Schemes, Agrément Certificates and Other Approvals Quality Assurance Schemes
104.5 SR	Irish Agrément Board Roads and Bridges Certificates
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104.10 SR	Provision of Information
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1421.13 SR	Underground and Ducted Cable
1421.14 SR	Underground and Ducted Cable

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1422.2 SR	Cable Joints
1422.3 SR	Cable Joints
1422.4 SR	Cable Joints
1422.5 SR	Cable Joints
1424.2 SR	Inspection and Testing to be Carried Out by the Contractor
1424.3 SR	Inspection and Testing to be Carried Out by the Contractor
1424.4 SR	Inspection and Testing to be Carried Out by the Contractor
1502.2 SR	Motorway Communications - General Requirements
1502.3 SR	General Requirements
1502.4 SR	General Requirements
1504.1 SR	Site Records
1504.2 SR	Site Records
1504.3 SR	Site Records
1505.2 SR	Cabinets and Ancillary Items
1506.3 SR	Cables
1506.4 SR	Cables
1506.5 SR	Cables
1507.4 SR	Cable Laying
1507.5 SR	Cable Laying
1507.6 SR	Cable Laying
1507.12 SR	Cable Laying
1507.13 SR	Cable Laying
1507.15 SR	Cable Laying
1507.16 SR	Cable Laying
1507.17 SR	Cable Laying
1507.18 SR	Cable Laying
1508.1 SR	Installation of Cabinets and Signal Posts
1511.2 SR	Cable Joints
1511.4 SR	Cable Joints
1511.5 SR	Cable Joints
1513.1 SR	Termination of Armoured Multi-pair Communication Cables
1513.6 SR	Termination of Armoured Multi-pair Communication Cables
1514.1 SR	Terminal Block Connectors
1518.2 SR	Cable Testing
1518.3 SR	Cable Testing
1518.4 SR	Cable Testing
1518.5 SR	Cable Testing

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1518.7 SR	Cable Testing
1518.8 SR	Cable Testing
1519.6 SR	Labelling and Numbering
1521.1 SR	Removal and Resiting of Existing Equipment
1521.2 SR	Removal and Resiting of Existing Equipment
1521.3 SR	Removal and Resiting of Existing Equipment
1521.6 SR	Removal and Resiting of Existing Equipment
1801.1 SR	Structural Steelwork - General
2203.3 SR	Anchorage and Attachment Systems for Metal Parapets for Vehicle Containment
2204 SR	Parapets - Amendment and Additions to BS 6779: Part 1: 1998
2207.1 SR	Inspection and Testing of Parapet Posts
2207.2 SR	Inspection and Testing of Parapet Posts

(ii) List of Substitute Clauses and Tables

Clause / Table / Figure No.	Title
101.1 SR	Accommodation and Equipment for the Employers Representative The Contractor shall provide, maintain, service and unless otherwise described in Appendix 1/1, remove on issue of the Defects Certificate, all accommodation including contents, access roads and hard standing thereto, as described in that Appendix, for the use of the Employers Representative.
101.2 SR	Equipment, furnishings, fittings and supplies shall be located as described in Appendix 1/1. All temporary initial accommodation shall be ready for occupation on the Starting Date and all other accommodation complete with contents, access roads and hard standing shall be ready for occupation and use by the Engineer within four weeks of the Starting Date unless otherwise stated in Appendix 1/1.
101.4 SR	Telephones shall have a separate connection direct to a telephone exchange of a telecommunication code system with privacy for conversation for the exclusive use of the Employer's Personnel. Applications to the Telephone Company for provision of telephone lines shall be made by the Contractor on behalf of the Engineer. The Contractor shall remain responsible for supply, maintenance, and removal of the internal phone system in the Engineer's office. Accounts from the Telephone Company shall be in the name of the Employer. These accounts shall be paid by the Contractor upon the Engineer's instruction.
101.6 SR	All equipment supplied by the Contractor shall be of a quality and precision appropriate to its proposed use and shall be delivered in a serviceable condition. The Contractor shall maintain all such equipment in serviceable condition and replace, if necessary, any that becomes unserviceable. The Contractor shall ensure that any equipment needing periodic calibration is calibrated on delivery, annually and at other times as and when required by the Engineer.
102.1 SR	Vehicles for the Employer's Personnel The Contractor shall provide transport as described in Appendix 1/2 for the exclusive use of the Employer's Personnel for any purpose in connection with the Works. The vehicles shall be delivered and maintained in good roadworthy condition. They shall have a current NCT Certificate where necessary, be licensed and insured for use on the public road and shall have comprehensive insurance cover for any qualified driver authorised by the Engineer together with any authorised passengers and the carriage of goods or samples. The Contractor shall provide fuel, oil and maintenance in conformity with the vehicle manufacturer's recommendations and shall clean the vehicles inside and out on a weekly basis, or more frequently where necessary. A suitable replacement shall be provided for any vehicle out of service for more than 8 working hours.

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103.1 SR	Communication System for the Employers Representative When required in Appendix 1/3 the Contractor shall provide a communication system for the Employers Representative as described therein, within 4 weeks of the Starting Date unless a different date for provision is required in Appendix 1/3.
104.3 SR	Standards, Quality Assurance Schemes, Agrément Certificates and Other Approvals Quality Assurance Schemes Where any work, goods or materials to be used in the Works are the subject of a quality management scheme or product certification scheme listed in Appendix 1/24 or 1/25 respectively only work, goods or materials conforming with such a scheme shall be used and the Contractor shall in each case provide to the Engineer a copy of the certificate of conformity affirming compliance with the scheme, unless the goods or materials bear a prescribed certification mark.
104.5 SR	Irish Agrément Board Roads and Bridges Certificates Where any work, goods or materials are required to have an Irish (or British) Agrément Board Roads and Bridges Certificate only work, goods or materials so certificated shall be used and the Contractor shall in each case provide to the Engineer a copy of the certificate. Types of work, goods and materials subject to such requirements are listed in Appendix 1/26.
104.8 SR	Provision of Information Unless otherwise specified, two copies of all information, including valid certificates, in respect of work, goods or materials proposed by the Contractor shall be supplied to the Engineer. Where the original documentation is in a language other than English, it shall be accompanied by an English translation. Information and certificates shall be supplied at least four weeks prior to the use of the work, goods or materials in the Works.
104.9 SR	When required in Appendix 1/4, three copies of detailed working and fabrication drawings, prepared by or on behalf of the Contractor shall be submitted to the Engineer.
104.10 SR	When the Contractor proposes to use a different standard, quality management scheme, product certification scheme or Agrément Certificate from that specified the Contractor shall provide all the relevant information to enable the Engineer to ascertain whether the proposal is equivalent to the specified requirement. The information shall be supplied at least 4 weeks prior to commencing the related works, to enable the evaluation of equivalence to be made, considering the programme for the Works.

Clause / Table / Figure No.	Title
105.1 SR	Goods, Materials, Sampling and Testing Goods and Materials The Contractor shall submit a list to the Employers Representative of the suppliers from whom he proposes to purchase the goods and materials necessary for the execution of the Works. Where a choice of goods or materials is listed in the Contract, the Contractor shall inform the Employers Representative of the goods or materials he proposes to use. No change in the list of suppliers and the Contractor's proposals shall be made without the consent of the Employers Representative.
105.2 SR	Sampling and Testing The testing scheduled in Appendix 1/5, including provision of the associated samples, shall be undertaken by the Contractor who shall supply to the Employers Representative, within 24 hours of the completion of each test, a copy of the results. Where ILAB accreditation is required the results shall be reported on an official ILAB test report or certificate. The following operations are not included in Appendix 1/5: (i) checking, inspecting, examining, measuring (except in connection with testing); (ii) trials and demonstrations; (iii) routine testing carried out by manufacturers and suppliers in compliance with a specified standard or specification; (iv) testing of plant. Where required in Appendix 1/5 a test certificate, complying with the provisions of the relevant standard or specification where applicable and certifying that the goods or materials have been tested and meet the specified requirements, shall be supplied to the Employers Representative by the Contractor at least four weeks prior to the incorporation of the goods or materials in the Works.
105.6 SR	The Contractor shall provide samples of goods and materials and deliver these to the Employers Representative as described in Appendix 1/6. Where required in Appendix 1/6, the Contractor shall arrange for the sampling of such goods and materials to be undertaken by testing laboratories holding ILAB accreditation to EN 45001 for such sampling. These samples shall be supplied in sufficient time for them to be tested and approved by the Employers Representative, taking into account the programme for the Works.
105.7 SR	Where testing is undertaken by a supplier or manufacturer in accordance with the Contract the Contractor shall ensure that each supplier and manufacturer will admit the Employers Representative, or his representative, to his premises at all

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	reasonable times for the purposes of inspecting, selecting the samples and witnessing the testing.
106.2 SR	Design of permanent Works by the Contractor Structures Where the Contractor is required to complete Transport Infrastructure Ireland current version of the NRA BD2 Procedure, the Contractor shall forward two copies of the completed report to the Employers Representative for acceptance.
106.3 SR	The Contractor shall submit two copies of the completed design and check certificates and drawings for each structure listed in Appendix 1/10 to the Engineer.
106.4 SR	Structural Elements and Other Features The Contractor shall design the structural elements and other features listed in Appendix 1/11 to comply with the design specifications therein. Alternatively, the Contractor may propose an element or feature designed by the manufacturer. In either case, the Contractor shall submit his proposals to the Employers Representative.
108.1 SR	Operatives for the Engineer The Contractor shall provide the Employers Representative with, and maintain continuity of, operatives equal to the tasks, and capable of performing the functions, described in Appendix 1/8.
108.3 SR	For laboratory-related duties, operatives shall be capable of assisting laboratory staff in routine tasks.
110.1 SR	Information Boards The Contractor shall, within four weeks of the Starting Date, provide and erect information boards at the locations and to the specification given in Appendix 1/21. The Contractor shall ensure that they are kept clean and maintained in a safe and legible condition and remove them on completion of the Works. The Contractor or any sub-contractor employed by him shall not erect any advertising sign on the site without the written permission of the Employers Representative.
111.1 SR	Existing Ground Levels The Contractor shall satisfy himself that the existing ground levels as described in Appendix 1/12 are correct. Work shall not proceed until the existing ground levels are agreed. Disturbance of the existing ground shall be deemed to indicate that the Contractor agrees with the levels contained in the Contract. Should the Contractor wish to dispute any levels he shall submit to the Employers Representative a schedule of the position of the levels considered to be in error and a set of revised levels. The existing ground relevant to the disputed levels shall not be disturbed before the correct levels are determined.

Clause / Table / Figure No.	Title
112.1 SR	Setting Out The Contractor shall, unless otherwise stated in Appendix 1/12, within 3 weeks of the Starting Date, carry out a check of the co-ordinates and levels of all permanent ground markers and permanent benchmarks described in Appendix 1/12 and shall supply the Employers Representative with their position and level in order that they may be checked and revised if necessary. The Contractor shall identify and bring to the attention of the Employers Representative any markers that are missing. The Contractor shall comply with any specific requirements for setting out described in Appendix 1/12.
112.2 SR	The Contractor shall keep updated schedules and drawings of all benchmarks (which shall be based on Ordnance Datum at Malin Head) used in the setting out and shall make these available to the Employers Representative when required.
113.1 SR	Programme of Works Subject and without prejudice to the Clause 4.9 of the Conditions, the programme which the Contractor submits to the Employers Representative shall comply with the specific requirements stated in Appendix 1/13.
114.1 SR	Payment Statements Subject and without prejudice to the Conditions, the Contractor shall comply with any requirements described in Appendix 1/14 concerning payment statements.
115.1 SR	Accommodation Works The Contractor shall undertake and complete the accommodation works as described in Appendix 1/15 or shown in the Accommodation Works drawings listed in Appendix 0/4 of the Specification. The Contractor shall give the Employers Representative at least ten days' notice of the date he intends to start work on individual plots, for the benefit of each owner, lessee or occupier.
116.2 SR	Public and Privately Owned Services or Supplies The Contractor shall, during the progress of the Works liaise with and take all measures required by any Statutory Undertaker or the management of other publicly or privately owned services or supplies, for the support and full protection of all such services or supplies but subject to any instructions or contrary directions by the Employers Representative. He shall keep the Employers Representative informed of such liaison and measures. No such services or supplies shall be interrupted without the written consent of the appropriate authority or owner. Where any service or supply is affected by the Works the Contractor shall provide a satisfactory alternative before interrupting the existing service or supply unless otherwise stated in Appendix 1/16.

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116.3 SR	The Contractor shall include for the programming consequences of all temporary and permanent diversions in his construction programme to the satisfaction of the Employers Representative and the Statutory Undertakers.
116.4 SR	Where privately or publicly owned services or supplies affected by the Works are subject to alteration, removal or addition, the Contractor shall be responsible for all arrangements with the owners and/or their agents for the execution and phasing of such works in accordance with his programme. Details of such work, preliminary arrangements made by the Employers Representative, and any orders already placed are given in Appendix 1/16.
116.5 SR	Where work is being undertaken on a motorway the Contractor shall take all measures required by the Road Authority for the location and protection of all cabling, ducts and other devices which form part of the motorway communications system or other systems of the road authority. Where the motorway communications system or other systems will be affected by the Works the Contractor shall ensure that an alternative system as described in Appendix 1/16 is fully operational prior to interrupting the existing systems. Any connections or disconnections to the existing systems may only be undertaken by the maintenance authority concerned. The Contractor shall be responsible for liaising, through the Employers Representative, with the maintenance authority.
117.3 SR	Traffic Safety and Management The Contractor shall, unless otherwise stated in Appendix 1/17, after consultation with the appropriate road authority and subsequently with any statutory authority concerned and An Garda Síochana, prepare and submit traffic safety and management proposals within the timescale described in Appendix 1/17 to the Engineer. These shall show the proposed traffic safety and management measures including provision of safety zones which he proposes for carrying out the Works. If stated in Appendix 1/17, the proposals shall include the provision of running lanes for the use of emergency vehicles within the Site. If required the Contractor shall make such changes to his proposals as may be necessary to meet the requirements of the Contract. Thereafter the Contractor shall furnish such details and information as may be necessitated by the Works or as the Engineer may direct.
117.5 SR	If the Contractor intends to construct central reserve crossovers as part of his traffic safety and management proposals he shall submit an outline of the proposals to the Employers Representative in advance, in accordance with the requirements of sub-Clause 3 of this Clause.
117.6 SR	The Contractor shall submit a formal application through the Employers Representative, as described in Appendix 1/17, to the appropriate authority for any

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	statutory orders required to be made or notices required to be published in connection with his traffic safety and management proposals. The Contractor shall inform the Employers Representative of details the Contractor has agreed with the road authority for traffic signs, lighting, construction, maintenance and removal of any central reserve crossovers
117.7 SR	If stated in Appendix 1/17, the Contractor shall undertake the maintenance functions described therein and to the extent there described, on the lengths of road there specified, until the issue of the relevant certificate of Substantial Completion.
117.8 SR	Nothing in this Clause 117 shall relieve the Contractor of his obligations under sub-Clause 3.6.1 of the Conditions.
117.9 SR	The Contractor shall, unless otherwise stated in Appendix 1/17, provide, erect, maintain, reposition, cover and uncover and finally remove traffic signs as necessary for the execution of the Works. In so doing, such other measures shall be taken by the Contractor as may be necessitated by the Works in accordance with any special requirements in Appendix 1/17, recommendations in the Department of the Environment Traffic Signs Manual, or other instructions of the road authority listed in Appendix 1/17. Where the circumstances of any particular situation are not covered by the recommendations or described in Appendices 1/17 or 1/18, the Contractor shall submit proposals for dealing with that situation to the Employers Representative.
117.10 SR	Traffic signs shall comply with the Department of the Environmental Traffic Signs Manual and the appropriate Clauses in Series 1200 of this Specification. The Contractor shall unless otherwise stated in Appendix 1/17 keep traffic signs clean, secure and legible and ensure that all signs required to be lit, whether by external or internal lighting, are so lit during periods when road vehicles are required to display lights.
117.11 SR	Where the Contract provides that the Contractor shall not erect, maintain or reposition traffic signs, the Contractor shall not change in any manner the permanent or temporary traffic signs without instruction from the Employers Representative and shall give such notice as is stated in Appendix 1/17 to indicate when signs should be moved compatible with the progress of the Works.
117.12 SR	All traffic safety and management measures shall be fully operational and shall have been submitted to the Employers Representative before the Contractor commences any associated work which affects the public road or the use of it.
117.13 SR	Any area of road which has been closed because of the Works shall not be re-opened until all appropriate traffic safety and management measures have been completed and the road is in a suitable condition for public use.

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117.15 SR	Temporary lighting shall be provided in accordance with Clause 1405 where required by Appendix 1/17, or by the Contractor in the execution of the Works.
117.16 SR	The Contractor shall provide and suitably sign points of entry to and exit from the Site, for vehicles and plant engaged on the Works. Such provision shall be subject to the agreement of the Employers Representative. The Contractor shall ensure that when any vehicle or item of plant is reversing within the Site on or adjacent to a road open to traffic, it does so only under the supervision of a person designated for the purpose of regulating traffic within the Site who shall be readily distinguishable from the remainder of the workforce.
117.18 SR	Where required in Appendix 1/17, the Contractor shall appoint a Traffic Safety and Control Officer who shall make all arrangements necessary for traffic safety and control, including the provision and operation of breakdown recovery vehicles where required in Appendix 1/20. The Traffic Safety and Control Officer shall have one or more nominated deputies. The Contractor shall provide the Employers Representative with the names of this Officer and his nominated deputies and with telephone numbers or details of other means by which they or one of them can be contacted at any time. Unless otherwise described in Appendix 1/17 the Traffic Safety and Control Officer or a nominated deputy shall be always on the Site when traffic management is in operation and shall be readily available to deal with matters related to traffic safety and control, including breakdown recovery vehicles where required in Appendix 1/20.
117.19 SR	If an accident or breakdown occurs on a carriageway or hard shoulder open to traffic within or in the vicinity of the Site, the Contractor and operators of recovery vehicles provided in accordance with Clause 120 shall act as requested by An Garda Síochana acting under their statutory powers.
118.2 SR	Temporary Diversions for Traffic Each temporary diversion of traffic shall be made operative in advance of any interference with the existing arrangements and shall be maintained to the standard stated in Appendix 1/18 or if no standard is so stated, in accordance with Sub-Clause 6 of this Clause. During the execution and completion of the Works, the Contractor shall provide appropriate diversion or reasonable and suitable access for each owner/ occupier of adjacent lands to enable him/her to continue operations where it is severed or flanked by the Works.
118.3 SR	Temporary Diversions for Traffic Specified by the Engineer The Contractor shall construct, maintain, remove and reinstate each temporary diversion for traffic specified in Appendix 1/18 in accordance with the details stated therein. Where stated in Appendix 1/18, the Contractor shall design each temporary

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	diversion for traffic, including any temporary structures, in accordance with the details stated therein. Unless otherwise described in Appendix 1/18, the Contractor shall remove each temporary diversion for traffic as soon as it is no longer required.
118.4 SR	Temporary Diversions for Traffic Proposed by the Contractor If the Contractor proposes to construct a temporary diversion for traffic as part of his intended traffic safety and management measures, he shall submit an outline of his proposals to the road authority and An Garda Síochana for their agreement.
118.5 SR	The Contractor shall submit a formal application to the appropriate authority for any statutory orders required to be made or notices required to be published through the Employers Representative, allowing such time as is stated in Appendix 1/18 for the orders to be made and notices to be published.
118.6 SR	The standard and siting of every temporary diversion for traffic shall be suitable in all respects for the class or classes of traffic using it, and its width shall be not less than that of the existing way except where indicated in Appendix 1/18.
118.7 SR	The Contractor shall inform the Employers Representative of any details agreed with the road authority for traffic signs, lighting, construction, maintenance, removal and reinstatement of any temporary diversion for traffic proposed by the Contractor.
118.8 SR	Nothing in this Clause 118 shall relieve the Contractor of his obligations under sub-Clause 3.6.1 of the Conditions.
122.1 SR	Progress Photographs The Contractor shall arrange, as described in Appendix 1/22, to have record photographs of the Works taken by a professional photographer.
122.3 SR	The copyright of all photographs shall be vested in the Employer and the negatives and prints shall be delivered to the Employers Representative within 4 weeks of exposure. The photographs shall not be used for any purpose whatsoever without the Employers Representative approval.
123.1 SR	Ionising Radiations Nuclear gauges or other sources of ionising radiations shall be used only where permitted or required by the Employers Representative.
123.2 SR	The Contractor shall provide, on request, to the Employers Representative a copy of the contractor's current valid licence issued by the Radiological Protection Institute of Ireland under SI 166 of the Nuclear Energy (General Control of Fissile Fuels, Radioactive Substances, and Irradiating Apparatus) Order, 1977.
123.3 SR	The Contractor shall provide, on request, to the Engineer a copy of the Contractor's "Radiation Safety Procedures", specified in Condition 2 of the RPII Licence.

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123.5 SR	The Contractor shall notify the Engineer in writing of any changes to : (i) the Contractor's RPII Licence conditions; (ii) the Contractor's Radiation Safety Procedures; (iii) the Radiological Protection Officers designated in the RPII Licence and in the Radiation Safety Procedures.
124.2 SR	Substances Hazardous to Health Hazardous substances shall only be used or generated in or about the Works where specified in the Contract or with the consent of the Employers Representative.
124.3 SR	Where any hazardous substance is so used or generated the Contractor shall: (i) identify the hazardous substance; and (ii) assess the risks created by its use; and (iii) specify the arrangements made and the resources provided to safeguard the safety and health of persons employed at the workplace against the risk posed; in his Safety Statement and bring the terms of the Safety Statement to the attention of persons employed by him and to other persons at the place of work who may be affected by the Safety Statement. The Contractor shall also provide the Employers Representative with a copy of his Safety Statement before the Starting Date.
124.4 SR	It shall be the duty of the Contractor involved in sharing a place of work with another Contractor to co-operate in implementing any safety, health, welfare and occupational hygiene provisions considered necessary and taking into account the nature of the work activities, to co-ordinate their work areas in relation to the protection from and prevention of occupational risks, and to inform each other and their respective employees or safety representatives (or both) of any risks involved in such activities. The Contractor shall provide the Employers Representative with written details of any such co-operation and/or co-ordination in relation to hazardous substances.
124.6 SR	If the Contractor proposes to use or generate any hazardous substance which has not been identified in the Safety Statement, he shall: (i) revise his Safety Statement accordingly; and (ii) put into effect any additional arrangements required to deal with the new hazardous substance as per the previous sub-Clauses; and (iii) advise the Employers Representative accordingly.
124.7 SR	The Contractor shall advise the Employers Representative of the information, instruction, training, equipment and supervision to be provided for the persons described in sub-Clause 5 of this Clause and for the Contractor's employees and any other persons with reason to enter the area in which the hazards exist, and of the

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	provisions to be made in monitoring their health. The Contractor shall provide the Engineer with written details of his proposals to prevent, control or monitor the exposure of members of the public to any substance hazardous to health used or generated in or about the Works.
124.8 SR	Where the measures referred to in this Clause necessitate the use of protective clothing or other safety apparatus by the Employer's Personnel, the Contractor shall: (i) provide the Employer's Personnel with sufficient suitable items of such protective clothing and other safety apparatus, so far as they are not otherwise supplied under Appendix 1/1; and (ii) arrange for the proper storage, maintenance and, if necessary, regular testing and replacement of the items provided to the Employer's Personnel; and (iii) arrange for appropriate training or instruction for the Employer's Personnel in the use of such items.
126.1 SR	Damage to Roadways The Contractor shall take every reasonable precaution to prevent dirt, mud or other deleterious material being dropped or spread by traffic or equipment associated with the Works on public roads or roadways which are made available for public use by the Contractor, whether such traffic or equipment is the Contractors own, his sub-contractors or his suppliers or hired by any of them. The Contractor shall clean roadways of any such dirt, mud or other deleterious materials which may be spilt or spread by traffic or equipment travelling to or from the site in connection with the Works, whether such traffic belongs to the Contractor, his subcontractors, or his suppliers. On each working day the Contractor shall employ a road suction sweeper to clean all public roads and entrances to public or private property within 500m of the site. This shall include washing. Such cleaning operations shall be carried out notwithstanding road cleaning work being carried out by the Employer or Employer's Personnel.
126.2 SR	The Contractor shall take particular care to avoid damage to roads, footpaths, grass margins and other surfaces outside of the authorised site and shall be liable for the cost of repairing, to the satisfaction of the Employers Representative, the Council, or the owner, all such damage caused by his operations. He shall take precautions to prevent spillage of diesel fuel or solvents.
126.3 SR 126.3 SR	The Contractor shall have regard to the maximum legal permissible loads for public roads in Ireland and were requested by the Employers Representative shall provide evidence of compliance regarding delivery of material to site. He shall also prohibit the use of tracked plant on road surfaces outside of the site unless suitably approved protective measures are taken to safeguard the integrity of the road surfaces.

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Cont'd	Pumping of water onto a public road or private property shall not be permitted. Heavy discharges to gullies and storm drains shall have silt traps incorporated in the temporary discharge arrangement. Any damage so caused shall be made good by the Contractor at his own expense.
127.1 SR	Safety Unless otherwise stated in Appendix 1/27, the Contractor shall be appointed PSCS in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 for the Works and any amendments thereof.
127.2 SR	Where stated in Appendix 1/27, the Contractor shall be appointed as PSDP in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 for the Works and any amendments thereof.
127.3 SR	All accidents reported under The Safety, Health and Welfare at Work (Construction) Regulations 2013 shall be reported immediately to the PSCS, PSDP and the Engineer. A copy of the subsequent written report to the Health and Safety Authority shall also be provided.
128.1 SR	Liaison Officer The Contractor shall designate one of his qualified engineering staff as a liaison officer to deal with landowners and utilities. The Liaison Officer shall attend all pre-entry meetings with landowners or occupiers together with the Engineers. These meetings with individual landowners or occupiers are intended to confirm the arrangements already agreed for temporary and permanent accommodation works.
129.1 SR	Emergency Services The Contractor shall include for the provision of a 24-hour, 7-day week emergency service from the start of construction work until Substantial Completion of the Works. This service shall ensure immediate action on the following: (i) Replacement or relocation of warning signs, lights and safety items on public roads; (ii) Repair of damaged or inadequate stockproof fencing; (iii) Restoration of water supplies or other services where interrupted or rendered inadequate; (iv) Repair work on any damaged or inadequate temporary works; (v) All repair work associated with working in public thoroughfares.
601.1 SR	Classification, Definitions and Uses of Earthworks Materials General Classification Earthworks materials shall fall into one or other of the following general classifications:

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	(i) acceptable material: material excavated from within the Site or imported on to the Site which meets the requirements of Table 6/1 and Appendix 6/1 for acceptability for use in the Works; (ii) unacceptable material Class U1 see sub-Clause 2 of this Clause: material excavated from within the Site which, unless processed so that it meets the requirements of Table 6/1 and Appendix 6/1, shall not be used in the Works; (iii) unacceptable material Class U2 as defined in sub-Clause 3 of this Clause: material excavated from within the Site which shall not be used in the Works.
601.4 SR	Where required in Appendix 6/1 unacceptable material shall be processed by mechanical, chemical or other means to render the material acceptable for use in the Works in accordance with the requirements of Table 6/1 and Appendix 6/1.
601.5 SR	Definitions Argillaceous rock shall mean shales mudstones siltstones slates and micaceous schists composed of particles of clay and silt and mica.
601.6 SR	Formation shall be the top surface of capping. Where no capping is required formation shall be the top surface of earthworks at the underside of sub-base, unless otherwise shown on the drawings in the Contract.
601.9 SR	Use of Fill Materials Materials with a soluble sulphate content exceeding 1.9g of sulphate (expressed as SO₃) per litre when tested in accordance with BS 1377: Part 3 shall not be deposited within 500mm, or as described in Appendix 6/3, of concrete, cement bound materials or other cementitious materials forming part of the Works.
601.10 SR	Materials with a water-soluble sulphate content exceeding 0.25 grams of sulphate (expressed as SO ₃) per litre when tested in accordance with BS 1377: Part 3 shall not be deposited within 500mm, or other distances described in Appendix 6/3, of metallic items forming part of the Works.
602.3 SR	General Requirements No excavated acceptable material or unacceptable material required to be processed, other than surplus to the requirements of the Contract, shall be removed from the Site unless indicated otherwise in Appendix 6/1. Material which is unacceptable only by reason of being frozen shall be retained on Site when in that condition. Where the Contractor is permitted to remove acceptable material, or unacceptable material required to be processed, from the site to suit his operational procedure, then he shall make good any consequent deficit of material arising therefrom.
602.4 SR	If any acceptable material or unacceptable material required to be processed is, where permitted by Appendix 6/1, used by the Contractor for purposes other than

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	for general fill, sufficient acceptable fill material to occupy, after full compaction, a volume corresponding to that which the excavated material occupied shall be provided by the Contractor.
602.5 SR	Acceptable material (other than Class 5A or any Class 5B material replacing Class 5A material in accordance with sub-Clause 3 of this Clause) surplus to the total requirements of the Works and all unacceptable material Class U2, and Class U1 not required to be processed or used in the Works, shall, unless indicated otherwise in Appendix 6/1, be run to spoil in tips provided by the Contractor. In the case of unacceptable material Class U2 the Contractor shall comply with any specific requirements for disposal described in Appendix 6/2.
602.6 SR	Where the excavation reveals a combination of acceptable and unacceptable materials the Contractor shall, unless indicated otherwise in Appendix 6/3, carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the Works without contamination by the unacceptable materials. Unless otherwise described in the Contract Classes of fill material required to be deposited separately shall be excavated separately without contamination by other Classes of material.
602.12 SR	Excavations for foundations and trenches shall be adequately always supported, and except where otherwise described in Appendix 6/3, shall not be battered. Where excavations are permitted to be battered, they shall be benched as described in Appendix 6/3 prior to backfilling and compaction. The additional work and materials shall be provided by the Contractor. Sheet piling and other excavation supports shall be removed as filling proceeds except where they are required in Appendix 6/3 to be left in position.
602.15 SR	The Contractor shall keep earthworks free of water including: (i) arranging for the rapid removal of water: (a) shed on to the earthworks; (b) entering the earthworks from any source; (ii) lowering and maintaining by appropriate measures, the water level in excavations, sufficiently to enable the Works to be constructed.
602.18 SR	Where materials are designated in the Contract as Class U2 hazardous material, the Contractor shall carry out any special requirements for their handling described in Appendix 6/2. Where hazardous materials are encountered during the progress of the Works, the Contractor shall make all necessary arrangements for their safe handling and disposal as Class U2 material after consultation with the Engineer and the appropriate statutory bodies.
603.2 SR	Forming of Cuttings and Cutting Slopes

Clause / Table / Figure No.	Title
	Cutting slopes or toes of cuttings shall only be undercut when required in the Contract for trench or other excavations. Such excavations shall be restricted in extent as described in Appendix 6/3 and where they require backfilling shall remain open only for the minimum period necessary, to prevent risk to the Works.
602.18 SR	Where materials are designated in the Contract as Class U2 hazardous material, the Contractor shall carry out any special requirements for their handling described in Appendix 6/2. Where hazardous materials are encountered during the progress of the Works, the Contractor shall make all necessary arrangements for their safe handling and disposal as Class U2 material after consultation with the Engineer and the appropriate statutory bodies.
603.3 SR	Except where otherwise described in Appendix 6/3, the excavation of cuttings may be halted at any stage providing at least 300 mm of material as a weather protection is left in place above the formation or above the sub-formation, subject to the requirements of Clauses 613 and 616. The Contractor shall install the permanent drainage before the bulk excavation reaches a level 300mm above formation or sub-formation. The cuttings shall be always kept well drained. The Contractor shall ensure that plant utilised in the earthwork's operation does not damage or alter the location of drainage works already constructed.
603.4 SR	Where pre-split blasting is required or permitted in Appendix 6/3, it shall comply with Clause 607 and any other requirements in Appendix 6/3. Full details of the methods and arrangements to be adopted shall be made available to the Engineer before commencement of drilling operations.
603.5 SR	Final faces of cuttings which are not to receive topsoil shall: (i) be left without scars or damage from construction plant; and (ii) to achieve a natural appearance, when the stratum permits and when pre-split blasting is not adopted, have the face left irregular within tolerances given in Appendix 6/3; and (iii) have boulders or other rock fragments that can be moved by hand without tools, removed; and (iv) where required in Appendix 6/3 have material that can be blown away by airline or water hose, having pressures no greater than those stated therein, so removed; and (v) have adequate access to enable inspection to be carried out to determine the extent of work required by this sub-Clause.
603.6 SR	Where required in Appendix 6/3, faces of cuttings which are not required to receive topsoil shall have one or more of the following measures carried out as appropriate:

Clause / Table / Figure No.	Title
	(i) Isolated patches of soft, fragmented and insecure material shall each be excavated to a depth of at least 200 mm unless other depths are stated in Appendix 6/3 and replaced as soon as practicable with concrete mix ST2 well rammed into the cleaned out void; (ii) Areas of cutting face requiring their surface to be made stable shall be trimmed back by a nominal 50 mm or other amount required in Appendix 6/3 and the resulting surface together with an area of any surrounding intact material as detailed in Appendix 6/3, shall have a suitable cement based grout or sprayed concrete, applied by pressure to form a total nominal thickness of 40 mm unless the required thickness is stated in Appendix 6/3. Where required in Appendix 6/3, reinforcement shall be fixed to the surface before application of the concrete or grout. Weep holes using approved permanent formers shall be constructed in the locations described in Appendix 6/3; (iii) Soft or insecure material interlayered with rock shall be excavated to the depth behind the face described in Appendix 6/3. The resulting cavity shall be filled with concrete mix ST2 or with masonry infill complying with the 2400 Series and provided with weep holes all in accordance with requirements in Appendix 6/3. (iv) Netting or other sheet covering as described in Appendix 6/3 or rock bolts as described in Appendix 6/10.
603.7 SR	Where required in Appendix 6/3, faces of cuttings which are to receive topsoil shall have one or more of the following measures carried out as appropriate: (i) Isolated patches of soft, fragmented, or insecure material shall be excavated and either: (a) filled by well ramming in a Class of fill with similar characteristics as the surrounding intact material; or (b) excavated and dealt with as described in sub-Clause 6(i) of this Clause; (ii) Other areas required to be made stable shall be dealt with as stated in Appendix 6/3.
603.8 SR	The concrete, referred to in sub-Clauses 6(i) and 6(iii) of this Clause, permanently exposed on the face of the cutting shall have surface features as nearly as possible matching those of the adjacent intact face. Such concrete and the grout referred to in sub-Clause 6(ii) of this Clause shall have a consistent colour as nearly as possible matching that of the adjacent intact face.
604.1 SR	Excavation for Foundations The bottom of all foundation excavations shall be formed to the lines and levels shown on the drawings in the Contract. Pockets of soft soil or loose rock shall be

Clause / Table / Figure No.	Title
	removed, and the resulting voids and any natural voids shall be filled with mix ST1 concrete (or other material as required by Appendix 6/3) except in excavations for corrugated steel buried structures when Class 6K lower bedding fill material complying with Table 6/1 shall be used. After placing of any blinding concrete shown on the drawings in the Contract, no trimming of the side faces of the excavation shall be carried out for 24 hours.
604.2 SR	The Contractor shall make good: (i) any lateral overbreak of the excavation above the bottom of the foundation greater than the net volume required for the permanent Works with material of the same Class as used for fill above structural concrete foundations to comply with Clause 611 (except that for corrugated steel buried structures Class 6K lower bedding material shall be used) or, where the excavation is too narrow to allow the compaction of earthworks materials, with mix ST1 concrete; (ii) any additional excavation at or below the bottom of foundations, including that resulting from removal of material which the Contractor has allowed to deteriorate, with mix ST1 concrete (or other material required by Appendix 6/3) except that under corrugated steel buried structures Class 6K material shall be used.
606.4 SR	Watercourses Redundant watercourses shall, where required in Appendix 6/3, be drained, and cleared in accordance with sub-Clause 2 of this Clause and material outside the existing watercourse profile excavated and dealt with as unacceptable material. The excavations shall be to the dimensions stated in the Contract and the hole filled with general or selected fills of the Class described in Appendix 6/3 complying with Table 6/1 deposited and compacted in compliance with Clause 608 and 612. Where the surface is to remain exposed it shall receive treatment, all as described in Appendix 6/3.
607.2 SR	Explosives and Blasting for Excavation Explosives shall be used in the quantities and in the manner recommended by the manufacturers. The written permission of the Engineer must be obtained for each location where the Contractor wishes to use explosives together with the written permission for the quantity and type of explosive to be used. The conditions attaching to any such permission shall be strictly adhered to. Permission will only be granted if the Contractor has satisfied the Engineer that all other methods for excavation are unsuitable. Such permission shall not in any relieve the Contractor of his liabilities or obligations under Clause 3.6 of the Conditions.
608.2 SR	Construction of Fills

Clause / Table / Figure No.	Title
	Starter layers of Classes 6B or 6C materials as described in Appendix 6/3 shall be deposited as the first layer or layers of fill above existing ground level or, if appropriate, above any ground improvement required by Appendix 6/13. Plant movement across starter layer material shall be restricted to that plant which is necessary for its deposition, spreading and compaction in compliance with this Clause and Clause 612 and any plant required to carry out any ground improvement beneath it if required by Clause 630. The Contractor shall take all reasonable measures to prevent damage to the underlying strata, which may include use of lighter spreading plant or the reduction of the number of passes of the compaction plant.
608.4 SR	Embankments and other areas of fill shall, unless otherwise required in the Contract, be constructed evenly over their full width and their fullest possible extent and the Contractor shall control and direct constructional plant and other vehicular traffic uniformly over them. Damage by constructional plant and other vehicular traffic shall be made good by the Contractor with material having the same characteristics and strength as the material had before it was damaged.
608.5 SR	Embankments and other areas of unsupported fills shall not be constructed with steeper side slopes, or to greater widths than those described in Appendix 6/3, except to permit adequate compaction at the edges before trimming back, or to obtain the final profile following any settlement of the fill and the underlying material. However, any over steepening or increase in width shall not exceed limits described in Appendix 6/3 and shall remain only for the minimum time necessary consistent with safety of the Works.
608.9 SR	The last 600mm depth of fill to sub-formation level, or formation level shall, unless otherwise required in the Contract, be carried out for the full width of embankments, or between the outer extremities of the verges in other areas of fill, in a continuous operation. The Contractor shall then continue without delay to carry out either (i) or (ii): (i) form the sub-formation or formation, all in accordance with Clauses 613 and 616, followed immediately by: (a) the construction of the full thickness of capping or sub-base as appropriate; or (b) if permitted in Appendix 6/3, the construction of a lesser thickness of capping or sub-base as described therein laid as a weather protection layer; (ii) place an additional 300 mm minimum compacted thickness of material above sub-formation level or formation level as appropriate for the full width of the filling to form a weather protection. This weather protection shall be composed of the same material as the sub-formation or formation and compacted in

Clause / Table / Figure No.	Title
	compliance with Table 6/1. The material shall be provided from the Contractor's own resources and the protection layer shall be constructed in a continuous operation.
608.11 SR	All permanent faces of side slopes of embankments and other areas of fill formed in Classes 2 or 7 cohesive materials shall, after any trimming operations, be re-worked and sealed by tracking a tracked vehicle suitable for the purpose, on the slope, or by other suitable methods.
609.1 SR	Geotextiles Used to Separate Earthworks Materials Geotextiles required as part of the Works to separate materials at locations described in Appendix 6/5 shall be manufactured from synthetic or other fibres as required therein and be in the form of thin permeable membranes.
609.2 SR	The Contractor shall provide evidence to the Engineer, before the geotextile is incorporated in the Works, that the geotextile will be sufficiently durable, when installed in contact with the materials to be separated, to maintain its integrity for at least the life period required in Appendix 6/5.
609.3 SR	Geotextiles shall be always protected against mechanical or chemical damage. Those susceptible to damage by light shall not be uncovered between manufacture and incorporation in the Works. Temporary exposure shall not exceed 5 hours.
609.4 SR	The method of selection and the required number of samples are as described in Appendix 6/5. Samples shall be taken from the consignment of geotextile to be used in the Works. Samples and test pieces cut from them shall comply with sub-Clause 7 of this Clause and test pieces shall be tested at a laboratory to prove that the geotextile meets the following criteria or other criteria described in Appendix 6/5: (i) The geotextile shall sustain a tensile load of not less than 13kN/m, when tested in any direction, determined in a wide strip tensile test carried out in accordance with BS 6906: Part 1. The characteristic strength shall be taken as the value of the strength of the material below which not more than 5% of the test results may be expected to fall. This represents the strength at 1.64 standard deviations below the mean strength; (ii) The geotextile shall have a CBR Puncture Resistance of not less than 2kN, determined in accordance with BS 6906: Part 4. The characteristic CBR puncture strength shall be taken as the value of the strength of the materials below which not more than 5% of the test results may be expected to fall. This represents the strength at 1.64 standard deviations below the mean strength;
609.4 SR contd.	(iii) The geotextile shall allow water to flow through it, at right angles to its principal plane, in either direction, at a rate of not less than 10 litres/m ² /s under a constant head of water of 100 mm, determined in accordance with BS 6906 :

Clause / Table / Figure No.	Title
	Part 3. The flow rate determined in the test shall be corrected to that applicable to a temperature of 15°C using published data on variation in viscosity of water with temperature; (iv) The geotextile shall have a size distribution of pore openings such that the mean 090, determined in accordance with BS 6906: Part 2, is between 50 microns and 350 microns.
609.7 SR	All samples and test pieces cut from them shall be maintained in a clean and dry condition, except for normal contamination and wetting during testing, and shall be retained by the Contractor in accordance with Appendix 6/5. Prior to determination of pore size and tensile strength, test pieces shall be conditioned and brought into equilibrium at a temperature of 20° ± 2°C, and a relative humidity of 65 ± 5%. The dry weight of the geotextile tested shall be quoted in g/m².
610.4 SR	Fill to Structures Where fill to structures is required to the same level on more than one side of a structural element or buried structure (except where Clause 623 applies) it shall be maintained at heights not differing by more than 250mm after compaction on opposing sides of the structural element as filling proceeds.
610.6 SR	Where required in Appendix 6/6, Class 6N and 6P material shall be shown, by means of a trial utilising not less than 20m³ of the material, deposited and compacted in accordance with this Clause, to be stable when it is trimmed to a slope of 1 vertical to 1½ horizontal, or other slope described in Appendix 6/6.
611.1 SR	Fill Above Structural Concrete Foundations Fill deposited above structural concrete foundations shall be, as shown on the drawings in the Contract: (i) Class 6N or 6P selected fill material complying with Clause 610 including compaction requirements; (ii) another class of selected fill or general fill complying with Table 6/1 deposited and compacted in compliance with Clauses 608 and 612 and in addition be subject to sub-Clauses 610.4 and 5.
612.1 SR	Compaction of Fills General Except for dynamic compaction, which shall comply with Clause 630, and unless otherwise described in Appendix 6/3, the Contractor shall carry out compaction in compliance with this Clause, as soon as practicable after deposition, on all those Classes of fill in Table 6/1 which require to be compacted.
612.6 SR	Method Compaction

Clause / Table / Figure No.	Title
	Plant and methods not included in Table 6/4 shall only be used providing the Contractor demonstrates at site trials that a state of compaction is achieved by the alternative method equivalent to that obtained using the specified method.
612.9 SR	The Contractor or the Engineer may carry out field dry density tests as described in sub-Clause 15 of this Clause on material compacted to method requirements at a frequency defined in Appendix 6/3, or when required by the Contractor or the Engineer. If the results of field tests show densities which indicate (when compared with the results of similar tests made on approved work in similar materials carried out in accordance with this Clause and Table 6/4), the state of compaction to be inadequate, then if this is due to failure of the Contractor to comply with the requirements of the Contract, the Contractor shall carry out such further work as is required to comply with the Contract.
612.12 SR	End-product Compaction The Contractor shall at least 14 working days before commencement of end-product compaction submit the following to the Engineer: (i) the values of maximum dry density and the optimum moisture content obtained in accordance with BS 1377: Part 4 using the 2.5 kg rammer method or vibrating hammer method as appropriate for each of the fills he intends to use which meet the requirements of the permitted Class or Classes (where within any Class of material the fill contains material having different maximum dry densities and optimum moisture contents the Class shall be further sub-divided, by extending the identification system, in order to monitor the compacted density); (ii) a graph of density plotted against moisture content from which each of the values in (i) above of maximum dry density and optimum moisture content were determined.
612.13 SR	Once the information contained in sub-Clause 12 of this Clause has been reviewed without objection by Engineer it shall form the basis for compaction.
612.14 SR	Fill compacted to end-product requirements shall have a field dry density, measured in accordance with sub-Clause 15 of this Clause, equal to or greater than the percentage given in Table 6/1 of the maximum dry density for the relevant Class of fill previously reviewed without objection by Engineer.
612.15 SR	The field dry density referred to in sub-Clause 14 of this Clause shall be measured in accordance with BS 1377: Part 9, except that nuclear methods shall only be used where required in Appendix 6/3. Where nuclear methods are used, the gauge shall be calibrated in accordance with BS 1377: Part 9. Use of nuclear gauges shall comply with Clause 123.

Clause / Table / Figure No.	Title
613.6 SR	Sub-formation and Capping No unprotected sub-formation which is to receive capping shall remain continuously exposed to rain causing degradation, nor be left uncovered overnight.
616.4 SR	Preparation and Surface Treatment of Formation Where required in Appendix 6/7 or where the tolerances in sub-Clause 1 of this Clause cannot be achieved in the preparation of formation in rock then one of the following shall be carried out so as to achieve the above tolerances: (i) the material shall be excavated below formation to the depth described in Appendix 6/7. The excavated material shall be processed as described in Appendix 6/7 and re-deposited and compacted in compliance with Clauses 608 and 612 and Table 6/4 Method 6 in compacted layers not greater than 250 mm thick; or (ii) where the rock surface is tabular it shall be regulated by depositing and compacting cement bound material as described in Appendix 6/7, complying with the 1000 Series, or mix ST1 concrete.
616.5 SR	The Contractor shall limit any areas of completed formation to suit the output of plant in use and the rate of deposition of sub-base. No formation of cohesive material Classes 2 and 7 shall remain continuously exposed to rain causing degradation or be left uncovered overnight.
617.3 SR	Use of Sub-formation or Formation by Construction Plant In addition to the requirements of sub-Clauses 1 and 2 of this Clause, the Contractor shall submit to the Engineer his proposals for the protection of the sub-formation or formation in areas where they are within 300 mm of the existing ground level, after topsoil has been stripped, before using construction plant or other vehicular traffic at or above sub-formation or formation.
618.2 SR	Topsoiling, Grass Seeding and Turfing Imported topsoil, Class 5B material, shall only be imported when required in Appendix 6/8.
618.3 SR	When required in Appendix 6/8 topsoil shall not be excavated from stockpiles: (i) which have been exposed to a cumulative rainfall exceeding 100mm, or other figure stated in Appendix 6/8, over the preceding 28 days; or (ii) when heavy rain is falling; or (iii) with a tracked vehicle.
618.4 SR	The areas to be grassed shall be prepared as described in Appendix 6/8 and receive one of the following treatments as described in Appendix 6/8: Treatment I: topsoiled, fertilised and seeded. Fertiliser and seed may, unless otherwise stated in Appendix 6/8 be applied by Hydraulic Mulch;

Clause / Table / Figure No.	Title
	Treatment II: topsoiled, fertilised and turfed; Treatment III: left un-topsoiled but fertilised and seeded by hydraulic mulch; Treatment IV: topsoiled and seeded, but not fertilised.
618.5 SR	Cutting slopes which are to receive Treatments I or II shall: (i) be benched where required in Appendix 6/3 to retain topsoil; (ii) unless otherwise stated in Appendix 6/8, be harrowed to a depth of 50 mm. Such harrowing shall be carried out, immediately prior to topsoiling, diagonally, at an angle between 5° to 45° to the line of the toe, measured on the plane of the slope.
618.6 SR	Topsoil in Treatment I, II and IV shall: (i) be deposited and spread to the thicknesses described in Appendix 6/8, which thickness shall be reduced where necessary to allow for any subsequent turfing required in Appendix 6/8 (it shall not be spread using a tracked vehicle, when so stipulated in Appendix 6/8); (ii) have stones and other debris removed and disposed of off Site which have: (a) dimensions greater than 100 mm equivalent diameter, unless stated otherwise in Appendix 6/8; and (b) dimensions greater than 50 mm equivalent diameter which lie within 50 mm of the surface; (iii) not have stones or other debris protruding above the surface by more than 30 mm; and (iv) immediately prior to sowing of seed, including that applied by hydraulic mulch, and before laying of turf, have: (a) its upper 50 mm thickness reduced to a fine till by use of a chain harrow or other plant producing a similar fine till; and in the case of Treatments, I and II only. (b) unless otherwise required in Appendix 6/8, fertiliser complying with sub-Clause 12 of this Clause evenly distributed and raked in, at a rate not less than 75 g per m² or another rate required in Appendix 6/8. If hydraulic mulch seeding is used such fertiliser may be incorporated in the mulch and no raking in is necessary.
618.7 SR	Seeding in Treatment I and IV shall: (i) employ a mixture of seed complying with sub-Clause 13 of this Clause; and (ii) be carried out by evenly distributing such seed at a rate of not less than 20 g/m² for side slopes of both embankments and cuttings and not less than 10 g/m² elsewhere or other rates required in Appendix 6/8; and

Clause / Table / Figure No.	Title
	(iii) be immediately followed by lightly raking, by use of a chain harrow or other suitable plant, the surface of the topsoil to cover the seeds, except that no raking is required following hydraulic mulch seeding.
618.8 SR	Turf in Treatment II shall: (i) be laid in the areas described in Appendix 6/8; and (ii) consist of Class 5C imported turf complying with Table 6/1 or, when permitted by Appendix 6/8, turf arising on Site and required to be excavated as Class 5A material; and (iii) be laid well bonded and lightly tamped and, when on slopes, be laid diagonally; and (iv) where required in Appendix 6/8 be retained in position by methods described therein; and (v) be regularly watered as necessary during prolonged dry weather.
618.9 SR	Hydraulic mulch seeding shall: (i) be applied by a process and consist of a mulch detailed in Appendix 6/8; and (ii) where required in Appendix 6/8 have, as part of the mulch, glass fibre or other material, to form a retaining agent during establishment of sward growth; and (iii) for Treatment III, have as part of the mulch, additional additives for promotion of grass growth on the material to be grassed.
618.10 SR	Except on areas not required to be mown, or to be mown three times, all as described in Appendix 6/8, areas of grass resulting from Treatments I to III and IV shall be mown twice to leave a nominal 75 mm height. The first mowing shall be carried out once the grass has reached a height of between 150mm and 200mm, the second when it has regrown to between 150 mm and 200 mm. The plant used for mowing shall comply with any requirements in Appendix 6/8. All areas shall, unless stated otherwise in Appendix 6/8, be left clear of grass cuttings following each mowing, by raking or other suitable method and arisings disposed of off Site.
618.11 SR	A selective herbicide especially formulated for the eradication of docks, thistles, ragwort and other pernicious agricultural weeds shall be applied by spot treatment spray or other efficacious method to such plants individually; the use of a spray boom will not be permitted.
618.12 SR	Fertiliser, including where permitted in Appendix 6/8 that are incorporated in hydraulic mulch, shall consist of a compound containing not less than 10% Nitrogen, 15% Phosphoric Acid and 10% Potash and samples shall be submitted to the Engineer prior to its use in the Works.

Clause / Table / Figure No.	Title
618.13 SR	Grass seed, including where permitted in Appendix 6/8 that incorporated in a hydraulic mulch shall be a tested mixture and certificates of germination and purity shall be provided before sowing, together with the names of the varieties used in the mixture. Unless otherwise required in Appendix 6/8 this shall contain the seeds listed in Table 6/5 to the proportions therein.
620.3 SR	Landscape Areas and Screening Methods Following completion of filling of landscape areas and screening mounds, Class 4 material shall where required in Appendix 6/9, be shaped as described therein.
620.4 SR	Class 4 material shall be deposited in landscape areas or screening mounds after any adjoining embankment or other area of fill has been completed. Where permitted in Appendix 6/9 and provided the embankment or other area of fill is always kept at least 1m higher than the landscape area fill, construction of such landscape area may proceed in parallel.
623.6 SR	Earthworks for Corrugated Steel Buried Structures Class 6M surround material shall be deposited and compacted uniformly on either side of the structure. The maximum difference in fill level on opposite sides of the structure shall be always no more than 250 mm unless otherwise permitted in Appendix 6/3.
623.7 SR	Class 6M surround material under the structure shall be well compacted by hand using a suitably sized pole or length of rectangular timber between the corrugations, or by another suitable method.
623.10 SR	Only that compaction plant described in sub-Clause 8 of this Clause, shall be used in the vicinity of the structure unless the depth of compacted Class 6M surround material placed above the crown of the structure is more than 1m, or one fifth of the span, whichever is the greater. The structure shall not be subjected to a surcharge greater than the depth of fill required in the Contract and permitted depth of any protection layer given in Appendix 6/3.
624.1 SR	Ground Anchorages The Contractor shall design the ground anchorages required as part of Works and listed in Appendix 1/11, in accordance with the design requirements described in Appendix 6/10. The ground anchorages shall be installed and where required in Appendix 6/10 proof loaded, in accordance with the requirements therein.
624.2 SR	Ground anchorages not forming part of the Works will only be permitted where such anchorage will not affect the Works.
626.4 SR	Gabions

Clause / Table / Figure No.	Title
	All wire shall be galvanised in compliance with BS 443 and be coated with a minimum thickness of 0.55mm of PVC for extruded coatings and 0.25mm of PVC for bonded coatings. The PVC shall be capable of resisting the effects of immersion in sea water, exposure to ultraviolet lights and abrasion, when tested for a period not less than 3000 hours in accordance with BS 2782: Part 5 Method 540B (ISO 4892).
627.1 SR	Swallow Holes and Other Naturally Occurring Cavities Infilled swallow holes and other naturally occurring cavities shall where required in Appendix 6/11 be excavated, filled and capped as described in Appendix 6/11.
627.2 SR	Open swallow holes and other shallow cavities shall where required in Appendix 6/11 be flushed, cleared of rubbish where to do so would not endanger operatives, and filled and capped as described in Appendix 6/11.
628.1 SR	Disused Mine Workings Disused mine workings shall, where required in Appendix 6/11, be investigated, inspected, monitored, cleared, flushed, filled, capped, or have any other treatment carried out, all as described in Appendix 6/11.
629.2 SR	Instrumentation and Monitoring Monitoring of instrumentation shall be carried out as required in Appendix 6/12 and the results supplied to the Engineer.
630.2 SR	Ground Improvement Dynamic Compaction Dynamic compaction shall be completed before the commencement of construction of any permanent works, or work on the placement or diversion of Statutory Undertakers equipment, within that part of the Site defined in Appendix 6/13 which contains the area to be dynamically compacted.
630.3 SR	The Contractor shall ensure that no damage or injury is caused to persons or property on or off the Site because of the dynamic compaction.
632.3 SR	Determination of Moisture Condition Value (MCV) of Earthworks Materials Where permitted in Appendix 6/1 the rapid assessment procedure for material acceptability also given in BS 1377: Part 4 may be used.
633.4 SR	Determination of Undrained Shear Strength of Remoulded Cohesive Material

Clause / Table / Figure No.	Title
	Where stated and described in Appendix 6/1, other tests may be used during construction to supplement the test described above, provided the results have been correlated to ensure compatibility.
637.1 SR	Determination of Resistivity (r_s) to Assess Corrosivity of Soil, Rock or Earthworks Materials Method of Test Where the resistivity of the ground or of material to be used in the Works is required to be determined, this shall be obtained by in situ tests as described in sub-Clause 2 of this Clause or, when required in Appendix 6/1, by laboratory tests on samples in accordance with BS 1377: Part 3.
637.3 SR	In Situ Resistivity Tests Details of the area and volume of material to be tested shall be submitted to the Engineer together with the arrangement of electrodes in each test. The Engineer shall be given notice of the date, time and location of each test so that he can arrange for attendance at each test.
637.6 SR	Where the depth of material to be tested is too great to be tested from the surface within the confines of the site, the Contractor shall undertake all necessary arrangements for testing such material, including subsequent tests which may be required at a lower-level following excavation. Details of his arrangements shall be submitted to the Engineer.
638.1 SR	Determination of Redox Potential (E_h) to Assess Corrosivity of Earthworks Materials for Reinforced Earth and Anchored Earth Structures Method of Test Where the redox potential of material to be incorporated into reinforced earth or anchored earth structures is required to be determined, this shall be obtained by in situ tests as described in sub-Clauses 2 to 6 of this Clause or, when required in Appendix 6/1, by laboratory tests on samples in accordance with BS 1377: Part 3.
638.3 SR	In Situ Redox Potential Tests Details of the area and volume of material to be tested shall be submitted to the Engineer together with the locations of the test pits.
638.4 SR	The Employers Representative shall be given notice of the date, time and location of each test so that he can arrange for attendance at each test.
638.5 SR	At each test location the tests shall be carried out in a test pit not less than 600 mm square in plan excavated to a depth given in Appendix 6/1.

Clause / Table / Figure No.	Title
639.2 SR	Determination of Coefficient of Friction and Adhesion Between Fill and Reinforcing Elements or Anchor Elements for Reinforced Earth and Anchored Earth Structures Reinforcing Elements The test shall be carried out following the procedure given in Clause 636 for the determination of the effective angle of internal friction and effective cohesion of earthworks materials except that: (i) The apparatus shall in addition include a steel block fitting closely inside the lower half of the shear box and equal in height to it less the thickness of the reinforcing element material. (The flat toothed grid fitting the bottom of the shear box is not required); (ii) The preparation of test specimens shall be as follows: Element material shall be cut to fit the interior plan shape of the shear box using enough strips of such material abutting to completely fill the interior.
639.2 SR contd.	plan area without overlap. They shall be firmly fixed to the top of the steel block so that the top face of the material is flush with the top edge of the lower half of the box and aligned so that shearing occurs in a direction parallel to the longitudinal axis of a reinforcing element. A sample of the fill material to be used in the Works, of sufficient size to carry out the tests, and within the range of moisture contents permitted in Table 6/1 for such material, shall be sieved to obtain a test sample passing the 20mm BS sieve, of sufficient quantity after compaction to fill the top half of the shear box. The top and bottom of the shear box shall be fixed together, and the test sample of the sieved fill materials immediately placed and compacted in the top half of the box as described in Clause 636.
642.1 SR	Determination of the Constrained Soil Modulus (M^*) of Earthworks Materials for Corrugated Steel Buried Structures General When required in Appendix 6/1, the constrained soil modulus M^* shall be determined from a plate loading test in accordance with BS 1377: Part 9. Three tests for M^* shall be carried out on each side of the structure, one of which is to be at the level of the maximum span unless otherwise described in Appendix 6/1.
642.4 SR	Procedure The loading test shall be carried out under a series of maintained loads. The maximum load should be such that the average pressure applied to the plate is more than 350 kN/m². The elastic modulus E_s shall be determined as the secant modulus

Clause / Table / Figure No.	Title
	between average pressures applied to the plate of 150 and 350 kN/m² in the first load cycle. A value of Poisson ratio of 0.3 shall be assumed. A second load cycle testing shall also be conducted, and the results of this test compared with the first load cycle to check that the plate was seated satisfactorily during the first load cycle. If the results of the first load cycle suggest that the plate was not seated satisfactorily, then the procedure shall be repeated at a new location. Second load cycle results shall not be used to demonstrate the adequacy of the material being tested.
1201.1 SR	Definitions, Sign Classification and Regulations For the purposes of this Specification the following definitions shall apply: (i) Prescribed Signs – Signs which are in accordance with: (a) The “Traffic Signs Manual” published by the Department of the Environment in 1996; and/or (b) The “Road Traffic (Signs) Regulations, 1997”; and any subsequent amendments of these documents (including any sign specially authorised by the Minister for the Environment & Local Government). (ii) Non Prescribed Signs – Signs, other than the above, which are: (a) Required by the Contract; or (b) Designed by the Contractor and approved by the Employer.
1201.2 SR	Sign Classification For the purposes of the Contract the following classifications apply: (i) Permanent Traffic Signs – Any of the traffic signs complying with sub-Clause 1201.1 part (i) or part (ii)(a), which will remain in position at the completion of the Works; or a traffic sign, traffic cone, cylinder or other traffic delineator to be retained by the Employer; (ii) Employer’s Temporary Traffic Signs – Any of the traffic signs specified in the Contract and complying with sub-Clause 1201.1 part (i) or part (ii)(a), which will not remain in position at the completion of the Works; (iii) Temporary Traffic Signs – Any of the traffic signs proposed by the Contractor and complying with sub-Clause 1201.1 part (i) or part (ii)(b), which will not remain in position at the completion of the Works.
1201.3 SR	Regulations Where the Contractor proposes to use Temporary Traffic Signs which are prescribed signs, he shall obtain the approval of the Engineer for their intended use and location.

Clause / Table / Figure No.	Title
1201.4 SR	Where the Contractor proposes to use Temporary Traffic Signs which are not prescribed signs, he shall obtain the approval of the Engineer for their intended design, use and location.
1202.2 SR	General Requirements for Permanent Traffic Signs Signs shall be in accordance with the requirements of the Contract.
1203.2 SR	Foundations for Permanent Traffic Signs and Signals All excavations for foundations shall be carried out in compliance with Clause 604 of this Specification.
1203.4 SR	Posts shall be supported for a minimum of 3 days after placing the concrete. Backfilling shall not take place until at least 48 hours after placing.
1205.1 SR	Location and Erection of Permanent Traffic Signs The approximate locations of Traffic Signs are described in the Contract. The exact location of each traffic sign shall be determined on site and recorded by the Employer's Personnel.
1205.3 SR	Signs erected on two or more posts shall have each post positioned so that the post centres are not more than 1525mm apart and no part of a sign shall be cantilevered by more than 610mm from a vertical post support (except on a special frame assembly e.g. H frame) unless otherwise approved by the Employers Representative.
1205.5 SR	No traffic sign shall be dismantled, resited or removed without the prior approval of the Engineer.
1206.1 SR	Covering of Permanent Traffic Signs Where it is required in Appendix 12/1 that permanent traffic signs be blanked-out or have an alternative message, the method to be adopted shall comply with the following, unless otherwise described in Appendix 12/1: (i) for plate signs: A cover plate made from 1.5 mm sheet, compatible with the underlying material, or a loose covering of a material approved by the Employers Representative, or, for covering periods of up to one year, a self-adhesive plastic film to support the temporary sign face sheeting; (ii) for other traffic signs: A loose covering of a material approved by the Employers Representative.
1206.2 SR	Cover plates shall be fixed by means of 5 mm diameter stainless steel bolts, washers and nuts complying with BS 6105 or non-ferrous rivets not more than 600 mm apart, the bolt passing through 5 mm thick and 12 mm diameter plastic distance pieces between the sign face and cover plate. Any holes remaining in the finished sign face shall be filled with rivets covered by a material approved by the Employers Representative, of a colour to match that part of the face.

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1206.6 SR	Removal of any covering shall be carried out with the minimum disturbance to traffic and only after the Employers Representative has given his approval.
1206.7 SR	Irrespective of any requirement in Appendix 12/1 to cover signs, any traffic sign erected at such a time that its legend does not relate either wholly or in part to the traffic movement and route in operation, shall have its sign face securely covered with one of the materials in 1206.1 until such time as the Employers Representative authorises its removal.
1207.1 SR	Employer's Temporary Traffic Signs Each Employer's Temporary Traffic Sign may be designated in the Contract as a Category A or a Category B type sign: (i) Category A signs shall comply with all the requirements for Permanent Traffic Signs as set out in Clauses 1202, 1203, 1204, 1205 and 1206; (ii) Category B sign face material shall, unless otherwise specified, be Class II retro reflective sign face sheet material as set out in the "Certification Scheme, Specification, and Guidance for the Construction of Traffic Signs – TS4" and shall satisfy the requirements set out in Appendix 12/1.
1207.2 SR	Employer's Temporary Traffic Signs shall also comply with the requirements of Clause 1215.
1208.2 SR	Temporary Traffic Signs The layout, size and use of these signs shall be in accordance with the Traffic Signs Manual or as otherwise approved by the Employers Representative. These signs shall be mounted and supported in a manner approved by the Employers Representative and that satisfies any specific requirements set out in Appendix 12/1.
1210.8 SR	Reflective Markers - Foundations for Posts The type and size of foundations for marker posts shall be as described in Appendix 12/2 and unless stated therein shall comply with this clause. All excavations for foundations shall be carried out in compliance with Clause 604. Unless otherwise described in Appendix 12/2 the post shall be installed centrally in 300mm diameter augured holes filled in compliance with Clause 2602 with mix ST2 concrete to within 75mm of the ground surface.
1211.6 SR	Road Markings - Temporary Road Markings Temporary road markings shall only be adopted with the prior approval of the Employers Representative and shall comply with the requirements of Appendix 12/3.
1211.7 SR	When temporary road markings are used on surfaces that will continue to be used by public traffic after its removal, any shadow trace remaining after its removal shall be permanently obliterated to the Employers Representative satisfaction. Prefabricated materials will not be permitted to be used for this obliteration.

Clause / Table / Figure No.	Title
1211.8 SR	Temporary road markings constructed from a proprietary prefabricated road marking material shall only be adopted in locations and on types of road surface as approved by the Employers Representative and shall comply with any other requirement therein. The marking material shall be new and together with any primer shall be stored and installed in accordance with the manufacturer's instructions and within the recommended shelf life. Prefabricated road markings shall only be applied to surfaces that are clean and dry. Upon removal they shall be disposed of off-site and if any making good is necessary to the road surface it shall be carried out to the Employers Representative satisfaction before the road is opened to traffic.
1212.3 SR	Road Studs – Reflective Road Studs The Contractor shall submit details of the reflecting road studs he proposes to use in the works to the Employers Representative.
1212.7 SR	Removal and Replacement of Existing Road Studs Following heating drying and removal of loose material, the base of the cavity shall be lined with 12 mm of A2 grade bitumen or otherwise as approved by the Employers Representative. The cavity shall then be filled to the level of the existing road surface with 14 mm chippings. The voids in the chippings shall then be filled with A2 grade bitumen or otherwise as approved by the Employers Representative to a level 5mm below the finished surface. The Contractor shall provide traffic safety and control measures, at sections of the roadway where cavities are not filled immediately following removal of road studs. Details of the traffic safety and control measures shall be submitted to the Employers Representative in advance. Filling of the cavity resulting from removal of the road stud shall be completed within three hours of removal of existing road studs and in no case shall cavities remain unfilled overnight.
1212.8 SR	Road studs, intended for reuse, shall be cleaned in a manner approved by the Employers Representative. Such studs shall have new inserts installed prior to installation in the road surface.
1213.4 SR	Traffic Cones, Traffic Cylinders, Flat Traffic Delineators and Other Traffic Delineators – General FTD's shall be constructed of rubber or plastic materials. It shall be possible to insert and remove blades without requiring a special tool. The height of the FTD shall be 750mm or 1000mm as approved by the Engineer. The sides of the blade shall make an angle of $10 \pm 2.5^\circ$ with its vertical axis; the width of the top of the blade shall be

Clause / Table / Figure No.	Title
	45 ± 10mm. The base shall have a maximum width measured parallel to the face of the blade of 0.75H where H is the height of the FTD and a minimum length measured at right angles to the face of the blade of 0.75H. The height of its outermost edge shall not exceed 70mm.
1213.19 SR	The Contractor shall submit to the Employers Representative a copy of a test certificate confirming that samples of the identical type of cone, cylinder, FTD or delineator as those to be used in the Works and supplied as permanent cones, cylinders, FTDs or delineators under the Contract, have been tested and found to comply with sub-Clauses 1 to 18 of this Clause.
1213.20 SR	Permanent Cones, Cylinders, FTDs and Other Delineators Where required in Appendix 1/5 the Contractor shall arrange for the tests described in sub-Clauses 22 to 56, for cones, cylinders, FTDs and other delineators, to be carried out at an approved testing laboratory. The numbers to be tested, as given in Appendix 1/5, will be selected at random by the Employers Representative from the batch to be supplied under the Contract. Failure of any test will result in rejection of the batch unless the Employers Representative directs otherwise.
1213.21 SR	Temporary Cones, Cylinders, FTDs and Other Delineators The Contractor shall submit to the Employers Representative certification substantiating that at least 1 in every 500 of any batch of cones, cylinders, FTDs and delineators to be used in temporary Works have passed the tests described in sub-Clauses 22 to 56 of this Clause as appropriate.
1215.2 SR	Temporary Signs, Signals, Road Markings and Other Delineators Employer's temporary traffic signs shall comply with this Clause in addition to the requirements of Clause 1207.
1215.3 SR	Temporary reflecting road studs shall comply with the following: (i) Clause 1212 and only be installed for periods of up to 3 months and thereupon be replaced unless otherwise agreed by the Employers Representative; or (ii) permanent reflecting road studs complying with Clause 1212 used for temporary purposes and having the Employers Representative prior approval.
1215.6 SR	Any other signal, lamp, barrier, or device shall be suitable for its intended purpose and where relevant shall comply with appropriate British Standards and shall be approved by the Employers Representative.
1215.8 SR	Any temporary covering of temporary signs shall comply with Clause 1206. Any temporary covering of road studs and road markings shall be to the approval of the Engineer and comply with any requirements described in Appendix 12/3.
1215.9 SR	Removal of temporary signs shall be carried out as soon as they become superfluous or a hazard to traffic. Methods of removal and making good shall be submitted to

Clause / Table / Figure No.	Title
	the Engineer. Making good shall be carried out immediately after removal of the traffic sign, to the satisfaction of the Engineer.
1216.3 SR	Traffic Signals – General Traffic signal equipment shall comply with the requirements and specification described in Appendix 12/5 including any amendments therein. It shall consist of control equipment including detector loops of a type which has received approval by the Minister for the Environment. They shall be maintained and serviced as described in Appendix 12/5.
1217.1 SR	Detector Loops The layout of the detector loops is described in Appendix 12/5. The exact position of detector loops shall be determined by the Employers Representative before the commencement of any associated work.
1217.13 SR	Before and after backfilling the slots, the Contractor shall measure the series resistance, the insulation resistance and the inductance of each loop circuit. In addition, the Contractor shall record on a suitable test certificate the site reference, the loop reference, the length of feeder cable on each loop circuit, the date of test, the prevailing weather conditions and ambient temperature. The results shall be submitted to the Employers Representative. (i) Series Resistance The series resistance shall be measured between the two conductors of a feeder cable comprising a loop circuit at the equipment housing. The resistance shall, unless otherwise stated in Appendix 12/5, when corrected to 20°C, be 13.7 ohms per kilometre of conductor. The measurement shall remain stable for a period of one minute with normal traffic flow over the loop in question. (ii) Insulation Resistance With the two conductors of a feeder cable comprising a loop circuit connected together, the insulation resistance between the feeder cable conductors and a good earth point shall, unless otherwise stated in Appendix 12/5, be 10 mega ohms or greater measured at a test voltage of 500 V d.c. applied for at least one minute. (iii) Inductance The inductance shall be measured at a frequency of 70 kHz $\pm$ 10% between the two conductors of a feeder cable comprising a loop circuit with no vehicles over or traversing the loop and with no other adjacent loop circuit energised. The inductance of the loop circuit shall, unless otherwise stated in Appendix 12/5, not vary by more than 20% from the theoretical value for the loop circuit.
1217.15 SR	Each feeder cable shall be labelled at its point of entry to the equipment housing, the system of identification to be agreed with the Employers Representative. The

Clause / Table / Figure No.	Title
	cable marker reference, each detector function and the physical position of each detector module inside the housing shall be shown on a drawing to be fixed to the inside of the equipment housing. The drawing shall be in the form of a self-adhesive label and comply with BS 4781.
1217.17 SR	A plan to a scale of 1:500 with detailed insets at 1:200 of each as-built loop installation shall be submitted by the Contractor to the Employers Representative. These shall be delivered within one calendar month of the issue of the relevant certificate of Substantial Completion. The drawings shall show: (i) street layout and names where applicable; (ii) cable runs and type of cable in each run; (iii) position of all joints; (iv) dimensions of loops and number of turns in each loop.
1217.24 SR	Detector Feeders - Motorways All loop cables shall be terminated in a roadside chamber using insulated crimp connectors and a ratchet type crimping tool. The whole joint shall then be encapsulated in a polymer acrylic or epoxy resin jointing system comprising a plastic joint surround. All cable ends which are left temporarily unterminated shall be sealed to prevent the ingress of water.
1218.2 SR	Pedestrian Crossings Surfacing of pedestrian crossing areas, where required, shall be laid with materials and to methods detailed in a document submitted to the Employers Representative and comply with Appendix 12/5. The finished surfacing shall have a minimum skid resistance value of 55 when tested in compliance with: (i) BS 3262 : Part 1 for thermoplastic material and prefabricated tiles; or (ii) BS 6044 for paint.
1301.2 SR	Road Lighting Columns and Brackets – General The designer and manufacturer of lighting columns and brackets proposed by the Contractor shall demonstrate adequate quality procedures and controls. The Contractor shall make provision for the design, supply and installation of all public lighting as described in Appendix 13/1. The Contractor shall where required provide designs for: (i) anchorages and attachment systems for columns with flange plates to foundation or bridge deck; (ii) foundations for columns with flange plates as described in Appendix 13/1.
1301.5 SR	Temporary lighting on Contractor's and Employers Representative's temporary diversions for traffic, and crossovers, shall comply with this Series.

Clause / Table / Figure No.	Title
1302.2 SR	Design of Lighting Columns, Brackets, Foundation, Anchorages and Attachment Systems Lighting columns and column systems shall be certified as complying with these specifications in accordance with the design and check certificate shown in Appendix 13/4 and as follows: (i) The design certificate for lighting columns (for planting or with flange plates), brackets, anchorage and attachment systems shall be completed by the manufacturer and the check certificate by an independent Checking Consultant accepted by the Employers Representative and the manufacturer. The design and check certification shall specify the range of combinations of column heights and length of brackets (taking account of orientation of bracket relative to door opening and orientation of sign) together with the weights and windage areas of lanterns for which the column has been designed and confirm that the design has been accurately transferred to the working drawings. (ii) Where lighting column designs are verified by testing as permitted in BS 5649: Part 8, a combination of calculations and testing shall be carried out as follows: (a) Fatigue life shall be verified by calculation; (b) Testing shall be in accordance with BS 5649 : Part 8 with the following modifications and instructions: Add to the end of the last sentence of Clause 4: "and UK DOT Standard BD 94". In Clause 5 substitute: "the site value for k" in place of "a k factor of 1". Add a new paragraph "The effect of the required 0.3m² sign shall be allowed for by applying a load equal to the calculated wind load of the sign oriented in accordance with Chapter 7, UK DOT Standard BD 94". Modify Clause 7(b) to read: "The temporary horizontal deflection of the lantern connection caused during the load test by the incremental load due to the horizontal forces corresponding to the value of k appropriate to the site, shall not exceed 0.06 (h+w). (See BS 5649: Part 2 as modified by UK DOT Standard BD 94 Clauses incorporated into the Specification for Road Works)". When applying Clause 7(e) the value of γ_t from Annex A shall be that of the country of origin of the column material. Delete the following text from the 4th line of Clause 8: "for k = 1.0 and". (c) The Checking Consultant shall witness the test and countersign the Annex C report unless the test is carried out by a testing laboratory acceptable to the Employers Representative.

Clause / Table / Figure No.	Title
	(iii) Any modification to a certificated design shall be subject to recertification by the manufacturer and the Checking Consultant.
1315.1(i) SR	Specification for Design Loads to BS 5649: Part 6: 1982 The Engineer evaluates a k value of 2.5 or less for the Site in accordance with the relevant reference in BS 5649: Part 6:1982 i.e. CP3: Chapter V: Part 2, when a value of 2.5 shall be used.
1801.1 SR	Structural Steelwork - General Structural steelwork shall be as described in Appendix 18/1 and the drawings referred to therein and shall comply with the requirements of this Series.
2203.3 SR	Anchorage and Attachment Systems for Metal Parapets for Vehicle Containment Only anchorages complying with 2203.1 & 2203.2 and having a current Irish Agrément Board Roads and Bridges Certificate shall be incorporated into the Works. At least 4 weeks before installation commences the Contractor shall submit to the Engineer a copy of the certificate together with copies of all documents referred to therein. Anchorages in drilled holes of an expanding type shall not be used.
2204 SR	Parapets - Amendment and Additions to BS 6779: Part 1: 1998 Clause 6.6.1 Insert additional sentence at end of clause as follows: 'The anchorage shall include an internally threaded component to receive the holding down bolt.' Clause 6.6.5 End of Note 1 insert: 'The tensile strength of concrete shall be ignored in the calculation.' Clause 9.4 9.4.2.3.5 Insert additional paragraph at end of clause as follows: 'Previous Test Reports. Copies of certified reports of destructive tests on components supplied under earlier contracts with the Overseeing Organisation shall be provided where required in Appendix 22/1. Amendment and Additions to BS 6779: Part 1: 1998 Clause 9.4 Insert additional paragraph at end of clause as follows: '(f) For all other components, including end posts, post anchorages, safety barrier connections and other components: One component for each type, unless successful destructive testing has been carried out within the last 6 months on a component of that type under another contract with the Overseeing Organisation.'
2204 SR contd.	Clause 10.1.1 Insert additional paragraph as follows: The Contractor or manufacturer shall arrange for third party certification that the new parapet Design complies with the

Clause / Table / Figure No.	Title
	requirements of this standard. The certification shall be undertaken by a body or testing laboratory in any Member State of the European Economic Area, offering suitable and satisfactory evidence of technical and professional competence and independence. The Overseeing Organisation is likely to require examining the full record of testing. Annex B Clause B 2.2e delete '9.1.3.6' and insert '9.1.2.6'.
2207.1 SR	Inspection and Testing of Parapet Posts Unless otherwise described in Appendix 22/1, the components for production posts and all completed production posts shall comply with the acceptance criteria are described in Clause 9.4.3 of BS 6779: Part 1.
2207.2 SR	Unless otherwise described in Appendix 22/1, the Contractor shall only supply parapet posts of a type which have certification for static destructive testing in accordance with Clause 9.4.3.3.6 of BS 6779: Part 1 Test certificates shall be valid for a period of six months from the date the posts were tested and certified.

(iii) List of Cancelled Clauses and Tables

Clause/ Table/ Figure Number	Title
131.2	Public Relations
612.3	Compaction of Fills

APPENDIX 0/2: CONTRACT SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES ETC.

List of Altered Clauses

Clause / Table / Figure No.	Title
117	Traffic Safety and Management
625	Crib Walling
626	Gabions
1803	Amendments and Additions to BS5400 Part 6: 1999
2104	Amendments and Additions to BS5400: Part 9: Section 9.2: 1983
2202	Metal Parapets
2203	Anchorage and Attachment Systems for Metal Parapets for Vehicle Containment
2205	Bedding Mortar
2208	Site Tests on Anchorages in Drilled Holes

List of Altered Clauses

Clause No.	Alterations to be made
117	Traffic Safety and Management 1 Insert at end of Sub Clause 1 "and the Department of Environment Traffic Signs Manual."
625	Crib Walling 1 Add to the end of Clause "and standard BD 68 of the Transport Infrastructure Ireland current version of the NRA DMRB"
626	Gabions 2 Delete "or other approved material"
1803	Amendments and Additions to BS 5400: Part 6: 1999 After 4.7.4, Paragraph 3, line 5 amendment insert. "4.7.5, Paragraph 1, line 3 Delete "but not before the rectification procedure has been approved by the Engineer".

Clause No.	Alterations to be made
1803	After 4.16 line 3 amendment insert "4.16, line 5 Delete "with the approval of the Engineer and using a procedure complying with the requirements of BS5135", insert "in accordance with the standards designated in Clause 3.1.1 and requirements specified in Appendix 18/1".
1803	After 5.5.1.3, paragraph 1 amendment, insert "5.5.2.1, Paragraph 1, line 6 Delete "by the Engineer", insert "by the Engineer". 5.5.2.1, Paragraph 3, line 3 Delete "by the Engineer", insert "by the Engineer". Page 11 5.5.2.3.2, Paragraph 1, line 4 Delete "agreed with the Engineer", insert "as specified in Appendix 18/1". 5.5.2.3.4, Paragraph 2, line 1 Delete "by the Engineer", insert "as specified in Appendix 18/1"."
1803	After Page 18 amendments insert "Page 19 Table, Notes to Table 8 Note 2 Delete "as agreed with the Engineer". "Page 20 Table, Notes to Table 8 Note 2 Delete "as agreed with the Engineer". "Page 21 Table, Notes to Table 8 Note 2 Delete "as agreed with the Engineer"."
2104	Amendments and Additions to BS5400: Part 9: Section 9.2: 1983 At the end of the Section headed 'Table 1' add:- Against 'Stainless Steel' after ')' add 'BS EN 10088' At the end of the table, in the first column add 'Stainless steel fasteners' and in the second column add 'BS EN ISO 3506' At the end of the table, in the first column add 'Welding of austenitic stainless steel' and in the second column add 'BS 7475'.
2202	Metal Parapets 2 Delete all references to: 'BS 6779 Part 1 1992' and insert 'BS 6779 Part 1'.
2203	Anchorage and Attachment Systems for Metal Parapets for Vehicle Containment Delete all references to: 'BS 6779 Part 1 1992' and insert 'BS 6779 Part 1'.

Clause No.	Alterations to be made
2205	Bedding Mortar <i>Delete text and insert: 'Bedding' Mortar shall consist of 'Conbextra HF' or equivalent 'non shrink grout'.</i>
2208	Site Tests on Anchorages in Drilled Holes <i>Delete all references in this Clause to: 'BS 6779 Part 1 1992' and insert 'BS 6779 Part 1'.</i> <i>Delete all references in this Clause to: 'BS 5080: Part 1: 1974 (1982)' and insert 'BS 5080: Part 1'.</i>

APPENDIX 0/3: List of Numbered Appendices Referred to in the Specification and Included in the Contract

This Appendix 0/3 is comprised of a list of the Numbered Appendices referred to in the Specification and included in this Contract.

Responsibility for the compilation/completion of the appendices is indicated by the following symbols:

E Employer compiles

C Contractor to compile and submit to the Employer's Representative

E/C Employer partially compiles, and Contractor completes and submits to the Employer's Representative

T/C Tenderer compiles and returns with his Tender. Post award of Contract the Contractor reviews and submits to the Employer's Representative

(P) The symbol 'P' indicates the appendix is national pro-forma and the format must not be altered.

Where a Contractor or Tenderer is required to compile or complete an Appendix, they shall do so in accordance with the TII Publication "Guidance on Specification for Works" and providing information like that stated in the sample appendices as a minimum.

Appendix 0/3 is comprised of two lists, A and B, of numbered Appendices as follows.

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

List 'B' gives a list of Contract-specific Numbered Appendices devised for this Contract.

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

Compiled/ Completed By	Appendix No.	Title	Used
		INTRODUCTION	
E	0/1	Contract-Specific Additional, Substitute and Cancelled Clauses, Tables and Figures Included in Contract	Y
E	0/2	Contract-Specific Minor Alterations to Existing Clauses, Tables and Figures included in the Contract.	Y
E	0/3	List of Numbered Appendices Referred to in the Specification and Included in Contract.	Y
E	0/4	List of Drawings in the Works Requirements.	Y
		PRELIMINARIES	
E	1/1	Accommodation and Equipment for the Employer's Representative	Y
E	1/2	Vehicles for the Employer's Personnel	Y
E	1/3	Communication System for the Employer's Representative	Y
E	1/4	Working and Fabrication Drawings	Y
E	1/5	Testing to be Carried Out by the Contractor.	Y
E	1/6	Supply and Delivery of Samples to the Employer's Representative.	Y
E	1/7	Site Extent and Limitations on Use.	Y
E	1/8	Operatives for the Employer's Representative.	Y
E	1/9	Control of Noise and Vibration.	Y
E	1/10	Principle structures to be designed by the Contractor	Y
E	1/11	Structural Elements and other Features designed by the Contractor	Y
E	1/12	Setting Out and Existing Ground Levels.	Y
E	1/13	Programme of Works.	Y
E	1/14	Monthly Statements	Y
E	1/15	Accommodation Works	Y
E	1/16	Privately and Publicly owned Services and Supplies.	Y
E	1/17	Traffic Safety and Management	Y
E	1/18	Temporary Diversions for Traffic	Y

Compiled/ Completed B	Appendix No.	Title	Used
E	1/19	Routeing of Vehicles	Y
E	1/20	Recovery Vehicles for Breakdowns	Y
E	1/21	Information Boards	Y
E	1/22	Progress Photographs	Y
E	1/23	Substances Hazardous to Health.	Y
E	1/24	Quality Management Schemes	Y
E	1/25	Product Certification Schemes	Y
E	1/26	NSAI Agrément Certificates	Y
E	1/31	As-built Records	Y
		SITE CLEARANCE	
E	2/1	List of Buildings etc, to be demolished	Y
E	2/2	Filling Trenches and Pipes	Y
E	2/3	Retention of Material Arising from Site Clearance.	Y
Not Used	2/4	Explosives and Blasting	N
E	2/5	Hazardous Materials	Y
		FENCING AND ENVIRONMENTAL NOISE BARRIERS	
E	3/1	Fencing, gates and Stiles	Y
E	3/2	Tree Protection Fencing	Y
		SAFETY BARRIERS	
Not Used	4/1	Safety Barriers	N
Not Used	4/2	Pedestrian Restraint Systems	N
Not Used	4/3	Safety Barrier Terminals	N
Not Used	4/4	Safety Barrier Maintenance	N
Not Used	4/5	Anti-Glare Screens	N
Not Used	4/6	Safety Barriers: TII Standard Construction Details	N
Not used	4/7	Vehicle Parapet Systems	N
		DRAINAGE AND SERVICE DUCTS	

Compiled/ Completed B	Appendix No.	Title	Used
E	5/1	Drainage Requirements.	Y
E	5/2	Service Duct Requirements.	Y
Not Used	5/3	Surface Water Channels and Drainage Channel Blocks	N
E	5/4	Fin Drains and Narrow Filter Drains and Geotextiles for Filter Drains	Y
Not Used	5/5	Combined Drainage and Kerb Systems	N
Not Used	5/6	Linear Drainage Channel Systems	N
E	5/7	Drainage and Service Ducts: TII Construction Details	Y
Not Used	5/8	Thermoplastic Structural Wall Pipes and Fittings	N
Not Used	5/9	Attenuation	N
		EARTHWORKS	
E	6/1	Requirements for Acceptability and Testing of Earthworks Materials	Y
E	6/2	Requirements for Dealing with Class U1 & Class U2 Unacceptable Material	Y
E	6/3	Requirements for Excavation, Deposition, Compaction (other than Dynamic Compaction)	Y
Not Used	6/4	Rock Armour	N
E	6/5	Geotextiles Used to Separate Earthworks Materials	Y
E	6/6	Fill to Structures and Fill Above Structural Foundations	Y
E	6/7	Sub-Formation & Capping & Preparation & Surface Treatment of Formation	Y
E	6/8	Topsoiling, Grass Seeding and Turfing	Y
Not Used	6/9	Earthwork Environmental Bunds, Landscape Areas, Screening Mounds, Strengthened Embankments.	N
Not Used	6/10	Ground Anchorages, Crib Walling, and Gabions	N
Not Used	6/11	Swallow Holes and other Naturally Occurring Cavities and Disused Mine Workings	N
E	6/12	Instrumentation & Monitoring	Y
Not Used	6/13	Ground Improvement	N

Compiled/ Completed B	Appendix No.	Title	Used
Not Used	6/14	Tie Bars	N
Not Used	6/15	Geosynthetic Cementitious Composite Mat (GCCM)	N
Not Used	6/16	Grouting	N
		ROAD PAVEMENTS – GENERAL	
E	7/1	Permitted Pavement Options	Y
E	7/2	Excavation & Reinstatement of Existing Surfaces	Y
Not Used	7/3	Surface Dressing	N
E	7/4	Bond Coats, Tack Coats and other Bituminous Sprays	Y
E	7/5	Road Pavement: TII Standard Construction Details	Y
E	7/6	Breaking Up or Perforation of Existing Pavement	Y
Not Used	7/7	Not Used	N
Not Used	7/8	Not Used	N
E	7/9	Cold Milling (Planing) of Bituminous Bound Flexible Pavement	Y
Not used	7/10	Microsurfacing	N
Not Used	7/11	High Friction Surfacing	N
Not Used	7/12	Low Energy Bound Mixtures	N
Not Used	7/13	Recipe Surface Dressing	N
		KERBS, FOOTWAYS AND PAVED AREAS	
E	11/1	Kerbs, Footways and Paved Areas	Y
Not Used	11/2	Access Steps	N
Not Used	11/3	Kerbs, Footways and Paved Areas: TII Standard Construction Details	N
		TRAFFIC SIGNS	
E	12/1	Traffic Signs: General	Y
E	12/2	Traffic Signs: Reflective Markers	Y
E	12/3	Traffic Signs: Road Markings and Studs	Y
Not Used	12/4	Traffic Signs: Cones, Cylinders, FTDs & Other Traffic Delineators	N

Compiled/ Completed By	Appendix No.	Title	Used
E	12/5	Traffic Signs: Traffic Signal and Detector Loops	Y
Not Used	12/6	Traffic Signs: Special Sign Requirements on Gantries	N
E	12/7	Traffic Signs: Preparation and Finish of Metal and Other Surfaces	Y
		ROAD LIGHTING COLUMNS AND BRACKET	
Not Used	13/1	Information to be Provided by the Designer for the Road Lighting Works when Specifying Lighting Columns and Brackets	N
Not Used	13/2	Column & Brackets Data Sheets 1 & 2	N
Not Used	13/3	Instructions for Completion of Column and Bracket Data Sheet	N
Not Used	13/4	Certification for Lighting Columns	N
Not Used	13/5	Road Lighting Column and Brackets: TII Standard Construction Details	N
		ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS	
E	14/1	Site Records	Y
E	14/2	Location of Lighting Units and Feeder Pillars	Y
E	14/3	Temporary Lighting	Y
Not used	14/4	Electrical Equipment for Road Lighting	N
E	14/5	Electrical Equipment for Traffic Signs	N
E	14/6	Preparation and Finish of Metal and Other Surfaces	Y
		MOTORWAY COMMUNICATIONS	
Not Used	15/1	Motorway Communications	N
		PILING AND EMBEDDED RETAINING WALLS	
Not Used	16/1	General Requirements for Piling and Embedded Retaining Walls	N
Not used	16/2	Precast Reinforced and Prestressed Concrete Piles and Precast Reinforced Concrete Segmental Piles	N
Not Used	16/3	Bored Cast in Place Piles	N

Compiled/ Completed B	Appendix No.	Title	Used
Not used	16/4	Bored Piles Constructed Using Continuous Flight Augers and Concrete or Grout Injection Through Hollow Auger Stems	N
Not used	16/5	Driven Cast-in-Place Piles	N
Not used	16/6	Steel Bearing Piles	N
Not used	16/7	Reduction of Friction on Piles	N
Not used	16/8	Non-Destructive Methods for Testing Piles	N
Not used	16/9	Static Testing of Piles	N
Not used	16/10	Diaphragm Walls	N
Not used	16/11	Hard/Hard Secant Pile Walls	N
Not used	16/12	Hard/Soft Secant Pile Walls	N
Not used	16/13	Contiguous Bored Pile Walls	N
Not used	16/14	King Post Walls	N
Not used	16/15	Steel Sheet Piles	N
Not used	16/16	Integrity Testing of Wall Elements	N
Not used	16/17	Instrumentation for Piles and Embedded Walls	N
Not used	16/18	Support Fluid	N
		STRUCTURAL CONCRETE	
E	17/1	Concrete – Classification of Mixes	Y
Not used	17/2	Concrete – Impregnation and Coating Schedule	N
E	17/3	Concrete – Surface Finishes	Y
E	17/4	Concrete – General	Y
		STRUCTURAL STEELWORK	
Not used	18/1	Requirements for Structural Steelwork	N
		PROTECTION OF STEELWORK AGAINST CORROSION	
Not used	19/1	(Specification for Works) Sheet No. Form BE/P1 (New Works) Paint System	N
Not used	19/2	(New Works) Requirements for Other Work	N

Compiled/ Completed B	Appendix No.	Title	Used
Not Used	19/3	(Specification for Works) Form BE/P2 Paint Data Sheet	N
Not Used	19/4*	(Specification for Works) Form BE/P3 Paint Sample Despatch List: Sheet 1	N
Not Used	19/4*	(Specification for Works) Form BE/P3 Paint Sample Despatch List: Sheet 2	N
Not used	19/5	(New Works) General Requirements	N
Not Used	19/6*	(Specification for Works) Form BE/PE1 (Maintenance) Paint System Sheet 1	N
Not Used	19/6*	(Specification for Works) Form BE/P1 (Maintenance) Paint System Sheet 2	N
Not Used	19/7	(Maintenance) Requirements for Other Work	N
Not Used	19/8	(Maintenance) General Requirements	N
		WATERPROOFING FOR CONCRETE STRUCTURES	
Not Used	20/2	Waterproofing for Concrete Structures	N
		BRIDGE BEARINGS	
Not used	21/1	Bridge Bearing Schedule	N
		PARAPETS	
Not Used	22/1	Parapets	N
		BRIDGE EXPANSION JOINTS AND SEALING OF GAPS	
Not Used	23/1	Bridge Deck Expansion Joint Schedule	N
Not Used	23/2	Sealing of Gaps Schedule (other than in Bridge Deck Expansion Joints)	N
		BRICKWORK, BLOCKWORK AND STONEMWORK	
E	24/1	Brickwork, Blockwork and Stonework	Y
Not Used	24/2	Brickwork, Blockwork and Stonework: TII Standard Construction Details	N
		SPECIAL STRUCTURES	

Compiled/ Completed B	Appendix No.	Title	Used
Not used	25/1	Structures to be Designed by the Contractor	N
Not used	25/2	Requirements for Reinforced Soil and Anchored Earth Structures	N
Not used	25/3	Requirements for Reinforced Clay Brickwork Retaining Walls of Pocket Type and Grouted Cavity Construction Structures	N
		MISCELLANEOUS	
E	26/1	Ancillary Concrete	Y
E	26/2	Bedding Mortar	Y
Not used	26/3	Cored Thermoplastic Node Markers	N
		WATERMAINS, UTILITIES AND ACCOMODATION WORKS	
E	27/1	Requirements for Watermains	Y
Not used	27/2	Watermains: Road Construction Details	N
		TRENCHLESS INSTALLATION OF ROAD DRAINAGE & SERVICE DUCTS	
E	28/1	Trenchless and Minimum Dig Techniques	Y
		CCTV SURVEY OF ROAD DRAINAGE SYSTEMS	
E	29/1	CCTV Survey of Road Drainage Systems	Y

LIST "B": List of Contract-specific Numbered Appendices Devised for the Works

Compiled/ Completed B	Appendix No.	Title	Used
E	1/31	As-Built Records	Y

APPENDIX 0/4: LIST OF DRAWINGS INCLUDED IN THE CONTRACT

1. Contract-specific Drawings Supplied to Each Tenderer

Refer to the Works Requirement Scoping Document (within Volume A Part A) and the Contract Drawings (within Volume A Part B) for a full list of the drawings in relation to this scheme.

2. Brought Into the Contract by Reference

- The TII Standard Construction Details contain drawings brought into the Contract by reference. Unless otherwise stated below the whole drawing is brought into the Contract.
- Irish Water's Water Infrastructure Standard Details (IW-CDS-5020-01),
- Irish Water's Code of Practice for Water Infrastructure (IW-CDS-5020-03),
- Irish Water's Wastewater Infrastructure Standard Details (IW-CDS-5030-01),
- Irish Water's Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03),
- Irish Water's Water Pipeline Specification (IW-TEC-1000-01)
- Irish Water's Technical Standard for Wastewater Gravity Sewers (IW-TEC-800-01)
- CIRIA Report 753 The SUDS Manual
- Eurocodes and standards generally.
- Guidelines for Managing Openings in Public Roads
- Council Exterior Lighting Design Requirements
- Greater Dublin Code of practice for drainage works.

APPENDIX 1/1: ACCOMMODATION AND EQUIPMENT FOR THE ENGINEER

1. Principal Office

- a. Integrated office accommodation shall be provided for separate occupation by the Employers Representative. The accommodation shall include a single entrance and messing facilities, car parking and security arrangements.
- b. The location and layout of the office shall be acceptable to the Employers Representative. The office shall be divided in a ratio of 2:1 exclusive of messing facilities and toilets and shall contain the supplies and equipment hereinafter described. The office shall be set apart from the Contractor's store and plant depot. It shall be served by roads of adequate width and have a car park for 6 cars. The roads and car park shall have a bituminous surface. The road access shall be kept clear of mud and debris and shall not be used by construction plant. Fire exit routes from the offices shall be free from steps or other obstacles and shall be constructed from paving slabs or a bituminous surface. The Contractor shall be responsible for the security of the offices.
- c. The office spaces provided for use by the Employers Representative shall include the furniture, fittings, equipment, stores, protective clothing, and surveying equipment as listed in this Appendix 1/1, for the Employers Representative's exclusive use. All telecommunication facilities provided for use by the Employers Representative, as described in this Appendix 1/1, shall be completely independent of the Contractor's facilities, to ensure privacy and confidentiality and for invoicing purposes.
- d. Complete security, privacy and confidentiality shall be ensured at all times in the rooms which shall be provided for the Employers Representative, for the Employers Representative's staff, the storeroom and for the Employers Representative's computer equipment, as described in this Appendix.
- e. The Contractor shall employ a booking system for the effective control of a shared Conference Room.
- f. The Offices for the use of the Employers Representative and his staff shall be thoroughly waterproof and shall have an adequate interior lining. All office accommodation shall comply with and be maintained to comply with the Factories Act and any other relevant legislation. They shall be adequately guarded at all times to ensure no unlawful or unauthorised entry. The Contractor shall provide for the insurance against all risks, of the contents of the offices including the property of the Employers Representative and his staff. This includes personal effects required in the normal course of duty.
- g. Non-portable buildings shall be erected on a level prepared under building consisting of brick or concrete dwarf walls founded on concrete strip footings. Floors shall not be less than 40mm above ground level and separated from the foundations by a damp-proof course linoleum or vinyl floor covering. External walls shall contain a suitable vapour barrier and a coloured oil-based paint. Headroom shall be not less than 2.25m. Ceilings shall be plasterboard covered on top with 25mm layer of glass wool insulation and finished with two

coats of white water-based paint. External doors shall be fitted with draught excluders and mortise locks. Roofs shall be watertight and covered with no less than two layers bituminous felt. All plumbing work shall be lagged.

- h. Windows to have an area of not less than 2m² for each of 10m² floor area and approximately one-third of windows to open. Storeroom door to be lockable. Sliding glass hatch to reception room to be lockable. All windows to be fitted with Venetian blinds and external security mesh. The offices shall be provided with 240-volt AC electricity supply and 13-amp socket outlets shall be provided on the basis of 1 double socket for each 5m² of office space. The offices shall be adequately provided with electric heating capable of maintaining a uniform room temperature of at least 20°C and shall be lit with electric fluorescent diffused lighting to a standard acceptable for a drawing office.
- i. The layout of the principal offices for use by the Employers Representative shall be to the satisfaction of the Employers Representative and shall provide as a minimum the dimensions for floor areas as listed in the following table:

Office	Minimum Floor Area per room (square metres)
Room for Employers Representative	20
Toilets and Shower - Men	9
Toilets and Shower - Women	9
Kitchen	5
Storeroom	3
Soils Laboratory	25
Conference Room (Shared)	25

- j. The Principal Offices for the Employers Representative shall be required throughout the Contract Period up to the issue of the Taking Over Certificate for the whole of the Works and for plus 3 months thereafter. They shall be available for occupation within 2 weeks of Works commencing on Site.
- k. Further to Clause 101.5 of the Specification all offices shall be properly cleaned and serviced at least twice per week, for so long as they are in use.
- l. The offices for the Employers Representative shall include the furniture, fittings, equipment, stores, protective clothing, surveying equipment and the like detailed in this Appendix 1/1.

2. Telecommunications: Equipment for the Employers Representative's Accommodation

- a. Internet Communications: A broadband connection with a minimum speed of 100mbps shall be installed for the sole use of the Employers Representative's staff when the phone lines are being installed.
- b. The Contractor shall supply **2 No. Apple iPhone 15 mobile telephones** (New and Unused) with minimum 256GB storage capacity for the use of the Employers Representative throughout the Contract Period and to be retained by the Employers Representative on issue of Certificate for Substantial Completion of the project. The telephones shall be supplied connected to a service provider and have full access to voice, text and internet (data) services. Each mobile telephone shall be supplied with the desk charger, in-vehicle charging adaptor, heavy duty covers and screen protectors.
- c. The Contractor will be responsible for the payment of all fees and charges associated with the mobile phones for the period of the Contract Only. On issue of the Certificate of Substantial Completion of the works the contractor will facilitate the transfer of the phone, including numbers, to the Employers Representative or their nominated party.
- d. The provision of mobile telephones shall include for connection charges and line rental. Call, text and data charges from the mobile phones the cost of which is deemed to be included in the Contractors Lump Sum price.

3. Accommodation, Furnishings and Fittings

a. Principal Office for the Employers Representative

Entrances and Hallways

- Concrete entranceway with boot scraper and washing facilities.
- Hallway with mats at main entrance door
- Provide fire extinguishers, wall mounted, to be regularly serviced.
- External sun flood lamps to hard standings with internal switch and external passive infra-red detector and time switch operation
- number sign board 1000mm x 600mm with the following in 50mm high letters.

Ballinasloe R446 Bridge Street to Harris Road Active Travel Scheme – Employer's Representative Office

- 1 number external Max-Min thermometer
- 1 number Notice Board 2m x 1m

b. Room for Project Employer's Representative

The following equipment shall be supplied for the exclusive use of the Employers Representative and his staff and shall be as described, or equivalent. The equipment listed here under will be retained by the Client on Completion of the Works.

- 2 number 2.0m x 1.8m kneehole desk with locking drawers
- 2 number padded swivel wheeled desk armchairs with arm rests
- 1 number A3/A4 HP photocopier/scanner/printer
- 1 number 2.0m x 1.2m table
- 7 number padded armchairs
- number Wastepaper basket
- number coat hooks
- 1 number glass fronted bookcase 1.5m wide x 1.0m high.
- 2 number desk lamps.
- Lockable Door
- 1 number document shredder
- 1 number first aid box
- 1 number drawing rack
- 1 number 1m2 "nobo" white boards with 1 set of 4 colour markers and erasers.
- Broadband connection for the duration of the contract
- 1 No. 19" Monitor,
- 1 No. Wireless mouse & Keyboard,

The contractor should provide for making the following available, as a shared resource, to the Employer Representative during the construction works.

- Such surveying equipment as necessary to allow the Engineers Representative to confirm the compliance of the contractors work with the Works Requirement.
- Printing A0/A1 Printing facilities
- This surveying and A0/A1 printing equipment may not necessarily be site based but accessible on reasonable notice.

c. IT Equipment

- (i) 02 number Laptop workstations (New and Unused) to Engineers Representatives approval provided for the Contract Period and to be retained by the Employers Representative on issue of Certificate of substantial completion of the whole works.
- (ii) Specification should include for the following as a minimum for each laptop as follows:
 - Official Mobile Workstation (ISR certified Mobile workstation unit).
 - Intel® Core™ i9 processor (12900HX 16core vpro 55w) or above
 - Genuine Windows® 10 Pro64 for workstations 21H2 or Win11pro64 for workstations 21H2
 - RAM: 16GB DDR5-4800 SODIMM (unit must have 4 Dimm slots to allow

for upgrade)

- Storage drive: 512GB NVMe Gen4 SSD with DRam cache (Gen4 Non volatile Memory Express solid state drive with Dram cache);
- Graphics card: Commercial CAD card with Minimum of 6gb DDR6 dedicated memory.
- ie. nVidia RTX A3000 or AMD RadeonPro W6600M.
 - RJ-45 gigabit LAN network connector (Intel 1219-LMGBE, vPro) or better
- WLAN: Intel® Wi-Fi CERTIFIED 6™ AX211 (2x2) and Bluetooth® 5.2 combo, vPro® or better
- 1 headphone/microphone combo;
- 1 SuperSpeed USB Type-A 5Gbps (with charging);
- 1 SuperSpeed USB Type-A 5Gbps ;
- 1 Mini DisplayPort™ 2.0;
- 1 HDMI 2.1;
 - Thunderbolt™ 4 with USB4™ Type-C® 40Gbps (USB Power Delivery) DisplayPort™ 1.4
- 5MP IR camera with a privacy shutter
- SD card reader
- Backlit keyboard
- 200 Smart external AC power adapter
- 95 Wh battery

Required Accessories:

- (iii) Broadband connection for the duration of the contract,
- (iv) 2 Number 23" Secondary Monitor,
- (v) 2 number Wireless mouse & wireless Keyboard,
- (vi) 1 number 16 GB USB data key,
- (vii) 1 number 1TB external Storage device,

Computer Software

- (i) 1 number Genuine Windows® 10 Professional;
- (ii) 1 number MS Project Licence;
- (iii) 1 number Microsoft Office Professional;
- (iv) 1 number Adobe Acrobat Professional Licence;
- (v) 1 number AutoCAD LT 2020 (Light Version);
- (vi) 1 number Latest Norton anti-virus, anti-spy ware, anti-spam software and firewalls with updates

Note all software licence should be stand alone and not constraint to a network or time period. The AutoCAD LT 2020 license should be for 3 years.

The contractor should provide for making the following available, as a shared resource, to the Employer Representative during the construction works;

- (vii) Such surveying equipment as necessary to allow the Engineers Representative confirm the compliance of the contractors work with the Works Requirement.
- (viii) Printing A0/A1 Printing facilities

d. Toilet & Shower

- 2 number WC suites
- 1 number toilet roll holders and supply of toilet rolls.
- 2 number bowl type urinals complete with auto flush.
- 1 number hand basins complete with taps and hot and cold-water supply.
- 2 number towel dispensers with supply of liquid soap, or supply of soap.
- 2 number wall mirrors.
- 3 number coat hooks.
- 1 number window mounted powered extractor fan.
- 1 number enclosed shower unit with hot and cold adjustable supply.
- Lockable doors.

e. Kitchen

- 1 number 4 plate electric cooker with grill and oven
- 1 number stainless steel sink with draining board, complete with cupboards and Formica worktop, hot and cold-water supply
- 1 number 'king size' waste bin complete with supply of liners

- 1 number wall mounted cupboard 2.0m long
- 1 number base unit 2.0m long with drawers and cupboards completed with Formica worktop 3.5m long.
- 1 number electric water urn, with filling facilities
- Supply of tea, coffee, milk, and sugar (replenished as required)
- 1 number 2 litre electric kettle with automatic switch-off
- 1 number filter coffee maker
- 10 cups and saucers
- 6 plates
- Crockery, cutlery, and cooking utensils for 5 persons as required by the Employers Representative
- Supply of towels and cleansing materials (replenished and laundered when required)
- 1 number refrigerator of approved make and type.
- 1 number 600-watt microwave with turntable
- 1 number fire extinguisher (dry powder)
- 1 number fire blanket
- 1 number window mounted powered extractor fan.
- 1 number hard broom
- 1 number soft brush
- 1 number dustpan and hard brush
- 1 number floor mop and galvanised bucket
- 1 number 1.5m x 1.5m table
- 4 chairs

f. Storeroom

- Timber racks to hold surveying equipment.
- 2 number lockable steel cabinets 1.0m wide and 2.0m high with shelving
- 10 linear metres of 225mm x 25mm shelving
- Clothes drying rack with tubular heater and 6 number coat hooks.
- Lockable door

g. Conference Room

- 1 number conference table 4m x 2 m free-standing
- 12 number padded chairs
- 8m² of framed cork or strawboard mounted on wall 1.0 metre above floor.
- 1 number wastepaper basket
- 6 number coat hooks
- Floor covering of heavy-duty linoleum or other approved material.
- 1 number window mounted powered extractor fan.

- 1 number white 'nobo' board for writing 2m2 in area.

h. Schedule of Surveying and Other Equipment

The following equipment shall be supplied for the exclusive use of the Employers Representative and his staff and shall be as described, or equivalent. The equipment listed here under will be retained by the Client on Completion of the Works. The Contractor shall be responsible for the supply of labour and materials for cleaning and maintaining the equipment throughout the period of the Contract:

- 50 metre measuring fibron tape
- 0.9 metre spirit levels
- Flashlights with batteries - replaced as required.
- Maximum and minimum thermometers in weatherproof case
- Infra-red thermometer as specified by the Employers Representative
- Wellington Boots with steel toe cap and mid-sole (2 pairs)
- Metatarsal Safety Boots to EN 345 (S3 H1 HR0 SRC) with steel toe cap and mid-sole (2 pairs)
- Thermal Jackets - or detachable linings for (d) below (2 number)
- Waterproof Over trousers (2 pairs)
- Safety helmets with comfort band chin straps and detachable ear defenders (2 Number)
- Industrial Gloves (12 pairs)
- High visibility vests to BS 6629: Class 'a': Appendix G Plus (6 number)
- Seaboot stockings (10 pairs)
- Safety glasses/goggles (6 pairs)
- Waterproof Bomber Jacket – high visibility to BS6629: Class 'A' Appendix G Plus (2 number)

APPENDIX 1/2: VEHICLES FOR THE EMPLOYERS REPRESENTATIVE

1. The following specification fulfils the vehicle requirements for the Works.
2. Vehicles shall be new, of a conspicuous colour agreed with the Employer's Representative, and fitted with fire extinguisher, heater and demister, magnetically attachable hazard flashing unit with bulbs, heavy duty suspension, spare wheel, fuel filler cap lock, bonnet lock and spare wheel lock, internal and external mirrors, mud flaps, floor mats front and rear, sun visors, gearbox covers, tow rope, towing hooks front and rear, laminated windscreen, and rear wash/wipe.
3. Vehicles shall be provided for the exclusive use of the Employer's Representative at all times. The Contractor shall indemnify the Employer, the Employer's Representative, his representatives and their respective staff authorised to drive the vehicles against claims in respect of damage to vehicles including claims from passengers. The vehicles shall be cleaned inside and outside once per week.
4. The vehicles shall be free from markings identifying any Company associated with this Contract.
5. The vehicles shall be provided for the duration of the Contract and up to 8 weeks after the issue of the Certificate of Substantial Completion of the Works.
6. All vehicles shall be licenced for use on the public road and shall have comprehensive insurance cover for social, domestic, commuting and business use for any qualified driver authorised by the Employer's Representative, together with any authorised passengers and the carriage of goods or samples.
7. The Contractor shall provide fuel, oil and maintenance in conformity with the manufacturer's recommendations. A suitable replacement shall be provided for any vehicle out of service for more than 24 hours.
8. The Contractor shall ensure that fuel is provided for the vehicle for the duration of the Works and up to 8 weeks after Substantial Completion of the Works to the satisfaction of the Employer's Representative.
9. The following vehicles of EU manufacture shall be provided:

Type	Number Required	Period Required
Vehicle Type "B", new and unused. The vehicle is to have seating for 2 people. Short wheelbase vehicle, Ford Focus or equivalent approved of engine capacity not less than 1500cc, power steering, hard top and side windows. To include for all consumables such as fuel and toll charges, and to be available for use by Employers Representative outside of the Contract Works. First Aid Box/Kit	02	Contract Duration and up to 3 months after the issue of the Certificate of Substantial Completion of the Works. Vehicles to be made available within 2 weeks of Contract Date.

APPENDIX 1/3: COMMUNICATION SYSTEMS FOR THE EMPLOYER'S REPRESENTATIVE

1. See Appendix 1/1 for requirements.

APPENDIX 1/4: WORKING AND FABRICATION DRAWINGS

1. Whenever required by the Employer's Representative, the Contractor shall supply calculations, test reports, data sheets, etc. in support of his detailed working and fabrication drawings. Such documents shall remain the property of the Employer's representative.
2. The Contractor shall submit three copies of all relevant documents to the Employer's representative at least two weeks in advance of the date on which the Contractor proposes to commence such works.
3. All drawings shall be supplied by the Contractor in AutoCAD 2018 and Civil 3D where applicable and requested by the Employer's Representative or another format acceptable to the Employer's Representative. Three printed paper copies of each drawing shall also be provided.
4. Drawings shall be to an appropriate scale and standard and in sufficient detail to enable the Employer's representative to assess the Contractors proposals.
5. The Contractor shall provide the following working and/or fabrication drawings to the Employer's Representative as a minimum:
 - a. Accommodation for the Employer's Representative
 - b. Traffic Management Proposals as required by the Contract.
 - c. Temporary Works
6. The Contractor shall engage fabricators and precast Specialists as necessary to deliver fabrication drawings to the Employer's Representative for items as listed.

APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE CONTRACTOR

GENERAL

1. Tests comparable to those specified in this Appendix shall be necessary for any equivalent work, goods or materials proposed by the Contractor.
2. Tests carried out by the Contractor to demonstrate compliance with the Specification, shall be carried out in a suitably accredited laboratory.
3. Unless otherwise shown in this Appendix 1/5 of the Specification, tests for work, goods or materials as scheduled under one clause are required for all such work, goods or materials in the Works.
4. Unless otherwise shown in this Appendix 1/5 of the Specification, test certificates for work, goods or materials as scheduled under any one Clause shall be required for all such work, goods or materials in the execution and completion of the Works.
5. The scope of the testing covered in Appendix 1/5 should not be regarded as exhaustive. Routine tests carried out by manufacturers and suppliers in compliance with an Irish or British Standard or other standard or specification are not included but where a standard or specification makes provision for a test certificate this is indicated in the Appendix 1/5.
6. The schedule of tests for the Contract should be completed by selecting the tests and data from Appendix 1/5. Different frequencies and additional tests should be included as appropriate. Where the frequency of testing in Table NG 1/1 is given by reference to a Clause in the TII Specification for Road Works (SPW), the frequency requirements of the Clause should be repeated in full in Appendix 1/5.
7. (IL) indicates that an Irish Laboratory Accreditation Board (ILAB) test report or certificate shall be required. (IAB) indicates that an Irish Agreement Board Certificate or British Agreement Board Certificate shall be required.
8. Tests carried out by the Contractor to demonstrate compliance with the Specification shall be carried out by a laboratory approved by the Employer.
9. 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).
10. (IL) indicates that an INAB test report or certificate is required.
11. (IAB) indicates that an Irish Agreement Board Certificate, or British Agreement Board Certificate, is required.
12. Unless otherwise shown in this Appendix tests for work, goods or materials as

scheduled under any one Clause are required for all such work, goods or materials in the Works.

13. Cube strength tests are not required for concrete complying with Clause 2602.
14. 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.
15. Tests carried out by the Contractor to demonstrate compliance with the Specification shall be carried out by 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.
16. In addition to the testing requirements in this Appendix, the Contractor will nominate one of the Contractor's Personnel to take samples as instructed by the Employer's Representative and in accordance with the sampling frequency and requirements outlined in Appendix 1/6. The individual proposed by the Contractor shall be competent as a sampling operative. The ability of the nominee to carry out sampling duties will be subject to assessment by the Employer's Representative.
17. The tables on the following pages give the minimum frequency of testing to be carried out by the Contractor to demonstrate compliance with the Specification. Testing shall be carried out immediately after sampling and results shall be passed to the Employer's Representative on completion of testing.
18. The Contractor shall carry out additional testing as and when instructed by the Employer's Representative.

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 300					
306	Permanent fencing				Quality management scheme applies
	Concrete components	Cover to reinforcement	1 per consignment (maximum 1 per 100 components)		
308	Gates and Stiles				Quality management scheme applies
	Reinforced concrete posts	Cover to reinforcement	1 per consignment (maximum 1 per 100 components) (BS 3470)		
310	Environmental Noise Barriers				
	Post Foundations	Load test on site	As required in Sub-Clause 310.29		Evidence of design calculations required
		Deflection test on site	As required in Sub-Clause 310.28		
	Preservation of Timber	Moisture Content	As required in sub-clause 310.14	Required	Quality management scheme applies
	Vandal resistance	Destruction testing	As required in Appendix 3/2		See sub-clause 310.11
311	Preservation of timber	Moisture content	As required in sub-Clause 311.2	Required for each batch	Quality management scheme applies

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 400					
407	Anchorage in drilled holes	On-site tensile load test	10%	Required	
	Road restraint system	As required by the system manufacturer	As required by the system manufacturer		As required by the system manufacturer
	Ground Conditions	In situ testing (sub-Clause 407.6 & 7)	As required by sub-clause 407.7.		
	Metal parapets			Required (BS 6779 Part 1)	Quality management scheme applies
	Welding for parapets	Welding procedures (Manufacturer's tests)	(Every 7 years)		
		Welder qualification (Manufacturer's tests)	(Every 2 years)	Required	
		Production testing (Manufacturer's tests)			
	Welded joints for parapets	Destructive testing			
	Parapet posts	Production testing as specified in BS 6779: Part 1: 1992 (Manufacturer's tests)		Required	Certification in accordance with Clause 2207 is required
	Anchorage in drilled holes for parapets	Loading test on Site	10%		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments		
Series 500							
501	Pipes for drainage and service ducts						
	Vitrified clay		[See Note A]		Product Certification Scheme applies		
	Concrete – PC/SRC	Not exceeding 900mm dia		[See Note B]			
	Concrete- Pre-stressed						
	Iron - Cast						
	Iron Ductile		[See Note B]				
	UPVC						
	Plastics (see Table 5/1)						
	Corrugated steel		(Manufacturer's tests)	Required (AASHTO)	[Note A: Additional manufacturer’s tests are provided for in the relevant standard but should normally not be required.]		
	Corrugated steel bitumen protection						
	Concrete PC/SRC exceeding 900mm dia		(Manufacturer's tests)	As per Clause 509.10		Required	[Note B: Certificates are provided for in the relevant standard but should normally not be required except for pipes which are not quality marked in accordance with relevant standard.]
	Other materials					Required	
						NSAI Agrément Certificate or equivalent required	
503	Pipe bedding						

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
		Grading and fines content (Washing and sieving method to be used)	1 per week(min of 3)	Required	<i>[Results of routine control tests from the factory production control system operated by the producer to be provided – see Annex C of IS EN 13242.]</i>
		Water Soluble Sulphate (WS) content (IN)	5 per source		
		Resistance to fragmentation (IL)	1 per source		<i>[LA Category]</i>
505	Filter medium backfill				
		Plastic index (IL)	1 per source	Required	<i>[Results of routine control tests from the factory production control system operated by the producer to be provided – see Annex C of IS EN 13242]</i>
		Grading and fines content (Washing and sieving method to be used)	1 per 500 tons		<i>[Results of routine control tests from the factory production control system operated by the producer to be provided – see</i>

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
		Water Soluble Sulphate (WS) content (IL)	5 per source		<i>Annex C of IS EN 1324.]</i>
		Resistance to fragmentation (IL)	1 per source		<i>[LA Category]</i>
506	Sealing existing drains				
	Concrete				
	Grout				
507	Chambers				
	Precast concrete				Product certification scheme applies
	Corrugated galvanised steel	(Manufacturer's tests)		Required	Product certification scheme applies
	Manhole steps				Product certification scheme applies
	Steel fitments				
	Covers, grates and frames				Product certification scheme applies
	Cover bolts				Quality management scheme applies
508	Gullies and pipe junctions				Product certification scheme applies
	Precast concrete				
	Cast iron and steel				

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
509	Watertightness of joints	Air test	All pipelines with watertight joints <i>[As required in Appendix 5/1 for partly watertight joints]</i>	Required	
512	Backfill to pipe bays	Grading	1 per 50 tons (min of 3)		
		Water Soluble Sulphate (WS) content (IL)	5 per source		
513	Permeable backing to earth retaining structures				
	Granular Material	Piping Ratio (as Cl 513)	1 per 100 tons (min of 3)		
		Permeability (as Cl 513)			
	Precast hollow concrete blocks	(Manufacturer's tests)		Required	
514	Fin Drains	(Manufacturer's tests)		Required	INAB (or equivalent) certification applies
515	Narrow Filter Drains				
	Geotextile, pipes and fittings	(Manufacturer's tests)		Required	INAB (or equivalent) certification applies
	Granular fill	Plastic Index (IL)	1 per source	Required	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
			Resistance to fragmentation (IL)			
			Water soluble sulphate (WS) content (IL)	5 per source		
			Oxidisable sulphides (OS) content and total potential			
			sulphate (TPS) content (IL)	1 per week (min of 3)	Required	[Results of routine control tests from the factory production control system operated by the producer to be provided – see Annex C of IS EN 13242.]
			Grading and fines content			
			Permeability (IL)	1 per source		
516	Combined drainage and kerb systems		Load test	A minimum of 1 test per 1000m for each type and source	Required	Certification that the system complies with Clause 516 is required [Quality mark in accordance with relevant standard or equivalent applies]
			(Manufacturer's tests)		Required	

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
517	Linear drainage systems	Load test	A minimum of 1 test per 1000m for each type and source	Required	Certification that the system complies with Clause 517 is required <i>[Quality mark in accordance with relevant standard or equivalent applies]</i>
518	Thermoplastic structured wall pipes and fittings	(Manufacturer's tests)		Required	INAB (or equivalent) certification applies
519	Geotextiles for filter drains	(Manufacturer's tests)	1 per source	Required	Certification that the system complies with Clause 519 is required <i>[Quality mark in accordance with relevant standard or equivalent applies]</i>

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
601	Acceptable material					
631 to 633	Class	General Description				
635 to 637	1	General granular fill	Grading	1 test per 1,000m ³ for each source	Required	
640			Uniformity Coefficient	1 test per 1,000m ³ for each source		
			MCV	As Required		

Clause	Work, Goods or Material			Test	Frequency of Testing	Test Certificate	Comments
				MC	1 test per 1,000m ³ for each source		
				1C only LA Coefficient (IL)	1 test per 1,000m ³ for each source (min of 2 total per source)	Required	
		2	General cohesive fill	Grading	1 test per 1,000m ³ for each source	Required	
				Plastic Limit	1 test per 1,000m ³ for each source		
				MC	1 test per 500m ³ for each source		
				MCV	1 test per 500m ³ for each source		
				Undrained Shear Strength	1 test per 1,000m ³ for each source (min of 2 total per source)		
				Effective Angle of Internal Friction and Effective Cohesion	1 test per 1,000m ³ for each source (min of 2 total per source)	Required	
				Grading (IL)	1 test per 2,000m ³ for each source		
601 631 to 633 635 to 637 640 (Cont'd)				MC (IL)	1 test per 1,000m ³ for each source	Required	

Clause	Work, Goods or Material			Test	Frequency of Testing	Test Certificate	Comments
				MCV (IL)	1 test per 500m ³ for each source*		
				5 Topsoil	Grading	1 test per 500m ³ (min of 1 per day during topsoiling works)	Required
				6 Selected granular fill			Class 6 testing to be reviewed by Engineer and frequencies varied as necessary to provide confirmation that materials and material sources provide results that are consistently compliant
				(Class 6A, 6B & 6C)	Grading	1 test per 1,000m ³ for each source	
					Uniformity Coefficient	1 test per 1,000m ³ for each source	
					Plastic Limit (IL)	1 test per 2,000m ³ for each source	
					LA Coefficient (IL)	1 test per 1,000m ³ for each source (min of 2 total per source)	
				(Class 6C Only)	Moisture Content (IL)	1 test per 2,000m ³ for each source	
601				(Class 6A & 6C Only)	Slake Durability (IL)	1 test per 1,000m ³ for each source (min of 2 total per source)	
631 to 633 635 to 637 640 (Cont'd)				(Class 6F1, 6F2)	Grading	1 test per 500m ³ for each source	

Clause	Work, Goods or Material				Test	Frequency of Testing	Test Certificate	Comments
				& 6F3)	Optimum MC (IL)	1 test per 500m ³ for each source		
					MC	1 test per 500m ³ for each source		
					LA Coefficient (IL)	1 test per 1,000m ³ for each source		
					Slake Durability (IL)	1 test per 1,000m ³ for each source		
					Total Sulfur Content (IL)	1 test per source (source approval)		
					Class RA (asphalt) content (IL)	2 per source		
					Bitumen Content (IL)	2 per source		
				(Class 6G)	Grading	1 test per 250m ³ for each source (min of 2 total per source)		
					LA Coefficient (IL)	1 test per 500m ³ for each source (min of 1 total per source)		
601 631 to 633 635 to 637 640				(Class 6H Only)	Grading	1 test per 200m ³ for each source		
					Plastic Limit (IL)	1 test per 500m ³ for each source		

Clause	Work, Goods or Material				Test	Frequency of Testing	Test Certificate	Comments
(Cont'd)					LA Coefficient (IL)	1 test per 200m ³ for each source		
					MC (IL)	1 test per 200m ³ for each source		
					MCV (IL)	1 test per 200m ³ for each source		
					pH Value (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Chloride Ion Content (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Water soluble sulfate content (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Oxidisable sulfides (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Resistivity (IL)	1 test per source (source approval)		
					Redox Potential (IL)	1 test per source (source approval)		

Clause	Work, Goods or Material				Test	Frequency of Testing	Test Certificate	Comments
601 631 to 633 635 to 637 640 (Cont'd)				(Class 6I & 6J Only)	Grading	1 test per 200m ³ for each source		
					Uniformity Coefficient	1 test per 500m ³ for each source		
					MC (IL)	1 test per 200m ³ for each source		
					MCV (IL)	1 test per 200m ³ for each source		
					Effective Angle of Internal Friction and Effective Cohesion (IL)	1 test per 200m ³ for each source (min of 1 test per week)		
					Coefficient of friction and adhesion (IL)	1 test per source (source approval)		
					pH Value (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Chloride Ion Content (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Water soluble sulfate content (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per		

Clause	Work, Goods or Material				Test	Frequency of Testing	Test Certificate	Comments
						week)		
					Oxidisable sulfides (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Resistivity (IL)	1 test per source (source approval)		
601 631 to 633 635 to 637 640 (Cont'd)					Redox Potential (IL)	1 test per source (source approval)		
					Organic Content (IL)	1 test per source (source approval)		
					Microbial Activity (IL)	1 test per source (source approval)		
					LA Coefficient (IL)	1 test per 200m ³ for each source		
					Slake Durability (IL)	1 test per 500m ³ for each source		
				(Class 6K, 6L & 6M)	Grading	1 test per 200m ³ for each source		
					Plastic Limit (IL)	1 test per 500m ³ for each source		
					Resistivity (IL)	1 test per source (source approval)		

Clause	Work, Goods or Material				Test	Frequency of Testing	Test Certificate	Comments
					Water soluble sulfate content (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Oxidisable sulfides (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Chloride Ion Content (IL)	Source approval and 1 test per 500m ³ for each source		
					pH Value (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
601 631 to 633 635 to 637 640 (Cont'd)				(Class 6K & 6M Only)	Uniformity Coefficient	1 test per 500m ³ for each source		
					Optimum MC (IL)	1 test per 200m ³ for each source		
					MC (IL)	1 test per 200m ³ for each source		
					MCV (IL)	1 test per 200m ³ for each source		

Clause	Work, Goods or Material				Test	Frequency of Testing	Test Certificate	Comments
					LA Coefficient (IL)	1 test per 200m ³ for each source (min of 1 total per source)		
					Grading	1 test per 200m ³ for each source		
				(Class 6N1, 6N2 & 6P)	LA Coefficient (IL)	1 test per 200m ³ for each source		
					Undrained Shear Strength (IL)	As Required		
					Effective Angle of Internal Friction and Effective Cohesion (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Permeability (IL)	Source approval and 1 test per 500m ³ for each source		
					MC	1 test per 200m ³ for each source		
601 631 to 633					MCV (IL)	1 test per 200m ³ for each source		
					pH Value (IL)	Source approval and 1 test per 500m ³ for each source		

Clause	Work, Goods or Material				Test	Frequency of Testing	Test Certificate	Comments
635 to 637 640 (Cont'd)					Water soluble sulfate content (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Oxidisable sulfides (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Slope Stability (IL)	Source approval and 1 test per 500m ³ for each source		
					Slake Durability (IL)	1 test per 200m ³ for each source		
				(Class 6Q)	Testing and frequency as per Class 1 Material with the addition of the following:			
					Water soluble sulfate content (IL)	1 test per 200m ³ for each source (min of 1 total per source)		
					Oxidisable sulfides (IL)	Source approval and 1 test per 500m ³ for each source (min of 1 test per week)		
					Chloride Ion Content (IL)	1 test per 200m ³ for each source (min of 1 total per source)		
					pH Value (IL)	1 test per 200m ³ for each source (min of 1 total per source)		

Clause	Work, Goods or Material			Test	Frequency of Testing	Test Certificate	Comments
601 631 to 633		7	Cohesive Material (Class 7H)	Testing and frequency as per Class 2 Material with the addition of the following:			
635 to 637 640 (Cont'd)				Water soluble sulfate content (IL)	Source approval and 1 test per 500m ³ for each source		
				Oxidisable sulfides (IL)	Source approval and 1 test per 500m ³ for each source		
				Chloride Ion Content (IL)	Source approval and 1 test per 500m ³ for each source		
				pH Value (IL)	Source approval and 1 test per 500m ³ for each source		
		8	Miscellaneous fill	MC	Source approval and 1 test per 500m ³ for each source		
				MCV (IL)	Source approval and 1 test per 500m ³ for each source		
601.11 & 601.12	Fill adjacent to cementitious materials or metallic elements			Water soluble sulfate content (IL)	1 test per 250m ³ (min of 1 test per location)		
				Oxidisable sulfides (IL)	1 test per 250m ³ (min of 1 test per location)		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
602.20	Material within 350mm of designed final surface of road or central reserve.	Frost Heave (IL)	1 test per 5,000m ³ (min of 1 total per source)		
609	Geotextiles Used to Separate Earthworks Materials	Durability	1 test per source/supplier		
		Tensile Load	1 test per 500m ² (min of 1 test per source/supplier)		
		CBR Puncture Resistance	1 test per 500m ² (min of 1 test per source/supplier)		
		Permeability	1 test per 500m ² (min of 1 test per source/supplier)		
		Pore Size	1 test per 500m ² (min of 1 test per source/supplier)		
612	Compaction of Fill Material				
	Method Compaction	Field Dry Density (IL)	1 test per 10,000m ²		
	End Product Compaction	Optimum MC (IL)	1 test per each class of material and each source		
		Field Dry Density (IL)	1 test per 250m ³		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
613	Sub-formation	CBR ¹ (using Cone Penetrometer or PLT or other test agreed with Employer's Representative) (N)	1 test per lane width per 1 length, or as agreed by Employer Representative * (Lanes means running lanes)	Required	CBR (or equivalent) test to be carried out on completed surface of sub-formation. Note correlation testing to be carried out to confirm validity of test correlations, see Appendix 6/1.
616	Preparation and surface treatment of formation	Where capping is omitted on formation	CBR ¹ (PLT or other test agreed with Engineer) (N)	1 test per 200m length (min daily), or as agreed by Engineer *	See Appendix 6/7 for specification requirements for granular material at formation. CBR (PLT) test to be carried out on completed surface of Earthworks, i.e. top of subgrade/ formation.
			In-situ depth of specified granular material	1 trial pit per 100m length of road or as agreed by Employer's Representative *	
			Grading/uniformity coefficient	1 test per 50m length (min daily), or as agreed by	

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
				Engineer *	
			PI (N)	As directed by Engineer *	
618	Topsoiling and grass seeding	Rate of spread of fertiliser	1 test per 1,000m ²		
		Rate of spread of seeding			
		Chemical analysis of fertiliser	1 per source		
		Grass seed germination and purity (Manufacturer's test)	1 per source	Required prior to sowing	
622	Earthworks for reinforced earth and anchored earth structures	Redox Potential	5 locations within the affected area		
	Reinforcing Elements	Coefficient of friction	1 test for each type of element with each type of fill		
	Anchor Elements	Adhesion			
624	Ground Anchorages	Proof Loading	Every anchor		
626	Gabions	Gabion mesh	Source Approval	Required	
642	Earthworks materials adjacent to structures	Constrained soil modulus (M*)	3 on each side of structure		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
614	Lime and Cement Improvement - U1	Water soluble sulfate content	Source Approval		
		Organic Content	Source Approval		
		Rate of spread	1 per 500m ²		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 700					
Series 700	Sub-base and roadbase material beneath surface of a road or paved central reserve	Frost heave (IL)	1 per source		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 800					
UGM A UGM Ac UGM Am UGM B UGM Bc UGM Bm	Unbound mixtures placed within 500mm of cement bound materials, concrete pavements, structures or products	Water soluble sulfate (WS) content (IL)	1 per 200m ³ for each source (min of 5 total per source)*	Required	[Where Required] [See NG 800]
		Oxidisable sulphides (OS) content (IL)	1 per 200m ³ for each source (min of 5 total per source)*		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
	Unbound mixtures placed adjacent to metallic structural elements forming part of the Works	Water-soluble sulfate (WS) content (IL)	1 per 200m3 for each source (min of 5 total per source)*		[Where Required] [See NG 800]
		Oxidisable sulfides (OS) content (IL)	1 per 200m3 for each source		
	Unbound mixtures	Grading and fines content	1 per 1000 tons or minimum of 2 per day*		[Results of routine control tests from the factory production control system operated by the producer to be provided - see Annex C of IS EN 13242]
		Flakiness index (IL)	1 per week*		
		Los Angeles Coefficient (IL)	2 per year*		
		Methylene Blue (IL)	1 per week*		
		Water absorption (IL)	[As Required]		[See NG 801.10]
UGM A UGM Ac UGM Am UGM B UGM Bc UGM Bm	Types A, B, C & D granular material	Magnesium Sulphate Soundness (IL))	1 per 2 years*	Required	[Where Required]
		OMC (IL)	2 per year*		[Declared values from the factory production control system operated by the producer to be provided - see Annex D of IS EN 13285]
		Moisture Content	1 per 1000 tons or minimum of 2 per day*		
		Liquid Limit (IL)	1 per week*		
	Types A & C granular	CBR (IL)	1 per week*		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
		material	Density (IL)	2 per year*		
		Type C granular material	Percentage of crushed or broken particles and of totally rounded particles in coarse aggregates	1 per month*		
		Type A granular material	Plasticity index (IL)	1 per week*		
			Tests for control and checking of HBM	Tests specified in Table 8/15		[See NG 800]
			Coefficient of linear expansion (IL)	[As required]		[See Clause 800]
			Tests for laboratory mixture design	As specified in Clause 826		[See NG 800]

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 900					
2.2 3 4 5 6 7.2	Constituent materials				
		Bond and tack coats	Requirements per Tables 15	As per Type Test report applicable to the Contract	Required
					Constituent materials include aggregate, binder, fillers, additives, chippings, pre-coated chippings,

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
7.3 8.1 8.4 8.6 9		Bituminous mixtures	Requirements per Tables 1, 2, 4, 5, 7, 8, 10, 11 & 14 Clause 4.2.4 for precoated chippings	As per Type Test report applicable to the Contract		reclaimed asphalt, and all other materials that comprise the product. For products not covered by a Harmonised Technical Specification, material properties to be tested at the beginning of the contract to verify the values declared. Tables refer to those contained in NRA Series 900.
		Aggregate for Surface Courses – Bituminous Mixtures	Friction After Polishing Test (IS EN 12697-49)	1 test per property per source (source approval)		
		Surface dressing	Requirements per Tables 15, 17 & 18	As per Type Test report applicable to the Contract		
		Surface Dressing - Aggregate	Friction After Polishing Test (IS EN 12697-49)	1 test per property per source (source approval)		
		High friction surfacing – binders	Requirements per Table 23a	1 test per property per source (source approval)		
		High friction surfacing – manufactured aggregates	Requirements per Table 23b			
		High friction surfacing – natural aggregates	Requirements per Table 23c			
		Low energy bound mixtures – Paving Grade and Polymer Modified Bitumen’s	Requirements per Table 14	1 test per property per source (source approval)		
		Low energy bound mixtures – Virgin Aggregates and Virgin Filler	Requirements per Table 24a			
		Low energy bound mixtures – Cationic Bitumen Emulsions	Requirements per Table 24b			
		Permanent repair material systems	Requirements per Table 26a	1 test per property per source (source		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
			approval)		
	Emergency repair material systems	Requirements per Table 28a	1 test per property per source (source approval)		
	Reclaimed asphalt	Requirements per Tables 13a & 13b	As per Type Test report applicable to the Contract		
3 4 5 6 8.1	Product Composition				
	Bituminous mixtures – All mixtures	Grading (IL)	A minimum of 1 per 600 tons or minimum 2 per five day period or part thereof whichever is greater.	Required	IS EN 13108-21 Factory Production Control (FPC) procedures apply. The samples shall be taken in conjunction with the product manufacturer. Portions of the same samples shall be split between the manufacturer, contractor and the Employer's Representative to enable subsequent test results to be compared
		Binder content (IL)			
	Low energy bound mixtures	Combined grading (IL)	1 per day	Required	The samples shall be taken in conjunction with the product manufacturer. Portions of the same samples shall be split between the manufacturer, contractor and the Employer's Representative to enable subsequent test results to be compared
		Binder content (IL)			
8.4 8.6	Permanent repair material systems	Requirements per Table 26b	1 test per property per source (source approval)		
	Emergency repair material systems	Requirements per Table 28b	1 test per property per source (source approval)		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
9 10	Works					
		Bituminous mixtures - All mixtures	Temperature of mixture at time of delivery	Per delivery		
			Layer thickness	1 pair of cores every 1,000 linear meters laid per lane.		Measurement taken for each core extracted for in situ air void analysis.
			Temperature of mixture at time of rolling	Continuously		
			Air void content (IL)	1 pair of cores every 1,000 linear meters laid per running lane.	Required	Cores taken from the wheel tracks.
			Water sensitivity (IL)	1 per Contract		
		Bituminous mixtures – Containing >10% reclaimed asphalt	Recovered penetration (IL)	As required per Series 900	Required	
			Recovered softening point (IL)			
			Indirect tensile strength (IL)			
			Moisture induced sensitivity test conditioning (IL)			Requirement is to make available to the Employer’s Representative
			Rheology (IL)			Requirement is to make available to the Employer’s Representative
	Bituminous mixtures - Asphalt Concrete base and binder course specific	Permanent Works – In situ air void content within 100mm of joint	1 pair of cores every 250 linear meters laid per running lane	Required	Cores centered 100mm from the final joint position.	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
			(IL)			
			In situ air void content at refusal (IL)	1 pair of cores every 1,000 linear meters laid per running lane		Cores taken from the wheel tracks.
			Resistance to permanent deformation (IL)	6 cores from the first kilometer length of material from each source; 1 core from each subsequent running lane kilometer		Cores taken from the wheel tracks
				from each subsequent running lane kilometer		
			Stiffness (IL)	1 pair of cores every 1,000 linear meters laid per running lane		Cores taken from the wheel tracks.
		Bituminous mixtures - Asphalt Concrete surface course specific	Macrotexture - Volumetric Patch (IL)	10 over 50 meters lane length	Required	Refer to Series 900 for requirements regarding minimum test coverage.
			Resistance to permanent deformation (IL)	6 cores from the first kilometer length of material from each source; 1 core from each subsequent running lane kilometer		Cores not to be taken from the wheel tracks.
		Bituminous mixtures - Hot Rolled Asphalt surface course specific	Resistance to permanent deformation (IL)	6 cores from the first kilometer length of material from each source; 1 core from each subsequent running lane kilometer	Required	Cores not to be taken from the wheel tracks.

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
			Rate of Spread of Chippings for shoulder-to-shoulder cover	At Contract start		Refer to Series 900 for requirements of repeating measurements.
			Rate of Spread of Chippings for mechanical chipping spreader	1 per 100m or 1 per day		Refer to Series 900 for requirements of repeating measurements.
			Macrotexture - Volumetric Patch (IL)	10 over 50 meters lane length	Required	Refer to Series 900 for requirements regarding minimum test coverage.
		Bituminous mixtures - Stone Mastic Asphalt binder course specific	Resistance to permanent deformation (IL)	6 cores from the first kilometer length of material from each source; 1 core from each subsequent running lane kilometer	Required	Cores taken from the wheel tracks.
		Bituminous mixtures - Stone Mastic Asphalt surface course specific	Macrotexture - Volumetric Patch (IL)	10 over 50 meters lane length	Required	Refer to Series 900 for requirements regarding minimum test coverage.
			Resistance to permanent deformation (IL)	6 cores from the first kilometer length of material from each source; 1 core		Cores not to be taken from the wheel tracks.
				from each subsequent running lane kilometer		
		Bituminous mixtures - Porous asphalt surface course specific	Relative hydraulic conductivity (IL)	Every 1,000 linear meters laid per lane and fraction thereof*	Required	
		Bond and Tack Coat	Rate of spread of binder	1 every 20,000 square meters or 1 ever month, whichever is		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
				greater		
			Accuracy of spread of binder	1 every 6 months		
		Surface Dressing	Rate of spread of binder	As required per Series 900		
			Accuracy of spread of binder			
			Rate of spread of chipping			
			Accuracy of spread of chipping			
			Volumetric patch (IL)	10 over 50 meters lane length	Required	Refer to Series 900 for requirements regarding minimum test coverage.
		High friction surfacing	Volumetric patch (IL)	10 over 50 meters lane length	Required	Refer to Series 900 for requirements regarding minimum test coverage.
			Surface shear strength of installed system (IL)	2 per substrate type		At least 1 test measured in the wheel track zone. Test locations at least 20 meters apart.
		Low energy bound mixtures	Moisture content (IL)	1 core every 50 linear meters laid per lane.	Required	
			Relative in-situ density (IL)			
			Air voids content (IL)			
			Indirect tensile stiffness modulus (IL)	1 pair of cores every 250 linear meters laid per lane.		1 core per pair taken from the wheel track zone.

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
		Repair systems (PRMS, LSRS, ERMS)	Volumetric patch (IL)	1 per discrete area	Required	Methodology described in IS EN 13036- 1 should be followed with number of test measurements to suit size of repair.

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1000					
1001	Cement types as stated in sub-Clause 1001.3			Required	Certificate to be provided monthly* for each type of cement. Quality management and product certification schemes apply
	Cements (all types) Ground granulated blastfurnace slag	Chloride content	Monthly*		Tests to be carried out by the manufacturer and results included on the test certificates required above
		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. Product certification scheme applies
		Shell content (IL) (Only required where marine aggregates are used)	Monthly *		

			Flakiness index (IL)	Monthly*		
			Resistance to fragmentation (IL)	Every 6 months*		
			Chloride ion content (IL)	Daily*		
			Acid soluble sulphate content (IL)	Monthly*		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
1001 (Contd)		Fine aggregate	Acid-soluble material (IL)	Monthly*		[As required, See sub-Clause 1001.11]
	Water		Tests specified in IS EN 1008	[As required].		
			Chloride content	Monthly*		
			Sulphate content	Monthly*		
			Acid-soluble alkali content	Weekly*		
	Admixtures		Chloride content	1 per consignment	Required (BS 934-2)	[See sub-Clause 1001.5]
			Sulphate content	1 per consignment	Required	
			Acid-soluble alkali content	1 per consignment		

1002 1003 1004 1044	Concrete	Air content test (IL)	As required in Table 10/9	Required	
		Density of in situ Concrete cores (IL)	As required in Table 10/9		
		Cube strength (IL)	As required in Table 10/9		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1005	Consistence	Compaction index (IL)	As required in Table 10/9		[See sub-Clause 1005.2]
		Vebe (IL)			
1011 1012	Dowel bars Tie bars			Required (BS 4449)	Product certification scheme applies
	Dowel bars and supporting cradles	Load test	1 per arrangement*		
	Sheathed dowel bars	Bond stress	4 bars		
	Cranked tie bars (coated)	Bend test	4 bars*		
		Salt fog cabinet	4 bars*		
1015	Joint filler board	Weathering test	3 per source		Normally undertaken by manufacturer

		Cork filler board	Compression and recovery	4 per source		
			Extrusion	1 per source		
			Immersion in water	2 per source		
			Immersion in acid	2 per source		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1016 1017	Applied sealants	Initial Penetration	1 per 1000m or 1 per day	Required (BS EN 14188-1, BS 2499-2, BS 5212-1, BS 5212-2) (IS EN 13880-2, IS EN 13880-3, and BS 4254)	
1016 1017 (Contd)					
		Resilience	1 per 1000m or 1 per day		
	Compression seals			Required (ASTM D2628) (BS 2752) (BS 4443-4, Method 10 and IS EN ISO 2440) (IS EN ISO 1856) (BS 903: Part A16 or IS ISO 1817)	
		Compression set	1 per type of seal*		
		Immersion in oil	1 per type of seal*		

	Self-expanding cork seal	Tests specified in Clause 1017	1 per type of seal*	Required	
1026 1044	Surface macrotexture	BS EN 13036-1 Volumetric Patch Technique (IL)	1 per day (set of 10)*	Required	

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1027	Aluminised curing compound	Efficiency Index	1 per source*		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 1100						
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 meters laid *	Required	[See BS 5931 for materials for in situ asphalt kerbs]
			Binder Content			
1104	Precast concrete flags		Bending strength	Minimum of 8 per 1000 units of each product (IS EN 1339)	Required	[Appropriate tests/samples should be scheduled where not included under other Clauses]
	Bedding	Granular material				
		Mortar				

1109	Cellular grass paving systems				NSAI Agrément certificate or equivalent scheme applies
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Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1200					
1202	Permanent traffic signs	Test specified in the Standard/Specification given in Clause 1202		Required	I.S. EN 12899-4 Factory Production Control procedures apply.
1213	Permanent traffic cones and traffic cylinders	Part 7 of I.S. EN 13422		Required	Quality management and product certification schemes apply
1215	Traffic signals				Quality management scheme applies. Statutory approval of equipment applies
	Cables				[Special sample tests to BS 6346 should be scheduled where appropriate] Product certification scheme applies
	Controllers [Other equipment]	Tests specified in Appendix 12/5	Each controller before delivery to Site and again after installation		

		Cabling	Tests a, b, c, e, f, g, h, j as defined in sub-Clause 1424.2	Each traffic signals installation	Required	Certification that the installation complies with the National Rules for Electrical Installations is required.
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Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1216	Thermoplastic road marking materials	Tested for the requirements of the specification in accordance with I.S. EN 1436 initially on application and as detailed during the guarantee period.		Required	Quality management and product certification schemes apply.
1217	Retro reflecting road studs	Test specified in the Standard/ Specification given in Clause 1217		Required	Quality management and product certification schemes apply

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1300					
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]
1313	GFRP laminates	Loss on ignition	1 per 200 production columns		
		Colour fastness	1 per batch		
		Electric strength			
		Water absorption			
		Impact strength			

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1314	Brackets for laminating GFRP lighting columns				
		Polyurethane foam	Bulk density		
			Surface hardness		
			Apparent bulk density		
			Impact strength		
			Flexural stress		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1400					
1421	Cable				Product certification scheme applies [Special sample tests to BS 6346 should be scheduled where appropriate]

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1400					
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
	Networks	Tests specified in Clause 1424	Each network	Required	† Certification that the installation with the National Rules for Electrical Installations is required

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1600: Refer to Piling Specification					

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1700					
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. Product certification scheme applies
		Shell content (IL) (Only required where marine aggregates are used)	Monthly		
		Flakiness index (IL)	Monthly		
		Resistance to fragmentation (IL)	Every 6 months		
		Drying shrinkage (IL)	Monthly		
		Chloride content (IL)	Daily		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments		
1702 1703 1704 (Contd)			Sulphate content (IL)	Monthly				
			Blastfurnace slag		Bulk density (IL)	1 per 500 tons		
					Stability (IL)	1 per 500 tons		
					Sulphur content (IL)	1 per 500 tons		
	Water		Tests specified in IS EN 1008	[As required].				
			Chloride content	Monthly				
			Sulphate content	Monthly				
			Acid-soluble alkali content	Weekly				
	Admixtures		Chloride content	1 per consignment	Required (IS EN 934-2)	[See sub-Clause 1702.3]		
			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		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1707 (Cont'd)			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		
		Cube strength identity testing as described in Appendix 17/4 (IL)	2 cubes from each of 2 samples of each batch		
		Density	[As required]		[Requirements should be given in Appendix 17/1 as appropriate]
		Modulus of elasticity			
	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			

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
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				
	Precast concrete manufactured off Site	Cube strength (Manufacturer's tests)			Contractor to make available records of tests by manufacturer
1711	Grouting and Duct Systems for Post-tensioned Tendons				CARES Scheme for Supply and Installation of Post-tensioned Systems In Concrete Structures or an equivalent scheme is required. Quality management and product certification schemes for cement apply
		Full scale trials			See sub-Clause 1711.1 and Appendix 17/6
		Air pressure tests			See sub-Clause 1711.3 and Appendix 17/6
		Duct assembly verification tests			See sub-Clause 1711.3 and Appendix 17/6
		Fluidity	See Table 17/7		See sub-Clause 1711.8 and sub-Clause 1711.9 and Table 17/8
		Bleeding			

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
		Volume change			
		Cube strength			
		Sieve			
		Sedimentation			
	Admixtures			Required	Quality management and product certification schemes apply Data on their suitability, including previous experience should be made available. See sub-Clause 1711.10
1712	Reinforcement				Product certification scheme applies
		Steel bars		Required (BS 4449 & IS EN 10080)	
		Steel wire		Required (BS 4482 & IS EN 10080)	
		Steel fabric		Required (BS 4483 & IS EN 10080)	
	Stainless steel			Required (BS 6744)	

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1713	Fabricated reinforcement			Required	Certification that fabricated reinforcement complies with the routine inspection/testing requirements of BS 8666 is required if the fabrication is not covered by a product certification scheme listed in Appendix 1/25
1716	Reinforced jointing systems	Permanent elongation Characteristic strength (Manufacturer's tests)		Required for each type of connection	NSAI Agrément certificate or equivalent scheme to apply
1717	Reinforcement metal arc welding	Welding procedure approval (BS 7123)	As required in BS 7123		Tests should be carried out by an independent testing body specified in BS 8666
		Welder approval (BS 7123)			
1718	Prestressing Tendons				Product certification scheme applies CARES (PT6-PT8)
	Steel wire			Required (BS 5896)	
	Steel bar			Required (BS 4486)	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
1718 (Cont'd)		Seven-wire Strand			Required (BS 5896)	
		Pre-stressing steel (all types) Super strand to BS 5896 or other than lowest strength 3-7 mm dia wires to BS 5896	Proof load Breaking load Elongation Ductility Relaxation Modulus of elasticity 0.1% proof load Breaking load	[As required] Each reel		
1724	Post-tensioning anchorages		Tests in accordance with IS EN 13391 (Manufacturer's tests)		Required (IS EN 13391)	Product certification scheme applies CARES Scheme
1726	Stainless steel bar				Required (BS 6744)	Product certification scheme applies
1727	Inspection and testing of structures and components		As required by Appendix 17/4	As required in Appendix 17/4	Required	

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 2000					
2003	Mastic asphalt	Test specified in BS 6925	1 per source	Required (BS 6925)	Sampling to comply with BS 6925
	Proprietary waterproofing systems				IAB or BBA certification applies
		Compatibility test with CFRP Plates	1no within 14 days of contract award	Required	Contractor to provide certificate of compatibility from waterproofing manufacturer
		Pull-off test for adhesion of Membrane	4no per bridge deck		In accordance with BSEN 24624:1993
		Haliday test to detect pinhole faults	Every 10m2		
	Additional bituminous protection	Tests specified in BS 594 : part 1	1 per 15 tonnes		Sampling to comply with BS 594 : Part 1
		Stability value	Test specified in BS 598 : Part 107	1 per 15 tonnes	
2004	Tar	Tests specified in BS 76	1 per source		Sampling to comply with BS 76
	Cut back bitumen	Tests specified in BS 3690 : Part 1	1 per source		Sampling to comply with BS 3690 : Part 1
2008	Waterproofing membrane	Tensile strength, elongation at break (BS ISO 37)			

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
2009		Tear strength (BS ISO 34-1)			
		Deck adhesion (Clause 2008.5)	Three tests per 500m ² of sprayed membrane		
		"Holiday Test"			

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 2400					
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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
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			
	Calcium silicate			Required IS EN 771-2)	
	Concrete			Required (IS EN 772-2)	
2407	Blocks				
	Concrete			Required (IS EN 772-2)	
2408	Manufactured Stone	In accordance with IS EN 771-5		Required	
2410	Stainless Steel				

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
2411		Wire/fabric			Required (IS EN 10088-1)	
		Bars			Required (BS 6744)	

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 2600					
2601.2	Bedding mortar materials				
2601	Bedding Mortar	Flow cone test	Each batch		
		Flow between glass plate			
		Compressive strength			
		Expansion test			
		Water absorption	1 per source		
		Elastic stability			
		Flow cone test	Each Load		
Compressive Strength					
2604	Plastic coating to fencing posts, gates and ancillaries	In accordance with BS 1722 Part 16			

Key

- † Indicates a requirement in SRW for the test to be carried out by the Contractor; such tests should therefore be scheduled in Appendix 1/5.
- †† Indicates a statement in SRW that the test may/will be carried out under the direction of the Overseeing Organisation; samples for such tests should therefore be required in Appendix 1/6.
- * Indicates that the frequency of testing is given for general guidance and is only indicative of the frequency that may be appropriate (i.e. no frequency is given in the SRW or reference documents). Where materials are known to be marginal or if initial test results show them to be such, the frequency of testing should be increased. Conversely where material properties are consistently in excess of specified minimum requirements or well below specified maximum limits, then the frequency of testing should be reduced.

APPENDIX 1/6: SUPPLY AND DELIVERY OF SAMPLES TO THE ENGINEER

Clause	Sample Description	Frequency of Sampling	Delivery Location
503, 505, 512, 513	Samples of Aggregates	Samples to establish compliance with the Specification shall be as the Employer's Representative may reasonably require. (see Appendix 1/5 for probable frequency)	Site compound
600 series	Samples of earthworks materials		
800 series	Samples of surface pavements unbound materials Samples of resin		
900 series	Samples of bituminous mixtures		
1000 series	Samples of fresh concrete and aggregates		
1100 series	Samples of bituminous mixtures Samples of resin-bound mixtures Samples of fresh concrete and aggregates Samples of decorative concrete Samples of ground and polished concrete kerbs		
1300 series	Samples of light fittings, sample panels		
2400 series	Samples of blocks/forms/pointing		

Notes:

1. Samples 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. Unless otherwise indicated in this Appendix, samples of work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
3. Unless otherwise scheduled under Clause 2602 samples of concrete complying with that Clause are not required.
4. More materials will be required by the Employer's Representative's team throughout the Contract especially samples of those materials the Contractor wishes to re-use from the earthworks operation and those materials considered or suspected as hard material by the Employer's Representative. The frequency of the delivery of these samples to the Employer's Representative's office will be as is set out in Table 1/5 of this document. At his/her discretion the Employer's Representative may decrease or increase the rate sampling based on the results of testing. The delivery of these samples in no way alleviates the Contractor of his responsibilities with regards to testing materials as set out in Table 1/5 or in other places in the Contract Documents.
5. Samples and all necessary supporting information are to be provided by the Contractor to the Employer's Representative within a defined period of the Contract Starting Date at the latest,

or earlier if deemed necessary by the Contractor's programme for delivery of the Works as listed in Table 1/6.2. A further time period from the date of delivery of such samples to the Employer's Representative is required by the Employer's Representative to make a written objection to a Contractor's proposals.

- 6.** The Employer's Representative's period for objection is 10 working days from when the Employer's Representative has received from the Contractor enough information to make a purposeful review of the matter submitted should it wish to make one.
- 7.** The Contractor shall not implement any submission before the period has ended, or contrary to any outstanding objection given with the period.
- 8.** Cut sheets/brochures/data sheets for all materials and products are to be provided by the Contractor to the Employer's Representative within two months of the Contract Starting Date at the latest, or earlier if deemed necessary by the Contractor's programme for delivery of the Works. A further 10 days from the date of delivery of such data to the Employer's Representative is required by the Employer's Representative to review and the Client revert, if necessary, with an objection on these proposals. The Contractor shall maintain a complete file of all materials and products proposed for use in construction of the Works including dates of submission of same to the Employer's Representative.
- 9.** Supply of Alternatives
 - a)** Trade names and/or suppliers are sometimes used in this Specification for the purpose of brevity and clarity of technical, aesthetic, and functional intent. Such references are for the convenience of the tenderer in clearly indicating the standard of technical, aesthetic, and functional requirements sought by the Employer. The intention is not to favour one product over another or to eliminate other products/suppliers.
 - b)** Other materials/suppliers may be put forward for consideration as equivalent materials to those stated in the Specification. Approval for substitution of equivalent materials/suppliers will be given where the alternative material/supplier are demonstrable equal in full accord with the original Specification.
 - c)** Equivalence of an offered substitution will be judged based on objective, clear and verifiable independent proof of similar compliance with equal standards to those specified. Where appropriate verification is provided through a detailed technical dossier, drawings, data sheets and/or a test report from a recognised body, a material/product substitution will be permitted by the Employer's Representative.
 - d)** Any increased costs arising whatsoever from such a substitution in terms of redesign, rescheduling, health and safety issues or other matters, shall be borne by the Contractor.
 - e)** Alternative suppliers/installers will need to prove their ability to perform their sub-element part of the main contract through the submission of proof of their technical and/or professional capacity (education, experience, equipment as a minimum).
 - f)** The Employer's Representative will determine on a case-by-case basis, from a technical, aesthetic, and functional perspective, what constitutes an equivalent standard/product. Verification will take place only after the award of Contract, as part of the contract management regime. A period of 10 working days is to be allowed to check submissions and provide samples as indicated in this Specification.

Product	Timescale	Timeframe for Approval of Sample
Sample Road Markings	4 weeks prior to installation	Within 10 days of receipt of sample from Contractor
All utility covers	2 weeks prior to installation	Within 10 days of receipt of sample from Contractor
Manhole Cover and Frame	2 weeks prior to installation	Within 10 days of receipt of sample from Contractor
Gully Grating and Pots	2 weeks prior to installation	Within 10 days of receipt of sample from Contractor
Kerb section (each type)	4 weeks prior to installation	Within 10 days of receipt of sample from Contractor
Sample concrete footpath and bituminous cycle track section	2 weeks prior to installation	Within 10 days of receipt of sample from Contractor
Public lighting elements, (i.e. poles, heads, minim pillars, etc.)	4 weeks prior to installation	Within 10 days of receipt of sample from Contractor

Table 1/6.2 - Supply and Delivery of Samples to the Employer's Representative

APPENDIX 1/7: SITE EXTENT AND LIMITATIONS ON USE

1. Extents of the Site.

- a. The extent of the site lies within the area bounded by the 'Site Extents' lines as indicated on the Drawings in Volume A Part B. Site extent may also extend to incorporate additional tie-ins where tie-in within the site extents is not physically possible, following agreement from the Employer's Representative and the Client. Site extents may also extend to incorporate additional tie-ins where tie-ins within the site extents are not physically possible.
 - Areas necessary for the proper implementation of Traffic Management measures.
 - Areas necessary for work to new and existing public lighting, utility ducts, road drainage, foul drainage, watermains / utilities, permanent and temporary traffic signs etc.
 - Areas necessary for utility works and/or tie-ins to roads, footpaths, cycle lanes, verges, walls, fences, road markings, ducting and drainage.
 - Areas necessary for retention and, or protection of existing boundaries, including structures.
 - Areas necessary for accommodation works.
 - Areas necessary for landscape protection, earthworks and preparation.
 - Areas necessary for reinstatement of lands and boundary fences disturbed by the works.
 - Areas necessary for as-built surveys.
 - Any areas outside the above for which the Contractor has obtained the written consent of both the owner/lessee/occupier and the Employer to the intended use.
- b. Areas required for the installation alteration and removal of plant for statutory or other bodies. The use of these areas will be limited by the terms of the way-leaves acquired
- c. The Contractor will also make provision for carrying out work as required under the Contract, for example Accommodation Works, embankment clearing and the like.
- d. In addition, and subject to the agreement of the Client and approval of the Employer's Representative, the extent of the Site shall include areas required for traffic control measures by the Contractor in compliance with Appendix 1/17, 1/18, 1/19 and 1/20 of the Specification, as and when necessary.
- e. The Contractor shall be fully responsible for all traffic management associated with the works. Detailed traffic management proposals shall be submitted to the Employer's Representative for acceptance.
- f. The Extent of the Site for the installation of plant for statutory or other bodies outside the site boundaries will be limited by the terms of the wayleaves acquired by statutory or other bodies for execution of the works, should such works be required.

- g. The Contractor shall take account of the requirement to prevent trafficking of the newly laid surface course until cured and achieved strength to accept loading.
- h. The Contractor is limited in the use of access routes by means of public roads to the site as stated in Appendix 1/19 and this Appendix 1/7.
- i. The Contractor shall ensure the safe passage of all road users using public roads within the Extent of the Site, and at traffic management interfaces, always. Details of all proposed diversions shall be agreed in advance with the Employer's Representative in accordance with Appendix 1/17.

2. Limitations on the Use of the Site.

- a. Site Constraints shall be those as defined by the Employer. The Contractor may not store any materials or plant, except in locations described in the Contract or otherwise consented to by the Employer. The Contractor shall maintain and facilitate existing vehicular and pedestrian flows to existing roads, entrances buildings and general traffic, as specified in Clauses 117 and 118 of the Specification for Road Works.
- b. The site shall be used by the Contractor only for the purposes connected with the Implementation of the Works Requirements and to the approval of the Employer's Representative.
- c. Temporary footpaths etc. must be provided where required.
- d. The Contractor shall ensure that temporary facilities, parked vehicles and plant, stockpiled material and the like are not situated within or adjacent to the site area so as to adversely affect users of the Public Roadway.
- e. The Contractor shall ensure that access is maintained to all private and public properties affected by the works.
- f. The Contractor shall abide by the requirements of An Garda Síochána at all times and in particular shall comply with their requirements relating to traffic management.
- g. The contractor shall take account of any anti-social behaviour that might occur on this site / compound.
- h. The Contractor shall comply with the requirements of the Department of Agriculture, Disease Eradication Scheme where such a need arises.
- i. Entry onto the Site shall be from public roads unless the Contractor enters into separate agreement with landowners to allow access through lands not forming part of the Site.
- j. The Contractor shall employ the use of a road sweeper to ensure the public roads and footpaths remain free of detritus.
- k. Works in Vicinity of existing bridges:

Canal Bridge: Works shall be confined to the road boundary and kept to the minimum necessary. Storage of materials and parking of plant or equipment on the bridge are prohibited.

The design ties-in to existing Bridge Street and footpath outside of the extents of the Bridge Street Bridge. Works are to be contained within the road boundary only. Bridge Street Bridge is outside of the works boundary.

I. Works in Vicinity of bus stops at Marina

All surface water arising from the works shall be disposed within the site and shall not discharge onto adjacent lands. The details outlined as part of Site Specific Flood Risk Assessment and the Road Safety Audit shall be implemented in that regard. This is in the interest of Protection of the EU designated sites and traffic safety.

No construction should take place on westbound side of the road near the Marina between months Nov-March to avoid disturbance on Qualifying Interests overwintering habits.

3. Existing Services

- a. Information has been provided to the Contractor, as part of the Background Information, in relation to the extent of existing known services within the site extents. It is the responsibility of the Contractor to explore, examine and inquire with all known Service Providers as to the extents of live services within the site boundary. The Contractor must, and have included for within the Contract Sum, have allowed for hand-digging around existing services. Services encountered within the excavation will be protected in accordance with the recommendations given by the Employers Representative.
- b. As part of the Works the Contractor must alter existing utility chambers and manholes in accordance with the Works Requirements. The Contractor must include, within the Contract Sum, provision for working around live services, connections, and cabling within the chambers as part of the Works.
- c. The existing services, as shown in the Background Information, are contained within a variety of different types of ducting and pipework. The materials of the ducting and pipework varies from PE, uPVC, Wavin and Concrete. The Contractor shall have provided for, within the Contract Sum, for working around and hand digging around these services and for providing due care so as not to damage, break or alter the existing service ducting and/or pipework.
- d. The Contractor must liaise with all relevant 3rd Parties and Utility Providers in relation to their services, ducting, and chambers prior to any alterations to same. The Contractor must ensure that there are no service disruptions to any existing service resulting from the Contractor's works.
- e. The existing public lighting network within the site extents is to be removed and replaced as part of the works. The Contractor must erect temporary lighting prior to

disconnection of the existing and maintain in place until the new public lighting system is live and operational.

- f. The existing CCTV poles, cameras and networks within the site extents is to be maintained throughout the course of the works. Prior to the removal of the CCTV as part of the works, as part of the Contractor's method of construction, the Contractor shall erect suitable replacements prior to disconnection of the existing.

4. Access to Businesses / Properties

- a. The Contractor must ensure that access is maintained to all businesses/properties during the working hours of each individual business/property.
- b. Access for pedestrians, cyclists and vehicular traffic is to be maintained to all properties along the route as per the Conditions of Contract. The Contractor must, prior to obstructing an entrance into any premises, receive written approval from the owner/occupier. The Contractor must issue the written agreement to the Employer's Representative prior to commencing works.

5. Public Safety

- a. The Contractor shall be responsible for complying with all statutory requirements with respect to Public Safety for all works in connection with this Contract. The Contractor's particular attention is drawn to the requirements of the Safety, Health and Welfare (at Work) Act 2005 (as amended and enacted) and the Safety, Health and Welfare at Work (Construction) Regulations 2013 (and amendments thereto).
- b. The Contractor shall allow for taking all necessary precautions to protect members of the public in general who may venture near to or within the site boundary.
- c. The Contractor shall submit to the Employer prior to commencement of the works, for his comment, proposals for complying with these requirements.
- d. The Contractor shall take all necessary precautions to prevent trespassers onto the site.
- e. The Contractor shall notify the Employer of the person delegated with the responsibility for site safety.

6. Local Conditions and Restrictions During Festivals and Events

The Contractor shall plan, programme and execute the Works to accommodate festivals, parades and other public events taking place in Ballinasloe, Co. Galway. The Contractor shall liaise with Galway County Council, An Garda Síochána, event organisers and other relevant stakeholders and shall comply with all temporary traffic management arrangements, road closures, parking restrictions and instructions issued in connection with such events.

Construction works need to be suspended in advance of and during the Fair, including night works for the following:

a. Ballinasloe Fair

The Fairgreen is scheduled for 18th Sept to 19th Oct with shorter closures on surrounding streets. The dates of the Fair could vary by a week in 2027 the Fair may take place a week earlier, i.e. the last week of September. Construction activities, including night works, shall be suspended as directed before and during the Fair. **There should be absolutely no impediment permitted to traffic or pedestrian movements during Ballinasloe Fair period for week prior and week pass Fair. Restrictions include:**

- i. Closure of Fairgreen and McNevin car parks in advance and during the festival.
- ii. Installation of traffic management barrier in advance during the fair horses will be brought to the Fairgreen along Dunlo Hill and Brackernagh down to Harris Road. **Key road closures implemented by Galway County Council generally include:**
 - Society Street (R348) from Main Street/Dunlo Street to Harris Road
 - Main Street/Bridge Street (R348) from R446 to Society Street/Dunlo Street
 - Dunlo Street (R904) from top of St. Michael's Square to R446
 - St Michael's Square, jubilee Street and Bolger's Lane
 - Faigreen and McNevin Avenue area'
- iii. New Road/R446 closure from Poolboy Roundabout to Bridge Street/R348, 19:00–22:00 on 9 October 2026 for the fireworks display.
- iv. Main Street/Bridge Street closure from the R446 to Society Street/Dunlo Street, 21:00–23:00 on 9 October 2026 for the tug-of-war event

b. Féile Cheoil Larry Reynolds

Féile Cheoil Larry Reynolds is normally held annually during the first weekend of September. The four-day traditional Irish music festival generally takes place from Thursday to Sunday and is scheduled for 3rd – 6th September 2026.

The event may require the suspension or restriction of construction activities and the use of on-street parking spaces on Main Street, Society Street and St Michael's Square. The Contractor shall keep these areas clear where required and shall coordinate all affected works, deliveries and traffic-management arrangements with Galway County Council and the event organisers.

c. St Patricks Parade

The annual St Patrick's Day Parade is organised by the local Tidy Towns Committee. Galway County Council is not the event organiser.

The standard route moves through the Society Street, Main Street, Harbour Road and Dunlo Street. The Contractor shall liaise with the Tidy Towns Committee, An Garda Síochána and Galway County Council to confirm the parade route, timing, road closures and traffic-management requirements. Works affecting the parade route or associated assembly and public-viewing areas shall be suspended or restricted as directed. Relevant contact details will be provided by Galway County Council when available.

d. Market Sunday

Market Sunday normally takes place on the second Sunday in October. For 2026, the event is scheduled for Sunday, 11 October 2026.

The Contractor shall review the relevant temporary road-closure notice and coordinate its Works with Galway County Council. Construction activities, deliveries, parking and traffic-management arrangements within the affected areas shall be suspended, removed or modified as required to safely facilitate the event.

All costs associated with programming, coordination, temporary suspension of the Works and compliance with these event-related restrictions shall be deemed included in the Contract Sum.

7. Other Requirements

- a. The Contractor shall maintain all public rights of way and access to private property during the Works. The Contractor shall be required to construct and maintain temporary pedestrian and/or vehicular access including, where necessary, temporary bridging for frontages during the execution of the works and the whole of the works shall be carried out to cause the minimum inconvenience to the public, Statutory Bodies, and other road users.
- b. The Contractor is to permit access by the Employer (and their agents / contractors) at all times during the works at the direction and approval of the Employer. Access vehicles will include cars, MPV's, maintenance vans (carrying up to 8 people) and 3 axle delivery / service vehicles / emergency vehicles weighing up to 20 tonnes.
- c. The Contractor is to permit access by utility providers (and their agents / contractors) at all times during the works at the direction and approval of the Employer. Access vehicles will include cars, MPV's, maintenance vans (carrying up to 8 people) and 3 axle delivery / service vehicles / emergency vehicles weighing up to 20 tonnes.

APPENDIX 1/8: OPERATIVES FOR THE EMPLOYER'S REPRESENTATIVE

1. The Contractor shall provide the Employers Representative with the operatives listed in the table below. The operatives shall only be changed with the permission of the Employers Representative or as directed by the Employers Representative.

Class of Operative Required	Number Required	Period Required
Chainman / Driver / Handyman	Up to 1 no. at any one time.	From Date of Commencement of the Whole of the Works to Date of Issue of Taking over Certificate for the whole of the Works at an average of 1 day per week.

APPENDIX 1/9: CONTROL OF NOISE AND VIBRATION

Noise

1. On-going noise and vibration monitoring should be carried out during the Works. The monitoring points and methodology used should be subject to the approval of the Employer's Representative. These results should be issued to the Employer's Representative on a weekly basis for the duration of the Works. Monthly reports detailing the noise levels shall be submitted to the Employer's Representative in a suitable format for issuing to the Client.
2. The noise levels (see Note (i) below) scheduled below for periods outside the normal working hours will only be permitted when consent has been given to exceptional working. Otherwise, there shall be no construction noise outside of normal working hours.
3. The noise level, Leq (see Note (ii) below) from all sources when measured 2.0m above the ground at any monitoring station shall either not exceed the appropriate level given in the Schedule or not exceed by more than 3 dB(A) the existing ambient noise level, Leq (see Note (iii) below), at the monitoring station measured over the same period, whichever level is the greater. The maximum sound level shall not exceed the level given in the Schedule below. Exceptionally, the Contractor may be given permission to carry out works which exceed the noise levels in the Schedule, provided that 5 working days' notice of the date and timing of these works is given to the Employer's Representative / The Council and the Contractor demonstrates that he intends to take all reasonable matters to mitigate the noise nuisance. After consultations with the Employer and any other interested bodies, a decision will be given within 3 working days of receipt of the notice.

Days and Times	Hours	dB LAeq,1hr	dB LAm _{ax}
Monday –Friday inclusive	08.30 – 18.00	65 leq	75
Saturday (Where work's permitted)	08.30 – 14.00	65 leq	75

Notes:

- (i) Noise levels relate to free field conditions. Where noise control stations are located 1m from facades of buildings, the permitted noise levels can be increased by 3 dB(A).
- (ii) The ambient noise level, Leq, at a noise control station is the total Leq from all the noise sources in the vicinity over the specified period.
- (iii) The existing ambient noise level, Leq, at a control station is the total Leq 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 a sound level meter which means the requirements of BS 5969 Type 1 or 2 set to SLOW response

and frequency weighting A.

4. The Contractor shall comply with the current national guidelines as specified in Transport Infrastructure Ireland Guidelines for the Treatment of Noise and Vibration in National Road Schemes (Revision 1, 25th October 2004). The Contractor shall adopt good site practice in accordance with BS 5228: Part 1: 1997 (Noise Control on Construction and Open Sites and any similar British Standard or Code of Practice which may be considered relevant.
5. Without prejudice to the Contractor's obligations under the preceding paragraph the Contractor shall comply with the following requirements:
 - (a) All vehicles and mechanical equipment shall be maintained in good and efficient working order and shall be fitted with effective exhaust silencers.
 - (b) All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers.
 - (c) Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum. Generators, or any other plant, shall not be left running / operational after hours unless in an emergency, and agreed with the Employer's Representative.
 - (d) Where practicable, plant with directional noise characteristics shall be positioned to minimise noise at adjacent properties.
 - (e) Static machines shall be sited as far away as practicable from inhabited buildings.
 - (f) Where it is necessary to provide power for the running of traffic signals, pumps etc., at any time outside normal working hours, then the sources of such power shall be from mains electricity except if the Employer's Representative agrees in writing that alternative plant may be used, after consultation with The Council.
 - (g) Good relations with people living and working in the vicinity of the roadworks are important. People who are likely to be affected by the noise shall be informed, by letter drop or other appropriate means, of any works to be carried out outside normal working hours. Notification of the public shall take place at least one week prior to the commencement of Site works.
 - (h) The Contractor shall organise his operations with regard to the positioning of plant and the location of haul routes etc., so that it minimises construction noise to adjacent properties.
 - (i) The period referred to as 'night' for the purposes of the Contract shall be from 18:00 hours to 08:00 hours.

6. Transport Infrastructure Ireland guidelines provide indicative noise levels that are typically acceptable, though more stringent limits are appropriate where pre-construction noise levels are low. Limits are suggested for both the 1-hour "A" weighted equivalent continuous noise level (LAeq,1hr) and for the maximum noise level (LAm_{ax}). While limits are suggested for evening working and for working daytimes on Sundays and Bank Holidays it is assumed that the explicit permission of the Employer would be required before non-emergency works are conducted at these times.
7. The Contractor shall furnish such information as may be required by The Council, and/or the Employer's Representative in relation to noise levels emitted by plant or equipment used or installed on the Site or which the Contractor intends to use or install on the Site and afford all reasonable facilities to enable such Authorities to carry out such site noise-monitoring as may be necessary.
8. The Employer's Representative shall have the right to order the Contractor to cease using any item of plant insufficiently silenced or generating noise levels more than those specified.
9. Compliance with these conditions and the other requirements of the Contract will not of itself constitute any grounds for defence against any proceedings, whereby any occupier of premises may complain to a Court of law of a noise nuisance.
10. The Contractor is responsible for proving that they are operating within the allowed noise limit.

Vibration

11. The vibrational limits reported below shall be complied with throughout the site, and the Contractor shall ensure that no exceedance of these limits shall occur within the site boundary.
12. The limits of vibrational amplitude and resultant peak particle velocity shall be limited to 2mm/sec.
13. The Contractor shall include for vibration monitoring at all locations where works are undertaken within 50m of an existing structure.
14. The Contractor shall provide equipment for monitoring vibrations both within and outside the site as directed by the Employer's Representative.
15. The Contractor shall comply with BS6472: 1992 Evaluations of Human Exposure to Vibration in Buildings (1Hz-80Hz). Any vibration monitoring carried out shall also follow BS6472: 1992. The Contractor shall also adopt good site practice in accordance with BS 5228: Part 1: 1997.
16. Compaction of material on site shall be achieved by dead rolling only. The use of vibration rollers shall not be permitted on this Contract. This requirement does not relieve the Contractor of his duties under the Contract.

Mud and Dust Control

17. The Contractor shall ensure that adequate provision is made to damp down areas where activities are likely to create dust. Measures shall include the spraying by pressure hoses to suppress dust and the provision of bowsers and suction road sweepers where appropriate.

18. Plant shall be sited and screened where necessary to minimise dust emission to adjoining areas.
19. All stockpiles shall be covered to prevent the generation of dust.
20. The Contractor shall ensure that off-site observations and monitoring of dust takes place to confirm that steps are successful in minimising dust release from site.
21. The Contractor shall take all measures necessary to prevent spillage onto public roads adjoining the Site and all roads forming part of the Site. The Contractor shall, using wheel washing equipment or other methods as approved by the Employer's Representative, prevent mud from the site being carried onto any surface or facilities in use by the public. In the event of mud or site material being deposited on a public road surface, the Contractor shall take all necessary steps to ensure the roads are cleaned immediately using road vacuum sweepers, or similar methods to be approved by the Employer's Representative, without adversely affecting public traffic.
22. If such levels of cleanliness are not maintained the Employer shall make alternative arrangements for road cleaning and charge this to the Contractor.
23. Damage to any highways, bridges, footpaths or right of ways (including services drains and sewers) caused by any vehicles used in connection with the Works shall be made good by or at the expense of the Contractor. No materials shall be stored on the highway.
24. For this clause the term "highway" shall be deemed to include any road or footpath, on or off the site, used by the public, together with any kerbs, gullies, sewers, street lighting, public utility services or tree planting associated therewith.

General

25. The Local Authority responsible for environmental matters is: The Council.
26. Notwithstanding the above, the Contractor shall comply with the following general requirements.
27. The Contractor shall comply with all current statutory rules and regulations regarding control of noise and pollution and shall ascertain from the Local Authority what requirements, restrictions, or consents, if any, shall apply to the Works in this respect. The Contractor shall take due cognisance of the requirements of this Appendix 1/9 in this regard and the permitted levels stated herein. Where the allowable levels of this Appendix 1/9 exceed those of the local authority, the former shall be deemed to apply. The Contractor shall demonstrate such compliance to the Employer regularly monitoring air quality, dust, and noise levels on site, taking all necessary measures to ensure that specified levels of pollution are not exceeded. The Contractor shall allow for any costs and expenses arising from such compliance.
28. The Contractor shall allow for all costs and expenses arising from such compliance.
29. Explosives shall not be permitted for use on this Contract.
30. The Contractor shall not interfere with or otherwise injuriously affect in any way possible or any watercourse or water supply.
31. The Contractor shall be liable for and shall indemnify the Employer against any expense, liability, loss, claim or proceedings whatsoever in respect of damage, noise, vibration, fumes,

dust, smoke and other nuisance and any alleged nuisance or any negligence on the part of the Contractor arising out of or during or by reason of the carrying out of the Works.

32. The Contractor shall take all reasonable precautions to prevent operatives, including those employed by sub-contractors, from trespassing on adjacent property.
33. Should the Contractor wish, or is required, to erect scaffolding on, or otherwise make use of adjoining land or property, he shall serve notices, obtain written permission, pay any fees, or charges the cost of which is to be included within the Contractors offer, subsequently clear away and make good any damage to the satisfaction of the Employer.
34. The Contractor shall take all necessary precautions to minimise any disturbance, inconvenience or nuisance to the occupiers and users of neighbouring properties and to the public generally and allow for executing any noisy or offensive operations at such times and in such a manner as not to cause unnecessary inconvenience.
35. If in the opinion of the Employer any of the arrangements, etc. for control of noise, fumes, pollution, and all other statutory obligations are inadequate the Employer reserves the right to arrange the necessary remedial action and to set off such costs against monies due to the Contractor.
36. The Contractor shall take all necessary precautions to avoid excessive electromagnetic disturbance of apparatus outside the site.
37. The Contractor must ensure that all electrical equipment and plant is suppressed to cause no unacceptable electrical or other interference to surrounding properties.

APPENDIX 1/10: STRUCTURES TO BE DESIGNED BY THE CONTRACTOR

The following structural elements are to be design by the Contractor.

1. Site Sign Foundations.
2. Temporary Works Design.
3. Traffic Management.
4. Internal pipework repairs.
5. Protection measures as deemed necessary by the Contractor to protect Privately and Publicly Owned Services and Supplies from damage during the course of the works.
6. Waste management plan.
7. Construction management plan.
8. Public Lighting

Other Structures to be designed by the Contractor are as agreed with the Employer's Representative at time of tender.

Prior to commencement of works, a full detailed design complete with a Design Standards Report to be submitted to the Employers Representative for agreement.

APPENDIX 1/11: STRUCTURAL ELEMENTS AND ANOTHER FEATURES TO BE DESIGNED BY THE CONTRACTOR

The full design details with respect to the bus shelters shall be agreed in writing with the planning authority prior to commencement of development on site. 4 Bay urban bus shelter to be installed at each bus stop at the Marina. Bus Shelters will be provided by the NTA. Contractor will be required to complete civil works to accommodate 4 Bay bus shelter.

APPENDIX 1/12: SETTING OUT AND EXISTING GROUND LEVELS

1. The setting out data contain the following information is set out on the drawings in Works Requirements Volume A Part B:
 - a. Co-ordinates and Levels of Permanent Ground Markers
2. Tie-ins shall be agreed on site between the Contractor and Employer's Representative where necessary.
3. The Contractor shall set out the works by reference to the Ordnance Survey Datum (Malin Head), to which all levels quoted in the Contract documents refer. Horizontal alignment shall be determined in accordance with Ordnance Survey Irish Transverse Mercator co-ordinates, to which all references to Eastings and Northings in the Contract documents refer.
4. The Contractor shall verify existing alignments at tie-in points at the commencement of the works and notify the Employer's Representative of any discrepancy so that the alignments may be adjusted to provide a smooth transition to existing.
5. The Contractor is to re-survey all existing survey stations on the site to confirm the easting, northing, and level at each station. The results of this survey work shall be provided to the Employer's Representative for verification prior to any setting-out of construction work.
6. The Contractor shall obtain in writing the Employer's Representative's approval for the setting out prior to the commencement of physical works.
7. The Contractor shall allow 24 hours between the setting out of any portion of the Works and the commencement of construction so that the setting out may be checked by the Employer's Representative. The 24-hour period shall commence only once the Contractor has informed the Employer's Representative that the setting out has been completed. Such checking shall be entirely at the discretion of the Employer's Representative. Any reduction in this timing shall be agreed in advance with the Employer's Representative.
8. All survey control stations shall be carefully preserved except where construction requires their removal. Before such removal substitute stations shall be established by the Contractor to the satisfaction of the Employer's Representative.
9. Permanent markings for setting out shall not be applied to surfaces that will be retained at the end of the Contract.
10. The contractor shall make himself fully aware of the data available on the drawings and should consider any implications on services where vertical profile is not available. The contractor will at his own expense be required to alter the vertical profile of services and provide associated valves, bends, anchorages as required where such is warranted to avoid clashes or achieve a compliant design.

General Requirements

Accuracy of Setting Out

1. The Contractor shall ensure when setting out that he complies with all requirements for special accuracy and critical dimensions shown on drawings or otherwise specified. Where work is not otherwise specified the Contractor must not exceed the tolerances in BS5606.
2. The Contractor shall ensure that appropriate methods are employed to identify the accuracy of measurements to be made in verifying the Works.
3. The Contractor shall use appropriate instruments and methods and monitoring and control procedures to ensure that specified standards of accuracy are obtained and provide systematic checking as the work proceeds to ensure that the adopted methods, materials, monitoring and control procedures are adequate.
4. All equipment utilised by the Contractor and/or Consultants shall have a valid relationship to a recognised measurement control standard.
5. The Contractor shall take corrective action in respect of work not complying with the standard of accuracy or tolerances specified, including rectification of work already carried out, adjustment of methods or materials used, increased supervision of identified source of inaccuracy. When any adjustment of design and/or details may be required the Contractor shall immediately notify the Employer.
6. The Contractor shall, wherever satisfactory accuracy, fit and/or appearance of the work are likely to be critical or difficult to achieve, obtain consent to proposals or to the appearance of the relevant aspects of the partially finished work as soon as possible.

Setting Out

1. The Contractor shall accurately, truly, and properly set out the Works and be responsible for the correctness of the positions, levels, dimensions and alignment of all parts of the Works and shall provide all necessary instruments, appliances, materials, equipment and labour in connection therewith. The Contractor shall ensure the careful protection and reservation of all benchmarks, sight-rails, pegs and other materials/equipment used in setting out the Works.

APPENDIX 1/13: PROGRAMME OF WORKS

Programme of Works

1. The Contractor shall provide a resourced programme prior to the Starting Date, in the form of a Gantt / Bar chart (an electronic copy to be compatible with Microsoft Project or similar approved). This programme shall be produced as a result of critical path analysis and must abide by the constraints stated or implied in the Contract. It shall show the level of detail appropriate to each stage of the works, and all activities and restraints shall be given a short title. The Critical Path shall be clearly indicated. All events shall be numbered and annotated with earliest and latest event dates. Proposed plant and resources assigned to each element shall be indicated.
2. The critical path analysis referred to above shall be provided to the Employer's Representative. Appropriate phasing of the works shall be considered in the preparation of any Programme submitted to the Employer or his Representatives.
3. The Contractor will not be permitted to commence any work on site prior to obtaining written approval from the Employer's Representative that the proposed Works Programme complies with this Appendix to the Specification. Any delays in complying with this requirement shall be attributable to the Contractor.

Schedule of Stated Constraints

4. The Contractor shall note the following Schedule of Stated Constraints:
 - a. The Contractor's programme should consider that access to any residential and/or commercial units along or adjacent to the route should be kept open during the working hours of each individual business/property. The Contractor must liaise with each business/property owner/occupier to achieve agreement on times where access/entrances can be temporarily closed to facilitate the Works. This agreement must be in writing and issued to the Employer's Representative prior to commencement of the works.
 - b. The Contractor may only impact upon normal traffic on one section of the road at any one time per location. A section subject to traffic management must be reopened to full traffic flows prior to traffic management being put in place on a second section.
 - c. The extent of alterations to existing privately and publicly owned utility services are outlined 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 permanent alterations or diversions. In some cases, the services need to be altered temporarily for a period before the permanent alterations can be undertaken.
 - d. Site Extent and Limitations on Use (see Appendix 1/7);
 - e. Traffic Safety and Management (see Appendix 1/17);
 - f. Approval by the Employer's Representative of Works Proposals and changes to Subcontractors or personnel in accordance with the timescales stated or implied in the Contract;

- g. Trial sections and demonstrations as required under the Specification.
 - h. Requirement to erect temporary or permanent fencing in accordance with the requirements of Appendix 3/1 and any accommodation works agreements or requirements included in this contract.
 - i. Keeping all side roads and accesses to residential and commercial properties along the route open at all times during the works.
 - j. Adhering to temporary restrictions on working areas imposed by The Council where required to facilitate works by others on adjacent infrastructure.
 - k. Maintaining access to public and private properties for the duration of the works.
 - l. Maintaining existing rights of way at all times for the duration of the Contract.
 - m. Constraints on working hours for the purposes of limiting noise and vibration nuisance are listed in Appendix 1/9.
 - n. Any statutory limitations on site clearance.
 - o. Obtaining all road opening licences and tree felling licences required for the works.
 - p. Site closure periods including working time to decommission works in advance of clearing the site.
5. The level of detail to be provided in the programme should not be less than the following:

Level 1

Within 15 days after receiving the notice under Clause 4.9 of the Conditions of Contract and any subsequent revision to this programme a Gantt / Bar chart programme providing the following level of detail:

- (i) Roadworks and Structures (each section of the works and each traffic management phase)
 - (a) Mobilisation – (site offices/compound establishment)
 - (b) Fencing
 - (c) Site Clearance
 - (d) Safety Barrier
 - (e) Topsoil Strip
 - (f) Earthworks
 - (g) Structures
 - (h) Footpaths and Cycleways
 - (i) Controlled and Uncontrolled pedestrian crossings
 - (j) Drainage
 - (k) Capping Layer
 - (l) Sub-base
 - (m) Bituminous courses: Base and Binder Course
 - (n) Surfacing
 - (o) Signing and lining
 - (p) CCTV
 - (q) Demobilisation

- (ii) All privately or publicly owned services and supplies. The Contractor shall provide separate programmes in respect of each utility/body.
- (iii) Traffic management measures including operation of site access, plant crossings and temporary diversions for traffic. The Contractor shall be fully responsible for all traffic management associated with the works. Detailed traffic management proposals shall be submitted to The Council Traffic Department and the Employer's Representative for approval in accordance with Appendix 1/17, and shall take into account all pedestrian accesses, footpaths and private entrances.
- (iv) Accommodation Works.
- (v) Landscaping Works.
 - (a) Planting
 - (b) Grass seeding
 - (c) Removal of existing trees
 - (d) Planting trees
 - (e) Maintenance Period
- (vi) In addition to the above the Contractor shall make allowances for the following (non- exhaustive):
 - To provide vehicular (where currently available) and pedestrian access to all properties including businesses and schools at all times during the entire works.

Level 2

At least four weeks before the commencement of any item of work, Bar Charts of the detailed programmes incorporating the following details:

- (i) Each element of Works
- (ii) Roadwork's:
- (iii) Footways
- (iv) Cycle tracks
- (v) Roundabouts
- (vi) Utility services protection
- (vii) Accommodation Works
- (viii) Surface Water drainage

Progress

6. The Contractor shall ensure that the progress of the Contract Works is maintained both on and off the Site and shall take such measures as may be necessary to ensure that the periods for completion of the Contract Works are achieved.

7. The Contractor shall monitor his own performance against the Contract programme and prepare comprehensive reports for the Employer at agreed intervals in which reference is made to the viability of Sectional Completion, Practical Completion and any other dates shown.
8. The Contractor shall ensure that the progress of the Contract Works is maintained both on and off the Site and shall take such measures as may be necessary to ensure that the periods for completion of the Contract Works are achieved without additional expense.
9. The progress report is to be prepared and issued two days before each site meeting and shall include:
 - a. A statement of overall progress compared to that previously reported.
 - b. Actual progress achieved compared with that planned on the baselined construction programme, together with explanations of any differences. The report must cover in detail both activities on the critical path and activities that are crucial to completion, any changes in the critical path, coming critical activities, and activities approaching criticality. Any trends in progress shall be identified and where appropriate duration to completion of key activities shall be reported. Actual and potential sources of delay shall be highlighted, together with proposed corrective action and measures to mitigate the impact of delay. (Activity status reports shall be produced for all activities in progress identifying for each activity: planned and actual start and finish dates, +/- weeks, % complete as planned, % actually complete, and duration remaining to completion).
 - c. A report on off-site progress of design, procurement, lead-in activities, and manufacture/fabrication activities.
 - d. Information requirements and outstanding information, including both information to the Contractor, and from the Contractor to the Employer; identifying the dates that the information is required.
 - e. Details of Instructions issued and requested, and any Confirmation of Instructions issued by the Contractor.
 - f. Records of any incidents that may result in an insurance claim, affect tenants trading, or reported under the Health & Safety requirements.
 - g. Current technical queries.
 - h. Contract date for completion and sectional/phased completion dates, together with any extension of time agreed or being claimed (including reasons).
 - i. Labour (number and description of tradesmen, labourers, and supervisors), plant (number, type, and capacity of all plant excluding hand tools), and materials schedules; identifying any shortages and stating corrective action being taken.
 - j. Provide a monthly labour return, classified by trade, giving a total number of personnel employed on site and indicating the number of new starts.
 - k. Any difficulties and delays in the execution of sub-contracts, stating corrective action being taken.
10. After the production of the Progress Report the Contractor shall, if necessary, update the programme and/or method statement to demonstrate how he proposes to overcome any delays which may have occurred. The recommendations, changes in logic and/or durations

shall be submitted to the Employer in the form of a schedule indicating both the previous and amended data. The updated programme and/or method statement will come into effect only upon approval of the Employer.

11. Where the sequence of work on site is varied, the Contractor is to revise the Construction Programme to reflect such amendments and obtain the Employer agreement prior to the next monthly update.
12. The Contractor shall wherever possible achieve a continuous rate of progress on individual operations. The Contractor should avoid only partially completing an operation and then leaving it for an extended period.

APPENDIX 1/14: MONTHLY STATEMENTS

1. The Contractor shall submit Interim Payment Statements to the Employer's Representative in accordance with Clause 11 of the Conditions of Contract. The monthly statements submitted by the Contractor to the Employer's Representative in accordance with the Conditions shall, whenever dealing with matters covered by the Bills of Quantities, be set out under Part and Section headings similar to those in the Bill of Quantities and shall separately identify each item and specify quantity, unit, rate and value.
2. In respect of Compensation Events, the Contractor shall separately show in his Interim Payment Statement quantities, units and rate of goods and/or materials and also details of any other matters to which he considers himself entitled. The Contractor shall allow the Employer's Representative to inspect invoices for goods or materials included in the statement.
3. Where the Contractor's monthly statements include works for which the Contractor considers extra payment is due, then reference to orders given by the Employer's Representative, notices given by the Contractor in accordance with the Contract, and relevant records shall be stated.
4. The Contractor shall note the requirements of Clause 11 of the Conditions of Contract, and the deductions that may be levied for failing to comply with the referenced clauses within.
5. When the valuation amount is agreed between the Employer's Representative and the Contractor, and a certificate for payment issued by the Employer's Representative, the Contractor is to forward an invoice for that amount to the Employer for payment purposes.

APPENDIX 1/15: ACCOMMODATION WORKS

1. Accommodation works may be agreed during the period of the Contract, the Contractor should provide for working out of sequence while such agreements are finalised.
2. Accommodation Works and boundary treatment proposed by the Employer and included in the Tender Documentation are shown on the Accommodation Works Drawings listed in Appendix 0/4 of the Specification.
3. The Contractor shall complete any Accommodation Works as early as possible within the period for completion of the Works. Notwithstanding this, private access must be provided across the Site to adjoining landowners and affected parties to the same level as that which will be provided by the Accommodation Works until such time as the Accommodation Works are complete. The Accommodation Works shall be carried out in accordance with a stated programme of which each owner shall be kept informed.
4. Before any construction is begun in the vicinity of any property the Contractor shall, at his own cost, engage an independent engineer to prepare a written and photographic record of the internal and external condition of each property.
5. All services, for example water, electricity, telephone and drainage, that are interrupted or interfered with during the Works shall be repaired and reinstated without unreasonable delay, maintained in effective condition during the Works and finally restored to as good a condition as before commencement of the Works.
6. All ditches, open drains, water courses and field drains interfered with by the Works shall, as far as possible, be maintained in effective condition during the Works and finally be restored to as good a condition as before commencement of the Works. Particular care shall be taken to ensure that the minimum amount of damage or disturbance to land drains is caused. The position of all land drains cut or disturbed during excavation shall be permanently marked by pegs on both sides of the acquisition strip immediately following their location. Any permanently severed pipes shall be connected into a new drain and any pipe disturbed by the works shall be re-laid to ensure free discharge into the new drain. Disused ends of interrupted land drains shall be adequately sealed.
7. Commencement of accommodation works shall be at the discretion of the Engineer and the Contractor shall include in his rates for the sequence of accommodation works to be determined by the Engineer.
8. Access to all properties affected by the works must be maintained throughout the contract.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES**General**

1. The Contractor shall liaise with all local authorities and statutory undertakers and other bodies which have any jurisdiction with regard to the Works and shall obtain from them the location of all existing services and their requirements in relation to the Works.
2. The Contractor must satisfy himself as to the exact location of all services, prior to carrying out work in any area of the Site. Information, in relation to the location of existing services has been provided to the Contractor within Volume A Part B and within Volume 0 of the Tender Documents.
3. No arrangements have been made in respect of temporary alterations of service and supplies necessary for the execution of the works. The Contractor shall make arrangements with the Statutory Undertakers for such temporary alterations of service or supplies.
4. The Contractor shall make arrangements with the Statutory Undertakers and others concerned for the co-ordination of his work with all work that needs to be done by them or their Contractors concurrently with the Works. Compliance with the periods of notice given in this Appendix does not relieve the Contractor of his obligations.
5. Private services to individual properties have not generally been listed or shown on the Drawings. The Contractor shall make arrangements with the Statutory Undertakers and others concerned for the phasing of all necessary disconnections and diversions of private services affected by the Works.
6. Disconnected apparatus shall be removed by the Contractor only with the prior consent of the Authority concerned.
7. It may be necessary to extend some of the existing services and their protection to ensure that maintenance access is available outside the extent of carriageway construction.
8. The names, addresses and telephone numbers of the authorities and public utilities companies serving in the locality are available upon request.
9. The services and supplies affected by the Works are shown on the issued Contract drawings.
10. All chamber covers, gratings and frames are to comply to D400 unless service provider specifies a lower grade.
11. As part of the Works the Contractor must alter existing utility chambers and manholes in accordance with the Works Requirements. The Contractor must include, within the

Contract Sum, provision for working around live services, connections, and cabling within the chambers as part of the Works.

12. The existing services, as shown on the Contract Drawings, are contained within a variety of different types of ducting and pipework. The materials of the ducting and pipework varies from uPVC, Wavin and Concrete. The Contractor shall have provided for, within the Contract Sum, for working around and hand digging around these services and for providing due care so as not to damage, break or alter the existing service ducting and/or pipework.
13. The Contractor must liaise with all relevant 3rd Parties and Utility Providers in relation to their services, ducting and chambers prior to any alterations to same. The Contractor must ensure that there are no service disruptions to any existing service resulting from the Contractor's works.
14. The existing public lighting network within the site is to be repositioned as part of the works. Prior to the establishment of the final public lighting, when lighting is removed, to facilitate the works, the Contractor must erect temporary lighting prior to disconnection of the existing.
15. The existing CCTV poles, cameras and networks within the site extents are to be repositioned as part of the works. Prior to the completion of the final CCTV works, when the CCTV system, poles or cameras are altered as part of the works, as part of the Contractor's method of construction, the Contractor shall erect suitable replacements prior to disconnection of the existing CCTV.
16. Construction traffic, including all traffic at site accommodation areas, shall only be permitted to transverse buried services after protective measures which are agreed with the Employer's Representative have been implemented. The Contractor shall restrict construction traffic to approved designated crossing points only.
17. Disconnected apparatus shall be removed by the Contractor only with the prior consent of the Authority concerned.
18. Where necessary, the Contractor shall liaise with all service providers and ensure full co-ordination of inputs between each. The Contractor shall provide attendance on all service providers and shall set out the works.
19. The Contractor is responsible for locating and protecting any underground services in the vicinity of any excavations.
20. The Contractor is responsible for temporarily supporting any underground services in the vicinity of any excavations.

21. The Contractor shall refer to the HSA publication "Code of Practice for Avoiding Danger from Underground Services" and any other relevant publications when dealing with or working nearby underground utilities and services.
22. The Contractor shall refer to the ESB publication "Code of Practice on Overhead Electricity Lines in Construction" and any other relevant publications when dealing with or working nearby overhead lines.
23. The names, addresses and telephone numbers of the authorities serving in the locality are to be made available to the Contractor if required.
24. Services and Supplies affected by the works: The Contractor must liaise with each services provider and work within the notification periods as required by each service provider.

SPECIAL REQUIREMENTS IN RELATION TO TELECOM PROVIDERS

(EIR, BT/ESAT AND Virgin Media/UPC).

25. Prior to commencement of any works or moving heavy plant or equipment over any position of the Site in the vicinity of EIR, BT/ESAT AND Virgin Media/UPC plant or apparatus, the Contractor shall contact EIR, BT/ESAT AND Virgin Media/UPC directly to arrange a meeting on site to discuss the works proposals and confirm details of EIR, BT/ESAT AND Virgin Media/UPC underground equipment or plant with EIR, BT/ESAT AND Virgin Media/UPC. On notification of the Works by the Contractor, EIR, BT/ESAT AND Virgin Media/UPC will nominate a designated Liaison Officer to deal with the Contractor regarding the location and protection of existing plant.
26. The Contractor shall be liable for the safety and security of EIR, BT/ESAT AND Virgin Media/UPC plant, where the Works cause its disturbance or exposure, from malicious or other damage. In the event of damage, however small or insignificant it may seem, the Contractor shall immediately notify the Employer's Representative and report the occurrence to EIR, BT/ESAT AND Virgin Media/UPC.
27. The Contractor shall be liable for the cost of repair of all damage to EIR, BT/ESAT AND Virgin Media/UPC plant throughout the area covered by his contract and shall make his insurers aware that should damage result to existing EIR, BT/ESAT AND Virgin Media/UPC plant during construction work, EIR, BT/ESAT AND Virgin Media/UPC will seek to recover from the Contractor the cost of traffic loss (i.e. loss of revenue) in addition to the repair costs.
28. Should the Contractor's Works Proposals or method for construction of the proposed Works necessitate the temporary or permanent relocation of EIR, BT/ESAT AND Virgin

Media/UPC plant in certain areas both in longitudinal and transverse situations, the Contractor shall ascertain the extent of such relocation before commencement of the Works. The position of such relocations shall be agreed with the Employer's Representative.

29. Notwithstanding the provisions of the Works Requirements, the Contractor shall make every effort to ensure that EIR, BT/ESAT AND Virgin Media/UPC plant will be located clear of other services. Where the specified clearance cannot be obtained it may be necessary to shift the services. As a minimum, the following clearances should be provided:
- (a) Where EIR, BT/ESAT AND Virgin Media/UPC Plant and E.S.B. cables are placed in parallel situations the clearance should be 600mm (measured radially) for High Voltage Cables and 450mm (measured radially) for Low Voltage Cables.
 - (b) Where EIR, BT/ESAT AND Virgin Media/UPC Plant and E.S.B. cables cross, the clearance should be 300mm for High Voltage Cables with a concrete slab of not less than 75mm protecting the E.S.B. cable, and 100mm for Low Voltage Cables.
30. EIR, BT/ESAT AND Virgin Media/UPC will provide Cable Watchers who will be required when excavating close to existing working cables, specifically Fibre Optic, PCM and ETS Cables or where otherwise deemed necessary by EIR, BT/ESAT AND Virgin Media/UPC. The cost of this attendance on Site shall be recouped from the Contractor by EIR, BT/ESAT AND Virgin Media/UPC.
31. Where such details show that the Contractor's works or the movement of plant or equipment may endanger EIR, BT/ESAT AND Virgin Media/UPC plant the Contractor must give the liaison Officer for each provider at least one week's notice of the date of which it is intended to commence such work or movement of plant and equipment in order that the presence of buried plant can be indicated by markers to be supplied by EIR, BT/ESAT AND Virgin Media/UPC and placed by the Contractor under the supervision of an EIR, BT/ESAT AND Virgin Media/UPC representative. The Contractor shall ensure EIR, BT/ESAT AND Virgin Media/UPC plant is protected from danger.
32. In the event of an EIR, BT/ESAT AND Virgin Media/UPC marker being disturbed for any reason it shall not be replaced other than in the exact position and to its former depth unless the repositioning is carried out at the direction and under the supervision of an EIR, BT/ESAT AND Virgin Media/UPC representative.
33. The Contractor shall take particular care in relation to the protection of EIR, BT/ESAT AND Virgin Media/UPC Plant and Apparatus, where such Apparatus includes the presence within the Site of optical fibre and/or co-axial cabling. The Contractor should

particularly note that damage to such Apparatus is extremely disruptive to the Company network and costly to reinstate. The Contractor shall make every effort to avoid the disturbance of Apparatus more than is necessary for the completion of the Works in accordance with the Contract.

34. When excavating around, moving or backfilling around Apparatus, the EIR, BT/ESAT AND Virgin Media/UPC Representative shall be given adequate notice, which shall not be less than 3 working days of the Contractor's intentions in order that he may supervise the works.
35. All excavation adjacent to Apparatus shall be carried out by hand until the exact extent and/or location of Apparatus is known. Mechanical borers and/or excavators shall not be used within 1.0m of Apparatus without the supervisory presence of an EIR, BT/ESAT AND Virgin Media/UPC Representative. To prevent any movement of Apparatus during excavation, complete shuttering shall be used as directed by the Employer's Representative if: -
 - a. Excavation is deeper than the depth of cover of adjacent Apparatus.
 - b. Excavation is within 1.0m of Apparatus in stable soil.
 - c. Excavation is within 5.0m of Apparatus in unstable soil.
36. If for the completion of the Works the Contractor intends using any of the following: -
 - i) Pile driving equipment within 10.0m of Apparatus.
 - ii) Explosives within 20.0m of Apparatus.
 - iii) Laser equipment within 10.0m of Apparatus.

The Contractor shall advise the EIR, BT/ESAT AND Virgin Media/UPC Representative, giving at least 7 Working Days written notice, in order that any special protective measures for the Apparatus affected may be arranged.

37. All EIR, BT/ESAT AND Virgin Media/UPC manholes, joint boxes and/or other access points and chambers within the Site shall be kept clear and unobstructed. Access for vehicles, winches, cable drums and/or any further equipment required by EIR, BT/ESAT AND Virgin Media/UPC for the maintenance of its Apparatus, shall be maintained at all reasonable times. The Contractor shall particularly note that footway type jointing chambers are not specified for carriageway loadings and will need to be adequately protected and/or demolished and rebuilt under the supervision of an EIR, BT/ESAT AND Virgin Media/UPC Representative where such chambers are likely to be placed at risk, either temporarily or permanently, from the movement of plant and/or equipment on the Site.

38. The covers to EIR, BT/ESAT AND Virgin Media/UPC chambers and/or Apparatus shall only be lifted by means of appropriate keys obtained from the EIR, BT/ESAT AND Virgin Media/UPC Representative and under the direct supervision of the EIR, BT/ESAT AND Virgin Media/UPC Representative. No employee of the Contractor or of any sub-contractor employed by the Contractor shall enter any chamber and/or Apparatus of EIR, BT/ESAT AND Virgin Media/UPC unless under the supervision of the EIR, BT/ESAT AND Virgin Media/UPC Representative and in any case not before the mandatory gas check has been carried out in the presence of the EIR, BT/ESAT AND Virgin Media/UPC Representative and such checks have shown it to be safe to enter the Chamber and/or Apparatus. The EIR, BT/ESAT AND Virgin Media/UPC Representative shall be given reasonable access to all Apparatus and chambers when required.

SPECIAL REQUIREMENTS IN RELATION TO THE E.S.B.

Statutory Regulations :-

39. Where work is being carried out, all relevant statutory requirements must be adhered to. The Construction (Safety, Health and Welfare) Regulation 1975 states in Section 132, part xvi: "Before any operation or works to which these regulations apply are commenced and also during the progress thereof, all practicable steps be taken to prevent danger to persons employed from any live electrical cable or apparatus which is liable to be a source of danger, either by rendering such cable or apparatus electrically dead or otherwise". It is the duty of every Contractor to comply with the 1975 regulations and any subsequent revisions and amendments.
Working in proximity to live overhead cables.
40. The Contractor shall familiarise himself and his staff with the contents of the ESB Networks Publication "Avoidance of Electrical Hazards when Working Near Overhead Electric Lines" and ensure that all of the recommendations for safe working systems are implemented prior to any works commencing.
41. In particular, the Contractor shall note the requirements for attendance and supervision by ESB when such works are undertaken and ensure that suitable notification, but no less than 10 Working Days, is provided to ESB to arrange site attendance where required.

Working in proximity to live underground cables

42. The Contractor shall familiarise himself and his staff on safe digging practices and ESB Networks Job Sheet "Safe System of Working for Digging", its publication "Avoidance of Electrical Hazards when Digging" (available at http://www.esb.ie/esbnetworks/safety_environment/safe_digging.jsp) and HSA

publication "HSA Code of Practice for Avoiding Danger from Underground Services" (http://www.hsa.ie/eng/Publications_and_Forms/Publications/Construction/).

43. In particular, the Contractor shall note the requirements for attendance and supervision by ESB when such works are undertaken and ensure that suitable notification, but no less than 10 Working Days, is provided to ESB to arrange site attendance where required.
44. In all cases covered above, a care and maintenance system must be introduced by the Contractor in order to ensure that barriers and warning notices remain effective for the duration of the work.
45. Except under such restrictions as the ESB Representative may impose for the safety of persons and the protection of property **WORKS SHALL NOT BE CARRIED OUT** or cranes or other plant erected operated and/or dismantled or materials stored within the 'prohibited space' which is that space within a radius of: -
 - i) 15.0m of live overhead electricity lines where lines are carried on steel towers;
 - ii) 9.0m of live overhead electricity lines where the lines are carried on wood poles

Together with anywhere vertically above this space. These distances shall be maintained at all times between any Overhead Electricity Lines or anything connected to such Overhead Electricity Lines owned leased or rented by the ESB.

Potential dangers

46. The Contractor shall note the following:
 - (i) The Contractor and any sub-contractor employed by him shall particularly note and bring to the attention of their respective employees the danger of 'Flash-over' where as a result of the very high voltages being transmitted potential lethal shocks can occur in close proximity to live Overhead Electricity Lines WITHOUT ANY CONTACT BEING MADE.
 - (ii) Debris produced when trimming or felling trees and/or from demolition MUST NOT fall or be projected into the 'Prohibited Space'. Similarly excavation spoil must not be dumped or accumulated so as to cause infringement of the 'Prohibited Space'.
 - (iii) Special care MUST be taken when using material, which shall include but not be limited to, rope wire and/or measuring tape and the like.
 - (iv) The Contractor shall exercise particular care when carrying out work which involves the use of water jets or piped slurry. Liquids when being carried or used for the purposes of the Works MUST NOT be allowed to splash fall or

otherwise be projected into the 'Prohibited Space'.

- (v) If a crane or other equipment is used crane stops fencing and warning notices shall be provided by the Contractor to ensure that there can be no encroachment on the 'Prohibited Space' by crane load or other equipment even if the crane load or other equipment slips fails or overturns.
- (vi) Portable ladders used in the vicinity of live Overhead Electricity Lines shall be of wood or other non-conducting material and shall not be reinforced by metal attachments running along stiles of the ladders. Even ladders without reinforcement can lead to serious electrical shocks if allowed to come close to live overhead equipment and therefore special precautions must be taken to ensure that the ladder cannot slip and encroach on the 'Prohibited Space'.
- (vii) Any disturbance of or attachment to any Plant or Equipment or Electric Cables(s) shall ONLY be carried out by the Staff of the Company or its authorised contractors and/or agents.
- (viii) Long objects, which shall include but not be limited to, pipes scaffold poles ladders and/or long handled tools or any object of such length that if carried vertically could infringe on the 'Prohibited Space' MUST BE CARRIED HORIZONTALLY.

- 47. Work should not be carried out in the immediate vicinity of the overhead lines during periods of poor visibility. If this is not reasonably practicable additional precautions MUST be taken including but not limited to the erection of appropriate barriers to ensure maintenance of the appropriate safety clearances.
- 48. In the absence of specific information provided by the ESB, it must be always assumed that an overhead electric line is live.
- 49. The Contractor shall consult the ESB Engineers not less than fourteen days before it is proposed to commence where any underground or overhead electricity cables or apparatus will be affected by the proposed work. The Contractor shall make all necessary arrangements with the ESB to safeguard the cable or apparatus.
- 50. The permission of the ESB Engineers must be obtained in writing before plant or equipment is operated or work of any kind is carried out within 12 metres of overhead lines. The Contractor shall give at least one weeks' notice to the ESB Engineers of the dates upon which it is intended to operate plant or equipment or carry out any work for which permission has been given by the ESB's Engineers. Liaison with the ESB should be continued until the construction work has been completed.
- 51. Access for plant and materials and the working of plant should be under direct supervision of a responsible person appointed by the Contractor to ensure that the safety precautions are observed. Self-adhesive danger stickers (obtainable free from

the Board) that warn machinery operators of the hazards of working near overhead electric lines should be placed on the cab window of machines. Before starting work in the vicinity of overhead electric lines machinery operators should be briefed by the responsible supervisors on the dangers existing and the precautions to be observed.

52. Lateral clearance for Public Lighting i.e. horizontal clearance from the nearest conductor = Height of the column + 1 metre. The ESB should be consulted to provide clearances before any standards can be erected.
53. Other services should be 250mm from underground cabling except for where they run parallel which should be first cleared depending on the length of run.
54. In the event of the ESB requiring emergency and/or maintenance work to be executed on the Electricity Cable(s) whether Overhead Electricity Lines or Buried Electricity Cables during the period of the Contract the Contractor shall afford all reasonable facilities and access to the staff of the ESB or its authorised contractors and/or agents.
55. The Contractor shall make his insurers aware that should damage result to existing ESB plant during construction work, ESB will seek to recover from the Contractor the cost of traffic loss (i.e. loss of revenue) in addition to the repair costs.

SPECIAL REQUIREMENTS IN RELATION TO IRISH WATER AND THE COUNCIL

56. Galway County Council is the statutory authority for public road development and for co-ordinating foul and surface water disposal and water supply functions (if applicable). These functions are dealt with by:

WATER DEPARTMENT:

57. The Contractor shall always maintain close liaison with the appropriate Council Departments in connection with any works affecting their services or any of the Department's apparatus.
58. Before commencing work in the vicinity of the Department's works or apparatus the Contractor shall give the Environmental Services Department and Water Services Department reasonable notice.
59. Whenever requested, the Council will endeavour to indicate the approximate position of their sewers, manholes, water mains, ducting, cabling, and other apparatus, but before carrying out any excavation by mechanical means the Contractor shall expose

the services by hand to satisfy himself of the exact position.

60. The Contractor shall not permit heavy plant to travel over IRISH WATER sewers, water mains or other apparatus unless suitable protection plates or concrete slabs have been provided to the satisfaction of the Employer's Representative.

Programme, Routing of Vehicles

61. The Traffic Department and the Employer's Representative shall be fully informed of the Contractor's programme in respect of the public roads before the commencement of any operations that will impact on the road network. The proposed routing of vehicles on public roads, together with the necessary signing shall be approved by the Employer's Representative and the Traffic Department prior to the Starting Date.
62. In addition, the Contractor shall give at least 5 working days' notice to the Council Traffic Department and the Employer's Representative of any operations which may involve the use of public roads by Contractor's Plant and/or abnormally heavy volume or oversized construction traffic.

Precaution Against Damage

63. The Contractor shall take all necessary precautions to prevent damage which may be caused by his operations to existing infrastructure including road pavement, drainage outfalls, roadside drainage, kerbs, verges, road signs, fences, hedges etc. and shall indemnify the Council in respect of the consequent costs of making good any damage which may occur to these installations as a result of his operations.

Public Lighting and Traffic Lighting

64. The Contractor shall ensure that no damage to the existing lighting cable and equipment ensues from his roadwork operations. Before commencing any work or moving heavy plant or equipment over any portion of the site, the Contractor shall confirm details of underground cabling and ducting on site with the Council, or where a private supply exists, the relevant owner. Where necessary the Contractor shall provide temporary lighting where required. The Contractor's proposals for any required temporary public lighting shall be submitted to the Employers Representative or the Council for approval. No work is to be carried out until a temporary public lighting plan is approved.
65. Where such details show that the Contractor's work or the movement of plant or equipment may endanger lighting plant, the Contractor must give the Employer's Representative, the Council Public Lighting Department and Traffic Department at least

five Working Days' notice of the date on which it is intended to commence such work or movement of plant and equipment in order that the presence of buried plant can be identified. The Contractor shall ensure that lighting plant is protected from damage.

66. Where public lighting is currently provided along the route, the Contractor shall ensure that public lighting is maintained during the hours of darkness for the duration of the works. The standard of the lighting to be provided shall not be less than the standard currently provided, to the approval of the Employer's Representative / the Council Public Lighting Department.

Removal of Signs

67. All signs displaying the name of the Contractor or the name of Sub-contractor or of suppliers shall be removed from the site within six months of the date of the Certificate of Substantial Completion for the whole of the Works.
68. Emergency signs shall be removed one week prior to the issue of the Defects Certificate.
69. Information boards, if applicable, shall be removed one week prior to the issue of the Defects Certificate.

Liability for Costs

70. Should the Contractor after due warning be in default in any way in relation to the above requirements, the Employer's Representative and/or Employer will make the necessary arrangements to rectify the situation and will recover the expense thereof from the Contractor.

Special Requirements for Environmental Considerations

71. The Contractor shall identify all Controlled Waters (including ditches, which may be affected by the works) and the permanent or temporary discharge points to these watercourses.
72. The Contractor shall note that failure to provide suitable preventative measures to control surface water runoff and implement silt and pollution control measures on site could lead to prosecution under the Control of Pollution Act 1974, as amended by Schedule 23 of the Water Act 1989 and Schedule 16 of the Environment Act 1995. The Employer's Representative's approval for discharges will be required and the Employer's Representative may have to suspend work until adequate pollution prevention measures have been carried out where the Contractor is in breach of agreed procedure. Notwithstanding this, approval or otherwise of any method statement shall

not absolve the Contractor of any of his duties in relation to the above Environmental Considerations.

73. In the event of spillage of any polluting substance and/or pollution of any Controlled Waters, the Contractor must notify the Employer's Representative and the Council immediately by telephone. In this regard it should be noted that the Council can be contacted on a 24-hour basis.
74. Materials which may cause pollution shall not be stored near Controlled Waters nor shall they be stored in such a manner that they may fall or be carried into Controlled Waters. All refuse and debris arising from the site in the vicinity of Controlled Waters shall be collected and removed as required so that none may fall or be carried into the Controlled Waters.
75. If temporary sanitation cannot be connected to the public foul sewerage system, the Contractor shall apply to the Employer's Representative for consent for any discharge in compliance with Section 34(1) of the Control of Pollution Act 1974.
76. The Contractor must not use construction plant in any Controlled Waters without the prior written approval of the Employer's Representative. Such approval will only be given where it can be demonstrated that plant is secure from oil leaks, etc.
77. Where construction plant must cross watercourses, temporary bridges or culverts, it should be installed with suitable mud splashguards. The fording of any Controlled Waters will not be permitted without the Contractor obtaining the prior written approval of the Employer's Representative.
78. Construction plant washing facilities (including wheel washes) shall be designed to operate on total recirculation wherever possible. Where this cannot be achieved, the disposal of wash water to any Controlled Waters shall not take place without adequate settlement and oil removal prior to discharge. The Contractor will require the Employer's Representative's approval for such discharges.
79. Borehole drilling or other ground investigations can produce a polluting effluent, which may require treatment before being discharged to Controlled Waters. The Employer's Representative must be advised by the Contractor of the measures to be taken to prevent pollution before the commencement of any such operations liable to give rise to an effluent.

Oil Pollution

80. The Contractor must ensure that oil is stored well away from any drain or Controlled

Waters. Oil storage tanks must be located on an impermeable base and be surrounded by an impervious bund with no surface water outlet. The bund must be capable of retaining at least 110% of the volume of the tanks.

81. Valves and couplings connected to oil storage tanks must be located within the bund and delivery hoses should be fitted with trigger-type handles suspended back within the bund after use. Valves and trigger filler handles must be kept padlocked when not in use.
82. The transportation of fuel and oil across the site in drums or other containers must be avoided as far as practicable. Where this is unavoidable, extreme caution must be taken to avoid spillages or leaks. The Contractor shall hold adequate stocks of oil absorbent and containment materials on site. The Contractor must ensure that relevant staff are familiar with the use of these materials.
83. Surface water, together with any material which accumulates within the storage tank bund, must be removed by means of a mutually controlled positive lift pump. Oil contaminated water must be disposed of at an appropriate licensed tip site, incineration plant or oil recovery plant.
84. The Contractor shall ensure that personnel are nominated as being responsible for the supervision of the filling of oil storage tanks, vehicles etc. and that a "Nominated Person" is available at all appropriate times. Diesel pumps, generators and similar equipment shall be placed on drip trays to collect minor spillages or leaks.
85. Mobile fuel and lubricant servicing units must be provided with appropriate quality delivery hoses with trigger-type delivery nozzles. These vehicles, when not in use must be parked in a secure area within an impermeable bund. Vehicles and plant must not be refuelled near drains or Controlled Water. Oil powered pumps, generators and the like should be positioned on impervious drip trays surrounded by earth or sand bunds and located at least 10 metres from any Controlled Waters. The use of such plant adjacent to Controlled Waters is not permitted and the disposal of waste oil/oily waters from the drip trays must be by the methods outlined in this Specification.
86. The Contractor shall take all reasonable measures to ensure the security of his oil storage facilities from acts of wilful damage or vandalism.
87. The Contractor shall make precautions to ensure that no site works affect the appearance of the finished paved surface.

Concrete Works

88. Cement, grout and unset concrete (unless specialist products as approved by the Employer's Representative are used) must not be allowed to enter any Controlled

Waters. Prevention may be achieved by diverting the Controlled Waters away from the working area with fixed shuttering or sandbags or by damming the flow upstream and pumping it beyond the working area. The inlet to the pump should be screened. Residual cement or concrete must be removed from the original channel before the Controlled Waters are returned to it. The Contractor must obtain all relevant approvals from the necessary overseeing authorities before any diversion of Controlled Waters can proceed.

89. The Contractor must ensure that drainage from excavations where concrete is being, or has been, newly poured shall not be pumped or allowed to issue directly into Controlled Waters without the prior approval of the Employer's Representative.
90. Tools and equipment must not be washed in Controlled Waters. If it is necessary to wash equipment on site, this must be done well away from Controlled Water and wash water must not be discharged directly into Controlled Waters or road drains without appropriate treatment. The Contractor must ensure that if concrete has to be sprayed in the vicinity of Controlled Waters, (e.g. on retaining walls, etc.) suitable protective sheeting is provided to prevent rebounded or windblown concrete from falling into Controlled Waters. Rebound material must be cleared away before sheeting is removed.
91. The direct discharge from any concrete batching plant to Controlled Waters will not be permitted. Subject to consultation with the Employer's Representative a discharge to a soakaway may be permissible.

Miscellaneous

92. The Contractor shall take suitable precautionary measures as agreed with the Employer's Representative to prevent any material from falling into Controlled waters when concreting, bitumen spraying, blast cleaning or painting operations are being carried out above Controlled Waters.
93. The Contractor should note that any approval by the Employer's Representative of the Contractor's proposals will not relieve the Contractor of his responsibilities with respect to any pollution which may occur. The Council will not be held liable for any damage or pollution resulting from operations on the site.
94. The Contractor shall provide The Council Drainage Department in advance of the commencement of the Works the names of responsible personnel on site together with 24-hour contact telephone numbers.

SPECIAL REQUIREMENTS IN RELATION TO PRIVATELY OWNED SERVICES

General

95. Privately owned services include watermains, sewers, rising mains and all other services pipes, drains, valves, fittings, and manholes owned or held in trust for private individuals or groups, community groups or private or publicly owned Companies. The Contractor shall liaise with the owners of private services in connection with any works affecting these services, prior to and during these works.
96. The Contractor shall ensure that all private services affected by his works be maintained fully functional during the Works except for the short periods required for making connections to divert these services temporarily or permanently.
97. Connections to private services shall only be made by agreement with the owners of the services.
98. Where there is a possibility of Private Services being encountered, either on account of the Contractor's working methods, or based on updated information, before carrying out any excavation by mechanical means the Contractor shall locate and expose the services by hand to identify their exact location.

SPECIAL REQUIREMENTS IN RELATION THE OFFICE OF PUBLIC WORKS

General

99. The Contractor shall contact the Office of Public Works before commencing any works that may, either directly or indirectly, interfere with streams, rivers, and controlled waters.

SPECIAL REQUIREMENTS IN RELATION TO THE DEPARTMENT OF THE ENVIRONMENT, HERITAGE, AND LOCAL GOVERNMENT

General

100. The Contractor shall take all reasonable steps to permit access to the site by the Department or its representatives at all times and shall permit the Department or its representatives to survey and take such observations and measurements as it requires.

Protection of Natural Heritage Interests

101. The Contractor shall ensure that all personnel (Contractors, sub-contractors, Specialists, and suppliers) are informed of, and trained as necessary, on requirements for protection of natural heritage interests during the conduct of work and that all personnel are informed of any sites, features or species subject to statutory protection.
102. If any protected site, feature or species is inadvertently damaged as a consequence of the Works the Department shall be informed within 24 hours and all reasonable steps taken to accommodate the Department's recommendations in respect of repair or compensation for the damage.
103. If, at any time, a protected plant or animal is encountered, or evidence suggesting the presence of a protected animal is detected, the Contractor shall immediately inform the Employer's Representative and shall consult the Department to agree necessary actions.
104. If at any time and for any reason, construction activities or stockpiles of soil, spoil or other material, are liable to cause elevated dust deposition on areas or features of interest for nature conservation which would be adversely affected by dust, the Contractor shall, with the advice of the appropriate Advisor and in consultation with the Department, minimise dust generation and/or dispersion.
105. If at any time and for any reason construction activities are liable to cause levels of noise or vibration to affect any species or areas of interest for nature conservation or features of geological or physiographic interest which would be adversely affected by the noise or vibration, the Contractor shall, with the advice of the appropriate Advisor and in consultation with the Department, adopt means to minimise the noise or vibration.

SPECIAL REQUIREMENTS IN RELATION TO INLAND FISHERIES IRELAND

106. The Contractor shall take all necessary measures to minimise environmental damage to watercourses and waterbodies in the area impacted by the Construction Works.
107. The Contractor shall retain a copy of the following documents on site for the duration of the works and shall ensure that all relevant method statements for works near or on watercourses or waterbodies comply with the requirements within these reference documents:
 - Transport Infrastructure Ireland "Guidelines for the Crossing of Watercourses During Construction of National Road Schemes"

- Inland Fisheries Ireland "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites"
 - Inland Fisheries Ireland "Fishery Guidelines for Local Authority Works".
108. The Contractor shall take sufficient protective measures to ensure that no concrete or cement materials, silt, mud, earth or other solid materials or runoff shall discharge into any waters or onto any areas that may in the future runoff into surface waters.
109. The Contractor shall provide a method statement outlining his proposals for the safeguarding of watercourses from all construction materials and also for the storage of on-site materials.
110. All chemicals, fuels, oils and other liquids used on the construction site shall be stored in double skinned containers within suitably bunded areas. Chemical absorbent material will be always stored on site in accordance with a suitable contingency plan in the event of any spills. Such a contingency plan shall include the provision of oil booms at all times for use in the event of an emergency.
111. The Contractor shall observe the requirements of CIRIA document 532 – Control of Water Pollution from Construction Sites.
112. Prior to commencement of any works on site near watercourses or that may impact on watercourses, the Contractor shall arrange to meet representatives of the Inland Fisheries Ireland to discuss the scheme in advance of preparing and submitting a method statement to the satisfaction of the Inland Fisheries Ireland.

Gas Mains

113. Gas pipe installation shall in accordance with Guidelines for Designers and Builders – Domestic Sites document and Gas Networks Ireland, Standard Conditions of Contract for the Installation of Gas Supply requirements. All notifications and approvals shall be the responsibility of the contractor. The contractor shall on making contact with Gas Networks outline to the client any formal applications, payments and approvals required. The contractor will be required to include in his price all elements associated with liaison and delays associated with Gas Networks Ireland.

It shall be the responsibility of the contractor to ensure the Gas Networks can facilitate the provision of the gas lines at a time suitable to the contractor.

Any omission or instruction to the contractor for additional gas lines or removal of gas lines from the contractor shall be instructed in accordance with the contract and where gas main is not placed the trenching shall not be undertaken by the contractor and associated cost shall be removed.

Natural gas is a highly flammable gas; lighter than air and will rise when released; nontoxic (but can suffocate in enclosed or confined spaces); and made up mostly of methane and has a smell added for safety purposes. Behaviour During an uncontrolled escape, natural gas will behave in the following ways: In open excavation, where there is a clear path to the atmosphere, natural gas will rise, dilute and disperse into the air. If the path to the atmosphere is blocked, the gas will travel through soil, ducts, drains, sewers and voids. It can also follow the line of other buried utility services. This can lead to gas entering a building or other confined spaces and may lead to a fire or explosion. Gas Networks Ireland should be contacted when any work adjacent to Gas Mains is required.

Definitions:

- ## General

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5. All Private Bus Services are to be retained throughout the scheme. The Contractor shall liaise with all Bus Service Operators in order to phase the works to accommodate existing Bus services including arrangements for temporary bus stops.
6. The Contractor shall implement the Traffic Management System prior to the commencement of any works in the area governed by that Traffic Management Plan only on confirmation of approval from the Employer's Representative. The Traffic Management Plan shall show the sequence of construction, within the programme constraints of Appendix 1/13, and include the following information as a minimum:
 - Phasing of the works.
 - Drawings showing traffic management layout, including:
 - Geometric Design (where applicable)
 - Position of traffic signals
 - Width of lanes
 - Working areas and Safety zones
 - Access and exit locations for construction.
 - Signing
 - Road markings
 - Temporary public lighting
 - Temporary traffic lights
 - Provision for emergency services
 - Provisions for local access
 - Temporary Bus Stop positions
 - Provision for Pedestrians
 - Provision for cyclists
 - Timing and duration of operations
7. Drawings showing the Contractor's detailed Traffic Management Plans shall be at a scale not less than 1:1000, supplemented with drawings at 1:500 or 1:250 scales as necessary, or as required by the Employer's Representative. A3 drawings are acceptable.
8. The Contractor's traffic management proposals shall ensure that construction joints in the surface course are within 15mm of the lane road markings or centreline as deemed appropriate by the Employer's Representative.
9. The Contractor shall also include within his team a traffic manager whose responsibility it will be to liaise weekly with The Council where appropriate to maintain satisfactory arrangements for deliveries for the construction works, and to avoid congestion with

respect to implementation of approved Traffic Management Plans. All Traffic Management measures proposed by the Contractor must be agreed in advance with The Council Traffic Regulation and Safety section, An Garda Síochána and the Employer's Representative before being implemented.

10. The Contractor shall ensure that temporary measures are taken to ensure that any traffic control signals are maintained on the scheme during construction. The Contractor shall liaise with the local authority traffic department prior to disconnection and reconnection.

Undertaking the Works

11. All the works within public roads take place on roads with posted speed limits of 80kph. In accordance with Chapter 8 of the Traffic Signs Manual, the designation of the road for Traffic Management Design Parameters will be Level 2.
12. It is not permitted to fully close existing roads during the construction works as no suitable diversion routes are readily available to facilitate the temporary diversion of traffic.
13. It is envisaged that static lane closures will be required under this contract. A static lane closure is appropriate for works that are confined to a fixed location and where minimum lane widths can be maintained. Following lane closure design, the PSCS shall develop a suitable method of controlling traffic past the works site.
14. Temporary safety barriers placed around the working area should be clearly defined by temporary road markings, signage and coning as specified in the Traffic Signs Manual. The PSCS shall carry out a risk assessment before commencing any works on site, to determine the type of barriers (if any) and cones most suitable for the works.
15. Any temporary pedestrian and cycle tracks shall be properly segregated and protected from trafficked lanes and construction activities. Where works occupy footpaths then dedicated protected routes must be provided that do not require crossing of the carriageway in accordance with Chapter 8 of the Traffic Signs Manual. The routes must be adequately supervised and maintained to ensure that pedestrians do not encroach into the works area.
16. The Contractor shall programme the works with the aim of always ensuring the safety of pedestrians / cyclists and keeping the disruption to pedestrians / cyclists to an absolute practical minimum and provide the Employer's Representative with a method statement to demonstrate how he intends to do that.

17. It is the Contractor's responsibility to keep informed, inter alia by close liaison with the Gardaí, The Council and the Employer's Representative, of other ongoing or planned construction events, which may impact upon his works.
18. The Contractor must submit the developed Construction Stage Traffic Management Plan to for review and approval before commencement of construction. The Contractor is responsible for the erection, maintenance and removal of all traffic management measures and signage.
19. The Council procedures for road opening licences must be strictly adhered to for works on public roads. The Contractor is entirely responsible for obtaining Road Opening Licences and Road Closures as necessary to enable him to fulfil his contractual obligations.
20. Existing traffic, together with access for local property owners, schools and the emergency services, will have to be facilitated as part of the contractor's traffic management plan.
21. The Contractor shall continually risk assess all temporary traffic management installations to determine if the measures taken have had the desired effect in reducing traffic speeds to an appropriate level during the works. If traffic speeds are deemed inappropriate, the Contractor is to provide additional traffic management measures to reduce such speeds to a level appropriate to the works. The design of any such measures must be subjected to risk assessment which must be passed to the PSDP for review before being implemented.

Traffic Safety and Management

22. The Contractor shall be responsible for obtaining written approval of all Traffic Safety and Management, including Traffic Management Plans. The Contractor shall provide, erect and maintain such traffic signs, road markings, lamps, barriers and traffic control signals and such other measures as may be necessitated by the works in accordance with the following:
 - i) Traffic Control Layouts (in order of priority from a-f below)
 - a) The recommendations contained in Chapter 8 of the Traffic Signs Manual published by The Department of Transport, 2019, (hereafter known as Chapter 8).
 - b) The recommendations contained in "Guidance for the Control and Management of Traffic at Road Works", Department of Transport
 - c) The requirements of above-mentioned documents shall be provided insofar as they do not contradict the requirements of the Road Traffic Act 1961 and any subsequent amending and supporting legislation including

but not restricted to:

- The 1968 Road Traffic Act
- The 1994 Road Traffic Act
- The 1993 Roads Act
- The Road Traffic (Signs) Regulations 1997 (SI 181 of 1997) and the provisions of the law of Ireland in general and in particular.

- d) The sign background colour for all statutory and warning signage layout and sign working shall be in accordance with the requirements of the Irish DOE Traffic Signs Manual 1996, and amended Chapter 8, 2019.
- e) Safety zones in accordance with the requirements of Chapter 8 shall be provided with each Traffic Control Layout.
- f) In any event the layouts, traffic lane widths, safety zone widths, sign spacing, cone and barrier spacing and all other components of any proposed temporary road works layout, shall have the prior approval of The Council as appropriate and shall be submitted to the Employer's Representative at least 14 days prior to the installation of the Traffic Management measures. Any such Traffic Management Plan shall comply with the requirements of Section 2 (ii) of this Appendix 1/17.

- 23. Full time access to all properties and businesses must be maintained and managed. Should traffic- signal-controls be used then they must be vehicle actuated and suspended in favour of manually operated STOP/GO control to prevent unacceptable delays or queuing. Traffic management measures implemented must be cognisant of the large number of private and commercial accesses located along the route which must be actively managed.
- 24. Two-way access for pedestrians must be maintained in accordance with the Traffic Signs Manual at all times. Where works are to occupy footpaths then dedicated protected routes must be provided that do not require crossing of the carriageway in accordance with Chapter 8 of the Traffic Signs Manual. The routes must be adequately supervised and maintained to ensure that pedestrians do not encroach into the works area.
- 25. The Contractor shall allow for variable message signs (VMS's) in accordance with Chapter 8 paragraph 8.3.4 of the Traffic Signs Manual on approach routes affected by traffic management measures for the entire duration of the Works. The VMS's must be in place 2 weeks in advance of traffic management measures commence advising motorists of the upcoming road works and shall remain in place until 2 weeks after Substantial completion. VMS shall be sited clear of all junction and access visibility splays and locations are to be agreed with the Employer's Representative as part of the process for agreeing the Contractor's Traffic Management proposals.

26. A minimum of six (6) No. Variable Message Signs (VMS) shall be erected in advance of the Works and shall remain in place for the full duration of the Works.

Locate VMS at all approaches to town, see VMS road closure map for guidance, ie.

- 8 Creagh junction,
- 2Brackernagh on exit from N6,
- 11 R348 Mountbellew approach
- 9 Pollboy approach
- 18 Harris Road junction

at such additional locations as may be directed by the Employer's Representative, in consultation with the Galway County Council Area Office.

27. Regular meetings between the Employer's Representative, the Contractor, The Council, the Gardaí and other emergency services shall be arranged by the Contractor and shall take place throughout the Construction Period; as well as at initiation or changes of Traffic Management layouts and at any other time deemed necessary by any of these parties. Such meetings shall take account of any special events that may require Traffic Management Operations.
28. The works are to be programmed in such a manner as to reduce disruption to local residents, schools and businesses along the road.

Notice Requirements

29. When Temporary Traffic Orders are required for proposals put forward by the Contractor, he must submit his draft Order to the Council Traffic Department and the Area Engineer, allowing the following notice periods for approval:
- | | |
|--|------------------|
| a) Amending or making Traffic Orders | 6 weeks |
| b) Authorisation of non-prescribed sign | 6 weeks |
| c) Authorisation of Mobile Lane Closure | 6 weeks |
| d) Moving permanent sign to be compatible
state of the works as described in Clause 117.11. | 6 weeks with the |
| e) Authorisation of three-way signal control | 6 weeks |
| f) Approval for the use of Temporary Vertical Concrete Barriers | 6 weeks |

Notwithstanding the foregoing, those periods (if any) stated in Appendix 1/13 are not available for Traffic Management installations.

In addition, there shall be absolutely no impediment permitted to traffic or pedestrian movements during Christmas Moratorium period of 4/12/2026 – 8/1/2027.

Maintenance

30. While the Traffic Management System is installed on the carriageway, the Contractor shall ensure that the cones, signs, cylinders, barriers, lamps, temporary studs and markings (including any diversionary signs off site) are inspected regularly. In areas where resurfacing is required, the Traffic Management System shall be removed within 30 minutes of inactivity unless otherwise agreed with the Employer's Representative. The Traffic Management layouts shall be maintained in accordance with the requirements of Chapter 8 of the Traffic Signs Manual or as approved by the Employer's Representative. All Traffic Management operatives shall be trained to the industry standard.
31. The Contractor shall apply for, and obtain, any Road Control Licences as required by The Council Roads Control Section (i.e. T2 Permit or other as applicable to the nature of the works site) where works are proposed on the public road.
32. The Contractor shall be responsible for the maintenance of all public roads, site access roads and temporary diversions within the site until issue of the Certificate of Completion. In addition, maintenance of public roads outside the site boundary may be required, as directed by the Employer's Representative.
33. The Contractor shall keep a daily record of all defects, the times when they were identified or reported to him, 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 lane or carriageway occupation.
34. In the event of an accident occurring adjacent to any of the works, the Contractor shall immediately contact the Garda Síochána and the Employer's Representative informing them of the following:
 - Location of the accident
 - 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 any possibility of ignition from leaking chemicals.
35. The Contractor shall provide telephone numbers of a minimum of 3 No. personnel who can be contacted by the Garda Síochána and / or Employer's Representative both during

and outside normal working hours and who shall be responsible for initiating action should it be reasonably required in the event of an emergency.

36. The Contractor shall be responsible for maintaining the running traffic carriageway and any pedestrian routes adjacent to the Works in a clean, clear and safe condition at all times.
37. The Contractor shall maintain arrangements whereby he can quickly call out personnel outside the normal working hours to carry out any maintenance work needed for an emergency. The Employer's Representative shall be provided with a list of names, addresses and telephone numbers of the Contractor's staff who are responsible for the organising of emergency work.
38. In the event of an accident occurring within the site, and once broken down or damaged vehicles and debris have been removed, the Contractor shall, on the direction of the Employer's Representative, restore the road surface to its original condition, reinstate safety fencing and anchorages to the satisfaction of the Employer's Representative. The Contractor shall submit to the Employer's Representative within 48 hours fully detailed and separate records of plant, labour and materials used for restoration and reinstatement for record purposes.
39. The Contractor shall ensure that all signs, cones, barriers, delineators, and bollards used in connection with the Works shall be inspected and if necessary, cleaned regularly, at intervals not greater than once a week and when necessary. The Contractor shall ensure that all reflective patches and sleeves on cones or other delineators are cleaned or replaced at intervals of not greater than seven days, or as necessary to maintain effective reflectivity.
40. The Contractor shall be responsible for ensuring that temporary footpaths and cycle tracks must be sealed using either a bituminous bound material or concrete surfacing. Temporary footpaths and cycle tracks consisting of compacted aggregates will not be permitted.
41. Strict measures shall be put in place at construction access points to mitigate the risk of haul vehicles dropping fill or other construction material onto the existing road carriageway whilst hauling material to the site and also whilst exiting the site back onto the road network. Such measures must include:
 - Wheel Wash Facilities shall be provided on site at all times to ensure the wheels of every haul vehicle are kept clean and free of construction debris.

- Road Sweeper/Cleaner shall be available on site at all times to clean up any spillage from construction vehicles occurring on the road carriageway and to ensure that the existing road network is kept clean and free of construction debris.
- Measures to control dust generated by construction vehicles shall be provided on site.

Site Vehicles, Personnel and Plant

42. No vehicles shall exceed 30kph when travelling within the works areas of the site, and a maximum of 15kph speed limit is to be observed adjacent to works in progress, accommodation or standing plant. Temporary speed limit signs are to be erected as appropriate, or as directed by The Council or the Employer's Representative.
43. Only vehicles essential for carrying out the works shall be permitted within the works area. Non- essential vehicles, particularly private cars, shall not enter the working areas. The Contractor shall provide sufficient parking for employees' cars, and other-nonessential vehicles, at a location away from the working areas and shall provide transport to the site as necessary.
44. All vehicles travelling within the works area shall be equipped with a flashing amber lamp of sufficient intensity to be clearly visible in daylight. The flashing lamp must be visible from all angles and must not be obscured by any parts of the vehicle structure or load. Certain vehicles shall require more than one lamp. The use of "lighting bars" incorporating more than one lamp and/or prism reflectors is permitted. The use of Hazard lights as an alternative will not be permitted.
45. All necessary lighting, signs and notices for directing pedestrians and traffic throughout the carrying out of the Works are to be provided by the Contractor. If in the opinion of the Employer the lighting, signs and notices are inadequate the Employer reserves the right to arrange the necessary provisions and set off such costs against the monies due to the Contractor.

Road/Lane closures and other restrictions

46. No road closures Except specified in Appendix 1/7 will be allowed to carry out these works.
47. Working hours will be 08.00-18.00 Monday to Friday and 08.00am - 14.30 on Saturdays. Working will not be permitted on Sundays unless at the absolute discretion of The Council.

48. The Contractor shall at all times liaise with, and comply with the requirements of An Garda Síochána.
49. When excavating along the carriageway edge the Contractor shall ensure that the level difference between the carriageway and the works is never greater than 50mm within 0.5m of a running lane.
50. The minimum running lane width through the works shall be in accordance with the requirements of Chapter 8 of the Traffic Signs Manual. The Contractor shall develop his Traffic Management Plans such that two traffic lanes in each direction are maintained at all times unless agreed with The Council in advance.
51. Temporary warning sign W170: Other Hazard with supplementary plate P069 "No Road Marking" in accordance with 6.21.15 of the Traffic Signs Manual, subject to approval by the Employer's Representative, shall be displayed following resurfacing. The signs shall be required until road markings are reinstated.
52. Where temporary lane closures are required, the length of any lane closure shall not exceed 150 metres in length and flagmen with stop/go signs shall be used. Temporary lane closures on more than one section of the road shall not be permitted, unless otherwise agreed in writing with the Employer's Representative and The Council.

Manual Traffic Signal Control

53. Traffic flows shall be always monitored, and manual traffic signal control implemented should the situation demand, or at the request of the Employer's Representative. Operators shall be in radio contact at all times of manual control.

Signing before roadworks commence & Diversion Signing

54. "Works start here" signs shall be erected by the Contractor at least three weeks before start of works unless instructed otherwise by the Employer's Representative. Variable Message Signs (VMS) should be erected at least one week before the start of the works advising motorists the period over which the works will take place unless instructed otherwise by the Employer's Representative.

Maintenance Requirements

55. The Contractor shall sweep, patch, remove debris, restore road surface to its original condition using Dense Bitumen Macadam (delay set macadam shall not be permitted) and maintain the trafficked carriageway surfaces within the Site Limits and for 100 metres beyond each end, to allow traffic to pass safely within the speed restrictions of the sites. This shall be carried out, as a minimum, three times daily or as required by

the Employer's Representative.

Control of Dust and Mud on the Road

56. The Contractor shall keep all roads, accesses and rights of way, leading to, from or crossing the site free from mud, slurry and any other hazardous substance that is deposited through his operations. Any such substance deposited by the Contractor or his sub-contractors on any such road shall be removed immediately by the Contractor at his expense. The Contractor shall use a suction sweeper for this purpose, the use of a tractor and mechanical brush shall not be permitted.
57. The Employer's Representative shall have the authority to close any such site access if such a substance deposited is not promptly removed by the Contractor and any losses or expenses incurred as a result shall be borne by the Contractor.
58. The Contractor shall take all measures necessary to prevent spillage onto public roads adjoining the Site and all roads forming part of the Site. In wet weather the Contractor shall, using wheel washing equipment or other methods as approved by the Employer's Representative, prevent mud from the site being carried onto any surface or facilities in use by the public. In the event of these occurring, the Contractor shall take all necessary steps to ensure the roads are cleaned immediately using road vacuum sweepers, or similar methods to be approved by the Employer's Representative, without adversely affecting public traffic.

Local Roadways

59. Where construction work is required on side roads or junctions, which lie outside the Site Extents, the Contractor shall consult with The Council Traffic Department with regard to any restrictions that may apply.

Lane Closure Bulletin/Summary of Traffic Management Installations

60. The Contractor shall maintain a record of all Traffic Management operations implemented.
61. The Contractor shall submit to the Employer's Representative daily, in an electronic form compatible with MS Office applications or equivalent, a Lane Closure Bulletin detailing all Traffic Management restrictions on the Network, including nil returns.
62. Within 5 days of the completion of all Works, the Contractor shall provide the Employer's Representative, in electronic form compatible to MS Office applications or equivalent, with a summary of the Traffic Management Installations used.

63. The required reporting proforma for both the above submissions to the Employer's Representative is in Annex 1.
64. Roads closed for site access and Traffic Management Plan shall be agreed with both the Employer and the Employer's Representative prior to implementation.

Specific Requirements

65. Where Works are likely to impede on any local accesses or entrances, the Contractor shall give a minimum of 10 days' notice to the inhabitants of the impending works.
66. Where lane closures are likely to be required, the Contractor shall complete and issue the lane Closure Bulletin overleaf.
67. Where works are undertaken on public roads, the Contractor shall provide a minimum length of 25m of temporary safety barrier on the approach to the pedestrian crossing points as part of his traffic management works.
68. The Contractor shall not impede the right of way into any private access or business along or adjacent to the alignment. The Contractor shall take all measures necessary to ensure that access is always maintained.
69. The Contractor shall be fully responsible for all traffic management associated with the works. Detailed traffic management proposals shall be submitted to the Employer's Representative for approval in accordance with this Appendix, and shall consider all pedestrian accesses, footpaths and entrances to private developments.
70. The responsibilities of the Contractor shall include, but not be limited to the Co-ordination, co-operation and agreement with the Employer's Representative, The Council and the Garda Síochána in all matters relating to Traffic Management.
71. Where road opening is required for services or tie-ins, the Contractor shall obtain the relevant road opening licences to undertake the work. It should be noted that a separate road opening licence shall be required from The Council for each individual road opening.
72. The Contractor shall also provide information including qualifications of the Traffic Operations Supervisor, who shall be responsible for the implementation of the developed TMP onsite.

73. The Contractor is to provide and maintain and make available to the public a 24hr contact number for the PSCS/Contractor. Where access to residences or property is required then a suitable access/egress procedure should be agreed with the relevant parties and coordinated through the Temporary Traffic Operations Supervisor.

Publicity

74. The Contractor shall, for the duration of the Scheme, inform the Employer, AA Roadwatch, and other Traffic Information Outlets at least two (2) weeks in advance of any planned changes to the Temporary Traffic Management layouts.

Traffic Information Outlets

Outlet	Contact
AA Roadwatch	Tel: 01 6179539 Email: roadw@theaa.ie
Galway Bay FM	Tel: +353 91 770 077 / +353 91 770 000 Email: news@galwaybayfm.ie
Oranmore Garda Station	091 388 030

75. The Contractor is required to appoint a Liaison Officer as per clause 128.2 AR in these requirements who will be responsible for advising local residents, businesses, and property owners of proposed traffic management plans. The Liaison Officer is required to carry out a leaflet drop to all residences and businesses affected by any proposed traffic restrictions, 1 week prior to implementing any traffic management plan, and prior to any and all subsequent changes to traffic management.
76. The Contractor is to provide and maintain and make available to the public a 24hr contact number for the PSCS/Contractor. Where access to residences or property is required then a suitable access/egress procedure should be agreed with the relevant parties and coordinated through the Temporary Traffic Safety & Control Officer.
77. The Contractor shall inform the Traffic Information Outlets of any recordable delays (delays of 10 minutes or more) to through traffic affected by the Contractors Temporary Traffic Management Schemes.

Response to Faults and Complaints

78. The Contractor shall ensure that any fault, malfunction, or failure associated with temporary traffic signals, pedestrian signal equipment, warning signage, cones, barriers, or other Temporary Traffic Management measures is responded to promptly. Upon receipt

of a complaint, report, or notification of a fault—whether from the Employer’s Representative, An Garda Síochána, the Roads Authority, Traffic Information Outlets, or a member of the public—the Contractor shall attend the site within two (2) hours and take all necessary measures to make the situation safe. Where the fault relates to temporary traffic signals, the Contractor shall, where necessary, implement manned traffic control as an interim measure until the intelligent traffic signal system is fully restored.

APPENDIX 1/18: TEMPORARY DIVERSIONS FOR TRAFFIC

General Requirements

1. No temporary diversions have been agreed with The Council and the Contractor shall not rely on the approval of any temporary diversions when planning the works.
2. The Contractor shall consult with the Council where appropriate with regards any traffic management, including the rerouting of pedestrians, road closures or road opening licences required by the Contractor to complete the Works. Following this, the Contractor shall submit a formal application to the Local Authority for any statutory orders required to be made or notices required to be published. The Contractor shall allow a period of 6 weeks for the orders to be made and notices to be published.
3. All correspondence in relation to traffic management must be copied to the Employers Representative.
4. The Contractor shall provide for the construction and maintenance of all temporary roadways that are necessary for the temporary diversion of traffic wherever the Works interfere with existing public or private roads or other ways over which there is a public or private right of way, whether vehicular or pedestrian. Before proposing any temporary traffic diversions.
5. The Contractor shall provide for the construction and maintenance of all temporary traffic management necessary for the temporary diversion of traffic and or pedestrians wherever works are to be executed by a service or utility provider engaged by the Employer in the execution of works associated with the completion of the project.
6. The Contractor must ensure that all access and egress is maintained to all businesses and properties through the Works during the operating hours of each business/property. The Contractor must liaise with the owner/occupier of each business/property and obtain written agreement to obstruct any access/egress. The written consent must be issued to the Employers Representative prior to commencement of the Works.
7. The Contractor shall comply with the following provisions for constructing temporary roadways:
 - i The temporary roadways shall be constructed to an alignment and design approved by the Employers Representative. Any temporary diversions of National Roads shall be designed in accordance with the Design Manual for Road and Bridges to a design speed of 85Kph. Any temporary diversions of Regional, Local or Link roads shall be designed in accordance with the Design Manual for Road and Bridges to a design speed of 50Kph, unless noted

- otherwise and agreed with the Employers Representative.
- ii Temporary diversions of roads shall have a bituminous surface, consisting of not less than 100mm thick dense bitumen macadam on 200mm thick sub-base to Clause UGM A on a firm foundation.
 - iii The minimum cross fall or super-elevation shall be 3%, and gradients shall not be greater than 6 per cent (except where otherwise agreed in writing by the Employers Representative).
 - iv The minimum carriageway width, radius and headroom for temporary diversions and temporary roads shall be as follows:

	Width (m)	Headroom (m)
a) Single Lane Traffic	3.0	5.1
b) Two Lane – two way	6.0	5.1
c) Access Roads	3	4.25
d) Footpaths	1.8	2.5

- v The standard of construction and lighting of diversions shall be suitable in all respects for the class or classes of traffic using the existing carriageways.
- vi Suitable drainage is to be provided.
- vii Temporary road markings, traffic signs and barriers are to be provided as necessary.
- viii Temporary fencing/barriers shall be provided to separate pedestrians from vehicular traffic.
- ix Temporary footpaths and or cycle lanes shall consist of a 60mm DBM macadam wearing course over a 150mm granular subbase.
- x Where single file traffic is necessary on a public road by reason of the construction of the works, the Contractor shall, subject to the approval of the Employers Representative and the Local Authority, provide and maintain a minimum carriageway width of 3.0m or wider where necessary at curves, junctions and other locations specified in documents.
- xi When alternate one-way (shuttle) working of traffic is required, the Contractor shall provide and maintain time activated electric traffic light control signals and such traffic signs as may be approved by the Employers Representative and the Local Authority.
- xii Suitable locations shall be agreed with the Gardaí and the bus service operators for temporary bus stops where existing facilities are affected by the works.
- xiii The temporary road pavement shall be maintained during the construction of the works until such time as the traffic diversion is no longer required.
- xiv When the diversion is no longer required, the diversion materials are to be removed and the area treated as per the requirements of the Contract.

8. The Contractor shall supply details of the following for each temporary road diversion:
 - i Phasing of the Works
 - ii Drawings showing traffic management layouts including as follows:
 - (a) Position of traffic signs and signals
 - (b) Width of Lanes
 - (c) Working areas
 - (d) Safety zones
 - (e) Entry points for site vehicles, and the like
 - (f) Pedestrian and cycle access
 - (g) Access/Egress to each business/property along the works
9. The Contractor shall provide and maintain access to all existing properties adjacent to the Works during the working hours of each business/property. The Contractor must liaise with the owner/occupier of each business/property and obtain written agreement to obstruct any access/egress. The written consent must be issued to the Employers Representative prior to commencement of the Works.
10. Temporary traffic lights powered by a generator must comply with the requirements of Appendix 1/9 of this Specification.
11. The Contractor is to maintain all turning movements on the existing junction at all times throughout the works.
12. The Contractor must provide areas through the works to facilitate deliveries and collections from the businesses through the Works.
13. The existing traffic lights are to be maintained as operational until the new lights are switched on.
14. At least 4 weeks in advance with weekly repeat and daily repeat in the week prior to the proposed diversion of any temporary diversions required for the works the Contractor shall advise AA Roadwatch to make notices on local roads to advertise to the public the proposed diversions.

Temporary Diversions for Traffic Specified by the Employers Representative

<i>Description</i>	<i>Drawing Ref Number</i>	<i>Construction/ Requirements</i>	<i>Des Maintenance Requirements (including timescale Responsibility)</i>	<i>Remarks (including constraints and reinstatement details)</i>
NONE	NONE	NONE	NONE	NONE

Temporary Diversions Proposed by the Contractor

15. All proposals by the Contractor to comply with Clause 117, 118 and 119 of the TII Specification for Roadwork's.
16. Were the Contractor wishes to avail of a road closure and or traffic diversion an application must be made in the first instance to the Council where appropriate.
17. The application is subject to statutory procedure, the Contractor should provide for a minimum period of 6 working weeks for completion of the process.
18. Any closure will be restricted to a period of not exceeding 6 working weeks.
19. Any closure will be restricted to a maximum length.
20. At all times the Contractor will provide access and through traffic for local residents, businesses, deliveries to local businesses and emergency services as required. This information and layout must be included within all traffic management plans and applications to the Local Authority with respect to rerouting of vehicles and pedestrians.
21. All costs attributed to the application and execution of the temporary closure will be borne by the Contractor, this includes any temporary works to facilitate local access.
22. For the restrictions on the provision of temporary speed limits please see Appendix 1/17 Point 1.8 also see the Road Traffic Act of 2004.
23. The extents of any one section of works shall be limited to no more than 50m of open excavation at one time unless agreed otherwise with the Employer's Representative.

APPENDIX 1/19: ROUTING OF VEHICLES**Permitted Access to and from the site**

1. Access to the construction site will be permitted only from the controlled access points, off the public road, which shall be agreed in advance with the Employer's Representative. The access point shall have advance warning signage and will be suitably wide to allow access for all vehicles in one turning movement from the public road. Under no circumstances shall queuing of delivery vehicles be permitted on public roads. Deliveries to the Contractor shall not be permitted to arrive to site during peak traffic hours.
2. The Contractor, his sub-contractors and suppliers shall only use the permitted Access Routes for purposes in connection with the works unless otherwise agreed by the Employer's Representative.
3. Access into and out of the sites shall be directly from and onto the public roadway. Suitable works access and exits shall be provided in accordance with the Traffic Signs Manual Chapter 8.
4. Vehicles leaving the sites shall be subject to the requirements of Appendix 1/17 "Traffic Safety and Control", paragraph 27-29, "Control of Dust and Mud on the Road".

The use of Permanent works by Construction Traffic.

5. Trafficking of the pavement forming part of the permanent works by construction traffic shall be avoided unless measures approved by the Employer's Representative have been taken to protect it from damage. Approval from the Employer's Representative does not relieve the Contractor of his responsibilities under the contract.
6. No tracked machinery shall be allowed on finished pavement at any time during the works.

Loaded Dump Trucks

7. No licences will be issued to the Contractor on this project for loaded dump trucks on public roadways going to or from the site as part of the Contract. All materials removed from the site shall be by appropriately permitted vehicles/hauliers and shall be transported to a suitably licensed site. All such documentation shall be copied to the Employer's Representative prior to the removal of any material from the site.

Movement of Machinery and Plant Across Public Roads.

8. The Contractor shall limit all movements across public roads, but where this is deemed

necessary by the Employer's Representative, the Contractor shall erect advance warning signage to advise motorists of an impending crossing point, irrespective of the duration for which the crossing point shall be active, and use two flag men to manually control traffic for each crossing.

APPENDIX 1/20: RECOVERY VEHICLES FOR BREAKDOWNS

- 1 At all times when the public road has been restricted in width due to the Works, the Contractor shall be responsible for the removal of shed loads and vehicles that are stationary due to mechanical breakdowns, accident damage or have been abandoned in the trafficked road. The Contractor shall accept the instructions of the Employer's Representative or the Gardaí in connection with this service but generally will be required to remove the obstruction clear of the Works, such that the running carriageway is cleared in the shortest possible time. Should the Gardaí be unavailable then the driver's consent will be obtained prior to such removal.
- 2 The Contractor shall make no charge for this recovery service to the owner or driver of the recovered vehicle but will be deemed to have allowed in his Tender Total for meeting this requirement.
- 3 If a vehicle cannot be moved immediately and, in the opinion of the Employer's Representative and Gardaí, the traffic flows are heavy enough to justify such action; traffic shall be directed onto an emergency route.

APPENDIX 1/21: INFORMATION BOARDS

- 1 At all times when the public road has been restricted in width due to the Works, the Contractor shall be responsible for the removal of shed loads and vehicles that are stationary due to mechanical breakdowns, accident damage or have been abandoned in the trafficked road. The Contractor shall accept the instructions of the Engineer or the Gardaí in connection with this service but generally will be required to remove the obstruction clear of the Works, such that the running carriageway is cleared in the shortest possible time. Should the Gardaí be unavailable then the driver's consent will be obtained prior to such removal.
- 2 The Contractor shall make no charge for this recovery service to the owner or driver of the recovered vehicle, but will be deemed to have allowed in his Tender Total for meeting this requirement.
- 3 If a vehicle cannot be moved immediately and, in the opinion of the Engineer and Gardaí, the traffic flows are heavy enough to justify such action; traffic shall be directed onto an emergency route.

APPENDIX 1/22: PROGRESS PHOTOGRAPHS

The following specification fulfils the progress photographs requirements for the whole of the Works.

1 Ground Progress Photographs

A set of ground progress photographs – 1 digital copy. A set of ground progress photographs shall be taken at 1-month intervals and as directed by the Employers Representative. The first set shall be taken prior to commencement of the Works.

2 1 set of aerial photos every 2 months. The first set of aerial photos shall be taken prior to commencement of the Works.

1 set of aerial photos 2 months after Practical Completion

Location	Type	No.	Aerial/ Ground	Frequency Required	Remarks
Whole Works	Digital	1 No. Set	Ground/ Aerial	Start of Project, monthly during projects and on Completion of Project	To be carried out on the first working day of each month and delivered to the Employers Representative within 5 working days

APPENDIX 1/23: SUBSTANCES HAZARDOUS TO HEALTH

General

- 1 All works shall be carried out in accordance with the Health and Safety at Work (Construction) Regulations 2013 and any subsequent relevant legislation.
- 2 The Contractor shall provide the Employer's Representative with a copy of his Safety Statement and shall revise it as necessary considering 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.
- 3 The Contractor shall be aware of and take the necessary precautions detailed in SA 8/94 "Use of Substances Hazardous to Health in Highway Construction".
- 4 Non-exhaustive list of materials that may require special precautions e.g. concrete, cement dust, bituminous materials, mortar, grouts, resins etc.

Restrictions in relation to Traffic Management Measures

- 5 The Contractor shall not store or arrange unloading of any substances considered hazardous to health at or near any traffic management safety zones or systems.
- 6 Where any burning of road markings is to be undertaken on public roads, this shall be undertaken during off peak hours, excluding school opening and closing times in the locality.

Restrictions in Relation to Working Practices

- 7 The Contractor shall take all reasonable precautions to use substances that are not known to be hazardous to health for use in the construction of the contract. Where the use of such substances is unavoidable, the Contractor shall ensure that all employees are advised of the proper methods for use of such substances and the consequences of not following recommended use.
- 8 These substances shall be stored in accordance with the manufacturer's recommendations.
- 9 Where potentially hazardous substances are encountered during excavations or any part of the works, the Contractor should seek the advice of a specialist subcontractor regarding the identification, treatment and disposal of such substances.
- 10 The Contractor shall ensure that all hazard sheets for materials to be used in the works are displayed prominently in the stores, and that all employees can read and understand these sheets. In any event, the Contractor shall ensure that toolbox talks address the subject of all materials to be used in the works and their potential risks.
- 11 Suitable PPE equipment shall be provided at all times.

Measures to be taken to Protect Members of the Public

- 12 All work should be planned to avoid generating dust - a water bowser shall be on site to enable dust to be dampened down when necessary.
- 13 The Contractor shall be required to provide temporary screening where there is risk of dust, arisings or debris impacting on the public. This temporary screening shall protect members of the Public in close proximity to the works including motorists and other road users.

- 14 Screening shall be of sufficient construction to protect the public from substances potentially hazardous to health, which are being used by the Contractor or because of the works.
- 15 For minor cutting with hand tools a fine water spray should be used.
- 16 Live carriageways are to be protected from dust or spray arising from Site clearance (or construction) which might otherwise reduce visibility.

APPENDIX 1/24: QUALITY MANAGEMENT SCHEMES

- The following is the list of accepted quality management schemes referred to in sub-Clauses 104.3 and 104.4 of the TII Specification for Roadworks.

Scheme

- Description: Manufacturers of Portland Cement

<u>Certification Body:</u>	Or
BSI Group The Netherlands B.V. Say Building, John M. Keynesplein 9, 1066 Amsterdam Country: Netherlands	The Certification and Inspection Dep NSAI, Eolas, Glasnevin, Dublin 9

Specification:

- Cement shall be in accordance with the 500, 900, 1000, 1700 and 2400 Series of the Specification and shall be manufactured to comply with all of the appropriate requirements of one of the following British Standards or the equivalent Irish Standard or European Norm.

BS 12	-	Specification for Portland Cement
BS 146	-	Specification for Portland Blastfurnace Cements
BS 1370	-	Specification for Low Heat Portland Cement
BS 4027	-	Specification for Sulphate-Resisting Portland Cement
BS 4246	-	Specification for High Slag Blastfurnace Cement
BS 6588	-	Specification for Portland Pulverised Fuel Ash Cements

- Description: Supply and Erection of Fences

<u>Certification Body:</u>	Or
BSI Group The Netherlands B.V. Say Building, John M. Keynesplein 9, 1066 EP Amsterdam Country: Netherlands	The Certification and Inspection Dep NSAI, Eolas, Glasnevin, Dublin 9

Specification:

- General fencing shall be in accordance with Series 300 of the Specification and the

following or equivalent standards.

6. BS 1722: Parts 1 to 13 - Specification for Fences.
7. Safety fencing shall be in accordance with Series 400 of the Specification and the drawings referred to in the Contract.

Note:

This scheme applies for general fencing and safety fencing. The part of this scheme which relates to safety fences requires training on an approved course run through the Local Government Management Board or the Construction Industry Training Board.

8. Description: Manufacture of Safety Fencing Components

<u>Certification Body:</u>	Or	Or
BSI Group The Netherlands B.V. Say Building, John M. Keynesplein 9, 10 EP Amsterdam Country: Netherlands	The Certification and Inspection Dept. NSAI, Eolas, Glasnevin, Dublin 9	Lloyd's Register Verification B.V. K.P. van der Mandelelaan 41A Rotterdam Country : Netherlands

Specification:

9. Safety fencing components shall be in accordance with Series 400 of the Specification and the Drawings referred to in the Contract.
10. Description: Manufacture of Industrial Fasteners and Associated Items

<u>Certification Body:</u>	Or	Or
BSI Group The Netherlands B.V. Say Building, John M. Keynesplein 9, 10 EP Amsterdam Country: Netherlands	The Certification and Inspection Dept. NSAI, Eolas, Glasnevin, Dublin 9	Lloyd's Register Verification B.V. K.P. van der Mandelelaan 41A Rotterdam Country : Netherlands

Specification:

11. Nuts, bolts and fixings shall be in accordance with the 300, 400, 500, 1300, 1800, 2200 and 2500 Series of the Specification and shall be manufactured to the requirements of the following standards or their equivalent Irish or British Standard or European Norm.
 BS 3410 - Specification for Metal Washers for General Engineering Purposes
 BS 4320 - Specification for Metal Washers for General Engineering Purposes

- BS 4395 - Specification for High Strength Friction Grip Bolts and Associated Nuts and Washers for Structural Engineering
- BS 4933 - Specification for ISO Metric Black Cup and Countersunk Head Bolts and Screws with Hexagon Nuts
- ISO 898 - Mechanical Properties of Fasteners
 Part 1: Bolts, Screws and Studs
 Part 2: Nuts with Specified Proof Load Values
- ISO 4014 - Hexagon Head Bolts Product Grades A and B
- ISO 4016 - Hexagon Head Bolts Product Grade C
- ISO 4017 - Hexagon Head Screws Product Grades A and B
- ISO 4018 - Hexagon Head Screws Product Grade C
- ISO 4032 - Hexagon Nuts, Style 1 Product Grades A and B
- ISO 4034 - Hexagon Nuts Product Grade C
12. 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

Notes:

13. Where the Contractor can demonstrate that the fastener required is made by fewer than three firms within this scheme, the requirements to comply with the scheme shall be deemed not to apply.
14. Where the Contractor obtains fasteners from a stockist, the stockist shall be registered under Part 1 of the BSI Registered Stockist System. 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 requirements to comply with the System shall be deemed not to apply.

15. Description: Timber Preservation

<u>Certification Body:</u>	Or	Or
BSI Group The Netherlands B.V. Say Building, John M. Keynesplein 9, 1066 EP Amsterdam Country: Netherlands	The Certification and Inspection Dept. NSAI, Eolas, Glasnevin, Dublin 9	Lloyd's Register Verification B.V. K.P. van der Mandelelaan 41A Rotterdam Country : Netherlands

Specification:

16. Chemicals used and timber preservative treatment to be carried out shall comply with

Clause 311 of the Specification.

Note:

17. Timber used for general fencing shall be treated by firms registered by these bodies, and firms shall only obtain chemical specialities used in treatment from a registered source.
18. Description: The Manufacture, Supply and Verification of Lighting Columns and Bracket Arms

<u>Certification Body:</u>	Or	Or
BSI Group The Netherlands B.V. Say Building, John M. Keynesplein 9, 1066 EP Amsterdam Country: Netherlands	The Certification and Inspection Dept. NSAI, Eolas, Glasnevin, Dublin 9	Lloyd's Register Verification B.V. K.P. van der Mandelelaan 41A Rotterdam Country : Netherlands

Specification:

The manufacture, supply and verification of lighting columns and bracket arms shall comply with Series 1300 of the Specification and the Department of Transport's Departmental Standards BD/26 and BD/90 Part IV.

Description: Application of Road Markings

<u>Certification Body:</u>	Or	Or
BSI Group The Netherlands B.V. Say Building, John M. Keynesplein 9, 1066 EP Amsterdam Country: Netherlands	The Certification and Inspection Dept. NSAI, Eolas, Glasnevin, Dublin 9	Lloyd's Register Verification B.V. K.P. van der Mandelelaan 41A Rotterdam Country : Netherlands

Specification:

19. Road marking material shall be in accordance with Series 1200 of the Specification and shall be manufactured to comply with all of the appropriate requirements and the following standards.

BS 3262 - Hot-applied Thermoplastic Road Marking Material Part 2: Specification for Road Performance

BS 6044 - Specification for Pavement Marking Paint

BS 6088 - Specification for Solid Glass Beads for Use with Road Marking Compounds and for Other Industrial Uses

20. Description: Traffic Sign Manufacture

<u>Certification Body:</u>	Or	Or
BSI Group The Netherlands B Say Building, John M. Keynesplein 9, 1066 Amsterdam Country: Netherlands	The Certification a Inspection Dept. NSAI, Eolas, Glasnevin, Dublin 9	Lloyd's Register Verification B K.P. van der Mandelelaan 41/ Rotterdam Country : Netherlands

Specification:

21. All works shall be in accordance with the relevant Clauses of Series 1200 of the Specification.

22. Description: Installation and Maintenance of Electrical Apparatus and Cabling for Highway Lighting and Traffic Signs

<u>Certification Body:</u>	Or	Or
BSI Group The Netherlands B Say Building, John M. Keynesplein 9, 1066 Amsterdam Country: Netherlands	The Certification a Inspection Dept. NSAI, Eolas, Glasnevin, Dublin 9	Lloyd's Register Verificat B.V. K.P. van der Mandelelaan 41/ Rotterdam Country : Netherlands

Specification:

23. All works shall be in accordance with the relevant Clauses of Series 1400 of the Specification.

APPENDIX 1/25: PRODUCT CERTIFICATION SCHEMES

The following is the list of accepted product certification schemes referred to in sub-clauses 104.4 and 104.6.

1. Marked Schemes

(a) Kitemark or Irish Standard Mark (ISM)		
Certification	BSI The Certification and Inspection Dept.	
Body:	389 Chiswick High Road or NSAI, Eolas, Glasnevin, Dublin 9 London W4 4AL	
BS No. or Equivalent Irish Standard	Title	Specification Series
BS 12	Specification for Portland Cement	500 1600 1700
BS 65	Specification for vitrified clay pipes, fittings and ducts	500
BS 437	Specification for cast iron spigot and socket drain pipes and fittings	500
BS 1247	Manhole steps Part 1: Specification for galvanized ferrous or stainless steel manhole steps Part 2: Specification for plastic encapsulated manhole steps	500
BS 3262	Hot-applied thermoplastic road marking materials	1200
BS 3506	Specification for unplasticised PVC pipe for industrial purposes	500
BS 3656	Specification for asbestos-cement pipes, joints and fittings for sewerage and drainage	500
BS 4346	Joints and fittings for use with unplasticised PVC pressure pipes	500
BS 4962	Specification for plastic pipes and fittings for use as sub-soil field drains	500
IS 1	Portland cement	500 1600 1700
IS 5	Aggregates for concrete	500 1600 1700

BS 5481	Specification for unplasticised PVC pipe and fittings for gravity sewers	500
BS 5911	Precast concrete pipes, fittings and ancillary products Part 100: Specification for unreinforced and reinforced pipes and fittings and fittings with flexible joints. Part 103: Specification for prestressed non-pressure pipes and fittings with flexible joints Part 110: Specification for ogee pipes and fittings (including perforated) Part 114: Specification for porous pipes Part 200: Specification for unreinforced and reinforced manholes and soakaways of circular cross section Part 230: Specification for road gullies and gully cover slabs	500
BS 6044	Specification for pavement marking paints	1200
BS 6087	Specification for flexible joints for grey or ductile cast iron drainpipes and fittings (BS 437) and ventilating pipes and fittings (BS 416)	500
BS 6088	Specification for solid glass beads for use with road marking compounds and other industrial uses	1200
EN 124	Gully tops and manhole tops for vehicular pedestrian areas. Design requirements, type testing, marking, quality control.	500
EN 295	Vitrified clay pipes and fittings and pipe joints for drains and sewers	500
EN 598	Ductile iron pipes and Ductile iron pipes, accessories and the joints for sewerage applications. Requirements and test methods	500
EN 60920	Specification for ballasts for tubular fluorescent lamps. General and safety requirements.	1400
EN 60921	Specification for ballasts for tubular fluorescent lamps. Performance requirements.	1400
EN 60922	Specification for general and safety requirements for ballasts for discharge lamps (excluding tubular fluorescent lamps).	1400
EN 60923	Specification for performance requirements for ballasts for discharge lamps (excluding tubular fluorescent lamps).	1400
EN 61048	Specification for capacitors for use in tubular fluorescent and other discharge lamp circuits. General and safety requirements	1400
EN 61049	Specification for capacitors for use in tubular fluorescent and other discharge lamp circuits. Performance requirements	1400

(b) Safety Mark		
Certification	BSI The Certification and Inspection Dept.	
Body:	389 Chiswick High Road or NSAI, Eolas, Glasnevin, Dublin 9 London W4 4AL	
BS No. or Equivalent Irish Standard	Title	Specification Series
BS 5467	Specification for cables with thermosetting insulation for electricity supply for rated voltages of up to and including 600/1000 Volts and 1900/3000 Volts	1400
BS 6004	Specification for PVC-insulated cables (non-armoured) for electric power and lighting	1400
BS 6346	Specification for PVC-insulated cables for electricity supply	1400
(i) Reinforcing and prestressing steel		
Certification	UK Certification Authority for The Certification and Inspection Dept.	
Body:	Reinforcing Steels (CARES) or NSAI, Eolas, Glasnevin, Dublin 9 Pembroke House 21 Pembroke Road Sevenoaks Kent TN 13 1XR	
BS No. or Equivalent Irish Standard	Title	Specification Series
BS 4449	Specification for carbon steel bars for the reinforcement of concrete	1000 1700 2500

BS 4466	Specification for scheduling, dimensioning, bending and cutting of steel reinforcement for concrete. (Except that the contractor or manufacturer of pre-cast concrete products may opt to obtain straight bars from a firm within the Scheme and cut and bend them on site or at the pre-casting works respectively provided that the levels of inspection and quality assurance specified in BS 4466 are maintained.)	1700
BS 4482	Specification for cold reduced steel wire for reinforcement of concrete	1000 1700
BS 4483	Specification for steel fabric for the reinforcement of concrete	1000 1700
BS 5896	Specification for high tensile steel wire and strand for the prestressing of concrete	1700

2. Non-Marked Schemes

(a) Ready Mixed Concrete		
Certification Body:	The Quality Scheme for Ready Mixed Concrete or The Certification and Inspection Dept. Wolsey House NSAI, Eolas, Glasnevin, Dublin 9 3 High Street Hampton Middx TW 12 2SQ	
BS No. or Equivalent Irish Standard	Title	Specification Series
BS 12	Specification for Portland Cement	500 1000 1700
BS 146	Specification for Portland blastfurnace cement	1000 1700
BS 822	Specification for aggregates from natural resources for concrete	500 1000 1100 1700 2600

BS 1014	Specification for pigments for Portland cement and Portland cement products	1700
BS 1047	Specification for air cooled blast furnace slag aggregate for use in construction	1000 1700
BS 1305	Specification for batch type concrete mixers	1000 1700
BS 1881	Testing concrete Part 106: Methods for determination of air content of fresh concrete	1700 2600
BS 3148	Methods of test for water for making concrete (including notes on the suitability of water)	1700 2400 2600
BS 3797	Specification for lightweight aggregates for masonry units and structural concrete	1700
BS 3892	Pulverised fuel ash Part 1: Specification for pulverized fuel ash for use as a cementitious component in structural concrete	500 1000 1700
BS 4027	Specification for sulphate resisting Portland cement	1700 2400
BS 4246	Specification for high slag blast furnace cement Concrete admixtures Part 1: Specification for accelerating admixtures, retarding admixtures and water reducing admixtures Part 2: Specification for air entraining admixtures Part 3: Specification for superplasticising admixtures	1000 1700
BS 5328	Concrete Part 1: Guide to specifying concrete mixers Part 2: Methods for specifying concrete mixers Part 3: Specification for the procedures to be used in producing and transporting concrete Part 4: Specification for the procedures to be used in sampling, testing and assessing compliance of concrete	1000
BS 6588	Specification for portland pulverized fuel ash cements	1000 1700
BS 699	Specification for ground granulated blast furnace slag for use with Portland cement	1000 1700

APPENDIX 1/26: IRISH AGREEMENT BOARD ROADS AND BRIDGES CERTIFICATES

The following is a list of types of work, goods or materials for which proprietary products are required to have either an Irish Agreement Board Roads and Bridges Certificate or a British Board of Agreement Certificate.

Description	Specification Clause
Safety Fences and Barriers	400
Pipes for Drainage and/or Service Ducts other than those listed in Tables 5/1 and 5/2	500
Permanent Shuttering for Road Gullies	500
Fin Drains and Constituent Materials of Edge of Pavement Drainage	500
Prefabricated Temporary Road Marking Material	1200
Reflecting Road Studs	1200
Traffic Signal and Control Equipment	1200
Concrete Coating Material	1700
Paint Formulation	1900
Waterproofing for Bridge Decks	2000
Anchorage for Metal Parapets for Vehicle Containment	2200
Bridge Deck Expansion Joints	2300
Materials for Corrugated Steel Buried Structures	3200
Protective Coatings for Corrugated Steel Buried Structures	3200
Paved Invert Systems for Corrugated Steel Buried Structures	3200
Reinforcing Elements and Facing Units for Reinforced Earth	3200

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

Where types of work, goods or material for which proprietary products are required to have an Irish Agreement Board Roads and Bridges Certificate, a British Agreement Board Certificate shall be acceptable.

APPENDIX 1/31 AS-BUILT RECORDS**As-built Records**

1. The Contractor shall submit with any application for Substantial Completion Certificate for any part of the Works, to the Employer's Representative, complete as-built records for that part of the Works in conformity with this Appendix 1/31. Substantial Completion will only be certified for that part of the Works with accompanying complete as-built records in conformity with this Appendix 1/31. The Contractor shall retain and store a copy of all such records in accordance with the other provisions of the Contract.
2. As-built records shall be submitted in hard copy and on USB. One complete hard copy of the as-built records and three copies of each USB shall be supplied to the Employer's Representative fully labeled and indexed. The format for labeling and indexing shall meet the requirements of the Employer's Representative, as shall the electronic format of the data on the USB.
3. All drawings, references and sections within the USB copy shall be hyperlinked to their appropriate sections. All AutoCAD layers shall also be included in the as-built records. As a minimum, all drawings shall be provided in AutoCAD 2018 DWG format as extracted from the detailed compilation of all data in Civil 3D,, or equivalent as Approved by the Employer's Representative, and also in DWF format.
4. The particular requirements of the as-built records are that they shall include, as a minimum, the following:
 - i) All as-built records as specified for the Safety File in this Appendix 1/31;
 - ii) Design data as detailed within this Appendix 1/31;
 - iii) For design elements, one copy of each of all design drawings on A1 size paper clearly marked "As-Built Drawing"; and copies of all drawings in AutoCAD DWG and DWF format and schedules in Microsoft Word or Microsoft Excel format as appropriate and written to a DVD-ROM with a lifetime warranty;
 - iv) All records of below ground as-built services, ducts/cables and surfaces shall be portrayed and submitted in 2D/3D AutoCAD DWG and DWF file;
 - v) Photographs as specified in the Appendix 1/22;
 - vi) An "Execution and Completion Report" identifying the actual types of materials and construction that were used throughout the Works;
 - vii) Overall comprehensive ducting and cable schedule which matches the site wide identification/tagging system used.
 - viii) Each duct to be mapped to indicate its location and details of any cables contained therein;
 - ix) All details in respect of each cable shall be included in the schedule, including

but not limited to, product data, testing, certifying and commissioning of all cables as specified in Appendix 14/1.

- x) Overall comprehensive CCTV schedule which matches the recording as specified in Series 2900.
5. For the purposes of these As-Built Records, a defect shall mean a failure of any component in the Works during the construction of the Works, including, but not limited to, deterioration in the road pavement including chip loss, deterioration of trench reinstatement on roads, loose pavers, unexpected movement of earthworks slopes, evidence of poor drainage and the like, subsidence and/or movement of pavement works, and subsequent identification of the use of materials within the Works that would not have met the requirements of the Specification.
6. Where the Works involve alterations, or additions, to roads, utilities or other features outside the extent of the Site, the As-Built Records pertaining to such shall be in a separate file or separately identified so that it can be passed to The Council or other relevant utility provider. In such cases, it shall not be acceptable to cross-refer to other As-Built Records and the file, or part, shall be a stand-alone document.
7. The Defects Certificate will not be issued on any part of the Works until complete As-Built Records for that part of the Works in conformity with this Appendix 1/31 have been approved by the Employer's Representative.

Information to be supplied for the Safety File

8. The drawings and other information listed in this Appendix are the minimum requirements that shall be incorporated, as appropriate, to form the Safety File. The Safety File shall contain an index listing all drawings and other information provided with reference to information that shall be in other records to which the file cross-refers. The Safety File shall be submitted as an electronic file and in hard copy for the approval of the Employer's Representative.
9. The safety file for the Project shall in most instances be a composite document incorporating information on individual elements making up the project.
10. The following additional information, as a minimum, shall also be included in the Safety File for the Project:
- i) Hazardous materials data sheets;
 - ii) Relevant method statements, including, but not limited to, method statements for dismantling, modification or demolition of any Works;
 - iii) Operation and maintenance manuals; and
 - iv) Service requirements.

As-Built Drawings

11. As-built drawings shall be provided by the Contractor detailing all of the various elements of the Works and the following in Navisworks, including but not limited to;
 - i) All ducts clearly identified by a unique reference number;
 - ii) All chambers clearly identified by a unique reference number and these should be linked to a duct and chamber schedule in EXCEL;
 - iii) All services installed including all fittings, connections, chambers, and manholes including invert and cover levels;
 - iv) All cables installed on site;
 - v) Access control and communications equipment;
 - vi) All structures constructed as part of the Works including all sub-surface formation levels;
 - vii) All finished surface levels;
 - viii) All retained existing ground levels
 - ix) All existing services encountered and retained on Site;
 - x) All street furniture;
 - xi) All lighting columns, including all minipillars;
 - xii) All CCTV
 - xiii) All fencing and railing, and
 - xiv) Landscaping Works.
12. The drawings shall have all non-existing background information.
13. Drawings showing the construction of control and communications equipment in the Works shall be provided showing, as a minimum, location and details of the type of equipment and routes interconnecting cables and power supply.
14. Statements shall be provided detailing the equipment functionality.
15. Drawings showing the construction of landscaping Works shall be provided showing, as a minimum, the location and extent of planting and grass seeding areas including type of planting and seeding, species, numbers and sizes as appropriate.
16. Drawings shall be provided showing the location and extent of hard landscaping including type of material as appropriate.
17. Drawings shall be provided showing the areas of landscape cut and fill.

Design Information

18. Design information shall be provided including the following, as a minimum:
 - i) All details necessary to allow the works to be reviewed by a third party,

- ii) All details necessary to allow construction to proceed,
- iii) All details listed as a requirement of the As Built drawings,
- iv) Details of the design of any diversions required to utilities necessary for completion of the Works.

Construction Methods

- 19. Information shall be provided on methods of construction where special techniques were necessary, for example, de-watering or ground freezing.
- 20. Any significant unanticipated health and safety problems that arose during construction, and the steps taken to overcome them, shall be described.

Materials

- 21. The Contractor shall provide details of materials and products used in the Works. This shall list all suppliers by name, address and material product supplied. Where products or materials are covered by SI No. 619 Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001, the full details of the product or material specification shall be given.
- 22. Where sub-contractors are responsible for activities involving the construction, installation or application of products or materials, names and addresses of such sub-contractors shall be given.

Maintenance Facilities/Procedures/Manuals

- 23. Full information on maintenance facilities, procedures and manuals shall be prepared.
- 24. An operations and maintenance manual shall be provided for all plant, machinery or equipment forming part of the Works. The manual shall detail the methodology for comprehensive testing, routine maintenance, fault repair and testing. The operation and maintenance manual shall detail the following, as a minimum, in separate sections;
 - i) Introduction: Summary of the project history and purpose;
 - ii) Health & Safety: General commentary on the Health and Safety duties of the plant operatives, advice on specific hazards present on the plant and recommendations for dealing with visitors to the plant;
 - iii) Process Description: General description of the treatment process employed on the Plant. Each unit operation shall be described and its purpose as part of the process detailed;
 - iv) Control Philosophy: Description of how public lighting and CCTV is controlled and the objective of controlling it. This section shall also include the specifics of any computer software used to control the plant;
 - v) Process Parameters: Details of the plant process and control parameters.

- Details shall be provided for each individual item and for the overall plant;
- vi) As-Built Drawings: A3 size reduced copies of the final drawings detailing all installed items;
 - vii) Panel Wiring Diagrams: As-built details;
 - viii) Equipment Schedule: Detailed list of the equipment provided on the plant. Each item of equipment shall be identified complete with the details of the duty, manufacturer, nameplate, and consumables;
 - ix) Maintenance schedule: List of duties required of the operating staff separated into daily, weekly, monthly and yearly duties. Model record sheets shall be provided for guidance; and
 - x) Manufacturer's Literature: Original literature not photocopies, from the equipment manufacturers.
25. Hardcopies of the operations and maintenance manuals shall be provided in hardwearing 4 ring PVC binders with front and side labels indicating the project and manual title and the series number of the manual and the volume. Each manual shall include a table of contents which shall list the entire manual contents with the contents specific to the volume highlighted. The table of contents shall generally be as per the above list, with each of the main sections broken down into appropriate subsections. Each item of equipment shall have its own subsection in the section containing the manufacturer's literature. Dividers shall be provided for each section and subsection.
26. Electronic copies of the operations and maintenance manuals shall be provided on USB in PDF format, with identical content to the hardcopy, to allow the creation of a replacement hardcopy from the softcopy. The electronic copy shall be fully bookmarked to assist in its use.
27. The Contractor shall supply two hardcopies of the operations and maintenance manual, each containing an electronic copy of the manual, and a further three electronic copies.

Demolition

28. The Contractor shall provide information in respect of the health and safety implications to operatives and others where total or partial decommissioning, demolition or dismantling of existing elements is proposed.
29. The Contractor shall provide details of any health or safety implications that the removal of any plant, services, machinery or equipment, particularly electrical/electronic, may have on others outside of the Site.

APPENDIX 1/32 Sustainable Measures

The successful tenderer is required to submit a Carbon Footprint Analysis Report detailing the carbon emissions (kg CO₂eq*) of the project as well as an overall total carbon emissions calculation for the entire contract. The analysis report shall include:

- A calculation of CO₂eq emissions associated with the project to include a carbon emissions calculation of kgCO₂eq/KM² of road construction. Where Reclaimed Asphalt/other low carbon technique is proposed, a calculation of the kgCO₂eq savings of the business-as-usual scenario Vs CO₂ emission associated with the proposed Reclaimed Asphalt /low carbon technique shall also be given.
- The Report shall include emissions associated with 'cradle to gate' activities and include for Material Production, Plant Use, Material Transport, Staff Travel to Site, Fuel Usage, Laying Processes.
- To assist in the development of the report and in the calculation of carbon emissions, the successful supplier shall utilize an existing carbon tool for the roads sector such as TII Carbon Tool/ UK Highways Carbon Tool/Other. The chosen methodology shall be agreed with Galway County Council in advance.
- The Carbon Footprint Analysis Report shall be submitted within 4 weeks of substantial completion of the Contract.

* A carbon dioxide equivalent or CO₂ equivalent, abbreviated as CO₂-eq is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential (Source: European Commission).

APPENDIX 2/1: LIST OF BUILDINGS, ETC. TO BE DEMOLISHED

- a) All site clearance requirements are set out on drawings.
- b) The Contractor must liaise with any affected landowners and ensure suitable fencing has been erected to secure the affected properties prior to demolition.
- c) In relation to the demolition of existing utility chambers and manholes to facilitate the change in levels and introduction of ring beams please refer to the relevant drawing for the construction of new chambers and manholes.

APPENDIX 2/2: FILLING OF TRENCHES AND PIPES

- 1) All redundant ducts or services shall be grubbed out and backfilled as follows:
 - a) At depths not exceeding 1 metre all pipes, ducts and drains are to be grubbed out and backfilled to underside of proposed concrete pavement with Cement Bound Granular Material CBGM Type B Grade C10 to clause 822 of the Contract Specification. This may only be done when the owner of the equipment or the Employer's Representative has directed that they no longer require the existing ducts.
 - b) At depths exceeding 1 metre all pipes, ducts and drains are to be grubbed out and backfilled with Class 6F2 Capping Material to clause 613 and compacted in layers in accordance with table 6/4 of the Contract Specification up to formation level.
- 2) Removal of redundant ducts may only be done when the owner of the equipment or the Employer's Representative has directed that they no longer require the existing ducts.
- 3) When directed by the Employer's Representative only, redundant ducts, services and drains shall be left in place and filled with an approved flowable grout in accordance with clause 506.3 iii of the Contract Specification. [Example product is 'duct fill grout' by Kilsaran. Alternative Products must achieve as a minimum the same standard as the Example Product or the requirements of the Contract Specification]
- 4) All existing ditches / drains being made redundant by the development layout are to be backfilled with Class 808 material within the road/verge/footpath alternatively if within open space backfilled with selected excavated material Class 2C to Series 600 and compacted in layers and a filter drain provided along existing route where directed.

APPENDIX 2/3: RETENTION OF MATERIAL ARISING FROM SITE CLEARANCE

All materials arising from the demolition and site clearance process are to be disposed of offsite to an approved licenced waste facility. The contractor is to submit to the Engineer the permits for both transportation and disposal of the haulier and licence facility respectively at least 2 weeks prior to material been disposed of offsite.

The Contractor shall note that the local Tidy Towns Committee (a local voluntary group) has expressed an interest in salvaging and reusing plants from the landscaped Grand Canal Roundabout and the landscaped traffic island in front of the Marina that have been identified to be removed as part of the Works.

The Contractor shall:

- a.** Prior to commencing removal of any planting, liaise directly with the nominated representative of the Tidy Towns Committee to agree arrangements for:
 - The method and sequence of plant removal;
 - Timing of removal works;
 - Temporary storage of salvaged plants, where required;
 - Collection and transportation of plants from the site or agreed off-site storage location;
and
 - Health and safety requirements associated with these activities.
- b.** The Contractor shall exercise due care during removal operations to maximise the survival and reuse potential of the plants. Plants shall be carefully excavated, protected from damage and, where agreed with the Tidy Towns Committee, temporarily stored in a suitable location off-site pending collection.
- c.** The Contractor shall provide 2 weeks' notice to the Tidy Towns Committee in advance of any plant removal operations. Any plants not collected within the agreed timeframe, or which are deemed unsuitable for reuse due to their condition, may be disposed of by the Contractor in accordance with the Contract requirements.
- d.** The Contractor shall make no additional claim for delay, disruption, storage, handling or coordination associated with the salvage and transfer of planting, and shall be deemed to have included all associated costs in the Contract Sum.
- e.** Tidy Towns Contact details will be provided on awards of tender.

APPENDIX 2/5: HAZARDOUS MATERIAL

1. The Contractor shall ensure that appropriate measures are taken to safeguard the health of the Contractor's operatives and the general public for the duration of the works.
2. In the event that hazardous materials are discovered on the site, the Employer's Representative is to be informed immediately.
3. The Employer's Representative has the right to request that tests be carried out on any suspected hazardous materials to determine their exact nature.
4. Under certain circumstances, specialist contractors may be required to remove the hazardous materials from site. The Contractor shall seek the approval of the Employer's Representative where the services of a Specialist Contractor in accordance with Appendix 6/2 are to be engaged. The Contractor shall ensure that the Specialist Subcontractor, if any, shall comply with all relative legislation regarding the required permits and licensing for the disposal of hazardous materials.
5. Hazardous materials arising from site clearance and/or excavations shall be disposed of only at licensed sites.
6. The Contractor shall note the following non-exhaustive list of legislation, which applies to Employers and Employees when working in the vicinity of Asbestos;
 - European Communities (Protection of Workers) (Exposure to Asbestos) Regulations 1989
 - European Communities (Protection of Workers) (Exposure to Asbestos) (Amendment) Regulations 1993
 - European Communities (Protection of Workers) (Exposure to Asbestos) (Amendment) Regulations 2003

Others;

 - The Safety, Health and Welfare at Work Act 2005
 - The Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001
 - The Safety, Health and Welfare at Work (Carcinogens) Regulations 2001
7. It should be noted in particular that the European Communities (Protection of Workers) (Exposure to Asbestos) Regulations 1989 require that employers must seek to eliminate, reduce, enclose, or at a last resort to use personal protective equipment. The requirement to implement safe working procedures shall be determined by a risk assessment to determine primarily the type of Asbestos.
8. It is a requirement of the Contract that the Contractor carries out all works associated with the implementation of the above legislation and all other relevant legislation. This includes not only for the protection of workers during the removal phase but also the safe disposal of asbestos materials (in whatever form) to a disposal site in accordance with the Local and National guidelines / legislation governing the Safe Disposal of Asbestos materials.

APPENDIX 3/1: FENCING, GATES AND STILES

Locations of Fences, Gates and Stiles

1. The location of fencing, gates and stiles are shown on the Contract drawings.

Fencing.

2. Refer to the 300 series drawings for the locations and details of proposed timber post and rail fencing.

Temporary Fencing

3. Temporary fencing shall be at the discretion and cost of the contractor and agreed with the Employer's Representative prior to erection.
4. Temporary fencing shall be installed to demarcate the Extent of Works, to protect identified structures to be protected on site, to protect designated trees and areas of open space on site. All temporary fencing shall be in place 1 week prior to the commencement of works on site. The line of all temporary fencing shall be set out and agreed with the Employer. Note temporary fencing erected must not hinder access to adjacent properties or dwellings.

APPENDIX 3/2: FENCING: TRANSPORT INFRASTRUCTURE IRELAND ROAD CONSTRUCTION DETAILS

All fencing to be provided as part of the works must comply with Series 300 of the Transport Infrastructure Ireland Specifications for Roadworks Volume 1 and Volume 4. The Transport Infrastructure Details from Volume 4 of the Specifications for Roadworks are shown but not limited to the list below.

TII Standard Detail Drawing Number	Title
CC-SCD-00301	Timber Post and Rail Fence Types A and B
CC-SCD-00302	Stud Fence
CC-SCD-00303	Concrete Post and Rail Fence
CC-SCD-00304	Timber Post and Wire Fence
CC-SCD-00305	Cleft Chestnut Pale Fence
CC-SCD-00306	Concrete Post and Mesh Fence
CC-SCD-00317	Steel Palisade Security Fence
CC-SCD-00318	Cranked Concrete Post and Mesh
CC-SCD-00321	Timber Post and Tension Mesh Stud Fence

APPENDIX 5/1: DRAINAGE REQUIREMENTS

General

1. The existing and proposed surface water drainage layouts, where applicable, are shown on the 0500 Series Drawings.
2. The location of the existing drainage is to be confirmed on site and the information to be provided to the Employer's Representative.

Surface Water Drainage Pipework

3. The surface water carrier drains will be as detailed on the Contract drawings and in accordance with Irish Waters Code of Practice. Pipes must be fully BBA approved and HAPAS approved. Pipes must have 1.2m cover minimum cover in trafficked areas. Concrete surround to be provided if cover is less than 1.2m but this must be agreed in writing with the Employer's Representative.
4. The requirements for bedding and backfill materials are indicated on the 500 series drawings.
5. The width of the trench required is in accordance with TII CC-SCD-00521. The trench should provide for a minimum of bedding below pipe as per TII CC-SCD-00521 or as per manufacturers recommendations, whichever is more onerous. Local soft spots must be removed and filled in accordance with TII specification for works. The pipe must sit evenly on the bed and must be free of voids under the pipe. Bedding shall be as indicated on the 500 series drawings.
6. Bedding to be in accordance with TII CC-SCD-00521 or manufacturer's requirements, whichever is more onerous.
7. Compaction above pipes should not be carried out until a minimum cover of 300mm is achieved. Compaction equipment shall be sized so as not to exert and undue stress on the pipe. Further backfill to the required level should be carried out in layers no greater than 150mm.
8. Gully pipes shall be concrete pipes of 150 diameter shall be Class 120 spigot and socket joints with rubber ring fittings (fitted in accordance with manufacturers specification) to comply with IS EN 1916 and IS6.
9. Where uPVC pipes are used they shall have Type Z bedding and surround in accordance with CC-SCD-00521. The Contractor is advised that the works involve gully connections crossing the proposed road. It is the Contractor's responsibility to adjust the level of existing and proposed services locally to accommodate the gully connections crossing the road. It is the Contractor's responsibility to liaise with the various service providers in this regard.

Jointing

10. Pipes are generally manufactured in 6 metre lengths and are joined with straight couplers or suitable fittings (e.g. tees, wyes, bends etc.)
11. Pipes should provide a fully watertight seal when installed.
12. Leak tightness should be in accordance with BS EN 1277:1997. Note, the maximum permitted angular deflection is 2°.
13. Rubber seals used in watertight applications must be in accordance with BS EN 681-1:1996
14. Manufacturer's recommendations should be followed for joining of pipes.

Jointing uPVC Pipes

15. The handling, installation and jointing of uPVC pipes shall be in accordance with the provisions of "Recommendations for Handling and Installation of Unplasticised PVC Pipe" (Ref. SR.3) or "Recommendations for Handling and Installation of uPVC Buried Drains and Sewers" (ref. SR7) as appropriate. Both documents are published by the National Standards Authority of Ireland.

Handling and Storage of Pipes

16. Handling should be done carefully and in accordance with national health and safety guidelines. Dragging of pipes and fittings must be avoided. HDPE pipes and fittings become slippery in wet or in cold weather and extra precautions may be necessary.
17. All pipe stacks should be made on firm, flat ground to support the weight of the pipes and lifting equipment. For safety and Pipes and fittings should be transported and stored in their packaging.
18. The stacking height for pipes should be limited to not more than 3 meters. Pipes should be not be stored in open areas subject to high winds. It is recommended that pipes are not stored in direct sunlight for more than 3 months.

Tolerances for Pipelines, Shafts and Tunnels

19. The position of the internal face of any pipeline, shaft or tunnel shall not deviate from that described in the contract by more than the following permissible deviations:

Work Category	Dimension or Alignment	Possible Deviation
Pipeline	Line and Level	20mm
Pipe Jacking	Line	75mm
	Level	50mm
Shafts and Chambers	Vertically	1 in 300

Shafts and Tunnels	Finished Diameter	1% but not exceeding 50mm
Tunnels without secondary lining	Line (shield drive)	75mm
	Line (hand drive)	50mm
	Level (shield drive)	50mm
	Level (hand drive)	25mm
Tunnels with secondary lining.	Line	20mm
	Level	10mm
Shaft, tunnel and sewer lining segments	Maximum lipping between edges of adjacent segments	5mm

Junctions and Laterals on Sewers

20. Laterals shall be laid from the junctions to the boundary of the properties.
21. Junctions and laterals shall be effectively sealed with an end cap, the location of which shall be positively indicated.

Cleansing of Pipelines

22. On completion of construction internal surfaces of pipelines shall be cleaned thoroughly in such a way as to remove all oil, grit and other deleterious matter.

Precautions Prior to Testing Pipelines

23. Before testing any pipeline, the Contractor shall ensure that it is anchored adequately and that thrusts from bends, branch outlets or from the pipeline ends are transmitted to solid ground or to a suitable temporary anchorage.
24. Open ends shall be stopped with plugs, caps or blank flanges properly jointed.
25. Testing against closed valves shall not be permitted without the prior written consent of the Employer's Representative.
26. Should the Contractor be compelled to test against a valve, the valve shall have been tested at the manufacturer's works to the full maximum test pressure before delivery on site.

Notification of Test

27. The Contractor shall notify the Employer's Representative at least one clear working day beforehand of his intention to test a section of pipeline.

Testing Non-Pressure Pipelines

28. Non-pressure pipelines laid in open cut shall be tested after they are jointed and before

any concreting of backfilling is commenced, other than such as may be necessary for structural stability whilst under test.

29. The pipelines shall be tested by means of an air and water test in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) documents and by a closed circuit television (CCTV) examination as specified in the contract, in lengths determined by the course of construction, in accordance with a programme approved by the Employer's Representative.
30. A further test shall be carried out after the backfilling is complete.

Water Test for Non-Pressure Pipelines

31. This testing should be in accordance with the GDSDS.
32. The test pressure for non-pressure pipelines up to and including 750mm nominal bore shall be not less than 1.2m head of water above the pipe soffit or ground water level, whichever is the higher at the highest point, and not greater than 6m head at the lowest point of the section. Steeply graded pipelines shall be tested in stages in cases where the maximum head, as stated above, would be exceeded if the whole section were tested in one length.
33. The pipeline shall be filled with water and a minimum period of 2 hours shall be allowed for absorption, after which water shall be added from a measuring vessel at intervals of 5 minutes and the quantity required to maintain the original water level noted. Unless otherwise specified, the length of pipeline shall be accepted if the quantity of water added over a 30 minute period is less than 0.5 litre per lineal metre per metre of nominal bore.

Air Test for Non-Pressure Pipelines

34. This testing should be in accordance with the GDSDS.

CCTV Inspection of Pipelines

35. This testing should be in accordance with the GDSDS.
36. Where internal inspection of pipelines by CCTV is required, the Contractor shall provide all necessary equipment, including suitable covered accommodation for viewing the monitor screen, together with personnel experienced in the operation of the equipment and interpretation of results.
37. The intensity of illumination within the pipe and the rate of draw of the camera shall be such as to allow a proper examination of the inside of the pipe. Provision shall be made for the movement of the camera to be stopped and its position recorded and for permanent photographs to be taken at any point requested by the Employer's Representative.

Infiltration

38. Non-pressure pipelines (including tunnels) and manholes shall be tested for infiltration and backfilling. All inlets to the system shall be effectively closed, and any residual flow shall be deemed to be infiltration.
39. The pipeline, including manholes, shall be accepted as satisfactory if the infiltration, including infiltration into manholes, in 30 minutes does not exceed 0.5 litre per lineal metre per metre of nominal bore.
40. Notwithstanding the satisfactory completion of the above test, if there is any discernible flow of water entering the pipelines at a point which can be located either by visual or CCTV inspection, the Contractor shall take such measures as are necessary to stop such infiltration.

Chambers and Gullies

41. All existing Storm/Foul manholes chambers are to be raised/lowered to suit proposed ground levels. Existing frames/covers are to be replaced with new covers in accordance with the specification and set to suit new levels. Covers to be raised/lowered/replaced are shown in the Contract Drawings.
42. All surface and foul water drainage manholes shall be pre-cast concrete and comply with the requirements of BS 5911:part 200 and Clause 507 of the Specification. Manholes shall be tested for watertightness to the satisfaction of the Employer's Representative and in accordance with the requirements of the GDSDS.
43. Gullies are to be trapped sulphate resisting pre-cast concrete. For Gully details refer to TII CC-SCD- 00510.

Ironworks

44. Manhole covers, gully frames and other ironwork shall be set or reset to the final levels prior to the laying of the uppermost surface course, or in areas where no surfacing works are being undertaken, to the level of the adjacent verge. The Contractor must allow for adjusting all gullies within the site extents as indicated in the Contract Drawings within his fixed price lump sum.
45. Chamber covers, gratings and frames shall be lockable in accordance with BS EN124-2, 2015, and shall be class D400. A 300mm wide protective concrete surround shall be included for all chamber covers in grassed areas.
46. Gully gratings and frames shall be in accordance with EN124-2, 2015 and shall be class D400. All gratings shall be flat-topped and lockable and the frames shall have no flange on the kerb face to permit a flush fit. The waterway area for the gully grating shall not be less than 800cm².

Cutting Pipes Square

47. Where sewers enter manholes, the pipes shall be cut square with the internal facing of the manhole wall. No jagged edges or rough faces shall be left on the pipe. Pipes are to be placed before the walls are cast and are to be built into the wall as it rises. Connections of pipes to manholes should not be done by boxing out and subsequently building in the pipe.

Treatment of Severed or Redundant Surface Water Drains

48. Unless otherwise shown on the drawings, where existing chambers or gullies are made redundant by the Works they shall be removed where they are within 1m of formation and backfilled with Clause UGM A subbase material. Chambers extending below this level and those beneath the existing pavement shall be removed down to 1m below formation and the remainder shall be cleared of all silt and debris and backfilled with mix ST1 Concrete.
49. Where existing pipes are made redundant by the works, they shall be removed or grouted up in accordance with Clause 506.3 of the Specification.

Connections to Existing Drains

50. ***Where required, the Contractor shall break into existing manholes to make necessary connections and make good manhole walls on completion of connection works. The Contractor shall take all measures necessary to ensure no blockages occur in the existing network during these works and shall make suitable provision for overpumping existing volumes.***

Protection of Existing Drains

51. All work carried out to existing sewers shall have the prior approval of the Employer's Representative.
52. Where existing drains are beneath or within 0.5m of the edge of the proposed carriageway, they shall be protected in accordance with TII CC-SCD-02751. The Contractor shall not be permitted to expose the existing pipe nor disturb the in-situ material surrounding the pipe. All work carried out to existing sewers shall have the prior approval of the Employer's Representative, or the Council Water Services Department, where appropriate.
53. Where existing land drains are severed by the works, the Contractor shall connect these into the proposed drainage system. Where the drains connect into a cut zone, they shall be tied into the top of slope interceptor drainage system. Where drains are severed through the excavation and replacement of material beneath proposed embankment, the Contractor shall extend the land drain into the slope toe drain where such a drain is to be constructed. Where this will not be constructed, the Contractor shall extend the land drain through the embankment starter layer or replaced material in accordance to the detail shown in CC-SCD-00520.

Date of Jet Washing

54. Date and details of the air-test and result achieved. If the air-test failed, the reason why, the repair (if required) undertaken including exact location of the repair, and details of the retest.

CCTV results

55. All tests and results must be witnessed and signed off by the Employer's Representative. No test result will be accepted in the absence of the Employer's Representative sign off and the Contractor shall be responsible for any retesting arising and costs associated therein.

APPENDIX 5/2: SERVICE DUCT REQUIREMENTS

GENERAL REQUIREMENTS

1. Service ducts for electricity, public lighting, data, telecommunications and traffic cabling, together with associated cable chambers, shall be installed in accordance with the requirements indicated on the relevant Construction Drawings and in accordance with TII 'Specification for Works' & The Council Public Lighting Specification. The standard TII 'Standard Construction Details' in respect of service ducts and cable chambers shall be deemed to apply except where modified or superseded by the Contract Drawings and Specification.
2. Generally, 100mm ducting will be used for longitudinal duct runs along road verges and footpaths, with 150mm ducts used for crossing roads.
3. This Appendix 5/2 shall be read in conjunction with Appendix 1/16, which provides additional specific requirements in respect of each of the particular services, as well as Appendix 12/5 in respect of traffic and Appendix 14/4 in respect of public lighting.
4. Each batch of ducting shall include the manufacturers name QA details.
5. The positioning, depth and colour coding of pipes for service ducts shall generally conform to the recommendations set out in the U.K. National Joint Utilities Group (NJUG) Publication 'Volume 1: Guidelines on the Positioning and Colour Coding of Underground Utilities Apparatus' and I.S. 370:2007 'Colour Code for Buried Plastics Piping' unless stated otherwise within the Service Provider's particular requirements.
6. In addition, the minimum cover depths for service ducts shall be in accordance with the following, unless specific cover depths are specified under a particular Service Provider requirements:
 - 750mm in trafficked areas
 - 550mm in non-trafficked areas
7. Where minimum cover is not achievable as part of the construction of the new road alignment, a protective concrete slab is to be provided to the existing and proposed services as per the Contract drawings.
8. In addition to the colour coding of ducts, the ducts shall be stamped with the words 'Telecommunications Cables', 'Public Lighting', 'Danger Electricity Cables' etc. as appropriate printed in large block capital continuously along their length, to the approval of the Employer's Representative.

9. Any other deviation from the guidelines contained in the above NJUG publication requires approval by the Employer's Representative.
10. The installation of telecommunications ducts shall comply with the 'Recommendations for Underground Telecommunications Cable Works for Roads, Commercial and Residential Schemes' as published by the Department of Public Enterprise.

PIPES FOR SERVICE DUCTS

Ducts

11. All pipes, bends, coupling, etc. shall be from a single manufacturer. Unless otherwise indicated, pipes for service ducts shall generally be uPVC single wall pipes with a minimum wall thickness of 3.8mm complying with Class B or better of BS 3506, or HDPE single wall pipes with a minimum wall thickness of 5mm complying with IS EN 50086-2-4. All pipes used shall be suitable for the depth of burial and the types of cables to be pulled through them.
12. Ducts shall be of 'Normal' duty in accordance with IS EN 50086-2 and shall comply with IS EN 50086- 2 in terms of duct deformation and impact resistance requirements.
13. Ducts shall have a smooth low friction inner surface completely free of ripples, sharp edges and protrusions.
14. All ducts shall have large radius bends at changes in directions. All radius bends (11.25°, 22.5°, 45° & 90°) shall only be used with the approval of the Employer's Representative.
15. Ducts shall have a circumferential mark to indicate the correct push-in distance for duct jointing for spigot and socket joints.
16. The internal diameter of all pipe ducts shall be as indicated on the Contract Drawings.
17. All duct joints shall be watertight and shall be fitted with draw rope in accordance with Clause 501.8.

Duct Handling and Storage

18. Care should be taken when loading/unloading ducts to avoid damage to the ducts. Any damaged or defective ducts shall be marked in a conspicuous manner and removed from Site.

19. Ducts shall be stored on a smooth flat horizontal surface, supported by side supports at intervals of not more than 1.5m and fully in accordance with the manufacturer's recommendations. Ducting supplied in factory strapped bundles may not require side supports, however care should be taken when removing strapping, when tension may be released.
20. Socket ducts shall be stacked in layers in accordance with manufacturer's recommendations and with the socket at alternate ends of each layer. The socket on one layer should project beyond the duct spigots on the layer below so that the ducts are evenly supported along their length.
21. Duct stacks shall not exceed 7 layers with a maximum height of 2m.
22. The method of stacking shall be such as to ensure that the integrity of the ducts is maintained and that distortion is avoided.
23. Ducts shall not be stored in a place where they are likely to be in contact with surface water or other foreign matter which could make its way into the ducts.

EXCAVATION, BEDDING, LAYING AND SURROUNDING OF PIPES FOR SERVICE DUCTS

Excavation, Bedding and Surround for Service Ducts

24. All excavation for service ducts shall be carried out by the Contractor to Clause 502 of Transport Infrastructure Ireland 'CC-SPW-00500-Specification for Road Works Series 500'. Bedding and surrounding of ducts shall be carried out in accordance with Clause 503 of Transport Infrastructure Ireland 'CC-SPW-00500-Specification for Road Works Series 500'.
25. All ducts shall be laid to the depths specified above, unless specified otherwise by particular Service Provider, with bedding, surround and backfill in accordance with CC-SCD-00561 and CC-SCD-00562 or the particular service provider's requirements, as appropriate.
26. Material for the bedding and surround to all ducts and multi-ducts shall be clean and sharp and conforming to BS EN 12620:2002.
27. Ducts shall be evenly and solidly bedded and all sand shall be compacted to the degree specified without voids to ensure adequate support. Particular care shall be taken to ensure that sand is compacted into the spaces in between any multi-ducts.
28. Ducts passing under roads carrying heavy vehicles shall be completely surrounded with lean-mix concrete to a minimum radial thickness of 150mm.

Duct Laying

29. Each duct shall be carefully examined immediately prior to laying and any damaged or defective ducts shall be marked in a conspicuous manner and removed from Site.
30. The location and arrangement of the various duct banks shall generally be as indicated on the Contract Drawings, but the precise positions/lines of the duct banks shall be agreed between the Contractor and the Employer's Representative before commencement of the works.
31. Ducts shall not be laid in trenches where water is lying in the bottom.
32. Every effort must be made to prevent dirt ingress into the ducts. Allowing dirt to enter ducts on the basis that the dirt should be removed later during the duct cleaning process is not acceptable.
33. Bricks or other hard packings shall not be used as temporary duct supports.
34. Ducts shall be aligned as straight as possible in the horizontal and vertical directions. All sweeps shall be gradual as possible and jointed above ground prior to installation.
35. For ducts in trefoil formation, the ducts shall be bound together with duct ties at 3m intervals or more frequently as required to maintain the duct formation.
36. Where duct routes are located within the loading zone of influence of existing structures the trench shall be filled with concrete of minimum strength 10N/mm² in order to ensure the structural integrity of the adjacent structure.
37. Ducts shall be laid on the trench bed with the sockets towards the duct layer. The spigot end and inside of the duct to be joined shall be thoroughly cleaned with a dry rag. A duct shall be temporarily inserted to prevent ingress of soil or foreign material prior to jointing.
38. The spigot end of the duct shall be pushed into the socket initially by hand and then driven in to achieve proper engagement by tapping with a hammer against a suitable wooden batten placed across the remote socket. Full engagement is when the indicator on the duct seals properly. Joints shall be made in such a manner as to avoid any sharp internal edges that may interfere with cabling operations.
39. Cutting of ducts shall be with a suitable non-electrical hand cutting tool. All cut ends shall be square to the axis of the duct and all burrs removed before use. Cutting of occupied ducts, if required, shall be carried out with extreme care.

40. Ducts not required to enter a jointing chamber shall by-pass the chamber either to the side or beneath the chamber. In certain circumstances and with the approval of the Employer's Representative, ducts may pass through the chambers uninterrupted. All ducts for medium voltage cables shall be plug-and- socket water-sealed.
41. Telecommunications ducts along the main runs shall be plug-and-socket air- and water-tight to facilitate the blowing of fibre optic cables.

Crossing of Electricity Ducts

42. A minimum radial clearance of 300mm between the outer services of ducts shall be provided where telecommunications or traffic ducts cross electricity ducts. Wherever possible, the telecommunications or traffic ducts shall cross above the electricity ducts.
43. Where it is not possible to provide the minimum 300mm clearance, a reduced separation may be agreed with the Employer's Representative on the basis that mechanical protection overlaid with marker warning strip shall be inserted between the crossing ducts. This mechanical protection may be in the form of concrete blocks or tiles, or hot dip galvanised steel plating to the approval of the Employer's Representative.

Duct Cleaning and Testing

44. Immediately after ducts are laid they shall be cleaned with an approved brush or swab in accordance with the manufacturer's recommendations and to the approval of the Employer's Representative, following which the ducts shall be tested by drawing a cylindrical wooden/iron mandrel through them in accordance with Transport Infrastructure Ireland 'Specification for Works'. This is to be witnessed by the Employers Representative and all chambers and gullies are to be inspected with the Employers representative prior to handover of the area.

Draw Ropes and Duct Plugs/Caps

45. Immediately after cleaning and testing, each individual duct run shall be fitted with a single piece polypropylene draw rope with a minimum 8 kN breaking strength. The type of draw rope used shall be approved by the Employer's Representative prior to installation.
46. A surplus of 2 metres of draw rope shall be left neatly coiled at each end of each duct run, with the ends suitably and effectively secured to prevent accidental withdrawal of the rope.

47. After installation of the draw ropes a plastic purpose-made plug or cap shall be placed in/over all open ends of ducts to prevent ingress of water and/or foreign matter. Duct plugs/caps shall be approved by the Employer's Representative prior to installation.

Backfilling and Reinstatement of Existing Footways, Verges and Carriageway

Backfilling

48. Backfilling shall be carried out in accordance with Clause 505 of Transport Infrastructure Ireland 'CC- SPW-00500-Specification for Road Works Series 500' and with the 'Guidelines for the Opening, Backfilling and Reinstatement of Trenches in Public Roads' issued by Department of the Environment, Heritage and Local Government.
49. Backfill material shall be Clause 808 material.
50. Backfilling shall be undertaken immediately after the bedding, laying and surrounding of the ducts and shall be compacted in layers of no greater than 150mm. In order to minimise post-construction settlements, it is essential that the correct backfill materials are utilised and that the compaction methods employed are in accordance with the best engineering practices.
51. Pavement layers should be reinstated in accordance with TII CC-SCD-00705 where the carriageway is being reinstated.

Marker Tapes

52. Distinctive marker tapes shall be provided over all service ducts at a depth of 180mm from the surface in footways and 350mm from the surface in carriageways and in the apron slab areas, or as otherwise directed by the Employer's Representative or as per Service Provider's requirements.
53. Marker tape shall be 300mm wide PVC, coloured as detailed below, with the words 'Telecommunications', 'Electricity' etc. as appropriate printed in large block capitals continuously along its length, all to the approval of the Employer's Representative. The tape shall provide full lateral cover over the ducts and shall be in vertical alignment with the duct run. For large duct configurations, more than one width of tape may be necessary to cover the extra width of the duct section.
54. The marker tape shall be manufactured from high quality material to an approved international or national standard in order to ensure its long-term performance with regard to physical integrity and readability.

55. Marker tape shall be in accordance with Service Providers requirements.

Marker Tiles or Posts

56. Cable duct marker tiles or posts shall not be required.

Surface Reinstatement

57. Surface reinstatement shall generally be in accordance with Transport Infrastructure Ireland 'Specification for Works' and to the particular requirements detailed in the Contract Documents and Drawings.

Cable Chambers

58. The construction of the cable chambers shall be in accordance with the relevant Standard Construction Detail for each service provider.
59. Adequate and safe access/egress to the cable chambers shall be provided to facilitate the installation and future maintenance of cables.

Frames and Covers to Cable Chambers

60. Frames and covers to cable chambers shall comply with the requirements of IS EN 124 and shall be as described in Appendix 5/1 and 5/2 of this Specification.
61. Cable chamber frames and covers shall be set square to structure or kerb lines.
62. All chamber covers are to be lockable. All lockable covers to be removed from locked end. Frames must be laid to allow for easy removal of covers.
63. All chamber covers located in grassed areas shall include a 300mm wide, 150mm deep 30N20 protective concrete surround, trowelled and bull nosed.
64. Chambers with covers which are positioned in areas with paving slabs shall be recessed, suitable to accept the paving slabs, by Galco or approved equivalent.
65. The paving within each recessed cover shall have a steel nameplate affixed displaying the utility provided, as applicable and agreed with the individual service provider and as accepted by the Employer's Representative.

Specific Ducting and Chamber Requirements for Service Providers

General

66. All ducts and chambers shall be constructed in accordance with the various Service Provider's requirements.
67. In some cases, as indicated in Table 5.1, the Service Provider will install the ducts and chambers (including fixtures and fittings), otherwise ducts and chambers must be installed by the Contractor. In all cases the Contractor shall carry out the excavations and backfilling (to Service Provider's specification), required to facilitate the laying of the service.
68. Table 5.1 below also outlines where ducts and chambers (including fixtures and fittings) will be supplied and/or installed by the service provider and where ducts and chambers (including fixtures and fittings) will be supplied by and/or installed by the Contractor.

Provider	Supply of Ducts and Chambers incl. fixtures and fittings	Ducts & Chambers installed by	Connection of service By
Storm Water Drainage	Contractor	Contractor	Contractor
Foul Water Drainage	Contractor	Contractor	Contractor
Watermains	Contractor	Contractor	Irish water
Gas Networks	Gas Networks	Gas Networks (Ducts) & Contractor (Chambers)	Gas Networks
EIR	Contractor	Contractor	EIR
ESAT/BT	Contractor	Contractor	ESAT/BT
Virgin Media/UPC	Contractor	Contractor	Virgin Media/UPC
Telecom (Spare)	Contractor	Contractor	N/A
Unidentified	Contractor	Contractor	Contractor
Traffic	Contractor	Contractor	The Council
ESB	Contractor	Contractor	ESB
Public Lighting	Contractor	Contractor	Contractor

TABLE 5.1

Note: In all instances in Table 5.1 the Contractor is responsible for the excavation of trenches bedding and backfilling of ducts and pipes.

Existing Covers

69. Raising of the existing covers must comply with the particular requirements of the surface providers outlined below.

EIR**EIR ducts**

Dimensions: Ave. Outside Diameter (mm):

99.6 – 100.5 Wall Thickness (mm):

3.1 – 3.5

Lengths: 6m plus the socket

Colour: Black

Joints: The socket shall have a min. length of 100mm and a slight taper allowing the spigot to engage at between $\frac{1}{3}$ & $\frac{2}{3}$ of socket length. The spigot end shall have a chamfer.

Tensile Strength: (ISO 6259-2) – Frequency: Every Shift

Dumbell Sample cut from pipe = 115mm x
25mm Type 2 Oven Softening temperature
= 125 – 130°C

Duration of heating / softening = 1 minute per
mm of thickness Speed of Machine = 5.0 ±
0.5mm per minute

Tensile strength = ≥
45N/mm² Elongation
= ≥ 80%

Impact Test: (BS 2782: Part 11: Method 1108A)

Frequency: Every Shift - Sample
length: 200mm. Test to be carried
out at 20°C and 0°C

Conditioning 20°C for 30 minutes and 0°C for
2 hours. Strike within 60 seconds of removal
from conditioning bath.

T.I.R. $\leq$ 10% = Accept

Pipe Diameter. (mm)	Impact Weight (D 25 head)	Drop Height (Meters)	No. of Samples / Shift	No. of Strikes per Sample
100	2 Kg	2	4	6
60	1 Kg	2	8	3

Reversion Test Frequency: Every Shift

Sample length = 150mm approx.

Lines Scribed =
100mm

apart Oven Temperature
=
150oC

Immersion Time = 30 minutes

Remove and allow for cooling. Measure any change in distance between the scribed lines,
which shall not be greater than 5%.

Compression test. EN 50086-2-4 (Clause 10.2)

10 days after

manufacture. Sample

Length: 200mm

Compression rate:

15mm per min.

Force at least 450 N at 5% deflection.

Cutting Test. Cut through 1.5 Meters of overhanging pipe without fracturing.

"It shall be possible to cut fully through an unsupported overhang length of 1.5 metre
of duct without the duct showing any evidence of fracturing before the complete cut is
made".

MARKING: White Ink at one-metre intervals

WAVIN (or equivalent)- 100mm Eircom Duct – day – shift - year

EIR chambers

70. All existing EIR chambers are to be raised/lowered to suit proposed ground levels.
71. Where new chambers are required they shall be constructed by the Contractor in accordance with the EIR Specification. All chambers must be constructed to the satisfaction of EIR.
72. Contractor must allow for resetting all EIR Chambers within the works area to suit proposed road levels. Chambers must be raised/reset under the supervision of and to the satisfaction of EIR and in accordance with EIR Specification.
73. Covers for EIR chambers must be EN124-certified, and must be to a minimum rating of B125 (for use on footways) or E600 (for use in carriageways).
All chambers on EIR plant must be:
- EN124 compliant; &
 - Fit-for-Purpose in the EIR network.
74. In addition to EN124 compliance, the following are EIR's minimum requirements for recessed covers to conform to EIRs existing network construction practises & procedures:
- The size of the frame and cover should fit EIR standard chambers
 - The frame should fit on all four walls
 - The covers must be capable of being lifted with EIR's standard lifting keys
 - The covers should be designed for one-person lifting (using a lifting key & wooden roller bar)
 - The manufacturer should ensure that, when installed, the units should have no lips or gap.
75. Covers must be lockable. Where covers are lockable:
- Locks must be fitted by the manufacturer
 - Locks must be capable of use with EIR's standard locking key
 - Locking bolt needs to be captive (e.g. with circlip)
 - Plastic bung cover to be fitted over locking bolt to keep out dirt, mortar etc

76. All EIR chamber covers must bear the following markings (a-d):
- (a) EN124
 - (b) the appropriate class (e.g. B125, E600)
 - (c) the name and /or identification mark of the manufacturer
 - (d) the mark of a certification body. and may bear:
 - (e) additional markings related to the application or the owner
 - (f) product identification (name and/or catalogue number)
77. For use on EIR chambers, covers which do not bear the name "EIR" plus markings EN124 are to be considered unacceptable.
78. As per EN124, the class of unit which should be used is :
- Group 4 (minimum class D400)**
- Carriageways of roads (including pedestrian streets)
79. Individual covers and support bars should be interchangeable (e.g. the same lids could be used for JB4's, JB4(A)'s, JB4(B)'s and JB4(C)'s).
80. EIR approved covers can be sourced from EJ (<http://www.ejco.com>) (Formerly Cavanagh Foundry Ltd) or from CUBIS Industries (<http://www.cubisindustries.com>)

PUBLIC LIGHTING

Public Lighting ducts

81. The indicative layout of the proposed public lighting ducts are shown on the contract drawings, the contractor is responsible for the design and installation of the public lighting system.
82. Refer to Appendix 13/1 for Public lighting duct requirements.
83. Public Lighting Ducting shall comply with latest version of I.S. EN 61386-1-21-22-23-24 and shall be single wall, coloured red and manufactured from high-density polyethylene. The nominal external diameter of the duct shall be 107mm with a minimal wall thickness of 5mm. Each length of duct shall be stamped with the words "Public Lighting" or "Street Lighting", in 18mm black lettering repeated at 1-metre intervals. Ducts shall be laid with this legend facing upwards.
84. Ducting shall be laid in fully coupled unbroken lengths and shall be installed to achieve

the minimum buried depths of NYCY or SWA cable in the HD Polythene pipe as indicated in Table 52B of the National Rules for Electrical Installations Fourth Edition ET 101:2008.

85. A minimum depth of 450mm cover is required in urban footways, grass margins, pedestrian ways, laneways, and gateway entrances and a minimum depth of 750mm is required at road crossings or in carriageways. The developer is responsible for any Road Opening Licenses, e.g. T2's etc., that may be required.
86. Ducting shall be laid in a straight line, close to the line of the column locations and shall contain a continuous draw wire of 8 kN strength. Ducting shall be laid in a bed of sand and surrounded by sand. The compacted thickness of sand below the duct shall be a minimum of 50mm, and at each side of the duct 25mm. Sand should be used to backfill to 150mm above the top of the ducting. An Electrical hazard warning tape must be laid on top of the sand along the length of the ducting at approximately 300mm below finished ground level. The tape should be made of yellow plastic with the words "caution electric cable below" printed on it.
87. The remainder of the trench shall be backfilled to ground level using selected material free of any larger or sharp stones greater in size than 50mm.
88. All adjacent 'hard' areas, e.g. paths, driveways and roads shall be cleaned of clay and stone spillages.
89. If the works are associated with road/ footpath construction works it is recommended that ducting be laid as late as possible in the work programme, just prior to final landscaping if possible, in order to minimise exposure to damage by other operations.
90. Road crossing ducts shall be adequately protected by a cover of lean mix concrete and at a depth consistent with road construction requirements, normally a minimum of 750mm. The duct ends shall be protected from ingress of rubble or other material.

Public Lighting Chambers

91. The layout of proposed public lighting chambers will be the subject of the contractors design.
92. Cable chambers shall be provided to intercept road crossing ducts & longitudinal duct runs or broken duct runs at 90 degrees to each other.
93. The cable chambers shall consist of a 100mm deep concrete foundation base, 225mm thick concrete blocks laid flat, with ducts continuing through the blockwork to slightly inside the chamber. It shall be complete with cable chamber frame/cover to finished pavement surface level.
94. At these points suitable chambers shall be constructed to facilitate the drawing in of cables

and provide access for any future cabling works.

95. Cable chamber frames and covers shall conform to EN 124 grade B125 for chambers in grassed area or footpaths and EN124 grade D400 for chambers in the carriageway. Cable chamber frames and covers can be obtained from Cavanagh Foundry or approved equal. The cover shall be retained in position by a stainless-steel bolt with 'Allen Key' type head and bolt lid. The cover shall be stamped 'Public Lighting'
96. Refer to Appendix 13/1 for Public lighting chamber performance specification requirements.

ESB

ESB ducts

97. The layout of existing ESB ducts/mini pillars are shown on the Drawings provided as part of the Background Information. The Contractor is required to satisfy themselves as to the location of all existing services.
98. ESB Ducts for MV/LV cables shall be in accordance be provided in accordance with Standard Specification for ESB MV/LV Networks Ducting (Minimum Standards) http://www.esb.ie/esbnetworks/en/downloads/MVLV_Duct_Summary.pdf?v=20101028 and <http://www.esb.ie/esbnetworks/en/downloads/MV-LV-Installation-Drawings.pdf?v=20101028>
99. Trench Installation Sequence shall be in accordance with Standard Specification for ESB MV/LV Networks Ducting (Minimum Standards).
100. Minimum Ducts Spacing for ESB Ducts shall be in accordance with Standard Specification for ESB MV/LV Networks Ducting (Minimum Standards).
101. Marker tape shall be in accordance with Standard Specification for ESB MV/LV Networks Ducting (Minimum Standards).
102. Duct Surround Material shall be in accordance with Standard Specification for ESB MV/LV Networks Ducting (Minimum Standards).
103. All other requirements of Standard Specification for ESB MV/LV Networks Ducting (Minimum Standards) must be complied with by the Contractor.
104. Each duct should be provided with a strong continuous 10mm polypropylene draw rope free of knots and securely anchored at each end.

105. Where it is not possible to provide the minimum 300mm clearance, a reduced separation may be agreed with the Employer's Representative on the basis that mechanical protection overlaid with marker warning strip shall be inserted between the crossing ducts. This mechanical protection may be in the form of concrete blocks or tiles, or hot dip galvanised steel plating to the approval of the Employer's Representative.

ESB Pillars and vaults

106. All pillars and vaults for ESB shall be in accordance with the particular requirements of ESB, and the Contractor shall liaise with ESB and the Employer's Representative immediately on commencement to ensure that all equipment, method statements and programme issues are understood and approved.
107. The contractor is referred to the ESB document '*Electrical Services Guidebook for Housing Schemes*' for details of ESB requirements in relation to mini pillars and associated vaults, as well as ducting layouts at mini pillar vaults.
108. All mini pillars must be earthed.

BT/ESAT

BT/ESAT ducts

109. There are no schedule BT/ ESAT duct works required as part of the Contract.
110. Where the Contractor proposes any diversionary works to existing BT/ ESAT infrastructure BT require up to 120 days notice of intention to carry out work that may be deemed intrusive or to have any potential impact on the BT network.
111. In addition BT/ESAT must be furnished with a sign off on the proposed civils plan prior to work starting.
112. For any new ducting works BT/ESAT will provide the ducts for any works which shall be 2x100mm ducts to BT/ESAT specification.
113. The contractor shall install BT/ESAT ducts and rope to the approval of BT/ESAT. Ducts in verge will be laid at minimum cover of 450mm. Ducts in carriageway will be laid at min cover of 750mm.
114. The installation of BT/ESAT ducts shall comply with the 'Recommendations for Underground Telecommunications Cable Works for Roads, Commercial and Residential

Schemes' as published by the Department of Public Enterprise.

BT/ESAT Chambers

- 115. BT/ESAT shall construct the chambers and supply the covers. BT/ESAT will install cable and jointing.
- 116. The contractor shall liaise with BT/ESAT to co-ordinate the installation of BT/ESAT chambers. The contractor is responsible for programming of these works with BT/ESAT.

VIRGIN MEDIA/UPC

Virgin Media/UPC ducts

- 117. Where required, the installation of Virgin Media ducts shall comply with the 'Recommendations for Underground Telecommunications Cable Works for Roads, Commercial and Residential Schemes' as published by the Department of Public Enterprise.
- 118. The contractor shall supply and install the proposed 2x110mm green (RAL 6010) twinwall duct with rope as indicated in the contract drawings.
- 119. The proposed ducts must be in accordance with the general duct requirements.
- 120. Ducts laid in private property will be laid solely by Virgin Media/UPC contractors. The contractor must facilitate Virgin Media/UPC contractors as required.
- 121. Ducts to be laid with 450mm cover in non trafficked areas and 750mm cover in trafficked areas.

Virgin Media/UPC Chambers

- 122. Virgin Media/UPC chambers must be constructed in accordance with Virgin/UPC Specifications as indicated on drawing TII Cable Joint Management SCD.
- 123. Virgin Media/UPC chambers are to be constructed by the contractor. Cover and frames to be supplied by Virgin Media/UPC

Telecom (Spare) ducts

- 124. Spare ducts shall meet the requirements of EIR's specifications, with the exception that the ducts shall be Dia. 100mm twin wall and purple in colour.

Telecom (Spare) Chambers

125. Spare duct chambers shall meet the requirements of EIR's specifications.

TREATMENT OF EXISTING DUCTS**General**

126. The Contractor shall be responsible for locating, supporting and protecting all existing services as detailed in Appendix 1/16 in situ during the works. Details of existing services are based on preliminary information from Statutory Undertakers. There is no guarantee as to the accuracy of this information and the Contractor shall liaise with relevant stakeholders prior to undertaking any works in connection with the services or utilities.
127. The Contractor shall be fully responsible for all Statutory Undertaking and Public Services works including making all necessary arrangements, provision of builders work and attendances as required, etc.
128. The Contractor shall refer to the HSA publication "Code of Practice for Avoiding Danger from Underground Services" and any other relevant publications when dealing with or working nearby underground utilities and services.
129. The Contractor shall refer to the ESB publication "Code of Practice on Overhead Electricity Lines in Construction" and any other relevant publications when dealing with or working nearby overhead lines.
130. Should any ducts be damaged during the works, the responsibility for repair of these ducts shall lie with the contractor.
131. The Contractor is responsible for locating and protecting any underground services in the vicinity of any excavations.
132. As part of this contract where possible and unless indicated otherwise in the drawings all existing ducts and services are to be protected in situ. In all cases, where there is slack available on existing ducting, the ducting should be lowered to increase the cover to those ducts.

General treatment of all existing ducts located within the extent of the excavation.

133. Where existing services are located within the extent of the proposed excavation, these

services should be carefully exposed by the Contractor. The need and use of tracing equipment, trial holes and slow digging/hand digging should be allowed for by the contractor in his lump sum. The Contractor is advised that existing services may include intermittent and or total lean mix bedding surround and backfill. These ducts should be protected by the contractor during the works. Should these services be damaged by the contractor during the works, the contractor is fully responsible for the repair, costs associated with these repairs and any other consequential costs.

134. Services that are exposed within the excavation during the works, shall be lowered if slack is available and protected/surrounded with 150mm of lean mix concrete to ST2 as per TII's CC-SCD-00561 or as otherwise agreed with individual service providers.

General treatment of existing ducts partly exposed within the extent of the excavation.

135. Where existing service ducts are located at the base of the excavation, and are partly exposed, the contractor shall be responsible for the protection of these ducts during the works. The contractor shall expose these ducts, lower where slack is available and protect with lean mix concrete in accordance with CC-SCD-00561. Should these services be damaged by the contractor during the works, the contractor is fully responsible for the repair, costs associated with these repairs and any other consequential costs.

Existing ducts below excavation level.

136. Where existing service ducts are located below the base of the excavation, the contractor shall be responsible for the protection of these ducts during the works. Should these services be damaged by the contractor during the works, the contractor is fully responsible for the repair, costs associated with these repairs and any other consequential costs.
137. Existing watermains that are to be retained within the footprint of the site extents, where the distance from the finished ground level to the external crown of the watermain is less than 1200mm, should be protected in situ through the use of precast concrete slabs in accordance with TII CC-SCD-02751.

APPENDIX 5/4: GEOTEXTILES FOR FILTER DRAINS

1. The geotextile for filter drains shall have a size distribution of pore openings such that the apparent size 090 when determined in accordance with BS 6906: Part 2 or other appropriate test is less than 300 microns.
2. The geotextile shall allow water to flow through it, in either direction, normal to its principal plane at a rate of not less than 10 l/m²/s under a constant head of water of 100 mm and a maximum breakthrough head of 50 mm when determined in accordance with BS 6906: Part 3.

APPENDIX 5/7: DRAINAGE AND SERVICE DUCTS – TRANSPORT INFRASTRUCTURE ROAD CONSTRUCTION DETAILS

Clause No.	RCD Drawing No.
501.8	RCD/500/50
503.3(i)	RCD/500/1 and RCD/500/2
503.3(iii)	RCD/500/1 and RCD/500/2
508.1	RCD/500/14, RCD/500/15 and RCD/500/16
509.9	RCD/500/51
517.4	RCD/500/1

APPENDIX 6/1: REQUIREMENTS FOR ACCEPTABILITY AND TESTING ETC. OF EARTHWORKS

EARTHWORKS OVERVIEW

1. The earthworks must be programmed, planned and executed taking particular, but not exclusive, account of the constraints given in other Appendices and any specific details presented in the Geotechnical Reports.
2. Clause 602 of the Specification sets out arrangements the Contractor shall make for maintaining the integrity of the acceptable materials arising from the site. The attention of the Contractor is especially drawn to the physical constraints as listed below.
3. The Contractor shall note that his earthworks construction must be planned and carried out taking into account the following particular constraints:
 - a. The limitations on the use of public roads as laid out in Appendix 1/19.
 - b. The programme constraints outlined in Appendix 1/13.
 - c. Rerouting of services.
 - d. The limitations on noise/vibrations and dust control measures as required in Appendix 1/9.
 - e. Any contaminated ground identified.
 - f. Areas of soft ground identified in Appendix 6/13.
 - g. Maintaining traffic flows as specified in Appendix 1/17.
 - h. Significant cuttings in soil and rock.
 - i. The disposal of unsuitable material to properly licensed tips, where applicable.
 - j. The construction of culverts and other miscellaneous works required as part of the construction.
 - k. Complying with the Specification for Road Works (SRW), published by TII.
 - l. Testing requirements as detailed in Appendix 1/5.
 - m. The excavation of cuts, the construction of fill and any works that could cause uncontrolled spilling of material onto existing roads.
4. Unacceptable material Class U1, as defined in Clause 601.2 of the Specification for Road Works could be encountered on the scheme. The Contractor may process this material so that it complies with the permitted constituents and material properties of Table 6/1 for a particular material. The Contractor shall obtain a Landfill Licence or any other necessary permit or planning permission or an exemption from the relevant authority within whose jurisdiction the Contractor intends to dispose of the unacceptable U1A materials as appropriate.

CLASSIFICATION & TESTING OF MATERIALS

5. The permitted classes, acceptable limits and material properties required for acceptability for fills appropriate to this contract are given in Table 6/1 of this Specification Appendix. Unless described in this Appendix, grading requirements for

each class of material are given in Table 6/2 of the TII SRW and compaction requirements given in Table 6/4 of the TII SRW.

6. The relevant classification and acceptability testing as specified in Appendix 1/5 shall be carried out by the Contractor on each class of earthworks material seven days prior to placement or as agreed by the Engineer. All testing shall be undertaken and be stored and handled in accordance with BS5930.
7. The Contractor shall provide copies of all classification test results and acceptability testing to the Engineer prior to import or placement of the material but not more than five days from completion of the testing or as agreed by the Engineer.
8. Where acceptability of materials is questionable, or the Engineer is of the opinion that material properties have changed, further testing may be requested.
9. The Contractor shall maintain accurate records of where the samples were taken and when and where this earthworks material is placed in the permanent works. Copies of these records shall be regularly submitted to the Engineer.

GROUNDWATER

10. The Contractor shall allow and be responsible for the control of groundwater in all temporary excavations and in all temporary situations during the course of the works, and it shall be noted that pumping into existing watercourses or sewers shall only be permitted upon provision of a detailed Method Statement and its subsequent approval by the relevant authorities.
11. The Contractor shall take all necessary measures to prevent any surface runoff from the construction works flowing directly into any of the watercourses, both existing and proposed, on the site. The Contractor shall provide measures to channel surface water runoff to specific discharge points where silt traps, screens and any other measures deemed necessary will be employed to prevent any excessive clouding of the watercourses.
12. Where pumping is undertaken and discharge is into an existing watercourse, a method statement of the intended operation (which should include the Contractors methodology to limit silt, debris and other contamination entering the watercourse) shall be presented for approval.

SPECIAL REQUIREMENTS

13. The frequency of testing of earthworks materials is indicated in Appendix 1/5.
14. Where nuclear density gauge is employed to monitor in situ or compacted density, dry density or moisture content, the gauge shall have been calibrated within the previous seven days, and the measurement shall have been calibrated against other measures of the required properties obtained by other tests.
15. CBR value of cohesive subgrades (generally with strength in the range $2\% < \text{CBR} < 6\%$) may be assessed using cone penetrometers as described in HD25

16. To demonstrate the correlation of CBR and/or strength testing with MCVs, additional testing will be required. In situ CP (e.g. Mexiprobe) testing with laboratory MCVs and CBRs measured on samples taken at the same location, with moisture content testing to demonstrate sample equivalence will be carried out to demonstrate that CBR = 3 is achieved on material within 1.0m of sub-formation. A series of tests at a minimum average rate of one set (i.e. 1 no. CBR, 1 no. MCV and 1 no. DCP all carried out on a sample of the same Class 2 cohesive general fill material at the same moisture content) per day will be carried out during the first four weeks of earthworks operations, giving a minimum of 20 nos. sets of data, to provide an initial correlation. Thereafter test data will be collected at a rate of two sets per month with a minimum of two sets for each earthworks fill element

CLASS	MATERIAL PROPERTIES			
	PROPERTY	TEST	ACCEPTABLE LIMITS	
			LOWER	UPPER
1A	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Uniformity Coefficient	BS 1377: Part 2	10	--
1B	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Uniformity Coefficient	BS 1377: Part 2	–	10
1C	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Uniformity Coefficient	BS 1377: Part 2	5	–
	10% Fines Value	Clause 635	50 kN	
2A	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Liquid Limit	BS 1377: Part 2	–	–
	Plastic Limit	BS 1377: Part 2	–	–
	Moisture Content	BS 1377: Part 2	PL - 4	-
	MCV	Clause 632	8	14
	Undrained shear strength of remoulded material (IL)	Clause 633	40 kPa	–
2B	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Plastic Limit	BS 1377: Part 2	–	–
	Moisture content	BS 1377: Part 2	-	PL – 4
	MCV	Clause 632	8	14
	Undrained shear strength of remoulded material (IL)	Clause 633	40 kPa	-
2C	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Moisture Content	BS 1377: Part 2	-	-
	Optimum Moisture Content (OMC)	BS 1377: Part 3	–	–
	MCV	Clause 632	8	14
	Undrained shear strength of remoulded material (IL)	Clause 633	40 kPa	–
2D	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Moisture Content	BS 1377: Part 2	–	–

CLASS	MATERIAL PROPERTIES			
	PROPERTY	TEST	ACCEPTABLE LIMITS	
			LOWER	UPPER
	MCV	Clause 632	8	14
	Undrained shear strength of remoulded material	Clause 633	40kPa	-
4	Grading (IL)	BS 1377:Part 2	As per Class 2 Table 6/2 or as agreed by Employer's Representative	
	MCV		6 or as specified by the Employer's Representative	18 or as specified by the Employer's Representative
5A	Grading	Clause 618	-	Clause 618
6A	Grading	Visual Assessment / BS 1377: Part 2	Table 6/2	Table 6/2
	Uniformity Coefficient	BS1377: Part 2	10	-
	Plasticity Index	BS 1377: Part 2	Non-plastic	
6B	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
6C	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Uniformity Coefficient	BS 1377: Part 2	10	-
	Plasticity Index	BS 1377: Part 2	Non-plastic	
	Soaked 10% Fines Value (IL)	Clause 635	50 kN	-
	MC		OMC-2%	OMC+1%
	Moisture Content (on that part of material passing 20mm BS sieve) (IL)	BS 1377: Part 2	-	TBC
	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Plasticity index	BS 1377: Part 2	Non-plastic	
6F1	Soaked 10% fines value (IL)	Clause 635	50 kN	-
	Moisture content (on that part of the material)	BS 1377: Part 2	--	OMC

CLASS	MATERIAL PROPERTIES			
	PROPERTY	TEST	ACCEPTABLE LIMITS	
			LOWER	UPPER
	passing 20 mm BS sieve) & OMC (IL)	BS 1377: Part 4 (Vibrating hammer method)		
6F2	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Plasticity index	BS 1377: Part 2	Non-plastic	
	Soaked 10% Fines Value (IL)	Clause 635	50 kN	–
	Moisture content (on that part of the material passing 20 mm BS sieve) & OMC (IL)	BS 1377: Part 2 BS 1377: Part 4 (Vibrating hammer method)	–	OMC
6F3	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Plasticity index	BS 1377: Part 2	Non-plastic	
	Soaked 10% Fines Value (IL)	Clause 635	50 kN	–
	Moisture content (on that part of the material passing 20 mm BS sieve) & OMC (IL)	BS 1377: Part 2 BS 1377: Part 4 (Vibrating hammer method)	OMC-2%	OMC
6G	Grading	BS 812: Part 103	Clause 626	Clause 626
	Soaked 10% fines value (IL)	Clause 635	50 kN	–
6H	(i) Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	(ii) Plasticity index	BS 1377: Part 2	Non-plastic	
	(iii) Soaked 10% fines value (IL)	Clause 635	50 kN	–
	(iv) mc (IL)	BS 1377: Part 2	–	–
	(v) MCV	Clause 632	8	14
	(vi) pH value (IL)	BS 1377: Part 3	Table 6/3	Table 6/3
	(vii) Chloride ion content (IL)	BS 812: Part 117	–	Table 6/3

CLASS	MATERIAL PROPERTIES			
	PROPERTY	TEST	ACCEPTABLE LIMITS	
			LOWER	UPPER
	(viii) Sulphates (IL)			
	(ix) Resistivity (IL)	Clause 637	Table 6/3	–
	(x) Redox potential (IL)	Clause 638	Table 6/3	–
	(xi) Organic content (IL)	BS 1377: Part 3	–	Table 6/3
	(xii) Microbial activity index (IL)	Table 6/3	–	Table 6/3
6I	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Uniformity Coefficient	BS1377: Part 2	10	–
	Plasticity index	BS 1377: Part 2	Non plastic	
	(iii) Soaked 10% fines value (IL)	Clause 635	50 kN	–
	Effective angle of friction (ϕ') and effective cohesion (c') (IL)	Clause 636	$\phi' = 36^\circ$ $c' = 0$	–
	Coefficient of friction and adhesion (fill/elements) (IL)	Clause 639	$\phi' = 36^\circ$ $c' = 0$	–
	pH value (IL)	BS 1377: Part 3	Table 6/3	Table 6/3
	Chloride ion content (IL)	BS 812: Part 117	–	Table 6/3
	Sulphates (IL)		–	
	Resistivity (IL)	Clause 637	Table 6/3	–
	Redox potential (IL)	Clause 638	Table 6/3	–
	Organic content (IL)	BS 1377: Part 3	–	Table 6/3
	Microbial activity index (IL)	Table 6/3	–	Table 6/3
	Moisture content (on that part of the material passing 20 mm BS sieve) & OMC (IL)	BS 1377: Part 2 and BS 1377: Part 4 (Vibrating	OMC– 2%	OMC+3%

CLASS	MATERIAL PROPERTIES			
	PROPERTY	TEST	ACCEPTABLE LIMITS	
			LOWER	UPPER
		hammer method)		
6J	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Uniformity coefficient	BS 1377: Part 2	5	10
	Plasticity index	BS 1377: Part 2	Non plastic	
	Soaked 10% Fines Value (IL)	Clause 635	50 kN	–
	Effective angle of friction (ϕ') and effective cohesion (c') (IL)	Clause 636	$\phi' = 36^\circ$	–
			$c' = 0$	
	Coefficient of friction and adhesion (fill/elements) (IL)	Clause 639	–	–
	pH value	BS 1377: Part 3	Table 6/3	Table 6/3
	Chloride ion content	BS 812: Part 117	–	Table 6/3
	Sulphates (IL)			
	Resistivity (IL)	Clause 637	Table 6/3	–
	Redox potential (IL)	Clause 638	Table 6/3	–
	Organic content	BS 1377: Part 3	–	Table 6/3
	Microbial activity index (IL)	Table 6/3	–	Table 6/3
	Moisture content (on that part of the material passing 20 mm BS sieve) & OMC (IL)	BS 1377: Part 2 and BS 1377: Part 4 (Vibrating hammer method)	OMC– 2%	OMC+2%
6N	Grading	BS 1377: Part 2	Table 6/2	Table 6/2
	Soaked 10% fines value	Clause 635	50 kN	–
	Undrained shear parameters (c and ϕ) (IL)	Clause 633	–	–
	effective angle of friction (ϕ') and effective cohesion (c') (IL)	Clause 636	$\phi' = 36^\circ$ $c' = 0 \text{ kPa}$	–

CLASS	MATERIAL PROPERTIES			
	PROPERTY	TEST	ACCEPTABLE LIMITS	
			LOWER	UPPER
	Permeability (IL)	Clause 640	5 x 10 ⁻⁵ m/s	–
	pH value (IL)	BS 1377: part 3	6	9
	Moisture content (on that part of the material passing 20 mm BS sieve) & OMC (IL)	BS 1377: Part 2 and BS 1377: Part 4 (Vibrating hammer method)	OMC-2%	OMC+1%
	Sulphates (IL)	TRL447 (see Notes 2 to 4)	–	TRL447 (see Notes 2 to 4)
	MCV	Clause 632	–	–
	Slope stability test	Clause 610	1V:1.5H	–
6P	Grading	BS 1377: part 2	Table 6/2	Table 6/2
	Soaked 10% Fines Value (IL)	Clause 635	50 kN	–
	Undrained shear parameters (c and ϕ)	Clause 633	–	–
	Effective angle of friction (ϕ') and effective cohesion (c') (IL)	Clause 636	$\phi' = 40^\circ$ $c' = 0$ kPa	–
	Permeability (IL)	Clause 640	5 x 10 ⁻⁵ m/s	–
	pH value (IL)	BS 1377: part 3	6	9
	Sulphates (IL)	TRL447 (see Notes 2 to 4)	–	TRL447 (see Notes 2 to 4)
	mc (indicative) (IL)	BS 1377: part 2	OMC-2%	OMC+2%
	MCV	Clause 632	–	–
	Slope stability test	Clause 610	1V:1.5H	–
8	MCV	Clause 632	8	14

Table 6.1A: Acceptable Limits for Materials to be used on site

The Contractor should note the requirements of Table 6.1 regarding the use of 6F3 and 7I materials. The express permission of the Engineer is required if these materials are to be allowed as capping materials.

Earthmoving

1. Clause 602 of the Specification sets out arrangements the Contractor shall make for maintaining the integrity of the acceptable materials arising from the site. The attention of the Contractor is especially drawn to the physical constraints as outlined in Appendix 6/1 paragraph 1.

APPENDIX 6/2: REQUIREMENTS FOR DEALING WITH CLASS U2 UNACCEPTABLE MATERIAL

1. Unacceptable material, Class U2 shall be as defined in SRW Clause 601.3 and/ or defined as hazardous wastes under the Waste Management Acts and Regulations, 1996 and 2010 or latest revision or Act/Regulation.
2. Japanese knotweed or material containing fragments of Japanese knotweed shall be treated as Unacceptable Material Class U2.
3. It shall be the responsibility of the Contractor to deal with any unacceptable material Class U2 arising from any excavation within the land made available adjacent to the site in accordance with this appendix and at his own cost.

Measures for Dealing with Unacceptable Material Class U2

4. While it is not expected that Class U2 material will be encountered on the scheme there is a risk that uncontrolled filling has been carried out in the past.
5. In the event that Class U2 material is encountered excavations shall cease in that area immediately the area fenced off and the Engineer notified. The area shall be inspected by a suitably qualified Environmental Engineer and an appropriate investigation should be carried out to determine the extent and chemical characteristics of the Class U2 unacceptable material, and to identify any hazardous substances.
6. In the event of any such occurrence method statements and the appropriate Safety and Health documentation shall be submitted by the Contractor to the Engineer for review detailing how any potentially contaminated material will be sampled and tested. The Contractor shall carry out sampling and testing based on a grid spacing and to depths appropriate to the risk, extent and degree of contamination anticipated. Further samples to reduce the grid spacing may be taken after the initial analysis if required by the Engineer.
7. The Contractor shall:
 - a. Comply with all relevant legislation in respect of all operations including the excavation and disposal off-Site of all contaminated unacceptable materials, including any construction and demolition materials that do not comply with the requirements of Appendix 6/1.
 - b. Comply with all relevant legislation in respect of treatment of any areas of contaminated material known to exist or encountered in the execution and completion of the Works.
 - c. Produce as part of the Environmental Operating Plan a "Construction and Demolition Waste Management Plan" in accordance with the provisions of current guidance.
 - d. Prepare as part of the Quality Assurance System an "Execution Quality Assurance Plan" that shall include all of the following:
 - e. All the necessary procedures to ensure relevant testing and classifying of all materials to ensure that all unacceptable contaminated material shall not be designated as acceptable material in accordance with the Specification and to ensure that there shall be documentary control and written evidence of all materials that shall be required to be disposed off-Site to any licensed landfill site in accordance with the provision of

- current legislation.
- f. All the necessary procedures to ensure that the assessment and management of any unacceptable contaminated materials excavated as part of the execution of the Works shall be supervised by a qualified body independent of the Contractor.
 - g. All the necessary procedures to ensure that the relevant authority shall be notified 2 working days in advance of the excavation or disposal of any contaminated unacceptable material as part of the execution of the Works, whose personnel or advisers shall be entitled to witness any such activities and all the necessary procedures to ensure the documentation of the chain of custody for all materials classified as "contaminated unacceptable material" that is disposed off-Site to any licensed landfill site
8. Non-hazardous contaminated unacceptable material shall be dealt with in accordance with the Construction Requirements.
 9. In the event that the material is confirmed as Class U2 material the Contractor shall submit a Method Statement to the Engineer detailing his proposals for dealing with the Class U2 material. The Engineer will, if satisfied with the proposals, provide written permission to proceed with the treatment of the U2 material. For removal and replacement of the U2 material, the Contractor shall make arrangements for the Class U2 material to be excavated and removed off site by a Specialist Waste Disposal Contractor approved by the Engineer or by the Contractor under the supervision of a Specialist Waste Disposal Contractor and disposed of to an appropriately licensed facility in accordance with the current Irish Waste Management legislation and associated statutory instruments. No such material shall leave the site without the approval of the Engineer. The Contractor shall keep records of the materials removed and shall obtain the Engineer's authentication of the records.
 10. Surface water flow from the area of the U2 material shall be strictly controlled by an arrangement of a series of grips and sumps, and pumped to dedicated storage tanks to the Engineer's satisfaction.
 11. The pumped water will be sampled and tested to determine the required treatment before it can be discharged to the receiving watercourse. The water is not to be discharged to a receiving watercourse without the written approval of the Engineer. Groundwater/ leachate from contaminated areas shall be contained by a method to be agreed with the Engineer and pumped to the dedicated storage facilities (tanks, attenuation ponds, attenuation pipelines, etc.). The Contractor shall carry out such treatment on the groundwater/ leachate as the Engineer may require to bring the water to such a standard as to permit its return to the receiving watercourse.

Stockpiling of Class U2 Materials On-Site

12. Excavated contaminated material for immediate disposal off site shall not be placed in temporary stockpiles on site prior to classification and disposal, unless otherwise agreed by the Employer's Representative.
13. Material excavated and designated for treatment shall be transported to the appropriate process area for treatment.

14. Where contaminated materials are to be stockpiled, the Contractor shall construct impermeable hard standings with adequate drainage for leakage or provide impermeable containers for storage prior to disposal.

Leachate and Contaminated Water

15. 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.
16. Groundwater/leachate pumped or collected from any contaminated area shall be stored in secure containers prior to appropriate off-site disposal unless otherwise shown on the drawings... The Contractor shall ensure that contaminated waters do not discharge onto the ground. All such waters will be transferred by tanker off site for appropriate disposal unless otherwise shown on the drawings.
17. Drainage arisings and leakage from areas of contaminated material stockpiles shall be collected and stored in secure containers prior to appropriate off-site disposal. The Contractor shall ensure that contaminated waters do not discharge onto ground. All such waters shall be transported and disposed off site in an appropriate facility following the procedures outlined below for transport and disposal of Class U2 contaminated materials.

Waste disposal and Transport

18. It is the Contractor's responsibility to ensure that all class U2 material and waste produced or encountered on site is dealt with (including but not limited to handling, storage, transport, treatment, disposal etc) in accordance with all current regulations and legislation as well as other requirements of relevant authorities.
19. Prior to remove any Class U2 materials from site, the Contractor shall submit a method statement for the transport and disposal of such materials with details including (but not limited to) of the carrier, the licensed facility, method of disposal etc to the Employer's Representative for approval.
20. The burning of any type of waste on site shall not be permitted

APPENDIX 6/3: REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION (OTHER THAN DYNAMIC COMPACTION)

General

1. Earthworks requirements including lines, levels and standard details are shown on the Contract drawings.
2. Excavation and filling are required to construct levelled platforms for the roadways and landscape areas.
3. Topsoil stripping is required beneath the entire footprint of the proposed scheme's platforms, embankment and structures.
4. Excavation is required to or below sub formation as shown on the drawings, soft spots/areas identified during inspection on site prior to filling or foundation construction or as instructed by the Employer's Representative.
5. Fill shall be constructed from the base of the excavation level with slopes at a gradient of 1(v):2(h) with capping material beneath the roadways and hard standing areas as shown on the 0100 Series drawings unless otherwise agreed or instructed by the Employer's Representative.
6. Method Compaction shall be carried out in accordance with Table 6/4 of the TII SRW otherwise end-product compaction will be required. The Contractor shall submit his proposal in writing to the Engineer for approval where end-product compaction is to be carried out.
7. All excavated material shall be classified as unacceptable material Class U1 or U2 and shall be removed off site.

Blasting

8. Blasting shall not be permitted as part of the Works.

Excavations, Cuttings and Cut Slopes Requirements

9. The cuts in in-situ material shall be constructed with slopes at a gradient as shown on the earthworks drawings.
10. Undercutting of cutting slopes or toes of cuttings shall be in accordance with Clause 603 of the Specification for the temporary excavation of trenches for drainage, construction of foundations, soft spots etc in order to prevent any detrimental effect to adjacent earthworks taking into account all temporary works, the site conditions and method of working. The Contractor shall ensure that all slopes and batters of permanent or temporary earthworks or other excavations are safe or adequately supported to prevent failure. Adequate support shall be provided to exposed services and/or adjacent services, structures, road and adjacent land.

11. Undercutting at the toe of existing slopes of existing embankments or newly constructed earthworks platforms or embankments shall be adequately supported to prevent the failure of the slope. These excavations shall be kept free of all water and dewatering may be required.
12. Excavations within 5m of the toe of any slope shall be less than 10m in length along that slope and shall be backfilled immediately.
13. Temporary excavation shall not be permitted within 10m of either end or either side of another excavation or open trench at the toe of an earthworks slope unless otherwise approved in advance by the Employer's Representative following submission by the Contractor of a detailed method statement.
14. Dewatering including pumping water from within an excavation shall be in a controlled manner in order to avoid migration of fines in the adjacent soils and to avoid movement of adjacent structures or earthworks. It is the responsibility of the Contractor to monitor and prevent any movement of existing structures or earthworks.
15. Where the excavations require supporting and the Contractor chooses to provide supports and struts, these shall be removed progressively as filling occurs unless otherwise directed by the Employer's Representative.
16. If boulders of a size greater than 600mm are encountered during excavation, then they shall be removed by splitting, breaking or other method to the satisfaction of the Employer's Representative. If such boulders are located at formation level, then the void formed shall be backfilled with capping 6F1 or 6F2.
17. It shall be the responsibility of the Contractor to temporarily control the inflow and level of groundwater within or adjacent to the excavation to allow the required works and inspection to be carried out in accordance with the Contract.

Construction of Fill

18. Upon completion of topsoil stripping and/or excavation below earthworks as shown on the drawings or required in the specification or directed by the Employer's Representative, the Contractor shall inspect and proof roll all areas of prior to filling for the construction of embankments and platforms.
19. The proof-rolling shall consist of at least two passes of a smooth-wheeled roller without vibratory action and having a minimum mass per metre roll width of 2100Kg, or other suitable method agreed with the Employer's Representative.
20. In cohesive soils, a minimum undrained shear strength value of 50KPa is required beneath the fill.
21. The foundation level of fill and/or base of the excavation shall be kept dry and compacted prior to inspection and proof rolling and during construction.
22. A minimum CBR of 4% is to be achieved at subformation unless otherwise instructed or agreed by the Employer's Representative.
23. Soft spots/areas at formation/base of the excavation shall be defined as areas where the soil does not meet the minimum shear strength requirements and/or display excessive deformation during proof rolling. The extent of soft spots shall be determined by inspection

during proof-rolling. Unless otherwise instructed or agreed by the Employer's Representative, soft spots shall be excavated and backfilled in with Class 6F1 or 6F2 material.

24. Upon completion of stripping or excavation to the formation level of areas in cut, at grade or shallow fill (e.g. for construction of earthworks, pavement foundation) or excavation of insitu ground to be replaced as shown on the drawing or required in the contract, the Contractor shall notify the Employer's Representative for inspection and witnessing proof rolling. It is the responsibility of the Contractor to provide safe access to the area and level of inspection to the Employer's Representative as well as plant and labour for proof rolling of same.
25. Proof-rolling shall consist of at least two passes of a smooth-wheeled roller without vibratory action and having a minimum mass per metre roll width of 2100Kg, or other suitable method agreed with the Employer's Representative.
26. In granular material, the material at the base of the excavation shall be kept dry and compacted prior to proof rolling.
27. Where the material at the base of top soil stripping or excavation for the construction of earthworks platform (fill or insitu material in cuts) does not meet the above criteria or display in the opinion of the Employer's Representative showing excessive movement.
28. Prior to the deposition of any fill material in an excavation, the Contractor shall submit detailed records of the inspection and proof rolling including location and depth of any soft spots and remedial work undertaken to the Employer's Representative for approval.
29. The Contractor's particular attention is drawn to Clause 608 (Construction of Fills) of the Specification and the requirement to provide protection against weather. Protection including (but not limited to) sealing the surface of earthworks, providing an adequate fall and/or temporary drainage to avoid water ponding at any time within the earthwork's areas shall be required.

Cohesive/granular fill interfaces

30. Cohesive/granular fill interfaces shall be constructed such that drainage of the interface is towards the edge of the embankment. The slope of the interface shall be such that any water drains to the outside of the embankment. No pockets of granular material shall be formed within cohesive material.

Compaction

General

31. Requirements of compaction shall comply with Clause 612

Method Compaction

32. Additional compaction in the top 600mm over the full width of the embankments to Clause 612.10 is required.
33. The frequency of field dry density testing shall be as set out in Appendix 1/5.

End Product Compaction

34. A nuclear surface density gauge (NDG) will be permitted for measuring the insitu bulk density and moisture density in order to determine the moisture content and dry density of the compacted material in place of sand replacement tests (SRT calibrated for the materials on site) provided that it is calibrated for each type of material (site won or imported) used on site. The gauge shall be calibrated in accordance with BS 1377: Part 9 for each area and each layer of material tested. For each type of material tested, the calibration test results shall be submitted to the Employer's Representative for approval prior to its use on site and with the end product test results for the in situ material.

Benching to Receive Fill

35. Filling against existing slope is not required but benches shall be provided to backfill battered excavations or to replace unstable material within new slopes. Benches shall be 0.5m in height for each step.
36. Additional compaction shall be carried out within two metres each side of the upright face of the lower bench immediately following the compaction of the first layer of fill material on the upper bench to ensure adequate (95%) compaction occurs at the steps.

Cuttings & Embankment Faces

37. Cutting and embankments slopes shall be benched or arrowed prior to receiving any topsoil.

Making Good Prior to Topsoiling

38. All cuttings and embankment slopes shall be made good prior to placing topsoil as shown on the drawings in accordance with Clause 603.7 of the Specification. Any ruts shall be backfilled with material of the same Class as the surrounding fill and levelled. Any protruding boulder or other large particle shall be removed and replaced with material of the same Class as the surrounding fill levelled.

CONTRACTOR TO KEEP RECORDS OF FILL PLACEMENT

39. The Contractor shall keep records of the following for each fill area:
 - i. Contract Identification and name of Earthworks Subcontractor
 - ii. Date and Hours Worked

- iii. Details of fill location
- iv. Weather conditions and minimum / maximum air temperatures and
- v. Details of any fill treatment carried out.
- vi. The Contractor shall allow access to these records to the Engineer

Archaeological Evaluations

- 40. If any object of archaeological interest is exposed during the course of the Works, the Contractor shall notify both the Employer's Representative and DOEHLG, and desist from work in the immediate vicinity of the find until such time as the area can be fully investigated.
- 41. The Contractor shall make available this land and accommodate any reasonable requests to assist in the investigation. Anything found as a result of such an investigation shall become the property of the State.
- 42. The contractors attention is drawn to the requirements of Appendix 1/13 regarding programming constrain.
- 43. The Contractor is to include within the earthworks operation that all excavations of any type and to any depth will be monitored by an archaeologist.

APPENDIX 6/5: GEOTEXTILES USED TO SEPARATE EARTHWORKS MATERIALS

1. Geotextile for separating earthworks materials shall comply with BS8006 and EN965.
2. Geotextiles shall be synthetic non-woven, thermally bonded or mechanically needled fabric composed of UV stabilised polypropylene or polyester filaments, except that where the geotextile is in contact with PFA it shall be synthetic non-woven mechanically needled fabric composed of UV stabilised polypropylene filaments.
3. All geotextiles which are to be incorporated in the permanent works shall have a minimum life expectancy of 120 years.
4. Testing of geotextiles shall be in accordance with the Specification and relevant European Standards to confirm the supplier specifications. The frequency of testing of geotextiles shall be as shown in Table 1/5.
5. General purpose Geotextile Filter/Separator materials shall meet the following criteria:

Mean wide width strip tensile strength	13 KN/m minimum	BSEN ISO 10319:1996
Mean CBR puncture resistance	20 KN minimum	BSEN ISO 12236:1996
Mean trapezoidal tear resistance	575 N minimum	ASTM D4533
Mean AOS O90 pore size	0.05 – 0.35 mm	BSEN ISO 12956:1999
Permeability, 10 cm head	10 litres/m ² sec min.	BSEN ISO 11058:1999
6. Geotextiles used in the Works shall, when exposed to UV light in an accelerated weathering test, carried out and interpreted in accordance with BS PD 6533:1993 Section B, have a resistance to UV light and weathering, such that the time to reduce the characteristic tensile strength by 50% exceeds 3 months. They shall have a resistance to chemical and biological degradation, such that when tested in accordance with index test methods in BS PD 6533:1993 Sections 4 & 5, the reduction in characteristic tensile strength does not exceed 25% of the original value. The Contractor shall provide test results confirming that all relevant materials comply with these criteria.

Laying and Lapping

7. Supply and Handling
 - i) Geotextiles shall be supplied to site in an undamaged condition and shall not be damaged by site handling, whether supplied in the form of rolls or packages. The methods of supply and handling adopted shall ensure that: the geotextile is supplied dry, and remains dry; the geotextile is protected from abrasion and damage; the geotextile is protected from contamination; the geotextile is protected from exposure to sunlight (ultra-violet radiation in particular).
 - ii) Items within consignments of geotextiles shall be supplied to site clearly marked with the name of the product and its grade or code number, in order that it shall easily be identified both before and after removal of any wrapping.

- iii) Geotextiles may be stored in the open (outdoors) provided that such storage is safe, secure and free from hazard. Geotextiles shall not, by virtue of their storage environment, be subject to temperature extremes or other harmful conditions. Geotextiles shall be stored on an even, and preferably horizontal, surface.
 - iv) Geotextiles shall be stockpiled or stored in such a way that the weight of overlying material does not damage that which is below. Any geotextiles damaged during storage should be removed from site. Wrapping provided shall not be removed before the geotextile is used unless replaced by alternative wrapping that shall provide the required protection.
8. Installation Procedure
- i) The geotextiles shall at all times prior to placement be stored under cover and suitably protected from direct sunlight and water. Care shall be taken to ensure that the geotextiles are not damaged during placement or during the deposition, spreading and levelling of the fill material. No traffic or site plant shall be permitted to traffic the reinforcement prior to placing the fill.
 - ii) The fabrication and installation shall be planned and implemented taking into account existing or diverted services and drainage works.
 - iii) Jointing shall be by overlapping only and all overlaps shall be a minimum of 500mm. Any punctures or damage to geotextiles shall be made good by overlaying with geotextile having an overlap of at least 500 mm from the edge of the damaged area. The number of joints shall be kept to an absolute minimum.
9. Requirement for Placing and Compaction of Fill
- i) Placing and compaction of fill shall be carried out so that the reinforcement shall be installed at the specified level on top of compacted fill, completed formation or completed sub-formation as appropriate. The surface on which the geotextile is to be placed shall comply with the surface level tolerance in Clause 616.
 - ii) Fill shall not be tipped directly onto the geotextile. Fill shall be carefully spread onto previously placed geotextile and shall be taken forward and placed by hand-raking or suitable plant with a bucket type that causes the covering material to cascade onto the geotextile. Operation of construction plant directly on the installed geotextile is not permitted and its covering with fill material shall be carried out immediately after laying and jointing.
 - iii) During placing and compaction of fill, care shall be taken to avoid displacing the geotextile. At overlaps, the top piece of geotextile shall be the first to be covered by fill and no fill shall be permitted to come between overlapping layers.
10. The frequency of sampling and testing of geotextiles shall be as shown in Table 1/5. Samples for testing in accordance with Clause 609 shall be taken in accordance with the prescriptions of BS EN 963 'Geotextiles - Sampling and Preparation of Test Specimens'. The sampling report shall be sent with the samples to the test laboratory and a copy shall be delivered to the

Designer within 3 days of the sampling.

11. Samples of installed geotextiles are to be retained by the Contractor for a minimum of 12 months.

APPENDIX 6/6: FILL TO STRUCTURES AND FILL ABOVE STRUCTURAL FOUNDATIONS

1. In addition to the requirements of SRW Clause 610, class 6N shall be used in locations as specified on the Works Requirements Drawings. The material shall comply with the requirements of Table 6/1 as amended in Appendix 6/1. The upper bound value of ϕ' peak for class 6N shall be established by laboratory testing of the source material (not less than three shear box tests per 1000m³ (that is 2000t) of stock pile material) to demonstrate a ϕ' peak not exceeding 45°.
2. The Structure Drawings indicate the minimum lateral extents for backfill materials and the Contractor shall satisfy himself that his proposed material is stable at the trimmed batters shown on the Structure Drawings as required in Clause 610.6. If the Contractor proposes materials that cannot be trimmed to the batters indicated, shallower stable slopes shall be used.
3. Unless otherwise stated, fill materials to structures and above structural foundations shall be Class 6N complying with Table 6/1 and shall extend into the embankments as indicated on the drawings and shall be deposited and compacted to Clause 610 and above structural foundations to Clause 611.
4. If the Contractor, in placing and compacting structural fill, under-fills to the required profile, the Contractor shall not make good the under-fill by placing and compacting on the slope. The Contractor shall cut back the area of under-fill in such a manner so as to allow the placement and compaction of the under-filled area as specified in Clause 610.
5. Full scale determination of stable slopes constructed from Class 6N1 and 6N2 will not be required provided the material complies with the requirements of Appendix 6/1 Table 6.1 and that the Engineer is satisfied with the material following visual inspection.

APPENDIX 6/7: SUB-FORMATION & CAPPING & PREPARATION AND SURFACE TREATMENT OF FORMATION

1. The contractor shall carry out CBR and in-situ density testing at sub-formation to confirm that the required design CBR value has been achieved. If the required CBR has not been achieved on fill, the contractor shall replace and make good the defective fill. In areas where sub-formation is within in-situ material, the soft material should be excavated and replaced with Class 6F1 or 6F2 material as directed by the Employer's Representative.
2. Class 6F1 or 6F2 material shall be in accordance with Table 6/1 and shall not be frost susceptible.
3. Preparation and surface treatment of the sub-formation, including tolerances, shall be in accordance with Clause 616.1 as specified for formation.
4. Material used within 350mm of the final road surface shall not be frost susceptible. Requirements for lateral extent of capping and sub-formation, sub-formation shaping and crossfalls shall be as shown on the pavement construction drawings and in the road construction details.
5. Preparation and surface treatment of formation and sub-formation shall be carried out immediately prior to laying pavement foundation materials or sub-base. If at any time the subgrade becomes softened due to precipitation or site activities, the subgrade shall be stripped by at least 40mm to expose a competent sub-formation that shall be recompacted. Where the sub-formation level is reduced in this manner the pavement foundation construction thickness shall be increased with capping (or sub-base if appropriate).
6. Preparation of sub-formation shall be carried out only after installation of adequate subgrade / sub- formation drainage that shall be fully operational. Adequate temporary drainage shall be determined by the Contractor to suit the site conditions and method of working (attention is drawn to the moisture susceptible nature of some of the soils on this site).
7. At the time of trimming sub-formation which is required to receive capping at all areas, sub-formation shall be inspected and proof rolled and the contractor shall carry out in situ CBR and density tests.
8. CBR and in situ density tests shall be carried out at sub formation at a frequency of not less than 20m spacing along the carriageway of the main road and each side road, slip road, roundabout and each side of the carriageway where the conditions differ.
9. The Contractor shall notify the Employer's Representative prior to trimming sub-formation for inspection and witnessing proof rolling and testing. It is the responsibility of the Contractor to provide plant, equipment and labour for proof rolling and testing at the time of trimming sub-formation.
10. Based on the inspection, proof rolling and testing, further excavation may be required by the Employer's Representative to achieve sub formation on a subgrade layer meeting the Contract requirements and with the required thicknesses of capping and/or subbase.
11. The Contactor shall make good any area not meeting the contract requirement and/or, in the opinion of the Employer's Representative showing excessive movement. This shall involve the excavation of the material in the defective area and replacement with acceptable

capping material or if in granular fill, with acceptable granular material of the same class unless otherwise agreed with the Employer's Representative. The area shall subsequently be re-inspected and/or in-situ tests be carried out as required by the Employer's Representative.

12. In cut or at grade areas (including shallow embankments), the Contractor shall excavate below sub formation as shown on the drawings or as required to meet the specification requirements following inspection of subformation and achieve the required thickness of capping and subbase depending on the subgrade or otherwise as directed by the employer's Representative.
13. Prior to the deposition of capping, the Contractor shall submit detailed records of the subformation inspection and test results including details of defective areas and remedial work undertaken to the Employer's Representative for approval.
14. Where the required CBR of 15% has not been achieved at formation, the Contractor shall excavate and replace the defective material and make good the area as agreed with the Employer's Representative.
15. CBR Tests shall consist of a plate loading test in accordance with BS1377 Part 9 and the CBR value shall be calculated from the results of the 2nd loading cycle. The plate shall not be less than 450mm diameter but a 600mm plate maybe required depending on the material tested at each location. The Contractor shall provide a method statement including details of the equipment, reaction load and calculation of the CBR value for approval by the Employer's Representative.

APPENDIX 6/8: TOPSOILING, GRASS SEEDING AND TURFING

General

1. The maximum height of topsoil stockpiles shall be as per Clause 602.10, i.e. 2m.
2. The Contractor shall comply with the provisions of Clause 618.3.
3. All verges, side slopes and infill areas at rear of footway/cycleway shall be topsoiled and seeded (Treatment 1) in accordance with Clause 618.4 (i) as indicated on the drawings.
4. Topsoiling shall be in grassed verges, rear of footway/cycleways and landscaping areas as shown in drawings to the following thicknesses:
 - grass areas: 150mm thickness
5. In the event of a surplus of Class 5A topsoil arising from the site, the topsoil shall be retained within the site for the use by the Employer and placed at a location agreed with the Employer.
6. Where the existing ground has been disturbed by the Contractor, it shall be topsoiled and grassed as per the requirements of this Appendix.
7. Additional areas where Topsoiling and seeding is required are as identified on the Contract Drawings.

Groundworks Preparation

8. All grading operations on side slopes adjoining the road should be carried out so as to provide a rounded cross sectional profile. The finished grading shall contain no localised depressions or mounds.
9. Subsoil cultivation shall be carried out with a subsoiler or ripper to depths depending upon soil texture and degree of compaction (min 450mm) and including any access route prior to topsoiling (where applicable).
10. After major grading has been carried out, topsoil shall be spread evenly on formation levels to depths recommended by the Employer's Representative.
11. topsoil shall be good quality medium topsoil loam, easily moulded when moist. It must be neither too sticky nor leave a smooth polished surface when smeared. It shall be free from all chemical or other pollutants, without excessive proportions of stones or flints and those present must not exceed 50mm gauge. It must not include subsoil, excessive proportions of clay, sand, chalk or lime, nor may it contain rubbish or other extraneous material, pernicious weeds or couch grass whether roots or top-growth, or roots of trees or shrubs. In addition to the requirements of Table 6/1, Class 5A topsoil shall be free from propagules of aggressive and noxious weeds.
12. Topsoil shall be reduced to a fine tilth by stone raking or harrowing. All stones or other debris with any dimension greater than 25mm shall be collected and removed off site and any other remaining stones or debris shall not be upstanding more than 25mm. The topsoil shall then be lightly rolled and compacted to the thickness described in the Contract and shall remain 25mm - 50mm above all finished levels to allow for settlement.
13. Finish level of topsoil to be 50mm above the finish level of ironmongery, footpaths etc.

Seeding

14. The seedbed shall be prepared by reducing to a fine tilth by raking or harrowing with a spike and chain harrow (light and uniform rolling). All stones larger than 25mm in any one dimension shall be removed. No seed shall be sown until the cultivation and preparatory work has been approved. Finished levels shall have fullness under moderate consolidation to 25mm - 50mm above paths, kerbs and manholes.
15. Prior to seeding, fertiliser consisting of an approved compound containing not less than 10% Nitrogen, 10% Phosphorous and 20% Potassium or similar composition shall be evenly distributed on the topsoil at a rate not less than 75g/m.
16. Sowing of grass seed shall be carried out during calm weather conditions by an even distribution using a blend of seed consisting of the following grasses; 60% Dwarf Perennial Ryegrass, 20% String Creeping Red Fescue, 15% Slender Creeping Red Fescue and 5% Highland Browntop Bent Grass. The Contractor shall arrange for sowing during periods August/September and/or March/April unless otherwise agreed.
17. Prior to the first cut, the landscape contractor is to arrange for the hand picking of any stones greater than 25mm in any dimension which may arise on the surface as a result of settlement and the areas are to be rolled with a lightweight roller.

Maintenance

18. When grass is established between 40-75mm high, it should be topped with a rotary type mower to leave 25-50mm of growth to encourage tillering. Mowing machines used for this purpose shall be in a good state of repair, and evenly set with sharp blades to avoid laying or pulling young grass. If the sward is likely to be very heavy, the cuttings shall be removed.
19. The grass is to be maintained by the Contractor during the maintenance period to a height of 40mm and not greater than 70mm. Grassed areas shall be cleared of grass cuttings on completion of mowing operations.
20. No payment shall be made to the Contractor if the seed fails due to any cause whatsoever. The Contractor shall be required to repeat the seeding until a good sward is obtained. Grass areas shall only be accepted when germination has proved satisfactory and all weeds removed.

APPENDIX 6/12: INSTRUMENTATIONS AND MONITORING

Monitoring of Vibration

1. Monitoring to be carried out on a 24 hour/7 days per week basis for the duration of the Works.
2. The Contractor is required to ensure construction works do not affect the stability of existing buildings, plant or equipment. The Contractor is required to provide evidence of survey performance completed on a daily basis.
3. The Contractors procedure to provide for monitoring survey every 2 hours with rates of settlement analysed and assessed. Provision for construction methods to be modified or activity cessation if deemed applicable from analysis.
4. Measurement is required by manual surveying and remote monitoring. Records to be provided in digital format.

APPENDIX 7/1: PERMITTED PAVEMENT OPTIONS

General

1. The pavements detailed in this appendix are only to be constructed at the locations shown on the Contract Drawings in accordance with the relevant Specification clauses and appendices.
2. The Contractor shall make good any pavement which is damaged alongside the installation of new kerbs. This may require the provision of surface course and binder course as per the specification above alongside newly laid kerbs.
3. Pavement edge details to be in accordance with CC-SCD-00701 or CC-SCD-00702 where appropriate.
4. Joints between the existing pavement and new construction shall be undertaken in accordance with the schematic transverse and longitudinal joint sections shown on CC-SCD-00703 and CC-SCD- 00704 respectively.
5. Any existing surface course shall be thoroughly removed by cold milling or hand tools in accordance with Appendix 7/9 prior to the new surface course being laid.
6. The Contractor shall undertake a visual pavement condition survey of the existing binder course following planing in accordance with Clause 702.5 in advance of resurfacing.
7. The Contractor shall monitor the temperature of the materials during placement behind the paver screed at intervals coinciding with the initial discharge of each load of material, during the discharge and at the end of the load being discharged, to ensure continuity of the placement temperature.
8. All surfacing materials shall take account of the requirements of DN-PAV-03023 June 2020 - Surfacing Materials for New and Maintenance Construction, for Use in Ireland

Sheet 1 – Pavement Type – Road Carriageway Full Construction

1	Location: As shown on the 0100 and 0700 series Drawings		General Requirement	
2	Grid for checking surface levels of pavement courses, if different from the requirements of Cl. 702.4: Long dim: Trans dim:		N/A N/A	
3	Category of Road Surface regularity (Cl. 702.7 and Cl. 702.8): Longitudinal Regularity: Transverse Regularity:		A Yes 20m	
4	Requirements for coarse aggregates – Polished Stone Value (PSV), Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 3.2.2, 5.2.2, 6.2.2, 8.4.1.1, 8.6.1.1):		Minimum PSV = 65 Maximum AAV = 14	
5	Requirements for pre-coated chippings – Polished Stone Value (for general use mixtures, PSV for mixtures for roundabouts, Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 4.2.4):		N/A	
6	Requirement for the friction after polishing test (DN-PAV-03074, Cl. 2.26):		No	
7	Freezing and thawing (soundness) category if different from the requirements (CC-SPW-00900, Tables 1, 4, 7, 10 and 17):		N/A	
8	Compaction control and extraction of cores if different from the requirements (CC-SPW-00900, Cl. 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 (CC-SPW-00900, Cl. 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, Cl. 1.2, 1.3):		N/A	
11	Whether sub-base material may be spread in more than one layer (Cl 802.4).		Yes	
Permitted Pavement– Road Carriageway				
Pavement Course	Clause (Series 900)	Mixture Designation / Material	Thickness (mm)	Particular Requirements
Surface Course	5.1.1	SMA 10 Surf PMB 65/105-60 des	45	Resistance to polishing of chippings shall be minimum PSV = 65 Resistance to abrasion of chippings shall be maximum AAV = 14

Binder Course	3.1.4	AC 20 dense bin 40/60 des	60	Nominal Size: 0/20mm
Base	3.1.1	AC 32 dense base 40/60 des	100	Nominal Size: 0/32mm
Sub-base	Cl.808	Granular Material Type B	150	N/A
Capping	613	6F1/6F2	Varies	See Appendix 6/7
Total Pavement Thickness (excluding sub-base and capping)			205	

Sheet 2 – Pavement Type – Flat-top Ramps

1	Location: As shown on the 0100 and 0700 series Drawings	General Requirement
2	Grid for checking surface levels of pavement courses, if different from the requirements of Cl. 702.4: Long dim: Trans dim:	N/A N/A
3	Category of Road Surface regularity (Cl. 702.7 and Cl. 702.8): Longitudinal Regularity: Transverse Regularity:	A Yes 20m
4	Requirements for coarse aggregates – Polished Stone Value (PSV), Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 3.2.2, 5.2.2, 6.2.2, 8.4.1.1, 8.6.1.1):	Minimum PSV = 65 Maximum AAV = 10
5	Requirements for pre-coated chippings – Polished Stone Value (for general use mixtures, PSV for mixtures for roundabouts, Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 4.2.4):	N/A
6	Requirement for the friction after polishing test (DN-PAV-03074, Cl. 2.26):	No
7	Freezing and thawing (soundness) category if different from the requirements (CC-SPW-00900, Tables 1, 4, 7, 10 and 17):	N/A
8	Compaction control and extraction of cores if different from the requirements (CC-SPW-00900, Cl. 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 (CC-SPW-00900, Cl. 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, Cl. 1.2, 1.3):			N/A
11	Whether sub-base material may be spread in more than one layer (Cl 802.4).			Yes
Permitted Pavement– Flat-top Ramps				
Pavement Course	Clause (Series 900)	Mixture Designation / Material	Thickness (mm)	Particular Requirements
Surface Course	5.1.1	HRA 35/14 F with harden pre coated chippings	50	Resistance to polishing of chippings shall be minimum PSV = 65 Resistance to abrasion of chippings shall be maximum AAV = 14
Binder Course	3.1.4	AC 20 dense bin 40/60 des	60-135	Nominal Size: 0/20mm
Total Pavement Thickness (excluding sub-base and capping)			110-185	

Sheet 3 – Pavement Type – Road Resurfacing

1	Location: As shown on the 0100 and 0700 series Drawings	General Requirement
2	Grid for checking surface levels of pavement courses, if different from the requirements of Cl. 702.4: Long dim: Trans dim:	N/A N/A
3	Category of Road Surface regularity (Cl. 702.7 and Cl. 702.8): Longitudinal Regularity: Transverse Regularity:	A Yes 20m
4	Requirements for coarse aggregates – Polished Stone Value (PSV), Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 3.2.2, 5.2.2, 6.2.2, 8.4.1.1, 8.6.1.1):	Minimum PSV = 65 Maximum AAV = 14
5	Requirements for pre-coated chippings – Polished Stone Value (for general use mixtures, PSV for mixtures for roundabouts, Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 4.2.4):	N/A
6	Requirement for the friction after polishing test (DN-PAV-03074, Cl. 2.26):	No
7	Freezing and thawing (soundness) category if different from the requirements (CC-SPW-00900, Tables 1, 4, 7, 10 and 17):	N/A

8	Compaction control and extraction of cores if different from the requirements (CC-SPW-00900, Cl. 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 (CC-SPW-00900, Cl. 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, Cl. 1.2, 1.3):	N/A		
11	Whether sub-base material may be spread in more than one layer (Cl 802.4).	Yes		
Permitted Pavement– OVERLAY / IN-LAY				
Pavement Course	Clause (Series 900)	Mixture Designation / Material	Thickness (mm)	Particular Requirements
Surface Course	5.1.1	SMA 10 Surf PMB 65/105-60 des	45	Resistance to polishing of chippings shall be minimum PSV = 65 Resistance to abrasion of chippings shall be maximum AAV = 14
Binder Course	3.1.4	AC 20 dense bin 40/60 des	25-40	Nominal Size: 0/20mm
Total Pavement Thickness (excluding sub-base and capping)			70-85	

Sheet 4 – Pavement Type – Road Reinstatement

1	Location: As shown on the 0100 and 0700 series Drawings	General Requirement
2	Grid for checking surface levels of pavement courses, if different from the requirements of Cl. 702.4: Long dim: Trans dim:	N/A N/A
3	Category of Road Surface regularity (Cl. 702.7 and Cl. 702.8): Longitudinal Regularity: Transverse Regularity:	A Yes 20m
4	Requirements for coarse aggregates – Polished Stone Value (PSV), Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 3.2.2, 5.2.2, 6.2.2, 8.4.1.1, 8.6.1.1):	Minimum PSV = 65 Maximum AAV = 14

5	Requirements for pre-coated chippings – Polished Stone Value (for general use mixtures, PSV for mixtures for roundabouts, Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 4.2.4):			N/A
6	Requirement for the friction after polishing test (DN-PAV-03074, Cl. 2.26):			No
7	Freezing and thawing (soundness) category if different from the requirements (CC-SPW-00900, Tables 1, 4, 7, 10 and 17):			N/A
8	Compaction control and extraction of cores if different from the requirements (CC-SPW-00900, Cl. 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 (CC-SPW-00900, Cl. 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, Cl. 1.2, 1.3):			N/A
11	Whether sub-base material may be spread in more than one layer (Cl 802.4).			Yes
Permitted Pavement– OVERLAY / IN-LAY				
Pavement Course	Clause (Series 900)	Mixture Designation / Material	Thickness (mm)	Particular Requirements
Surface Course	5.1.1	SMA 10 Surf PMB 65/105-60 des	45	Resistance to polishing of chippings shall be minimum PSV = 65 Resistance to abrasion of chippings shall be maximum AAV = 14
Binder Course	3.1.4	AC 20 dense bin 40/60 des	60	Nominal Size: 0/20mm
Base	3.1.1	AC 32 dense base 40/60 des	100	Nominal Size: 0/32mm
Total Pavement Thickness (excluding sub-base and capping)			205	

Sheet 5 – Pavement Type – Offline Cycleway Construction

1	Location: As shown on the 0100, 0700 and 1100 series Drawings	General Requirement
2	Grid for checking surface levels of pavement courses, if different from the requirements of Cl. 702.4: dim: Long dim: Trans	N/A N/A

3	Category of Road Surface regularity (Cl. 702.7 and Cl. 702.8): Longitudinal Regularity: Transverse Regularity:	A Yes 20m		
4	Requirements for coarse aggregates – Polished Stone Value (PSV), Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 3.2.2, 5.2.2, 6.2.2, 8.4.1.1, 8.6.1.1):	Minimum PSV = 65 Maximum AAV = 10		
5	Requirements for pre-coated chippings – Polished Stone Value (for general use mixtures, PSV for mixtures for roundabouts, Aggregate Abrasion Value (AAV) (CC-SPW-00900, Cl. 4.2.4):	N/A		
6	Requirement for the friction after polishing test (DN-PAV-03074, Cl. 2.26):	No		
7	Freezing and thawing (soundness) category if different from the requirements (CC-SPW-00900, Tables 1, 4, 7, 10 and 17):	N/A		
8	Compaction control and extraction of cores if different from the requirements (CC-SPW-00900, Cl. 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 (CC-SPW-00900, Cl. 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, Cl. 1.2, 1.3):	N/A		
11	Whether sub-base material may be spread in more than one layer (Cl 802.4).	Yes		
Permitted Pavement– Offline Cycleway Construction				
Pavement Course	Clause (Series 900)	Mixture Designation / Material	Thickness (mm)	Particular Requirements
Surface Course	5.1.1	SMA 6 Surf PMB 65/100-60 des	25	Resistance to polishing of chippings shall be minimum PSV = 65 Resistance to abrasion of chippings shall be maximum AAV = 10 Chippings to be in RED Colour RAL 3013
Binder Course	3.1.4	AC 20 dense bin 70/100 des	50	Nominal Size: 0/32mm
Base	3.1.1	UGM A (CL. 804)	150	Nominal Size: 0/32mm
Total Pavement Thickness (excluding sub-base and capping)			205	

APPENDIX 7/2: EXCAVATION AND REINSTATEMENT OF EXISTING SURFACES

1. No excavation will be permitted within the proposed carriageway following completion of the surface course.
2. Reinstatement of trenches in existing carriageways necessitated during the course of the works shall comply with CC-SCD-00705 (Bituminous) of the TII Standard Details and "Guidelines for Managing Openings in Public Roads – Guidelines for the Openings, Backfilling and Reinstatement of Openings in Public Roads, Second Edition (Rev 1), April 2017".
3. Pavement edge shall be finished as per CC-SCD-00702 (in-situ kerb) of the TII Standard Details where kerbs are used and as per CC-SCD-00701 (Pavement Type 1) of the TII Standard Details at all other locations.
4. Transverse joints between the existing pavement and the new pavement shall be constructed as per CC-SCD-00703 of the TII Standard Details.
5. Longitudinal joints between the existing pavement and the new pavement shall be constructed as per CC-SCD-00704 of the TII Standard Details.

Temporary Trench Reinstatements

6. 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 Specification and the following requirements:
 - (i) Prior to excavation, the sides of the trenches are to be marked out and any bituminous bound pavement cut with a saw;
 - (ii) Existing pavement shall be broken out with reasonable care and attention not to damage the existing pavement being retained alongside;
 - (iii) The temporary re-instatement of these trenches, once the service has been laid, will consist of ST2 mix concrete backfilling to within 50mm of the existing surface;
 - (iv) Immediately prior to the laying of the surface course material, as stated in section 3 above, the edges of the existing pavement shall be cleaned of all loose material and coated with an appropriate hot bituminous binder;
 - (v) The final 50mm is to be finished with close graded Hot Rolled Asphalt subject to Clause 4.1.1;
 - (vi) The joint formed between the reinstated pavement and the existing pavement shall also be sealed with an appropriate hot bituminous binder;
 - (vii) The requirements of Specification Clause 706.3 and 706.9 shall also apply;
 - (viii) The use of delay set bituminous material will not be permitted

APPENDIX 7/4: BITUMINOUS SPRAYS

1. Surface preparation of the milled surface shall comply with SRW Series 900, Clause 10.1.4.
2. A bond coat shall be sprayed onto the surface before placing each layer in accordance with SRW Series 900, Clause 10.1.4.
3. Bond coats and other bituminous sprays shall comply with the requirements of Clause 10.1.4. A bond coat shall be sprayed onto all surfaces immediately prior to the placing of inlays/overlays and regulating material over the full extent of the works and where bituminous surfaces are left exposed for more than 4 weeks.
4. Before spraying is commenced, the surface shall be prepared in accordance with Clause 10.1.4. All surfaces (except new pavement layers) shall be mechanically suction swept before application of bond coat.
5. It is the responsibility of the contractor to keep the new pavement areas free of traffic or dirt. If new pavement layers have been trafficked or soiled prior to overlaying, it shall be the responsibility of the contractor to have the surface thoroughly clean (including mechanically suction swept) and sprayed at his own expense.
6. Bituminous sprays shall comply with the requirements of Clause 10.1.4 of the Specification and have spread rate 0.5-0.7 l/m² excluding tack coats for thin surfaces which shall be agreed in writing with Employer's Representative.

APPENDIX 7/5: Road Pavements: TII Standard Construction Details

1. Refer to Appendix 0/4.

APPENDIX 7/6: Breaking Up or Perforation of Existing Pavement

1. Breaking up pavement may be required for the construction of the new footpaths and roads as shown on the Contract Drawings.
2. The Contractor shall carry out the breaking up of redundant pavement in accordance with the Health and Safety Regulations and the Works Requirements. It is the responsibility of the Contractor to ensure that breaking up of the pavement is carried out in such a manner that will not damage other service or utility works including drainage system etc. that are to be retained or will form part of the new works
3. Adequate precaution shall be taken to ensure that breaking of the existing pavement does not exceed the specified boundaries that form part of the existing pavement. Areas of the pavement to be broken shall be delineated both longitudinal and transversely by saw cutting prior to breaking up.
4. Where the Employers Representative agrees that existing carriageway to be built over by footpaths can be left in place, the existing carriageway is to be punctured to its full depth and at centres no greater than a 0.5m radius.

APPENDIX 7/9: Cold Milling (Planing) of Bituminous Bound Flexible Pavement

1. The Contractor shall choose whether to profile plane or constant depth plane, in order to achieve the pavement design specified in Appendix 7/1.
2. Cold milling shall comply with CC-SPW-00900, Clause 2.1.
3. In accordance with CC-SPW-00900, Clause 10.1.1.1, the Contractor shall carry out a sweep of the area to locate any buried metalwork within the area to be cold-milled.

Schedule: Sweeping Areas Prior to Cold-milling	
Drawing No.	Location
Areas identified as to be overlaid in Series 0700 Drawings	All locations where milling of existing pavement is indicated or where required to comply with CC-SCD-00703 and CC-SCD-00704.

APPENDIX 11/1 KERBS, FOOTWAYS AND PAVED AREAS

General

1. The extents of all kerbing, footways, and paved areas are shown on the 1100 Series drawings.
2. All kerbing works shall be in accordance with the details shown on the Contract Drawings. The upstands of the kerbs shall comply with the requirements as shown on the drawing and details contained within the Contract Drawings.

Precast Kerbs

3. Prefabricated kerbs shall be as per the details provided on the 1100 series drawings.
4. All kerbing upstands shall match the existing upstands adjacent to the Works.
5. Channels, edgings and quadrants sizes are to be in accordance with the 1100 and 2600 series drawings.

In-Situ Concrete Kerbs

6. Kerbs shall be in situ concrete, grade C40/50, as detailed in CC-SCD-01102 unless otherwise specified.
7. The standard in situ concrete kerb height is 125mm as indicated on the drawings.
8. Generally, in-situ concrete kerbs shall be extruded, constituted to the dimensions shown on the drawings where radius is $> 5\text{m}$. Where the kerb radius is $< 5\text{m}$, or where special treatment such as bevelling is required, the kerbs shall be shuttered in-situ to the same dimensions.
9. At traffic island nosings, in situ concrete kerbs as per CC-SCD-01107 shall be extruded to the dimensions required for the specified kerb types as shown on the contract drawings. Where the kerb radius is $< 12\text{m}$, the kerbs shall be shuttered to the same dimensions.
10. At pedestrian dropped kerb locations, the kerb up-stand shall be flush (0mm upstand) for pedestrian access in accordance with CC-SCD-01102 and CC-SCD-01103.
11. At vehicular dropped kerb locations, the kerb up-stand shall be 25mm in accordance with CC-SCD- 01102 and CC-SCD-01103.
12. Concrete edging kerb to be provide between cycle path and verge at locations indicated in the drawings, and as shown in the 0100 Series Drawings.
13. At approaches to and exits from segregated cycle tracks kerbs to taper from 125mm to 0mm as shown in Standard Construction Details.

14. The use of precast concrete kerbs shall not be utilised unless otherwise agreed in writing with the Employer's Representative.

Footpath Construction

15. Concrete footways and paved areas shall comply with Clause 1106 of the TII Specification for Roadworks.
16. Concrete footways shall be finished by floating with a wooden trowel while still "green" lightly brushed with a bass broom to produce a slight roughness.
17. Edges shall be bull-nosed with a steel trowel.
18. Ramps shall be constructed of 150 mm thick air entrained C30 concrete with A393 mesh reinforcement top and bottom on 150 mm Type B sub-base to Clause UGM Ac.
19. Footpaths in non-trafficked areas shall be to the following construction:

Course	Material	Thickness	Particular Requirements
Surface	Grade C30 air entrained in-situ concrete to Clause 1106	100mm	Brushed Finish
Sub-base	Clause 808	100mm	

Tactile Paving

20. Tactile paving shall be 400mm square and shall consist of 50mm thick buff/red coloured blister surface approved tactile paving slab on 50mm clean sharp sand blinding to BS 882 Grading C or M on 200mm sub-base to Clause 808 sloping at 10 degrees or less to the horizontal.
21. Installation and layout of tactile paving shall comply with National Council for the Blind of Ireland. Requirements.
22. Paving tiles shall be aligned such that the blisters are perpendicular to the crossing.
23. Paving tiles shall have a 225mm concrete surround, where they are not supported in place by concrete footpaths/ shared surfaces or kerbings.

APPENDIX 12/1: TRAFFIC SIGNS: GENERAL

General

1. All traffic signs shall conform in all respects with the Department of Transport's Traffic Signs Manual (2019) and TS4: Guidelines, Certification scheme, and specification for the construction of traffic signs (2012).
2. The approximate locations of the permanent traffic signs are shown on the 1200 Series Drawings.
3. The approximate locations of the Traffic speed Cushions are shown on the 1200 Series Drawings.
4. Refer to Contract Drawings for details of existing signage to be retained as part of the final Traffic Signs Design, where applicable.
5. Refer to 1200 Series and 2600 Series drawings for locations and details.
6. Exact locations of proposed signs to be agreed on-site
7. All sign face materials shall be Class Ref 2 retro reflective material complying with the requirements of IS EN 12899-1.
8. The mounting heights specified for each warning and regulatory sign shall be agreed with the Employer's Representative. Direction signage shall be mounted 1.2m high unless they are located above or adjacent to footways where they shall be 2.3m high, or cycle ways where they shall be 2.5m high. The set back of the sign shall be at least 450mm from the edge of the carriageway/cycleway, and generally set at the back of the footpath, or within the verge if shown as such on the drawings.
9. The minimum heights and lateral clearances specified for each warning and regulatory shall be agreed with the Employer's Representative.
10. Minimum cover of 125mm to be provided from the top of all sign foundations to finished ground level, unless otherwise agreed with the Employer's Representative.
11. Signs shall be placed as indicated on drawings unless otherwise agreed with the Employer's Representative.
12. Where direction signs are mounted in traffic islands, the mounting height shall be adjusted so the sign face shall not to be obstructed by guardrails or other signage.
13. Signage shall not be mounted at heights less than 1.2m so as not to obscure visibility along the route, or visibility to the right at junctions.

Temporary Traffic Signs

14. All temporary signs for road works shall comply with Chapter 8 – “*Temporary Traffic Measures and Signs for Roadworks*” of the Traffic Signs Manual (2019) as published by the Department of Transport.
15. Verges shall be levelled and vegetation trimmed or cleared to accommodate all temporary signs in an upright position and to achieve satisfactory visibility as required by the Traffic Signs Manual (2019). The Contractor shall maintain the verge accordingly for the duration of the temporary sign installations. Clearance of vegetation shall be kept to a minimum necessary to achieve the satisfactory visibility.
16. The Contractor shall be responsible for covering (in a manner accepted by the Employer’s Representative) and uncovering any existing signs which become inaccurate or misleading as a result of the introduction of any Traffic Management System. The material used to cover the signs shall be opaque. Hessian shall not be used for this purpose.
17. Where existing signage is in the way of the proposed works, these signs should stay in place for as long as possible to give time for new bases to be constructed. If this is not possible, temporary signage will need to be provided. This should be agreed with the Employer’s Representative before work commences.
18. Verges shall be levelled and vegetation trimmed or cleared to accommodate all re-erected signage in an upright position and to achieve satisfactory visibility. Clearance of vegetation shall be kept to a minimum necessary to achieve a satisfactory visibility.

APPENDIX 12/2: Traffic Signs: Road Markings and Studs

Marker posts are required to indicate location of buried fittings chambers to watermain, refer CC-SCD-02713. Post to be erected to the rear of the footway/cycle lane or as agreed with the Employer's Representative.

For each sluice valve, scour valve, air valve and hydrant the Contractor shall fix a marker post adjacent to the particular fitting. Where approved by the Engineer one marker post may suffice for two or more fittings which are in close proximity.

Marker posts shall be pre-cast concrete Grade 25 to dimensions shown on Drawings. Each post shall be reinforced with 3No. 12mm dia M.S. bars 1m long and shall be set in ground in 0.05m³ concrete Grade 20. Each plate shall be set in a recess previously formed in post and shall be fixed to post with 4Nr 12mm dia M.S. rag bolts. Hydrant indicator plates shall be single hydrant indicator plates with fixed black letters complying with B.S. 3251 except that the plates shall conform to colour reference no. 309 (canary yellow) in B.S. 381C. Air valve and sluice valve indicator plates shall comply with the specification for single hydrant indicator plates with fixed letters in B.S. 3251 except that they shall be coloured white and, instead of the letter H, shall bear the letters A.V. and S.V. respectively as approved.

APPENDIX 12/3: Traffic Signs: Road Markings and Studs

Permanent Road Markings and Road Studs

1. All road markings and road studs shall conform in all respects with the Department of Transport's Traffic Signs Manual (2019).
2. The locations of road markings and road studs are shown on the 1200 Series Drawings.

Permanent Road Markings

3. For the application of road markings, the quality of the material and the workmanship shall comply with all relevant European Standards including, but not limited to:
 - (i) EN 1436: Road Marking Materials – Road Marking Performance for Road Users
 - (ii) EN 1423: Road Marking Materials – Drops on Materials: Glass Beads, Antiskid Aggregates, and Mixtures of the Two
 - (iii) EN 1424: Road Marking Materials – Premix Glass Beads
 - (iv) EN 1871: Road Marking Materials – Physical Properties
4. All carriageway markings shall be white or yellow as detailed, thermoplastic material reflectorised by the application of glass beads.
5. All thermoplastic markings shall be screed applied, or as agreed by the Employer's Representative.
6. The Contractor shall apply thermoplastic markings, either white or yellow, to the following thicknesses:
 - (i) The thickness of application shall be $4.25 \pm 0.25\text{mm}$ on road surfacing where the average texture depth is greater than or equal to 1.5mm.
 - (ii) The thickness of application shall be $2.75 \pm 0.25\text{mm}$ on road surfacing where the average texture depth is less than 1.5mm and on recovery work where the thickness of the existing marking is less than 1mm.
 - (iii) The thickness of application shall be $1.75 \pm 0.25\text{mm}$ for temporary markings, for marking lightly trafficked areas, as designated in this appendix, and for recovery work where the thickness of the existing markings is 1.0mm or greater.

The Contractor shall lay the appropriate thickness of marking following consultation with and as approved by the Employer's Representative.

7. Marking thicknesses shall be measured by using a suitable micrometer gauge, or callipers on samples of markings laid on steel plates placed beneath the application machine during the laying operations. The thickness laid on the plate shall be representative of the thickness of material laid on the road.
8. All markings shall be reflectorised by the application of glass beads to the surface of the marking material. Solid glass beads 400g/m^2 to 500g/m^2 from the machine, shall be applied by pressure concurrently with the laying of the line with sufficient velocity to ensure retention in the surface of the line. The solid glass beads so sprayed shall give uniform cover and immediate reflectivity over the whole surface of the marking. On screed applied markings where pressure application is not practicable, gravity application will be permitted.
9. The Contractor shall note that the above mentioned solid glass beads which are to be applied to the surface of the markings are in addition to the minimum solid glass bead content specified for incorporation within the body of the mix for reflectorised markings.
10. If in the opinion of the Employer's Representative a tack coat is necessary to promote better adhesion, the Contractor shall apply a 50/50 blend of 70 pen. bitumen in a volatile solvent such as dichloromethane applied with a brush, roller or portable sprayer and spread at about 14 square metres to the litre. The solvent shall be allowed to evaporate before the thermoplastic is applied.
11. The Contractor shall not carry out any work when the weather conditions or the road conditions (e.g. dampness, dust, cold) are such that the quality of the work might be adversely affected. In particular, application of markings shall not be carried out when the road temperature is less than 5°C . Where the Employer's Representative is of the opinion that such adverse conditions exist, he/she may instruct the Contractor to suspend the work, but this shall not relieve the Contractor of the obligation to suspend the work where such adverse weather conditions or road conditions exist.
12. The Contractor shall ensure that the horizontal alignment of the applied marking is to the satisfaction of the Employer's Representative in respect of straightness of line and smoothness of curvature.
13. The Contractor shall supply to the Employer's Representative, certification that the materials and the method of application of markings to the road which the Contractor proposes to use, conforms to this specification. For this purpose the Contractor shall obtain from Transport Infrastructure Ireland or another approved agency, a report containing:
 - (i) The certified analysis, from a laboratory with current ISO Certificate, of each grade of thermoplastic material intended for use.
 - (ii) The results of an examination of the application equipment the Contractor proposes to use, undertaken by a Company approved by Transport Infrastructure Ireland.

- (iii) Certification that a minimum skid resistance of 55 (BPN) as measured by the British Portable Pendulum shall be achieved where required.
14. The submitted Report shall relate to certification carried out within the previous six months. Any subsequent change in the source of thermoplastic material or the method of application shall be certified as acceptable by Transport Infrastructure Ireland or another approved agency before use.
15. Edge markings of cross-hatching are to be provided with 10mm - 25mm drainage gaps at 4m intervals.
16. The continuous edge markings shall be provided with 10mm - 25mm drainage gaps at 20m intervals.
17. All direction arrows and lettering shall have a skid resistance level of 55BPN.

Application of Thermoplastic Road Markings

18. The quality of the material and the workmanship shall comply with the requirements of BS 3262, Parts 1 and 3; Hot-Applied Thermoplastic road marking materials, together with all amendments to that specification, except where the following requirements differ from that standard.
19. The Contractor shall apply the markings, both white and yellow to the following thicknesses:
20. The thickness of application shall be $4 \pm 0.5\text{mm}$ on road surfacing whose average texture depth is greater than or equal to 1.5mm.

Testing

21. The thickness shall be measured by using a suitable micrometer gauge, or callipers on samples of markings laid on steel plates placed beneath the application machine during the laying operations. The thickness laid on the plate shall be representative of the thickness of material laid on the road.

Material

22. The Contractor shall lay the appropriate thickness of marking following consultation with and as approved by the Employer's Representative. All markings shall be reflectorised by the application of glass beads to the surface of the marking material. Solid glass beads 400g/m² to 500 g/m² from the machine, shall be applied by pressure concurrently with the laying of the line with sufficient velocity to ensure retention in the surface of the line. The solid glass beads so sprayed shall give uniform cover and immediate reflectivity over the whole surface of the marking. (On screed applied markings where pressure application is not practicable, gravity application will be permitted).

23. The Contractor shall note that the above mentioned solid glass beads which are to be applied to the surface of the markings are in addition to the minimum solid glass bead content specified in Table 1 of BS 3262 for incorporation within the body of the mix for reflectorised markings.

Tack Coat

24. If in the opinion of the Employer's Representative a tack coat is necessary to promote better adhesion, the Contractor shall apply a 50/50 blend of 70 pen. bitumen in a volatile solvent such as dichloromethane applied with a brush, roller or portable sprayer and spread at about 14 square metres to the litre. The solvent shall be allowed to evaporate before the thermoplastic is applied.

Weather Conditions

25. The Contractor shall not carry out any work when the weather conditions or the road conditions (e.g. dampness, dust, cold) are such that the quality of the work might be adversely affected. In particular, application of markings shall not be carried out when the road temperature is less than 5°C. Where the Employer's Representative is of the opinion that such adverse conditions exist, he/she may instruct the Contractor to suspend the work, but this shall not relieve the Contractor of the obligation to suspend the work where such adverse weather conditions or road conditions exist.

Alignment

26. The Contractor shall ensure that the horizontal alignment of the applied marking is to the satisfaction of the Employer's Representative in respect of straightness of line and smoothness of curvature.

Certification

27. The Contractor shall supply to the Employer's Representative, certification that the materials and the method of application of markings to the road which the Contractor proposes to use, conforms to this specification. For this purpose the Contractor shall obtain from The Environmental Research Unit or another approved agency, a report containing:
- (i) a minimum skid resistance of 55 (BPN) as measured by the British Portable Pendulum shall be achieved where large areas of the road surface are covered with road workings and braking is likely to occur
 - (ii) certified analysis of each grade of thermoplastic material
 - (iii) the results of an examination of the application equipment the Contractor proposes to use.
28. The submitted Report shall relate to certification carried out within the previous six months.

Any subsequent change in the source of thermoplastic material or the method of application shall be certified as acceptable by The Environmental Research Unit or another approved agency before use.

29. The methods of testing shall be in accordance with British Standard 3262 unless otherwise agreed with the Employer's Representative.
- 30.

Temporary Road Markings

31. Temporary white lines and other road markings laid on the permanent works carriageways shall only be used if approved by the Employer's Representative.
32. Temporary road markings shall be reflectorised and laid in accordance with this appendix.
33. Prefabricated materials will be acceptable for temporary lane lines but should not be used for lane arrows.

Removal or Concealment of Road Markings

34. Permanent Obliteration: Existing road markings to be permanently obliterated may be removed by sand blasting, scabbling, water jetting or by another approved method agreed with the Employer's Representative. The use of a thermal lance to burn off road markings shall only be permitted subject to the approval of the Employer's Representative. Obliteration of road markings using either bituminous or black paint is not permitted.
35. Temporary Obliteration: Where existing road markings are to be temporarily obliterated for traffic management or any other purpose, existing road markings shall be marked with similar approved black material or other colour as directed by the Employer's Representative, which shall be able to withstand the traffic load upon it for the required period. Upon removal of the black material or similar approved covering, the original markings are to be upgraded to the standard apparent before the temporary obliteration.

Performance Requirements

36. All Road Markings provided under the contract shall be thermoplastic materials complying with the following performance requirements of IS EN1436:2007+A1:2008. The application of preformed road markings is not permitted save with the express written approval of the Employers Representative.

- (i) Luminance: White Material Class $\square 4$: $\square \geq 50$ (Texture depth < 2mm) White Material Class B3: $\square \geq 40$ (Texture depth ≥ 2 mm) Yellow Material. Class B2: ≥ 30
- (ii) Retroreflectivity: White Material Class R2: $RL \geq 100$ Yellow Material. Class R1: $RL \geq 80$
- (iii) Skid Resistance: White Material Class S2: $SRT \geq 50$ Yellow Material. Class S2: $SRT \geq 50$
- (iv) Durability: In any 100m length of road marking (continuous or broken line) at least 90 per cent of the marked area shall contain a uniform coating of marking material through which the underlying surfacing has not penetrated. Discontinuities over the full width of line, due to wear, shall not be accepted in continuous lines. At least 75 per cent of each marked segment of a broken line shall remain intact.
- (v) Chromaticity: The colour of White material shall fall within the boundaries of the four sided figure as defined by the 'x' & 'y' coordinates of four corner points on the Chromaticity chart as set out below. The colour of Yellow material shall fall within the boundaries of the figure as defined by the 'x' & 'y' coordinates of the points on the Chromaticity chart as set out below.

The corner points of chromaticity regions on the CIE chromaticity diagram for white and yellow road markings shall be as set out below:

Colour		1	2	3	4
White	x	0.355	0.305	0.285	0.335
	y	0.355	0.305	0.325	0.375
Yellow	x	0.443	0.545	0.465	0.389
	y	0.399	0.455	0.535	0.431

Dimensions, Tolerances & Alignment

36. Road markings (lines, letters and symbols) shall be of the form and to the dimensions specified in the Road Traffic (Signs) Regulations and in the "Traffic Signs Manual 2019" [TSM] unless otherwise specified in the contract or by the Employers Representative. Where alternative dimensions are provided for in the Regulations and/or TSM these shall be specified in the contract or shall be as directed by the Employers Representative.

The dimensions of installed lines and markings shall meet the following tolerances:-

- (1) Line Width : Specified width +10% to -5%

- (2) Line Thickness : Minimum 2.5mm (maximum thickness shall not exceed 5mm in any case).
 - (3) Line Length: (Segments up to 4m long) The average of any 10 consecutive segments shall be between + or - 50mm of the specified length and no one segment within that 10 shall be less than the specified length by more than 75mm. Quantities for payment will make no allowance for any extra lengths. Where lengths fall short of the specified length removal and reinstatement of the markings will be required.
 - (4) On newly constructed roads being marked for the first time, the lateral placing of the markings shall be within tolerances of ± 15 mm of the design position as set out by the Contractor or as described in the scheme drawings.
37. The Contractor shall ensure that the horizontal alignment of the applied marking is to the requirements of the Employers Representative in respect of straightness of line and smoothness of curvature. The Contractor must, in advance of commencing performance of the contract, satisfy the Employers Representative as to his capability of carrying out the work to the preceding requirements.
38. Notwithstanding the requirements and tolerances in the specifications for line dimensions, the phenomenon of an excess flow or 'fishtailing' of material at the point where lines, particularly extruded lines, commence or terminate is undesirable. (This is more likely to occur in the laying of broken yellow or white lines). Where such phenomenon is identified, particularly where repetitive it shall be deemed not to comply with this specification and the Employers Representative may, at his sole discretion, reject such work. Excess spray and spray drift particularly where repetitive shall be treated similarly. The lines shall be laid in a smooth flowing alignment. Visible interruptions shall not be accepted. Line edges shall be clearly defined.

Performance Warranty

39. The Contractor warrants that all road markings laid under this contract shall meet the performance standards for Durability, Retroreflectivity, Luminance, Chromaticity and Skid Resistance of this specification for a minimum period of 2 years and the Contractor shall make good any deficiencies, which arise in that period at its sole expense. This requirement applies in addition to any general Period of Warranty stated in the Appendix to the Conditions of Contract.

Minimum Line Thickness

40. Notwithstanding the performance requirements of this specification the minimum thickness of markings laid under this contract shall be 2.5mm. This is a minimum value only and does

not relieve the Contractor from any of its obligations under the contract. The Contractor shall be deemed to have visited the site of the works and made all tests and investigations of the road surfaces on site necessary to meet this requirement and to have fully included for same in its tendered rates.

Drainage Gaps

41. At all continuous road markings and hatched areas gaps of 15-25mm shall be provided where required (and at a minimum of 15m intervals) to allow for the drainage of the pavement or road carriageway and to prevent water ponding on the road surface.

Reflectorisation

42. Unless otherwise directed by the Employers Representative, all markings shall be reflectorised by the application of glass beads to the surface of the marking material. In the case of reflectorised thermoplastic markings solid glass beads, 400g/m² to 500g/m², shall be applied by pressure concurrently with the laying of the line with sufficient velocity to ensure retention in the surface of the line. The solid glass beads so sprayed shall give uniform cover and immediate reflectivity over the whole surface of the marking. (On screed-applied markings where pressure application is not practicable, gravity application will be permitted). The solid glass beads, which are to be applied to the surface of the markings, are in addition to the minimum solid glass bead content specified for incorporation within the body of the mix for reflectorised markings.

Installation

43. It shall be permissible to apply a Tack Coat to promote better adhesion of the markings. This may particularly be the case in overlaying existing thermoplastic material with new material. The Tack Coat should be laid to the same width as the line being laid in so far as practicable. The application of a tack coat and its type shall be agreed with the Employers Representative in advance.
44. The Contractor shall not carry out any work when the weather conditions or the road conditions (e.g. dampness, dust, cold) are such that the quality of the work might be adversely affected. In particular, application of markings shall not be carried out when the road temperature is less than 5 degrees Celsius. When the Employers Representative is of the opinion that such adverse conditions exist, he/she may instruct the Contractor to suspend the work, but this shall not relieve the Contractor of its obligation to suspend the work in the first place where such adverse weather conditions or road conditions exist.
45. Prior to laying any markings the Contractor shall consult with the Employers Representative

and agree full details of the work to be carried out and the hours/sequence of operations. The Contractor and Employers Representative (or its representative) shall meet on site to pre-mark line/symbol locations and to confirm details prior to installation, e.g. whether lines are continuous or broken, length of line marks and gaps for broken lines, design and dimensions of arrows, letters or symbols; marking thicknesses; and

Method(s) of application.

46. The Contractor shall also agree with the Employers Representative on site at pre-marking stage, whether the road and weather conditions are such that the work can be successfully carried out during the periods proposed. Any such discussion/agreement shall not place any responsibility on the Employers Representative for any subsequent poor quality work or work which does not comply with the specification. A decision in relation to the requirement for a tack coat may also be appropriate at this stage.

Material Testing & Quality Control

47. The Contractor shall submit to the Employers Representative the product name(s) and manufacturer(s) of the materials in proposes to use under the contract together with material data sheets and certification that the material and the method of application of markings to the road which the Contractor proposes to use, conforms to the specification. All materials and solid glass beads shall be obtained from manufacturers who operate Third Party Quality Assurance Schemes under ISO 9002, EN 29002
48. For the purpose of control, the thickness of line markings shall be measured by using a suitable micrometer gauge, or callipers, on samples of markings laid on steel plates placed beneath the application machine during the laying operations. The thickness laid on the plate shall be representative of the thickness of material laid on the road.
49. Certification that the material and the method of application of markings to the road which the Contractor proposes to use, conforms to the specifications outlined shall be submitted to the Employers Representative prior to the commencement of lining works. The Contractor shall be required to obtain from the National Roads Authority or another approved agency, a report containing:
 - (1) The certified analysis, from a laboratory with current ISO Certificate (Copy of Cert. To be attached) for this specific purpose, of each grade of thermoplastic material the Contractor proposes to use and

- (2) The results of an examination of the application equipment the Contractor proposes to use. This examination shall be carried out by a company approved to do so by the National roads Authority. (In the event that a Company has up to date ISO Certification for maintenance of road marking machinery and apparatus including control devices this will be accepted as complying with this requirement on submission of such Certification to the National Roads Authority for verification.)

The submitted report shall relate to certification carried out within the previous six months. Any subsequent change in the source of thermoplastic material or the method of application shall be certified as acceptable by the National Roads Authority or another approved agency before use. All necessary costs associated with such certifications shall be borne by the Contractor. Notwithstanding the above the road authority may at any stage request independent analysis of the material and/or equipment. The costs in these circumstances shall be borne by the Contractor if the materials or equipment fail and by the authority in the event of full compliance.

APPENDIX 12/5: Traffic Signals and Detector Loops

Permanent Traffic Signals

Locations for the items below are as indicated in 0500 and 1200 series drawings contained in Vol A Part B:

- Signal heads.
- Controller.
- Ducting of carriageway and cable crossings.
- Electricity supply.
- Detection (including control units).
- Posts and gantries.
- Cables and routes.
- Telecommunications carrier interface.
- Inspection chambers.
- Road markings.

APPENDIX 12/7: TRAFFIC SIGNS: PREPARATION AND FINISH OF METAL AND OTHER SURFACES

All works associated with the preparation and finish of metal and other surfaces shall comply with Clause 1209 of the Specification.

APPENDIX 14/1: SITE RECORDS

1. As-built drawings shall be supplied to the Employer's Representative by the Contractor in hard copy and on USB. One complete hard copy of the as-built records and three copies of each USB shall be supplied to the Employer's Representative fully labeled and indexed. The format for labeling and indexing shall meet the requirements of the Employer's Representative, as shall the electronic format of the data on the USB. The above shall be in compliance with Clause 1402.
2. All drawings, references and sections within the USB copy shall be hyperlinked to their appropriate sections. All AutoCAD layers shall also be included in the as-built records. As a minimum, all drawings shall be provided in AutoCAD 2018 DWG format as extracted from the detailed compilation of all data in Civil 3D, or equivalent as Approved by the Employer's Representative, and also in DWF format.
 - i) All records of below ground as-built services, ducts/cables and surfaces shall be portrayed and submitted in Civil 3D;
 - ii) All record of above ground features shall be portrayed and submitted in Revit format;
 - iii) On completion above and below ground models they are to be incorporated into a single 3d model in Navisworks. It should have facilities to allow users to open and combine the 3D models, navigate them in real-time and review the model using a set of tools including comments, material information, redlining, viewpoint, and measurement.
3. The Contractor shall keep a daily record in duplicate in a clear and legible form, on drawings, of all work carried out as it proceeds. One copy shall be kept available for the use of the Employer's Representative during the Contract and shall, at completion of the Works, be handed to the Employer's Representative for record purposes.
4. The AutoCAD file shall be updated with the 'As built' details and returned to the Employer's Representative with three copies of each drawing within one month of the end of works on site.
5. The Contractor shall also supply three full sets of 'as built' drawings in paper print format.
6. A set of the 'As built' schematic diagrams are to be provided in a plastic wallet fixed to the inside of the door of each feeder pillar illustrating all the circuits and equipment supplied from that pillar.
7. The Contractor shall produce Schematic Cable Layout drawings detailing the following:
 - i) Jointed, looped and fused spur circuits
 - ii) Key identifying lighting columns.
 - iii) Protective device types and rating, including for MCB's PSDCC value and MCB type
 - iv) Circuit Phasing
 - v) Both construction and maintenance numbers
 - vi) Each single schematic drawing shall detail all circuits emanating from one feeder pillar

as a minimum

8. The contractor shall produce site layout plans detailing;
 - i) Depth of cables including number and size of cables and cable material
 - ii) Duct locations including depth, number and size of ducts and duct material.
 - iii) Cable chamber locations including type, depth, incoming and outgoing ducts, type of chamber cover and details of cable joints within.
9. Offset distances indicating the line of cables or ducts and any change in direction from kerbs, building lines or any other feature unlikely to change position. Offsets of the existing cable shall be taken at 20m intervals where cables maintain a steady line, and at 5m intervals where the line of the cable varies. Locations of lighting columns, duct chambers and the like. Both construction and maintenance numbers.
10. All permanent works are to be included in the as built drawings.
11. Works under each series of the Specification for Road Works shall be produced as a separate drawing.

APPENDIX 14/2: LOCATION OF LIGHTING UNITS AND FEEDER PILLARS

General

The Contractor shall be responsible for setting out the positions of high masts, lighting columns, metering and feeder pillars, as shown on the drawings. The Contractor shall be aware of the requirements of the ESB with regard to clearances from power lines, and if any conflicts should arise, these shall be referred immediately to the Employer for resolution before any equipment is erected.

The positions and descriptions of lighting units and feeder pillars are shown on the Contract Drawings.

The lighting installation shall meet the recommendations of BS5489 (2003) Code of Practice for the Design of Road Lighting and ISEN 1320-2 (2003) Road Lighting, as detailed in Appendix 14/4.

The electrical supply at each public lighting supply point shall be single-phase or three-phase 230/400 VAC, 50 Hz.

APPENDIX 14/3: TEMPORARY LIGHTING

The Contractor shall be responsible for Temporary lighting to be provided where an existing installation is to be disconnected during the Works.

The standard of lighting shall be appropriate to the speed and volume of traffic during construction.
Any temporary lighting installation shall be approved by the Employer as part of Traffic Management.

Temporary lighting shall not be removed or disconnected until the permanent installation is operative.

APPENDIX 14/5: ELECTRICAL EQUIPMENT FOR TRAFFIC LIGHTS

Refer to Vol A Part B document for belisha beacons and traffic lights specifications.

APPENDIX 14/6: PREPARATION AND FINISH OF METAL AND OTHER SURFACES

Lighting Columns, steel feeder pillars and all steel and metallic accessories and components shall be treated in accordance with the relevant sub-Clauses of Clause 1307.

It shall not be a requirement to paint galvanised lighting columns, or feeder pillars.

APPENDIX 17/1: CONCRETE – CLASSIFICATION OF MIXES

Structural concrete shall comply with the following Schedule. Mix designations for each specific structural element are detailed on the Contract Drawings. These mixes shall be supplied as design mixes in accordance with DN-STR-03012, Series 1700 of the Specification and IS EN 206 taking the most onerous requirements as appropriate.

The mixes below shall be supplied as designed mixes in accordance with I.S. EN 206-1:2000			
Location	Kerbing	Footpaths & Shared Surface	Retaining Wall & Pier Foundation
Mix Reference	3	2	1
Ordinary or Special Concrete (O or S)	S	S	O
Class of Concrete (Grade)	C40/50	C40/50	C40/50
Exposure Classes	DC-2		XC4, XA2, XD2, XF2
Minimum Cement Content (kg/m ³), inclusive of content of ggbs.	360	400	400
Max Aggregate Size	20	10 or 20	20
Maximum Free Water / Cement Ratio	0.50	0.45	0.45
Maximum Cement Content (kg/m ³)	550	550	550
Density Class (For lightweight Concrete)			
Required Type and Class of Cement	OPC/ggbs mix	CEM1/2/3	
Other (specify requirements)			CI 0,40
Chloride Class			
Type & Class of Cement			All cements in Tables NA.2 and NA.3

Combination of PC to ISI/BS12 with ggbs to BS6699. Note ggbs to have less than 15% Al_2O_3 . (or cements to IS EN 206)	Yes	Yes	
Minimum % ggbs by weight of total ggbs, portland cement mix.	50%	Max 65% ggbs with CEM1	<35
Sampling and Testing	[See Clause 1707 of Specification]		
Quality Assurance Requirements	[See clause 1707 of the Specification and App 1/5]		

APPENDIX 17/3: CONCRETE – SURFACE FINISHES

- Concrete Surface Finishes shall be as shown on the Contract drawings. If there is no indication of the finishes on the drawings, the surface finish shall be as follows:

U ₁	=	unformed surfaces, unexposed, levelled to produce uniform surface
U ₃	=	unformed surfaces, in-situ concrete kerbs
U ₄	=	Applied to concrete abutment deck finish
U ₅	=	unformed surfaces, in-situ concrete footways
F ₁	=	All formed internal surfaces unexposed (no external requirements)
F ₂	=	Applied to all hidden wall faces
F ₄	=	Applied to all exposed wall faces

General

- Permanently exposed concrete surfaces to Classes F2 finish, (or better), shall be protected from rust marks and stains of all kinds.
- The following finishes are to be provided:
 - Buried unformed surfaces - U1
 - Buried formed surfaces - F1
 - Exposed unformed surfaces (excluding areas to receive waterproofing) - U3
 - Retaining Walls, exposed face - F4
 - Retaining Walls, hidden face to receive masonry cladding – F2
 - Precast elements - F4
- A regular formwork joining pattern is required at all exposed surfaces.
- All exposed concrete surfaces shall be of a uniform colour and subject to approval.
- Formwork for curved concrete surfaces shall be achieved by smooth unbroken curved surface.

The contractor is to refer to Appendix 11/1 for the requirements for Sand Blasted Finish to the concrete pavement and footpaths.

- All formwork joints for exposed surfaces shall form a regular pattern agreed with the Employer's Representative with horizontal and vertical lines continuous throughout each structure. All construction joints shall coincide with these horizontal and vertical lines. The Contractor shall produce a drawing detailing the proposed arrangement of formwork boards for all concrete elements, for the approval of the Employer's Representative.
- Hidden concrete surfaces shall be class F1 finish to Clause 1708.
- Permanently exposed concrete surfaces shall be class F3 finish to Clause 1708 and shall be protected from rust marks and stains of all kinds.
- Surface finish to the exposed soffit and sides of concrete elements are to have a class F3 finish to Clause 1708.

6. All new concrete surfaces to receive waterproofing shall either have or shall be prepared to a U4 surface finish to Clause 1708.
7. Existing concrete surfaces to receive waterproofing are to be cleaned and prepared to a suitable finish as described by the waterproofing manufacturer. Testing will be required to confirm the acceptability as per Appendix 20/1.

APPENDIX 17/4: CONCRETE – GENERAL

General

1. The requirements for the concrete shall be as stated in sub-clause 1701.1.
2. Reinforcement designations will be as BS8666: 2000. Typical reinforcement layout, bar size and spacing for each portion of the works are shown on the drawings. Minimum cover to steel reinforcement as shown on drawings. Stainless steel bars shall be grade 500 as per BS 6744.
3. Concrete testing shall be in accordance with Appendix 1/5. Concrete cube tests shall be undertaken for every 24m³ for reinforced concrete. 4no. cubes shall be taken for testing at 7, 14 and 28 days. One cube shall be kept in reserve for testing at 56 days if required. General compliance with the specified characteristic strengths shall be based on tests of 100 mm or 150 mm cubes. If the average strength of the test specimens taken to represent a given batch of concrete fails to meet the appropriate requirement, the whole of that batch of concrete represented by those specimens shall be deemed not to comply with the strength requirement of the specification. Compliance with this requirement in respect of a given batch of concrete shall not be adduced as evidence of compliance in respect of any other batch.
4. Action to be taken in the event of non-compliance with testing:
The Contractor shall take such remedial action as the Employer's Representative may require, including the removal of the relevant concrete, and shall, before proceeding with the concreting, submit for the Employer's Representative approval, details of the action proposed to ensure that the concrete still to be placed in the Works will comply with the requirement of the Specification.
5. Expansion joints are shown on the drawings. All joints shall receive a polysulphide seal, the colour of the polysulphide shall be to the Employer's Representatives approval. Construction joints shall only be formed where shown on the drawings or where agreed with the Employer's Representative.
6. The Contractor shall submit their curing proposals to the Employer's Representative for review in advance of any concrete works.
7. Trial mixes shall be conducted for all designed mixes.
8. The sequence of construction and assembly shall be agreed with the Employer's Representative.
9. Cement and aggregates shall be from the same sources for each structure to minimise colour differences between batches.

10. All structural concrete shall be designed concrete.
11. All concrete shall be produced in accordance with Clause 1706 of the Specification for Road Works. Water shall not be added to delivered concrete.
12. Where identity testing is required it shall be in accordance with the requirements given in Annex B of IS EN 206-1 and Appendix 1/5 of the Specification.
13. The use of retarding agents is not permitted.
14. Welding of reinforcement other than steel fabric shall not be permitted without prior acceptance by the Employer's Representative. This includes tack welding of reinforcement, which shall be carried out in accordance with IS EN ISO 17660-2:2006 (Non load bearing welded joints). Load testing samples of tack welded connections are to be carried out to the requirements of IS EN 17660- 2:2006 to demonstrate that the specified yield strength of the reinforcement is unaffected. The results of this load testing shall be provided to the Employer's Representative for acceptance.

Concrete Compliance

1. Strength:
General compliance with the specified characteristic strengths shall be based on tests of 100 mm or 150 mm cubes at an age of 7 days and 28 days.
2. Cube Testing:
If the average strength of the test specimens taken to represent a given batch of concrete fails to meet the appropriate requirement, the whole of that batch of concrete represented by those specimens shall be deemed not to comply with the strength requirement of the specification. Compliance with this requirement in respect of a given batch of concrete shall not be adduced as evidence of compliance in respect of any other batch.
3. Action to be taken in the event of non-compliance with testing:
The Contractor shall take such remedial action as the Employer's Representative may require, including the removal of the relevant concrete, and shall, before proceeding with the concreting, submit for the Employer's Representative approval, details of the action proposed to ensure that the concrete still to be placed in the Works will comply with the requirement of the Specification.

Testing

4. The Contractor is to refer to Appendix 1/5 for testing requirements.

APPENDIX 24/1: BRICKWORK, BLOCKWORK AND STONEMWORK

1. Mortar Designation for Brickwork, Blockwork and Stonework:

Mortar for wall construction shall generally be designation (iii). However all mortar below ground level and mortar to be used with the granite stonework is to be designation (i).

2. Clay Bricks:

Frost resistant bricks classified in EN 1996 shall be provided and no sample of a brick intended for use in facework should develop efflorescence worse than 'slight' when tested in accordance with EN 1996. Bricks manufactured to the requirements of BS EN 771 should have a minimum strength of 7 N/mm².

3. Stonework to Boundary/Retaining Walls and Other Structures

- A. Stonework shall be 'quarry or similar approved by the Engineer. The stonework is to be handpicked and trimmed so that the stone facing in the completed wall complies with the following:
 - i. Individual stone dimensions shall not exceed 500mm or be less than 100mm and the average dimension of the stones shall be 350mm + 25mm.
 - ii. Stone facing is to be constructed in horizontal courses at 500mm centres (approx.) and the exposed width of the mortar joints shall not exceed 24mm or be less than 6mm.
 - iii. The exposed stone face is to be such that no part of the face is more than 10mm from the specified vertical (or inclined) plane of the wall.
- B. Mortar to be used in the construction shall be designation (i) (1:3 cement: natural sharp sand). Backing material (Class 10/40 concrete) shall be used to fill-up all concealed voids within the wall.
- C. Wall ties within the construction shall be stainless steel ties of minimum cross section of 25mm x 3mm to BS:1243.
- D. Before the general delivery of stone to site, a sample panel is to be constructed on site. The panel is to be altered if required until it obtains the approval of the Engineer. The purpose of the sample panel is to ascertain whether the stonework complies with the specification and to have an approved sample for comparison. The panel is to be 3 metres long and 1.5 metres high with a vertical corner at one end.
- E. All joints shall be sufficiently thick to prevent stone to stone contact and shall be completely filled with mortar. The exposed face of the joint shall be recessed about 5mm from the adjoining stone facing.
- F. Stone coping where required on the top of the walls shall be stonework from the same quarry as the general stonework. In the case of rectangular masonry copes, the size

requirement of Clause 1(a) above shall be complied with but the average dimension shall be 250mm + 25mm with the largest side placed vertically. In the case of rounded coping and castellated coping refer to the TII Publications Standard Detail Series 2400.

4. Concrete Blocks:

Solid blocks for use in boundary/retaining walls construction shall be 5N blocks with an average compressive strength in excess of 5N/mm² per block.

5. Brickwork and Blockwork:

Block walls shall be built in accordance with EN 1996 and SR 325. Blocks shall be normal concrete solid blocks and jointed in mortar designation (iii) (designation (i) below ground level) with no cavities resulting. Vertical joints are to be provided at 6 metres maximum centres. The control joint is to be fitted with a 10mm thick rigid compressible load such as 'Korkpak' and shall be located with a pier on both sides.

Pointing to blockwork (where not rendered) and to brickwork is to be recessed about 5mm from the face.

APPENDIX 26/1: ANCILLARY CONCRETE

26/1.1 Concrete

Mix	Cement / Total Aggregate	Purpose
ST1	210 / 1940	Building concrete and backfill for structural foundations, Backfill to overdig of post holes and preparation of formation to Clause 616.
ST2 ST3	240 / 1920 270 / 1890	Footings to fence posts and augured foundation for traffic signposts; Bed, haunch and surround to drains (other than A and Type Z); Surround to chambers and gullies.
ST4	300 / 1860	Bed at drains Type A and Type Z; Foundation, channels and benching to chambers; Bedding and backing to precast kerbs, channels, edgings and quadrants; (Non-augured) Foundations for traffic sign posts; Feeder Pillar and Controller Bases.
ST5	330 / 1830	Anchor blocks for safety fencing; Foundations for safety fence posts, environmental barrier posts and Pedestrian guard rail; Foundations for planted lighting columns.

Note – All ancillary concrete to be in accordance with IS EN 206.1.

APPENDIX 26/2 BEDDING MORTAR

26/2.1 Bedding Mortar

Bedding mortars for all flags, slabs, kerbs, channels, etc together with those mortars used for bedding of ironwork shall comply with Series 2601 of the Contract Specification, IS EN 998 Part 2:2010 and the relevant parts of BS 7533. The bedding mortar shall be a fine bedding concrete containing an aggregate with at least 70% crushed igneous rock with a flakiness index of less than FI35 when measured in accordance with BS EN 933-3, and which conforms to a BS EN 12620 GF85 2/4 (CP) fine aggregate. The following minimum characteristics must be achieved for bedding mortar:

Minimum compressive strength when measured in accordance with BS EN 1015-11 – 35

N/mm² Flexural strength – 4.5 N/mm² A)

Minimum adhesive strength when measured in accordance with BS EN 1015-12 – 2.0 N/mm²

Modulus of elasticity when measured in accordance with BS EN 13421 (18000 ± 3500) N/mm²

Maximum shrinkage when measured in accordance with BS EN 445 not greater than 0.10%

A) Denotes includes the use of primer mortar.

To avoid brittleness in the performance of bedding mortar, it should also achieve a value of greater than 3.0 Joules when tested in accordance with BS EN 14158.

26/2.1 Jointing Mortar

Jointing mortars for all flags, slabs, kerbs, channels, etc together with those mortars used for bedding of ironwork shall comply with Series 2601 of the Contract Specification, IS EN 998 Part 2:2010 and the relevant parts of BS 7533. The bedding mortar shall be a fine bedding concrete containing an aggregate with at least 70% crushed igneous rock with a flakiness index of less than FI35 when measured in accordance with BS EN 933-3, and which conforms to a BS EN 12620 GF85 2/4 (CP) fine aggregate. The following minimum characteristics must be achieved for bedding mortar:

Minimum compressive strength when measured in accordance with BS EN 1015-11

40N/mm²

Flexural strength when measured in accordance with BS EN 1015-11 6 N/mm²

Minimum adhesive strength when measured in accordance with BS EN 1015-12 2.0

N/mm²

Modulus of elasticity when measured in accordance with BS EN 13421 (20000 ± 4000) N/mm²

Maximum shrinkage when measured in accordance with BS EN 445 not greater than 0.10%

APPENDIX 27/1: REQUIREMENTS FOR WATERMAINS

General

1. All works to be carried out in accordance with Irish Water standards and details which can be found at the following links;
 - <https://www.water.ie/our-customer-commitment/Code-of-Practice-for-Water-Supply.pdf>
 - <https://www.water.ie/connections/Water-Standard-Details.pdf>
2. The Tenderer should take account of the existing of watermains and the need for permission from Irish Water to work in close proximity to the existing mains.
3. The pipes generally will be of the following size and material and are to Irish Water Specification:
4. The laying of the watermain shall take account of existing and proposed services adjacent to this new main. The watermain shall be installed to comply with the most up-to-Date Irish Water documents
5. Water Infrastructure Standard Details Document IW-CDS-5020-01, DRA for Water Infrastructure Standard detail IW-CDS-5020-02, Code of Practice for Water Infrastructure IW-CDS-5020-03.
6. All fittings, chambers, valves, Marker Posts & Plates and Thrust blocks to comply with the Irish Water specification, details and documents.
7. The watermain is to be laid chlorinated swabbed and tested to the requirements of Irish Water and The Council.
8. All pipes bends and fittings shall as outlined on drawings and installed to materials and detail outlined on the Irish Water Website to Irish Water documents standard.

APPENDIX 28/1: TRENCHLESS & MINIMUM DIG TECHNIQUES

General

1. Pipe materials to be used for the trenchless techniques are to be suitable for the installation methods and final pipe material. Contractor to provide approvals and certificates for all pipe materials used for the drains installed by trenchless techniques e.g. Agreement Board certificate.
2. Contractor's method statement to include directions of bores, sequence of works, locations of driving receiving pits, sizes of pits with depths, size of machine proposed for installations;
3. Contractor to include for all temporary works design and temporary works associated with the trenchless techniques.
4. Contractor shall provide records of installation as Table NG 2804.1;
5. Allowable ground movements shall be as specified in sub-Clause 2804.7;
6. Contractor to monitor line and level of installation and provide on-going survey results of same. Deviation shall not alter foul or surface water gradients such that the final installed pipes would fall outside the limits of 1:20 to 1:200 gradients on either foul or surface water drains;
7. Contractor shall work outside of the area of protection to the existing trees in the vicinity;
8. Final installed trenchless drains shall connect to the manholes as indicated;
9. Final installed drains shall be subject to pressure tests.

APPENDIX 29/1: CCTV SURVEY OF ROAD DRAINAGE SYSTEMS

Condition Survey of Existing Drains and Sewers

1. The Contractor shall carry out an initial condition survey (including CCTV survey) of all existing surface water and foul drains/ pipework within the Works including gullies at the start of the works and a final condition survey (including CCTV survey) of all existing surface water and foul drains/ pipework within the Works including gullies at the completion of the works. An additional 200m of both foul and surface water drainage to be allowed for in the CCTV survey extents to facilitate un-chartered drains not on the drawings and those external to the Site upstream and downstream of the Site up to 450mm diameter for surface water.
2. The CCTV survey of the existing drains and sewers shall be carried out from the existing surface water and foul manholes identified on the drawings.
3. The Contractor shall clear all existing blockages to existing surface water pipes, foul pipes and surface water gullies within the works.
4. The Contractor shall conduct a visual inspection, (with photographs), of all existing chambers within the above surveyed sections, together with an accompanying report. These surveys shall be carried out before and after construction of new drainage works and following completion of any remedial works.
5. If the CCTV Survey reveals defects in the existing pipework, or defects in adjacent lengths of pipeline that in the opinion of the Employer's representative are the result of the Contractors works, the Contractor shall undertake the necessary remedial works. On the completion of the remedial work, the pipelines shall be surveyed again by CCTV. The above procedure shall be repeated until no defects are revealed by the CCTV Survey. The CCTV shall be undertaken in accordance with series 2900 of the specification.

Condition Survey of Installed Drains and Sewers

1. On completion of any foul or surface water drainage system comprising the Permanent Works it shall be thoroughly cleansed and all deleterious matter removed. For all new drains and sewers and any existing pipelines affected by the Works, the Contractor, shall carry out and submit a full condition survey, (including CCTV survey), of all pipework, and visual inspection, (with photographs), of all chambers, together with an accompanying report.
2. All new foul and surface water drainage, 100mm diameter and greater shall be CCTV surveyed on completion.

3. These surveys shall be carried out after construction of new drainage works and following completion of any remedial works.
4. All private drains (new and existing) shall be pre-cleansed prior to CCTV survey.
5. Traffic Management shall be provided by the contractor to facilitate the completion of all CCTV surveys in private and public areas. Traffic management in public areas to be co-ordinated and agreed with the Local Authority through a Road Opening License to be undertaken and paid for by the contractor.
6. The CCTV survey shall be carried out during hours to be agreed with the Employer and so as not to disrupt the Employer or adjacent dwellings.
7. The contractor will be responsible for clearing all blockages as encountered.
8. 2 hard copies of the report together with a pdf copy and 2 copies of the DVD shall be provided to the Employer's representative within 2 weeks of completion of the survey. Additional copies of the surveys shall be provided by the Contractor for inclusion in the Safety File.
9. Recording format shall be suitable for DVDs and playback on Windows Media Player or other approved software.
10. Digital Photographs of any defects to be provided and incorporated into the survey report.
11. Photograph intervals of 10m to be provided within the report.
12. Contractor to co-ordinate and agree with the Local Authority through a Road Opening License permission to lift and replace manholes in public areas to facilitate the surveys.
13. If the CCTV Survey reveals defects in the work undertaken by the Contractor, or defects in adjacent lengths of pipeline that in the opinion of the Employer's representative are the result of the Contractor's works, the Contractor shall undertake the necessary remedial works. On the completion of the remedial work, the pipelines shall be surveyed again by CCTV. The above procedure shall be repeated until no defects are revealed by the CCTV Survey. The CCTV shall be undertaken in accordance with series 2900 of the specification. This requirement shall be in addition to the prescribed air or water tests.



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