




Household Recycling Site, Isles of Scilly
Tender Document
Site Development
On Behalf of
The Council of the Isles of Scilly

<p>Date: January 2015 Our Ref: JER6282 RPS 2420 The Quadrant Aztec West Almondsbury Bristol BS32 4AQ Tel: (0)1291 621 821 Fax: (0)1291 627 827 Email: rps@rpsgroup.com</p>		

Quality Management

Prepared by:	Jason Tose	
Authorised by:	John Basford	
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JKK8520-04	External Works Layout
BRM07665-XX-E-6301	Site External Lighting Layout
JKK8520 – 200	Phase 1 Retaining Wall Plan and Section Details
JKK8520 – 201	Phase 1 Retaining Wall Reinforcement details
JKK8520 – 201_BBS	Rebar Schedule

Appendices

Appendix 1	Electrical Design Brief
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1 Contract Data

1.1.1 The employer is:

The Council of the Isles of Scilly

Town Hall

St Mary's

Isles of Scilly

TR21 0LA

1.1.2 RPS Planning and Development Ltd is acting on behalf of The Council of the Isles of Scilly in relation to this contract. The following details apply:

John Basford – Project Manager

RPS Planning and Development

1.1.3 The works involve construction of a civic amenity site.

1.1.4 The site is as identified on *Drawing JKK5820 - 01* enclosed.

1.1.5 The start date to be agreed.

1.1.6 A programme for completion of 3 months is anticipated. Tenderers to provide a programme of works for agreement.

1.1.7 The period for reply is 3 weeks.

1.1.8 The defects period runs for 12 months after Completion.

1.1.9 The defects correction period is 6 weeks (unless otherwise agreed with the employer).

1.1.10 The retention is 5%.

1.1.11 The minimum amount of cover for the third insurance stated in the Insurance Table is £5 million.

1.1.12 The minimum amount of cover for the fourth insurance stated in the Insurance Table is £10 million.

1.1.13 The conditions of contract are the '**NEC3 Engineering and Construction Short Contract (June 2005)**' and the following additional conditions.

1.1.14 Payment item 51

- The item is amended for payment within 30 days of assessment date.

1.1.15 The Specification is incorporated on the drawings.

2 The Contractors Offer

2.1.1 The Contractor is

Name

Address.....

Telephone

E-mail address

2.1.2 The contractor offers to provide the works in accordance with the conditions of contract for an amount to be determined in accordance with the conditions of contract.

2.1.3 The offered total of the Prices for the works is

2.1.4 Signed on behalf of the contractor

Name

Position

Signature..... Date

3 The Employer's Acceptance

3.1.1 The employer accepts the Contractors Offer to provide the Works

3.1.2 Signed on behalf of the employer

Name

Position

Signature.....Date

4 Price List

Item Number	Description	Unit	Quantity	Rate	Price / £
1	Site set-up.(includes fencing, site security, etc.) and any general enabling works identified and required for the main works				
2	Demolition of existing structures				
3	Earthworks to establish required site levels (material to be stockpiled within phase 2 area not to impact on present site operations)				
4	Slab construction. Construction of new slab areas and construction of tie in to existing slab areas, curbing, thermoplastic white lining etc.				
5	Site closed drainage collector system including interceptor and outfalls.				
6	All required M&E including site lighting and site office connections				
7	Repositioning of site office and commissioning ready for occupation and use				
8	Landscaping works				
The total of the Prices					£

5 Works Information

5.1 Description of the Works

5.1.1 The works covered by this contract are at the Porthmellon Waste Management Site.

5.1.2 The scope of works generally comprise the following:-

- Construction of a Household Recycling Site at Porthmellon. (Phase 1) including:
 - Demolition of existing structures;
 - Concrete hardstanding with tie in to existing surfacing to be retained;
 - Surface water drainage system;
 - Retaining structure for skip area;
 - Associated utility provision (M&E); and
 - Minor landscaping.

5.2 Drawings

- JKK8520-01 Engineering Layout
- JKK8520-02 Drainage Details
- JKK8520-03 Construction Details
- JKK8520-04 External Works Layout
- BRM07665-XX-E-6301 Site External Lighting Layout
- JKK8520 – 200 Phase 1 Retaining Wall Plan and Section Details
- JKK8520 – 201 Phase 1 Retaining Wall Reinforcement details
- JKK8520 – 201_BBS Rebar Schedule

5.3 Specifications

5.3.1 The technical specifications are incorporated and referenced on the drawings identified in Section 5.2.

5.3.2 In addition to the technical works the Contractor shall arrange and provide for 1 No. set of digital photographs for progress photographs to be taken at daily intervals throughout the period of the contract. Photographs to be taken from 2 locations to be agreed with the client's representative on commencement of works. Photographs to be taken with a minimum 10 M pixel camera.

5.4 Constraints on how the Contractor Provides the Works

- 5.4.1 No information concerning this Contract may be released by the Contractor to anyone else, except to such persons and to such extent as may be necessary for the performance of the Contract, without the prior consent and approval of the Project Manager.
- 5.4.2 The Contractor shall undertake the role of principal contractor under the Construction (Design and Management) Regulations and shall allocate resources to enable him to comply with the requirements and prohibitions imposed on him by or under the relevant statutory provisions. The information for the Health and Safety File is to be available within 28 days of completion of the Works to enable the Project Manager to compile the document for handing to the Employer at Completion.
- 5.4.3 It is the responsibility of the Contractor not to interfere with the day to day routine of the sites. In particular deliveries of materials should be timed where possible to avoid the busiest period of waste inputs into the sites and should be agreed in advance with the Site Manager.
- 5.4.4 The Contractor shall be required to provide, maintain and subsequently remove a suitable electricity supply to suit his own requirements.
- 5.4.5 A potable water supply is available from the site operations compound to which the Contractor can connect at his own cost. The Contractor shall make arrangements for carrying and storing water as necessary for the Works.
- 5.4.6 The Contractor shall ensure that water does not accumulate on or adjacent to the surfaces of the Works. To ensure this, temporary watercourses, ditches, drains, pumping or other means of maintaining the Works free from water, shall be provided by the Contractor, complying with all statutory requirements and in agreement with the Project Manager.
- 5.4.7 Any provisions required as part of temporary works for construction but not part of the permanent works will be removed / reinstated on completion unless agreed to the contrary with the Project Manager.

Site Restrictions/Key Conditions

- 5.4.8 The following highlight some of the key restrictions/issues for the site but do not cover all the Conditions set out in the Planning Permission and the Environmental Permit and should only be used as a guide. It is the responsibility of the Contractor to ascertain the conditions relevant to his works, contained in the Planning Permission and Environmental Permit.
- 5.4.9 The Porthmellon Waste Management Site operates in accordance with Lawful Development Certificate P/13/032 approved by The Council of the Isles of Scilly on 17th July 2013.
- 5.4.10 The Contractor is to facilitate requirements of CQA as a result of Regulator requirements. This will be via production of expected work programmes (Section 5.5) and notification to the Project Manager of key work activities.

5.5 Requirements for the Programme

- 5.5.1 The programme shall establish the sequence of all activities for the construction of the Works incorporating the requirements of all Sub-Contractors, statutory authorities / regulators and others engaged direct by the Employer whose work is dependent upon or has a bearing upon the progress of the Works including durations for ordering and delivery of major construction materials and durations for drawing preparation, manufacture and delivery of materials relating to Sub-Contractors, and statutory authorities.
- 5.5.2 The Contractor shall include sufficient time within the programme for Sub-Contractors, Regulators and statutory authorities to test, validate and commission their works.
- 5.5.3 The Contractor must also indicate, in consultation with the Project Manager, on his programme the latest dates by which he requires final information or Approval from the Project Manager.
- 5.5.4 Site progress meetings will be held when required by the Project Manager and at a minimum of monthly intervals. They shall be attended by representatives of the Contractor.

5.6 Services and other things provided by the Employer

- 5.6.1 No services and other things are to be provided by the Employer other than access to the identified site.
- 5.6.2 Service Plans provided within the pre-construction information pack (PCIP) are an indication only and the contractor must satisfy himself that all pipework, services and electric cables have been identified before works commence.
- 5.6.3 The Site Services and where appropriate, DSEAR drawings, are provided within the PCIP. The contractor will be required to satisfy for himself the location of overhead and underground electric cables present on and adjacent to the Working Areas. The Contractor shall take all necessary precautions to avoid damage to, and safety hazards from, these cables. These precautions shall, at a minimum, be in accordance with the appropriate 'Health and Safety Executive' Guidance Notes.

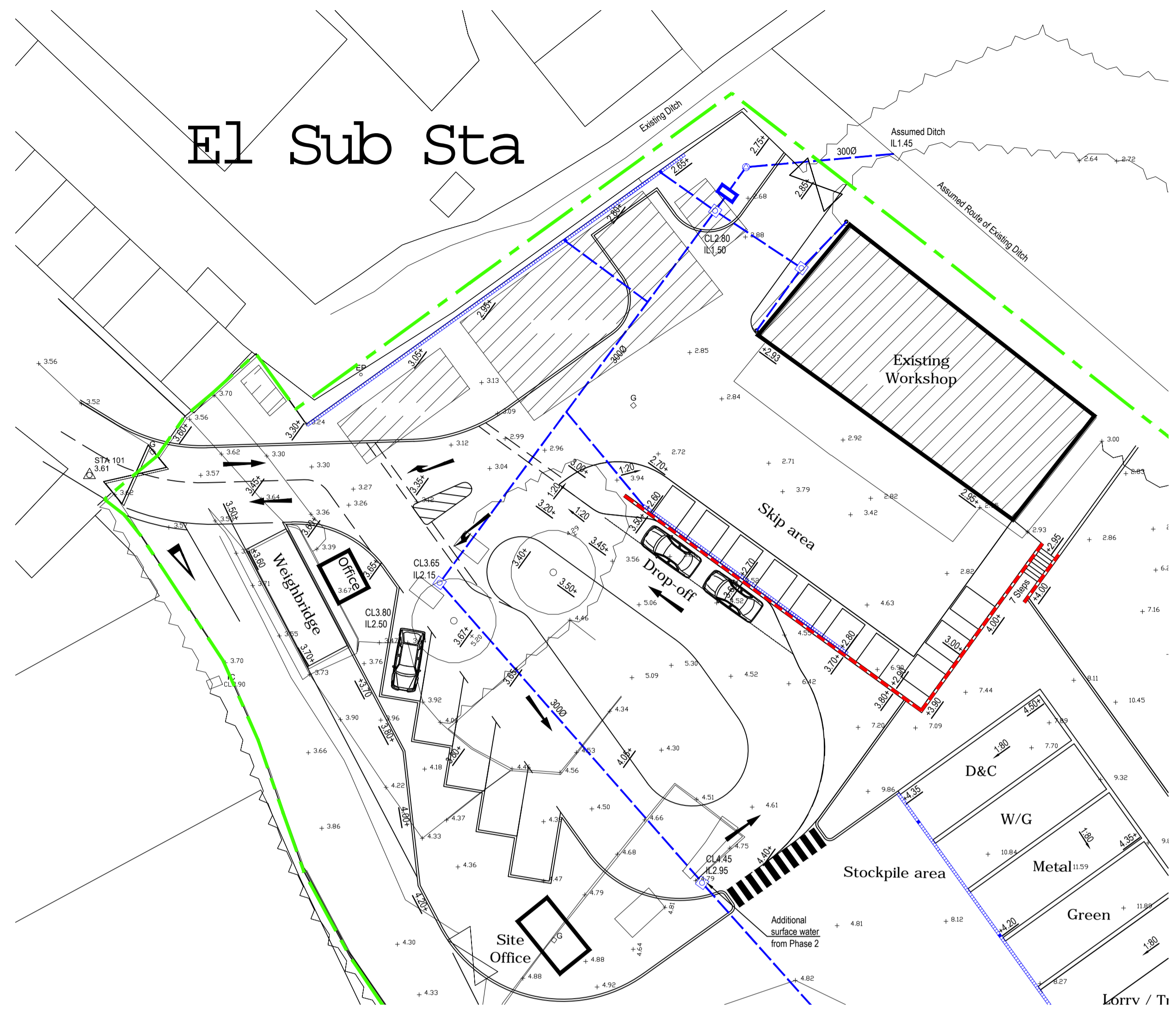
6 Site Information

- 6.1.1 The following provides details of site information and should be read in conjunction with the drawings listed in section 5.2. It is the responsibility of the contractor to satisfy himself of the accuracy of the site information.
- 6.1.2 The Contractor shall be deemed to have inspected the site and surroundings and to have satisfied himself as to the means of access, loading constraints, rights of way, public access, nature and conditions of the existing property and generally of any conditions and restrictions which in any way may influence his tender.
- 6.1.3 Arrangements to visit and inspect the site and buildings shall be made with the Site Manager during normal office hours.
- 6.1.4 The Contractor is to confine his operations to the area of the site, or such other areas as the Project Manager may specifically direct.
- 6.1.5 The Contractor shall not use the site for any purpose other than that of carrying out the Works.
- 6.1.6 The Contractor shall be deemed to have made due allowance here or in his prices for local conditions, the nature and accessibility of the site, the nature and extent of the operations and storage space for materials, including all additional handling and transporting, due to site conditions and the nature of the ground. The Porthmellon Waste Management Site is located to the south-east of Hugh Town on the Island of St. Mary's, Isles of Scilly. The Site is accessed from Telegraph Road (A3111) turning on to Moor Well Lane and is the principal waste management site for the Isles of Scilly. The site is an operational waste management site.
- 6.1.7 Landfilling at the site started in 1965 (approximately), with waste tipped directly onto the relatively flat Lower Moors. Wastes accepted at the site include domestic, commercial and industrial waste, including garden, farm and inert waste (demolition materials, rubble and glass). It is understood that historically much of the combustible waste was typically burnt at the site. However, since 1978 the waste has been incinerated and the incinerator ash (IBA) has been deposited at the site. Consequently over time, large stockpiles of IBA have built up across the site. In addition, stockpiles of soil and green waste, loose vegetation, construction and demolition waste and bulky waste have accumulated at the site. These historic deposits are collectively referred to as 'legacy waste'.
- 6.1.8 The site is in close proximity to an Industrial Estate immediately to the north and the residential properties of Hugh Town to the south and west. Further industrial and commercial premises lie to the west of the site.
- 6.1.9 The hospital is located to the south-west of the site. Five Islands School is located approximately 60 m to the north-west of the site and Carn Gwaval Primary School located approximately 100 m to the south-east of site. St Mary's Island airport is located approximately

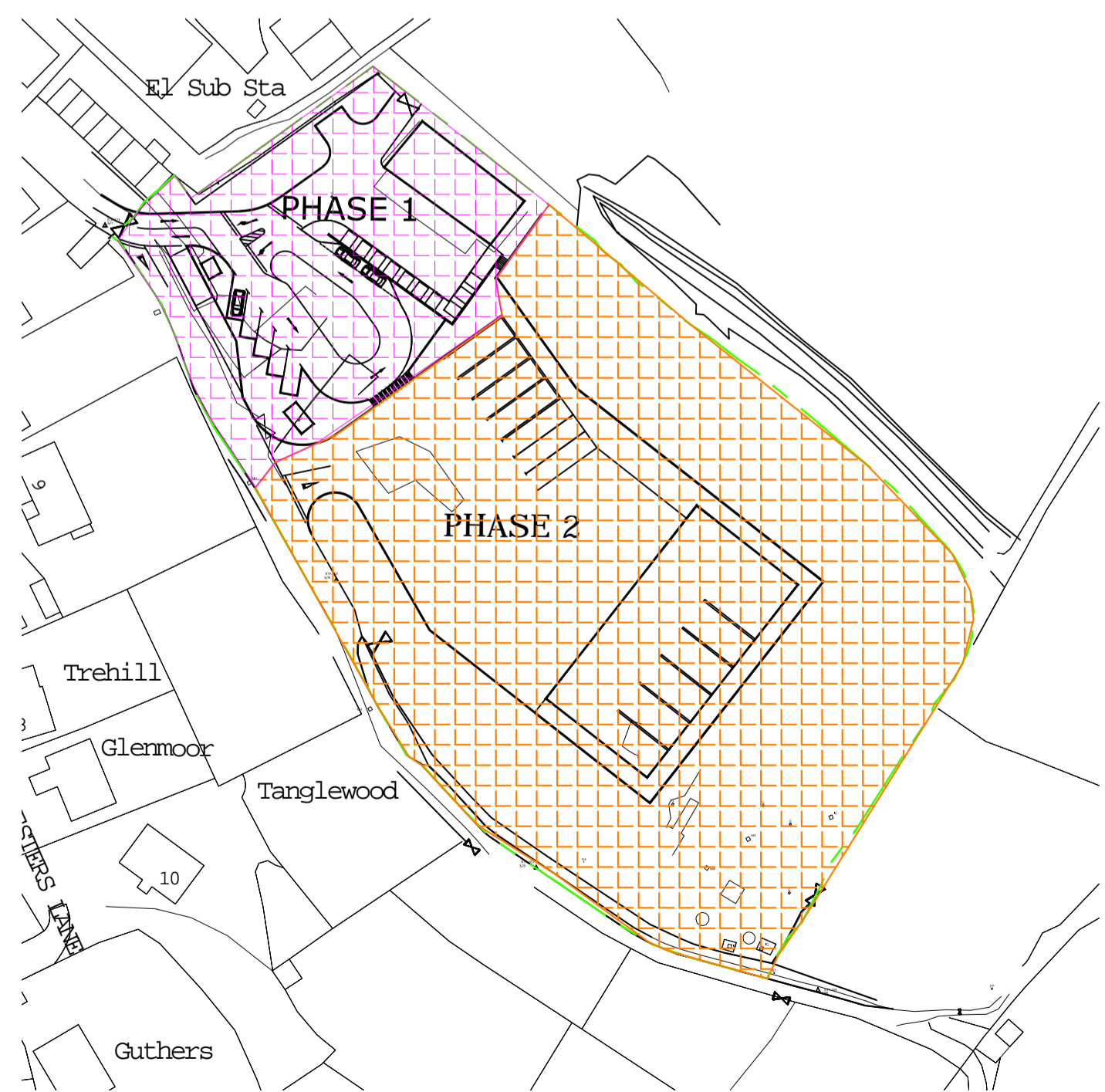
730 m to the south-east of the site. Allotment gardens are located adjacent to the west and south-west of the site.

- 6.1.10 To the north and east of the site the land is low lying and is an ecologically sensitive wetland area that has been designated a Site of Special Scientific Interest (SSSI).
- 6.1.11 The site is located on alluvium deposits consisting of clay, silt, sand and gravel from the Holocene period and underlain by the Isles of Scilly Intrusion, a granite rock from the Permian – Carboniferous period. The alluvial deposit is classed as a secondary aquifer, but in this case is believed to effectively act as an aquitard with relatively low permeability given the silty clay present. Confined below the alluvium are glacial deposits and granite. A local groundwater abstraction (Joaney's Well) is located within the glacial deposits at a distance of approximately 400 m from the Site. The site does not lie within a Source Protection Zone (SPZ).
- 6.1.12 Porthmellon Bay is located approximately 85 m to the north-west of the site, Porth Cressa Bay lies approximately 405 m from the site to the south-west and Old Town Bay approximately 390 m from the site to the south-east.
- 6.1.13 Numerous surface water ditches/drains are located to the east and south-east of the site and relate to the low lying marsh lands of the Lower Moors SSSI.
- 6.1.14 The site is not located within a flood zone, however, the flood prediction map made available by the Environment Agency details that the site is partly located in, and surrounded by, land at risk from a 1 in 200 year flood.
- 6.1.15 Throughout the duration of the contract the site shall remain an active waste management site for the purposes of the reception and transfer of waste for which the Employer is required to make provision for. The Contractor shall remain inside of the working areas, unless otherwise directed to do so by the Project Manager, and not cause disruption to the Employer's normal operations, and shall produce in conjunction with the Project Manager a traffic management plan. At all times waste management site traffic shall have priority over the Contractor's construction traffic.
- 6.1.16 **Hours of Work** - The maximum working hours permitted shall be:
- Monday to Saturday - 0800 to 1800 hrs
 - Sundays and Bank or Public Holidays - No works involving the use of machinery
- 6.1.17 The above working hours are for engineering works only. Works outside of the agreed hours may only take place if prior permission is granted by the Project Manager.
- 6.1.18 The Contractor shall ensure that access by unauthorised persons to his site compound and all areas in which he is carrying out work is prevented.

Drawings



Proposed Engineering Layout Phase 1
Scale 1:250



Proposed Site Layout Phasing Plan
Scale 1:1000

DRAINAGE KEY

SURFACE

- Rectangular PCC manhole
- Separator/Klargester full retention NPS Range NSFA 100 (550mm²) Class 1 or similar specified
- Monitoring point & shut off valve
- Drainage channel
- Rainwater downpipe

GENERAL KEY

- Existing ground levels
- Proposed finished levels
- Building finished floor level
- Site boundary
- Retaining Wall

SCHEDULE OF ACCOMMODATION

	sq m	sq ft
Recycling Building (GEA) 22x42m	: 924	9,946
Site Office (GEA) 12.4x4.2m	: 52	560
TOTAL (GEA)	: 976	10,506
12x4m Stockpile Area	: 4	
2x2.5m Yard skips	: 10	
Lorry Parking	: 3	
Car Parking	: 5	
SITE AREA	: Ph1 total area - 0.28 Ha	Ph2 total area - 0.91 Ha
IMPERMEABLE AREA		Ph2 - 0.31 Ha

NOTES:

- Surface water from the site is discharging to existing ditch at assumed level. Survey of the ditch to be carried out and the levels to be confirm.
- Surface water sewers design to accommodate storm event 1 in 30 years for whole site (Phase 1 & Phase 2).

Notes

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P1 FIRST ISSUE IM KMc 19.12.14

Rev	Description	By	Ckd	Date



Sherwood House,
Sherwood Avenue, Newark, Nottinghamshire, NG24 1QQ
T: +44 (0)1636 605 700 E: rpsnewark@rpsgroup.com

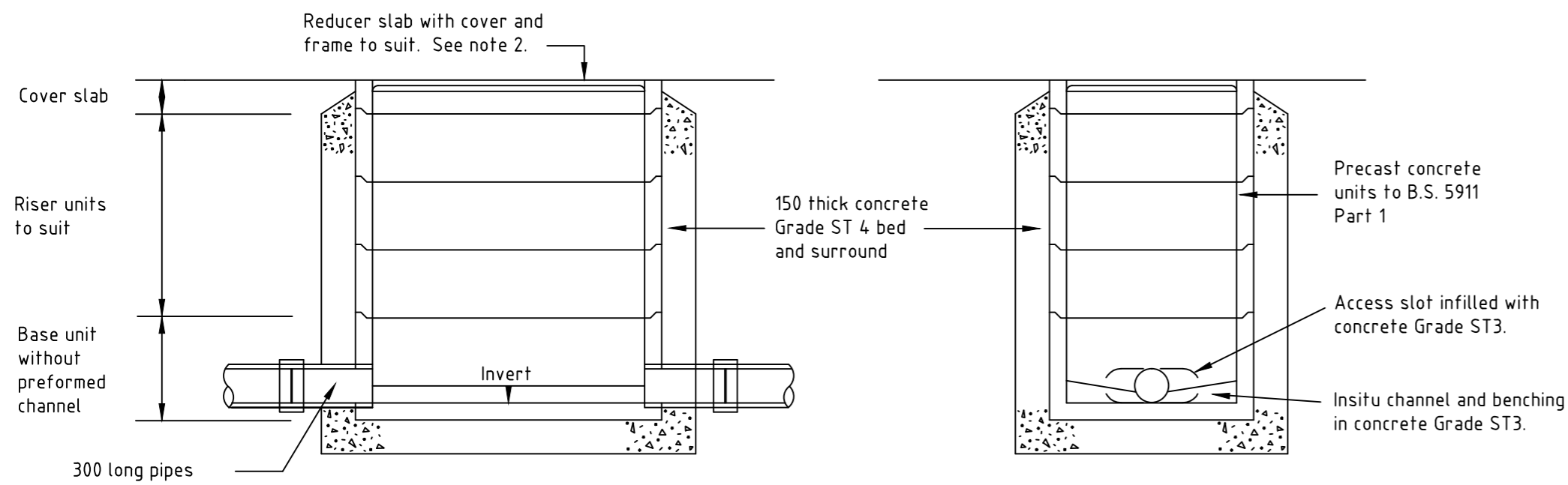
Client Council of the Isles of Scilly

Project Porthmellon Waste Management Facility, St. Mary's, Isles of Scilly

Title Engineering Layout

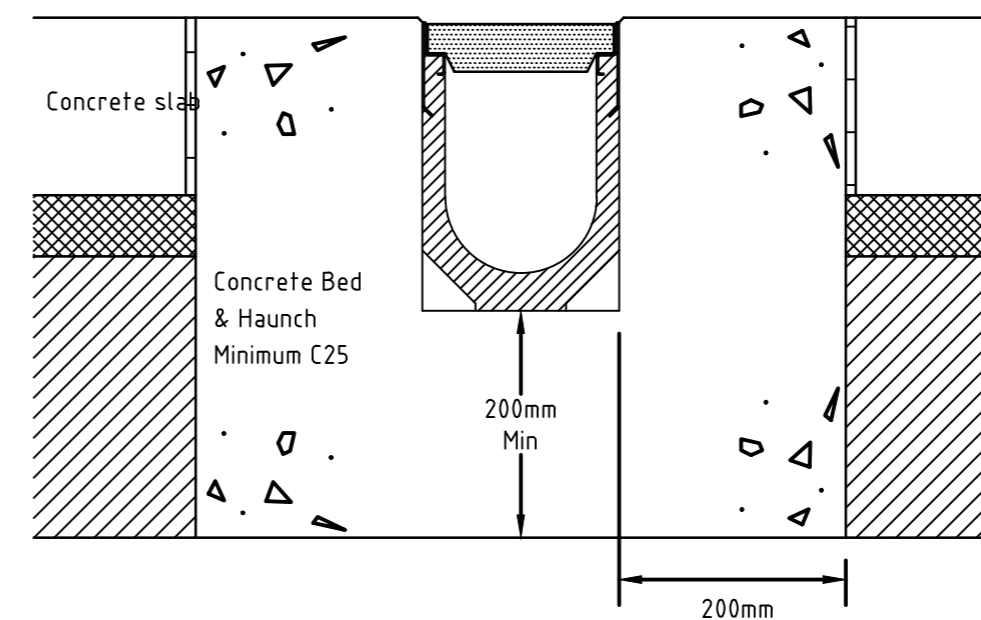
Status	Scale	Date Created
Preliminary	AS SHOWN @ A1	02.01.15
Project Leader	Drawn By	Checked by
KMC	IM	

Drawing Number	Rev
JKK8520 _01	P1



DEPTH m	MINIMUM CHAMBER SIZE mm x mm
0 - 1	600 x 450
1 - 2	1200 x 750 with step irons

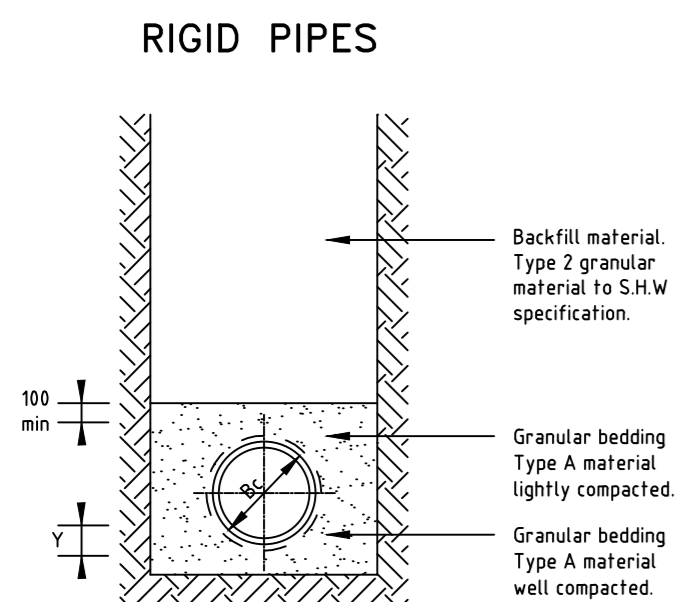
**RECTANGULAR PRECAST
CONCRETE MANHOLE**



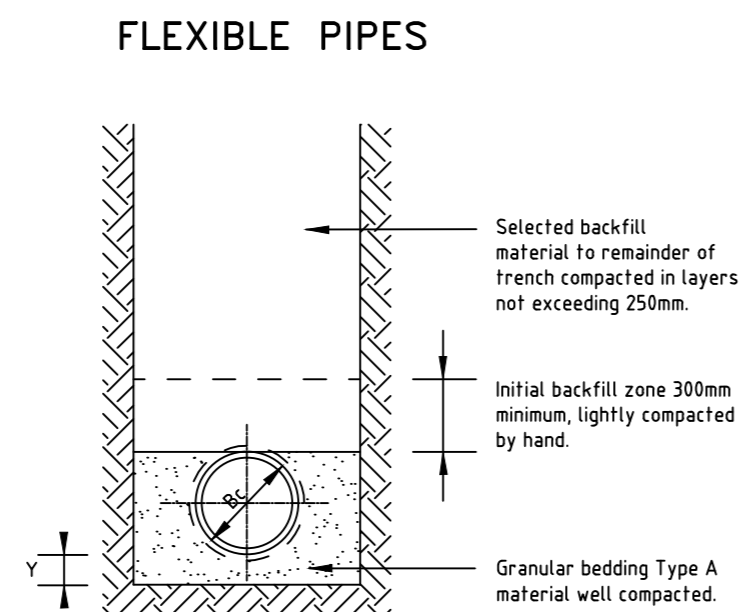
NOTES

All drainage channels shall be installed strictly in accordance with the manufacturers instructions

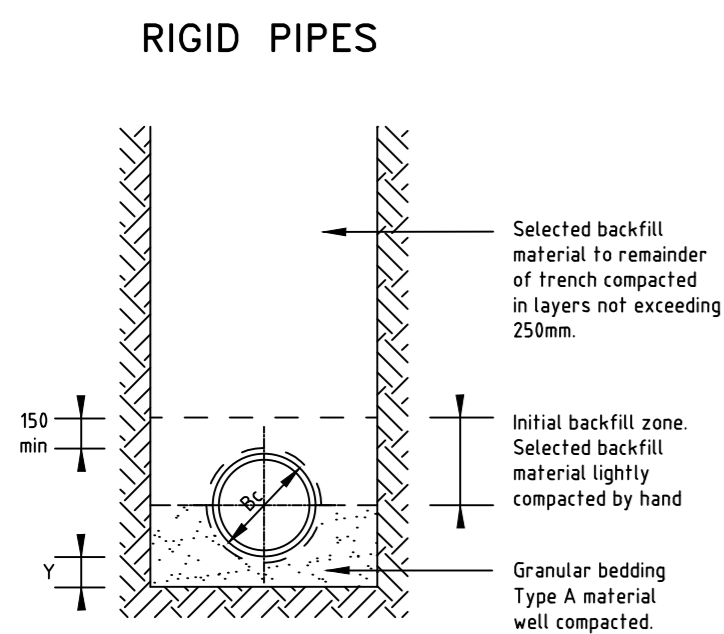
ROAD DRAIN CHANNEL ACO 100



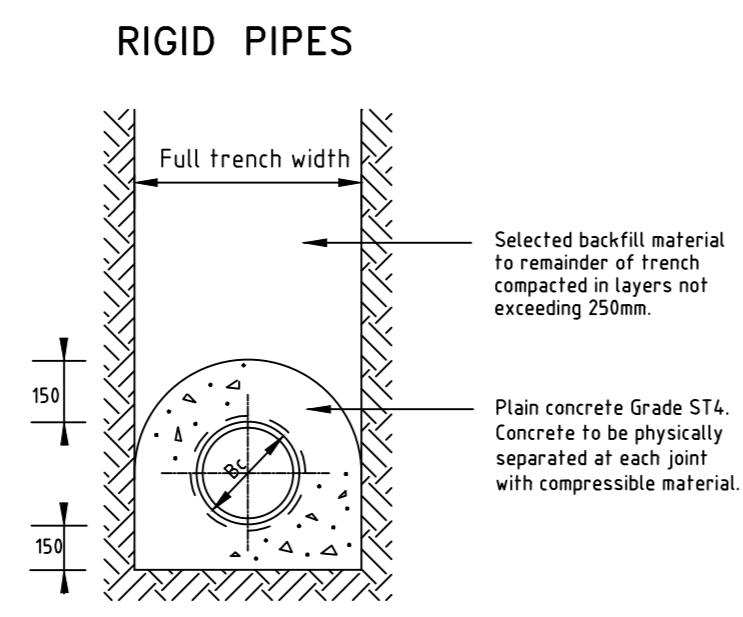
CLASS S BEDDING
(On Trafficked areas)



CLASS S BEDDING

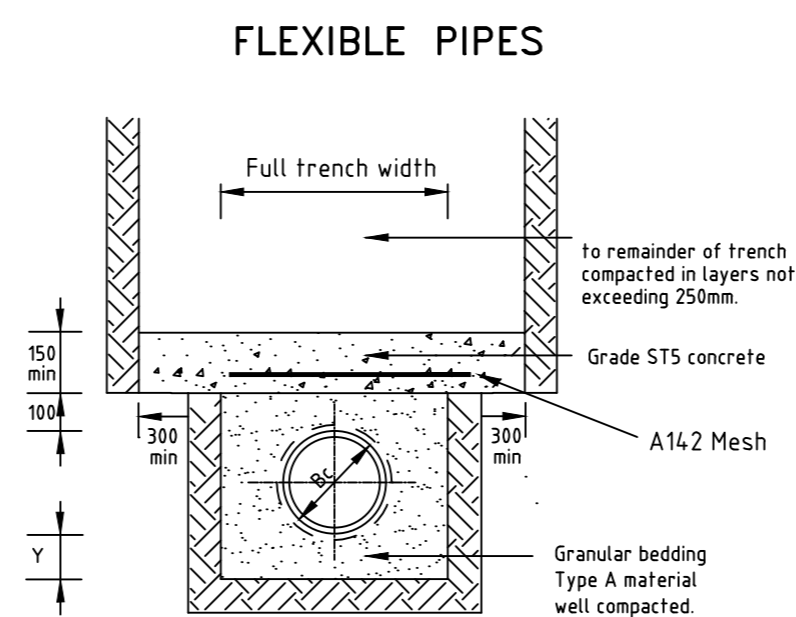


CLASS B BEDDING
(Non-trafficked areas)



CLASS A BEDDING

For cover to pipes of less than 1.00m in paved areas, and less than 0.45m in open spaces.



CLASS A BEDDING

For cover to pipes of less than 0.90m in paved areas, and less than 0.60m in open spaces.

TRENCH WIDTHS

Pipe Dia	Trench width max.	Y
100	600	100
150	600	100
225	700	100
300	750	100

GRANULAR BEDDING

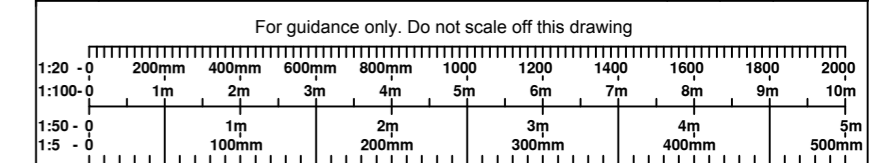
Nominal bore of pipe (mm)	Alternative Aggregate sizes (mm)	
	Single sized	Graded
100	10	-
150	10 or 14	14 to 5
225-300	10, 14 or 20	14 to 5 or 20 to 5

Granular bedding for pipes and backfilling material for temporary drains (trench sub-drains) shall consist of aggregates from natural sources to BS EN 12620 and BS EN 12620-1 or sintered pulverised fuel ash complying with the relevant provisions of BS 3892; sized in accordance with the above table

Selected fill material, whether selected from locally excavated material or imported, shall consist of uniform, readily compactible material, free from vegetable matter, building rubbish and frozen material, or materials susceptible to spontaneous combustion, and excluding clay of liquid limit greater than 80 and/or plastic limit greater than 55 and materials of excessively high moisture content. Clay lumps and stones shall be retained on 100mm and 40mm sieves respectively.

P1 FIRST ISSUE IM TD 19.12.14

Rev	Description	By	Ckd	Date



Noble House
Capital Drive, Linford Wood, Milton Keynes MK14 6QP
T:+44 (0)1908 669898 E: rpsmks@rpsgroup.com F:+44 (0)1908 669899

Client

Project Porthmellon Waste Management Facility, St. Mary's, Isles of Scilly

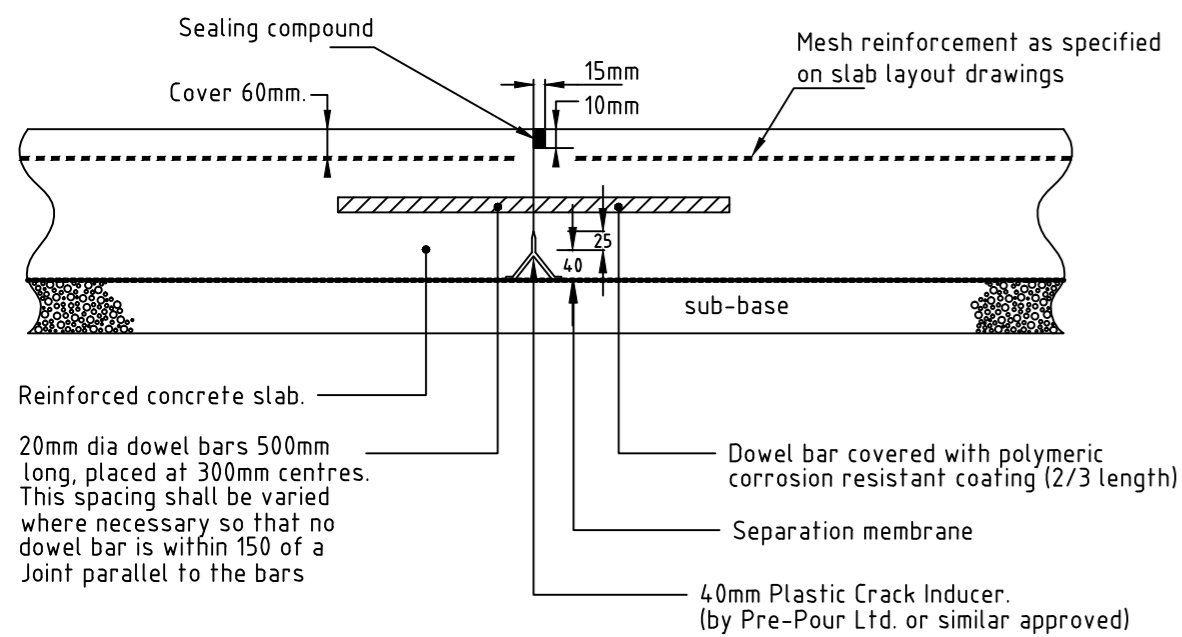
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Status Preliminary Scale NTS @A1 Date Created 02.01.15

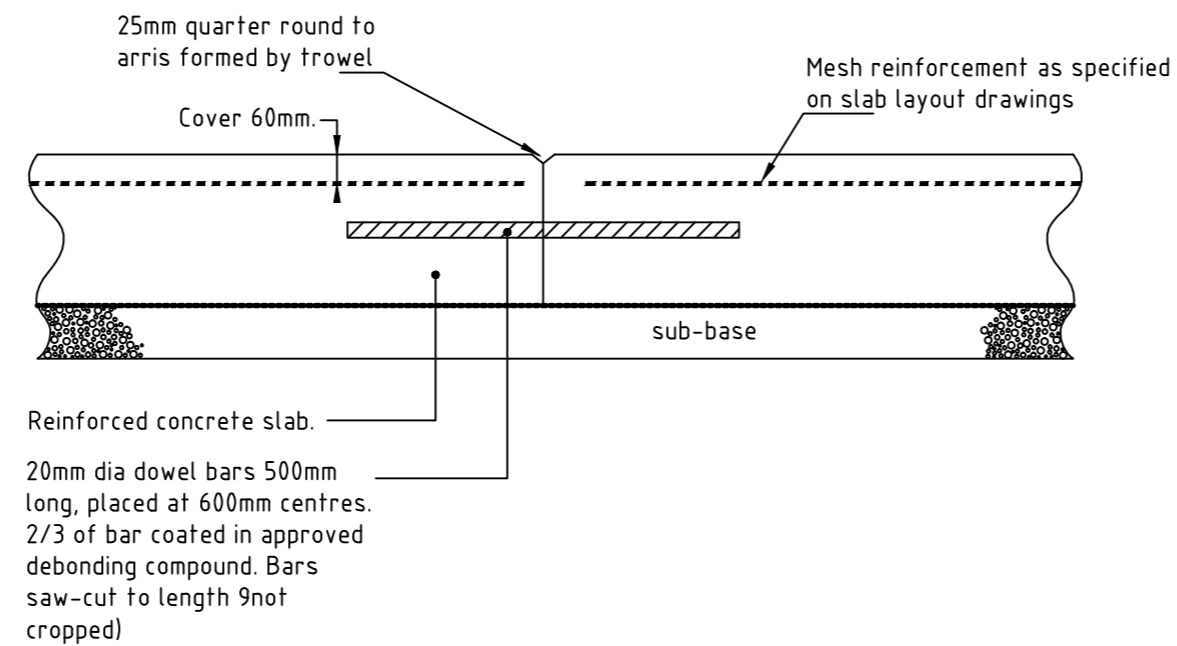
Project Leader KMc Drawn By IM Checked by KMc

Drawing Number JKK8520 _02 Rev P1

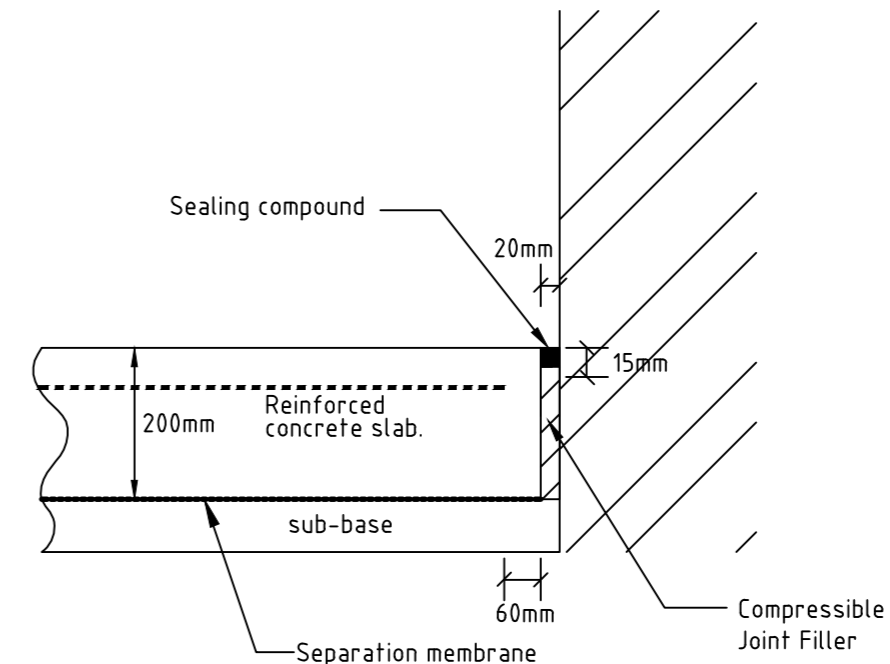
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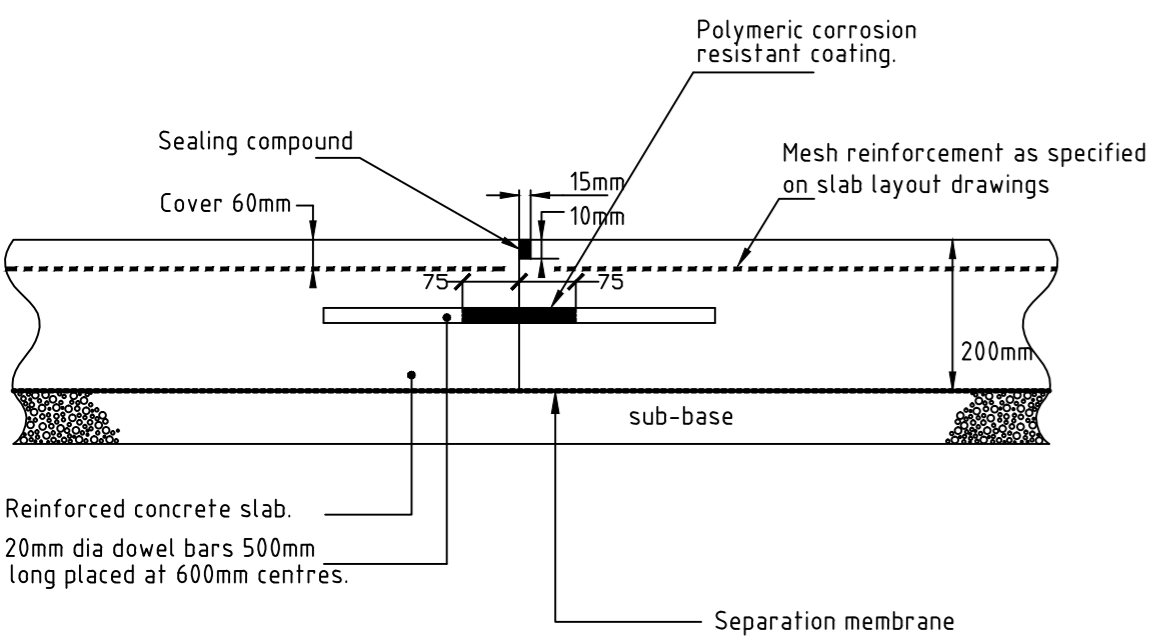
CONTRACTION JOINT – C.J. – WITH SAWN GROOVE



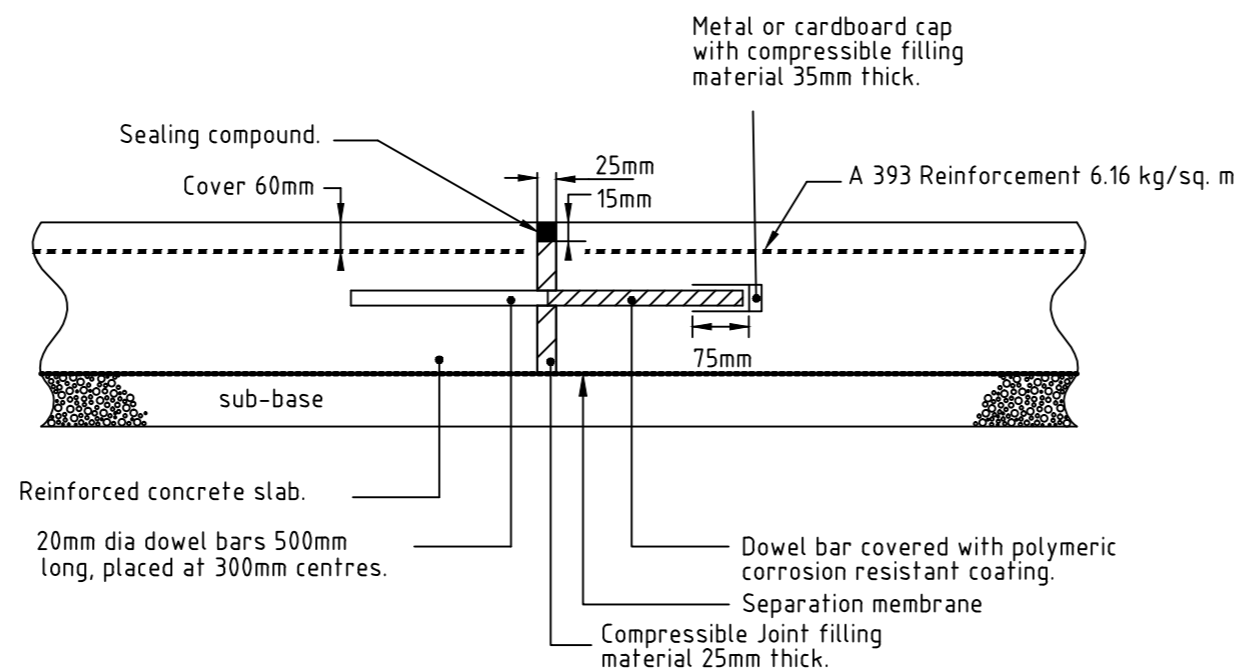
DEBONDED LONGITUDINAL JOINT – D.L.J.



ISOLATION JOINT – I.J.



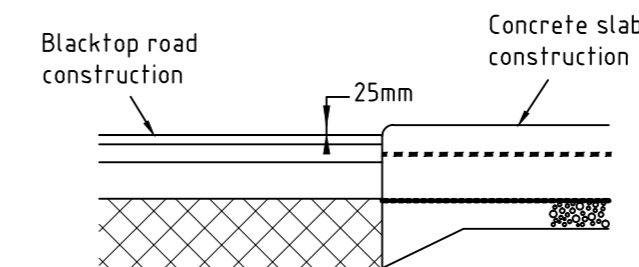
LONGITUDINAL JOINT – L.J.



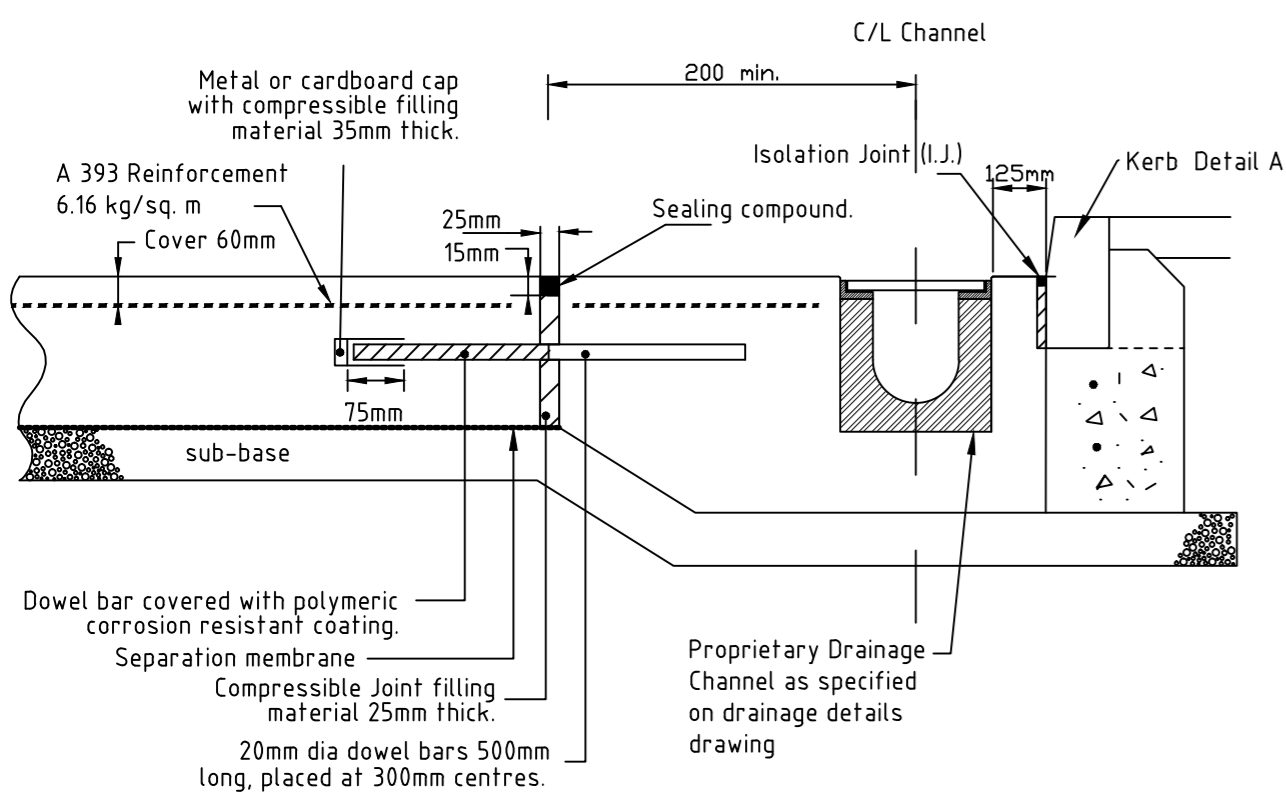
EXPANSION JOINT – E.J.

NOTES:

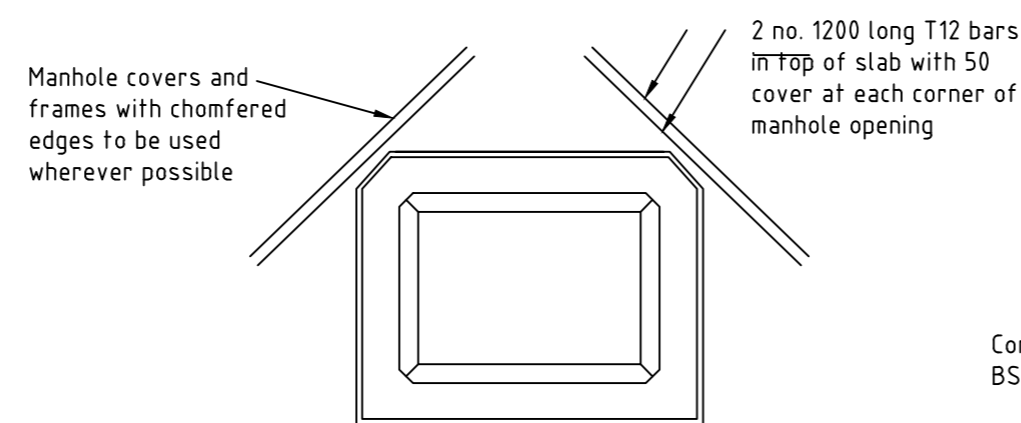
1. Concrete to be air entrained C40 to clause 1001 SHW specification.
2. Sealing compound to be Colpor 200PF by FOSROC or similar approved.
3. Separation membrane to clause 1007 SHW specification.
4. Polymeric coating to be cold applied bitumen, by RLW or similar approved.
5. Cover to all fabric/reinforced at Joints to be 60mm.



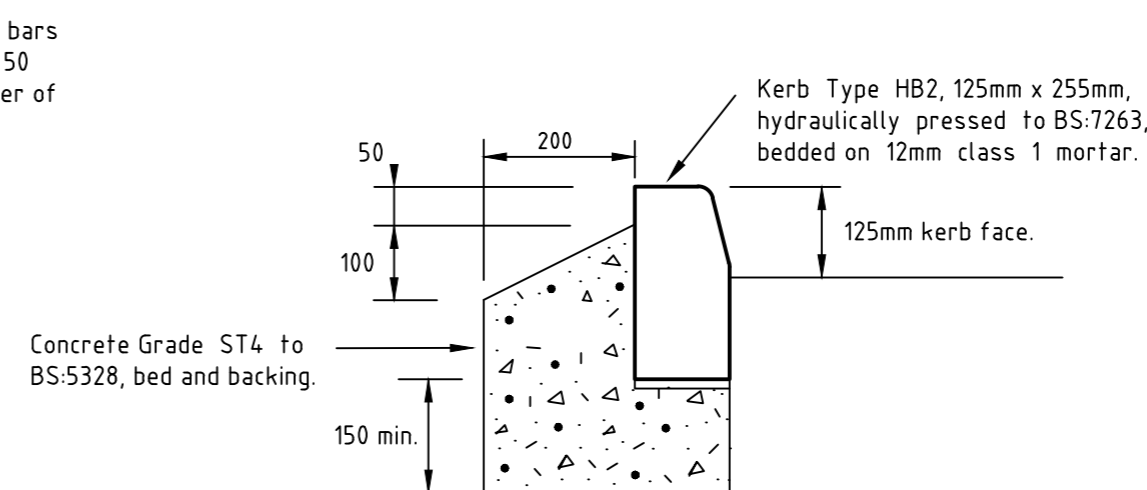
BLACKTOP ROAD AT DROP OFF /CONCRETE ROAD AT SKIP AREA



DRAIN CHANNEL EXPANSION JOINT – D.E.J.



TYPICAL MANHOLE DETAIL AT CONCRETE SLAB LOCATION



DETAIL A

Note:
Openings in concrete slab should be positioned in the corners of bays, either alongside or astride a transverse joint and have chamfered corners.

Notes

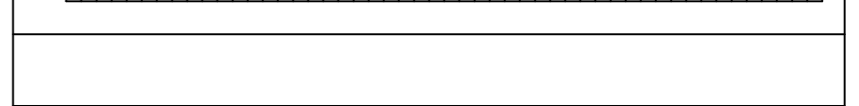
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NOTES

1. Concrete mixes are designed mixes in accordance with the relevant clauses of BS:5328, Parts 2, 3 & 4.
2. DTP specification refers to the Manual of Contract Documents for Highways Works, Volume 1.
3. Refer to layout plan for any variations to road.
4. Kerb foundations shall not be less than 150mm thick, and shall be seated on or in the sub-base, this depends on pavement construction thickness.
5. All kerbs shall be laid on a 25mm bed of mortar designation (i). Refer to Clause 6.15 of the Specification
6. Adequate bond shall be provided between foundation and haunch. Preferred method of bonding to be by means of steel reinforcement hoops at 900mm centres or any other method to be approved by the engineer.
7. Mortar joints between kerbs not to be provided unless specified by the engineer. Gaps between kerbs to be 1 to 2mm, where mortar jointing is specified.
8. Kerb backing normally brought up to 50mm below top of kerb, but where final surface of footway is slab paving, kerb backing shall finish 75mm below top of kerb.
9. 250mm type 2 sub-base material to cl.804 of Highway Agency Specification. If CBR value less than 3% then depth of sub-base to be increased to 450mm.
10. The minimum total carriageway construction thickness shall not be less than 450mm

P1 FIRST ISSUE IM TD 19.12.14

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Noble House
Capital Drive, Linford Wood, Milton Keynes MK14 6QP
T:+44 (0)1908 669898 E: rpsmks@rpsgroup.com F:+44 (0)1908 669899

Client Council of the Isles of Scilly
Project Porthmellon Waste Management Facility, St. Mary's, Isles of Scilly
Title Construction Details

Status	Scale	Date Created
Preliminary	NTS @A1	02.01.15
Project Leader	Drawn By	Checked by
KMc	IM	KMc

Drawing Number	Rev
JKK8520 _03	P1

Notes






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3. This drawing should be read in conjunction with all other relevant drawings and specifications.

NOTES:

1. Final joints layout to be agreed between contractor and RPS.
2. For typical construction details refer to dwg. JKK8520_03.
3. All external concrete areas to have heavy brush finish with trowelled margins at joint location. Brush finish to provide grooves parallel to the slope of pavement.
4. All works are to be carried out in accordance with the requirements of the Manual of Contract Documents for Highway Works, Volume 1 Specification and to the approval of the local highway authority where the works are to be executed within areas of public highway.
5. All road markings and signage works to comply with The Traffic Signs Regulations and General Directions 2002.

- Denotes 200mm thick concrete slabs at Skip Area with heavy brush finish to the following specification:
1. Concrete strength class to be C28/35 at 28 days max. to BS EN 206-1:2000 and BS 8500-1:2006 & A1:2012. Minimum cement content to be 330kg/m³. Nominal aggregate size to be 20mm. Air content to be 5%.
 2. C385 mesh reinforcement with 50 min. top cover and main bars parallel with long joint.
 3. 1200 gauge polythene slip membrane.
 4. 250mm Type 2 granular sub-base material to Cl. 804 of Highway Agency Specification for Highway Works and divided for slip layer. If CBR value is less than 3% then depth of sub-base to be increased to 450mm.

GENERAL KEY

C.J.	Contraction Joint
L.J.	Longitudinal Joint
I.J.	Isolation Joint
D.L.J.	Debonded longitudinal Joint
E.J.	Expansion Joint
	Site boundary
	Existing concrete slab
	Existing tarmac road construction
	Kerb Detail A location
	Proposed finished levels

P1 FIRST ISSUE		IM	KMc	19.12.14
Rev	Description	By	Ckd	Date



Sherwood House,
Sherwood Avenue, Newark, Nottinghamshire, NG24 1QQ
T: +44 (0)1636 605 700 E: rpsnewark@rpsgroup.com

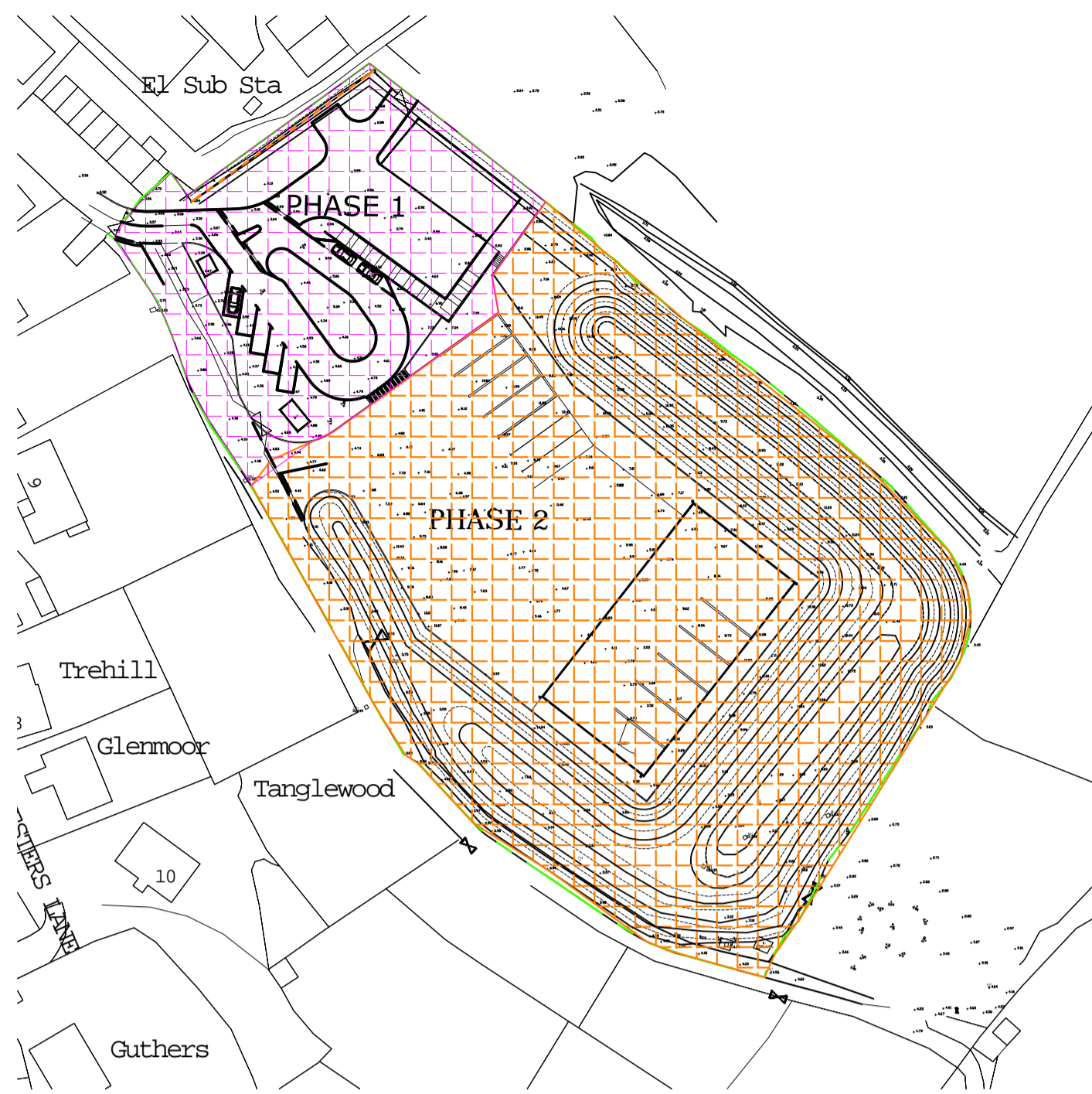
Client Council of the Isles of Scilly

Project Porthmellon Waste Management Facility, St. Mary's, Isles of Scilly

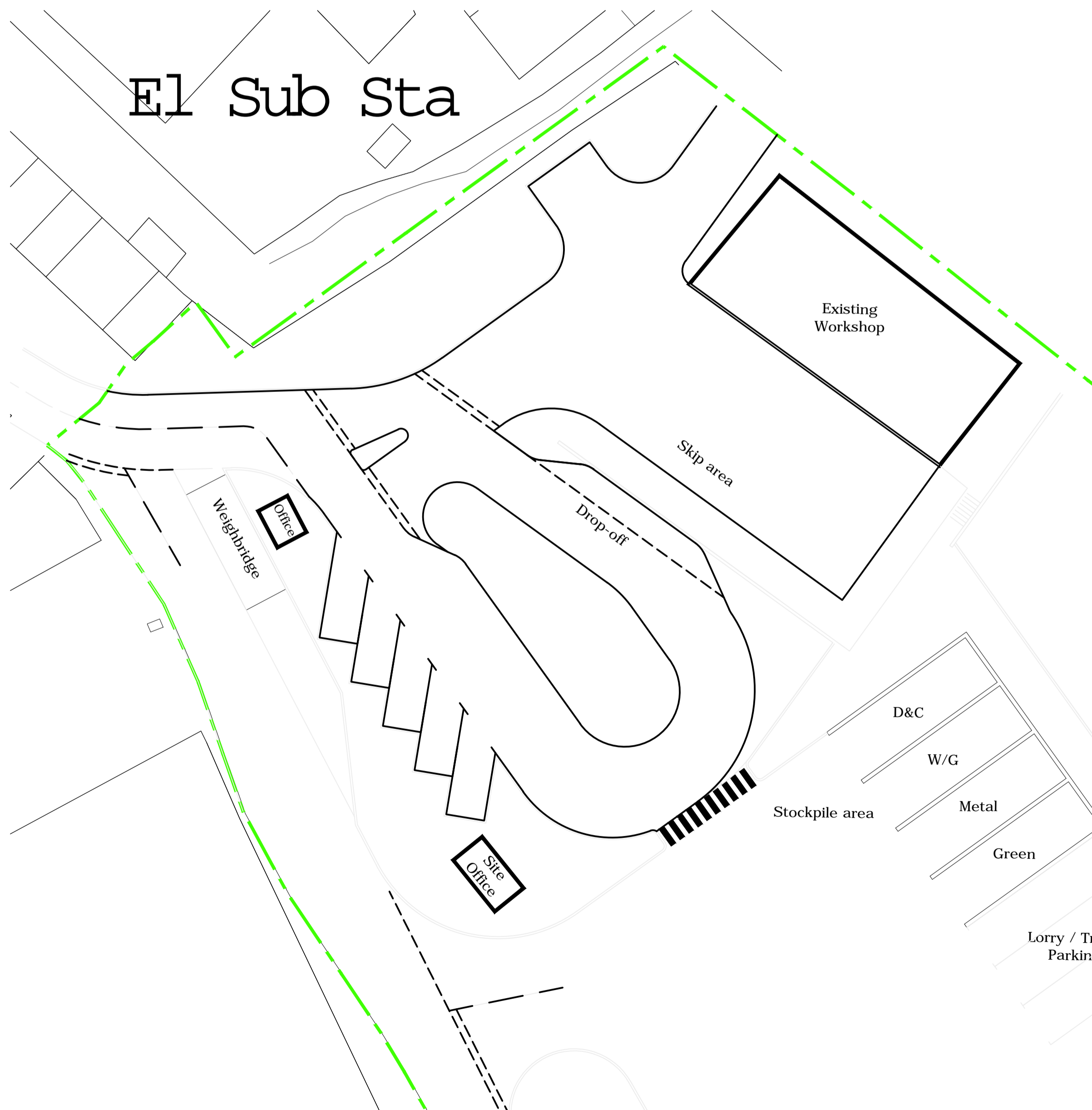
Title External Works Layout

Status Preliminary	Scale AS SHOWN @ A1	Date Created 02.01.15
Project Leader KMc	Drawn By IM	Checked by KMc

Drawing Number JKK8520 _04	Rev P1
----------------------------	--------



Proposed Site Layout Phasing Plan
Scale 1:1000



Proposed White Lining Outline
Scale 1:250



Slab Layout Phase 1
Scale 1:250

Notes

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LEGEND

- EX1 1X15W LED ROAD LANTERN POST TOP MOUNTED ON 6M COLUMN. COLUMNS TO BE HEAVY DUTY WHERE CCTV CAMERAS ARE MOUNTED. LUMINAIRE DETAILS AS PER LUMINAIRE SCHEDULE.
- EX2 1X29W LED ROAD LANTERN POST TOP MOUNTED ON 6M COLUMN. COLUMNS TO BE HEAVY DUTY WHERE CCTV CAMERAS ARE MOUNTED. LUMINAIRE DETAILS AS PER LUMINAIRE SCHEDULE.
- EX3 1X69W LED FLOODLIGHT POST TOP MOUNTED ON 6M COLUMN. COLUMNS TO BE HEAVY DUTY WHERE CCTV CAMERAS ARE MOUNTED. LUMINAIRE DETAILS AS PER LUMINAIRE SCHEDULE.
- EX4 1X23W LED WALL MOUNTED FLOODLIGHT. LUMINAIRE DETAILS AS PER LUMINAIRE SCHEDULE.
- EX5 1X69W LED WALL MOUNTED FLOODLIGHT. LUMINAIRE DETAILS AS PER LUMINAIRE SCHEDULE.
- DB DISTRIBUTION BOARD



A Preliminary Issue BT JRS 19.12.14

Rev	Description	By	Chk	Date



Sherwood House,
Sherwood Avenue, Newark, Nottinghamshire, NG24 1QQ
T: +44 (0)1636 805 700 E: rpsnewark@rpsgroup.com

Client

Project **Porthmellon Waste Management Facility, St. Mary's, Isles of Scilly**

Title **Site External Lighting Layout**

Status	Scale	Date Created
Preliminary	1:500 @A1	Dec '14
Project Leader	Drawn By	Checked by
JRS	BT	JRS

Drawing Number	Rev
BRM07665 XX-E-6301	A

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6. FOR ALL SETTING OUT INFORMATION REFER TO THE ARCHITECTS DRAWINGS AND DETAILS.
7. WHERE IT IS REQUIRED THAT INSPECTION BE MADE BY THE LOCAL AUTHORITY, THIS SHALL BE ARRANGED BY THE CONTRACTOR TO SUIT HIS PROGRAMME. ANY COSTS ARISING OUT OF FAILING TO CARRY OUT THE WORK TO THE SATISFACTION OF THE LOCAL AUTHORITY WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
8. MESH REINFORCEMENT TO BE GRADE 48S TO BS 4483 LOOSE BARS TO BE GRADE 500 TO BS 4449.
9. ALL REINFORCEMENT TO BE FIRMLY HELD IN PLACE WITH CHAIRS OR SPACERS BEFORE CONCRETE IS PLACED. ALL REINFORCED CONCRETE TO BE MECHANICALLY VIBRATED IN LAYERS NOT EXCEEDING 300mm THICK.

BACKFILLING

10. ALL BACKFILL VERTICALLY ABOVE THE FOUNDATION SHALL BE FREE DRAINING LIGHTLY COMPACTED GRANULAR MATERIAL - MINIMUM WIDTH OF GRANULAR BACKFILL 450mm - ALL OTHER BACKFILL TO BE OF LIGHTLY COMPACTED GRANULAR MATERIAL. A MINIMUM PERIOD OF 28 DAYS SHOULD ELAPSE AFTER CONSTRUCTION BEFORE COMMENCING BACKFILLING.

THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING JKK8520-201 FOR REINFORCEMENT DETAILS.

REINFORCED CONCRETE:
CONCRETE COMPRESSIVE STRENGTH CLASS TO BE MINIMUM C32/40.
MAXIMUM WATER CEMENT RATIO = 0.40.
MINIMUM CEMENT CONTENT 380 kg/m³.

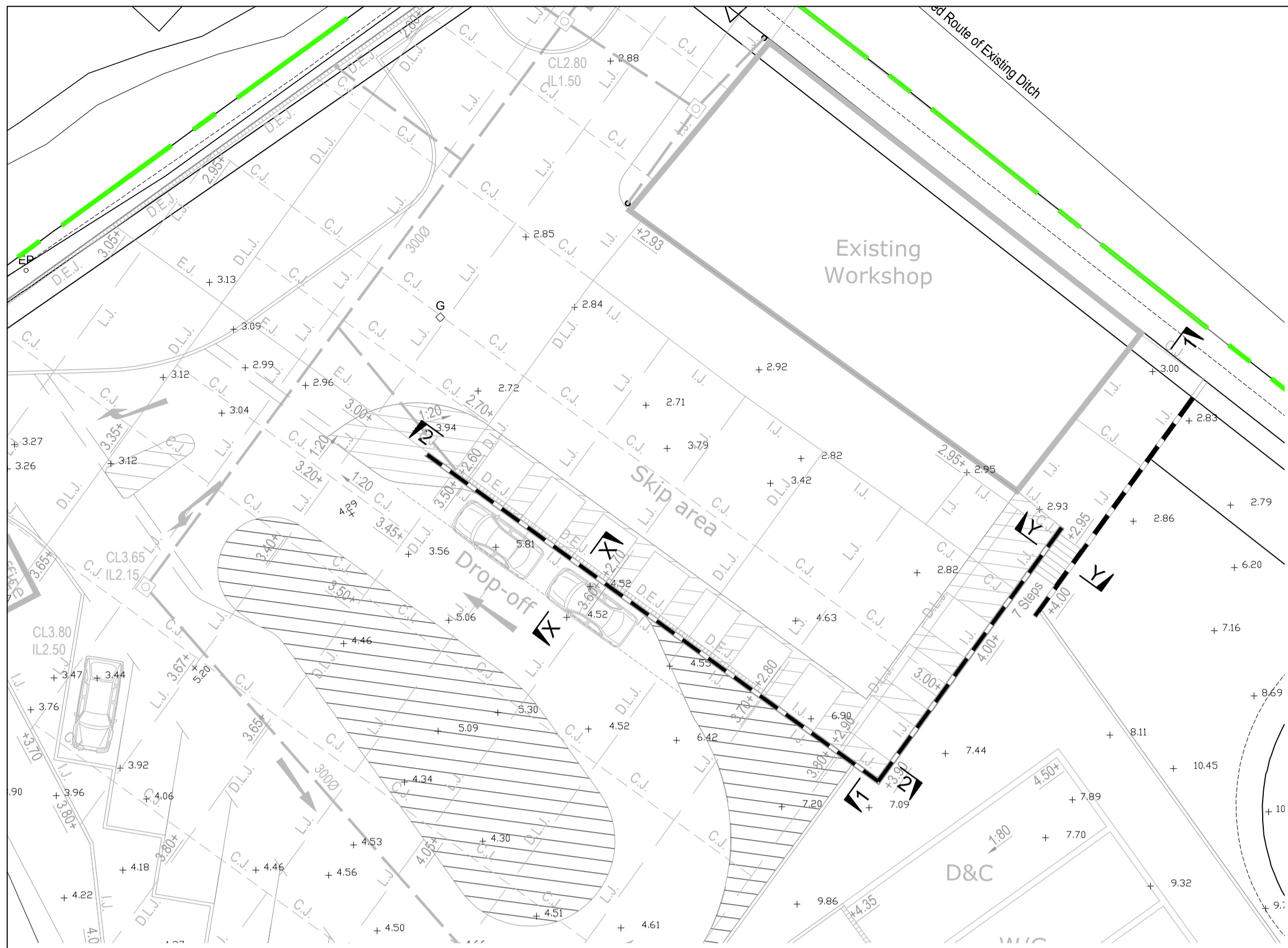
BLINDING CONCRETE:
BLINDING CONCRETE TO BE MIN. FND 2.
COVER TO BE 50mm ALL STEEL TO SHUTTERED/BLINDING FACE. MINIMUM 75mm COVER TO EARTH FACE.

LAP LENGTHS TO BE AS FOLLOWS, UNLESS NOTED OTHERWISE:
H10 Bars = 450mm (minimum)
H12 Bars = 550mm (minimum)
H16 Bars = 700mm (minimum)
H20 Bars = 850mm (minimum)
H25 Bars = 1100mm (minimum)

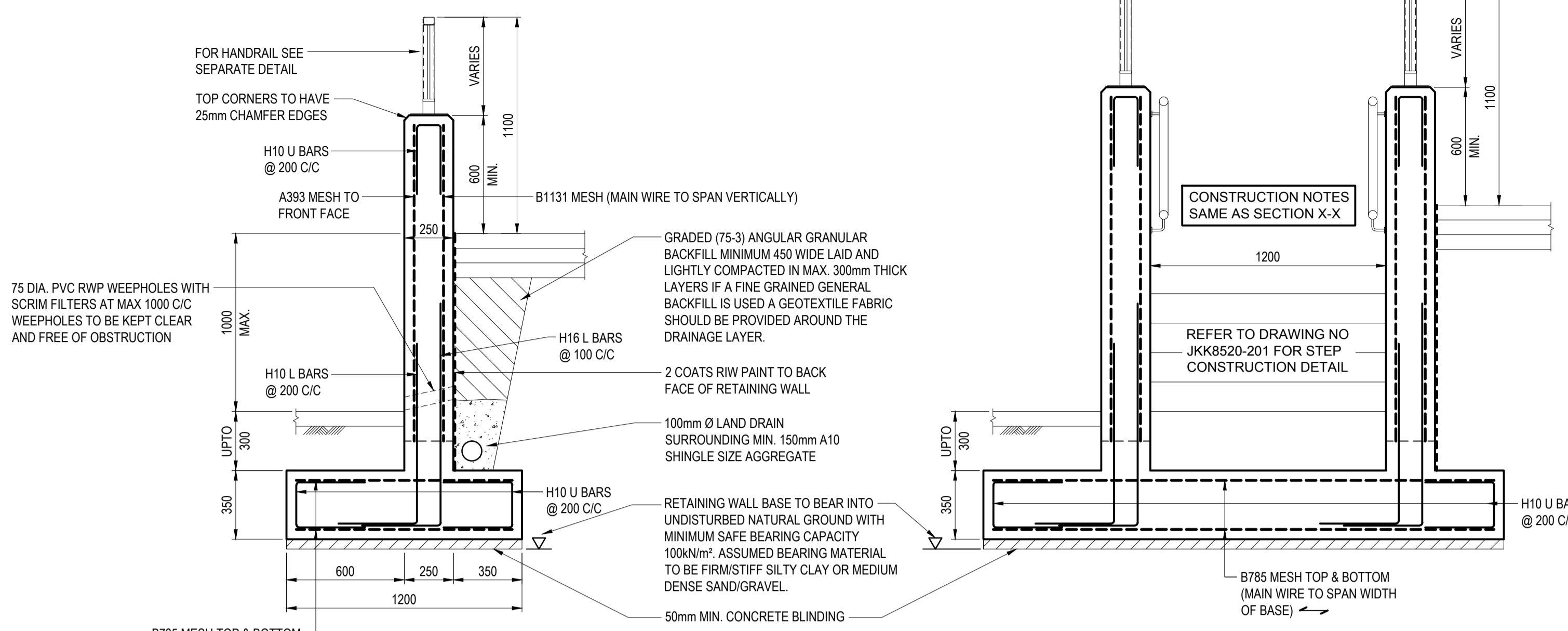
ALL LAP LENGTHS TO BE BASED ON THE SIZE OF THE SMALLER BAR.
LAP TO MESH TO BE MIN. 450mm.

STEELWORK NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ENGINEERS AND ARCHITECTS DRAWINGS.
4. CONTRACTOR TO TAKE RELEVANT SITE DIMENSIONS PRIOR TO FABRICATION. DISCREPANCIES TO BE REPORTED TO THE ENGINEER. ANY COSTS ASSOCIATED WITH THE FAILURE TO TAKE SITE DIMENSIONS PROPERLY WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL STEELWORK TO BE GRADE S275 TO BS EN 10025 U.N.O. ALL STEEL SECTIONS TO BS 4-1:2005.
6. ALL BOLTS TO BE GRADE 8.8 AS NOTED TO BS 4190 MINIMUM M16 U.N.O. ALL NUTS TO HAVE FLAT WASHER, OR TAPERED WHERE NECESSARY, PLUS SINGLE COIL SPRING WASHER OR LOCK NUT.
7. ALL EXTERNAL STEELWORK IS TO BE GALVANIZED TO BS EN ISO 1461:2009 U.N.O. VENT HOLES TO BE SEALED POST GALVANISING U.N.O.
10. ALL WELDS TO BE CONTINUOUS 6mm FILLET WELDS UNLESS INDICATED OTHERWISE. ALL BUTT WELDS (INDICATED FSW ON DRAWING) TO BE FULL PENETRATION, FULL STRENGTH WELDS
11. ALL STEEL TO STEEL CONNECTIONS ARE TO BE DESIGNED & DETAILED BY THE STEELWORK CONTRACTOR.

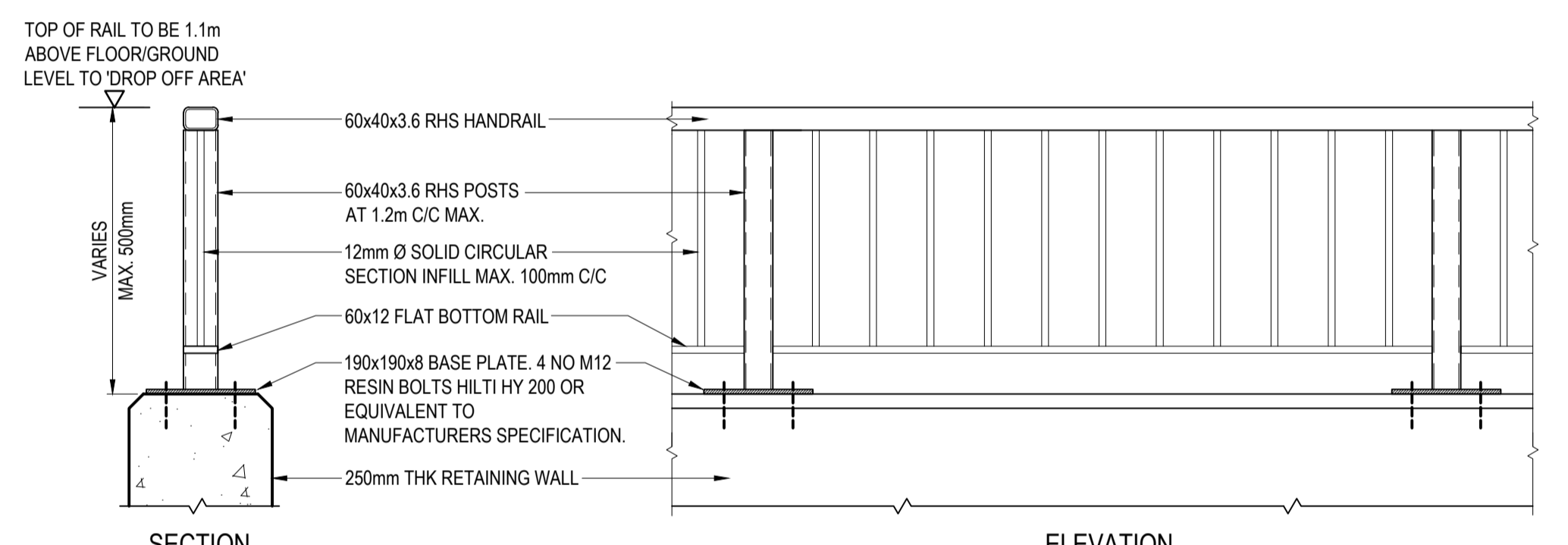


PART PLAN
SCALE 1:200



SECTION X-X
TYPICAL RETAINING WALL SECTION
UPTO 1.0m RETAINED HEIGHT
SCALE 1:20

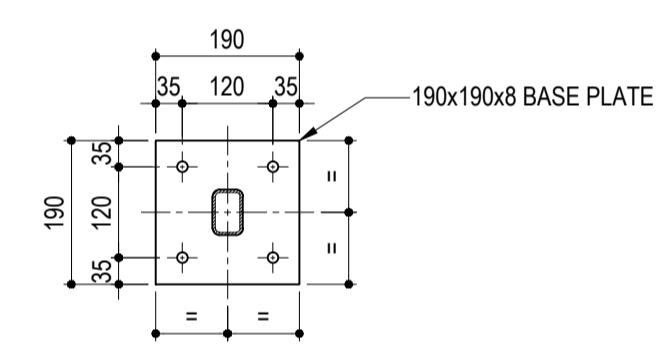
SECTION Y-Y
SCALE 1:20



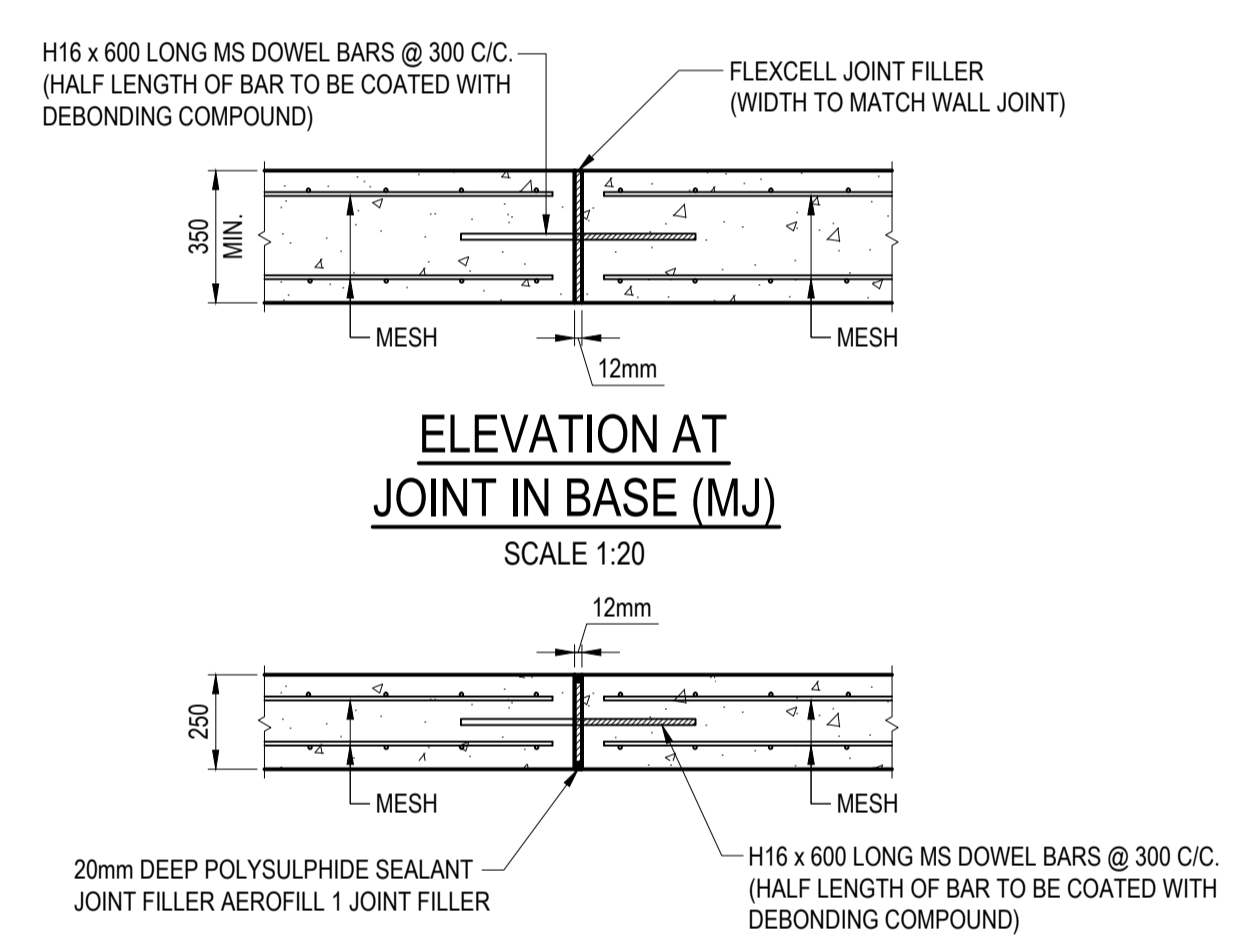
ALTERNATELY USE PROPRIETARY HANDRAIL SYSTEM (KEY CLAMP) OR SIMILAR TO SPECIALIST SUPPLIER DESIGN AND DETAILS.

FINAL HANDRAIL DETAIL AND FINISH TO BE CONFIRMED WITH RPS/CLIENT PRIOR TO CONSTRUCTION. FINISH TO BE SUITABLE FOR COASTAL AREA IN ACCORDANCE WITH BS EN ISO 12944.

HANDRAIL DETAIL
SCALE 1:10

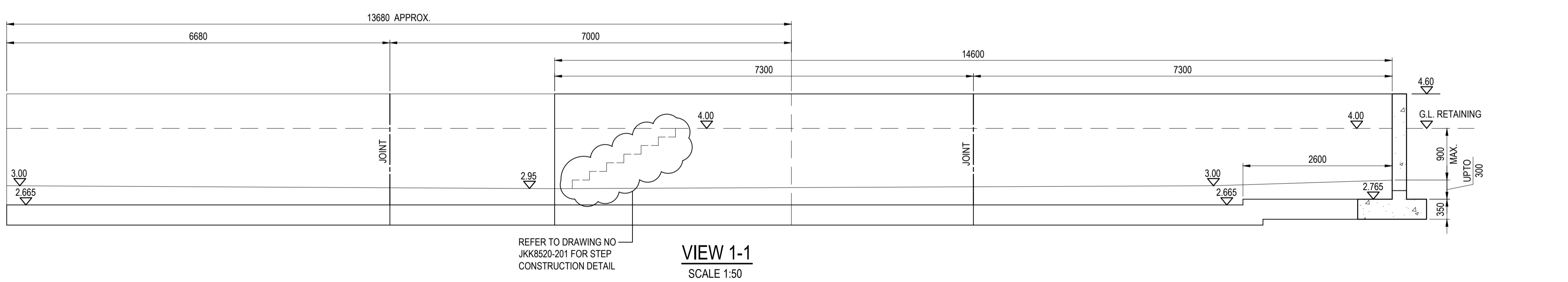


BASEPLATE DETAIL
SCALE 1:10

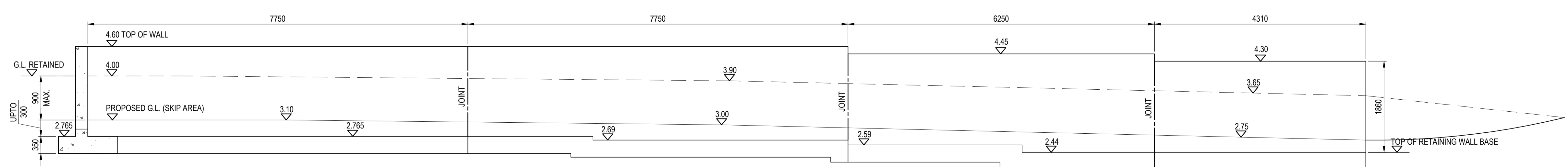


ELEVATION AT JOINT IN BASE (MJ)
SCALE 1:20

PLAN VIEW JOINT IN WALL STEM (MJ)
SCALE 1:20



VIEW 1-1
SCALE 1:50



VIEW 2-2
SCALE 1:50

A	CONSTRUCTION ISSUE.	RS	MF	23.02.15
P1	FIRST ISSUE	RS	MF	22.12.14
Rev	Description	By	Ckd	Date



Noble House
Capital Drive, Linford Wood, Milton Keynes MK14 6QP
T: +44 (0)1908 669898 E: rpsmk@rpsgroup.com F: +44 (0)1908 669899

Client **COUNCIL OF THE ISLES OF SCILLY**

Project **PORTHEMELLON WASTE MANAGEMENT FACILITY, ST. MARY'S, ISLES OF SCILLY**

Title **PHASE-1 RETAINING WALL PLAN & SECTION DETAILS**

Status	Scale	Date Created
CONSTRUCTION	1:50 @A1	17 DEC 2014
Project Leader	Drawn By	Checked by
MF	RS	MF

Drawing Number	Rev
JKK8520 _200	A

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REINFORCED CONCRETE:
 CONCRETE COMPRESSIVE STRENGTH CLASS TO BE MINIMUM C32/40.
 MAXIMUM WATER CEMENT RATIO = 0.40.
 MINIMUM CEMENT CONTENT 380 kg/m³.

BLINDING CONCRETE:
 BLINDING CONCRETE TO BE MIN. FND 2.
 COVER TO BE 50mm ALL STEEL TO SHUTTERED /BLINDING FACE.
 MINIMUM 75mm COVER TO EARTH FACE.

LAP LENGTHS TO BE AS FOLLOWS, UNLESS NOTED OTHERWISE:

- H10 Bars = 450mm (minimum)
- H12 Bars = 550mm (minimum)
- H16 Bars = 700mm (minimum)
- H20 Bars = 850mm (minimum)
- H25 Bars = 1100mm (minimum)

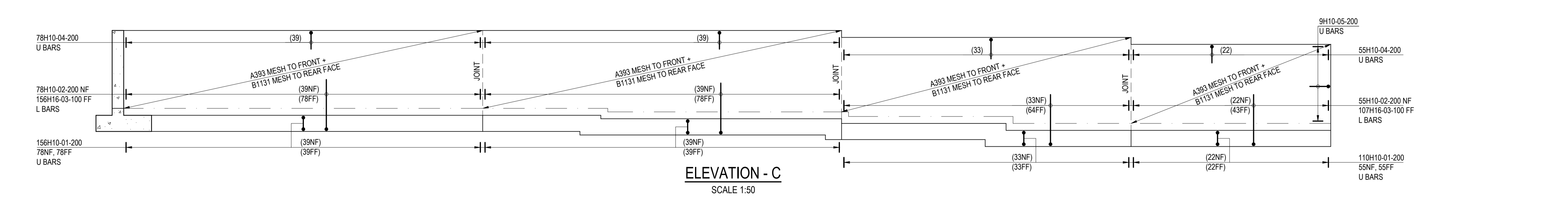
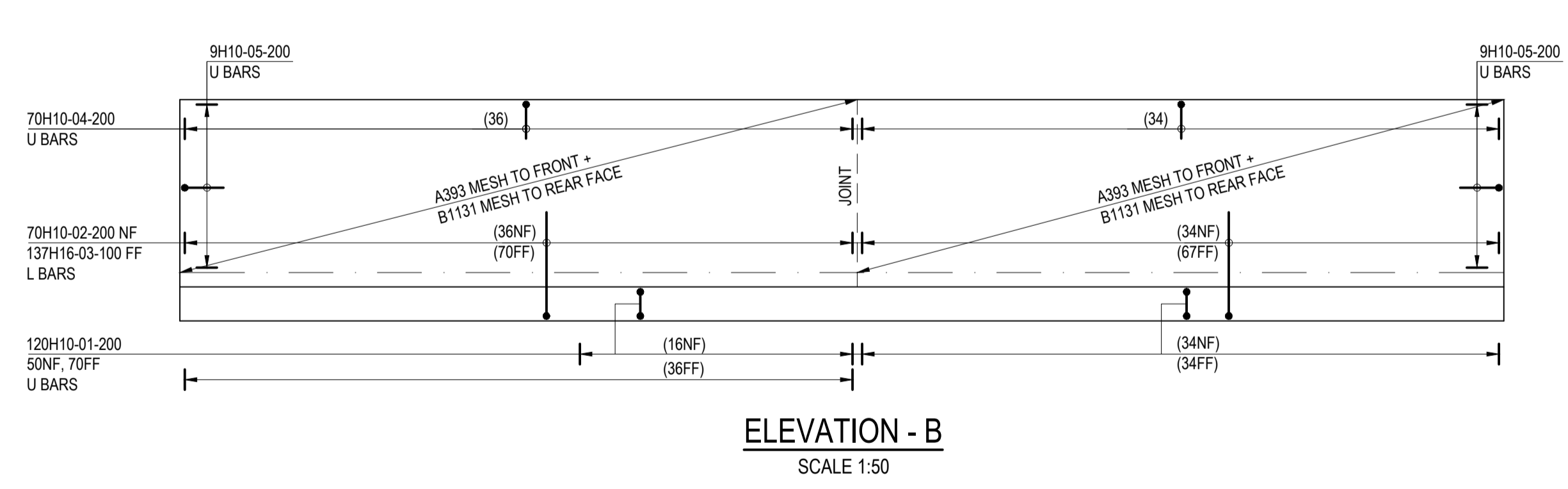
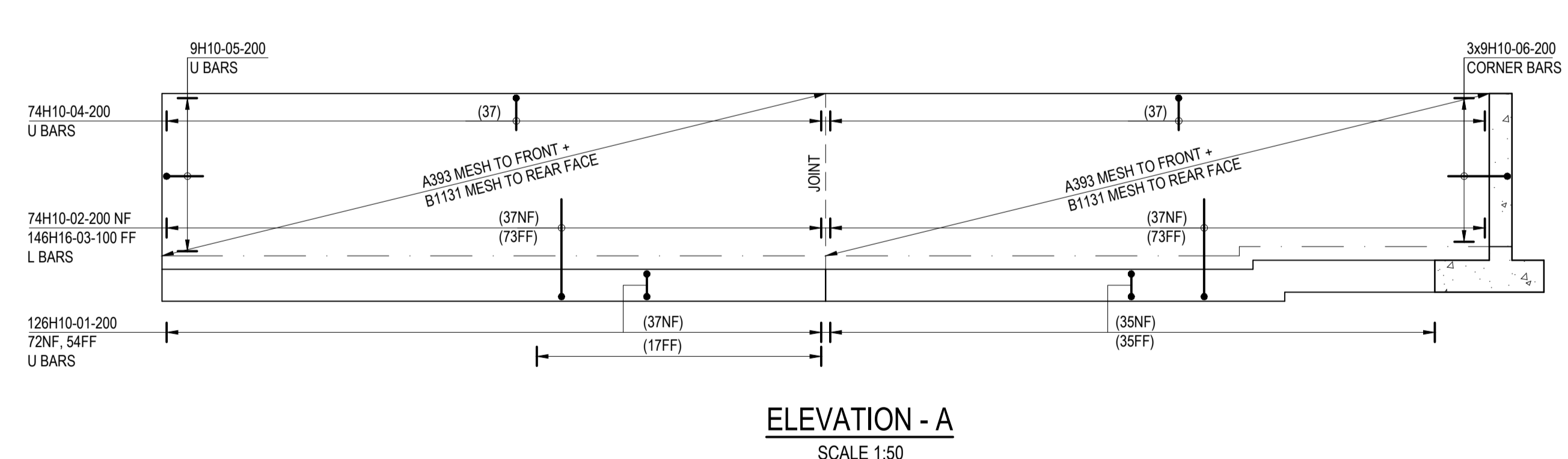
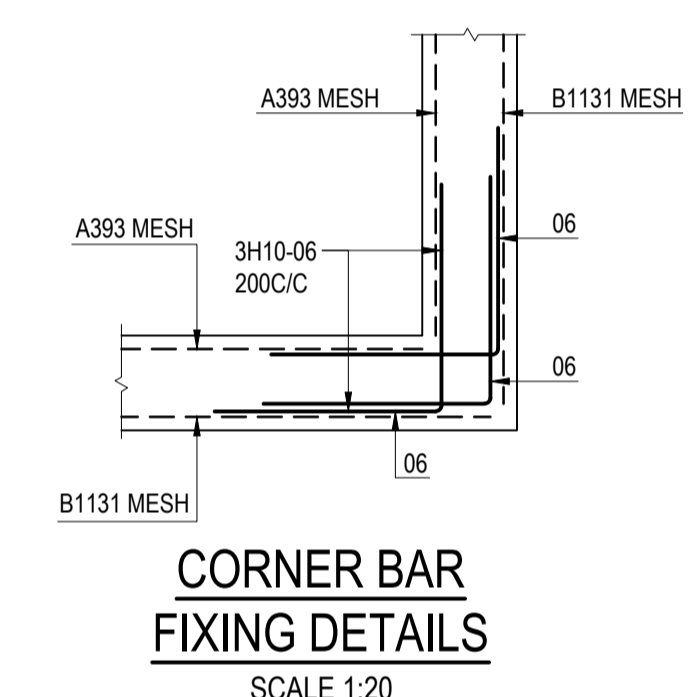
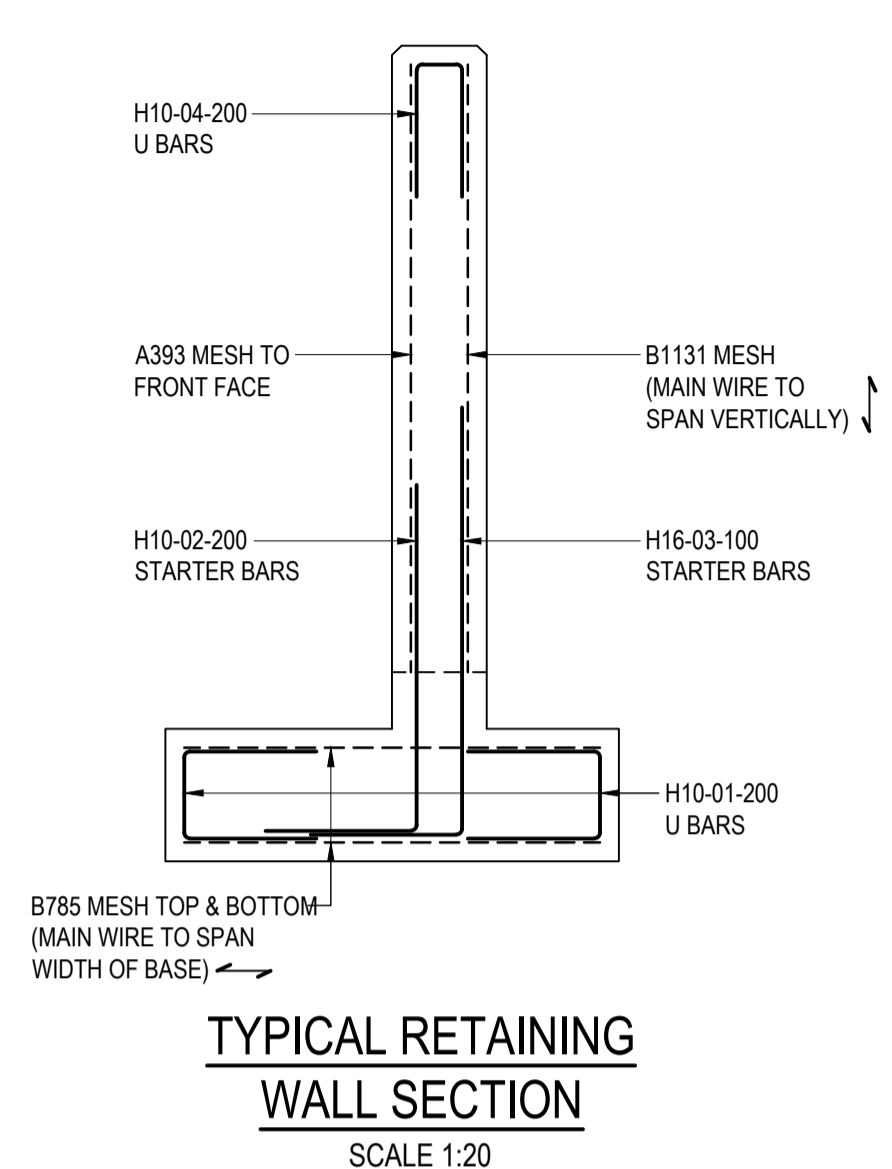
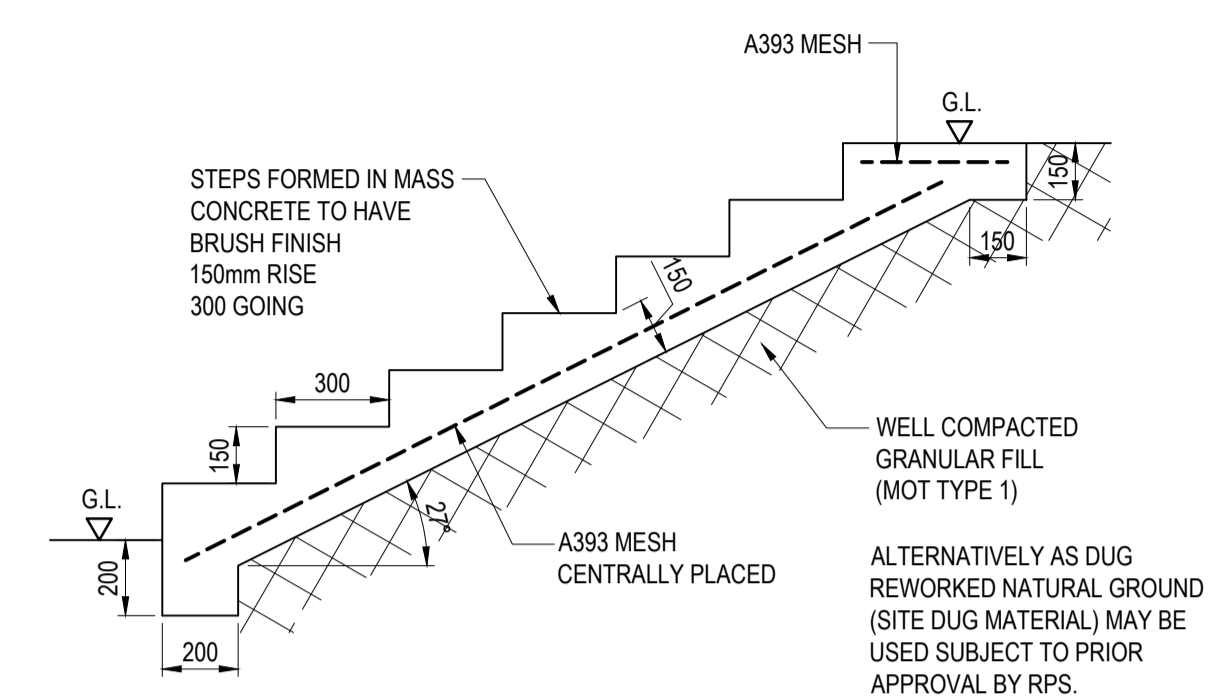
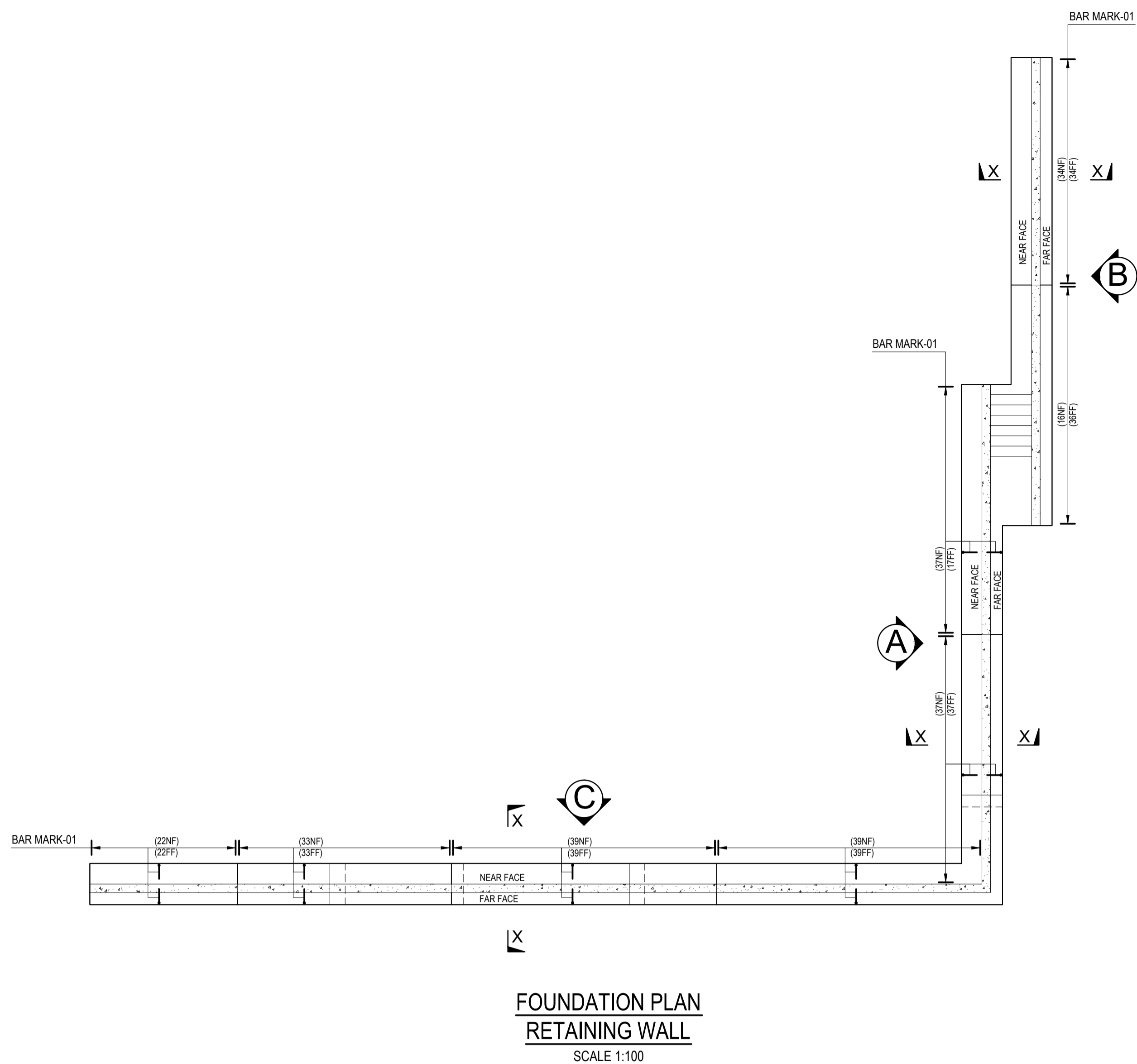
ALL LAP LENGTHS TO BE BASED ON THE SIZE OF THE SMALLER BAR.
 LAP TO MESH TO BE MIN. 450mm.

REINFORCEMENT ON THIS DRAWING SCHEDULED ON BENDING SCHEDULES JKK8520 - 201_01-02 (INC.)

STEELWORK NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ENGINEERS AND ARCHITECTS DRAWINGS.
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6. ALL BOLTS TO BE GRADE 8.8 AS NOTED TO BS 4190 MINIMUM M16 U.N.O. ALL NUTS TO HAVE FLAT WASHER, OR TAPERED WHERE NECESSARY, PLUS SINGLE COIL SPRING WASHER OR LOCK NUT.
7. ALL EXTERNAL STEELWORK IS TO BE GALVANIZED TO BS EN ISO 1461:2009 U.N.O. VENT HOLES TO BE SEALED POST GALVANISING U.N.O.
10. ALL WELDS TO BE CONTINUOUS 6mm FILLET WELDS UNLESS INDICATED OTHERWISE. ALL BUTT WELDS (INDICATED FSWB ON DRAWING) TO BE FULL PENETRATION, FULL STRENGTH WELDS
11. ALL STEEL TO STEEL CONNECTIONS ARE TO BE DESIGNED & DETAILED BY THE STEELWORK CONTRACTOR.

THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING JKK8520-200.



A	CONSTRUCTION ISSUE.	RS	MF	23.02.15
P1	FIRST ISSUE	RS	MF	22.12.14
Rev	Description	By	Ckd	Date

RPS

Noble House
 Capital Drive, Linford Wood, Milton Keynes MK14 6QP
 T:+44 (0)1908 669898 E: rpsmk@rpsgroup.com F:+44 (0)1908 669899

Client COUNCIL OF THE ISLES OF SCILLY

Project PORTHMELLON WASTE MANAGEMENT FACILITY, ST. MARY'S, ISLES OF SCILLY
 Title PHASE-1 RETAINING WALL REINFORCEMENT DETAILS

Status CONSTRUCTION Scale 1:50 @A1 Date Created 17 DEC 2014
 Project Leader MF Drawn By RS Checked by MF

Drawing Number JKK8520 _201 Rev A

RPS

Noble House, Capital Drive,
Linford Wood, Milton Keynes
MK14 6QP
T +44 (0)1908 669898
F +44 (0)1908 669899

RE -BAR SCHEDULE

Job Title

**PORTMELLOM WASTE
MANAGEMENT FACILITY
ST. MARY'S, ISLE OF SCILLY**

Sch No: **1**

Rev: **A**

Job No

JKK8520

Drg No

201

Status: **C**

Location

**RETAINING WALL
REBAR SCHEDULE**

Issue

Date: **22.12.14**

Sch By	RS	Chkd	MF										
Member	Bar Mark	Type & Size	No of Mbrs	No in Each	Total No	Length of each bar †	Shape Code	A ^x mm	B ^x mm	C ^x mm	D ^x mm	E/R ^x mm	Rev
WALL-A	01	H 10	1	126	126	1025	21	400	250	400			
	02	H 10	1	74	74	1400	11	450	(950)				
	03	H 16	1	146	146	1775	11	650	(1150)				
	04	H 10	1	74	74	925	21	400	150	400			
	05	H 10	1	9	9	900	21	400	130	400			
	06	H 10	1	27	27	1200	11	600	(600)				
MESH IN BASE	Total area of B785 Mesh = 46m ² (20% Allowance made for Laps)												
MESH IN WALL	Total area of A393 Mesh = 35m ² (20% Allowance made for Laps)												
	Total area of B1131 Mesh = 35m ² (20% Allowance made for Laps)												
WALL-B	01	H 10	1	120	120	1025	21	400	250	400			
	02	H 10	1	70	70	1400	11	450	(950)				
	03	H 16	1	137	137	1775	11	650	(1150)				
	04	H 10	1	70	70	925	21	400	150	400			
	05	H 10	1	18	18	900	21	400	130	400			
MESH IN BASE	Total area of B785 Mesh = 40m ² (20% Allowance made for Laps)												
MESH IN WALL	Total area of A393 Mesh = 35m ² (20% Allowance made for Laps)												
	Total area of B1131 Mesh = 35m ² (20% Allowance made for Laps)												

This schedule complies with BS 8666:2005. Reinforcement in accordance with BS4449 scheduled as class H shall be ductility class A,B or C for bars up to and including 12mm diameter and ductility class B or C for larger bars

X specified in multiples of 5mm † specified in multiples of 25 mm

Status P preliminary T tender C construction



Noble House, Capital Drive,
Linford Wood, Milton Keynes
MK14 6QP
T +44 (0)1908 669898
F +44 (0)1908 669899

RE -BAR SCHEDULE

Job Title PORTMELLOM WASTE MANAGEMENT FACILITY ST. MARY'S, ISLE OF SCILLY				Sch No: 2
Job No JKK8520				Rev: A
Drg No 201		Status: C		Issue Date: 22.12.14
Location RETAINING WALL REBAR SCHEDULE				

Sch By	RS	Chkd	MF	Member	Bar Mark	Type & Size	No of Mbrs	No in Each	Total No	Length of each bar †	Shape Code	A ^x mm	B ^x mm	C ^x mm	D ^x mm	E/R ^x mm	Rev
				WALL-C	01	H 10	1	266	266	1025	21	400	250	400			
					02	H 10	1	133	133	1400	11	450	(950)				
					03	H 16	1	263	263	1775	11	650	(1150)				
					04	H 10	1	133	133	925	21	400	150	400			
					05	H 10	1	9	9	900	21	400	130	400			
				MESH IN BASE	Total area of B785 Mesh = 80m ² (20% Allowance made for Laps)												
				MESH IN WALL	Total area of A393 Mesh = 55m ² (20% Allowance made for Laps)												
					Total area of B1131 Mesh = 60m ² (20% Allowance made for Laps)												
				STAIRS	Total area of A393 Mesh = 4m ² (20% Allowance made for Laps)												
				DOWEL BARS		H 16	1	50	50	600	00						

This schedule complies with BS 8666:2005. Reinforcement in accordance with BS4449 scheduled as class H shall be ductility class A,B or C for bars up to and including 12mm diameter and ductility class B or C for larger bars

X specified in multiples of 5mm † specified in multiples of 25 mm

Status P preliminary T tender C construction

Appendices

Appendices

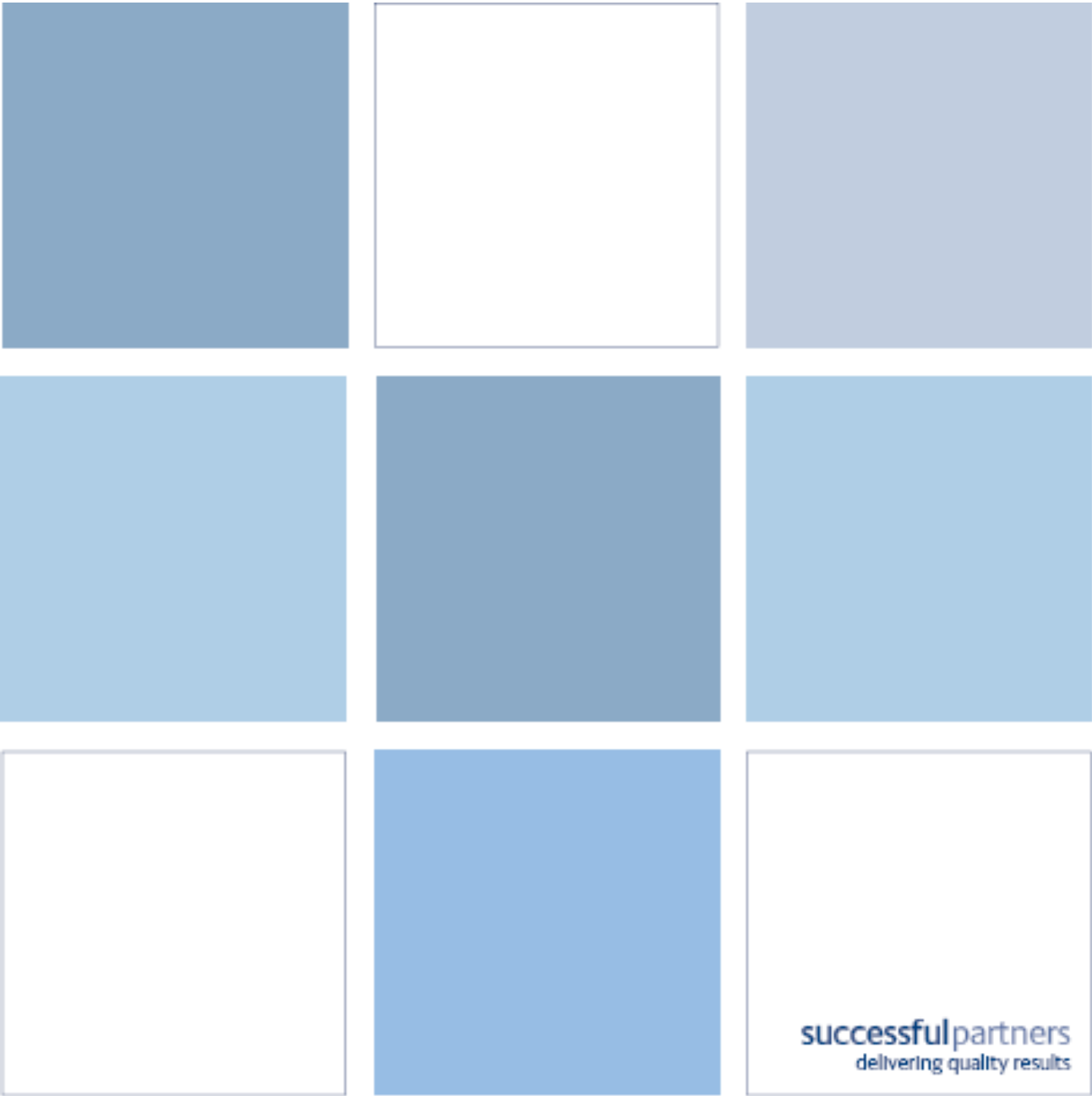
Appendix 1 - Electrical Design Brief



Electrical Design Brief

for

Porthmellon Waste Management Facility



ELECTRICAL SERVICES

DESIGN BRIEF

AT

Porthmellon Waste Management Facility,
Isles of Scilly.

RPS PROJECT No: BRM 07665

REVISION - 17-DECEMBER-2014

REVISION A 16-JANURARY-2015

REVISION B 24-FEBURARY-2015

Author

John Sheaf

Qualifications

I.Eng MIET ACIBSE

Signature



Checked/Authorised

Danielle Sims

Qualifications

BEng(Hons) CEng MCIBSE

Signature



Contents

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2. Building Services Design Brief	2
3. General Specification Clauses	7
4. Proposed Manufacturers	37



1. Preface

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5. Clients permitted assignees established by written assignment; and
6. Professional advisors of permitted assignees

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2. Building Services Design Brief

Proposed External Lighting Scheme

Generally

The lighting proposals have been developed to design guidance contained within CIBSE Lighting Guide 6 "The Outdoor environment" and particularly with respect to outdoor work and storage areas, BS EN 12464-2 "Lighting of work places - Part 2: Outdoor work places" and BS EN 13201-2 "Road Lighting – Part 2: Performance requirements".

This defines preferred levels of maintained horizontal illuminance as follows:-

<u>Area or Task</u>	<u>Illumination</u>
Short term handling of large units	20 Lux
Traffic areas of slowly moving vehicles	10 Lux
Walkways exclusively for pedestrians	5 Lux
Access Road (Class S4)	5 Lux

The proposed lighting scheme has been designed to provide a site average lighting level within the HGV movement area of 20 lux and an average lighting level within the public offloading area of 10 lux.

The proposed lighting systems employ's street lantern technology providing no upward light output.

All lighting will be operated via ambient daylight level photocell controls, together with operational times to ensure that lights are extinguished at site closing time.

Drp BRM07665/XX-E6301

- Our lighting calculation method does not include a prediction for Sky Glow level and therefore direct illuminations to the sky is only assessed as being controlled by selection of lanterns having zero upwards light output ratio.
- The lighting system therefore provides a well illuminated space which unfortunately when viewed from the boundary, will be of a greater apparent brightness than that produced by the surrounding area lighting.
- The light reflected to the sky will of course relate to the final reflectance factors of the primary concrete surface of the ground slab.
- As previously confirmed all lighting will be extinguished in accordance with the planning approval.
- Minor security lighting will be provided to the operational office/cabin/workshops and will comprise energy efficient low wattage fluorescent luminaires.



External Lighting Scheme

Correlation for Design Proposals with The Institute of Lighting Engineers "Guidance Notes for the reduction of light pollution"

Various methods are suggested for reduction of unnecessary light

A1 *Do not "over light"*

The average lighting levels incorporated within the design proposals are in line with those recommended with CIBSE Lighting Guide 6 "The Outdoor Environment"

A2 *Switch off lights when not required*

As previously confirmed.

All lighting will be operated via ambient daylight level photocell controls, together with operational times to ensure that lights are extinguished at site closing time.

A3 *Use lighting equipment that minimises the upward spread of light*

Lanterns as selected have a photometric performance characteristic for upward light output ration equal to zero.

A4 *Keep glare to a minimum by ensuring that the main beam angle of all lights is directed towards any potential observer is kept below 70deg*

The proposed lighting systems employ current generation street lanterns with controlled photometric performance throughout. The column heights are 6.0 metres at the perimeter.

The aim being to produce a properly lit lighting scene providing reasonable uniformity levels Between horizontal and vertical illumination levels with the aim to reduce as far as possible conflict between vehicle and pedestrian movement within a potentially congested area.

A5 *For road lighting installations, light near to and above the horizontal should be minimised to reduce glare and visual intrusion*

As stated previously the luminaires specified employ shallow flat glass optics with limit the upward light ratio to zero.

Environmental Zones

We believe it is acceptable to view the site as falling within the **Zone E2** category with limited population (housing) site locally.

The lighting design aims to direct all lantern output into the site to minimise spillage onto adjacent properties including the access road.

The lighting system therefore aims to provide a well illuminated space to facilitate a safe operating environment for HGV and public vehicle and pedestrian movement.

Scope of works

The proposed upgrading of the existing recycling facility will provide a modern split level arrangement giving freedom of access to all user groups.

Phase 1

The lower area will be for HGV vehicles to load segregated waste streams that have been collected in the skip area and prepare them for transportation to the Recycling Building or off-site facilities for re-use.

The raised area will be for public vehicle access, parking, unloading and emptying of bulk waste into skips.

Phase 2

The transfer station will be an operational yard where HGV vehicles offload waste into a stockpile area and for heavy machinery to offload/collect waste to/from the Recycling Building.

The site of the proposed development lies within a rural zone and lighting has been designed to achieve Rural Lighting Category E2. LED luminaire that produce no UV are bat friendly and are specified for the site external lighting.

Columns

The design has focused on minimising the height of the columns the light spillage from the facility. The majority of the lighting columns are 6m high.

Floodlights

All floodlights located in the site are set at 0° above horizontal to reduce back spill light from the luminaire on to adjacent housing area. Floodlights are between 5 to 9m high. All luminaire in the transfer station are floodlights in order to reduce the number of luminaires required and some are wall mounted to reduce columns required.

This combination of lighting column heights and luminaries will provide a safe zone for members of the public and operational staff where there will be vehicle parking and unloading. These column heights will provide an optimum more uniform light delivery to ensure the safety within the operational area. With lantern and floodlight optics that will provide excellent optical and directional lighting to reduce light overspill.

The Electrical Contractor shall provide the external lighting installation as shown on Drawing No BRM07665/XX-E/6301 which shall confirm to the following:

- The installation shall be carried out utilising XLPE/SWA/PVC cables laid in ducts and trenches as shown on the relevant drawings. No allowance shall be made for in Contractors tender for trenching, ducting or concreting but he shall allow for attendance with regard to the actual erection of the columns.

RPS

- The actual trenching etc. will be carried out by the main contractor. Prior to complete backfilling the contractor shall lay Heptape warning tape at a depth of 300mm above the cable.
- The external lighting shall be switched by contactor(s) installed in the main switchroom. The coil of the contactor being switched by Quartz controlled time switch labelled "EXTERNAL LIGHTING" and photocell.



Proposed Internal Lighting Scheme

Generally

The lighting proposals have been developed to design guidance contained within SLL Code for Lighting 2012 and applicable CIBSE Guides.

This defines preferred levels of maintained horizontal illuminance as follows:-

<u>Area or Task</u>	<u>Illumination</u>
Recycling Building, Working area	300 Lux at floor level
Workshop/Store	300 Lux at floor level

The general lighting within the buildings will be provided by surface/suspended mounted linear fluorescent corrosion resistant luminaires and will be controlled by local wall mounted switches.

Wiring to these luminaires shall emanate from the respective distribution board in each building in LSF single core cable enclosed in trunking/lighting trunking to which the luminaires are fitted to. Due to the nature of the work undertaken in the buildings it is not proposed to provide any automatic lighting controls.

Emergency luminaires shall consist, of the normal luminaires converted by the use of 3-hour non-maintained inverter/battery units. The inverter/battery units shall be fitted within the luminaire construction.

All this is as indicated on **Drg BRM07665/XX-E6301**.

Self-contained 3-hour maintained illuminated exit signs will be provided for escape routes to all areas.

External luminaires immediately adjacent to the final exits from the building shall also be provided with emergency conversions.

Emergency lighting test key switches shall be provided adjacent to the normal lighting switch or adjacent to the respective distribution board in each area to enable testing of the emergency lighting. Key switches shall be incorporated within the same switch plate as the normal lighting switch wherever possible.

Cables shall be sized according to the latest IET wiring regulation.

The electrical contractor shall however check all cable sizes once all the general power requirements are known and the sub-mains feeding the various distribution boards have had the sizes fixed.

3. General Specification Clauses

CROSS-LINKED POLYETHYLENE INSULATED CABLE INSTALLATIONS

General

Armoured cross-linked polyethylene (XLPE) insulated cables shall be manufactured in accordance with BS 5467.

Un-armoured cross-linked polyethylene insulated cables shall be manufactured in accordance with I.E.C.502.

Conductors shall be high conductivity annealed copper or high purity aluminium, as specified, and shall be in accordance with BS 6360.

Copper conductors shall be stranded circular and compacted for single core cables, and shaped stranded for multi-core cables of 50mm² and above. Aluminium conductors shall be stranded circular and compacted for single core cables, and shaped solid for multi-core cables.

The neutral conductor shall be of the same cross-section as the phase conductor unless otherwise specified.

All cables shall be XLPE insulated, PVC bedded, galvanised steel wire armoured, PVC sheath overall and 600/1000 volt grade.

If armoured single core cable is specified, the armour shall be non-magnetic (i.e., aluminium wire or strip).

The outer sheath of 6,350/11,000 volt grade cable shall be coloured "red".

Where cable installed under this specification is to be fire resistant in either a power supply or control application i.e. related to firefighting or life safety systems, then compliance with BS 8519 is regarded as mandatory. The category of cable (1, 2 or 3 – 30, 60 or 120 mins) shall be related to the specific application as set out in the standard.

All cables installed under this specification shall be BASEC Approved. All cable supplied should be traceable back to its origin of manufacture. Therefore, cable drum serial numbers, etc should be logged on site to facilitate an audit trail, and such information should also be included in the O&M documentation.



Core Identification

Each conductor core insulation shall be identified by numbers, or by colours, at the option of the manufacturers, in accordance with the following sequence:

Number of Cores	Colours
Two	Phase - Brown
	Neutral - Blue
Three	Phase - Brown
	Phase - Black
	Phase - Grey
Four	Phase - Brown
	Phase - Black
	Phase - Grey
	Neutral - Blue

Routing

Cables shall be run between termination points in continuous lengths. Joints will not be allowed unless specified or approved.

All low voltage cables laid direct in the ground shall be laid at a depth of 600mm and blinded with a radial thickness of at least 100mm of sand. All high voltage cables shall be laid in a similar manner but at a depth of 900mm. The presence of underground cables shall be indicated by marker tapes laid directly above the cables after the trench has been backfilled, the tapes being approximately 300mm below the surface level. The tapes shall

be manufactured from high grade polythene 150mm wide by 0.1mm gauge, coloured yellow with the words "electric cable below" along its length.

Cables which follow the same route and are laid in the ground shall be in horizontal formation with spacing between cables where possible of not less than 150mm with the exception of single-core cables which shall be run in trefoil formation and touching along their entire length. Each group of cables shall be indicated by separate marker tapes.

Adequate cable markers of approved design shall be used to indicate the route of buried cables at intervals of not more than 75 metres and at points where change of direction occurs. Where markers are of a free-standing post type, they shall be not less than 150mm wide x 800mm high x 75mm thick, be indelibly marked 'Electrical Cable' and 300mm shall be exposed above ground.

The cables shall be marked at each end and at access points by a label indicating the cable size and circuit.

Cables under roads and rail crossings shall be run in conduits of either vitrified clay having a plastic sleeve to BS EN ISO 2556, BS EN ISO 9397, BS EN ISO 11443, BS ISO 18553, BS EN 763 and BS EN 578 to form a push fit joint, pitch fibre or proprietary corrugated plastic. The conduits shall have a minimum diameter of 100mm, have bends to suit the cables and extend 1m on either side of the road or rail crossing. Where corrugated plastic conduits are used, conduits shall be installed in straight sections between draw-in points and the length between draw-in points shall be limited to suit the expected sizes of cable to be drawn in.

Cables under floors or through walls shall be run in conduits of either vitrified clay having a plastic sleeve to BS EN ISO 2556, BS EN ISO 9397, BS EN ISO 11443, BS ISO 18553, BS EN 763 and BS EN 578 to form a push fit joint, pitch fibre or proprietary corrugated plastic. The conduits shall have a minimum diameter of 100mm and the bends to suit the cables. Where corrugated plastic conduits are used, conduits shall be installed in straight sections between draw-in points and the length between draw-in points shall be limited to suit the expected sizes of cable to be drawn in.

Cable conduits and ducts that terminate in buildings shall be sealed with a permanently plastic weatherproof sealing compound in conjunction with hardwood bushes to prevent the ingress of water, foreign matter and vermin. Any spare conduits and ducts shall be similarly sealed.

Cables shall be installed only when both the cable and ambient temperature are at or above a temperature of 5°C and have been so kept for the previous 24 hours, or when special precautions have been taken to maintain the cable at or above this temperature to avoid risk of damage during handling.

Unless otherwise specified, cables run in air, including engineering service ducts, shall be fixed with aluminium alloy or approved non-inflammable claw cleats with galvanised back-straps using galvanised bolts conforming to BS 4190 with maximum spacing between supports as detailed in Section 522.8 of BS 7671+A1. Cleats for cables up to and including 50mm dia. shall be fixed by a single bolt and above 50mm dia. by 2 bolts. The correct size of cleat fixing stud shall be provided to suit the cable size to ensure that the stud does not extend appreciably beyond the tightened nut. Excess pressure of cleats on P.V.C. - insulated cables shall be avoided to prevent deformation of the plastic sheathing to BS EN ISO 2556, BS EN ISO 9397, BS EN ISO 11443, BS ISO 18553, BS EN 763 and BS EN 578. Suitable

supporting steelwork and/or galvanised cable tray shall be provided where cables cross open spaces. Such steelwork shall be protected by a rust inhibiting paint.

In addition to the above, all cables shall be installed in accordance with manufacturer's instructions/requirements.

Installation Bending Radius

Cables shall not be bent during installation to a radius smaller than 8 times the overall diameter of the cable.

Jointing and Terminating

General

The jointing and terminating of all cables shall be performed by an experienced cable joiner trained and fully conversant with modern techniques and once the cable is cut for the purpose of making a joint or termination the work involved shall be completed without interruption; if for any reason the work cannot be completed then the cable ends shall be sealed immediately with P.V.C. tape.

All cable joints and terminations shall be supplied except the termination to the Supply Authority's service cable box. All switchgear supplied by others will be complete with cable boxes but not terminating materials.

All joints shall be made in cast iron or moulded plastic boxes to BS EN ISO 2556, BS EN ISO 9397, BS EN ISO 11443, BS ISO 18553, BS EN 763 and BS EN 578, purpose made for XLPE/PVC/SWA/PVC sheathed cables. All joints shall be selected from the cable manufacturer's selection chart suitable for the size of cable and type of joint required. The complete jointing technique shall be carried out strictly in accordance with the manufacturer's recommendations, and particular attention should be paid to the installation of earth bonding clamps in joints and terminations, to ensure that each armour wire or strip contributes equally to the conductance of the bonding connection, and that the resistance across a connector is not higher than that of the equivalent length of connected armour of the cable.

Where cables are terminated outside buildings or in damp situations compound filled boxes shall be used.

Particular attention shall be paid to ensure earth continuity of the cable armouring, cast iron boxes being provided with armour clamps and moulded plastic boxes to BS EN ISO 2556, BS EN ISO 9397, BS EN ISO 11443, BS ISO 18553, BS EN 763 and BS EN 578 with armour clamps and a copper strip. After completion of the joints, cast iron boxes shall be painted with two coats of bitumastic paint.

Cable jointing using cold-pour resin compound and heat-shrink cable joints shall be carried out in accordance with BS 6910: Parts 1 and 2, for the voltage range up to 1000V ac and 1500V dc.



a) **XLPE Insulated, Armoured, PVC Sheathed Cable with Copper Conductors**

Joints shall be of the indented compression type made by means of a hydraulic compression ramhead and suitable compression dies according to the core size of the cable, with strict adherence to the cable manufacturer's recommendations on accessories, ferrules, compression pressures and jointing techniques.

Terminations shall be made using the indented compression method with sockets of soft tinned copper, shaped to match the profile of the conductor core. Suitable approved aluminium cable glands with earth tag washers shall be used and the glands protected with PVC shrouds. Clamps around the armour for earth bonding will not be accepted.

All metal to metal contacts at termination points, gland to armour contacts and dissimilar metal contacts shall be smeared with an approved grease.

b) **Cable Glands**

All cable glands for terminations shall be manufactured in brass or aluminium as applicable, and shall be in accordance with BS EN 50262. All glands shall be provided with locknuts, earth tags and PVC shrouds.

c) **Through Joints**

Through joints shall not be allowed in any cables without prior written approval from the Services Engineers.

Cabling Glanding

Cables shall be terminated/glanded into equipment and distribution boards as follows:

- i) All conductors (including neutral) via a single aperture, bush or gland.
- ii) Should single core cables be routed through an aperture of a cable ladder, then care shall be taken to ensure each cable conductor, including the neutral of a circuit, be routed via the same aperture.

The above is to avoid the effects of circulating eddy currents. Any queries shall be raised with the Engineer prior to setting to any works.



LOW SMOKE AND FUME (LSF) CABLES

General

Low smoke and fume (LSF) cables shall be manufactured from materials which have been tested in accordance with: BS 6724 and BS 7629.

Where cable installed under this specification is to be fire resistant in either a power supply or control application, i.e. related to firefighting or life safety systems, then compliance with BS 8519 is regarded as mandatory. The category of cable (1, 2 or 3 – 30, 60 or 120 mins) shall be related to the specific application as set out in the standard.

All cables installed under this specification shall be BASEC Approved. All cable supplied should be traceable back to its origin of manufacture. Therefore, cable drum serial numbers, etc should be logged on site to facilitate an audit trail, and such information should also be included in the O&M documentation.

Routing

Cables shall be run between termination points in continuous lengths. Joints will not be allowed unless specified or approved.

All low voltage cables laid direct in the ground shall be laid at a depth of 600mm and blinded with a radial thickness of at least 100mm of sand. The presence of underground cables shall be indicated by marker tapes laid directly above the cables after the trench has been backfilled, the tapes being approximately 300mm below the surface level.

The tapes shall be manufactured from high grade polythene 150mm wide by 0.1mm gauge, coloured yellow with the words "electric cable below" along its length. Concrete interlocking cable tiles shall be installed to cover all mains and sub-mains distribution cables laid in the ground.

Cables which follow the same route and are laid in the ground shall be in horizontal formation with spacing between cables where possible of not less than 150mm with the exception of single-core cables which shall be run in Trefoil formation, with each trefoil group separated by a minimum distance of 300mm. Neutral cables shall be laid between Trefoil groups. Each group of cables shall be indicated by separate marker tapes.

The cables shall be marked at each end and at access points by a label indicating the cable size and circuit.

Cables under roads shall be run in conduits of either vitrified clay having a plastic sleeve to BS EN 50086-2-4 to form a push fit joint, pitch fibre or proprietary corrugated plastic. The conduits shall have a minimum diameter of 100mm, have bends to suit the cables and extend 1m on either side of the road.

Where corrugated plastic conduits are used, conduits shall be installed in straight sections between draw-in points and the length between draw-in points shall be limited to suit the expected sizes of cable to be drawn in.

Cables under floors or through walls shall be run in conduits of either vitrified clay having a plastic sleeve to BS EN 50086-2-4 to form a push fit joint, pitch fibre or proprietary corrugated plastic.

The conduits shall have a minimum diameter of 100mm and the bends to suit the cables. Where corrugated plastic conduits are used, conduits shall be installed in straight sections between draw-in points and the length between draw-in points shall be limited to suit the expected sizes of cable to be drawn in.

Cable conduits and ducts that terminate in buildings shall be sealed with a permanently plastic weatherproof sealing compound in conjunction with hardwood bushes to prevent the ingress of water, foreign matter and vermin. Any spare conduits and ducts shall be similarly sealed.

Cables shall be installed only when both the cable and ambient temperature are at or above a temperature of 5°C and have been so kept for the previous 24 hours, or when special precautions have been taken to maintain the cable at or above this temperature to avoid risk of damage during handling.

Unless otherwise specified, cables run in air, including engineering service ducts, shall be fixed with aluminium alloy or approved non-inflammable claw cleats with galvanised back-straps using galvanised bolts conforming to BS 4190 with spacing between supports to comply with BS 7671:2008+A1:2011 and the manufacturer's recommendations. Cleats for cables up to and including 50mm dia. shall be fixed by a single bolt and above 50mm dia. by 2 bolts.

The correct size of cleat fixing stud shall be provided to suit the cable size to ensure that the stud does not extend appreciably beyond the tightened nut. Excess pressure of cleats on P.V.C. - insulated cables shall be avoided to prevent deformation of the plastic sheathing. Suitable supporting steelwork and/or galvanised cable tray shall be provided where cables cross open spaces. Such steelwork shall be protected by a rust inhibiting paint.

In addition to the above, all cables shall be installed in accordance with manufacturer's instructions/requirements.

Installation Bending Radius

Cables shall not be bent during installation to a radius smaller than eight times the overall diameter of the cable.

Jointing and Terminating

a. General

The jointing and terminating of all cables shall be performed by an experienced cable joiner trained and fully conversant with modern techniques and once the cable is cut for the purpose of making a joint or termination the work involved shall be completed without

interruption; if for any reason the work cannot be completed then the cable ends shall be sealed immediately with P.V.C. tape.

All cable joints and terminations shall be supplied except the termination to the Supply Authority's service cable box. All switchgear supplied by others will be complete with cable boxes but not terminating materials.

All joints shall be made in cast iron or moulded plastic boxes, purpose made for XLPE/LSF/SWA/LSF sheathed cables. All joints shall be selected from the cable manufacturer's selection chart suitable for the size of cable and type of joint required.

The complete jointing technique shall be carried out strictly in accordance with the manufacturer's recommendations, and particular attention should be paid to the installation of all bonding clamps in joints and terminations, to ensure that each armour wire or strip contributes equally to the conductance of the bonding connection, and that the resistance across a connector is not higher than that of the equivalent length of connected armour of the cable.

Where cables are terminated outside buildings or in damp situations compound filled boxes shall be used.

Particular attention shall be paid to ensure earth continuity of the cable armouring, cast iron boxes being provided with armour clamps and moulded plastic boxes with armour clamps and a copper strip. After completion of the joints, cast iron boxes shall be painted with two coats of bitumastic paint.

Cable jointing using cold-pour resin compound and heat-shrink cable joints shall be carried out in accordance with BS 6910: Parts 1 and 2, for the voltage range up to 1000V ac and 1500V dc.

b. XLPE Insulated, Armoured, LSF Sheathed Cable with Copper Conductors

Joints shall be of the indented compression type made by means of a hydraulic compression ramhead and suitable compression dies according to the core size of the cable, with strict adherence to the cable manufacturer's recommendations on accessories, ferrules, compression pressures and jointing techniques.

Terminations shall be made using the indented compression method with sockets of soft tinned copper shaped to match the profile of the conductor core.

Suitable approved brass cable glands with earth tag washers shall be used and the glands protected with PVC shrouds. Clamps around the armour for earth bonding will not be accepted.

All metal to metal contacts at termination points, gland to armour contacts and dissimilar metal contacts shall be smeared with an approved grease.

c. Cable Glands

All cable glands for terminations shall be manufactured in brass and shall be in accordance with BS EN 50262. All glands shall be provided with locknuts, earth tags and PVC shrouds.



Single Core Cables

Single core cables shall be 450/750 volt rated and shall have copper conductor insulated with a cross linked LSF material.

The cables shall comply in full with BS EN 50525-3.

Single core, armoured cables shall have aluminium wire armour and conform to the same standards as multi-core armoured cables.

Multi-Core Cables

Multi-core cables shall be 600/1000 volt rated and shall be XLPE insulated, LSF compound bedded, galvanised steel single wire armoured or un-armoured as required, and LSF compound sheathed to comply fully with BS 6724.

Cabling Glanding

Cables shall be terminated/glanded into equipment and distribution boards as follows:

- i. All conductors (including neutral) via a single aperture, bush or gland.
- ii. Should single core cables be routed through an aperture of a cable ladder, then care shall be taken to ensure each cable conductor, including the neutral of a circuit, be routed via the same aperture.

The above is to avoid the effects of circulating eddy currents. Any queries shall be raised with the Engineer prior to setting to any works.

CABLES IN CONDUIT AND TRUNKING

General

Cables to be drawn into conduits or trunking shall be selected in relation to working temperature in accordance with the following table:-

Working temperature:	Cable:
not exceeding 65°C	450/750V grade PVC to BS 6004:2012, BS EN 50525-1:2011 HO7V-R/HO7V-U
not exceeding 80°C	85°C rubber compound insulated to BS EN 50525-1:2011
not exceeding 145°C	150°C rubber compound insulated to BS EN 50525-1:2011

The elastomer-insulated cables shall be identified throughout the length of the cable by the legends 'Heat Resisting 85' for 85°C rubber insulated and 'Heat Resisting 150' for 150°C rubber insulated either printed on a tape within the cable, or printed, indented, or embossed externally, the gap between the end of one legend and the beginning of the next not exceeding 300mm.



Only multi-strand conductor cables shall be used for installation within conduit and trunking. The number of cables drawn into any conduit or trunking shall only be such an amount so as to comply with Section 522.8 of BS 7671+A1.

Circuit cables shall not be drawn in until the conduit or trunking of that circuit is completed and the building weatherproof. Conduits shall not be dismantled for wiring operations.

During installation cables shall be combined to facilitate drawing-in and possible replacements. Cable joints shall not be used unless specified on written approval.

Cables of A.C. circuits installed in steel conduit or trunking shall always be so bunched that the cables of all phases and the neutral conductor, if any, are contained in the same conduit or trunking.

Except in lighting installations including emergency circuits, cables from separate distribution boards shall be run in separate and individual conduit and trunking wire-ways. Normal and emergency supply cables from different distribution boards feeding the same lighting points may (subject to detail design) occupy the same wire-way, providing they are separately identified and insulated to the higher voltage present.

Where cables of several circuits occupy the same trunking the cables of each circuit shall be bound together by clips or other approved means. Circuits shall be further grouped and bound to provide easy means of identification.

Cables and Installations

Cables associated with an installation shall not be installed in shared wire-ways associated with another installation. That is to say, any installation shall be arranged such that it is separate physically and electrically, particularly in respect of cable wire-ways.

TRUNKING INSTALLATIONS

Cable Trunking

All cable trunking shall be manufactured by a single Company who shall be accredited to the requirements of BS EN ISO 9002 for manufacture.

General



The trunking shall be supplied in standard lengths, each length including a coupling sleeve, and be free from all sharp edges and projections.

The lids of all trunking shall be drip proof and a tight fit securely fixed to the trunking by an approved means that will avoid damage to the cables. Self-tapping screws or fixed bridge pieces shall not be used to hold the cover in position.

Flush type covers shall be fitted when trunking is installed flush with the building fabric. The finished edge of the trunking shall finish flush with the finished surface.

Vertical trunking shall be fixed to the building structure at intervals of 1.2m or as specified in the Schedules or drawings.

Horizontal trunking shall be either suspended by hanger fittings and conduit or mild steel rod or supported by mild steel or angle iron brackets. Suspensions and supports which will be visible shall be painted to match the trunking.

No suspensions or fixings shall intrude into the internal space unless otherwise specified.

Where trunking passes through walls and partitions the cover shall terminate at either side of the wall at a point 80mm from the wall. Between the removable covers a fixed section of cover shall be installed through the wall.

Manufacturers' standard fittings shall be used. Only where these are inadequate to meet special local situations will fabricated fittings be accepted. Where special fittings or sections of trunking are fabricated, they shall be prepared and finished to the same standard as manufactured standard items.

All trunking shall be provided with internal fire barriers in accordance with Section 527-02 of BS 7671+A1. Internal fire barriers shall be made by binding the cables and filling the spaces with suitable fire resistant material.

Trunking shall be run in vertical and horizontal directions except where it is desirable to follow the line of a constructional feature, in which case approval shall be obtained.

In vertical runs cable support pins shall be fitted at intervals not exceeding 5m for P.V.C. insulated cable or in accordance with Section 522.8 of BS 7671+A1 for other types of cables.

In horizontal runs cable retaining straps or holders shall be provided at intervals of not more than 1m where the lid is on the under-side of the trunking.



Connections between trunking and any equipment or apparatus shall be by means of flanged couplings, screwed conduit coupler with smooth bore bush or fixed insulated flame resistant 'FR-2' type spacer pieces with fixed grommets. Direct attachment of trunking to equipment or apparatus without couplings or involving the need to cut the return edge of the trunking shall not be permitted.

Where trunking connects directly to distribution boards, the cable entry point(s) shall be sized to accommodate cabling from all used and spare ways.

At constructional expansion joints the trunking shall be provided with a sliding coupling complete with flexible earth continuity tape.

Where conduits are connected to multi-compartment trunking, the trunking shall be drilled to allow the conduits to pass right through to the appropriate section, should direct access to a compartment not be possible.

Steel Trunking (Not Bus Bar or Rising Mains Trunking)

Trunking and connectors shall comply with BS 4678: Part 1, Class 3 finish unless otherwise specified.

A copper earth bonding link shall be fitted between adjacent lengths of trunking and between all trunking fittings and adjacent trunking, and supplied by the trunking manufacturer, arranged on the outside of the trunking and fittings on all surface trunking (see separate clause on Floor Trunking). These links are to be relied upon for earth continuity and must be of a size to comply with Section 543 of BS 7671.

Steel thicknesses shall be at least 1.0mm for 50mm x 50mm trunking, 1.2/1.4mm for trunking above 50mm x 50mm and up to 150mm x 150mm and 1.6mm for trunking of 150mm x 150mm and above.

Where two or more services, required to be segregated in accordance with Section 528 of BS 7671:2008+A1:2011, are installed in a common trunking they shall be effectively segregated by earthed steel partitions.

Trunking shall not be used on an outdoor installation unless the trunking and accessories have a hot dipped galvanised finish. In such an installation the trunking must not be installed in a position liable to give ingress to driving rain.



Lighting Trunking

The type of lighting trunking shall be as specified and the position of runs and luminaires shall be as shown on the drawings.

Where the weight of a luminaire is supported by cable trunking the fixing of the trunking shall be adequate for the purpose. The support of luminaires from the trunking shall be by means of proprietary clamps or brackets. Where the trunking is visible the supports and proprietary fixings shall be painted to match the trunking.

DISTRIBUTION BOARDS

General

The Schedules or drawings specify whether distribution boards are to be provided with fuses or miniature circuit-breakers (M.C.B.). All spare fuseways shall be provided with fuses, M.C.B's or manufacturers standard blanking pieces.

All distribution boards shall be provided with a fully rated neutral bar with an outgoing way per fuse or MCB, together with a multi-way earthing bar with one outgoing way per fuse of MCB. A facility shall be provided for additional earthing terminals for compliance with Section 543.7 to BS 7671.

Each distribution fuseboard board, miniature circuit breaker board and consumer unit, shall be identified by an externally fitted, engraved multi-layered phenolic plastic label inscribed with the board reference number and supply origin as shown in the Schedules and Drawings.

Each label shall also be provided with the following information externally fitted to the access door:

- i. The reference and current rating of the device serving the equipment.
- ii. The location and reference of the device via which the equipment derives its electrical energy.
- iii. The voltage present.
- iv. The cable size, type and number of cores serving the equipment.



Within each distribution board a full circuit chart shall be provided on the rear of the door and this shall identify the following:

- i. Circuit reference.
- ii. Protective device rating and type.
- iii. Phase conductor CSA.
- iv. Circuit protective conductor CSA.
- v. Circuit type.
- vi. Circuit location.
- vii. Apparatus served.
- viii. Provision so that the circuit details can be modified at a later date.

The chart shall be encapsulated within an ABS plastic laminate.

In each distribution board there shall be an approved label which may be a card enclosed in a non-flammable transparent plastic envelope securely fixed to the inside of the door. The label shall show the number of each way, its reference as indicated in the Schedules or drawings, the rating of the fuse link or M.C.B., the cable size and the apparatus connected.

The label shall be so arranged that the circuit details can be modified at a later date. The ways shall be clearly identified either by the M.C.B. or fuse-bases and carriers being indelibly numbered in an approved manner or by the label. This may be by means of a numbered plan or a printed statement to the effect that the numbering of the ways is from left to right.

Instructions shall be obtained for any mounting heights that are not particularly specified.

All fixing materials, including any necessary steelwork, shall be supplied.

Where a surface distribution board is used in a concealed installation, the cables and conduits shall be brought into a flush adaptable box located behind the board and enter the board through a bushed aperture(s) in the back. The size of the aperture(s) in the back of the distribution board, and



the number and size of conduits serving the adaptable box shall be calculated on the basis that all outgoing ways are utilised. (Spare ways shall be assumed to be ring main circuits.)

Distribution Fuseboards

Distribution fuseboards shall be robust construction manufactured from rust protected steel to IP4X standard.

Enclosures with rated units from 20 amp to 100 amp shall be welded construction. Larger rated units shall have additional cast corner pieces.

All boards shall be fully gasketed complete with top and bottom end plates and internal fixing holes.

Distribution board doors shall be equipped with barrel-type locking devices and door latches or knurled finger operated screws.

Each board shall be provided with a minimum of two keys, which shall be common to all boards.

Busbar, main terminals and all live parts of the distribution board shall be fully shrouded.

Fuse units shall have skirted fuse carriers to prevent contact with live parts when withdrawing or inserting a carrier.

Where specified, switch disconnectors shall be provided, matching the pattern, colour and manufacturer of the distribution board.

Switch disconnectors shall be close coupled directly below the distribution board unless otherwise specified.

Switch disconnectors shall be identified by an external engraved multi-layered phenolic plastic label inscribed with reference number, the supply origin and size/number of cores of the supply cable.

Switch disconnectors shall be tested to BS EN 60946-3 and meet the constructional requirements.

Switches shall be quick make and break type, suitable for use on AC or DC. Units shall have removable internal contact assemblies and padlocking facilities.



All distribution boards shall be in compliance with the latest national and international standards.

BS 88: 2010 HRC Carriers

BS HD 60269-2:2010

BS EN 60269-1

ASTA 20 Certified Fuse Links

Fuse Units Availability Types A to D

Insulation Voltage 660 Volt AC 500 Volt DC

Miniature Circuit-Breaker Boards

Standard SPN DP 100A 125A 200A TPN.

M.C.B. distribution boards shall be manufactured from rust protected sheet steel with painted finish and be provided with heavy gauge removable top and bottom gland plates and internal fixing holes.

Boards shall be provided with fully shrouded busbars and neutral bar and the pan assemblies shall be fully removable.

The distribution board door shall be equipped with barrel type locking devices and latches.

Each board shall be provided with a minimum of two keys, which shall be common to all boards.

Where specified, switch disconnectors, RCCB or MCCB disconnectors, shall be located as an integral part of the board.

Where larger disconnectors are specified, they shall be provided matching the pattern, colour and manufacturer and close coupled directly below the distribution board.



All distribution boards shall be in compliance with the latest national and international standards:

BS 5486: Parts 13

BS EN 60439-3

BS EN 60439-3 Distribution Board

BS EN 60898-2:2006 Types B, C, D

BS EN 60947-2 15 kA MCB's

BS EN 60947-3 Switch Disconnectors

BS EN 61008 RCCB

BS EN 61009 RCBO

BS EN 60947-2

IEC 60947-2 MCCB

Consumer Units

Consumer units shall be metal construction, as specified.

They shall be provided with totally encapsulated busbar providing a safety rating of IP2XB and an internal IP rating to be BS EN 60529.

All M.C.B. consumer units shall be in compliance with the latest national and international standards.

BS EN 60439-3

CM 16 Test Consumer Unit



BS EN 60947-2 15 kA MCB's

BS EN 61008 RCCB

BS EN 61009 RCBO

BS EN 60946-3 Switch Disconnecter

LIGHTING INSTALLATIONS

Luminaires

All luminaires listed in the lighting schedule shall comply with BS EN 60598 and be supplied and installed complete with lamps. Where a choice of colour of either metalwork or glasswork is available for the luminaires and none is specified, the colour will be specified at a later date.

All fluorescent luminaires shall be complete with a fused terminal block. The fused terminal block shall include a suitable size fuse, protective terminal cover and terminals, sized to suit installed cables specified elsewhere.

If different colour finishes alter the price of the luminaires the standard finish shall be the basis on which the tender is made unless otherwise specified.

When tubes are inserted in luminaires the tube details shall face downwards.

Installed luminaires shall not be used for temporary lighting without the Services Engineer's approval.

All diffusers, louvres and glassware for luminaires shall be cleaned, immediately prior to handover.

All lamps and luminaires shall be disposed of by an approved Contractor.



Lighting Points

i. Wiring

The minimum size of cable for lighting circuits shall be 1.5 sq.mm.

Circuit wiring in lighting trunking shall be looped into P.V.C. flexible terminal blocks suitable for the temperature at which they will operate.

Circuit wiring in conduit, with luminaires mounted on the conduit system, shall terminate within the luminaire using heat resisting cables or sheath.

Circuit wiring in conduit, with luminaires mounted remote from the conduit system, shall terminate at a luminaire supporting coupler (LSC) to BS 7001. Final connection shall be by means of flexible cable.

Wiring to all luminaires shall be non-hygroscopic and heat resisting.

Where continuous lines of surface mounted luminaires are specified, through wiring will be permitted provided that the proposed method of erection, lining up and connection of the luminaires is acceptable. If this is not the case, then a separate loop-in conduit or M.I.M.S. system shall be made to each luminaire. Continuous runs shall be mounted true and in a straight line with no gap between adjacent luminaires.

If through wiring is permitted this shall be fixed clear of the control gear in the luminaires and where this is not possible high temperature P.V.C. wiring shall be used. All holes through luminaires for through wiring shall be bushed and an insulated 1.5 sq.mm earth wire shall be run between all the luminaires in the run.

Wiring to the lampholders of tungsten filament luminaires which are not equipped with cool wiring devices or suspended from ceiling roses shall be silicone-rubber-insulated and braided or glass fibre insulated capable of withstanding a temperature of 140°C.

Flexible pendant drops shall be white circular heat-resisting P.V.C. insulated and sheathed cable of conductor cross sectional area not less than 0.75 sq.mm, unless otherwise specified.

Wiring to luminaires shall also be in accordance with the particular manufacturers recommendations.



ii. Erection of luminaires

Decorative luminaires shall be suspended by the manufacturer's pendant sets which shall include all necessary suspension wires.

Luminaires shall be mounted at the heights given in the Schedules or drawings.

Fluorescent luminaires shall have fixing and cable entry arrangements on two centres to suit the luminaires. The fixing arrangement shall be suitable for use with conduit boxes.

For luminaires in suspended ceilings the cabling or conduit system shall terminate in a BS box above the ceiling. From the conduit box to the luminaire either of the following methods of wiring may be used.

- a) An internal threaded dome cover with a cable gland for flexible cord shall be fixed to the BS box and a flexible cord shall be run from the dome cover to the fitting.
- b) A multi terminal ceiling rose with socket and plug attachment shall be fitted to the box and a flexible cord run to the luminaire. The flexible cord shall be secured to the luminaire by use of a suitably sized compression gland.

Flexible cords shall be 3-core 0.75 sq.mm. in 6 amp circuits, 1.0 sq.mm in 10 amp circuits, and 1.5 sq.mm in 16 amp circuits. The third core of the flexible cord shall be used for earth continuity and shall be securely fixed to the conduit box and luminaire.

For surface mounted luminaires the cabling or conduit system shall terminate in a BS box to which the luminaire is fitted.

Suspended fluorescent and industrial-type tungsten luminaires shall be suspended by rigid conduit from ball-and-socket dome covers or drop rods. Such dome covers shall be fitted with flexible copper connectors between the ball and the socket.

Where suspended fluorescent luminaires are specified they shall be suspended to suit the lighting calculations but generally subject to a minimum mounting height of 2400mm.

Approved angle blocks shall be provided for luminaires suspended from or mounted on sloping surfaces.

Break-joint rings of approved colour shall be provided wherever the diameter of the ceiling rose or plate from which a luminaire is suspended or the diameter of the gallery or the width of the spine of



a surface mounted luminaire does not exceed the diameter of the aperture in the ceiling for the associated conduit box by at least 10mm. If this requirement causes a break-joint ring to be provided for any luminaire, then break-joint rings shall be used for all other similar luminaires in the same room or area.

Fluorescent luminaires which are to be mounted end to end in continuous rows shall be provided with all necessary jointing pieces for the battens and diffusers or reflectors. The manufacturer shall be informed of the precise quantities required at the time of ordering to avoid delay. Battens for which special jointing pieces are not provided shall be butted together and connected by means of smooth bore bushes and locknuts tightened up to ensure that no gap appears between adjacent battens. End caps shall be fitted only at the ends of rows.

All luminaires shall be carefully stored before erection and, prior to handover, any damaged paintwork made good and the complete luminaires cleaned.

M.I.M.S. Cables at Lighting Points

Lighting points shall not be used as M.I.M.S. cable junction boxes for the through-connection of switch wires. Not more than three connectors will be permitted at any lighting point.

Strap wires for two-way or intermediate switching shall be connected directly between switches and not through lighting points.

From each ganged switching position, cables to lighting points shall be limited to single and twin core cables or a multi-core cable shall be taken to a separate junction box from which separate cables shall be run to a point in each switched group of lights. Such a junction box shall be used in a concealed installation only if it can be fixed in a concealed but accessible position e.g., behind a demountable ceiling panel.

The junction box used for this purpose shall be complete with lid and porcelain multiple connector blocks with sufficient ways to suit the number of connections necessary. The connector block shall be fixed to the base of the box using M4 bolts and nuts. All terminals in this connector block shall be adequately marked for identification, securely fixed within the box.

When a system of dry construction is used the junction box and cable glands need not be used.



Ceiling Roses

Ceiling roses shall comply with BS 67 and be of approved manufacture. They shall be coloured white having a moulded plastic base suitable for direct mounting on to a conduit box and three terminals, plus earth terminal, the 'live' terminal being shrouded.

Plug-in ceiling roses shall be coloured white having a moulded plastic base suitable for direct mounting onto a conduit box and a 2 amp, 3 pin socket, (4 pin if emergency circuit connection required) plug and locking cover. The base shall have three (or four) terminals plus earth terminal, the 'live' terminals being shrouded.

Lampholders

Lampholders shall comply with BS EN 61184 and be effectively earthed where of metal.

Where lampholders are screwed direct to conduit systems they shall be brass, unless they are installed in a bathroom or toilet when they shall be insulated.

Lampholders which are not electrically continuous shall be complete with Home Office pattern skirts.

Lampholders used in conjunction with P.V.C. sheathed cables shall be provided with a cable grip.

Batten lampholders shall be suitable for direct mounting on circular conduit boxes.

Unless otherwise specified lampholders for emergency lighting systems shall be SBC, positioned to such a way as to place the lamp specified in its normal position.

Lamps

The sizes, types and colours of lamps are shown on the Schedules or Drawings.

Tungsten filament lamps shall have coiled coil filaments where they are available, and unless otherwise specified those of ratings up to 200 watts shall be pearl, or silicone coated.



Tungsten filament lamps up to and including 150 watts shall be fitted with bayonet caps 200 watt lamps with Edison screw caps and lamps exceeding 300 watts with Goliath Edison screw caps except when the fitting specified requires otherwise.

Lamps for use at a voltage other than 230v shall be fitted with caps which prevent them from being used in 230v lampholders.

Local Lighting Switches

Lighting switches shall be manufactured in accordance with BS 3676 and shall be of the type and ratings shown in the Schedules or Drawings. The mounting height to the centre of the switch shall be 1.0m to meet DDA requirements unless otherwise specified, and where the structure and furnishings permit, the distance from the edge of the architrave to the near edge of the switch shall be 150mm.

Where several switches on one phase are shown at one position, a ganged box shall be used. Different phases shall not be ganged in one box unless each phase is segregated in a separate compartment which is covered by a separate internal warning plate.

Where possible the arrangement of switches in ganged boxes shall be similar in plan to the lighting points which they control. Switches not so arranged shall be labelled in an approved manner to indicate the circuits controlled.

Sunk switches shall be mounted in sheet steel or malleable cast iron boxes of minimum depth 37mm fitted with adjustable grids to allow for variations in the thickness of plaster.

The faceplates of sunk switches shall be fixed square and flush with the wall. Fixing rings shall not be the only means of securing the faceplates.

The swing of all doors shall be checked on site before marking out any chases for switch positions.

Surface mounted switches connected to surface conduits shall be fitted to either malleable cast iron or pressed steel boxes with cover plates giving protection to the switching mechanism.

Watertight switches shall be in malleable cast iron boxes with spout nipple entries.

Lighting switches installed in ducts shall be of the weatherproof type.



Ceiling switches shall be fixed to circular BS boxes using break-joint rings. The switches shall be white or ivory coloured, and fitted with silent interiors.

In rooms where inflammable gases are used, switches and controls for electrical plant on perimeter walls shall be of the flush pattern fitted with brass plates of the finish specified in flush steel or malleable cast iron boxes.

Any requirement in such rooms for sparkless switches will be particularly specified, and where they are required, they shall be of the same pattern of switch module, switchplate, box and finish as the other switches in the same area or room.

All switches for use in hazardous and explosive gas atmospheres shall be suitable for the area they are to be installed.

The installation of earth connections for lighting switches shall be as detailed in the Earthing and Bonding Section of this specification.

Emergency Lighting Test Switches

Emergency lighting test switches shall be manufactured in accordance with BS 3676 and shall be of the secret key gridswitch type complete with neon indicator which shall be illuminated when the keyswitch is in the 'Test' position.

The cover plate shall be engraved 'Emergency Lighting Test Switch' in red letters approximately 3mm high.

The mounting height to the centre of the switch shall be 1.0m to meet DDA requirements unless otherwise specified, and where the structure and furnishings permit, the distance from the edge of the architrave to the near edge of the switch shall be 150mm.

Different phases shall not be ganged in one box unless each phase is segregated in a separate compartment which is covered by a separate internal warning plate.

Where possible the emergency lighting test switches shall form part of the switchplate for the general lighting. Where this is not possible, the emergency lighting test switches shall be located adjacent to the general lighting switches. The arrangement of the test switches shall be similar in plan to the lighting points which they control. Switches not so arranged shall be labelled in an approved manner to indicate the circuits controlled.



Sunk switches shall be mounted in sheet steel or malleable cast iron boxes of minimum depth 37mm fitted with adjustable grids to allow for variations in the thickness of plaster.

The faceplates of sunk switches shall be fixed square and flush with the wall. Fixing rings shall not be the only means of securing the faceplates.

The swing of all doors shall be checked on site before marking out any chases for switch positions.

Surface mounted switches connected to surface conduits shall be fitted to either malleable cast iron or pressed steel boxes.

Emergency Lighting

The following statutory documents apply to emergency lighting:-

1. Health and Safety at Work Act 1974.
2. Fire Precautions Act 1971.
3. Fire Certificates (Special Premises) Regulations 1976.

Other special conditions will apply relating to Local Fire Officer and Local Authority requirements, and the like and these will be detailed in the Specification where applicable. The equipment shall comply with the following British Standards:-

BS EN 60598-2-22	Luminaires.
BS EN 61558-1 & BS EN 60742	Safety isolating transformers for industrial and domestic purposes.
BS EN 61558	Safety of power transformers, power supply units and similar.
BS EN 13032-1:2004:	Photometric measurements.
BS EN 61184	Specification for bayonet lampholders.
BS EN 61347-1 & 61347-2 &	Ballasts for operation of tubular fluorescent lamps.



BS EN 60921

BS 1853 Tubular fluorescent lamps.

BS 5266:2011 Code of Practice for emergency lighting of premises.

BS EN 61347 Lamp Control gear.

The installation of all equipment and wiring shall comply with all other relevant sections of this Specification.

For the purpose of this section of the specification, the definitions of all plant, equipment and materials, included on the drawings and in this specification, shall be as those defined in BS 5266:2011 and BS EN 1838.

On completion of the installation of the emergency lighting system, or part thereof, an inspection and test certificate shall be given in accordance with Appendix A of BS 5266: 2011 Part 1 and BS EN 1838. The Services Engineer shall be advised at least two weeks before the tests are being undertaken to enable the various authorities to witness the tests.

Emergency Lighting Luminaire Conversions

Unless specified elsewhere within the drawings or specification all general lighting luminaires which are required to have either integral or remote emergency conversion packs fitted, shall be fitted with such conversions by the specified manufacturer at the works prior to delivery and carry the 'CE' mark.

Luminaires which have been converted to emergency version by any organisation other than the original manufacturer of the luminaire will not be accepted without the express written consent of the Services Engineer being given prior to the conversion taking place upon completion these luminaires shall carry the 'CE' Mark.



EXTERNAL LUMINAIRES AND COLUMNS

Responsibility

Unless otherwise specified the Main Contractor shall be responsible for excavation, erection of the columns, concreting and backfilling, and the correct alignment of the columns.

Excavation

Holes shall be excavated to the appropriate planting depth. Root depths where the ground is consolidated and where no underground obstructions require the use of raft or crank roots, shall comply with the manufacturer's recommendations with a minimum depth of 900mm. In normal well consolidated soil the width of the hole shall be sufficient only for the baseplate or flags where these are used. The maximum width of flags placed under the base of concrete columns shall be approximately twice the width of the column base.

Erection

Prior to erection the excavation shall be cleared of obstructions, water, rubble or loose soil. Any bare or corroded patches of steel column roots shall be cleaned and treated with bituminous paint. Base plates where provided shall be fitted securely and when used for earthing shall be bonded to the column. Base stones or flags shall be placed in position where appropriate. Columns shall be correctly aligned in the vertical position with door openings facing away from oncoming traffic unless otherwise specified.

When the columns have been erected the excavations shall be back-filled with concrete tamped at 150mm intervals to 450mm from the ground surface. A minimum of 2 - 50mm diameter earthenware ducts shall pass through the concrete base to provide access for the cables to the column.

Columns shall be erected prior to cabling and the earth surrounding them shall not be disturbed for at least seven days.

Concrete

Foundation concrete shall be made with BS Normal or Rapid-hardening cement. Aggregate shall comply with BS EN 12620 and shall not be larger than 40mm. The mix proportion by volume shall be:-

Coarse aggregate	-	5
Fine aggregate	-	2.5
Cement	-	1

When all-in aggregate is used the proportion by volume shall be:-

All-in aggregate	-	7
Cement	-	1

The ratio by volume of water to cement in all mixes shall not be more than 0.6.



Cabling

Cables serving standards must loop into and out of the standards except where otherwise stated.

The cables shall follow the route shown on the drawings and unless otherwise detailed shall be laid direct in the ground at a depth of 600mm and blinded with a radial thickness of at least 100mm of sand. The presence of underground cables shall be indicated by marker tapes laid directly above the cables after the trench has been backfilled, the tapes being approximately 300mm below the surface level. The tapes shall be manufactured from high grade polythene 150mm wide by 0.1mm gauge, coloured yellow with the words "Electric Cable Below" printed along its length.

Wiring between the cut-out, lantern and control switch if not specified shall be 2.5 sq.mm P.V.C. insulated and sheathed.

Control Switches

Control switches shall be of the weatherproof rotary type, all wiring being inside the column.

Base Compartment

A control gear compartment shall be provided in all columns, to contain the specified cut-outs and the cable sealing chambers complete with armour clamps.

Access to the compartment shall be by means of large weatherproof door with locking device to resist unauthorised entry.

A baseboard for the control gear shall be fitted inside the compartment. The baseboard shall be manufactured from a material which is non-hygroscopic.

Steel Columns

Steel columns shall comply with BS EN 40-3 and BS EN 40-4.

The exterior of the column and any metal attachment shall be painted after erection in accordance with the specification.

Unless otherwise detailed, steel columns of 8 metre height or above shall include a factory fitted multi frequency damper. All cables routed through these columns shall be provided with a protective sleeve to prevent chaffing or other damage to the cable during installation and normal usage.

Where the steel column is similar to or higher than the surrounding structure they are to be earthed in accordance with BS EN 62305-3, 'Protection against Lightning – Physical damage to structures and life hazard'

The earth electrode shall be fitted with its terminal connection in an inspection chamber. Inspection chambers shall be in pre-cast concrete with a heavy cover permanently marked



'Earth Electrode'. The cover shall be arranged so that it is flush with the finished ground level.

Concrete Columns

Concrete columns shall be of pre-stressed reinforced concrete and shall comply with BS EN 40-3.

Joints between concrete column section shall be pointed in accordance with the manufacturer's instructions with material to match the column colour.

Aluminium Columns

Columns shall comply with BS EN 40-3.

The exterior of the column and any metal attachments shall be painted after erection in accordance with the specification.

Unless otherwise detailed, aluminium columns of 8 metre height or above shall include a factory fitted multi frequency damper. All cables routed through these columns shall be provided with a protective sleeve to prevent chaffing or other damage to the cable during installation and normal usage.

Where the column is similar to or higher than the surrounding structure they are to be earthed in accordance with BS EN 62305-3, 'Protection against Lightning – Physical damage to structures and life hazard'

The earth electrode shall be fitted with its terminal connection in an inspection chamber.

Inspection chambers shall be in pre-cast concrete with a heavy cover permanently marked 'Earth Electrode'. The cover shall be arranged so that they are flush with the finished ground level.

Column Lanterns

These shall be of the manufacture and type specified in the Schedules, supplied complete with the necessary column top mounting spigot to match the specified column.

All lighting columns shall be served by a switched 230V supply automatically controlled through a contactor and a solar dial time clock.

Belisha Beacons and Illuminated Signs

The Sub-Contractor shall install all necessary cabling and terminate same in the items shown.

These shall be served by a continuous 230V A.C. supply.



Photocells

Photocell control units shall be IP65 rated as a minimum and of polycarbonate type enclosure and comply with BS 5972.

The photocell unit shall have a 'Switch On' lighting level of 70 lux and be pre-calibrated to switch on with a 10 minute warm-up period of discharge lamps. It shall also be suitable for use with fluorescent and tungsten lighting.

The voltage operating range of the photocell shall be no greater than 198 volts to 264 volts and the 'Switch Off' lighting level shall be 105 lux.

Mounting details of the photocell shall be specified on the associated drawings and/or in the particular section of this Specification. The photocell shall be installed with all necessary mounting accessories.