US01 Underground Services

UNIVERSITY OF LEICESTER

Document Control

Rev	Date	By	Comments
B	Jun 17	L. Davies	Technical Review Update
C	Dec 17	UoL	Sign off for release.
D	Mar 20	J Thrupp	March 20 issue
E	April 20	A Singleton	General update to tracker and other minors.

Design Guidance

1. Any underground jointing (applicable to modifications to existing underground LV power cables) shall be carried out using a proprietary resin joint kits manufactured by Messrs. BICC Ltd. or AEI Ltd.
2. Where power cables are laid in a common trench with other services, particularly communications (IT) cables a minimum separation of 300mm shall be maintained.
3. All excavations on site shall be undertaken in consultation with the Maintenance division, no works shall be undertaken unless services drawing have been consulted and local area has been assessed for the presence of services eg CAT scan of area. Hand digging shall be undertaken when excavations are in close proximity to services.
4. Manholes / draw pits shall be installed at changes of direction and at regular intervals along ducted routes with draws wires left in situ accordingly.
5. External lighting installations shall adopt a loop in / out arrangement, avoiding the use of underground joints and easing future fault identification.
6. All installations associated with Telecommunications / Data shall comply with BS6701: 2004
7. Consultation with the Universities Grounds and Gardens is essential for all trenching through soft dig areas to agree the extent of excavations, their routing and reinstatement details.
8. Excavations in the proximity of Trees shall follow the NJUG “Guidelines for the planning, installation and Maintenance of Utility services in proximity to Trees” and take due consideration of the “Avoiding tree damage during construction” guidelines developed by the Royal Arboriculture association.
9. Spare ducting shall be installed alongside ALL ducted routes at a rate of 50% additional ducts to the quantity utilised as part of the project (i.e. where 4No. ducts are utilised, 6No. shall be provided). This shall also apply in principle to all types of ducting such as LV, and ELV services and not just the total quantity.
10. Below ground ducting shall be minimum 100mmø with the exception of individual ducts serving lighting columns and bollards etc.
11. The following diagrams and tables are extracted from the National Joint Utilities Guidelines for the Positioning and colour coding of underground Utility Apparatus (Issue 8 - 2013)
12. Trenching and backfill shall be provided correctly and to industry best standards. Services shall be laid in a trench on a sand base with sand backfill prior to making up ground and the installation of marker tapes and marker tiles.

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FIGURE 1 - Recommended Positioning of Utility Apparatus in a 2 metre Footway

Note – the same positioning should apply in the carriageway/service strip (if safe and practical to do so) where a development has no footway(s) available for services and/or the boundary of the property is on the carriageway (please refer to minimum depths in carriageways). For further advice please contact the asset owner.

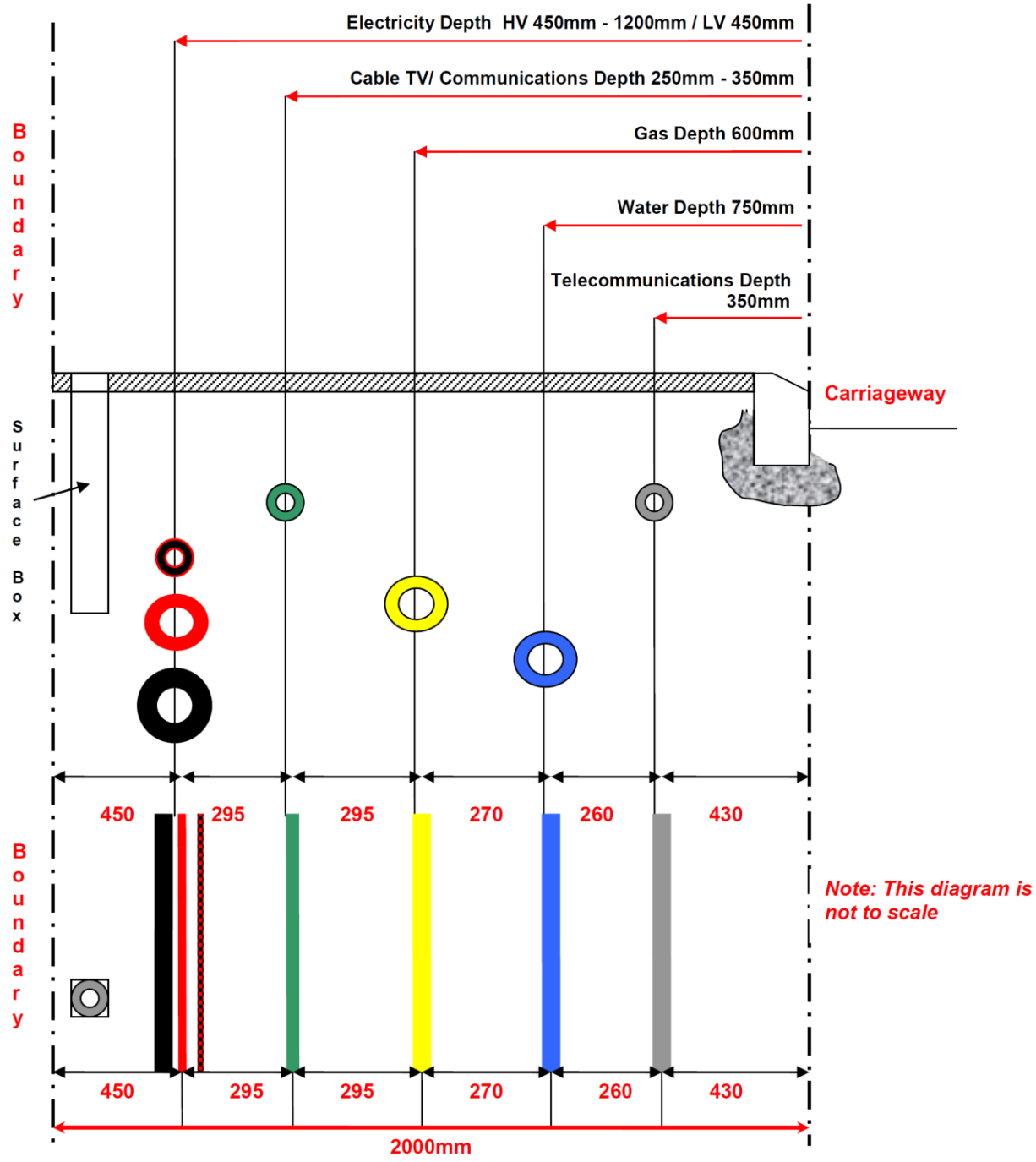

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TABLE 1 – Recommended Colour Coding of Underground Utilities Apparatus

All depths are from the surface level to the crown of the apparatus

Utility	Duct	Pipe	Cable	Marker Systems	Recommended Minimum Depths	
					Footway/Verge	Carriageway
Electricity HV (High Voltage)	Black or red duct or tile	N/A	Red or black	Yellow with black and red legend or concrete tiles	450-1200mm	750-1200mm
Electricity LV (Low Voltage)	Black or red duct or tile	N/A	Black or red	Yellow with black legend	450mm	600mm
Gas	Yellow	*** See row below	N/A	Black legend on PE pipes every linear metre.	600mm footway 750mm verge	750mm
	*** **PE** - up to 2 bar - yellow or yellow with brown stripes (removable skin revealing white or black core pipe). - between 2 to 7 bar -orange. **Steel pipes** may have yellow wrap or black tar coating or no coating. **Ductile Iron** may have plastic wrapping **Asbestos & Pit / Spun Cast Iron** – No distinguishable colour					
Water non Potable & Grey Water	N/A	Black with green stripes	N/A	N/A	600 – 750mm	600 – 750mm
Water - Firefighting	N/A	Black with red stripes or bands	N/A	N/A	600 – 750mm	600 – 750mm
Oil / fuel pipelines	N/A	Black	N/A	Various surface markers Marker tape or tiles above red concrete	900mm *All work within 3 metres of oil fuel pipelines must receive prior approval*	900mm *All work within 3 metres of oil fuel pipelines must receive prior approval*
Sewerage	Black	No distinguishing colour / material (eg: Ductile Iron may be red; PVC may be brown)	N/A	N/A	Variable	Variable
Communications ○ ● ● ●	Grey, white, green, Black, purple	N/A	Black or light grey	Various	250 – 350mm	450 - 600mm
Water	Blue or Grey	Blue polymer or blue or uncoated Iron / GRP. Blue polymer with brown stripe (removable skin revealing white or black pipe)	N/A	Blue or Blue/black	750mm	750mm minimum
Water pipes for special purposes (e.g. contaminated ground)	N/A	Blue polymer with brown stripes (non-removable skin)	N/A	Blue or blue/black	750mm	750mm minimum

These guidelines describe utility industry practice. However, it should not be assumed that all apparatus will conform to the recommendations for positioning and colour coding contained in this publication.

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Design Components

Item	Manufacturer	Comments
Natural Gas	Wavin Glynwed Durapipe	Yellow MDPE suitable for electrofusion welding. Gas pipework buried to a minimum of 600mm depth. An embedded trace facility shall be utilised to ease future service location. Marker tape to be placed above pipe for future identification.
Mains Cold Water	Wavin Glynwed Durapipe	Blue MDPE PE50/PE100 suitable for electrofusion welding pipework buried to a minimum depth of 750mm to crown of pipe. Marker tape to be placed above pipe for future identification.
Mains Cold Water (Contaminated Site)	Wavin Glynwed Durapipe	Where site conditions dictate Durapipe Protecta-line shall be used.
HV Cabling	Any BASEC Member	Three core Cu/XLPE/SWA/PVC (11000V) power cables c/w red PVC outer sheath Method of installation shall be direct burial or ducted to minimum 750mm below ground. Cable marker tiles and warning tape shall be applied in accordance with good working practice.
LV Cabling	Any BASEC Member	Cu/XLPE/SWA/PVC (600V) power cables c/w black PVC outer sheath Method of installation shall be direct burial or ducted to minimum 450mm below ground. Cable marker tiles and warning tape shall be applied in accordance with good working practice.
Telecommunications & IT	Any BASEC Member Copper Fibre Blown fibre	External duct PE (unarmoured) CW 1308/CW 1700 Telecommunications grade cable, PE filled. Internal CW 1308 within suitable containment. Direct buried or ducted single wired armoured CW 1128/1198 cable, PE filled. All components to IEC60794/5 specification, refer to University's standard specification

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Framework Contractors

Service	Specialist	Address & Contact Details
HV Distribution cabling and switchgear	Central Power	Central Power Unit 1 Great Barr Business Park Baltimore Road Great Barr West Midlands B42 1DY Tel: 0121 358 1142 Email: info@centralpower.co.uk
LV Distribution cabling and switchgear	Project Appointed Civils/ M&E specialist	
Communications cabling and switchgear	Project Appointed Civils/ M&E specialist	

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