

Imperial College London

**Information & Communications Technology
Network Infrastructure Group**

Network Infrastructure Standards
January 2018

Appendix L – External Infrastructure

Version 1.5

Appendix L – External Infrastructure

1. Introduction

This Section details the required standards for External infrastructure.

2. Standards

The College has not had thus far an established policy regarding its external infrastructure installation as it traditionally would use existing or just complement existing with similar, or new proposed by external parties during installation projects.

This has led to several challenges to the organisation and in particular to ICT and Estates departments, who are responsible for the maintenance and running of the infrastructure and services.

This document will be the first attempt to correct this situation.

As a very specialist requirement that should be done adequately at a first attempt because of the permanent nature of the external infrastructure installation and the costs to both install and maintain (if/when any fail). Also critical to do this adequately on day one is the nature of the critical services running within the infrastructure and also the wayleave contracts that are signed with the Telcos providing services to Imperial College or third parties within our campuses.

3. What is included

This document will establish the requirements for the construction and installation of:

- Manholes and inspection pits
- Ducting
- routes

3.1 Manholes

The construction and installation of manholes will be as per manufacturer's instructions and specifications, but will need to enable ICL or third parties to effectively use them.

This means that there needs to be available to ICL:

- Step irons.
- Cable routing/bearers.
- Bell mouths.
- Sump.
- Anchor iron.
- Cable glands on all ducts (or similar).

The sizing will be calculated depending on the number of ducts required for the run. And the above specifications can be reduced if the manhole/inspection pit

is small enough not to necessitate parts of the requirement (for example: steps will not be needed if there is no way to get inside of the manhole).

Manhole covers and construction must be fully adequate to the environment they will be in. Meaning that the construction and the cover of a manhole in a footpath will have a different specification and construction from the ones in the highway or a road or access for heavy equipment.

All manhole covers will reflect their ownership/use.

ID A: "ICL ICT"

For all manhole covers that are dedicated to data cabling.

ID B: "ICL ICT/BT"

For all BT specified ducts and routes but owned by ICL.

All manholes will be geotagged as part of the handover process.

3.2 Ducting

The construction and installation of ducts will be as per manufacturer's instructions and specifications.

It will be core drilled and sealed or have the holes pre-installed at the manhole manufacturer and sealed.

The ducts will be sized in collaboration with ICT and will be done to enable all services required on day one and in the future strategy of the campus or building and with a safety margin as it is much more expensive to add these than install on day one (not to mention disruptive and potentially risky).

3.3 Routes

The construction and installation of manholes will be as per manufacturer's

All buildings will have full resilient routes and dual entrance points as a minimum. The penetration of the ducts into the building will be into an intake room as per ICT standards and the ducts adequately sealed.

All campuses will have multiple and resilient routes and dual entry points as a minimum. Four, at least, are advisable as the connectivity to the campus is done via third parties (Telcos) which may be limited in the area where they can enter the campus.

4. What is excluded

BT specifications are excluded even if all the infrastructure is owned by ICL. We will install as per BT specifications at the time (manholes and ducting). The routes are to be designed and maintained by ICL and/or an approved contractor but the specification

for the BT ducts will be theirs. The same with the manholes, these will be ID'ed as described above.

5. Labelling / ID

5.1 Manholes

All manhole covers will be labelled as per information above in point 3.1. and will reflect their ownership/use.

ID A: "ICL ICT"

For all manhole covers that are dedicated to data cabling.

ID B: "ICL ICT/BT"

For all BT specified ducts and routes but owned by ICL.

5.2 cabling

Fibre:

Fibre cabling will be labelled with information required by the company providing the service to Imperial or third parties working within our estate.

It will be done in a labelling system that will withstand the harsh conditions of the external installation. The label needs to be attached and readable at any time during the lifetime of the cable and the responsibility to maintain so will be of the Telco or owner of the fibre.

The Imperial College own installations will follow the same rules as all others and the information to be included in the labels is as described in "Appendix H" of the College standards.

Copper:

Copper cabling will be labelled with information required by the company providing the service to Imperial or third parties working within our estate.

It will be done in a labelling system that will withstand the harsh conditions of the external installation. The label needs to be attached and readable at any time during the lifetime of the cable and the responsibility to maintain so will be of the Telco or owner of the fibre.

The Imperial College own installations will follow the same rules as all others and the information to be included in the labels is as described in "Appendix G" of the College standards.

6. Accepted systems

6.1 Cubis

<http://www.cubis-systems.com/uk/>

The proposed product is the Stakkabox Ultima System (<http://www.cubis-systems.com/uk/products/access-chambers/ultima/#main>).



Cubis can provide the chambers with pre-fitted accessories and duct entry making it easier to install onsite. This is an option but can also be done and assembled onsite.



Pre-fitting Service

Focusing on customer needs, we have developed the parts required and offer a pre-fitting service, saving further time on site.

Documentation:

<http://www.cubis-systems.com/uk/products/large-chambers/ultima-connect/#main>

<http://www.cubis-systems.com/media/3335/stakkabox-ultima-connect-brochure.pdf>

<http://www.cubis-systems.com/media/3065/cubis-product-size-guide.pdf>

Examples:

<https://youtu.be/BluVGrkuMig>

<https://youtu.be/yLc06JRIOmo>

6.2 Clark

<http://www.clark-drain.com>

The product list can be seen in:

<http://www.clark-drain.com/products/>

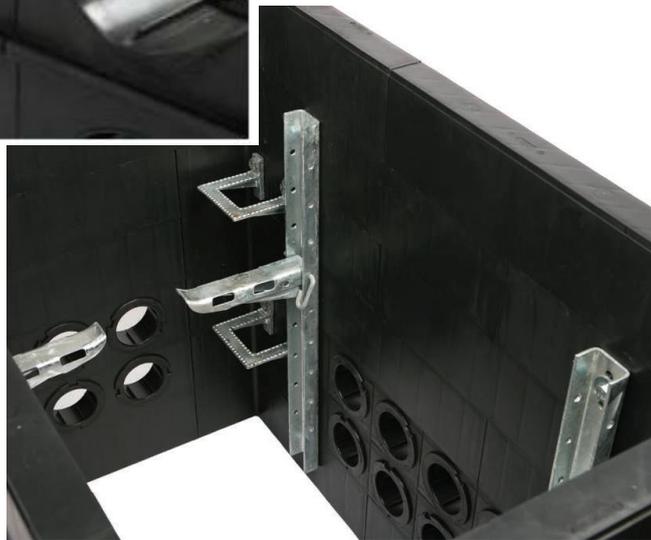
For chambers please check:

<http://www.clark-drain.com/products/chamber-access-solutions/>



← Manufactured duct entries.

Accessories to be installed with an agreed pre-configuration and with duct entries made by manufacturer. →



Galvanised steel internal bearer bars stabilise the chamber wall and prevent ring movement.



Factory fitted step irons have a slip-resistant tread pattern and are designed, manufactured & tested to EN13101:2002.



Due to the lattice strength structure within the chamber walls there is minimal flexing on the step irons which prevent operator uncertainty during access.

Tested up to 40T load rating classification

A strong uniform lattice structure inside the chamber walls reduces flexing and provides a firm structure for easy manual handling and assembly.



Moulded duct aperture will accommodate 96mm and 110mm bellmouth and cap.



Duct-entries can be supplied in various configurations.



The thickness of the chamber walls have been optimised to provide excellent cover seating and good interaction with the bedding material.

← Construction and installation example.

All manufacturer specifications are to be followed on any, or all, of the systems. Both

systems have comprehensive literature to enable an easy installation (which includes videos) and adequate to different types of requirement and location of installation.

Most of the accessories will be required and specially so if they are big enough to have people work inside them (i.e. installation of steps).

7. Installation commissioning and use

7.1 Information and costs

ICL will have one of the approved contractors to check the installation and pre-delivery of any such systems to ensure an adequate installation and the creation of the documentation needed to manage the infrastructure.

The chosen contractor will be named in Appendix A of the standards.

The cost of running this process will be passed on to the organisations that require the services to be installed. A price table needs to be published and communicated and maintained for the installation and duration of the service.

7.2 Using the infrastructure

All service requests will be done to ICT (Network Infrastructure - ictns-infra-dl@imperial.ac.uk).

ICT will liaise with Legal Services to agree on the acceptance, or not, the wayleave of the Telco operator. When this is agreed, and if necessary, the second stage of the process will initiate.

ICT will provide the cost table to the requestor and/or Telco to agree on costs prior to any survey or other work done onsite.

After the acceptance of the costs, surveys will be carried out with the incumbent company that will provide local inductions where the Campus or Building Managers have accepted that this could be done. The College contractors will be responsible for maintaining both ICT and Estates department abreast of all works onsite. ICL will need to have a minimum of 10 working days for notifications. Of course, any emergency can be addressed but these time frames will need to be considered and incorporated into any programme of installation.

ICT and Estates to receive RAMS and both must accept them considering the specificities of each department's focus.

When RAMS accepted, the Telco is to provide proposed work dates, and a programme, that will not be less than 10 working days from the request date. This process will be managed by the ICL contractor that will keep communication with ICT and Estates departments. Chaperoning and specification are to be addressed during this stage and so will any correction (de-snagging) of the installation. This needs to be incorporated into the programme.

The ICL contractor will update drawings and/or information on the database of the installed services as per individual agreement between ICL and the company.

Job closure.

The process will be maintained and kept up to date by ICL ICT. Please contact for the latest.

8. Maintenance and Business As Usual (BAU)

The responsibility to supervise the infrastructure installed within the parameters of the Imperial College Standards will be of ICT and the College's contractor.

The responsibility to repair any damage occurred in the infrastructure will be of the Estates department and their specialist contractors. They will have the expertise to carry out these works.

The finance of the repairs will be as current College infrastructure maintained by the Estates department (under the LTM budget) but ICT will assist in any of this with the funds still available from the charges to third parties. This will enable the College to reduce maintenance costs with any shared infrastructure.

Considering the yearly nature of budgeting, the funds available for the maintenance must be considered from any payments done do ICL from the current year of the maintenance works.

9. Drawings

Please refer to Support Services Engineering Team CAD Strategy.
In addition to this all chambers to be geo tagged and the information included into the drawings to be delivered to ICL.