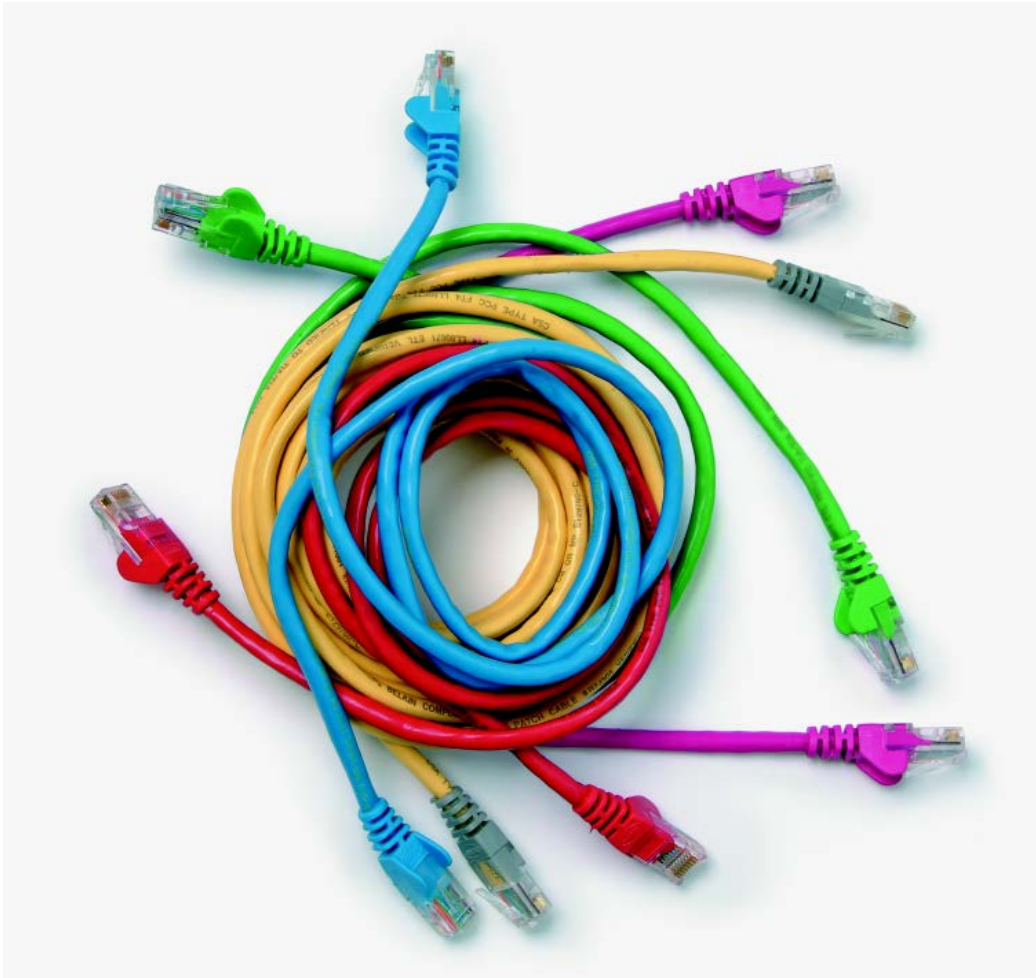


Level 3 Design and plan for an external underground network cabling infrastructure (3667-304/7540-359/7360-326)

**Designing and Planning Communications Networks/
Systems and Principles (QCF)**
Assignment guide for Candidates
Assignment A



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Level 3 Design and plan for an external underground network cabling infrastructure (3667-304/7540-359/7630-326)

Assignment A

Introduction – Information for Candidates

About this document

This assignment comprises all of the assessment for Level 3 Design and plan for an external underground network cabling infrastructure (3667-304/7540-359/7630-326).

Health and safety

You are asked to consider the importance of safe working practices at all times.

You are responsible for maintaining the safety of others as well as your own. Anyone behaving in an unsafe fashion will be stopped and a suitable warning given. You will **not** be allowed to continue with an assignment if you compromise any of the Health and Safety requirements. This may seem rather strict but, apart from the potentially unpleasant consequences, you must acquire the habits required for the workplace.

Time allowance

The recommended time allowance for this assignment is **12 hours**.

Level 3 Design and plan for an external underground network cabling infrastructure (3667-304/7540-359/7630-326)

Candidate Instructions

Time allowance: 12 hours

Assignment set up:

This assignment is made up of **five** tasks:

- Task A – Select appropriate maps/charts and select sensible routes to be surveyed
- Task B – Identify positions along the routes selected in Task A that may require a detailed site survey
- Task C – Document more fully their chosen option
- Task D – Identify the works activities that make up the project
- Task E – Prepare a project plan

Scenario

In order to promote tourism as a major industry for South Wales, it has been decided that several tourist information offices covering the Bristol and South Wales areas will be upgraded to provide an exciting range of the latest features to encourage tourists. A major part of this plan is to provide a fibre optic cable link between all of the tourist information offices listed below:

Pontypridd Museum Bridge Street Pontypridd Rhondda Cynon Taff CF37 4PE	The Promenade The Triangle Barry Island Vale of Glamorgan CF62 5TQ
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Penarth Pier The Esplanade Penarth Vale of Glamorgan CF64 3AU	Cardiff Visitor Centre The Old Library The Hayes Cardiff CF10 1NE
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Lower Twyn
Square
Caerphilly
CF83 1JL

Museum & Art
Gallery
John Frost
Square
Newport
NP20 1PA

5 High Street
Caerleon
Newport
NP18 1AE

Castle Car Park
Bridge Street
Chepstow
Monmouthshire
NP16 5EY

Wildwalk
@Bristol
Harbourside
Bristol
Bristol
BS1 5DB

In order to add further value to the scheme, the development agency funding the network is hoping that parts of their infrastructure may be taken up by other telecommunications network providers in order to offer more competitive and class-leading services to businesses in the South Wales areas. You should consider this opportunity to provide services for businesses when planning the network.

To meet peak tourist holiday seasons, and avoid disruption to services during these periods, the client is keen that sections can be constructed within a 6 week period (corresponds to a period without school holidays).

You will plan two routes between three sites as your own individual work, but it is the responsibility of all candidates to ensure the full network is of a resilient, but cost-effective topography.

Assignment Information

Please read all of the information below before starting the assignment.

Costs for excavation, laying duct, reinstatement & building jointing boxes

Contract charges

Single way 100 mm duct in verg	= £20.00 per metre at a rate of 250 metres a day
Single way 100 mm duct in footway	= £55.00 per metre at a rate of 70 meters a day
Single way 100mm duct in carriageway	= £80.00 per metre at a rate of 40m per day
Box (man-hole) in grass	= £250 per box at a rate of 2 boxes a day
Box (man-hole) in asphalt	= £800 per box at a rate of 1 box a day
Joint Box F6	= £800 at a rate of 2 boxes a day
Joint Box F10	= £1500 at a rate of 1 box a day
Joint box C12	= £1500 at a rate of 1 box per day
Additional 100 mm duct in trench	= £2.75 per metre
Cost to install 4-way sub-duct in 100 mm duct	= £3.25 per metre

Cabling costs

Contract charges or man-hours

Installation preparation/set-up time	= half hour per installation site
Optical Fibre cable installation into duct	= 20 m/min
Direct burial of optical fibre cable	= 5 m/min
Fleeting cable	= 1 hour operation
Fibre splicing cost	= half an hour per 8 splices
Cable preparation pre-splicing	= 1 hour
Fibre termination cost	= half an hour per 8 fibres
Cable installation within buildings	= 10 m/hour

Product charges

48 – fibre joint closure	= £80
96 – fibre joint closure	= £120
144 – fibre joint closure	= £150
48 – fibre ‘OTIAN’ style joint closure	= £150
96 – fibre ‘OTIAN’ style joint closure	= £200
144 – fibre ‘OTIAN’ style joint closure	= £250
Single-mode fibre pigtailed	= £6 each

Assume in-building cabinets, cable containment (tray or basket) and management is existing.

Cable Costs

Single-mode Fibre Optic Cable

8 – fibre OM1 external cable	= £0.60 /m
24-fibre G.652 loose tube external cable	= £1.50 /m
48-fibre G.652 loose tube external cable	= £2.25 /m
64-fibre G.652 loose tube external cable	= £2.50 /m
96-fibre G.652 loose tube external cable	= £3.50 /m
144-fibre G.652 loose tube external cable	= £5.00 /m

Armoured cable sheath add £1 /m

Cables supplied as standard on 2.2 km drum lengths

Cables on 4.8 km drums can be supplied and installed for an additional cost of £100 (for 'straight' runs these cables can be blown-in, whilst for more twisty routes the cables may need to be fletted and pulled or blown two ways).

Universal cable designation – add 75% to cable costs

LSZH cable designation – add 50% to cable costs

Universal and LSZH designated cables available on short drums of 200 m and 500 m.

Flexible steel ducting ('copex') = £2 /m

Installed fibre specifications

Assume the following performance for cabled fibre:

OM1 fibre at 1 dB/km with splices at 0.3 dB maximum.

G652 fibre at 0.40 dB/km for 1310 nm transmission

G652 & G.655 fibre at 0.25 dB/km for 1550 nm transmission

G.652 splices at 0.1 dB average or better.

Termination/connection loss of maximum 0.75 dB.

Chromatic dispersion at 1550 nm

G.652 fibre = 18 ps/nm.km maximum

G.655 fibre = 6 ps/nm.km maximum

Equipment requirements

Equipment requirements are not generally the concern of the cable planner, however the planner must ensure the design is fit for purpose and does not increase overall costs by putting undue pressure on equipment requirements. Our system designers have therefore provided the following equipment requirement information:

'Standard equipment' (1310 nm):

Loss budget lower than 20 dB

Chromatic Dispersion tolerated 1000 ps/nm

'Standard Equipment' (1550 nm) at additional £500 per fibre:

Loss budget lower than 20 dB

Chromatic Dispersion tolerated 1000 ps/nm

‘Extended Range Equipment’ (1550 nm) at additional cost of £1200 per fibre:

Loss budget lower than 25 dB

Chromatic Dispersion tolerated 1500 ps/nm

‘Super Long Range Equipment’ (1550 nm) at additional cost of £5000 per fibre:

Loss budget lower than 28 dB

Chromatic Dispersion tolerated 2000 ps/nm

‘Cost of hiring traffic lights and signage’ (to hire a set of 2 plus generator and 200 metre cable and required road signs)

£45 per day or £150 per week

Manhour rates

Assume £15.00 per man-hour for cable installers.

Assume £22.00 per man-hour for fibre splicers.

Assume £25.00 per man-hour for cable testers.

Assume £50.00 per man-hour for supervisors/inspectors

Task A – Select appropriate maps/charts and select sensible routes to be surveyed

- 1 Agree the network topography with all candidates.
- 2 Identify the **three** sites and obtain appropriate maps for route planning.
- 3 Identify **two** possible routes between each site.

Task B – Identify positions along the routes selected in Task A that may require a detailed site survey

Identify positions along the routes selected in Task A that may require a detailed site survey (areas more likely to have hazards or engineering difficulties). You should explain what features may be present that would need to be identified in a site survey, and what tell-tale signs could alert the surveyor to such presence.

- 1 Identify potential hazards for **each** route.
- 2 Identify **three** areas of concern that are likely to cause hazards or engineering difficulties.
- 3 Explain how the route could be surveyed, including the issues identified in Tasks B1 and B2.
- 4 Give **four** examples of typical observations that could be interpreted as potential hazards.

Task C – Document more fully their chosen option

Document more fully their chosen option, explaining benefits of their chosen route and any possible drawbacks.

- 1 Select and document the optimum route between each site. The documentation should be clear and concise and explain the design. It should identify:
 - type and quantities of major components
 - advantages of the design
 - possible timescales
 - broad costs
 - potential hazards or problems.

Continued over ...

Task D – Identify the works activities that make up the project

Identify the works activities that make up the project, prepare detailed plans and calculate the overall costs of completing the project.

- 1 Break down the selected design into identifiable packages of work. (e.g. lay duct, build boxes, install cables, splice and terminate cables).
- 2 Produce accurate diagrams in sufficient detail to identify the type and location of the plant or equipment that is required to be installed. You must include details of the following:
 - detailed route plan
 - underground joint boxes
 - hazards or issues
- 3 Break down the selected design into identifiable packages of work in order to cost each package of work and produce an overall cost for the selected design. This should include:
 - cost of stores and materials
 - relocation costs if appropriate
 - installation costs
 - man-hour costs
 - contract costs where applicable.

Thought should also be given to the provision of a realistic contingency with respect to the cost.

Task E – Prepare a project plan

Prepare a project plan, and identify those work packages that are critical in meeting the overall timescale of the project and explains what measures would need to be implemented to ensure the project is completed on time.

- 1 Using the packages of work identified in Task D construct a project plan, PERT diagram or similar project diagram to show the relationship between the various packages of work.
- 2 Using the project plan or project diagram, identify the critical path and calculate the expected time to complete the project.
- 3 Identify the packages of work that are critical to meeting the timescale for the overall completion of the project, and whether additional resource could reduce timescales.
- 4 Describe **three** measures that could be put in place to ensure the project is completed on time.

When you have finished working:

- Sign each document above your name and label all removable storage media with your name.
- Hand all paperwork and removable storage media to your assessor.

If the assignment is taken over more than one period, all paperwork and removable media must be returned to the test supervisor at the end of each sitting.

End of assignment

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