

Virgin Media Network Expansion via FTTP Narrow Trenching Build Methodology

Compliance with 3rd Edition (England) Specification for
Reinstatement of Openings in Roads (SROH)

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Traditional trenching - 96mmØ ducts

- Use of 2x96mmØ ducts - trenches 200mm to 350mm wide [8" to 14"]



- Adopting FTTP [*bundles of micro-ducts*] reduces Civils requirements

Virgin Media's current Network Expansion via FTTP

- FTTP blown fibre solutions use micro ducts:
 - bundles of 8mmØ micro ducts (normally c.24 max in any trench sections)
 - There is an individual 8mmØ micro duct for each Home/Business Premise
- FTTP blown fibre solutions reduces the necessary physical presence:
 - Reduced width of trenches – between 75-to-100mm vs. c.150-to-200mm traditionally
 - Underground Chambers – substantially, no longer needed (*there will be some*)
 - Above-ground Cabinets – majority are small-size cabinets (*much reduced intrusion*)
- Original Trials in 2015/early 2016:
 - Papworth (Cambridgeshire) – pilot to establish start-up processes
 - Leicestershire Villages and Lamborne (Wiltshire)
 - Wider UK - c.20k homes (200km)
- Concept proven – has supported VM move to UK-wide roll-out
 - 2017 YTD – Actual Project total metreage, c.3.75 million metres (*FTTP provides 85%+*)
 - 500-600km per month – that's 50m or 5 Homes per minute

Traditional Trench width



2-way 96mm \varnothing ducts ~350mm

FTTP Narrow Trench



24 micro-ducts ~80-100mm
[absolute minimums] [only 10 shown]



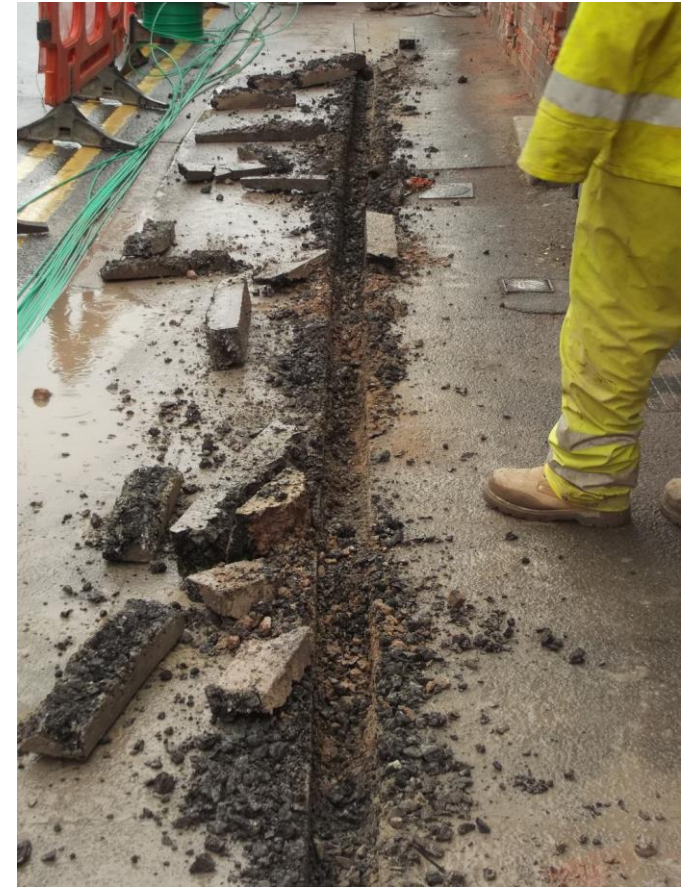
Removing upper Tarmac Surface layers - Top-cutting method [*Photos from Trials*]



- Advantages of using Top-cutter:
 - Good speed of cutting
 - Crushes into Fines [may be re-used to bed micro-ducts]
 - Uniform trench width



Removing upper Tarmac Surface layers - Twin-bladed Floor Saw method [*Photos from Trials*]



- Advantages of using Twin-bladed Saws:
 - Speeds-up cutting time [*single pass of Saw*]
 - Also produces uniform trench which limits aesthetic intrusion of finished reinstatement
 - **But** saw paste can be excessive
- Existing Tarmac layers then broken out and removed by hand or excavator

Clearing-out the Trench



Excavating to c.350mm
[Spoil dragged out, not bucketed]



Modified excavator bucket



Cleared Trench

Installing the micro-ducts



Pre-bundled micro-duct installation



Micro-ducts enter cabinet directly
[no underground chamber needed]

Installing the micro-ducts



Pre-fabricated
multi-loom
trailer supports
pre-bundling of
micro-duct installation

Typical Cabinets



Main Hub Cabinet and associated Power Cabinet
[serves c.3000 Homes]

Majority smaller-sized Cabinets
[Same size as Power Cabinet – 990(H) x 540(W) x 330(D)]

[Shows micro-ducts and fibre
trays - Serves c.50 Homes]



NRSWA Specification Compliance

- Same depth of cover to micro-ducts as Traditional VM trenches [*old CATV build*]
- VM FTTP narrow trench reinstatement is:
 - Conforming 'narrower' standard trenching
 - Reinstatements comply with all current SROHs/SRORs
 - It is **NOT** micro (or slot) trenching [*adopted by some other Communication Companies*]
- Trench backfill - options:
 - Mainly - Traditional sub-base granular materials [*use of modified compaction equipment*]
 - Alternative Option - Foamed Concrete:
 - SROH/SROR permitted – *VM can address any HA structural/encasement/water concerns (*)*
 - Permitted 'open' length tends to inhibit
- Marker Tape with metallic thread supports future traceability
- Any localised damage to footways will be repaired
- Final reinstatement quality influenced by pre-existing condition of footways

SROH – Specification for the Reinstatement of Openings in Highways [England and Wales]

SROR – Specification for the Reinstatement of Openings in Roads [Scotland and Northern Ireland]

(*) Virgin Media is fortunate in that its Alan Rainford chairs the HAUC (UK) SROH committee, and is able to promote Virgin Media's narrow-trenching both in Virgin Media terms, but, more importantly, from a position of UK technical authority in relation to compliance.



FTTP Narrow Trenching Benefits

- Physical:
 - Reduced overall impact on fabric of footways - during construction and long term
 - Underground Chambers minimal
 - Cabinet dimension/size reduced
- Environmental/Sustainability areas:
 - Volumes of excavated material going to Landfill Sites reduced
 - Volumes of reinstatement materials imported to site reduced
 - Fewer construction vehicles and movements
 - Improved carbon footprint
- Speed of Construction
 - Reduced impact on immediate householders/prospective customers
 - Reduced delays to all road users
 - Both support VM's key interface with Authority in terms of Street Works control
 - Current productivity:
 - UK Average c.50m per crew per day (5 Homes) [West Midlands currently at c.50m]
 - Best Regional Average – Northern Ireland c.75m per crew per day

FTTP – Compaction of Type 1 Sub-Base

“S10.3 Equipment Operation and Restrictions

1) All compaction equipment shall be used in accordance with the requirements of Appendix A8.

2) Additional guidance on compaction procedures and the maintenance of compaction equipment is included in Section NG10.3.

S10.3.1 Hand Rammers

Except as permitted in Sections S2.2.1 (4), S10.2.2 and S10.2.4 (1), hand rammers shall be permitted to assist the initial placement of material only. For all materials, full compaction shall be applied, in accordance with the relevant requirements of Appendix A8.

S10.3.2 Percussive Rammers

Percussive rammers shall be permitted for the compaction of reinstatement materials, in accordance with the following requirements:

- a) The nominal mass shall not be less than 10 kg.
- b) The width of the foot shall not exceed 200 mm
- c) The contact length of the foot shall not exceed 200 mm.

S10.3.3 Vibrotampers

Vibrotampers shall be permitted for the compaction of reinstatement materials, in accordance with the following requirements:

1) 50 kg Minimum Nominal Mass

- a) The width of the foot shall not exceed 5 mm per kg of the nominal mass. *[This is a maximum width stipulation]*
- b) The contact length of the foot shall not exceed 350 mm nor be less than 175 mm. *[Therefore foot Length (L) must be $175\text{mm} < L < 350\text{mm}$]*
- c) The foot contact area shall not exceed 1000 sq. mm per kg of the nominal mass. *[For a 75mm width of foot, this theoretically permits a Length (L) of over 600mm; therefore L(Max) of 350mm - under S10.3.3(b) - prevails]*
- d) The mass of any extension leg shall not exceed 10% of the nominal mass.

2) 25 to 50 kg Nominal Mass - permitted in areas of restricted access only

- a) The width of the foot shall not exceed 150 mm. *[This is a maximum width stipulation]*
- b) The contact length of the foot shall not exceed 200 mm.”



Visual comparison between Traditional and VM FTTP narrow-trenching



BUT accept this will not always be achieved –
pre-existing asset condition; rocky sub-grade

Any Questions/Contact details

- Any Questions or Issues not covered?
- Contact Details for follow-up queries/issues:
 - Alan Rainford BScEng CEng FICE FCIHT
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- Some non-Virgin Media Sales !!
 - Will be on VM Stand in Exhibition Area
 - Willing to take HAUC (UK) SROH Working Party Questions – 4th Edition Review