

S3 – Excavation



Researched, compiled and produced by



and



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Introduction- SROH S3

This advisory document is designed to assist incoming and existing Inspectors as support and refresher material. It will be provided in simple language to aid in understanding and avoiding technical or descriptive explanation.

The current edition (Ed 4) of the Specification for Reinstatement of Openings in the Highway (SROH) has been updated to assist readers in understanding, and introduce new methods and developments within street-works.

Remember, the SROH applies to works undertaken on carriageway's, footway's and verge's maintained at public expense (not private roads or land).

You will now be taken through the key items within S3 which will enable you to have a better understanding of what you should look for when monitoring excavation.



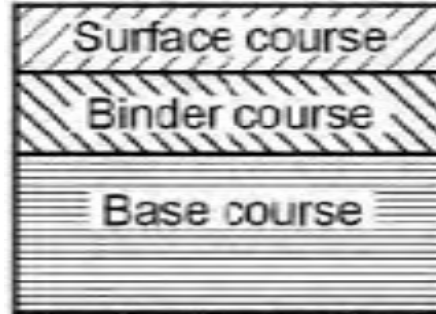
Please note:

This document is simply to aid in understanding of the Specification for the Reinstatement of Openings in the Highway (SROH) and should not be used for any other purpose. The simplicity of language is to assist in explanation, but may detract from certain technical or descriptive specification requirements and, therefore, the SROH should be consulted for clarity.

S3 Excavation

What is says in the SROH

S3.1.1 Care must be taken when cutting surface layers to avoid undue damage to the running surface or to the bond between the surface course and binder course. Cutting by machine, e.g. road saw, coring equipment or planer, is preferred. All loose materials must be removed to ensure that the excavated edge is in a safe and stable condition.



What it means

Maintaining the quality of the road surface is paramount. If you damage the existing layers you may cause the structure to fail after completion. Failure between layers may cause issues such as water penetration which is likely to freeze in cold weather and end up fracturing the surface layers. Therefore, it is so important to carefully cut the edges to reduce risk of damage.

Where you pre-cut using machines such as a road saw, large diameter core (*below*), or road planer, you will maintain the existing road surface by reducing the likelihood of cracking and de-bonding between existing layers. Therefore, it is less likely to cause failure after completion of works.



You can see from this image that a road saw was used to cut the bound materials on the surface. This also reduces the risk of the excavation process pulling or breaking the road surface layers. This provides a clean edge for final reinstatement whilst maintaining the integrity of the existing layers

S3 Excavation

What it says in the SROH

S3.1.3 When any material that may be of a historical or archaeological interest is identified (including natural material, cobbles or setts) excavation must stop. The authority must be informed as soon as possible and afforded the opportunity to inspect the material.

What it means

Whilst digging, if you find anything that looks unusual, or may be of historical interest you should stop works and report it to your supervisor. If necessary, this can then be reported to the highway authority to investigate.

You can see from this image that an excavation in the carriageway uncovered an old Roman road construction in Northumberland in 2020 and was documented by the authorities for its historical significance.



Whilst digging the trench shown on the right, workers found what was part of Hadrian's Wall below the road surface.

NOTE

Do not continue works if you discover something reportable as it could result in evidence of an offence



S3 Excavation

What it says in the SROH

S3.2.2 Trench widths should be such that adequate access is available for placement and, where non flowable materials are used, compaction of the surround to apparatus.

S3.2.3 Trench walls should be even and vertical with no undercutting of the running surface. If undercutting occurs and compaction is impossible, measures should be taken to fill any voids as soon as practicable or immediately after trench support has been provided.

What it means

You need to ensure you have enough space to work and place the apparatus to ensure proper compaction around and above it. When digging the trench or hole you should ensure the walls are straight and vertical to the surface. Undercutting means loose material should not fall away from under structural layers where it undermines them. If this occurs you should ensure it is repaired, or the area is cut out to avoid undermining.

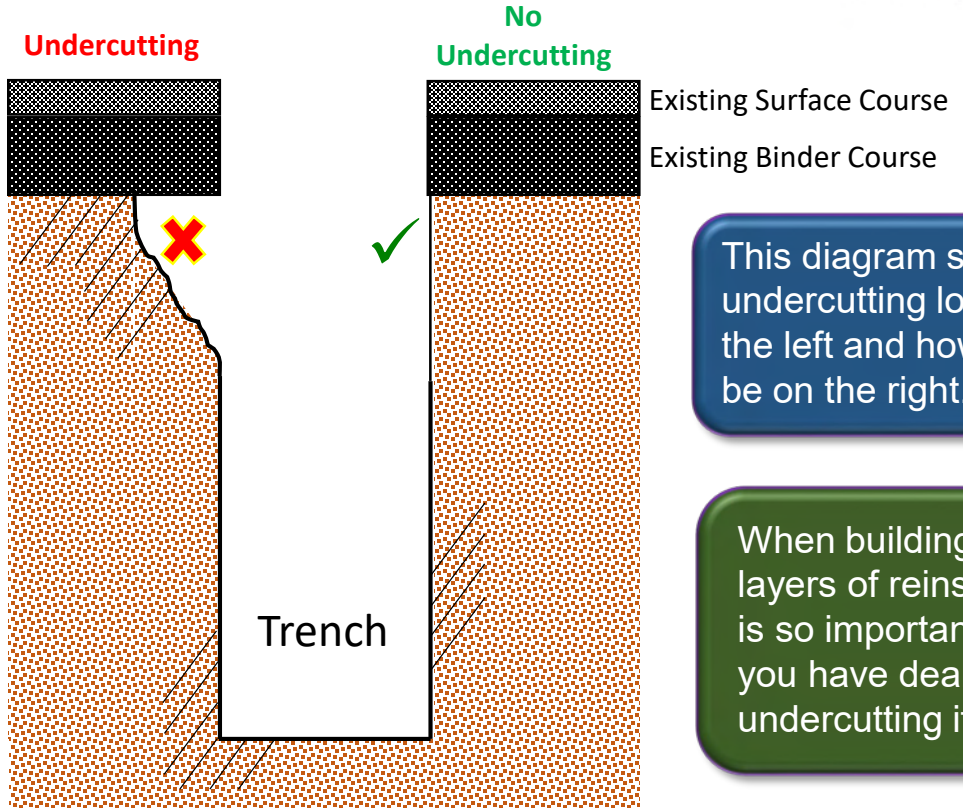


Good
vertical
trench wall



What happens if you don't repair undercutting?

It will leave a void below the existing surface which is likely to sink causing a surface defect beside your completed trench.



This diagram shows what undercutting looks like on the left and how it should be on the right.

When building up the layers of reinstatement it is so important to ensure you have dealt with undercutting if it occurs



Do not ignore undercutting as it is likely to create weakness.

S3 Excavation



What it says in the SROH

S3.2.4 Excavations must be protected, as far as is reasonably practicable, from the ingress of water, and water running into them must be drained or pumped to an approved disposal point.

S3.3.1 Excavated materials that are to be re-used should be protected from excessive drying or wetting during storage. Additionally, these materials should be excavated, stored, handled and laid to avoid contamination, segregation and loss of fines.

What it means

You must stop water from entering the excavation if you can, if it does find a way in you should pump it out. Water can cause weakening of the existing material and cause collapse and undermining as previously discussed.

If you want to re-use any of your excavated materials, you must ensure they are not affected by water, and are stored with protection so they are suitable for use. Excavated material not for re-use must be removed from site.



The excavation on the left will show where water has been mainly pumped out. The trench walls are weak and elements of previous collapse are evident in the sides and bottom. You can also see where parts of the upper layers have been undermined and are likely to further collapse. The effect of such flooding may require significant cut back to complete a successful reinstatement

If water is sediment-laden, you can only discharge a minimal quantity with permission of the Environment Agency. You also need to ensure that dirty water doesn't overflow onto pavements and roads as this is a pedestrian and traffic hazard not to mention unsightly for residents.

Be aware
if you need to remove
water from an excavation,
you may need to check if
you require a discharge
permit if is
contaminated.

Remember:
If materials for re-use are
water saturated, they will
never compact as required.



PLEASE
NOTE

S3 Excavation

What it says in the SROH

S3.4.1 The sides of excavations in soft or loose ground must be provided with a side support system in most cases. The support system must be designed and installed to restrain lateral movement of the walls and should be installed without delay.

What it means

When digging on soft, loose or bad ground, particularly at depths where operatives may become trapped or injured, the trench or excavation walls must be supported using correct and sufficient trench support. Do not continue to excavate where a risk of collapse exists where operatives or property is at risk.

Trench support may also be known as “shoring up”

What does side support involve?

It means where you add a system of support for the sides of the trench to stop it collapsing

Doesn't that make the work more awkward to do?

Sometimes, but you must ensure the excavation is safe at all times and never take any undue risk.

Ahh! It makes sense not to go into a dangerous trench.

Exactly, that's why you add support.



PLEASE NOTE



S3 Excavation

What it says in the SROH

S3.5.1 The undertaker must take all reasonably practicable measures to prevent the permanent disturbance of artificial or natural drainage systems/paths. Where disturbance does occur, it must be notified immediately to the owners of the system and any landowners who are affected. Disturbed systems must be restored to the requirements of the owner; see [S11.4](#).

What it means

If you come across any form of existing drainage when digging your opening, you must ensure it is not damaged, re-routed or affected by your works. There are many types of drainage system such as concrete pipes, clay pipes, perforated plastic or clay land drains, or simple french drains as an example. You should be able to identify them and all must be maintained without disturbance. If not you should inform the owner so a solution or repair is provided.

PLEASE NOTE
You don't want someone else's water leaking within your works, so make sure you don't damage drainage.



This is a standard clay pipe available in several sizes. It is mainly used for rain and storm water drainage along with older sewer connections.



This is a clay land drain for surface water and waterlogged areas. There are many shapes and types as can be seen on the next image.



As already mentioned, clay land drain types can come in many shapes and sizes. It is important that you are familiar with these if found when digging. Make sure they are still working as required and can carry water past or through works area.



This is a french drain, usually a trench filled with gravel over a perforated clay or plastic pipe. These are often covered over, so it important to make sure they are not damaged as they may affect your works if cut through or damaged.

S3 Excavation

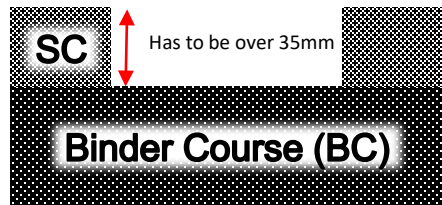
What it says in the SROH

S3.6.1 No shallow or aborted excavation is permitted to undermine the integrity of the remaining road structure. Any prematurely terminated excavation must be reinstated in accordance with the following requirements:

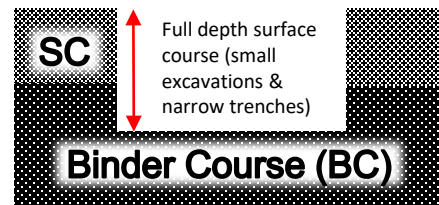
- 1) Where reinstatement can be achieved by laying a thicker surface course in accordance with A2, or S6.6 in the case of micro trenches, or S6.5 in the case of small openings and narrow trenches, no further excavation is required.
- 2) In all other cases, the binder course must be excavated to allow a binder course layer to be reinstated in accordance with A2. Where the existing depth of excavation is greater than 100 mm and the additional depth is less than the minimum layer thickness of base material, a thicker binder course may be laid.
- 3) In deeper excavations, no further excavation is required. Reinstatement must be carried out in accordance with the relevant requirements of S5 to S9, as appropriate.

What it means

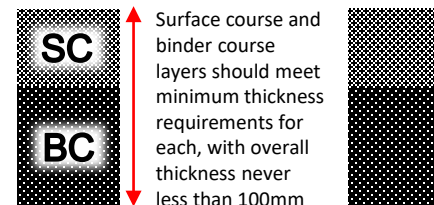
Be aware, if for any reason you need to abandon the works your reinstatement must comply with the SROH specification. You cannot lay shallow reinstatement that does not meet minimum requirements of the SROH (eg. 24mm of SC in carriageway). Full depth surface course may be used in small excavations and narrow trenches. Otherwise, you are required to reinstate surface course and binder course to comply with minimum layer values of the SROH. If the existing base layer is not fully excavated you can apply a thicker binder layer to fill it in. Where the excavation is deeper, you must reinstate to the SROH specification requirements for minimum structural layer values. This will be further explained below:



In a CW, if surface course has been dug out, it would need to be at least 35mm or more for a compliant SC reinstatement allowing for minimum tolerance for layer thickness ($40 - 5 = 35\text{mm}$)

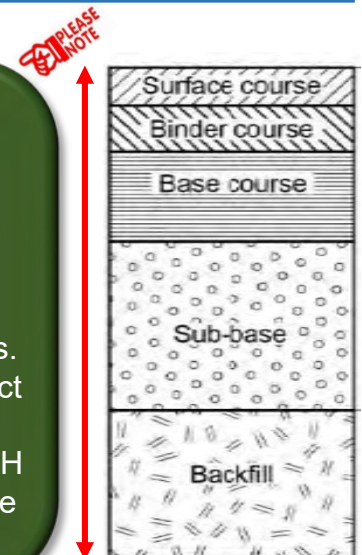


Surface course material can be laid to a thicker depth where abandoned dig has passed into existing binder layer in small excavations and narrow trenches.



If the abandoned dig area is greater than a small excavation or narrow trench and is over 100mm in depth, you are required to replace binder and surface course layers to comply with SROH

If you dig into the base course layer (bound or unbound) you can increase the binder course layer to fill the additional depth. However, if the abandoned dig has gone so deep as to pass base and other structural layers. You should reinstate with correct backfill, sub-base and base materials as shown in the SROH to correct layer thickness' where required.



S3 Excavation



What it says in the SROH

S3.7.1 Mole ploughing uses a ploughing machine to pull a flexible pipe or cable below ground. It is employed in unmade ground and may be used in verges. The mole plough creates a slit in the surface of the ground which should not require reinstating provided that the surface profile is restored in accordance with S9. However, where connections are made to apparatus installed by mole ploughing, excavations must be carried out and reinstated in accordance with this Code.

S3.7.2 Soil displacement moling and other trenchless methods do not create an excavation and, when carried out in a proper manner, do not require reinstatement. However, at launch and receive pits and at any intermediate excavations where connections are made to apparatus, reinstatement must be carried out in accordance with this Code.

What it means

As described in the SROH, the use of mole ploughs are accepted and they only cut a slot in verged areas which closes in after the pipe or cable has been installed as part of the process. Therefore, they are not classed as an excavation as they usually do not require any form of reinstatement. However, where there are inspection chambers, or any other form of apparatus linked to the installation it will usually involve digging and reinstating, and therefore, has to meet requirements of the SROH specification.

If the mole plough process has been proven to cause damage to footway, carriageway or associated infrastructure, the responsibility of remedial action will be directed to the relevant undertaker responsible for the works.



S3 - Summary



Why should you pump out water found in an excavation?

If you leave water in an excavation it can severely affect the existing ground and undermine the pavement structure

What should you do to keep out water during an excavation?

If you are excavating on a road or footway, you should use whatever means available to divert rain water or surface water away from the works by using items such as sand bags or alternative approved methods. When diverting water, ensure it is clean and not contaminated to an extent which may be considered an unlawful discharge.

If undercutting occurs, what should be done?

Where it occurs, every effort should be made to ensure that the risk of undermining and subsidence is avoided. This may be through correctly packing the area with appropriate materials, using materials such as foamed concrete if allowable, or cutting out the undercut area allowing for correct layers installation.

What is the importance of trench support or shoring?

Supporting trench sides, also known as shoring, is so important to use where the ground is loose, weak or very soft. It is to protect workers and equipment from collapse. **Do not enter any excavation unless you are completely sure it is safe.**

