

Road Openings & Reinstatement Specification

1 Introduction

The minimum recommended specifications for temporary and permanent reinstatements of trenches in roads, cycle tracks, footways and grassed areas are set out in this document. The diagrams and text describe both the materials to be incorporated in the works and the methods to be adopted. In some instances, special circumstances at a particular site may necessitate the use of materials other than those set out in this document, such as in the case of high skid resistant materials at junctions and pedestrian crossings etc. Any variations in these specifications must obtain the prior written agreement of the Road Authority in advance of commencement of the trench excavation works.

2 General Principles of Reinstatement

The reinstatement of any surface shall be completed so that all edges of the reinstatement are flush with the adjacent surfaces and the reinstatement shall not show any significant depression in between.

Definitions:

(i) Intervention:

Restoration of a reinstatement which does not comply with the performance standards to a condition which does comply.

(ii) Temporary Reinstatement

The placing and compaction of the surface layers and backfill materials (as per attached Drawings) of a trench (and its surrounding area) which has been excavated, to provide a sealed running surface for pedestrian and/or vehicular traffic for a period to allow for subsequent material settlement/movement (within the tolerances as set out in this document) in the trench backfilling or other trench constituents and in the surrounding area of the trench..

(iii) Permanent and Immediate Permanent Reinstatement

Permanent

The removal of any temporary reinstatement materials and the placing and compaction of the surface layers (as per attached Drawings) of a trench (and its surrounding area) which has been excavated and backfilled to provide a sealed running surface for pedestrian and/or vehicular traffic following a period during which temporary reinstatement has been carried out and allowed to settle. Such permanent reinstatement should be identifiably deemed permanent or agreed as being permanent by the Authority having ultimate responsibility for the reinstatement.

Immediate permanent reinstatement

A one-stage reinstatement procedure where a cement bound material rather than a granular material is used as a sub-base to make up the level to the base of the road pavement and the reinstatement is completed (as per attached Drawings).

Immediate permanent reinstatement must be completed within two weeks of completion of the sub base. Such immediate permanent reinstatement should be identifiably deemed immediate permanent or agreed as being immediate permanent by the Authority having ultimate responsibility for the reinstatement.

(iv) Maintenance Period:

If a maintenance period is called for in the licence or agreement the Undertaker shall ensure that the temporary reinstatement conforms to the prescribed standards until the permanent reinstatement is completed and that the permanent reinstatement conforms to the prescribed standard throughout the maintenance period. The maintenance period shall begin from the date on which the Road Authority issues the Maintenance Period Commencement Certificate and should continue for a minimum of 2 years. Where it is necessary to re-excavate a reinstatement to carry out an engineering investigation or to repair a defect, the reinstatement shall be deemed to be new and the maintenance period shall begin again.

The Road Authority should be satisfied as to the competence and financial standing of any Contractor allowed to carry out trench reinstatements.

2.1 Investigation of Services

Prior to carrying out any excavation for a trench, particularly in a public road, the Engineer/Contractor in charge of the work, Statutory Undertaker, Contractor or private individual should ensure that checks have been carried out to locate any existing pipes and/or apparatus in the ground. In particular, the following should be consulted:

1. Electricity Supply Board or other licenced undertakers in the Electricity Sector in the area.
2. Eircom or other licenced undertakers in the Telecommunication Sector.
3. Bord Gais Eireann or other licensed undertakers in the Gas Sector.
4. Local Authority
 - (a) Water Supply
 - (b) Sewerage
 - (c) Surface Water Drainage.
5. Local Piped Television Company.
6. O.P.W. - Archaeological Site.
7. CIE / Iarnrod Eireann - at or adjacent to level crossings and other properties of CIE / Iarnrod Eireann – way-leaves, licences, agreements may be required.
8. Adjacent Property Owners likely to be affected.

2.2 Survey

Prior to any excavation in a road or footway, the area to be excavated should be surveyed by the Road Authority to establish the condition of the road/footway.

All defects in the general area of the proposed excavation should be recorded. This should afford an opportunity to establish the need for repairs to areas immediately outside the proposed excavation at time of final reinstatement and also will help to avoid contention when permanent reinstatement is carried out.

This survey offers an opportunity to examine the proposed works in detail and will allow adjustments to the line of excavation as may be considered necessary. It is desirable, where practicable, to have road crossings at right angles across the carriageway and to ensure that any service boxes are located away from road junctions.

3 Construction Requirements

3.1 General

1. The precise line of the pipeline shall be agreed between the Contractor and the Road Authority before the commencement of construction.
2. The Contractor will cause to make good, damage to other services caused by the execution of the works at the Contractors own expense to the satisfaction of the appropriate Authority, Statutory Undertaker or Individual Owner.
3. Where necessary for protection purposes, existing vulnerable services in trenches shall be wrapped in 12mm neoprene rubber, or similar, before backfilling takes place.
4. It is the responsibility of the Contractor to locate all existing services, and to safeguard same during construction. The Contractor shall be liable for any damages arising and consequential damage to existing services.
5. Statutory Undertakers and service providers shall submit an “as constructed drawing/map” to the Local Authority Roads Department detailing the line and depth of the installed apparatus when work has been completed. Details of dates of excavation/temporary reinstatement and final reinstatement shall also be provided including confirmation in writing by a competent person acceptable to the Road Authority that the trench reinstatement complies in full with this Specification.
6. Streets and public roadways shall be cleaned and swept both during and after the installation work.
7. Any silting of downstream drainage facilities, whether ditches or pipe or catch pits/sumps which results from the works shall be cleaned out as part of the site clean up.
8. Any damage to storm drainage facilities and roadside features and furniture, which may be disturbed or blocked due to the works undertaken by the Licencee/Utility shall be replaced with new materials by the Licencee/Utility.
9. In the event of any interference with road markings, the Licensee/Utility shall arrange for immediate replacement with temporary markings and arrange with the Road Authority to have permanent markings restored in conjunction with final trench reinstatement. The cost of any replacement road markings shall be borne by the Licensee/Utility.
10. At the discretion of the Road Authority, if requested, prior to commencing any trench in a public road, a set of colour photographs 5” x 7” will be required every 20 metres along the roadway (or other spacing and location as may be specified). Such set of photographs shall be provided in albums which are catalogued and cross referenced.
11. Street surfaces shall be cleaned at the end of each days work with a power brush or other approved means.
12. Any pipes or other materials stored along the public roadway must be placed at a safe distance from the carriageway and hard shoulder and in such a manner as to avoid falling/rolling on to the roadway.
13. No excess material shall be disposed of along the public roadway.

14. All crushed rock backfill material shall be compacted to 95% of maximum density (Modified Proctor).

15. Longitudinal installations and trenches should be laid out parallel to the centre line of the road in so far as practicable.

16. In carriageways where excavations occur within 1 metre of a kerbline or construction joint, then, permanent (or immediate permanent) reinstatement must be undertaken to that kerbline or construction joint. In footpath where excavations occur, permanent (or immediate permanent) reinstatement shall extend for the full width of the footpath, be properly squared off and taken to the nearest original transverse joint. In all circumstances the permanent (or immediate permanent) reinstated surface finish must match the original.

3.2 Surface Water Drainage

In the case of any road opening, whether by Private Individual, Contractor, Statutory Undertaker or Local Authority, any surface water drainage system disturbed during excavation must be notified to the Road Department of the Local Authority and reinstated to the satisfaction of that Authority.

3.3 Special Case – Porous Asphalt/Macadam Surfaces

In the case of trench formation where there is a bituminous surface layer/wearing course of porous asphalt, porous macadam or other permeable material designed to act as a conduit for surface water and discharge it to the side or to an edge drain special reinstatement requirements will be necessary. In such circumstances it will be necessary to remove and reinstate the full width of such porous material draining to and across the trench from the crown or high point to the discharge point unless otherwise specified or agreed with the Road Authority in writing in advance.

4 Identification Markers

4.1 Marker tapes

Distinctive marker tapes are to be provided over all underground services including those for which the Local Authority is itself responsible viz. water, surface water and sewerage.

The following colour codes on marker tapes are to be incorporated in all trenches in public roads at the depths shown in attached Drawings.

Service	Duct / Pipe Colour	Marker Tape Colour *
Electricity	Red	Red
Telecommunications	Green or Grey	Green
Gas	Yellow	Yellow
Water Supply	Blue / Black	Blue
Sewerage	Brown	Brown
Surface Water	Black	Black
Cable T.V.		Chevron of Red/Blue/Green
Other Services		Chevron of Black/White

*Marker Tapes should be a minimum 125mm wide.

4.2 Metal Plates

Metal plates should be included with all non metallic ducting/services e.g. concrete or PVC ducts, watermains, gas mains etc. in order to assist in subsequent location of the service by means of metal detector. This will be of particular benefit in effecting emergency repairs. The recommended spacing for such plates is at 25 metre intervals and over each connection point not characterised by a junction box/manhole or other visible feature, the plates should be a minimum 125mm x 125mm - preferably galvanised. Depth of installation should usually be 300mm. The option of placing a continuous metal strip or wire to enable subsequent location as an alternative to metal plates is also acceptable.

5 Rubber Tyred Excavators/Tracked Excavators

The use of rubber tyred excavators is obligatory for trenches in public roads. The road surface shall be protected from the jacks of such machines by means of suitable rubber or timber pads or by other such approved means.

Where in exceptional circumstances, with the prior written consent of the Road Authority for reasons of depth or difficult digging, it is necessary to utilise tracked machinery, the Engineer in the case of direct Local Authority works, or Licensee in other cases should ensure and agree with the Local Authority that the project includes adequate funds to enable subsequent repair of areas outside of the reinstatement width of the trench itself which will be damaged due to the movement of the tracks on the road surface and by machine slewing actions, etc.

6 Cutting the Road Surface

In bituminous and concrete road surfaces and footways, the trench lines shall initially be cut utilising a concrete saw or equivalent mechanical means to the full depth of the bituminous or concrete material prior to any excavation work. This helps to reduce the overbreak at the excavation stage and to keep the upper road pavement layers adjacent to the trench intact.

It is important to reduce the factors, which contribute to adjacent road damage to a minimum. Where a trench is opened in a public road, the continuum of the unbound material in compression which provides strength to adjacent areas is removed and its sides are subjected to stresses from various sources, such as:

1. Wedge shaped break from surface.
2. Earth slip circle.
3. Traffic wheel load too close to the edge of the trench.
4. Construction traffic wheel/track loads.

The duration for which the trench is open is an important factor in the subsequent behaviour of the trench. For this reason, the time should be kept to a minimum in order to reduce the risk of failure and consequent damage both within the trench and on the adjacent road surface.

The use of trench boxes also helps to reduce subsequent damage. The use of bulk-head wheel stops for safety reasons will also prevent damage by construction traffic.

7 Backfilling

Following the excavation of a new road trench, and laying or repair of utility apparatus, trench reinstatements commence with a backfilling operation. The ultimate performance of the restored trench will be greatly influenced by the manner in which this backfilling operation is carried out. It is vital therefore that the correct backfill materials are utilised and that the compaction methods employed are in accordance with the best engineering practices.

Supports must be progressively withdrawn as backfilling and compaction progresses and any voids carefully filled.

The use of conveyor belt side fillers is desirable.

8 Compaction

The material shall be compacted in layers by mechanical means in accordance with the National Roads Authority's Specification for Road Works, using either Vibratory Rollers with mass per unit width not exceeding 2300kg, or Vibro Tamper or Vibrating Plate compactors. No mechanical compaction is permitted within 400 millimetres vertically of the crown of pipes and this material should be placed and compacted utilising manual means. Material below and adjacent and around the sides of pipe installation however should be mechanically compacted.

Proper compaction of the material is vital. Compaction plant should be selected carefully to give the best results on the material used. Specialised equipment can sometimes be required for narrow trenching or restricted sites but the following plant is likely to be the most commonly used means of compaction for the majority of reinstatement.

HAND RAMMER	used for the compaction of all material where access is severely restricted, e.g. around underground services or street furniture. Should not be used as a substitute for mechanical compaction equipment.
VIBRO TAMPER	easily transported and handled and especially suitable for narrow trench-work. delivers between 450 and 650 blows per minute through a small plate to effect compaction. is not recommended for the compaction of base or wearing course materials.
VIBRATING ROLLER	the preferred method of compaction of bituminous materials. may be single or twin drum. not suitable in small and/or narrow excavations with restricted access.
VIBRATING PLATE	available in a range of weights and sizes of plate. suitable for compaction in trenches. can be used for bituminous materials but will not give a good surface finish.

It is not acceptable to place the backfill material and compact at a later stage when other layers have been placed, or compact excessive depths from the surface of the trench. Such a practice generally gives rise to excessive post-construction settlements and should not be permitted.

Compaction of trench backfill materials shall be carried out in accordance with the following clauses of the N.R.A. Specification for Road Works:-

Clause 802 for granular materials, and
Clause 1035 for cement bound materials, and
Clause 1043 for foamed concrete for backfilling excavations.

9 Permanent Reinstatement

The temporary surface shall be completely removed to the depth specified in the relevant Drawing. The exposed surface shall be regulated with the same material and thoroughly compacted in accordance with the National Roads Authority's Specification for Road Works. The remainder of the permanent reinstatement work shall be in accordance with the Standard Drawings.

10 Intervention Criteria/Tolerances

Notwithstanding the minimum general recipe type specifications relating to materials and methods, the following paragraphs set out performance standards to which road surface profiles should comply in order to be deemed acceptable. These criteria apply to temporary and permanent reinstatements in order to determine acceptability. Exceedance of any of these parameters during the period of temporary reinstatement requires corrective intervention on the part of the responsible road opening Licencee. Exceedance of such parameters in the specified period subsequent to the permanent reinstatement where such has been carried out by the Statutory Undertaker or other Licensee under guarantee also requires corrective action on the part of the road opening Licensee prior to any take-over of responsibility by the Road Authority.

Furthermore any defects such as crocodile cracking or potholes as outlined in An Foras Forbatha Publication RC 337 require corrective intervention.

Where intervention is required and carried out, the specified period for temporary and/or permanent reinstatement shall recommence.

The tolerances as set out below are recommended having regard to safety and achievement of best engineering standards and having regard to practical working limitations.

It is important to note that intervention limits are only an indication of the performance of the reinstatement and are not a statement of hazard existence. Furthermore Local Authorities may devise and apply more stringent criteria than those outlined below having regard to their own experience.

10.1 Recommended Criteria:

Edge Depression

Corrective intervention shall be required where the depth of any edge depression exceeds the limits shown in Tables 1, 2, and 3 below.

Surface Depression

A surface depression is a depressed area within the reinstatement having generally smooth edges and gently sloping sides forming a shallow dish. Corrective intervention is required where the depth of any area of surface depression exceeds the limits shown in Tables 1, 2 and 3.

Surface Crowning

The upstand of the reinstatement above the level of the existing adjacent surfaces spanning more than 100mm in any plan dimension shall not exceed the limits shown in Tables 1, 2 and 3.

Fixed Features

The maximum allowable tolerance between the levels of fixed features including concrete products and ironware shall not exceed ± 6 mm.

Table 1 Concrete Footpaths

Intervention	Reinstatement Width (mm)								
	Up to 400	nom 450	nom 550	nom 650	nom 750	nom 850	nom 950	nom 1000	nom >1000
Edge Depression	5	5	5	5	5	5	5	5	5
Surface Depression	4	4	5	6	7	8	9	10	10
Surface Crowning	4	4	5	6	7	8	9	10	10

Table 2 Concrete Roads

Intervention	Reinstatement Width (mm)								
	Up to 400	nom 450	nom 550	nom 650	nom 750	nom 850	nom 950	nom 1000	nom >1000
Edge Depression	6	6	6	6	6	6	6	6	6
Surface Depression	8	8	10	10	10	10	10	10	10
Surface Crowning	8	9	10	10	10	10	10	10	10

Table 3 Flexible/Composite Roads and Footpaths

Intervention	Reinstatement Width (mm)								
	Up to 400	nom 450	nom 550	nom 650	nom 750	nom 850	nom 950	nom 1000	nom >1000
Edge Depression	5	5	5	5	5	5	5	5	5
Surface Depression	8	9	11	13	15	15	15	15	15
Surface Crowning	8	9	11	13	15	15	15	15	15

11 Safety/Signposting of Works

The arrangement of signs and other safety aspects at trench reinstatement works should be in accordance with the latest editions of “**The Traffic Signs Manual: Chapter 8 – Temporary Traffic Measures and Signs for Road works**” and with the Dept. of Transport document “**The Guidance Document for the Control & Management of Traffic at Road Works.**”

The full range of signs shall be maintained in place until such time as the temporary reinstatement has been completed and also during the permanent reinstatement works.

Before temporary traffic lights are permitted timings, which should normally not exceed 3 minute whole cycle duration, should be agreed with the Road Authority in advance of commencement of the work. Whole cycle duration's in excess of 5 minutes shall not be permitted.

Each site must display a minimum of two Roadwork Identification Signs, positioned to be clearly visible to approaching traffic and pedestrians from either direction. Each sign must indicate the Utility / Company name, the Utility / Company telephone number and the Contractors name and telephone number if applicable.

Excavations must be adequately lit and protected at night.

12 Quality Control

All materials should be in accordance with the most recent version of the **National Roads Authority's 'Specification for Road Works' and the relevant Irish Standards, British Standards and European Standards.** As the quantities of materials used in trench reinstatement will generally be quite small, special care will be required to ensure compliance with specification. Additional testing of materials will often be required. Ongoing measurements to establish compliance with the performance criteria should also be carried out. The schedule of sampling and testing set out in Table 4 is recommended in cases involving a minimum of 100 tonnes of bitumen bound materials or cement bound materials and/or 200 tonnes of granular unbound materials. On jobs involving quantities less than the above the commencement samples and minimum rate should apply, except where the Engineer is satisfied from experience of the source of the material and the consistency of quality from the particular supplier.

Table 4 Testing Schedule

Granular/crushed rock materials (including Clause 804 and Wet Mix)

Sampling Rate	1 at commencement of works and 1 per 200 tonnes thereafter
Test for	Grading (Wet grading required), Moisture content and liquid limit

Bituminous Materials

Sampling Rate	1 at commencement and thereafter 1 per 100 tonnes
Test for	Binder Content, Viscosity, Penetration, Grading, Temperature (twice daily) Also check delivery, laying and rolling temperatures

Bituminous Emulsion

Sampling Rate	1 per tanker delivery
Test for	To comply with the requirements of the DOE Specification for Surface Dressing

Concrete Materials

Sampling frequency	1 per 20 tonnes
Test for	Cube Strengths and Slump
Establish	Quality performance at Manufacturing Plant including current margins, cement content and source/quality of aggregates

These rates may be increased at the discretion of the Engineer depending on results and on site circumstances.

13 Method of Reinstatement:

The reinstatement shall be carried out in accordance with the Specifications as set out in the Reinstatement Drawing Notes and Reinstatement Drawings.

If in doubt as to requirement in any specific case consult with the relevant Area Engineer in the Local Authority or his/her Representative.

14 Reinstatement Drawing Notes

1. All works shall be in accordance with the **N.R.A Specification for Road Works and any conditions specified in the Road Opening Licence.**
2. Control and signposting of roadworks shall be in accordance with the latest editions of **“The Traffic Signs Manual: Chapter 8 – Temporary Traffic Measures and Signs for Road works** and with the Dept. of Transport document **“The Guidance Document for the Control & Management of Traffic at Road Works”** and any specific conditions contained in the Road Opening Licence.
3. Excavations shall be sufficiently protected to avoid harmful effects of adjacent wheel loading from both traffic and construction vehicles and to prevent undermining of the adjacent pavement.
4. If undermining of the adjacent pavement occurs, it must be cut back 75mm beyond the edge of the collapse along the whole of that section of excavation to maintain a straight edge parallel to the original excavation.
5. The specification for buried services shall be appropriate to sustain the relevant traffic loading at the depth of cover of the installed service.
6. A minimum 50mm clearance is required vertically and horizontally between individual ducts or services installed in a group.
7. Material in which services are to be laid shall be sufficiently compacted to prevent the occurrence of residual consolidation.

8. **Temporary Reinstatement** is defined as the first stage of a two-stage reinstatement procedure where a DBM temporary surface course is laid over a sub-base of granular rather than cement bound material. The surface course shall be designed to last for a minimum consolidation period of six months and must seal and maintain the area of backfill and provide a safe and serviceable surface for vehicles and other road users.
9. **Permanent reinstatement** is defined as the second stage of a two-stage reinstatement procedure where the temporary reinstatement is removed and the permanent pavement reinstatement is completed.
10. **Immediate permanent reinstatement** is defined as a one-stage reinstatement procedure where a cement bound material rather than a granular material is used as a sub-base to make up the level to the base of the road pavement and the reinstatement is completed. Immediate permanent reinstatement must be completed within two weeks of completion of the sub base.
11. Granular material shall be to Cl.804 (which is Granular Material Type B) or to Cl.806 wetmix macadam and shall be compacted in layers not exceeding 150mm and in accordance with Cl.802. Granular material may not be used where a Road Authority specifies Immediate Permanent Reinstatement.
12. Cement bound material shall be to Cl.1038 or Cl.1039 for lean mix concrete or Cl.1043 for foamed concrete.
13. Longitudinal installations and trench excavations shall be straight and laid out parallel to the centre of the road/footway in so far as is practicable. In the case of transverse road or footway crossings, where practicable, the alignment shall be at right angles to the kerb or property line. Where it is necessary to have a crossing at a skew angle the area of reinstatement shall be extended.
14. All edges of excavated areas on concrete or bituminous footways and roadways shall be saw cut to form trimmed edges. For permanent reinstatements, a trimmed edge shall be a minimum of 100mm from the firm edge of the excavation.
15. Excavation on a road shall not be not be closer than 300mm to the kerblines in order to prevent undermining of the adjacent footway.
16. Service boxes or chambers shall be located away from road junctions as far as practically possible. The final locations and sizes of service boxes or chambers shall subject to prior written approval from the Road Authority.
17. Careful consideration should be given to the route of service openings where expensive reinstatement may be required (e.g. traffic loops, special surfaces, etc.).
18. The use of a backacter is assumed for mechanical excavation. The use of other means of mechanical excavation (e.g. trencher/top cutter) shall be subject to prior written approval from the Road Authority. The use of rubber tyred excavators is required for trenches in public roads.
19. Temporary direction signs and/or road markings required for the roadworks must be in place at all times during the work and must be removed immediately following completion of the work.

20. (a) Where road markings are removed or damaged a record of the layout and locations shall be taken by the utility/company in order to facilitate their reinstatement upon completion of the works.
- (b) All road markings shall be reinstated by the appropriate utility/company immediately after permanent reinstatement is completed. The road marking shall be carried out by a reputable lining contractor approved by the Road Authority.
- (c) Where coloured surfaces or anti-skid surfaces are damaged they must be reinstated by the utility/company as part of the permanent reinstatement. Full width reinstatement must be carried out to the Road Authority's specifications.
21. Where steel plates are used they must comply with the following:
- The plates must be set in flush with the road surface
 - **They must have an anti-skid surface.**
 - The plates shall be fixed to the road surface (to prevent dislodgement) by means of countersunk holding down bolts. A groove is required to be made around each excavation into which the plate shall sit and be fixed.
 - Consideration should be given to accidental wheel loading, where appropriate.
 - The utility/company and its contractor will be responsible for the structural adequacy and safety of any such plates.
22. Road Authorities may specify minimum cover of 750 mm to services on roads.
23. The use of compacted sand (in lieu of Clause 503 material or foam concrete) to surround service pipes shall be subject to the prior written approval of the Road Authority.

15 Cement Bound Materials:

Cement Bound Materials shall be in accordance with the N.R.A *Specification for Road Works* and any conditions specified in the Road Opening Licence.