TIMARU DISTRICT COUNCIL
Te Kaunihera ā-Rohe o Te Tihi o Maru

Land Transport
Connecting Our Community

Timaru District Council | Land Transport Unit

Backfill & Reinstatement Requirements Guide

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Prepared By

Document Owner	Organisation
Land Transport Unit	Timaru District Council

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About this Guide

This Guide outlines the minimum backfill and reinstatement requirements when completing works on the Timaru District road network. This includes both Council contract works, as well as any private and/or utility operator works on the network.

It is critical that works are completed to a consistent, quality standard – providing optimum value for ratepayers and ensuring robust transport connections within our community. The requirements set out in this document will support both Council and industry to achieve this.

From 1 July 2022, the requirements set out in this Guide are mandated and will be monitored within the Corridor Access Request (CAR) process. All contractors will need to meet the requirements to achieve completion status and to enable the warranty period of the works to commence.

Ongoing, the requirements will be reviewed and updated at regular intervals, in keeping with industry best practice.

Contents

Glossary of Terms and Definitions

AC – Asphaltic Concrete

CBR – California Bearing Ratio

Clegg Hammer – where a Clegg Hammer is to be used, then it shall be the standard Australian Digital model with a 4.5kg compaction hammer, using a drop height of 450mm.

Clegg Hammer Impact Value (IV) – the Clegg Hammer Impact Value is defined as the reading at the end of the 4th blow.

Kerb and Channel - any kerb, kerb and channel or channel that exists within the Timaru District Council road network.

MDD – Minimum Dry Density

NDM – Nuclear Density Meter

Vehicle Crossing Apron – the section of footpath between a compliant formed kerb and channel and the property boundary used for the purpose of vehicle access to a property.

One Network Road Classification and One Network Framework

Road Controlling Authorities around New Zealand classify roads under the One Network Road Classification (ONRC).

The Timaru District Council has assigned each road on the network an ONRC classification. Minimum reinstatement criteria can change depending on what area of the network works take place. The Corridor Manager can be contacted for assistance in confirming the minimum reinstatement criteria for works.

The One Network Framework (ONF) is the successor to the ONRC and will be adopted by the Timaru District road network in due course. Updated information will be provided once functional classification of the Timaru District network has taken place.

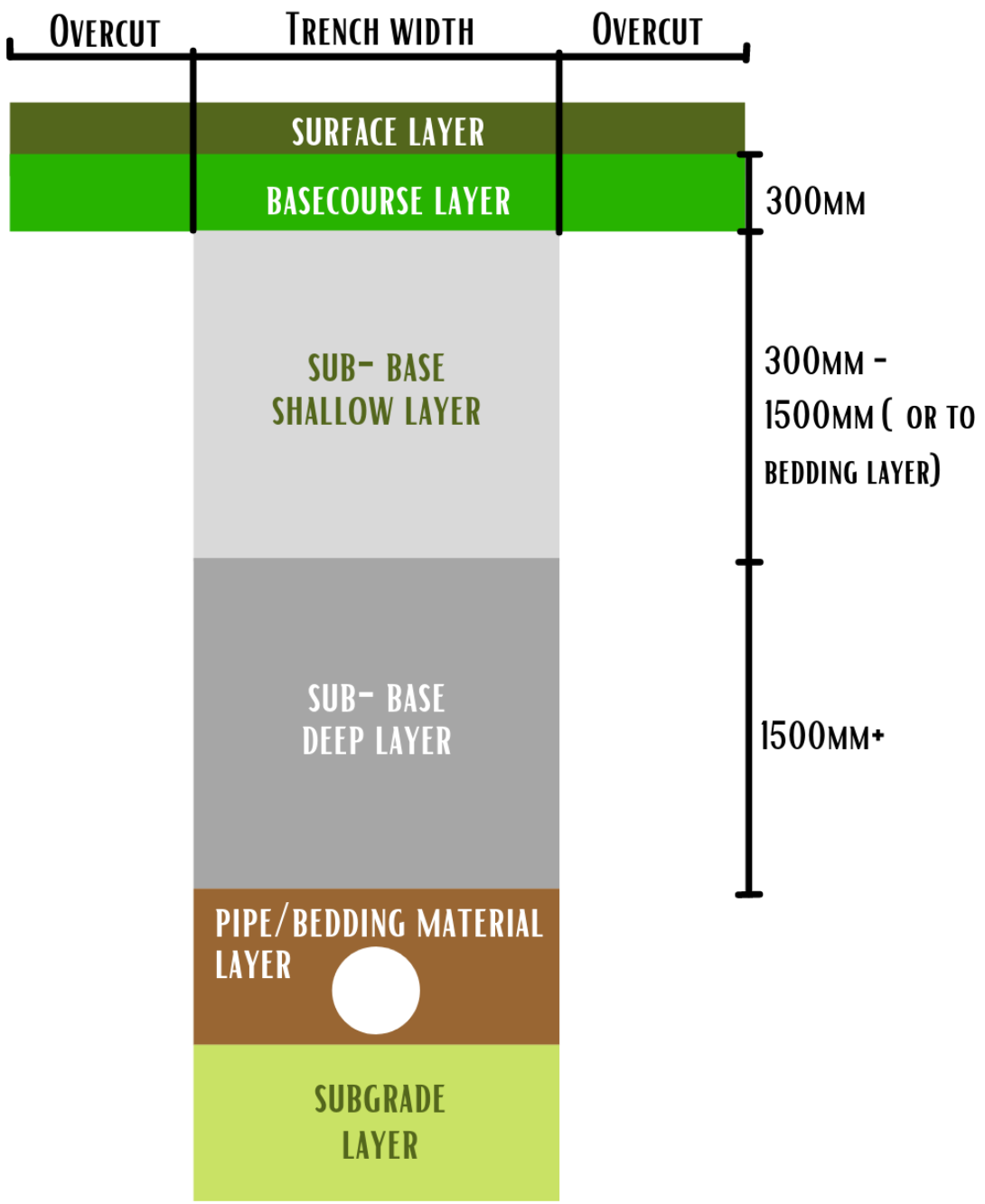
The road classification applies to all assets on that particular road and information identifying the ONRC/ONF classification can be found on the Mobile Roads application: www.mobileroad.org .

More information on ONRC and ONF can be found at https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group.

Typical Trench Example

Figure 1 below provides an example of a typical trench excavation. The sections of this guide that follow outline the minimum reinstatement requirements for each layer. Please note that the reinstatement requirements for the pipe/bedding material layer are set out by the utility owner and as such are not included in this guide.

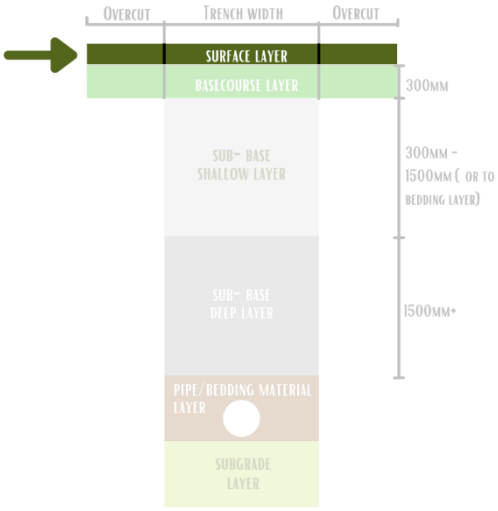
Figure 1 – Typical Trench Example



Section 1 – Surface Layer Reinstatement

Surface material must match the existing surface in type, quality, texture, skid resistance, strength and ride quality. The surface shall also be continuously graded towards storm water drainage channels or gullies and be shaped to avoid ponding.

Figure 2 – Surface Layer



1.1 CONDITION OF PAVEMENT SURFACE FOR SEALING

The surface of the pavement at the time of sealing shall be free from loose material, reasonably dry and tightly compacted using compliant material to achieve a clean stone mosaic finish.

Any pre seal inspections required shall be undertaken at most 24 hours prior to sealing taking place. Once the inspection has been undertaken by the Corridor Manager or their nominated representative and passed for sealing, the CAR holder shall be responsible for maintaining the pavement to this condition until sealing takes place. Any works required to maintain this condition shall be at the CAR holder's expense.

1.2 CHIPSEAL SURFACING

It is the responsibility of the CAR holder to select a chipseal design that is appropriate for the traffic application and matches the existing chipseal surface.

Chipseal design details must be kept and provided to the Corridor Manager upon request.

1.3 CHIPSEAL BINDER REQUIREMENTS

Binder shall comply with **NZTA M01:2020 Specification for Bitumen** and shall be suitable for the traffic application at the location of the area of trenching/excavation.

Binder shall be applied at a consistent rate that allows for uniform coverage over the sealed area, and shall be sprayed at the correct design temperature.

No spraying shall be carried out when the air temperature measured within the confines of the sealing area is below 10° C.

Records of binder application rates shall be kept and provided to the Corridor Manager upon request.

1.4 SEALING CHIP REQUIREMENTS

Chip used for sealing shall comply with **NZTA M06:2019 Specification for Sealing Chip.**

The spread rate of chips shall be such that complies with the existing surface design and consistently covers the sealed area. The rate of chip spread shall be controlled so that the finished surface texture matches the existing surface texture.

Prior to the sweeping and removal of surplus chip, at no point shall the chip be allowed to migrate away from the sealed patch so as to cause a hazard to road users, or be allowed to migrate into any stormwater or surface channels or discharge points.

Sweeping and removal of surplus chip from the site shall be carried out no later than 7 days after the sealing operation. Every precaution shall be undertaken to ensure that chips which are in contact with the binder are not removed.

Not more than 50 grams weight of loose chips shall be left on any two metre square area of the surface.

1.5 ASPHALT SURFACING REQUIREMENTS

Asphaltic Concrete used for sealing shall comply with **NZTA M10:2020 Specification for Dense Graded Asphaltic Concrete.** AC mix types commonly used in the Timaru District Council owned roads are outlined in table 6 below.

Asphalt shall be laid at the same mix type and thickness to the surrounding surface unless specified otherwise by the Corridor Manager.

All joints between the new and existing asphalt surface shall be finished with bandaging on the carriageway. Bandaging material and application shall comply with industry standards and be as approved by the Corridor Manager.

Table 1 - Timaru District Commonly Used Asphalt Mixes

Location/Traffic Application	ONRC Classification	Mix Type
Industrial Roads	All Classification	AC 14
High Use Urban Roads	Regional to Secondary Collector	DG 10
Residential Roads	Access and Low Volume	DG 10
Footpaths	All Classifications	DG 7
Residential Vehicle Crossings	All Classifications	DG 7
Light Commercial Vehicle Crossings	All Classifications	DG 7

1.6 TACK COATS AND MEMBRANE SEALS

Table 2 below outlines where a tack coat or membrane seal is required prior to placing asphalt.

A tack coat shall consist of bituminous emulsion and shall be applied at a consistent rate to ensure an even application of the tack coat.

A membrane seal shall be a single coat grade 4 chip seal using recognised designs and must be applied as a pre-treatment for all asphalt surfacing on any road carriageway. At no point is a tack coat acceptable to use as a surfacing pre-treatment on the road carriageway.

Photographic evidence of the tack coat/membrane seal and evidence of binder application rate is required to be kept and provided to the Corridor Manager upon request. This may be uploaded to the CAR at the time of notifying works completion.

Table 2- Asphalt Surface Pre-Treatments

Location in Road Reserve	Pre Treatment Type	Application Rate
Footpath	Tack Coat	0.5L/m^2
Carriageway	Membrane Seal	At least 1.0L/m^2

1.7 ASPHALT APPLICATION METHODOLOGY

Asphalt shall be placed using the approved methodology outlined in Table 3. Any variation to the approved methodology is strictly at the discretion of the Corridor Manager and additional specifications may be demanded at the CAR holder's expense to manage risks to the asset by using a differing methodology to what is defined.

Table 3 - Approved Asphalt Application Methods

Location	Area To Be Sealed	Approved Method
Carriageway	Less than 20m^2	Hand Laying of AC acceptable
Footpath	Less than 10m^2	
Carriageway	More than 20m^2	AC to be laid by a self propelled levelling mechanical paving machine with a tamping bar as per TNZ P/09
Footpath	More than 10m^2	

1.8 CONCRETE INDUSTRIAL VEHICLE CROSSINGS

Concrete Industrial Crossings shall be constructed to the relevant standard construction specifications that can be found on the Timaru District Council website. The CAR holder shall keep records of the following information to be made available at the request of the Corridor Manager;

- Reinforcing Mesh used that complies with the requirements in the standard drawing used.
- Evidence that Concrete 28 Day strength complies with the requirements in the standard drawing used.

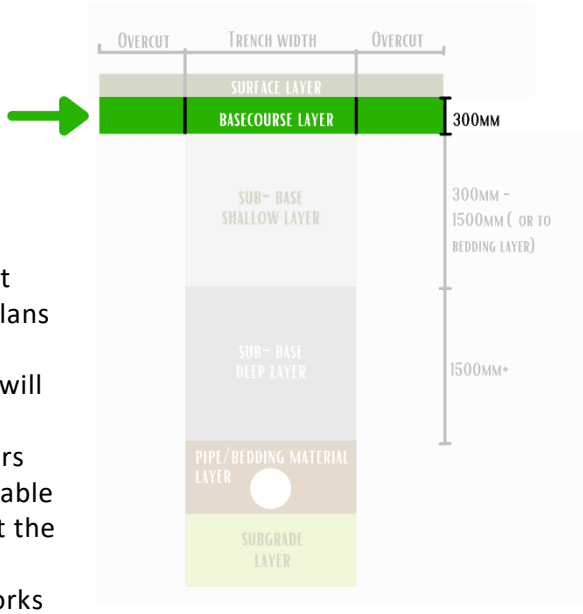
1.9 BERMS

The top 20mm of the basecourse layer being clean topsoil, free from any debris over 10mm nominal size, shall be dragged and trimmed to reduce the surface to be tilt free from clods. The top layer must be free and open in preparation for the application of seed. It is the responsibility of the CAR holder to ensure that the seed strike is successful and growth is consistent throughout the area reinstated.

Section 2 - Basecourse Layer Reinstatement

Backfilling your excavation with the correct material and ensuring that it is well compacted is important to ensure that not only the excavation lasts, but also that it does not damage the surrounding pavement or other assets.

Figure 3 – Basecourse Layer



The basecourse layer consists of the material directly below the surface layer as demonstrated in Figure 3. Basecourse thickness will vary depending on what asset you are working on. Timaru District Council Standard plans can be found at https://www.timaru.govt.nz/council/publications/construction-standard-specifications and will specify basecourse layer depth required.
Placement and compaction of all layers must be in layers not exceeding 200mm compacted thickness. Refer to Table 5 for material and compaction requirements. Note that the Corridor Manager may specify different basecourse reinstatement requirements at the time of issuing a works access permit. If this occurs then those requirements are to be complied with in full.

Table 5 – Basecourse Layer Material and Compaction Requirements

Basecourse Layer Type	Minimum Requirements
Carriageway and Kerb and Channel Construction depth to 300mm down from surface layer	• Material: M/4 AP40 • Max. Compaction Layer: 200mm • Compacted minimum dry density 98% MDD as per TNZ B/2 Specification • Clegg reading not less than 35 – **Clegg Hammer testing approval for Access or Low Volume Classified Roads with a posted speed limit of 50kph or less only – Refer to Table 3 for more details.**
Vehicle Crossing Apron Construction depth up to 200mm from surface layer- refer to relevant vehicle crossing standard plan for specific depth	• Material M/4 AP40 • Max. Compaction Layer: 100mm • Compacted minimum dry density 95% MDD as per TNZ B/2 Specification • Clegg reading not less than 30
Footpath Construction depth to 100mm from surface layer	• Material: M/4 AP20 • Max. Compaction Layer: 100mm • Compacted minimum dry density 95% MDD as per TNZ B/2 Specification • Clegg reading not less than 25
Berm Construction depth to 100mm from surface layer	• Material: Clean Topsoil, free from any debris over 10mm nominal size • Max. Compaction Layer: 100mm • Topsoil material to be lightly compacted and must be sufficient to ensure that settlement of material does not move under-foot.

2.1 BASECOURSE LAYER OVERCUT REQUIREMENTS

Table 6 – Basecourse Layer Overcut Requirements

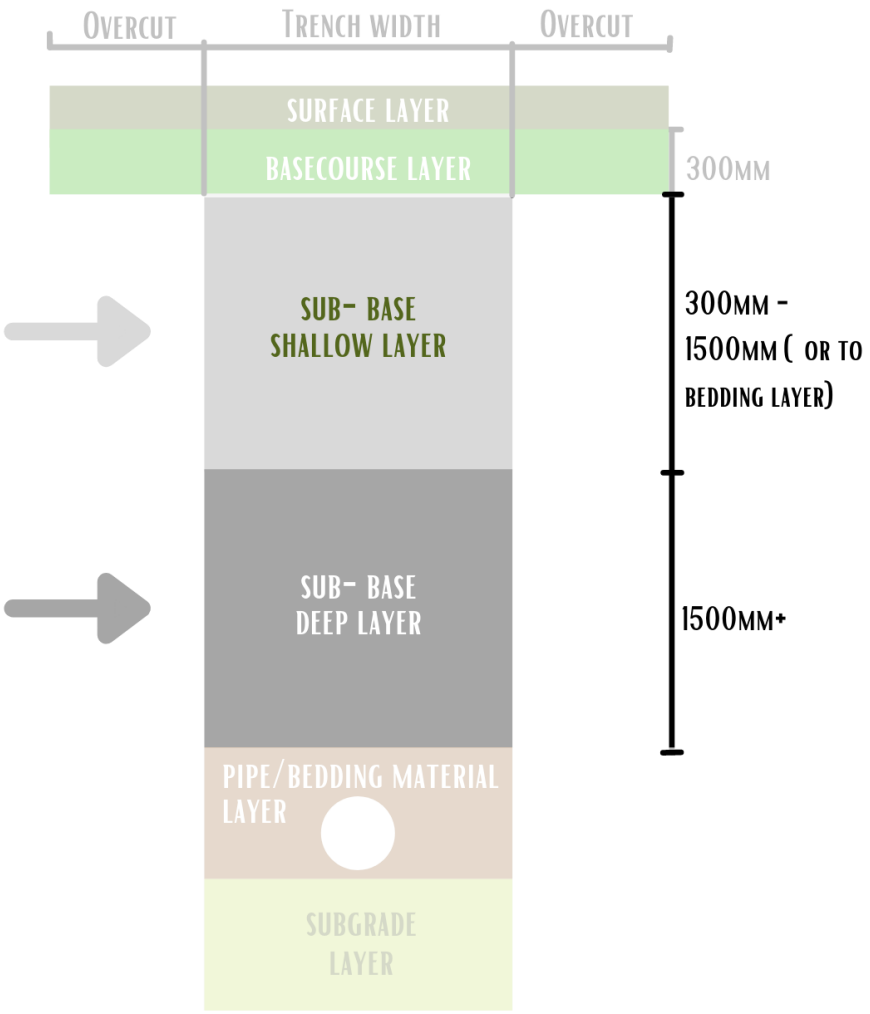
ONRC CLASSIFICATION	MINIMUM OVERCUT REQUIREMENTS	MINIMUM PLANT TO BE USED IN COMPACTION
Works occurring across the road e.g. road crossings and lateral connections		
Asphaltic concrete (AC) carriageway surface		
All ONRC Classifications	700mm each side of the trench	Construction roller
Chipseal or unsealed carriageway surface		
Regional/Arterial	700mm each side of the trench	Construction roller
Primary/Secondary Collector	300mm each side of the trench	Reversible plate compactor/pedestrian roller
Access/Low Volume	150mm each side of the trench	Plate compactor
Works occurring down the road e.g. mains construction or other works running longitudinally down the carriageway		
All ONRC Classifications – any surface type	As agreed with Corridor Manager – early engagement with Land Transport Unit during design stages highly recommended	As above

Section 3 – Sub-base layer Reinstatement

The Sub-base layer has been split into two sub-categories. How many Sub-base layers are to be reinstated depends on how deep the service is being installed.

- **Sub-base Shallow** – Generally this layer is situated 300mm down from the surface layer to 1500mm.
- **Sub-base Deep** – Generally this layer is situated 1500mm down from the surface layer to the Pipe/Duct and bedding material layer.

Figure 4 – Sub-base layers



Placement and compaction of all layers must be in layers not exceeding 200mm compacted thickness. Refer to Tables 7 and 8 for minimal material and compaction requirements.

Table 7 – Sub-base shallow minimum reinstatement requirements

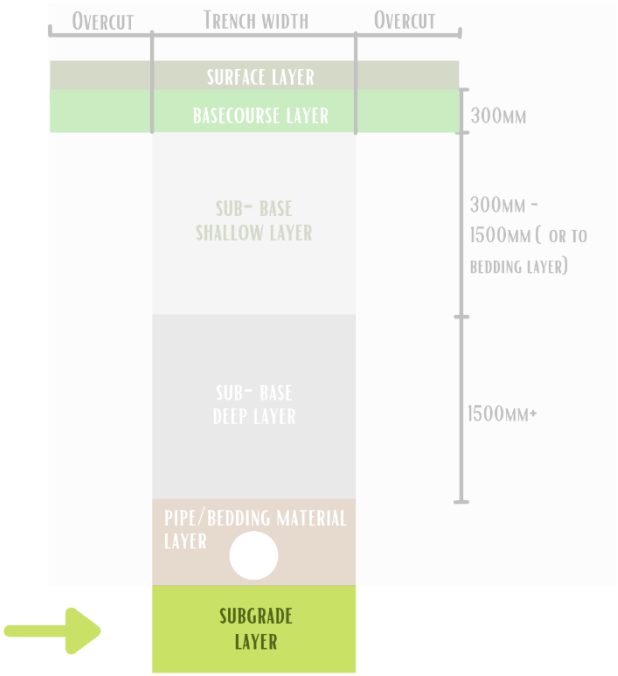
Sub-base Layer Type	Minimum Requirements
Carriageway and Kerb and Channel Construction depth between 300mm to 1500mm down from surface layer	• Material: AP65 • Max. Compaction Layer: 200mm • Compacted minimum dry density 95% MDD as per TNZ B/2 Specification • Clegg reading not less than 30
Vehicle Crossing Construction depth between 150mm to 1500mm down from surface layer	• Material: AP65 • Max. Compaction Layer: 200mm • Compacted minimum dry density 95% MDD as per TNZ B/2 Specification • Clegg reading not less than 25
Footpath Construction depth between 100mm to 1500mm down from surface layer	• Material: AP65 • Max. Compaction Layer: 200mm • Compacted minimum dry density 95% MDD as per TNZ B/2 Specification • Clegg reading not less than 25
Berm Construction depth between 100mm to 1500mm down from surface layer	• Material: AP65 if within 1m of kerb. Other backfill may be used in areas of berm greater than 1m from the kerb providing the required compaction standard is achieved. • Max. Compaction Layer: 200mm • Compacted minimum dry density 95% MDD as per TNZ F/1 Specification • Clegg Reading not less than 25

Table 8 – Sub-base deep minimum reinstatement requirements

Sub-base Layer Type	Minimum Requirements
Carriageway and Kerb and Channel Construction depth 1500mm from surface layer to pipe/duct bedding material	• Material: AP65 • Max. Compaction Layer: 200mm • Compacted minimum dry density 90% MDD as per TNZ F/1 Specification • Clegg reading not less than 25
Vehicle Crossing Construction depth 1500mm from surface layer to pipe/duct bedding material	• Material: AP65 • Max. Compaction Layer: 200mm • Compacted minimum dry density 90% MDD as per TNZ F/1 Specification • Clegg reading not less than 25
Footpath Construction depth 1500mm from surface layer to pipe/duct bedding material	• Material: AP65 • Max. Compaction Layer: 200mm • Compacted minimum dry density 90% MDD as per TNZ F/1 Specification • Clegg reading not less than 25
Berm Construction depth 1500mm from surface layer to pipe/duct bedding material	• Material: AP65 if within 1m of kerb. Other backfill may be used in areas of berm greater than 1m from the kerb providing the required compaction standard is achieved. • Max. Compaction Layer: 200mm • Compacted minimum dry density 95% MDD as per TNZ F/1 Specification • Clegg Reading not less than 15

Section 4 – Subgrade Layer Reinstatement

Figure 5 – Subgrade layer



The subgrade layer is the natural material underneath a constructed pavement. If the subgrade material is weak, this may have an impact on the quality of the reinstated material and lead to an increased risk of failure and asset damage. There may be some instances where it will be suitable to excavate weak material to ensure a suitable pavement reinstatement. Refer to the Table 9 below for information regarding subgrades.

Table 9 – Minimum Subgrade Strength and Weak Subgrade Treatment

Road Reserve Location	Testing Method
Carriageway/Vehicle Crossing and Kerb and Channel	**California Bearing Ratio (CBR):** • Inferred CBR reading of 7 undertaken by Scala Penetrometer – if poor subgrade persists, treatment of weak subgrade methodology is to be approved by the corridor manager. **Post Construction Benkelman Beam (if requested by the Corridor Manager):** • Corridor Manager may specify this treatment if not already specified in contract documentation. • Regional, Arterial, Primary Collector and Secondary Collector ONRC classification and all Asphalt Surfacing: Maximum deflection no greater than 1mm • Access and Low Volume ONRC classification excluding AC Surfacing: Maximum deflection no greater than 1.3mm
Footpath (Excludes Vehicle Crossings)	**California Bearing Ratio (CBR):** • Inferred CBR reading of 7 undertaken by Scala Penetrometer – if poor subgrade persists, treatment of weak subgrade methodology is to be approved by the corridor manager.

Section 5 – Kerb and Channel Reinstatement

Wherever a trench or excavation occurs underneath any kerb and channel, proper backfill compaction and testing is still required.

This will require the section of kerb and channel on top of the excavated area to be replaced if the contractor cannot provide and gain approval from the corridor manager a methodology that achieves and demonstrates compliance with the relevant layer and lift minimum compaction requirements without removing the affected length of kerb and channel.

All kerb and channel replaced shall be installed as per standard plan G-101.

5.1 EXCAVATION OF KERB AND CHANNEL

The limits of work shall be saw cut to ensure a clean construction joint to 50mm depth on all exposed faces.

All edges of excavation through existing sealed footpaths or carriageways shall be neatly cut parallel to the kerb and channel a minimum of 500mm into the carriageway and 300mm in to the vehicle crossing apron, footpath or berm.

5.2 KERB AND CHANNEL ALIGNMENT

The line and level of kerb and channel shall be perfectly straight between tangent points and on curves shall sweep round without kinks, flats or angles in a smooth true arc to the radius shown or directed as appropriate to neatly match with the general road profile.

Tolerances in level of not more than 5mm from design (where existing) may be accepted provided the kerb and channel has no depressions which pond water or that demonstrate visible irregularities in level.

Tolerances in position shall be not more than +/- 10mm with no visible irregularities in profile. Transitions between existing structures and standard profiles shall be smooth flowing and comply with the requirements of this specification.

5.3 KERB AND CHANNEL CONCRETE

Except where specified by the corridor manager, concrete shall comply with NZS 3109.

Unless otherwise stated, concrete shall have a 28 day strength of not less than 20 MPa. All concrete shall be compacted in place.

Concrete finish shall conform to **NZS 3114: Specification for concrete surface finishes**, and all concrete shall be a uniform colour and free from surface defects. This includes repairs to damaged concrete and concrete test-core holes.

Construction joints shall be installed in new kerbs and channels at approximately 5m spacings with a maximum of 6m. Construction joints shall be guillotined a minimum depth of 50mm on all exposed faces and on the front face of the channel. The vertical surfaces of the kerb and channel shall not be deformed i.e. the moulded kerb profile shall not alter.

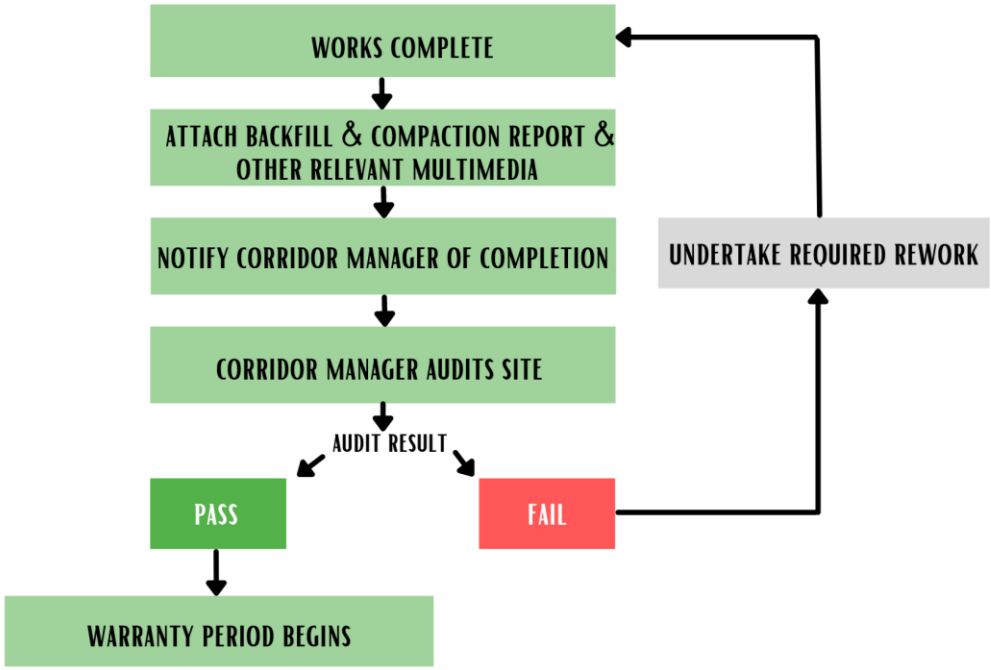
5.4 KERB AND CHANNEL BACKFILL LAYERS AND COMPACTION

Backfill and compaction for material underneath the kerb and channel shall be as per the Carriageway and Kerb and Channel requirements as per the relevant layer tables of this document.

Section 6 - Compaction and Materials Testing and Evidence

In order for the Corridor Manager to award works completion and allow the works to enter into the warranty period, Evidence that compliant materials have been used and the prescribed level of compaction has been achieved.

Figure 6 – Compaction and materials testing and evidence process



All excavation works that require a Corridor Access Request need to provide evidence that correct Materials and Compaction has been achieved. Tables 10 and 11 below set out the requirements and evidence needed to be provided to enable a work completion notice to transition into the warranty period. Table 12 specifies what Compaction testing methodologies are suitable for each ONRC level.

It is recommended that prior to site establishment or excavation, Contractors take photos of the site condition. These can be saved as multimedia items in the Corridor Access Request system.

Table 10 - Compaction Testing and Evidence Minimum Requirements

Nuclear Density Meter (NDM) or Clegg Hammer	• Photo evidence required for each lift with a tape measure scale demonstrating maximum compaction layer compliance. • Photo of NDM and reading(s) on site of test(s) – Photo must show the device on site with identifiable location context. • Plan of location of each NDM test completed. • Report of test results including relevant compaction testing specification complied with. • Frequency and location of testing: - Refer to Table 3 – Compaction Testing Frequencies and Locations. • Including any other Inspections or Hold Points specific to project or outlined in contract documentation or Corridor Access Request (CAR) conditions.

Table 11 – Compaction Testing Frequencies and Locations

Unless Specified by the Corridor Manager, minimum frequency and location of compaction testing will be as below;	
Carriageways, Vehicle Crossings, Kerb and Channel and Footpaths	• Where the excavated area is greater than 0.5m^2 and less than 5m^2, tests required at a rate of one test per every 200mm lift for each layer of backfill completed. • Where the excavated area is larger than 5m^2, tests are required at a rate of one test per every 200mm lift for each layer of backfill completed every 5m^2. • For Trenches – tests are required at a rate of one test per every 200mm lift for layer of backfill completed for every 15m of trench. A minimum of two tests is required.
Berms	• Where the excavated area is greater than 0.5m^2 and less than 5m^2, tests required at a rate of one test per every 200mm lift for each layer of backfill completed. • Where the excavated area is larger than 5m^2, tests are required at a rate of one test per every 200mm lift for each layer of backfill completed every 5m^2. • For Trenches – tests are required at a rate of one test per every 200mm lift for layer of backfill completed for every 15m of trench. A minimum of two tests is required

Table 12 – Approved Compaction Testing Methodologies

ONRC/ONF Category (see https://www.mobileroad.org/)	Approved Compaction Testing Method
Carriageway and Kerb and Channel	
Regional and Arterial	• **Basecourse** - NDM • **Sub-base Shallow** - NDM • **Sub-base Deep** - NDM
Primary Collector and Secondary Collector	• **Basecourse** - NDM • **Sub-base Shallow** - NDM • **Sub-base Deep** – Clegg Hammer
Access and Low Volume	• **Basecourse – posted speed limit 60kph or more** – NDM • **Basecourse – posted speed limit 50kph or less** – Clegg Hammer • **Sub-base Shallow** – Clegg Hammer • **Sub-base Deep** – Clegg Hammer
Vehicle Crossings, Footpaths and Berms	
Regional and Arterial	• **Basecourse** - NDM • **Sub-base Shallow** – Clegg Hammer • **Sub-base Deep** – Clegg Hammer
Primary Collector and Secondary Collector	• **Basecourse** - NDM • **Sub-base Shallow** – Clegg Hammer • **Sub-base Deep** – Clegg Hammer
Access and Low Volume	• **Basecourse** – Clegg Hammer • **Sub-base Shallow** – Clegg Hammer • **Sub-base Deep** – Clegg Hammer