

# Surface Preparation for Sealing

## Scope of this Work Instruction

If the surface preparation of the pavement is not at the highest level then the subsequent chip sealing or hot mix asphalt paving will probably fail due to water entering the work or binding materials failing, leading to rutting, stripping and the break up of the seal coat. To reduce the need for rework it is important to ensure the surface preparation is at the highest standard.

Surface preparation must be planned and carried out carefully, with the appropriate, equipment and staff, following appropriate, safe and efficient work practices, to ensure that the specified work quality is achieved; delays are avoided; and a safe site is maintained.

### THIS WILL BE ACHIEVED BY

- Training staff in the correct construction techniques and best practice.
- Careful and thorough planning for equipment selection, methods/procedures and timetabling.
- Adhering to the correct construction practices at all times.
- Contingency planning for weather, traffic etc.
- Attention to safety matters.

### Responsibilities and Actions

The Quality Manager shall review the Contract Documents to identify the specific details and requirements of the Client. Where appropriate, these shall be noted on the Inspection Checklist and or the documents issued for construction, and/or written instructions to field staff.

The Quality Manager shall be responsible for selecting, appointing and reviewing the performance of the appropriate staff for critical aspects of the work. He shall be responsible for regularly and progressively inspecting the work at various stages to ensure that it complies with the requirements and also to authorise immediate remedial work should this be found necessary.

### Standards to be Followed

The appropriate NZTA / Transit and/or Local Authority Specifications, Standards and Procedures must be followed at all times.

The Contract Documents must be referred to for all specific information. Proper and legal traffic management procedures must be implemented.

All staff shall be made fully aware of all of these matters by way of thorough training and adequate regular instructions.

## Inspection Procedures

Inspection and quality reviews shall be carried out daily for each defined section of the works as they are completed and BEFORE any sealing or paving work is started. Details of these shall be recorded on the Compaction Checklist (see next page for example) for each defined section. Defects in the work shall be rectified immediately and prior to sealing or paving. Copies of all Inspection Compaction Checklists shall be retained in the Job Folder by the Quality Manager.

## Quality Awareness by all Personnel

All personnel shall be thoroughly conversant with the critical need to adhere to the Quality Standards. Regular briefings should be carried out.

All personnel, particularly Foremen, Site Supervisors and Contract Managers must be aware of their responsibility to be constantly checking for “substandard quality” work and equipment. They should be particularly vigilant against the practice of “hiding mistakes” which could have catastrophic consequences for other construction staff and for the safety and performance of the completed works.

## Checklists to be Completed and Retained

Checklists are an essential and vital part of the Quality Programme. They ensure that “problems” and “defects” are discovered and rectified before they can become a hazard or a financial burden on Chris Gommans Contracting Ltd.

The Contract Manager will ensure that the appropriate inspections, sampling and testing, and other quality matters are carefully completed and recorded immediately in the correct manner at the required frequency to satisfy the quality requirements of the Contract Documents and this Quality Programme.

## Quality and Safety Requirements

The following principal requirements should be met on a day to day basis in order to maintain the required quality and safety standards:

- Suitably trained, qualified and experienced personnel for all aspects of supervision, construction and inspection
- Inspection, sampling and testing of all processes, materials, construction, with records completed and retained.
- Control of setting out and dimensional tolerances at all stages of construction.
- Quality management of all aspects covered by other Work Instructions in the Quality System.
- Constant vigilance in identifying and reporting defective materials, and processes.
- Immediate remedial work where required as a result of inspections and testing.

# COMPACTION TEST – IC 10

Contract: \_\_\_\_\_

Location(s): \_\_\_\_\_

Tested by: \_\_\_\_\_ Signature: \_\_\_\_\_

Area Tested:	Material Tested:	Penetrometer Test	Clegg Test
Berm <input type="checkbox"/>	<input type="text"/>	2 blows per 50 mm	5 drops > 25
Footpath <input type="checkbox"/>	<input type="text"/>	4 blows per 50 mm	5 drops > 32
Driveway <input type="checkbox"/>	<input type="text"/>	7 blows per 50 mm	5 drops > 35
Carriageway <input type="checkbox"/>	<input type="text"/>	7 blows per 50 mm	5 drops > 35

Distance between tests \_\_\_\_\_ Length of job \_\_\_\_\_ or dimensions \_\_\_\_\_ m<sup>2</sup>

Comments	Depth	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9
	50 mm									
	100 mm									
	150 mm									
	200 mm									
	250 mm									
	300 mm									
	350 mm									
	400 mm									
	450 mm									
	500 mm									
	550 mm									
	600 mm									
	650 mm									
	700 mm									
	750 mm									
	800 mm									
	850 mm									
	900 mm									
	950 mm									
	1000 mm									
	1050 mm									
	1100 mm									
	1150 mm									
	1200 mm									

**NOTES**

Settlement of trenches must be avoided at all times. Generally, inadequate compaction contributes to settlement. Unstable ground conditions could also cause slumping of the surrounding area. To avoid settlement, the backfill material shall be placed and compacted in layers not exceeding 200 mm, except for the top 300 mm layer where compaction in 150 mm layers is required. Testing should be carried out using a Penetrometer or Clegg Impact Hammer. The following tests from NZS HB 2002:2003 are necessary to ensure that the compaction of the trench meets with the required standards.

- For any trench lengths of 5m or more, compaction testing is required at a rate of one test per layer of backfill per 5m of trench.
- Where trench lengths is less than 5m in length and greater than 0.5m<sup>2</sup> in area, one test per backfill layer is required.

A suitably qualified person shall carry out all testing. The contractors shall record all tests at a frequency no more than every 5m. It is expected that more frequent testing will be required to confirm uniform compaction to the required standard.

## Compaction

The equipment and methods used shall be appropriate to the type of roading material being compacted and to the standard required by the specification. The amount of compactive effort (number of passes etc) must be sufficient to achieve the required density having regard to the moisture content of the material and the equipment. Testing with appropriate equipment, such as Nuclear Densometer, Cone Penetrometer or Clegg Hammer and should be carried out so that the standard is reached without excessive compaction which could damage the construction layers. We will use the record sheet on the previous page to record and verify that this has occurred.

With the possible exception of drainage, no single factor of road construction has a greater influence on the final result than proper compaction.

COMPACTION IS ACHIEVED BY:

- Pressure (rolling)
- Impact (ramming)
- Vibration (rapid oscillation of roller)

FACTORS AFFECTING COMPACTION:

- Dry density
- Wet density
- Moisture content

ACTUAL RESULT IS DETERMINED BY:

- Soil type and grading
- Moisture content
- Type and weight of compaction plant
- Number of "passes" made by compactor
- Thickness of loose soil layer (before compaction).

## Control of Surface Shape

Careful final grading shall be carried out as the compaction proceeds to ensure that the finished surface is to the required shape within the specified tolerances and without localised "ponding" areas, ridges, corrugations or other defects. Remedial work shall be carried out immediately where the checks indicate such "deformities".

## Surface Preparation

Immediately prior to surface coating with chipseal or hot mix the surface shall be prepared (primed), to provide a texture suitable for and appropriate to the applied coating. It shall be free from loose grit and dust and have a moisture content within the limits required by the coating. "Cleaning" operations must be carried out carefully to prevent loosening of the surface.

## Surface Maintenance

Where it is necessary to hold a prepared surface for some time before priming, a suitable temporary protective layer shall be applied and maintained. After its removal and prior to priming, the surface shall be re-inspected and checked. Adequate traffic management measures shall be used where necessary to minimise damage.

## Common Types of Compaction Plant

**Smooth rollers** (steel wheeled). These are best for gravels, sands and mixtures with reasonably high moisture content.

**Pneumatic-tyre rollers.** These are best used on sandy and cohesive soils with fairly high moisture content.

**Sheepsfoot rollers.** These are best employed on cohesive soils with low moisture content.

**Vibratory rollers.** These are best employed on non-cohesive soils, for which it produces excellent results. It can be used on most soils successfully.

## Number of Passes

The number of passes required is fairly well defined and any additional passes is usually a waste of time. For example the following table provides estimates.

COMPACTOR	HEAVY CLAY	SILTY CLAY	SANDY CLAY	SAND	SAND & GRAVEL	GRAVEL
Steel wheel 9 tonne plus	8	6	8	4	4	4
Pneumatic tyred 10 tonne	8	8	8	16	16	16
Pneumatic tyred 24 tonne	4	4	4	8	8	8
Sheepsfoot	24	18	28			
Vibratory 1.5 tonne				4	4	4

## Operator Considerations

- Work from side of task to centre, overlapping each pass.
- Slow and steady, without interruptions.
- Avoid rolling heated base materials.
- Over-rolling should be avoided - uneconomic and may cause damage.

## Backfilling of Trenches

All backfill materials shall comply with approved specification as set out by the RCA and may need to be certified by the quarry (supplier). This means they have been sampled and tested by a certified testing agency. The RCA may request the Chris Gommans Contracting Ltd provide records of material test certification.

Under normal operations material will be placed and compacted in layers less than 200 mm, except for the top 300 mm layer where compaction in 150 mm layers is desirable under NZS HB 2002:2003 the Code of Practice for Working in the Road.

Mechanical compaction equipment appropriate to the size and location of the trench and the type of backfill material should be used to compact trenching materials in layers. If cement or other stabilised layers exist in the roadway, the trench will have to be reinstated with similar material unless otherwise specified by the RCA in the contract.

We may be required to provide subsoil drainage to ensure that the groundwater level is kept below 1 metre from the finished surface level. If underbreak or other disturbance of the pavement layers occurs, the surface of such areas will probably be required to be re-cut, excavated (as necessary) and backfilled to meet the contract compliance requirements.

Where groundwater is likely to accumulate due to excavations, these areas must be well pointed during work and permanently drained before backfilling. This will possibly require a variation and so the Quality Manager must be kept informed.

The RCA may from time to time collect samples of materials from the construction site for laboratory testing. Should the materials not meet specified standards, the material must be replaced. All associated costs will have to be met by Chris Gommans Contracting Ltd so **this is not** something we wish to encourage.

### Standard to be met

The table on the following page shows the ideal compaction standard and materials to be used for trenching operations. Unless specified by contract, Chris Gommans Contracting Ltd will follow this process whenever possible.

## Chipseal Surfaces

It may be necessary to lay 30 mm Mix 10 on a waterproof seal membrane and texturised with a one or two coat chipseal to match existing surface.

**Chipseal work should be undertaken in following TNZ specifications and may be contracted out. This may include:**

- Sweeping and basecourse surface preparation
- Spraying of binder at approved rate and conditions
- Spreading and rolling of appropriate grades of chip
- Sweeping and removal of excess and loose chip

See Works Instruction for Sealing and Chipseal

### REQUIREMENTS FOR BACKFILLING AND COMPACTION

1	CARRIAGEWAY	2	VEHICLE CROSSING	3	FOOTPATH	4	BERM
a	0m-0.3m Depth range <ul style="list-style-type: none"> <li>TNZ M/4 AP40</li> <li>Max. compaction layer 150mm</li> <li>Compacted minimum dry density 98% (MDD) as per TNZ B/2</li> <li>Clegg reading not less than 35.</li> </ul>	a	0m-0.3m Depth range <ul style="list-style-type: none"> <li>GAP 65</li> <li>Max. compaction layer 150mm</li> <li>Compacted minimum dry density 95% MDD as per TNZ B/2</li> <li>Clegg reading not less than 32</li> </ul>	a	0m-0.1m Depth range <ul style="list-style-type: none"> <li>GAP65</li> <li>Max. compaction layer 150mm</li> <li>Compacted minimum dry density 95% MDD as per TNZ B/2</li> <li>Clegg reading not less than 32</li> </ul>	a	0m-0.1m Depth range <ul style="list-style-type: none"> <li>Clean Topsoil</li> <li>Compacted and rolled and raked required to achieve required compaction result</li> </ul>
b	0.3m-1.5m Depth range <ul style="list-style-type: none"> <li>GAP65</li> <li>Max. compaction layer 200mm</li> <li>Compacted minimum dry density of 95% MDD as per TNZ B2 Specification</li> <li>Clegg reading not less than 32</li> </ul>	b	0.3m-1.5m Depth range <ul style="list-style-type: none"> <li>GAP65</li> <li>Max. compaction layer 200mm</li> <li>*Clegg reading not less than 32</li> <li>Compacted minimum dry density of 95% MDD as per TNZ B2 Specification</li> </ul>	b	0.1m-1.5m Depth range Within 1m of kerb: GAP65 <ul style="list-style-type: none"> <li>Max. compaction layer 200mm</li> <li>*Clegg reading not less than 32</li> <li>Compacted minimum dry density of 95% MDD as per TNZ B2 Specification</li> </ul> <p>Outside 1m of kerb: Other backfill materials may be used providing the required compaction standard is achieved. *Clegg reading not less than 25 Compacted minimum dry density of 95% MDD as per TNZ F/1 Specification</p>	b	0.1m-1.5m Depth range Within 1m of kerb: GAP65 <ul style="list-style-type: none"> <li>Max. compaction layer 200mm</li> <li>*Clegg reading not less than 32</li> <li>Compacted minimum dry density of 95% MDD as per TNZ B2 Specification</li> </ul> <p>Outside 1m of kerb: Other backfill material may be used providing the required compaction standard is achieved. *Clegg reading not less than 25 Compacted minimum dry density of 90% MDD as per TNZ F/1 Specification</p>
c	1.5m to top of pipe bedding material <ul style="list-style-type: none"> <li>GAP100/GAP150</li> <li>Recommended compaction layers in 200mm</li> <li>Thicker compaction layers to a maximum of 600mm are permissible provided that the required compaction standard is achieved,</li> <li>Compacted minimum dry density of 90% MDD as per TNZ F1 Specification</li> <li>Clegg reading no less than 25</li> </ul>	c	1.5m to top of pipe bedding material <ul style="list-style-type: none"> <li>GAP100/GAP150</li> <li>Recommended compaction layers in 200mm</li> <li>Thicker compaction layers to a maximum of 600mm are permissible provided that the required compaction standard is achieved,</li> <li>*Clegg reading not less than 25</li> <li>Compacted minimum dry density of 90% MDD as per TNZ F1 Specification</li> </ul>	c	1.5m to top of pipe bedding material Within 1m of kerb: GAP100/ GAP150 <ul style="list-style-type: none"> <li>Recommended compaction layers in 200mm</li> <li>Thicker compaction layers to a maximum of 600mm are permissible provided that the required compaction standard is achieved,</li> <li>*Clegg reading not less than 25</li> <li>Compacted minimum dry density of 90% MDD as per TNZ F1 Specification</li> </ul>	c	1.5m to top of bedding material <ul style="list-style-type: none"> <li>Within 1m of kerb: GAP100/GAP150</li> <li>Recommended compaction layers in 200mm</li> <li>Thicker compaction layers to a maximum of 600mm are permissible provided that the required compaction standard is achieved,</li> <li>*Clegg reading not less than 25</li> <li>Compacted minimum dry density of 90% MDD as per TNZ F1 Specification</li> </ul>
d	Surfacing of 50mm AC MIX 10 on a membrane seal <ul style="list-style-type: none"> <li>200mm 20MPa Concrete with approved reinforcement</li> <li>The finish surface to match the surrounding surface. See 2.1 trench reinstatement</li> <li>All road markings to be reinstated within 48 hours. Refer 6.6.11</li> </ul>	d	Surfacing of 30mm AC MIX <ul style="list-style-type: none"> <li>150 mm 20MPa Concrete for Residential crossings</li> <li>200mm 20MPa Concrete for Commercial crossings and carriageways</li> <li>Reinstate special surfaces to match existing</li> <li>For vehicle crossing details refer to RCA's standard drawings</li> </ul>	d	2) Outside 1m of kerb: <ul style="list-style-type: none"> <li>Other backfill materials may be used providing the required compaction standard is achieved.</li> <li>Compacted minimum dry density of 90% MDD as per TNZ F1 Specification</li> <li>*Clegg reading not less than 25</li> <li>Surfacing of 25mm AC MIX 10</li> <li>100mm 20 MPa Concrete or as required by special circumstances e.g. Commercial Footpaths, Cycleways, Vehicle Crossings</li> <li>25mm Mix 10</li> <li>Red chip or Red Slurry seal to be reinstated to standard</li> <li>Reinstate special surfaces to match existing surface, full reinstatement of the area is required e.g. Brick Band and special paving areas</li> </ul>	d	2) Outside 1m of kerb: <ul style="list-style-type: none"> <li>Other backfill material may be used providing the required compaction standard is achieved.</li> <li>Compacted minimum dry density of 90% MDD as per TNZ F1 Specification</li> <li>Clegg reading not less than 25</li> </ul>