TNZ P/4 NOTES: 1989

NOTES FOR RESEALING

These notes are for the guidance of supervising officers and must not be included in the Contract Documents.

1. SCOPE

This specification is produced primarily for works on state highways.

Resealing includes the seal coat over a primed surface, second coat seal over a first coat seal or sealing over an existing sealcoat or asphaltic concrete paving, and includes smaller chip (grades 5 or 6) seals for crack sealing purpose or to even out and reduce the texture of an existing sealcoat. There is also provision for dry grit locking coats.

Every sealcoat designer and site supervisor should have attended a sealing basics and sealing site supervisors' course or should have access to and be familiar with those course notes, which are referred herein.

2. EDGE DEFINITION AND TOLERANCE

The edges of the sealcoat should in all instances be the edges of the existing sealcoat or on a primed surface should be clearly defined to be of the width specified.

3. SEALING PERIOD

Sealing within the specified period when fluxed and/or cutback asphaltic binders are used should be firmly adhered to. Any work outside this period is liable to produce a host of problems both during and after the construction because of the slow rate of loss of volatiles. Emulsified asphalt can be used at any time of the year when conditions are suitable because, once the material has fully broken, the residual binder has full strength. Sealing with emulsified asphalt should in colder (winter) periods be applied early in the day to ensure full breaking of the binder before sunset, otherwise lower night temperatures would prevent the break which, with anionic types, occurs only by evaporation of the water.

Use of cationic type is recommended for work in colder periods because its initial chemical break is not entirely dependent on the rate of evaporation. However, the curing period is still dependent on ambient temperature as removal of water is by evaporation.

Kneading, obtained by rolling and traffic, will assist curing by displacing trapped water to the upper surface.

4. WORKING HOURS

The working hours are restricted to ensure satisfaction of the construction unless the Engineer decides, because of the traffic volume and pattern or for other reasons, that different working hours should be adopted.

5. USE OF PRIVATE LAND

The use of private land, particularly for stockpiling sealing chips, is becoming more common. If the Contractor elects to adopt that method, it is essential to ensure that a clearance is received from the landowner before the final payment is made to the Contractor.

6. CONSTRUCTION PLANT

Whilst the mechanical condition of plant is the responsibility of the Contractor it must be ensured that reduction of spray "run" lengths are made if a chip truck or roller suffer mechanical breakdown. Regular checking is necessary to prevent the adverse effects of oil, water or fuel from plant and vehicle leakages on the new or prepared surface.

Chip spreading equipment is required to satisfy the specification and must be checked before the work commences.

Rollers may be pneumatic tyred for which the weight is required to be checked in advance and the Contractor is required to provide means of checking tyre pressures.

Rubber coated vibrating drum rollers may be used, providing the Contractor produces evidence of the approval of the General Manager of Transit New Zealand. Approved roller models are equivalent to specified pneumatic tyred rollers unless the conditions of the approval state otherwise.

Before work commences, it is essential to check that the certificate of compliance for the distributor to be used is current, that the attached spray chart is being used, and that the bar height and nozzle angles are correct. Also, check the lap width on the certificate.

7. CONDITION OF SURFACE FOR SEALING

It is essential to have checked thoroughly that the surface to be sealed is properly and fully repaired. Sealing over depressed, cracked areas or over existing edge break is not sensible and will lead to premature repairs to the new sealcoat. All repairs, regardless of when the faults occur, are the responsibility of the client, up to the day of sealing. Care is necessary to ensure that the entire surface to be sealed is swept free of deleterious matter.

8. ASPHALT CEMENT

Asphalt cement is also called bitumen, straight-run or base bitumen and, for sealing purposes, is defined by the penetration test numbers as 80/100 or 180/200. Selection of the asphalt cement grade is described in "Sealing Basics of the Sealing Site Supervisors' Course Notes", which also contains definitions of fluxed and cutback bitumen and adhesion agents.

These notes should be fully understood before designing or supervising sealing works in accordance with this specification. A sample of the asphalt cement in a two litre container (two-thirds full) should be taken before flux, cutter or adhesion agent material is added. This should be sent to laboratory for penetration and viscosity testing to relate with results of resultant asphaltic binder testing and should not delay blending and spraying operations.

The term "asphaltic binder" is adopted in the specification to include straight-run bitumen as well as fluxed and/or cutback bitumen binders as opposed to emulsified asphalt binders.

Asphaltic binders are suitable for use with all TNZ M/6 chips except grade 6 for which quick-breaking emulsified asphalt conforming to TNZ M/1 should be used. This is mainly because the low residual application rate of 0.55 litres per square metre which is required for grade 6 chips can be achieved, at a uniform transverse and longitudinal distribution by using a 55% asphalt cement emulsion. This is because the actual cold emulsion application rate is about 1.0 litres per square metre compared with an equivalent asphaltic binder residual rate of 0.55 litres per square metre plus small diluent allowance. Bitumen distributors are only calibrated for total hot spray rates of 0.8 litres per square metre or more and would require greater travel speed than the calibrated speed range. The combined effects are very likely to result in uneven application rate where it is more critical in terms of chip loss or flushing than when using larger chips.

9. DILUENTS IN ASPHALTIC BINDER

The term asphaltic binder applies to any binder using a penetration grade asphalt cement which may be blended with automotive gas oil (AGO), kerosene and/or adhesion agent, and sprayed at a temperature as defined in Table III.

9.1 The use of an adhesion agent complying with TNZ M/13 is mandatory. An adhesion agent, at the dosage rate proven by testing to be satisfactorily reactive with chips from the stone source of the chips to be used, is to be added to the binder in the presence of the Engineer or he must have satisfactory evidence that the proven agent and dosage rate have been used.

9.2 Fluxing

Fluxing of the asphalt cement, by the addition of AGO, is decided at the design stage, dependent on the penetration grade of the asphalt cement to be used and on the climatic, ambient temperature and traffic conditions. AGO is effectively used as a fine tuning of the residual binder to soften the binder permanently by decreasing its viscosity.

The additive rate, in parts per hundred parts of the specified penetration grade of asphalt cement, is to be included in Schedule A.

9.3 Cutting Back

Kerosene is used for cutting back the binder. Being volatile, this diluent reduces the viscosity temporarily, to make the binder more fluid on the road after the chips are applied to obtain adhesion. In Table II it will be seen that as the shade air temperature decreases the quantity of total diluent increases. The use of shade air temperature is based on its relationship with the road surface temperature which until recently has been very difficult to measure accurately.

To fulfill its purpose the kerosene additive rate in parts per hundred parts of asphalt cement (pph) should be set to satisfy the expected maximum shade air temperature. Work carried out earlier in the day may be more prone to adhesion problems initially, but these will be corrected during the maximum temperature period. Conversely, when the shade air temperature is falling, more kerosene may be necessary and the temperature expected at the time of spraying should be the basis for determining the quantity of kerosene required. A shade air temperature tolerance of $-3^{o}C$ is specified to determine whether any particular formulation can be sprayed. Judgement is required by the site supervisor concerning the upper tolerance limit of shade air temperature, even though the specification adopts $+3^{o}C$.

Table II establishes the total diluents in parts of diluent per hundred parts of the specified asphalt cement by volume at $15^{o}C$ so that deduction of AGO and adhesion agent in parts per hundred must be made to determine the parts of kerosene per hundred parts of asphalt cement that are required. Table I sets out the diluent equivalence of the various adhesion agents.

9.4 Blending the Asphaltic Binder

Accuracy of the quantity calculation and measurement is essential in the blending of asphaltic binders. The Contactor's calculations should be checked independently and the diluent quantity measuring devices are required to be certified, so those certificates should be checked.

Both site and central blending plant blending are acceptable, and where cental blending plant facilities are available without increased costs then that method is generally preferred.

For site blending, the mixing is generally obtained by pump circulation of the binder. For an acceptable degree of mixing not less than 20 minutes of circulation with at least 80% of maximum pump speed is necessary.

Central blending plants may employ a wide range of mixing methods. When an unknown plant is being used, sufficient samples should be taken during delivery to the distributor or transfer tanker to check the acceptability of the blend. Further mixing by circulation in the distributor may be expected to occur but the product from the blending plant must satisfy the blending specification.

Every load of blended binder which is blended in the absence of the Engineer or the engineer's representative is to have a certificate containing the specified data. The certificates must be collected and checked on-site for conformity with the contract requirements. Faulty certificates or apparently complying certificates for binder, which **laboratory tests** prove to be outside the specified tolerance, should result in client supervision of subsequent blending in that central plant until dependable accuracy is ensured. The payment for diluents may also be affected.

9.5. Sampling and Testing of Binders from Distributor Trucks

9.5.1 Sampling

Samples of asphaltic materials shall be taken from bitumen distributors in accordance with TNZ M/1.

A minimum of two samples per bitumen distributor load shall be taken. The first of these samples shall be taken at the end of the initial spray run and the other immediately before the final spray run.

9.5.2 Testing of Binders

9.5.2.1 Emulsified Binders

The emulsified binder shall be tested for compliance with TNZ M/1 for viscosity, binder content and residue on a 710 µm sieve and any other tests within TNZ M/1 as seen necessary by the Engineer.

9.5.2.2 Asphaltic Binders

When the fluxing, cutting and adhesion agents are added and blended to the asphaltic binder in the presence of the Engineer or the engineer's representative whether to test the binder for the type, quantity or presence of these agents shall be at the Engineer's discretion.

If the Engineer or the engineer's representative was not present during the addition of the fluxing and/or cutting agents, at least one sample per bitumen distributor load shall be tested for diluent content using the method described in the Ministry of Works and Development Central Laboratory Report No 6-83/3.

If the Engineer or the engineer's representative was not present during the addition of the adhesion agent at least one sample per bitumen distributor load shall be tested for the presence of an adhesion agent as described in Central Laboratory test number B308-88. Also, for every ten samples of binder tested for the presence of an adhesion agent at least one of these samples shall be forwarded to the Bitumen Section of the Works and Development Services Corporation of New Zealand Ltd,

Central Laboratories to be tested for the quantity and type of adhesion agent present.

All samples taken which are not for immediate testing shall be stored for a period of at least three months, along with the binder remaining in the sampling container after the test portions have been taken.

9.6 Temperatures of Asphaltic Binder Materials

Table III sets out the median spray temperatures relative to total diluent based on each of the 180/200 and 80/100 penetration grades of asphalt cement. The notes explain total diluent, the spray temperature tolerance and the limits of the table.

The maximum temperatures to which binders should be heated relative to total diluent, for storage for a period exceeding one week and for storage for more than one day when thermostatic heaters are used, are all set to prevent adverse changes to the binder quality. Laboratory testing of any binder which may have been affected by overheating is necessary before that material is used.

10. EMULSIFIED ASPHALT BINDER

The spraying and reheating temperature limits are given to ensure satisfactory spraying characteristics and that overheating, likely to cause premature breaking, does not occur.

11. SAFETY PRECAUTIONS

Every sealing contractor and site supervisor should have thorough knowledge and a copy of "A Guide to Safe Practices for the Handling, Transportation and Storage of Bitumen" because they have responsibility for the safety of the workmen and the worksite to protect the travelling public.

12. QUANTITY OF BINDER

The correct application rates of binders for reseals and second coat seals are vital to prevent slicking or scabbing of chips during the service life. These rates are based on measurement of the average least dimension (ALD) of the chips to be used, the texture of the existing surface by the sand circle method (reference TNZ T/3), and the traffic volume per lane per day. The sand circle method involves the measurement of sand circle diameters in the outer wheel tracks and on centreline (or lane lines) at sufficiently frequent intervals along the road section, together with the recording of the position of any significant texture changes such as may occur at previous sealcoat junctions. The RD 286 : 1984 Sand Circle Design Algorithm provides the means to obtain the residual binder application rates by the formula:

$$R = (0.138 \; x \; ALD + e) \; x \; T_f$$

where R = Residual Binder Application Rate. The Residual Binder comprises asphalt cement and any additives that are expected to remain in the binder throughout the bulk of its service life.

ALD = Average Least Dimension (mm)

e = Texture Depth constant (related to the sand circle dia.) obtained from table A.

T_f = Traffic factor (related to vehicles/day/lane) obtained from Table B.

Sand Circle Diameter mm	e
150	0.49
155	0.45
160	0.42
165	0.39
170	0.37
175	0.34
180	0.32
190	0.29
200	0.25
210	0.22
220	0.20
230	0.18
250	0.14
275	0.11
300	0.09
325	0.07
350	0.05
400	0.03
500	0.00

Table A

Traffic in Lane vpd/lane	T_f
5	1.596
10	1.523
20	1.451
30	1.409
40	1.379
50	1.356
75	1.314
100	1.284
150	1.242
200	1.212
300	1.170
400	1.140
500	1.117
750	1.074
1,000	1.044
1,500	1.002
2,000	0.972
3,000	0.930
4,000	0.900
5,000	0.877

Table B

After completion of the sand circle testing, each lane should be considered independently and if the diameters applicable to more than 10% of the area being considered are less than 170 mm a texturising sealcoat is necessary.

Providing the difference between the average e value obtained from the diameters and the e values relative to the coarsest and finest texture (highest and lowest e values) do not exceed ALD/80 then the reseal residual binder rate can be determined using the RD 286 formula. Otherwise texturising of the coarser texture areas is necessary.

The residual binder application rate obtained from RD 286 is the rate for the binder comprising asphalt cement and AGO, as the automotive gas oil is expected to remain in the binder through most of its service life.

Texturising sealcoats are used primarily for reducing the texture of existing surfacing by incorporating more granular aggregate instead of bitumen which would result in flushing, bleeding and slicking during the sealcoat service life. Where the difference in coarseness is only marginally outside the ALD/80 limit, grade 6 chip with emulsified asphalt binder as a residual (asphalt cement at 15^{o}C) application rate of 0.55 litres per square metre will be satisfactory. Over a waterproof surface several years of service life can be expected before resealing is necessary, but if the existing surface is not waterproof, generally due to chicken wire cracking, that cracking can be expected to reflect through to the surface within a year so that resealing should be programmed accordingly.

Where the existing surface is very coarse, particularly where more than 10% of the surface area is of sand circle diameters less than 170 mm, then grade 5 chips should be used over an existing grade 2 or 3 chipseal but grade 4 chips may be more suitable over grade 1 or even larger grade 2 chips. The residual binder application rate for grade 4 or 5 chip texturising sealcoats should always be 0.8 litres per square metre.

Texturising sealcoats using grades 4 and 5 chips can be expected to provide a service life of up to 75% of the normal reseal life, ensuring a satisfactory surface for resealing at the end of that period. The texturising methods, using grade 6 chips with or without emulsified asphalt, can also be used as a locking coat to prevent chip loss in a new sealcoat in which the binder rate has been too low (refer Appendix A of the course notes). The method is also suitable with the use of grade 5 or 6 chips to correct low skid resistance due to polishing of the chips of the existing sealcoat or for double coat seals where texture limits are warranted because of pedestrian traffic. For double coat seals the initial residual binder rate should be reduced by 15% and the second coat should be applied immediately following the specified rolling of the initial sealcoat and before the effects of normal road traffic have occurred.

Binder application rates for wide sealed shoulders and parking strips should always be determined separately, based on realistic assessment of traffic density which in many instances may be only 10 vehicles per day.

The required residual binder application rate for each spray run can be determined well in advance of the sealcoat construction and from these the design cold binder application rates can be calculated when the adhesion agent and kerosene additives rates (pph) are known. Then by reference to the bitumen volume correction tables the hot binder

application rate can be calculated. This is the rate at the spray temperature given in Table III.

13. SEALING CHIPS

For state highways, grade 2 chips are normally used only for second coat seals. The use of such large chips is unnecessary for reseals.

Grades 3 and 4 chips are generally used for reseals and grades 5 or 6 are most commonly used for texturising purposes but can also be used in double coat seals, grade 5 being best suited over a grade 3 chip initial coat and grade 6 being better over a grade 4 chip initial coat. The latter combination gives a quieter ride, being especially suitable for urban conditions with pedestrian traffic.

Grade 6 chips are the only suitable chips for use as a locking coat with emulsified asphalt and also for dry grit locking coats (see section 19).

The dryness of chips should be checked during the initial chip spreading. Effectively chips as supplied can be surface moist but should be dry within five minutes of spreading. If there is free water apparent, or should water flow from a load when the tray is raised for spreading, then the chips should be rejected.

Testing of chips should be carried out subsequent to completion of the stockpiles and during the specified 14 days prior to use of the chips. The ALD results, so determined, are to be used for the calculation of binder spray rates. When chips are supplied by the client the same stockpile completion condition applies.

Chip stockpile sites should be as close to the midpoint of the works as is practicable and when warranted, the temporary use of private land should be considered.

Frequently used chip stockpile sites should be considered for sealing to avoid contamination of the chips.

14. APPLICATION OF THE BINDER

Only distributors have current certificates of compliance with TNZ E/2 are to be used.

The hot binder application rate for each spray run is to be given to the Contractor in advance and it is his responsibility to ensure that each individual spray rate is achieved, within the tolerances provided. Very short spray runs should be avoided since the tolerances are greater for small sprayed volumes because of the dipstick volume measuring limitations. Similarly, the use of handspraying should be minimised by pre-planning of spray runs but also because of the recognised inaccuracy of the resultant binder application with handspraying.

When an accumulating rev counter is fitted to the distributor, that counter should be used for checking the volume of binder used in individual spray runs to obtain the actual hot binder application rates, but dipstick measurements before and at the end of spraying from each distributed load are to be used for payment purposes as well as for checking

the accuracy of the counter and the variation from the directed application rates for all the spray runs carried out.

Binder is not to be sprayed on wet roads and the road must be generally dry, although isolated areas of dampness can be tolerated providing the air shade temperature is not less than 10^{o}C and rising. Heavily shaded areas should be sealed, if necessary, separately during the warmest part of the day.

It must be ensured that a minimum of 1 m wide strips of non-porous paper or fabric are used and properly secured at the start and finish of each spray run, the binder should be circulated through the spray bar to heat it fully, and the distributor should start moving from a point at least 5 m in advance of the paper or fabric strip in order to achieve spraying speed before commencing to spray on that strip.

15. PATTERN OF SEALING OPERATIONS

A pattern of sealing spray runs, defining lengths, widths and application rates, should be prepared to the satisfaction of both the Contractor and the Engineer to satisfy the specified longitudinal joint requirements and to define any essential handspray areas.

Longitudinal joints should always be of the lapped type, the lap width being as indicated in the certificate of compliance. All laps must be completed within the day's work and laps within traffic lanes are to be completed within 30 minutes in the interests of normal road traffic. Longitudinal joints should never be in normal wheel track areas and should generally be along lane limits or junctions, or as close to those as is practicable. Otherwise those joints may be along the centre of lanes to avoid wheel track flushing. For outer edges of sealcoats it must be ensured that a "cut-off" type nozzle is used at that end of the spray bar.

16. PROTECTION OF ROAD FURNITURE

Insufficient attention is often given to this matter so that kerbs and furnishings become affected by spray and service covers can become buried. The site supervisor should record all service covers in advance to ensure that none are overlooked. Special care is necessary for the rails at level crossings and for bridge expansion joints.

17. SPREADING OF CHIPS

Ensure that sufficient loaded spreading trucks are on site to provide cover before any spray run is commenced, and that spreading is completed within five minutes of the binder being sprayed.

The rate of spreading is the responsibility of the Contractor except that, when the client has supplied the chips, excessive spread rate can be governed providing the rate is specified in Schedule A for which a tolerance of +10% is allowed.

The spread rate is measured for compliance at the end of the protection period defined in clause 25.

Although the spread rate cannot be directed to be changed during the spreading, the Contractor can, when necessary, be advised that the spread rate is considered to be sufficiently inadequate or excessive so that acceptance in accordance with clause 25 may be prejudiced.

Windows of significant area may be expected after initial spreading and also after contractual rolling, but normal road traffic provides the final setting up, as lateral chip movement enables the final shoulder to shoulder interlocked chip placement to be obtained as specified. Where the chip spread has been uneven handbrooming, sheeting or light dragbrooming may be necessary.

18. ROLLING

The formula $T = \frac{V_t}{450\ x\ S\ x\ n}$ relates to the total specified rolling requirement when asphaltic binder is used, half of which is classified as initial rolling, required to be completed within 30 minutes of the chip application. Therefore further binder spraying may need to be delayed until rollers are available for the next spray run. Thus in effect the number and speed of available rollers controls both the length of spray runs and the period between successive spray runs.

The remainder of the rolling, classified as finish rolling, is to be obtained within the day of the sealing and by sunset on that day to satisfy clause 4 "Working Hours".

The formula $T = \frac{V_t}{450\ x\ S\ x\ n}$ is used to ensure that the new seal receives sufficient rolling.

The speed (S) has therefore been inserted in the formula. It is important to realise that this formula does not recommend any particular speed for rolling. The speed element (S) is solely introduced to ensure that the new seal still gets sufficient rolling. At 8 kph or greater it is considered that the new seal will get sufficient passes of the roller. Below 8 kph the formula allows for the total rolling time to be increased to compensate for this slower speed. As an example, a contractor is spraying 36,000 litres (hot meas.) on a reseal and using two rollers at an average speed slightly greater than 8 kph, therefore total rolling time

$$T = \frac{36{,}000}{450\ x\ 8\ x\ 2} = 5\ hours$$

That is two rollers working together would each require five hours of uninterrupted rolling time on the reseal.

If the average rolling speed was instead 5 kph:

$$T = \frac{36{,}000}{450\ x\ 5\ x\ 2} = 8\ hours$$

That is in this second example the two rollers together would require eight hours of uninterrupted rolling.

In sealing of reasonable flat and straight roads, it is not expected that rollers will have any trouble in achieving an average speed of 8 kph. However, it is important to ensure that extra rolling is carried out on steep grades and curves where the average speed of rolling drops below 8 kph.

It is important to ensure that greater emphasis is placed on the rolling of areas outside normal traffic wheel tracks. On a normal highway this means that greater rolling effort should be applied to the shoulders and centreline.

When emulsified asphalt as defined in TNZ M/1 is used as the binder, only the initial rolling is required.

In all sealcoats the compaction of chips is obtained effectively in two stages. The initial rolling presses the chips firmly into the binder with only a minority generally being ALD vertical. Some chips which are not initially in contact with binder may be moved to a gap where they can be pressed down into binder but there may be many windows or small gaps in the cover coat at the end of this stage. The second stage, for which normal road traffic is essential, occurs during and after the finish rolling and is produced by the kneading action of vehicle tyres at controlled speed. This action, along with the finish rolling, turns the chips into the ALD vertical position, causing lateral movement to develop chip interlock with shoulder to shoulder contact, thus closing up the windows. During this process the surface texture is ironed out, losing its initial excessive toothiness. This occurs relatively quickly in the normal traffic lanes but the channelling of traffic by cones, together where necessary with the provision of pilot vehicles, may be warranted to achieve this standard across the entire sealed width.

19. DRY GRIT LOCKING COAT

Provision is made for the application of a dry grit locking coat to any specified measure or where directed by the Engineer.

The purpose of the dry grit locking coat is to provide an additional locking effect to prevent chip overturn or loss until the volatile material in the binder has evaporated sufficiently. This is achieved by the light uniform application of grade 6 chips over the newly constructed sealcoat. It has proved to be very useful over grades 2 to 4 chips in areas of turning traffic, on small radius curves and at intersections or where frequent stopping and starting of vehicles are necessary as at traffic signals.

The dry grit locking coat should also be considered where, by error, the binder application rate on a section has been low and outside the specified tolerance. It has also proved to be successful in preventing extension of chip loss caused by wet conditions.

The time of application is important.

The application must be after the completion of rolling and after as much traffic compaction of the chips as is practicable. However, to ensure some adhesion to the binder it should be applied within 24 hours of the completion of the rolling. However, considerable value may be expected even if the application is a short time later.

20. NO FOULING OF SEALED SURFACE

Fouling caused by oil, fuel or water can result in chip loss and must be avoided by checking that construction vehicles and plant with leakages are removed from the site. Topsoil, clay or silt carried by the wheels of chip trucks can cause permanent flush areas in the newly sealed surfaces and this must be avoided.

21. INTERSECTING PUBLIC ROADS AND PRIVATE WAYS

Too frequently the sealing of intersecting unsealed roads to the road reserve boundary of the sealed road and the sealing of private ways to the kerb line or the line of the surface water channel line is neglected. This should be carried out with first coat sealing works but when resealing is being considered, shaping and first coat sealing of those areas should be carried out so that the second coat seal can be included with the resealing. Those areas for which second coat seal or reseal is warranted should be defined in Schedule A for inclusion in the work.

22. REMOVAL OF SURPLUS AND WASTE MATERIAL

Whilst forgotten remnants of chip stockpiles may be taken and used for maintenance purposes, these and other materials, if overlooked, can become a maintenance responsibility. The removal of all surplus and waste materials must be ensured before a certificate of completion is issued.

23. TRAFFIC CONTROL

As stated in TNZ G/1, traffic control including the correct establishment of satisfactory signs, normally two traffic controllers suitably clad, with R-53 STOP/GO paddles (which are more effective if the sign sizes are greater than the specified minimum dimensions), and radio intercommunication when necessary, must be checked to be established before sealing commences. This is essential and sealing operations should be allowed to commence only after the establishment has been checked to be complete. In the case of considerable sealcoat length it should be ensured that the single lane traffic length is limited by obtaining the adjoining spray run as soon as practicable to achieve the full width of sealing. This does not apply to multi-lane situations.

It is necessary to confirm that there is no power with the Contractor or the supervisor to enforce traffic speed in the restricted speed area. However, to assist in controlling traffic speed two vehicles with rear facing warning type signs marked "Pilot Vehicle Do Not Pass" can be employed to lead the alternate traffic streams in single lane sections and along the coned lanes on the newly sealed surface.

When there is evidence of a significant excessive speed problem, the District Commander, Traffic Safety Service, New Zealand Police should be consulted. Only they have the power to control the speed restriction.

Adverse weather, combined with traffic and excessive speed can completely ruin a sealcoat so that it may cost considerably more than the initial sealcoat to correct.

Reduced speed limits, enforcement, coned lanes and the use of pilot vehicles in the traffic stream can all assist to prevent damage. However, the use of clean chip, correct binder formulation with suitable adhesion agent and early total compaction, including that for which we depend on road traffic, are generally sufficient to avoid such problems.

24. REMOVAL OF SURPLUS CHIPS

The removal of surplus chips was once considered unnecessary but the need is now well recognised to prevent windscreen damage.

Generally, once the final interlocked shoulder to shoulder chip contact is obtained, chip removal can be achieved without loss of adhering chips. Brooming of surplus chips should be carried out sufficiently lightly and carefully to avoid dislodging adhering chips. In kerbed urban and particularly commercial areas, the use of suction after brooming may be necessary and may be specified in the job or contract specification. On no account should suction alone be used for surplus chip removal but only to remove swept chips.

25. PROTECTION AND REPAIR OF THE SEALCOAT

25.1 The Contractor is responsible for the protection of the sealcoat, from the completion of the contractual rolling of each section of construction carried out within the day for a period of 48 hours, until the removal of temporary speed restrictions. The standard to be achieved at the end of the 48 hours is primarily that the "take" of chips is satisfactory so that there is no evidence of remaining windows or of chip loss and that surplus chips have been removed. The inspection and testing are to be carried out at the end of the protection period after the removal of surplus chips and immediately prior to the removal of the temporary speed restriction.

Providing the standard complies, the Contractor is to be released from maintenance responsibility for the new surfacing. Thereafter any damage to the sealcoat is to be deemed to be fair wear and tear.

Areas of any spray runs for which the binder application rate was significantly lower than the specified tolerance limits may be excluded from the maintenance release and consideration may be warranted to a requirement that the Contractor apply a dry grit or emulsion grit locking coat as a prerequisite for that release.

If the removal of surplus chips does not satisfy the requirements of clause 24, then that requirement must be satisfied to enable the surface to be inspected fully.

25.2 If the newly sealed surface does not satisfy the "take" of chip requirement at the inspection time, suitable repair methods must be approved by the Engineer. The maintenance of the work remains the responsibility of the Contractor until the repairs are completed and the Engineer is satisfied that the surfacing is in a stable satisfactory condition.

25.3 The standard of remedial work is in compliance with the specification relative to the "take" of chips. As a guide to determine the period within which the repair of chip loss should be obtained, section 4.2 of the "Standard Levels of Maintenance Service for State Highways" should be adopted.

25.4 Where the chip loss comprises single isolated chips (pockmarking) a dry grit locking coat may be sufficient, but if bald areas have developed then repair is liable to be relatively difficult. During a hot period of a day a light spray of kerosene or turpentine can soften the binder sufficiently to enable rolling in of replacement chips of the same size. If some time has elapsed since the surfacing was completed, one grade smaller chip should be used.

If additional binder is necessary a light coat (almost tack coat) of heavily diluted binder should be sufficient providing the replacement chips are applied and rolled immediately. Excessive additional binder is liable to promote a slick surface in a relatively short time.

26. PAYMENT

The payment procedure and calculation methods are described in the course notes which should be thoroughly understood.

The payment should not be processed until test results of binder samples have been checked since those results are to be used for payment purposes when they prove that the binder formulation is outside tolerance. Individual spray run binder quantities which are in excess of the tolerance limits are also to be reduced to the tolerance limit for payment purposes.

The payment method provides for the payment of the asphalt cement, AGO and kerosene individually.

Payment for the adhesion agent is made on the basis of the total number of litres of asphalt cement approved for payment. For this reason a more rigid control of the addition of adhesion agent is specified.

There is provision for payment for cleaning the existing surface, for the supply of chips or for client's supply, for precoating of chips when specified in the job or contract specification for the supply and sealing of dry grit locking coat if required, and for the payment of a lump sum for traffic control.