



C5.1 ROADBED PART C: MEASUREMENT AND PAYMENT

(i) Preamble

The tendered rate for each item shall include full compensation for providing, maintaining and decommissioning upon completion, of all the construction plant, equipment, labour, tools, incidentals and supervision to carry out the activity or construct the works in the item, unless otherwise stated.

Any prime cost or provisional sums shall be paid in accordance with the provisions of the conditions of contract. The charge or mark-up tendered or allowed for is a percentage of the amount actually paid under the prime cost or provisional sum. This percentage shall cover all the Contractor's handling, supervision, profit and liability costs to provide the services in the prime cost or provisional sum item.

The requirements of Section C1.1 of Chapter 1 shall apply.

Where pay item descriptions include any wording in brackets it is an indication that contract specific information is to be inserted in the Pricing Schedule included in the Contract Documentation.

(ii) Classification of materials for labour enhancement

Where excavation is done using labour enhancement methods, the Engineer shall classify excavated materials either as soft or intermediate, in terms of Tables C5.1-1 and C5.1-2.

No hard material shall be measured under labour enhancement methods.

Table C5.1-1: Classification of excavated materials for labour enhancement

| MATERIALS CLASSIFICATION | DESCRIPTION |
|--------------------------|---|
| Soft | Material which can be excavated by means of a suitable shovel with or without the use of a pick or other hand-swung tool |
| Intermediate | Material which is difficult to excavate by hand even with the aid of a crowbar and requires the assistance of pneumatic tools for economic removal. |

Table C5.1-2: Classification of materials in terms of consistency and shear strength for labour enhancement

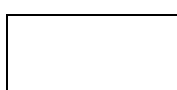
| MATERIALS CLASSIFICATION | CONSISTENCY | | NUMBER OF DCP BLOWS TO PENETRATE 100 mm * | |
|--------------------------|---------------------|--------------------|---|------------------|
| | Granular soil | Cohesive soil | Granular soil | Cohesive soil ** |
| Soft | Very loose to dense | Very soft to stiff | ≤ 15 | ≤ 8 |
| Intermediate | Very dense | Very stiff | >15 | >8 |

*Only applicable to materials comprising not more than 10 % gravel of size less than 10 mm and materials containing no cobbles or isolated small boulders.

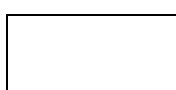
**This could be subjective depending on the moisture content of the cohesive material

(iii) Items that will not be measured separately

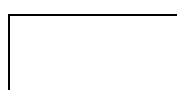
The following required activities will not be measured or paid for separately and the Contractor shall include the cost thereof in other items as deemed appropriate:



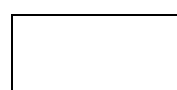
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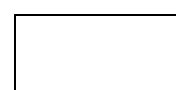
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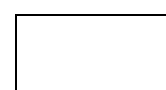
Witness 2



Employer



Witness 1



Witness 2



1. Staking of the road prism referred to in Clause A5.1.3.1.
2. Drainage and protection of the pavement layers from all damage that may occur for any reason until the Employer has taken over the Works.
3. Protection and repair as required of all existing and new roadside furniture, of all existing and new drainage structures and of all existing and new infrastructure until the Employer has taken over the Works
4. Protection and repair as required of any other items adjacent to, over or under the road that are damaged by the Contractor's vehicles, and equipment, or by public traffic being accommodated on or alongside the Works, during the construction of the Works.
5. Repair of all damage to any new or existing structures, buildings, road furniture and services that may occur for any reason before, during or after the construction of the roadbed up until the Employer has taken over the Works.
6. Provision of and/or the subsequent removal of all excess material after completion of the roadbed treatment.

(iv) Work in restricted areas

Clause C1.1.3.2b) of Chapter 1, specifies that all rates are to be inclusive.

(v) Items to be measured and paid for using payment items specified elsewhere in the specifications

For activities in Table C5.1-3 payment items specified in other Chapters or Sections of the specification, where they relate to work under this Section, will be listed in the Pricing Schedule.

Table C5.1-3: Payment items from other Chapters or Sections

| Activity | Section 5.1 reference | Section item reference |
|---|-----------------------|---|
| Ground improvement (Specialist Roadbed Treatment) | A5.1.3.3 | Section C12.3 of Chapter 12 – All applicable items |
| Remove unwanted material | A5.1.5.1 | Section C1.6 of Chapter 1 – All applicable items |
| Topsoil | A5.1.5.2 / A5.1.7.2 | Section C1.6 of Chapter 1 – All applicable items |
| Additional laboratory testing | A5.1.3.1 / A5.1.7.3 | Section C4.1 of Chapter 4 – All applicable items |
| Loading and hauling material | A5.1.5.4 / A5.1.7.3 | Section C1.7 of Chapter 1 – All applicable items |
| Clearing and grubbing | A5.1.7.1 | Section C1.6 of Chapter 1 – All applicable items |
| Construction of stockpile site | A5.1.7.2 | Section C4.1 of Chapter 4 – All applicable items |
| Fill material | A5.1.7.3b) | Section C5.2 of Chapter 5 – All applicable items |
| Hard material excavation | A5.1.7.3f) | Section C12.10 of Chapter 12 – All applicable items |
| Lime modification | A5.1.7.3g) | Section C5.4 of Chapter 5 – All applicable items |

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Witness 1

Witness 2

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| Drainage | A5.1.7.4 | Section C3.1 of Chapter 3 – All applicable items |
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(vi) Determining the quantities

Before carrying out any construction work in connection with clearing and grubbing and the removal of topsoil, the Contractor, shall at no cost to the Employer, take cross-sections at a maximum spacing of 20 m so as to determine the original ground line.

After completion of the topsoil removal the Contractor, shall at no cost to the Employer, take cross-sections at a maximum spacing of 20 m so as to determine the new ground line and subsequently the quantities of topsoil removed ahead of the commencement of the roadbed treatment.

After completion of the roadbed treatment the Contractor, shall at no cost to the Employer, take cross-sections at a maximum spacing of 20 m so as to determine the final roadbed levels and subsequently the quantities of any roadbed levelling operations, if any, ahead of the cut to fill operations commencing.

The Engineer shall take control measurements to determine the accuracy and adequacy of the cross-sections, and shall instruct the Contractor to correct any out of tolerance work and to take such additional measurements and cross-sections as may be deemed necessary. Such crosssections shall be taken before any cut or fill work is done.

Where the Contractor proceeds with further construction work before the Contractor and the Engineer have reached agreement on the accuracy and adequacy of the cross-sections, the Engineer's decision regarding the cross-sections to be used shall be final and binding on the Contractor.

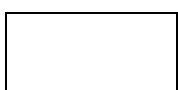
(vii) Material from commercial sources

Where specified in the Contract Documentation, material from commercial sources shall be used for the construction of roadbed treatment. In such cases the items listed below shall be applicable, except that the tendered rates shall also include full compensation for all transport costs as no load and haul shall be measured for commercial material.

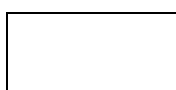
(viii) Payment items specifically for this Section of the specifications

| Item | Description | Unit |
|---------------|--|----------------------------------|
| C5.1.1 | Roadbed construction and compaction | |
| C5.1.1.1 | Compaction of in-situ material to 90 % of MDD | cubic metre (m ³) |
| C5.1.1.2 | Compaction of in-situ material to 93 % of MDD | cubic metre (m ³) |
| C5.1.1.3 | Compaction of imported material to 90 % of MDD | cubic metre (m ³) |
| C5.1.1.4 | Compaction of imported material to 93 % of MDD | cubic metre (m ³) |
| C5.1.1.5 | Compaction of in-situ sand roadbed to 95 % of MDD | cubic metre (m ³) |
| C5.1.1.6 | Compaction of in-situ sand roadbed to 100 % of MDD | cubic metre (m ³) |

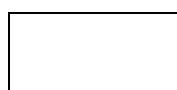
The unit of measurement shall be the cubic metre of roadbed material prepared and compacted as specified. The quantity of the in-situ material shall be computed in accordance with the authorised dimensions of the



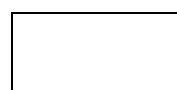
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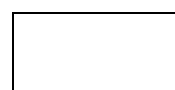
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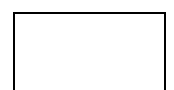
Witness 2



Employer



Witness 1



Witness 2



completed layers. The quantity of imported material shall be measured in the haul vehicles, by taking the volume of the imported material to be the equivalent of 70 % of the loose volume in the haul vehicles.

The tendered rates for items C5.1.1.1, C5.1.1.2, C5.1.1.5 and C5.1.1.6 shall include full compensation for shaping, scarifying, mixing of in-situ material and preparing and compacting the material to the specified MDD.

The tendered rates for items C5.1.1.3 and C5.1.1.4 shall include full compensation for shaping, scarifying with in-situ material where required and mixing of the imported material or the in-situ/imported material blend, then preparing and compacting the material to the specified MDD.

The tendered rates for items C5.1.1.3 and C5.1.1.4 shall include for loading and off-loading the imported material. The haul of the imported material shall be measured from the point of loading until the point of off-loading as per Section A1.7 of Chapter 1.

All material that requires being imported for the construction of the roadbed, to replace spoil material measured under item C5.1.2, or to replace unsuitable material measured under C5.1.3, except the levelling layer which shall be paid under item C5.1.12, shall be measured and paid for under this item C5.1.1.

Item Description Unit C5.1.2 Excavate material to spoil sites designated by the Employer

C5.1.2.1 Excavate material to spoil from roadbed construction, material obtained from:

- (a) Soft excavation cubic metre (m³)
- (b) Boulder excavation Class A cubic metre (m³)
- (c) Boulder excavation Class B cubic metre (m³)
- (d) Hard excavation (other than by blasting) cubic metre (m³)
- (e) Hard excavation (by blasting) cubic metre (m³)

C5.1.2.2 Excavate material to spoil from roadbed construction, using labour enhancement, material obtained from:

- (a) Soft excavation cubic metre (m³)
- (b) Intermediate excavation cubic metre (m³)

The unit of measurement shall be the cubic metre of material measured in its original position in cut and computed by the method of average end areas from levelled cross-sections taken as specified.

Where measurement by cross-sections is considered by the Engineer to be impractical, cut to spoil may be measured in the haul vehicles, by taking the in situ volume of the material to be the equivalent of 70 % of the loose volume in the haul vehicles.

For payment purposes a distinction shall be made between using conventional construction methods and using labour enhancement.

The tendered rates of item C5.1.2.1 shall include full compensation for excavating and loading from the road prism and roadbed the material in the different classes of excavation. Haul shall be measured and paid for from the point of loading to the point of off-loading.

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Witness 1

Witness 2

Employer

Witness 1

Witness 2



The tendered rates of item C5.1.2.2 shall include full compensation for using labour enhancement for excavating and loading from the road prism and roadbed in the different classes of excavation. Haul shall be measured and paid for from the point of loading to the point of off-loading.

The excavation of hard material by blasting shall exclude the cost of blasting which shall be measured and paid for under item C12.10.1 in Section C12.10 of Chapter 12.

Item Description Unit C5.1.3 Excavate material to spoil sites designated by the Contractor

C5.1.3.1 Excavate material to spoil from roadbed construction, material obtained from:

- (a) Soft excavation cubic metre (m³)
- (b) Boulder excavation Class A cubic metre (m³)
- (c) Boulder excavation Class B cubic metre (m³)
- (d) Hard excavation (other than by blasting) cubic metre (m³)
- (e) Hard excavation (by blasting) cubic metre (m³)

C5.1.3.2 Excavate material to spoil from roadbed construction, using labour enhancement, material obtained from:

- (a) Soft excavation cubic metre (m³)
- (b) Intermediate excavation cubic metre (m³)

The unit of measurement shall be the cubic metre of material measured in its original position in cut and computed by the method of average end areas from levelled cross-sections taken as specified.

Where measurement by cross-sections is considered by the Engineer to be impractical, cut to spoil may be measured in the haul vehicles, by taking the in situ volume of the material to be the equivalent of 70 % of the loose volume in the haul vehicles.

For payment purposes a distinction shall be made between using conventional construction methods and using labour enhancement.

The tendered rates of item C5.1.2.1 shall include full compensation for excavating and loading from the road prism and roadbed the material in the different classes of excavation. All haul costs shall be included in the tendered rates for item C5.1.3..

The tendered rates of item C5.1.2.2 shall include full compensation for using labour enhancement for excavating and loading from the road prism and roadbed in the different classes of excavation. All haul costs shall be included in the tendered rates for item C5.1.3..

The excavation of hard material by blasting shall exclude the cost of blasting which shall be measured and paid for under item C12.10.1 in Section C12.10 of Chapter 12.

| Item | Description | Unit |
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Witness 2

Employer

Witness 1

Witness 2



C5.1.4 Removal of unsuitable material to spoil

C5.1.4.1 In layer thicknesses of 200 mm and less

- (a) Stable material cubic metre (m³)
- (b) Unstable material cubic metre (m³)

C5.1.4.2 In layer thicknesses exceeding 200 mm

- (a) Stable material cubic metre (m³)
- (b) Unstable material cubic metre (m³)

The unit of measurement shall be the cubic metre of unsuitable material removed by the Contractor to spoil in accordance with the Engineer's instructions, and it shall be the in-situ volume of the material calculated in accordance with the authorised dimensions. Where the use of authorised dimensions proves to be unsatisfactory, then the unit of measurement shall be 70 % of the loose volume measured in the haul trucks.

The tendered rates shall include full compensation for excavating and loading the material from the road prism and roadbed in the different classes of excavation.

Hauling shall be measured and paid for from the point of loading to the point of off-loading as per Section C1.7 of Chapter 1.

The removal of unsuitable stable material in cuttings is measured and paid for under item C4.2.7 of Chapter 4.

| Item | Description | Unit |
|---------------|--|-------------------------------|
| C5.1.5 | In-situ treatment of roadbed in hard material | |
| C5.1.5.1 | In-situ treatment by ripping | cubic metre (m ³) |
| C5.1.5.2 | In-situ treatment by drilling and blasting | cubic metre (m ³) |
| C5.1.5.3 | In-situ treatment by drilling and splitting the material using non-explosive, rock-breaking products | cubic metre (m ³) |

The unit of measurement shall be the cubic metre of material treated in-situ as specified. The quantity shall be calculated from the authorised dimensions of the in-situ treatment.

The tendered rates for items C5.1.5.1 and C5.1.5.2 shall include full compensation for ripping or for drilling and blasting, shaping, scarifying, sizing, mixing of in-situ and imported material if required, processing and compacting the material as specified. Payment shall distinguish between in-situ treatment by ripping only and in-situ treatment by drilling and blasting.

The excavation of hard material by blasting for item C5.1.5.2 shall exclude the cost of blasting which shall be measured and paid for under item C12.10.1 in Section C12.10 of Chapter 12.

The tendered rates for item C5.1.5.3 shall include full compensation for drilling the holes, procurement of the rock-breaking product(s), charging the drilled holes and splitting the material. The tendered rates shall also include for shaping, scarifying, sizing, mixing of in-situ and imported material if required, processing and compacting the material as specified.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



All imported material shall be measured and paid for under Section C5.2.

No separate payment shall be made for oversize or surplus material excavated to spoil as a result of this treatment.

Surplus material shall be measured and paid under item C5.1.1 if used in the roadbed.

| Item | Description | Unit |
|---------------|--|--------------------------------|
| C5.1.6 | Roller-pass compaction | |
| C5.1.6.1 | Grid rollers | square metre (m ²) |
| C5.1.6.2 | Pad foot vibratory rollers | square metre (m ²) |
| C5.1.6.3 | Smooth drum vibratory rollers | square metre (m ²) |
| C5.1.6.4 | Other vibratory rollers. Specify..... | square metre (m ²) |
| C5.1.6.5 | Impact rollers | square metre (m ²) |
| C5.1.6.6 | Pneumatic rollers | square metre (m ²) |
| C5.1.6.7 | High energy impact compactor/roller (HEIC) | square metre (m ²) |
| C5.1.6.8 | Other rollers. Specify..... | square metre (m ²) |

The unit of measurement shall be the square metre of roadbed compacted in accordance with the specification for a single roller-pass. The quantity will be measured in accordance with the authorised dimensions of the area to receive single roller-pass compaction.

The area to be roller-pass treated will be adjusted to be commensurate with the number of roller-pass treatments instructed. The authorised area will be doubled when two roller-pass compaction is specified or trebled when three roller-pass compaction is specified in the Contract Documentation, or instructed by the Engineer, and so forth.

The tendered rates shall include full compensation for shaping, providing the rollers, keeping the rollers operational and ready for when soilmoisture conditions are favourable, and for compacting the roadbed with the specified number of roller-passes.

The Contractor shall base the tendered rates on a single, one direction pass for each specified type, size and weight of roller. The area covered by the nominal roller overlap width required to ensure full coverage of the area being compacted shall not be measured for additional payment. If the rollers available on site are different types, sizes and weights than those specified in the Contract Documentation, then revised rates which take into account the percentage increased or reduced compaction effort per roller-pass, shall be agreed with the Contractor based on the same percentage increase or decrease.

The unit of measurement for the addition of water shall be the kilolitre of water applied as required.

The tendered rates for the addition of water to achieve the required compaction shall include full compensation for the supply, delivery and application of the water when required.

| Item | Description | Unit |
|---------------|---|-------------------------------|
| C5.1.7 | Construction of a roadbed trial section | |
| C5.1.7.1 | Non wetting-up collapsing soil trial section at in-situ moisture content using conventional rollers | cubic metre (m ³) |

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Witness 2



and/or HEIC

C5.1.7.2 Non wetting-up collapsing soil trial section by excavating the soil to cubic metre stockpile and then importing the soil from the stockpile to controlled (m³) compacted layers

C5.1.7.3 Wetting-up collapsing soil trial section cubic metre (m³)

C5.1.7.4 Inactive and normal clay

(a) By material modification cubic metre (m³)

(b) By lime modification cubic metre (m³)

(c) By removal of material cubic metre (m³)

C5.1.7.5 Active clay

(a) Roadbed construction using lime cubic metre (m³)

(b) Roadbed construction by removal of active clay cubic metre (m³)

C5.1.7.6 Roller-pass compaction. cubic metre (m³)

The unit of measurement for a trial section shall be the cubic metre of material processed during construction of the trial section according to the authorised dimensions as specified in the Contract Documentation measured along the centre line of the road. A total length of at least 150 m of trial section and no more than 200 m will be measured for payment as a trial section.

The authorised depth and width of the trial sections including item C5.1.7.1 (the depth of compaction) and item C5.1.7.3 (the depth of wetting-up) shall be representative of what will ultimately be constructed as per the Contract Documentation.

The tendered rates for item C5.1.7.4(a) shall include full compensation to mechanically modify the material as specified in Clause A5.4.7.2 with the type of material and ratios of material as specified in the Contract Documentation.

The tendered rates for item C5.1.7.4(c) shall include full compensation for excavating and loading from the road prism and roadbed the inactive/normal clay material. Haul shall be measured and paid for from the point of loading to the point of off-loading.

The tendered rates shall include full compensation for setting out the trial section, preparing and providing the programme of work for the specific trial section and preparing the existing roadbed surface where required.

The tendered rates shall include full compensation for the application of water, in the case of items C5.1.7.3, C5.1.7.4, C5.1.7.5 and C5.1.7.6, all laboratory testing and for the full documentation of the construction techniques to produce a trial section that is compliant with the requirements specified in the Contract Documentation.

The addition of lime for construction of the trial sections shall be measured and paid for under Section C5.4.

| Item | Description | Unit |
|------|-------------|------|
|------|-------------|------|

C5.1.8 Construction of the roadbed in collapsing soil

| | | | | | |
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C5.1.8.1 Non wetting-up collapsing soil roadbed construction at in-situ moisture content using conventional rollers cubic metre (m³)

C5.1.8.2 Non wetting-up collapsing soil roadbed construction at in-situ moisture content using HEIC cubic metre (m³)

C5.1.8.3 Non wetting-up collapsing soil roadbed construction by excavating the soil to stockpile and then importing from the stockpile to controlled compacted layers cubic metre (m³)

C5.1.8.4 Wetting-up collapsing soil roadbed construction kilo litre (kl)

C5.1.8.5 Water for wetting-up collapsing soil roadbed construction kilo-litre (kl)

The unit of measurement for items C5.1.8.1, C5.1.8.2, C5.1.8.3 and C5.1.8.4 shall be a cubic metre of collapsing soil material constructed according to the authorised dimensions in the Contract Documentation, measured in-situ prior to the commencement of any construction.

The tendered rates shall include full compensation for setting out the collapsing soil material sections, for preparing and providing the construction programme for the roadbed construction and preparing the existing roadbed surface where required.

The tendered rates shall include full compensation for construction of the roadbed treatment all in terms of the Contract Documentation and/or in terms of the relevant compliant trial section constructed as per item C5.1.7. The tendered rates shall include full compensation for all labour, construction plant including conventional rollers (C5.1.8.1) or HEIC (C5.1.8.2), equipment and incidentals required to carry out the construction of the roadbed in collapsing soil material as specified.

The unit of measurement for item C5.1.8.4 shall be a kilolitre of water used to wet-up the collapsing soil.

The tendered rates for item C5.1.8.4 shall include full compensation for the provision and application of water for the construction of item C5.1.8.3, applied as per the compliant trial section under item C5.1.7.3.

| Item | Description | Unit |
|---------------|--|-------------------------------|
| C5.1.9 | Construction of roadbed comprising normal and inactive clay | |
| C5.1.9.1 | By material modification | cubic metre (m ³) |
| C5.1.9.2 | By lime modification | cubic metre (m ³) |
| C5.1.9.3 | By removal of material | cubic metre (m ³) |

The unit of measurement shall be a cubic metre of inactive clay material constructed according to the authorised dimensions in the Contract Documentation and down to a depth of 200 mm for both items C5.1.9.1 and C5.1.9.2.

The tendered rates shall include full compensation for setting out each inactive clay section and preparing the existing roadbed surface where required. The tendered rates for C5.1.9.1 shall also include for loading the material.

The tendered rates for items C5.1.9.1 and C5.1.9.2 shall also include full compensation for construction of the roadbed treatment of inactive clay by material modification or lime modification, respectively, as specified. The tendered rates for each item shall also include full compensation for all labour, construction plant, equipment and incidentals required to carry out the construction of the roadbed by material modification or lime modification as specified.

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Witness 1

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Witness 2



The hauling of compliant fill material shall be measured and paid for from the point of loading to the point of off-loading as per Section A1.7 of Chapter 1.

The production of the compliant material is measured and paid for under Sections C4.1 and/or C4.2 of Chapter 4.

The procurement and mixing of the lime is specified and measured in Section A4.4 of Chapter 4 and Section C5.4 respectively.

| Item | Description | Unit |
|----------------|---|----------------------------------|
| C5.1.10 | Construction of roadbed comprising active clay | |
| C5.1.10.1 | Roadbed construction using lime | cubic metre (m ³) |
| C5.1.10.2 | Roadbed construction by removal of active clay | cubic metre (m ³) |

The unit of measurement shall be a cubic metre of active clay material constructed according to the authorised dimensions in the Contract Documentation.

The depth of treatment for item C5.1.10.1 shall be 200 mm unless otherwise instructed in the Contract Documentation or by the Engineer. The depth of treatment for item C5.1.10.2 is the depth indicated in the Contract Documentation up to a limit of 750 mm unless instructed otherwise in the Contract Documentation or by the Engineer.

The procurement and mixing of the lime for item C5.1.10.1 is specified and measured in Section A4.4 of Chapter 4 and Section C5.4 respectively.

The tendered rates shall include full compensation for setting out each active clay section and preparing the existing roadbed surface as specified.

The tendered rates for item C5.1.10.1 shall also include full compensation for construction of the roadbed treatment of active clay using lime modification as specified.

The tendered rates for C5.1.10.2 shall also include for loading and off-loading the active clay. The hauling of the active clay material shall be measured and paid for from the point of loading to the point of off-loading as per Section A1.7 of Chapter 1.

The tendered rates for each item shall also include full compensation for all labour, construction plant, equipment and incidentals required to carry out the construction of the roadbed as specified.

| Item | Description | Unit |
|----------------|---|--|
| C5.1.11 | Construction of roadbed comprising a pioneer layer | cubic metre (m³) |

The unit of measurement shall be a cubic metre of pioneer layer material constructed in the authorised areas specified in the Contract Documentation or as instructed by the Engineer.

The compacted volume of the pioneer layer of material shall be taken as equal to 70 % of the loose volume of material in the hauling vehicles.

The tendered rate for the construction of the roadbed treatment using a pioneer layer over water-logged or soft clayey ground as per the Contract Documentation shall include full compensation for all labour, construction plant, equipment and incidentals required to carry out the construction of the roadbed using a pioneer layer as specified.

The loading and hauling of compliant pioneer material for the roadbed construction is measured and paid for as specified in Section A1.7 of Chapter 1.

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Tenderer

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Witness 1

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Witness 2

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Employer

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Witness 1

[Signature box]

Witness 2



The production of the compliant pioneer material is measured and paid for under Sections C4.1 and/or C4.2 of Chapter 4.

| Item | Description | Unit |
|------|-------------|------|
|------|-------------|------|

C5.1.12 Excavation for benches

C5.1.12.1 Excavation for benches

- (a) Side-cut to fill in soft material cubic metre (m³)
- (b) Side-cut to spoil in soft material cubic metre (m³)

C5.1.12.2 Excavation for benches using labour enhancement

- (a) Side-cut to fill
 - (i) Soft material cubic metre (m³)
 - (ii) Intermediate material cubic metre (m³)
- (b) Side-cut to spoil
 - (i) Soft material cubic metre (m³)
 - (ii) Intermediate material cubic metre (m³)

The unit of measurement shall be the cubic metre of material measured in its original position in cut and computed by the method of average end areas from levelled cross-sections taken as specified. The cross-sections shall be taken prior to excavating the cut for the benches.

Excavations shall be done using conventional construction and/or labour enhancement as specified and measured.

The tendered rates for excavating of benches under item C5.1.12.1 shall include full compensation for excavating from the road prism and roadbed in the class of excavation indicated. The rate shall also include full compensation for moving, by bull-dozer or excavating and loading the fill material a maximum of 1,0 km into its final location in the fill or for excavation, loading, off-loading and disposing of the spoil material at designated spoil sites up to a maximum of 1.0km, as instructed by the Engineer, including shaping and levelling-off any piles of spoil material.

The tendered rates for excavating of benches under item C5.1.12.2 using labour enhancement, shall include full compensation for excavating from the road prism and roadbed in the class of excavation indicated, loading the fill material, off-loading and disposing of the spoil material at designated spoil sites, as instructed by the Engineer, including shaping and levelling-off any piles of spoil material. The tendered rates shall include wheelbarrow transport over a haul distance of 100 m.

Hauling beyond 1,0 km when using conventional construction plant and 100 m using labour enhancement, shall be measured and paid for under Section C1.7 of Chapter 1.

Construction of the fill is measured and paid for under Section C5.2.

Construction of the cut, exposed benched area, shall be measured and paid under the appropriate item in Section C5.1.

For payment purposes a distinction shall be made between materials as classified above.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



| Item | Description | Unit |
|----------------|---|-------------------------------|
| C5.1.13 | Construction of a levelling layer | |
| C5.1.13.1 | Over roadbed treatment in hard material compacted to 90 % MDD | cubic metre (m ³) |
| C5.1.13.2 | Over a constructed pioneer layer compacted to 90 % MDD | cubic metre (m ³) |

The unit of measurement shall be the cubic metre of material measured in its final position and computed by the method of average end areas from levelled cross-sections taken as specified. The cross-sections shall be taken prior to the importation of the levelling layer and after completion of the levelling layer.

When measurement by cross-sections is considered impractical the Contract Documentation may specify that the volume of the levelling layer can be computed as 70 % of the loose volume in the haul trucks.

The tendered rates shall include full compensation for the construction of the levelling layer of varying thickness, with an average thickness of 200 mm and shall also include for all labour, construction plant, equipment and incidentals required to carry out the construction of the roadbed using a levelling layer as specified as well as compaction to the specified MDD.

The production of the compliant levelling layer material is measured and paid for under Sections C4.1 and/or C4.2 of Chapter 4.

Loading and hauling of the compliant material for the levelling layer is measured and paid for in Section C1.7 of Chapter 1 and is measured from the point of loading to the point of off-loading as per Section A1.7 of Chapter 1.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



C5.3 ROAD PAVEMENT LAYERS PART C: MEASUREMENT AND PAYMENT

(i) Preamble

The tendered rate for each item shall include full compensation for providing, maintaining and decommissioning upon completion, of all the constructional plant, equipment, labour, tools, incidentals and supervision to carry out the activity or construct the works in the item, unless otherwise stated.

Any prime cost or provisional sums shall be paid in accordance with the provisions of the conditions of contract. The charge or mark-up tendered or allowed for is a percentage of the amount actually paid under the prime cost or provisional sum. This percentage shall cover all the Contractor's handling, supervision, profit and liability costs to provide the services in the prime cost or provisional sum item.

The requirements of Section C1.1 of Chapter 1 shall apply.

Where pay item descriptions include any wording in brackets it is an indication that contract specific information is to be inserted in the Pricing Schedule included in the Contract Documentation.

(ii) Items that will not be measured separately

The following required activities will not be measured or paid for separately and the Contractor shall include the cost thereof in other items as deemed appropriate:

1. All surveying, setting out and level control required for the construction of the pavement layers.
2. Drainage and protection of the pavement layers from all damage that may occur for any reason until the Employer has taken over the works.
3. Protection of all existing or new kerbs, channels, sidewalks, lined drains, catch pits, kerb inlets, gratings, culverts, bridges, structures, buildings, road signs, guard rails, street lights, fencing, service pipes or cables and any other items adjacent to, over or under the road that could be damaged by the Contractor's vehicles, construction equipment, or by public traffic being accommodated on or alongside the pavement layers, during the construction of the pavement layers, until the Employer has taken over the works.
4. Compaction immediately adjacent to existing or new kerbs, channels, sidewalks, lined drains, catch pits, kerb inlets, gratings, culverts, bridges, structures, buildings, road signs, guard rails, street lights, fencing, service pipes or cables etc. using hand operated compaction equipment.
5. Repair of all damage to the pavement layers and any new or existing structures, buildings, road furniture and services that may occur for any reason before, during or after the construction of the pavement layers up until the Employer has taken over the works.
6. Provision of additional material in excess of the compacted volume of the layers calculated using the layer dimensions given in the Contract Documentation for whatever reason including additional material required for the correct placing, mixing, levelling and compaction of the layers.
7. Removal of additional material required for the correct mixing and working of the layers and left in windrow or on the sides of the road.
8. Breaking down and removal of oversize material up to 5 % of the compacted layer volume. Payment will only be made to remove any oversize material in excess of 5 % of the compacted layer volume that cannot be broken down on the road when instructed by the Engineer.
9. Loading and hauling of commercial pavement material identified by the Employer or by the Contractor.
10. Loading and hauling of alternative material identified by the Contractor.
11. Construction of tie-in joints to new or existing road layers or surfacing.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



(iii) Items to be measured and paid for using payment items specified elsewhere in the specifications

For activities in Table C5.3-1 payment items specified in other Chapters or Sections of the specification, where they relate to work under this Section, will be listed in the Pricing Schedule.

Table C5.3-1: Payment items from other Chapters or Sections

| Activity | Section 5.3 reference | Section item reference |
|---|-----------------------|---|
| Loading and hauling | A5.3.1 | Section C1.7 of Chapter 1 – All applicable items |
| Stabilisation | A5.3.1 | Section C5.4 of Chapter 5 – All applicable items |
| Subsoil drainage | A5.3.3.8 | Section C3.1 of Chapter 3 – All applicable items |
| Construction of edge constraints for BM | A5.3.7.10a) | Section C11.1 of Chapter 11 – All applicable items |
| Screening material | A5.4.7.2d) | Section C4.1 of Chapter 4 – All applicable items |

(iv) Items specifically for this Section of the specifications

| | | |
|-------------|--------------------|-------------|
| Item | Description | Unit |
|-------------|--------------------|-------------|

C5.3.1 Compiling and implementing M&U plans for the construction of all the pavement layers number (no)

The unit of measurement shall be the number of compiled M&U plans for the construction of the pavement layers.

Usually only one plan shall be required for each of the layers unless specified otherwise in the Contract Documentation.

The tendered rate shall include full compensation for gathering all information and compiling the plan(s) and for ensuring the implementation of the plan(s) during the construction of the pavement layers.

| | | |
|-------------|--------------------|-------------|
| Item | Description | Unit |
|-------------|--------------------|-------------|

C5.3.2 Construction of pavement layers

C5.3.2.1 Construction of layers using conventional construction methods:

- (a) Lower selected subgrade layer (layer thickness indicated) compacted to 93 % of MDD cubic metre (m³)
- (b) Lower selected subgrade layer (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
- (c) Upper selected subgrade layer (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
- (d) Upper selected subgrade layer (layer thickness indicated) compacted to 97 % of MDD cubic metre (m³)

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



- (e) Sand layer (layer thickness indicated) compacted to 97 % of MDD cubic metre (m³)
- (f) Sand layer (layer thickness indicated) compacted to 100 % of MDD cubic metre (m³)
- (g) Gravel wearing course layer (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
- (h) Gravel shoulder layer (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
- (i) Lower subbase gravel layer (unstabilised) (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
MDD
- (j) Lower subbase gravel layer (chemically stabilised) (layer thickness indicated) compacted to cubic metre (m³) 95 % of MDD
- (k) Upper subbase gravel layer (unstabilised), (layer thickness indicated) compacted to 97 % of cubic metre (m³)
MDD
- (l) Upper subbase gravel layer (chemically stabilised), (layer thickness indicated) compacted to cubic metre (m³) 95 % of MDD
- (m) Gravel base layer (unstabilised), (layer thickness indicated) compacted to 100 % of MDD cubic metre (m³)
- (n) Gravel base layer (chemically stabilised), (layer thickness indicated) compacted to 97 % of cubic metre (m³)
MDD
- (o) G5B crushed rock/boulder subbase layer (layer thickness indicated) compacted to 97 % of cubic metre (m³)
MDD
- (p) G5B crushed rock/boulder base layer (layer thickness indicated) compacted to 100 % of MDD cubic metre (m³)
- (q) G5A crushed rock/boulder subbase layer (layer thickness indicated) compacted to 97 % of cubic metre (m³)
MDD
- (r) G5A crushed rock/boulder base layer (layer thickness indicated) compacted to 100 % of MDD cubic metre (m³)
- (s) G4A crushed rock/boulder lower subbase layer (unstabilised or chemically stabilised) (layer cubic metre (m³) thickness indicated) compacted to 95 % of MDD
- (t) G4A crushed rock/boulder upper subbase layer (unstabilised or chemically stabilised) (layer cubic metre (m³) thickness indicated) compacted to 97 % of MDD
- (u) G4A crushed rock/boulder subbase layer compacted to 97 % of MDD cubic metre (m³)
- (v) G3 crushed stone subbase layer (unstabilised or chemically stabilised) (layer thickness cubic metre (m³) indicated) compacted to 97 % of MDD
- (w) G3 crushed stone base layer (layer thickness indicated) compacted to 85 % of BD cubic metre (m³)

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



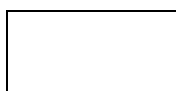
- (x) G2 crushed stone base layer (layer thickness indicated) compacted to 88 % of BD cubic metre (m³)
- (y) G2 crushed stone base layer (layer thickness indicated) compacted to 88 % of AD cubic metre (m³)
- (z) G1 crushed stone base layer (layer thickness indicated) compacted to 86 % of AD cubic metre (m³)
- (aa) G1 crushed stone base layer (layer thickness indicated) compacted to 88 % of AD cubic metre (m³)
- (bb) Bound macadam layer (layer thickness indicated) compacted to 90 % of AD cubic metre (m³)
- (cc) PMPL wet lean-mix concrete layer (Cube crushing strength and layer thickness indicated) cubic metre (m³)

C5.3.2.2 Construction of layers using labour enhancement:

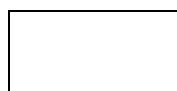
- (a) Lower selected subgrade layer (layer thickness indicated) compacted to 93 % of MDD cubic metre (m³)
- (b) Upper selected subgrade layer (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
- (c) Sand layer (layer thickness indicated) compacted to 97 % of MDD cubic metre (m³)
- (d) Sand layer (layer thickness indicated) compacted to 100 % of MDD cubic metre (m³)
- (e) Gravel wearing course layer (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
- (f) Gravel shoulder layer (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
- (g) Lower gravel subbase layer (layer thickness indicated) compacted to 95 % of MDD cubic metre (m³)
- (h) Upper gravel subbase layer (layer thickness indicated) compacted to 97 % of MDD cubic metre (m³)
- (i) Gravel base layer (layer thickness indicated) compacted to 98 % of MDD cubic metre (m³)
- (j) Gravel base layer (layer thickness indicated) compacted to 100 % of MDD cubic metre (m³)
- (k) Bound macadam layer (layer thickness indicated) compacted to 90 % of AD cubic metre (m³)
- (l) Soil cement or soilcrete (layer thickness indicated) wet mixture as per clause A4.1.5.14 cubic metre (m³)
- (m) Soil cement or soilcrete (layer thickness indicated) stiff mixture as per clause A4.1.5.14 cubic metre (m³)
- (n) Emulsion treated base material (G1 or G2 material and layer thickness indicated) as per clause cubic metre (m³) A4.1.5.15



Tenderer



Witness 1



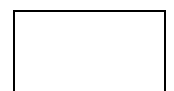
Witness 2



Employer



Witness 1



Witness 2



The unit of measurement shall be the cubic metre of material in the compacted layer, calculated using the layer work dimensions given in the Contract Documentation.

The tendered rates shall include full compensation for spreading the material, for breaking down oversize gravel material using one normal grid rolling operation or an equivalent operation, for removal of up to 5 % of the compacted layer volume of oversize material that cannot be broken down, for adding water for compaction purposes, for mixing, for levelling, for compacting to the specified density, for slush-compaction of G1 material layers or other layer that may be specified to receive slush-compaction and for finishing the layers in accordance with the specifications and the Contract Documentation. The tendered rates shall also include for the removal of all material in the windrow after the compaction of the layer has been completed.

Measurement and payment for loading the layer work material from borrow pits, quarries, cuttings, reclaimed material from existing roads and alternative materials identified by the Employer, transporting and then off-loading the material at the point of use is made under items C1.7.1 and C1.7.2 of Chapter 1.

The haul of the imported material shall be measured from the point of loading/collection to the point of off-loading as per Section A1.7 of Chapter 1.

A distinction shall be made between construction using conventional construction methods and labour enhancement.

| Item | Description | Unit |
|---------------|--|------------------------------------|
| C5.3.3 | Construction of crushed stone base supplied by the Employer | cubic metre (m³) |

This item is for crushed stone base constructed from type G1 or G2 material supplied from the Employer's stockpile (state location of stockpile) at R..... per ton (layer thickness indicated) and compacted to 88 % AD or 86% AD respectively as specified in the Contract Documentation.

The unit of measurement shall be the cubic metre of completed crushed-stone base in-situ and compacted to the specified density. The quantity shall be calculated from the net authorised dimensions of the layer as shown on the drawings or prescribed by the engineer. No adjustments shall be made to the net specified dimensions for level and thickness tolerances, overbuilding and/or other wastage.

The tendered rate shall include compensation for the purchase of the material from the Employer at R.....per ton, weighing on the calibrated weighbridge, furnishing and placing all materials, including crusher fines for correcting the grading of the crushed-stone and hauling the material to the point of use, rolling slushing and correcting the layers, and for testing, protecting and maintaining the work all as specified.

| Item | Description | Unit |
|---------------|---|----------------|
| C5.3.4 | Deductions for G1 crushed stone base material supplied by the Employer | ton (t) |

The unit of measurement shall be the ton of material supplied by the Employer.

The value of material supplied by the Employer and to be deducted from payments due to the contractor, shall be determined as the sum of audited weighbridge documentation and delivery notes.

| Item | Description | Unit |
|---------------|---|--|
| C5.3.5 | Breaking down oversize gravel layer material on the road | |
| C5.3.5.1 | By additional normal grid rolling as per clause A5.3.7.3b) | square metre-pass (m ² -pass) |
| C5.3.5.2 | By tamping roller | square metre-pass (m ² -pass) |

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



C5.3.5.3 By pad foot vibratory roller

square metre-pass
(m²-pass)

C5.3.5.4 By vibratory roller

square metre-pass
(m²-pass)

C5.3.5.5 By any other roller type

square metre-pass
(m²-pass)

The unit of measurement shall be the square metre-pass calculated by multiplying the layer surface area covered by the agreed number of rollerpasses used to break down the material satisfactorily.

The tendered rate for each square metre-pass instructed by the Engineer shall include full compensation for all supervision, labour, equipment, fuel, materials, work and incidentals necessary for completing the work. The same rates shall be applicable should there be a reduction in the number of roller-passes for a specific type of roller.

The tendered rate shall include full compensation for supplying the roller and removing the roller after completion of the breaking down process.

The items shall differentiate between the different types of rollers used.

| Item | Description | Unit |
|---------------|-------------------------------------|------------------------------------|
| C5.3.6 | Removal of oversize material | cubic metre (m³) |

The unit of measurement shall be the cubic metre of oversize material which cannot be broken down on the road and is removed for re-crushing or removed to spoil as instructed by the Engineer in excess of the 5 % of the compacted layer volume of oversize material included in the rates tendered for item C5.3.2.

The volume measured for payment shall be taken as 70 % of the loose volume in excess of 5 % of the measured volume of the layer as measured in the haul vehicles.

The tendered rate shall include full compensation for removing the oversize material from the pavement layers, loading it into the hauling vehicles and off-loading it at the point of disposal.

The haul of the oversize material in excess of 5 % by volume per layer shall be measured from the point of loading/collection to the point of offloading as per Section A1.7 of Chapter 1.

| Item | Description | Unit |
|---------------|---------------------------------------|------------------------------------|
| C5.3.7 | Recombining recovered material | cubic metre (m³) |

The unit of measurement shall be the cubic metre of the recombined material added to and mixed into the pavement layer as specified in Clause A5.3.7.2. The volume measured for payment shall be taken as 70 % of the loose volume of recovered material as measured in the haul vehicles.

The tendered rate shall include full compensation for mixing the recombined recovered material binder into the layer to form one homogeneous layer.

Payment for the construction operations required to process and compact the recombined layer will be paid for under item C5.3.2 and other relevant items

The haul of the recovered material shall be measured from the point of loading/collection to the point of off-loading as per Section A1.7 of Chapter 1.

| Item | Description | Unit |
|----------------------|----------------------|----------------------|
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| <i>Tenderer</i> | <i>Witness 1</i> | <i>Witness 2</i> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <i>Employer</i> | <i>Witness 1</i> | <i>Witness 2</i> |



C5.3.8 Processing of coarse gravel subbase or base layers cubic metre (m³)

The unit of measurement shall be the cubic metre of material in the compacted layer calculated using the layer work dimensions given in the Contract Documentation.

The tendered rate shall include full compensation for carrying out the processing and finishing work for a coarse layer as specified in Clause A5.3.7.4.

| Item | Description | Unit |
|------|-------------|------|
|------|-------------|------|

C5.3.9 Construction of a trial section

C5.3.9.1 Construction of a trial section using conventional methods of construction

- (a) Stabilised gravel layer (layer thickness indicated) trial section cubic metre (m³)
- (b) Crushed stone subbase layer (layer thickness indicated) trial section cubic metre (m³)
- (c) Crushed stone base layer (layer thickness indicated) trial section cubic metre (m³)
- (d) PMPL layer (layer thickness indicated) trial section cubic metre (m³)
- (e) Bound macadam layer (layer thickness indicated) trial section cubic metre (m³)
- (f) Any other cubic metre (m³)

C5.3.9.2 Construction of a trial section using labour enhancement methods

- (a) Stabilised gravel layer (layer thickness indicated) trial section cubic metre (m³)
- (b) Gravel base layer (layer thickness indicated) trial section cubic metre (m³)
- (c) Bound macadam layer (layer thickness indicated) trial section cubic metre (m³)
- (d) Any other cubic metre (m³)

The unit of measurement shall be the cubic metre of layer trial section constructed, tested and accepted. The quantity shall be calculated based on the authorised dimensions of the trial section layer.

The tendered rate shall include full compensation for providing all the material and constructing the particular layer for the trial section as specified. The tendered rate shall also include for any costs associated with a delay up to a maximum of ten working days, to allow for testing between completion of the trial section and the acceptance thereof.

A distinction shall be made between construction using conventional construction and labour enhancement.

| Item | Description | Unit |
|------|-------------|------|
|------|-------------|------|

C5.3.10 Removal of a completed trial section

- C5.3.10.1 Stabilised layer cubic metre (m³)
- C5.3.10.2 PMPL layer cubic metre (m³)
- C5.3.10.3 Crushed stone layer cubic metre (m³)

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2



The unit of measurement shall be the cubic metre of compliant trial section layer removed to a designated site when instructed by the Engineer. The tendered rates shall include full compensation for breaking up the trial section layer and for loading the broken up layer material..

The haul of the material to the designated site as instructed by the Engineer and off-loading the material shall be measured from the point of loading/collection at the trial section to the point of off-loading as per Section A1.7 of Chapter 1.

The removal to spoil of a non-compliant trial section layer shall be done by the Contractor at no cost to the Employer.

| Item | Description | Unit |
|----------------|------------------------------------|----------------|
| C5.3.11 | Riding quality measurements | |
| C5.3.11.1 | Using a 3,0 m straight edge | kilometre (km) |
| C5.3.11.2 | Using a rolling straight edge | kilometre (km) |
| C5.3.11.3 | Using an inertial profilometer | kilometre (km) |

The unit of measurement shall be the kilometre of riding quality measurements taken in each wheel path, measured along the wheel path as specified in Clause A5.3.8.5.

The tendered rates shall include full compensation for the cost of all traffic accommodation arrangements required, for several possible establishments and de-establishments of testing equipment, for the measurement of the riding quality with the specified instrument and the processing, analysis and interpretation of the riding quality measurements.

| Item | Description | Unit |
|----------------|---|-----------------------------------|
| C5.3.12 | Surface regularity payment adjustments | Provisional Sum (Prov Sum) |

The unit of measurement shall be the cumulative monetary value of each 100 m section of the completed base layer as measured and paid under item C5.3.2, multiplied by the applicable payment adjustment factor obtained from Table A5.3.8-6.

Tenderer

Witness 1

Witness 2

Employer

Witness 1

Witness 2

**C5.4 STABILISATION PART C: MEASUREMENT AND PAYMENT****(i) Preamble**

The tendered rate for each item shall include full compensation for providing, maintaining and decommissioning upon completion, of all the constructional plant, equipment, labour, tools, incidentals and supervision to carry out the activity or construct the works in the item, unless otherwise stated.

Any prime cost or provisional sums shall be paid in accordance with the provisions of the conditions of contract. The charge or mark-up tendered or allowed for is a percentage of the amount actually paid under the prime cost or provisional sum. This percentage shall cover all the Contractor's handling, supervision, profit and liability costs to provide the services in the prime cost or provisional sum item.

The requirements of Section C1.1 of Chapter 1 shall apply.

Where pay item descriptions include any wording in brackets it is an indication that contract specific information is to be inserted in the Pricing Schedule included in the Contract Documentation.

(ii) Items not measured in this Section

The following required activities will not be measured or paid for separately and the Contractor shall include the cost thereof in other items as deemed appropriate:

1. All surveying, setting out and level control required for the stabilisation of the pavement layers.
2. Protection of all existing or new kerbs, channels, sidewalks, lined drains, catch pits, kerb inlets, gratings, culverts, bridges, structures, buildings, road signs, guard rails, street lights, fencing, service pipes or cables and any other items adjacent to, over or under the road to prevent damage by any stabilising agent.
3. Repair of all damage to surfacing and any new or existing structures, buildings and road furniture caused by the stabilising agents.
4. All setting out work required for the accurate application of the stabilising agent specified in the Contract Documentation.

(iii) Items to be measured and paid for using items specified elsewhere in the specifications

For activities in Table C5.4-1 items specified in other Chapters or Sections of the specification, where they relate to work under this Section, will be listed in the Pricing Schedule.

Table C5.4-1: Payment items from other Chapters or Sections

| Activity | Section 5.4 reference | Section item reference |
|--|-----------------------|---|
| Clearing and grubbing - remote mixing | A5.4.7.4b) | Section C1.6 of Chapter 1 – All applicable items |
| Construction of stockpile site - remote mixing | A5.4.7.4b) | Section C4.1 of Chapter 4 – All applicable items |
| Procurement of stabilising agents | A5.4.5 | Section C4.4 of Chapter 4 – All applicable items |
| Procurement of commercial materials | A5.4.5.1 | Section C4.4 of Chapter 4 – All applicable items |
| Reclaimed materials | A5.4.5.1 | Section C5.5 – All applicable items |
| Processing and compaction of layer material | A5.4.7 | Section C5.3 – All applicable items |

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| Curing – membrane or prime | A5.4.7.6c) / A5.4.7.6d) | Section C6.1 of Chapter 6 and Chapter 10 – All applicable items |
|----------------------------|-------------------------|---|

(iv) Items specifically for this Section of the specifications

| Item | Description | Unit |
|---------------|--|--------------------------------|
| C5.4.1 | Pretreatment of gravel layers | |
| C5.4.1.1 | Pre-treatment of (insert layer thickness) gravel layer | cubic metres (m ³) |
| C5.4.1.2 | Pre-treatment of (insert layer thickness) gravel layer using labour enhanced methods of construction | cubic metres (m ³) |

The unit of measurement shall be the cubic metre of pre-treated material, the quantity of which shall be determined in accordance with the authorised compacted dimensions of the layer being treated.

No distinction be made in respect of the type of treatment agent used, the time taken for completion, or the specific layer being treated. The rate tendered shall furthermore apply to any combination of agents. Delivering the agent to the point of use and the distinction in respect of the manner in which the stabilising agent is spread, whether it be by hand using bags or by mechanical bulk spreader shall be paid under item C5.4.5.

The tendered rates shall include full compensation for watering and compacting the surface of the placed material prior to spreading the pretreatment agent for mixing the specified amount of pre-treatment agent, for the addition of any water required, and all materials, supervision, labour, equipment, tools and incidentals necessary for completing the specified work including for leaving the layer dormant for a period of 24 hours after being treated.

Distinction shall also be made in respect of the method of mixing and construction of the layer, either using mechanical methods of construction or using labour enhancement methods. The layer thickness can be varied by up to 20 mm and the rate for this pre-treatment work shall remain applicable.

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C5.4.2 Chemical stabilisation

C5.4.2.1 Chemical stabilisation (layer thickness indicated) of pavement layers (layer to be stabilised cubic metres (m³) indicated)

C5.4.2.2 Chemical stabilisation (layer thickness indicated) of pavement layers (layer to be stabilised cubic metres (m³) indicated) using labour enhanced methods of construction

The unit of measurement shall be the cubic metre of stabilised material, the quantity of which shall be determined in accordance with the authorised dimensions of the compacted chemically stabilised layers

No distinction shall be made in respect of the type of treatment agent used, the time taken for completion, or the specific layer being treated. The rate tendered shall furthermore apply to any combination of agents. Delivering the agent to the point of use and the distinction in respect of the manner in which the stabilising agent is spread, whether it be by hand using bags or by mechanical bulk spreader shall be paid under Item C5.4.5.

The tendered rates shall include full compensation for watering and compacting the surface of the placed material prior to spreading the stabilising agent, for the mixing of the specified amount of stabilising agent and all materials, supervision, labour, equipment, tools and incidentals necessary for completing the specified work. No distinction shall be made in respect of the type of cementitious stabilising agent used or the time for completion or the specific layer being stabilised. Distinction shall be made in respect of the method of mixing and construction of the layer, either using mechanical methods of construction or using labour enhancement methods. The layer thickness can be varied by up to 20 mm and the rate for this chemical stabilisation work shall remain applicable.

| Item | Description | Unit |
|--------|--|------------------------------------|
| C5.4.3 | Stabilised crushed stone PMPL layer (pavement layer, type of material and source indicated) | cubic metre (m³) |

The unit of measurement shall be the cubic metre of stabilised material for the PMPL layer, the quantity of which shall be calculated in accordance with the authorised dimensions of the final layer.

The tendered rate shall include full compensation for mixing the specified amount of stabilising agent at the central mixing plant and all materials, supervision, labour, equipment, tools and incidentals necessary for completing the specified work. No distinction will be made in respect of the type of cementitious stabilisation agent used, the time for completion or the specific layer being treated.

| Item | Description | Unit |
|---------------|--|-------------------------------------|
| C5.4.4 | Wet lean-mix concrete pavement PMPL layer (indicate specific pavement layer): | cubic metres (m³) |

The unit of measurement shall be the cubic metre of wet lean-mix concrete for the PMPL layer, the quantity of which shall be calculated in accordance with the authorised dimensions of the final layer.

The tendered rate shall include full compensation for mixing the specified amount of cementitious agent, water and material at a mixing plant (PMPL) and all materials, supervision, labour, equipment, tools and incidentals necessary for completing the specified work. No distinction will be made in respect of the type of cementitious stabilisation agent used, the time for completion or the specific layer being treated.

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| Item | Description | Unit |
|------|-------------|------|
|------|-------------|------|

C5.4.5 Cementitious stabilisation agents for pavement layers

C5.4.5.1 Addition of cementitious stabilisation agents (specify agent separately) for pavement layers

- | | | |
|-----|---|---------|
| (a) | Cement (for pavement layer) | ton (t) |
| (b) | And so forth for other agents (for pavement layers) | ton (t) |

C5.4.5.2 Addition of cementitious stabilisation agents (specify agent separately) for pavement layers and spreading the agent using bags and labour enhancement methods.

- | | | |
|-----|---|---------|
| (a) | Cement (for pavement layer) | ton (t) |
| (b) | And so forth for other agents (for pavement layers) | ton (t) |

The unit of measurement shall be the ton of cementitious stabilising agent spread and mixed into the prepared layer material in-situ.

The tendered rates shall include full compensation for the supply and delivery of the agent to the point of use. The tendered rates shall also include for spreading the specified amount of cementitious stabilising agent, and all materials, supervision, labour, equipment, tools and incidentals necessary for completing the specified work. The layer thickness can be varied by up to 20 mm and the rate for this work shall remain applicable.

A distinction shall be made between spreading the cementitious soil stabilisation agents by mechanical bulk spreaders or using labour enhancement methods.

C5.4.6 Addition of cementitious stabilisation agents (specify agent separately) for a PMPL layer

| | | |
|----------|--------|---------|
| C5.4.6.1 | Cement | ton (t) |
|----------|--------|---------|

| | | |
|----------|-------------------------------|---------|
| C5.4.6.2 | And so forth for other agents | ton (t) |
|----------|-------------------------------|---------|

The unit of measurement shall be the ton of cementitious stabilising agent mixed into the material at a central mixing plant at the specified application rate.

The tendered rates shall include full compensation for delivery of the agent from storage to the mixing plant and introducing the specified amount of cementitious agent and water into the mixing plant for the PMPL layer and all materials, supervision, labour, equipment, tools and incidentals necessary for completing the specified work. No distinction shall be made in respect of the type of cementitious stabilisation agent used, the time for completion or the specific layer being produced whether that is a wet lean-mix concrete or a chemically stabilised crushed stone material.

| Item | Description | Unit |
|---------------|--|-------------------------------------|
| C5.4.7 | Bituminous stabilisation of pavement layers | cubic metres (m³) |

| | | |
|----------|---|------------|
| C5.4.7.1 | Bituminous stabilisation (layer thickness indicated) of pavement layers (layer to be indicated) | litres (ℓ) |
|----------|---|------------|

| | | |
|----------|---|------------|
| C5.4.7.2 | Bituminous stabilisation (layer thickness indicated) of pavement layers (layer to be indicated) using labour enhanced methods of construction | litres (ℓ) |
|----------|---|------------|

The unit of measurement shall be the cubic metre of stabilised material, the quantity of which shall be determined in accordance with the authorised dimensions of the bituminous stabilised compacted layer.



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Witness 2



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Witness 1



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The tendered rates for bituminous stabilisation shall include full compensation for watering and compacting the surface of the placed material prior to spreading the stabilising agent, for mixing the specified amount of stabilisation agent and material and shall include full compensation for all incidentals. No distinction shall be made with regard to the type of bituminous stabiliser used, the time for completion, and the particular layer to be stabilised with bitumen. The tendered rate shall apply to any combination thereof.

The layer thickness can be varied by up to 20 mm, and the rate for this cementitious stabilisation work shall remain applicable.

A distinction shall be made between spreading the cementitious soil stabilisation agents by mechanical bulk spreaders or using labour enhancement methods.

| Item | Description | Unit |
|---------------|---|---------------|
| C5.4.8 | Bituminous stabilisation agent (specify agents separately) | |
| C5.4.8.1 | 60 % anionic emulsion | litres (ℓ) |
| C5.4.8.2 | 60 % cationic emulsion | litres (ℓ) |
| C5.4.8.3 | Foamed bitumen | litres (ℓ) |
| C5.4.8.4 | Any other | litres (ℓ) |

The unit of measurement shall be the litre of bituminous stabilising agent mixed into the road layer at the specified application rate. For bitumen emulsion this shall be the litre of 60 % emulsion mixed into the material. For foamed bitumen this shall be the litre of bitumen that is foamed.

For bitumen emulsion stabilisation the tendered rates shall include full compensation for diluting and introducing the specified amount of stabilisation agent at the point of use, and shall include full compensation for all incidentals. No distinction shall be made in regard to the type of bituminous stabiliser used, the method of application, the time for completion, and the particular layer to be stabilised with bitumen and the tendered rates shall apply to any combination thereof. The layer thickness can be varied by up to 20 mm, and the rate for this bituminous stabilisation work shall remain applicable.

For foamed bitumen, the rate shall also include for foaming the bitumen on the recycler, including the water and any other additive that may be required to achieve the minimum foaming characteristics and for injecting the foamed bitumen into the material being processed

The tendered rates shall also include full compensation for heating and the transfer into tankers of the bitumen. It shall also include for coupling to the recycling train, for all transport on site, for any re-heating required, for all wastage and for strict adherence to all safety measures required when handling warm or hot bitumen.

| Item | Description | Unit |
|---------------|---|-------------|
| C5.4.9 | Filler for bituminous stabilisation | |
| C5.4.9.1 | Filler for bituminous stabilisation (specify agents separately) | ton (t) |
| C5.4.9.2 | Filler for bituminous stabilisation spreading the agent or filler using labour enhanced methods of construction (specify agents separately) | ton (t) |

The unit of measurement shall be the ton of cementitious agent mixed into the road layer at the specified application rate.

The tendered rates shall include full compensation for the supply and the blending of the specified amount of filler with the bituminous stabilisation process and all materials, supervision, labour, equipment, tools



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and incidentals necessary for completing the specified work. No distinction will be made in respect of the type of filler used, the time for completion or the specific layer being treated.

A distinction shall be made between spreading the filler by mechanical bulk spreaders and using labour enhancement methods.

C5.4.10 Provision and application of water for curing **kilolitre (kℓ)**

The unit of measurement shall be the kilolitre of water provided and applied for curing a chemically stabilised layer.

The tendered rate shall include full compensation for furnishing, transporting and applying the water.

| Item | Description | Unit |
|-------------|--------------------|-------------|
|-------------|--------------------|-------------|

C5.4.11 Curing by covering with the subsequent layer **square metre (m²)**

The unit of measurement shall be the square metre of chemically stabilised pavement layer being cured by covering it with the subsequent layer. The quantity will be determined by the plan area of the authorised dimensions of the layer being cured

The tendered rate shall include full compensation for incidentals in respect of applying the subsequent layer for curing as specified, including the cost of regularly supplying and applying water.

| Item | Description | Unit |
|-------------|--------------------|-------------|
|-------------|--------------------|-------------|

C5.4.12 Curing with a membrane (type of material to be specified)

| | | |
|-----------|------------------|--------------|
| C5.4.12.1 | Cut back bitumen | litre (ℓ) |
|-----------|------------------|--------------|

| | | |
|-----------|---------------------------|--------------|
| C5.4.12.2 | Inverted bitumen emulsion | litre (ℓ) |
|-----------|---------------------------|--------------|

| | | |
|-----------|----------------------|--------------|
| C5.4.12.3 | Spray grade emulsion | litre (ℓ) |
|-----------|----------------------|--------------|

| | | |
|-----------|---------------------------------|--------------|
| C5.4.12.4 | Curing compound for PMPL layers | litre (ℓ) |
|-----------|---------------------------------|--------------|

The unit of measurement shall be the litre of curing material measured at spraying temperature and sprayed as specified.

The tendered rates shall include full compensation for supplying the material, preparation of the surface before applying the curing membrane, applying the membrane material and maintaining the surface as specified.

| Item | Description | Unit |
|-------------|--------------------|-------------|
|-------------|--------------------|-------------|

C5.4.13 Trial section for a PMPL layer (specify width) **square metre (m²)**

The unit of measurement for the trial section of the plant-mixed paver-laid pavement layer shall be the square metre of trial section of the specified width as specified in the Contract Documentation measured along the centre line of the road. A total length of at least 250m of trial section and no more than 350 m will be measured for payment as a trial section.

The tendered rate shall include full compensation for supplying, introducing and mixing the cementitious stabilising agent at the specified rate at the mixing plant for the construction of the trial section.

| Item | Description | Unit |
|-------------|--------------------|-------------|
|-------------|--------------------|-------------|

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C5.4.14 Trial section for a chemically stabilised layer cubic metre (m³)

The unit of measurement for the trial section of a chemically stabilised pavement layer shall be the cubic metre of trial section as per the authorised dimensions. A total length of at least 150 m of trial section and no more than 200 m will be measured for payment as a trial section.

The tendered rate shall include full compensation for placing spreading and mixing the stabilising agent at the specified application rate during the construction of the trial section.

| Item | Description | Unit |
|-------------|--------------------|-------------|
|-------------|--------------------|-------------|

C5.4.15 Trial section for a bituminously stabilised layer (specify width) square metre (m²)

The unit of measurement for the trial section of a bituminously stabilised pavement layer shall be the square metre of trial section of the specified width as specified in the Contract Documentation measured along the centre line of the road. A total length of at least 250 m of trial section and no more than 350 m will be measured for payment as a trial section.

The tendered rate shall include full compensation for placing spreading and mixing the bituminous stabilising agent and filler at the specified application rate during the construction of the trial section.

| Item | Description | Unit |
|-------------|--------------------|-------------|
|-------------|--------------------|-------------|

C5.4.16 Mechanical modification cubic metre (m³)

The unit of measurement shall be the cubic metre of material in the compacted layer which has been mechanically modified as per Clause A5.4.7.2a) calculated using the layer work dimensions given in the Contract Documentation.

The tendered rate shall include full compensation for mixing all the different materials together to form one homogeneous layer as per Clause A5.4.7.2.

Payment for the construction operations required to process and compact the modified layer shall be made under item C5.3.2.

| Item | Description | Unit |
|-------------|--------------------|-------------|
|-------------|--------------------|-------------|

C5.4.17 Addition of a soil binder cubic metre (m³)

The unit of measurement shall be the cubic metre of soil binder added to and mixed into the pavement layer as per Clause A5.4.7.2b). The volume of soil binder shall be calculated using the completed layer work dimensions given in the Contract Documentation multiplied by the percentage by volume of soil binder added as specified.

The tendered rate shall include full compensation for mixing the soil binder into the layer to form one homogeneous layer.

Payment for the construction operations required to process and compact the modified layer shall be made under item C5.3.2

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Witness 1

Witness 2

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Witness 1

Witness 2