South Africa
COTO
Committee of Transport Officials

COTO STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE WORKS

CHAPTER 1

SARF
better roads

Presented by
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CHAPTER 1 CONTAINS SPECIFICATIONS FOR VARIOUS GENERAL ITEMS THAT ARE NOT INCLUDED IN THE OTHER CHAPTERS AND MAY ALSO APPLY TO SOME ITEMS IN THE OTHER CHAPTERS.

THIS PRESENTATION DISCUSSES THE MAIN ASPECTS OF THE NEW COTO SPECIFICATIONS CONTAINED IN CHAPTER 1.

THE LAYOUT OF THE NEW SPECIFICATIONS IS VERY DIFFERENT TO THE EXISTING COTO SPECIFICATIONS AND NEARLY ALL OF THE OLD CLAUSES HAVE BEEN REVISED AND UPDATED. MANY ADDITIONAL REQUIREMENTS HAVE ALSO BEEN INCLUDED.

IF YOU WANT TO AVOID MAKING EXPENSIVE CONTRACTUAL ERRORS YOU NEED TO CAREFULLY READ THE FULL SPECIFICATION DOCUMENT IN ORDER TO FAMILIARISE YOURSELF WITH ALL THAT IT CONTAINS AND WHERE TO LOOK FOR THE SPECIFICATIONS YOU NEED. THIS IS A DOCUMENT THAT YOU NEED TO "Know and understand" !

STANDARD SECTION HEADINGS (for all Chapters)

PART A: SPECIFICATIONS

1. SCOPE
2. DEFINITIONS
3. GENERAL
4. DESIGN BY CONTRACTOR / PERFORMANCE BASED SYSTEMS
5. MATERIALS
6. CONSTRUCTION EQUIPMENT
7. EXECUTION OF THE WORKS
8. WORKMANSHIP

PART B: LABOUR ENHANCED

PART C: MEASUREMENT AND PAYMENT

PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

CHAPTER 1 CONTENTS

1.1 GENERAL PREAMBLE

PART A : SPECIFICATIONS

THE GENERAL PREAMBLE COVERS THE SPECIFICATION DOCUMENT AS A WHOLE AND SETS OUT THE FOLLOWING:

THE SCOPE OF THE SPECIFICATION DOCUMENT

GENERAL DEFINITIONS THAT ARE APPLICABLE TO ALL CHAPTERS OF THE SPECIFICATIONS

SCOPE AND GENERAL DEFINITIONS FOR LABOUR ENHANCED ACTIVITIES

RULES FOR MEASUREMENT AND PAYMENT OF THE WORKS

GENERAL REQUIREMENTS FOR GUARANTEES AND PAYMENT CERTIFICATES

A1.1.2 DEFINITIONS

Definitions of various items are given at the beginning of each section of every chapter of these Standard Specifications where they are most applicable. This Clause A1.1.2 contains only the general definitions that apply to all chapters of the Standard Specifications.

The definitions for the various contractual terms used in this revised COTO Specification are given in this clause but as various contract conditions may be used in conjunction with these Specifications the terminology used and the definitions of some of the terms may differ. In the event of any discrepancy, the terms given in the Conditions of Contract being used shall apply. The meaning of any other contractual terms not defined in this clause shall be as given in the applicable Conditions of Contract.

THE FOLLOWING DEFINITIONS ARE CONTAINED IN THIS SECTION A1.1.2 :

Conditions of Contract **Contract** **Contract Documentation**

Contractor

Dayworks **Defects Notification Period** **Drawings**

Engineer **Employer**

Pricing Schedule **Project Specifications**

Road Reserve

Site of the Works

Site Agent / Contractor's Representative / Construction Manager

Special Conditions of Contract **Standard Specifications**

Taking Over Certificate **Performance Certificate**

Works

Most of the definitions that are contained in this Clause A1.1.2 are the same or similar to the definitions given in the old specifications that everyone is familiar with.

However, the changes to the definitions need to be noted and understood as they have a direct impact on the management of the road construction contract.

The most important definitions are discussed in the next two slides.

CONDITIONS OF CONTRACT

The Conditions of Contract address the risks, liabilities and obligations of the contracting parties and the agreed procedures for the administration of the contract. The latest edition, or the applicable edition as defined in the Contract Documentation, of one of the following three standard conditions of contract, which have been recommended by the South African Construction Industry Development Board (CIDB) for Road and Bridge Works, shall apply as specified in the Contract Documentation:

- **Conditions of Contract for Construction for Building and Engineering Works designed by the Employer as published by the International Federation of Consulting Engineers (FIDIC Red Book).**

- **General Conditions of Contract for Construction Works as published by the South African Institution of Civil Engineering (GCC - SAICE).**

- **New Engineering and Construction Contract Documentation as published in the United Kingdom (NEC 3).**

EMPLOYER

The Employer is the person, entity or firm named as the Employer in the Contract Documentation and who is responsible for the payment for and the acceptance of the Works.

ENGINEER

The Engineer is the person, entity or firm appointed by the Employer to manage aspects of the Contract and to supervise the construction of the Works in accordance with the applicable Contract Documentation.

Depending on the applicable conditions of contract the term "Engineer" used in these Standard Specifications should be read as follows:

- **FIDIC - Engineer**
- **GCC - Employer's Agent / Employer's Agent's Representative.**
- **NEC 3 - Project Manager or Supervisor**

SITE AGENT / CONTRACTOR'S REPRESENTATIVE / CONSTRUCTION MANAGER

This the person authorised to act on behalf of the Contractor on the site of the Works.

1.1 GENERAL PREAMBLE

PART B: LABOUR ENHANCEMENT

B1.1.1 SCOPE

The scope of any labour enhancement and the methods and specifications related to labour enhanced construction are contained in Part B of each of the relevant sections of these Standard Specifications. The requirement for the use of labour enhanced construction methods to satisfy any particular project goals will be set out in the Contract Documentation.

The specifications given in Part A of these Standard Specifications will apply to all work carried by using labour enhanced construction methods unless some of the specifications in Part A are replaced with revised specifications in Part B that are specifically applicable to the specified labour enhanced construction methods.

B1.1.2 DEFINITIONS

LABOUR ENHANCEMENT

Labour enhancement is the process of improving the scope for the use of manual labour as an alternative to using machines to increase employment opportunities on a project.

LABOUR INTENSIVE

Labour intensive operations are those operations which, by their basic nature, require a lot of manual labour.

PROJECT LABOUR GOALS

Project labour goals are the requirements for a particular project to enhance the use of labour in the normal construction operations and/or to use additional labour intensive methods to replace or augment traditional construction methods that are usually involve lower levels of manual labour.

1.1 GENERAL PREAMBLE

PART C: MEASUREMENT AND PAYMENT

C1.1.2 MEASUREMENT

C1.1.2.1 Pricing Schedule

The quantities set out in the Pricing Schedule (sometimes referred to as the bill or schedule of quantities) are estimated quantities and are used for the comparison of tenders and for awarding the contract. It must be clearly understood that only the actual quantities of work done, or materials supplied, will be measured for payment and that the scheduled quantities may be increased or decreased as provided for in the Conditions of Contract.

C1.1.2.2 Measurement of completed work

Units of measurement

Calculation of quantities

Measurement of structures

Measurement of the depth of trenches and foundation excavations

C1.1.3 PAYMENT

C1.1.3.1 Contract rates

In computing the final contract amount, payment shall be based on the actual quantity of authorized work done in accordance with the specifications, instructions and drawings. The contract rates shall apply, subject to the provisions of the Contract Documentation, irrespective of whether the actual quantities are more or less than the scheduled quantities.

Where no rate or price has been entered against a pay item in the Pricing Schedule by a Contractor, it shall be accepted that no compensation for such work is required or will be paid regardless of the final measured quantity.

The contract rate for each item shall include full compensation for providing, maintaining and decommissioning upon completion, of all the 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.

C1.1.3.2 Rates to be inclusive

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

C1.1.3.3 The meanings of certain phrases in payment clauses

(a) Procuring and furnishing ... (material)

Where any of the words "supply", "procure", "provide", "provision of" or "furnish (material)" are used in the description of a pay item, it shall mean the supply and delivery to the point of use of all materials ……..

(b) Placing material

The phrase "placing material" shall mean the off-loading, spreading, blending, processing, watering, mixing, shaping and compacting (where specified) of the material required to construct the Works, as well as the procuring, furnishing, and applying and admixing of water; the breaking-down of oversize material, the removing of oversize material ……...

C1.1.3.4 Pay items

The descriptions under the pay items in the various sections of these Standard Specifications, indicating the work for which allowance shall be made in the tendered rates for such pay items, are for the guidance of the Contractor and do not necessarily repeat all the details of work and materials required by and/or described in the Standard Specifications.

The pay item descriptions shall be read in conjunction with the relevant specifications and drawings, and the Contractor shall, when tendering, bear in mind that his rates shall be inclusive as specified in Clause C1.1.3.2 above.

Note: Every pay item has a comprehensive description which specifies what is being paid for under that item.

C1.1.3.5 Payment for materials on the site

Payment for materials on site shall be made as provided for in the Contract Documentation for materials on the site which have not yet been incorporated into the Works. Where not specified in the Contract Documentation payment will be calculated at 80% of the materials purchase price, or, in the case of crushed stone which has not been purchased but has been produced on the site, at 80% of a fair evaluation of such crushed material. The Employer may, at his sole discretion, allow payment under "materials on the site" in respect of articles manufactured and stored off site, subject to proof of their ownership as being that of the Contractor if he has already paid for them, and to the articles being clearly marked with the Contractor's name, the contract number and other particulars in accordance with the Engineer's instructions.

C1.1.3.6 Rate-only items

Against an item in the Pricing Schedule where no quantity is given but a rate only is required, the Contractor shall fill in a rate or amount which will constitute payment for work which may be done in terms of this item. Such a rate-only item is used where it is estimated that little or no work will be required under the item, or where the item is to be considered as an alternative for another item where a quantity is given, or for variations in rates of application or mix proportions.

C1.1.3.7 Payment items from different sections

Whenever a payment item that is specified in a particular section is required to be used in another section of the Pricing Schedule then the relevant payment item number will be preceded by a reference to the section in which it is being used.

For example, the loading and hauling payment items from Section C1.7 may be inserted into the Pricing Schedule for the loading and hauling of the material required for the pavement layers which are paid for under the payment Section C5.3 as follows:

C5.3/1.7.1.1	**Loading from stockpile**	**cubic metres (m^3)**
C5.3/1.7.2.1	**Hauling material for use in the Works and off-loading it on the site of the Works**	**cubic metre kilometres (m^3-km)**

C1.1.4 VARIATION FROM SPECIFIED NOMINAL RATES OF APPLICATION OR FROM NOMINAL MIX PROPORTIONS

Various sections of these specifications specify nominal rates of application or nominal mix proportions for materials such as bituminous materials, aggregates, fillers, stabilizing agents, paint and the like. Tenderers shall base their tendered rates on these nominal rates of application and mix proportions.

Payment for a prescribed rate of application or mix proportion shall be based on the actual rate of application or mix proportion used, provided that this does not exceed the prescribed rate of application or mix proportion, plus any tolerance in the rate of application or mix proportion which is included in the Contract Documentation. If the actual rate of application or mix proportion exceeds the prescribed rate or proportion, no additional payment shall be made above the allowed tolerance limit. If the actual rate of application or mix proportion is below the prescribed rate of application or mix proportion, payment shall be based on the actual rate of application or mix proportion regardless of any tolerance allowed.

1.1 GENERAL PREAMBLE

PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

D1.1.1 PREAMBLE

The requirements for any performance guarantees and/or compliance certificates are specified in Part D of each chapter where applicable.

All product quality / performance / safety certificates issued by the South African Bureau of Standards (SABS) and by Agrément South Africa (ASA) will be accepted.

Product quality / performance / safety certificates issued by testing authorities based in foreign countries will only be accepted if specified in the Contract Documentation or at the discretion of the Employer.

1.2 GENERAL REQUIREMENTS AND PROVISIONS

PART A: SPECIFICATIONS

A1.2.1 SCOPE

This Section covers matters which relate to the Contract Documentation as a whole. It establishes generic requirements that may also be applicable to other sections of these Standard Specifications in order to avoid repetition in the other sections.

It includes payment items for general items that are not included elsewhere in this Chapter 1 or in the other chapters and for dayworks that are applicable to all the chapters.

A1.2.2 DEFINITIONS

ACCEPTANCE QUALITY CONTROL

Acceptance quality control encompasses those actions carried out by the Employer and/or the Engineer to inspect, sample, test and measure each constructed lot to determine whether the quality and workmanship is acceptable in terms of the specifications.

PROCESS QUALITY CONTROL

Process quality control encompasses those actions carried out by the Contractor to assess and control materials and construction processes to ensure that the quality of the final product/s meets all the specified requirements. It includes a quality plan with defined actions, inspections, sampling, testing and measurement for each construction process to ensure that the quality control process is carried out effectively.

A1.2.2 DEFINITIONS

STAKEHOLDER LIAISON

Stakeholder liaison is the process whereby the Employer and the Contractor engage with interested and affected parties, in particular the local authorities, local residents, schools etc., in order to

- **inform them how the Works will affect the local community, to discuss how any adverse effects of the Works on the local community and/or environment can be eliminated or alleviated**

and

- **to provide any health and safety information that is relevant to the local community regarding construction of the Works.**

A1.2.3 GENERAL

This clause includes specifications for all the general preliminary contractual items which are required to manage the Contract.

The 23 sub-clauses in this section of the Specifications will be discussed in the following slides.

A1.2.3.1 Contractor's activities in respect of property outside the road reserve provided by the Employer

The Contractor may occupy and make use of property outside the road reserve that is provided by the Employer for purposes of executing the contract, on condition that he:

- **Complies with any statutory provisions that may apply.**
- **Serves prior written notice to the owner (and copied to the Engineer).**
- **Adheres to all the written agreements made by the Employer with owners of the property with respect to:**
  - **the location, extent and use of borrow pits, haul roads, construction roads and bypasses;**
  - **the reinstatement of property occupied, used, damaged or destroyed, or compensation therefor and**
  - **the procedures for the moving of fencing, services and any other items related to the Contractor's activities.**

A1.2.3.1 Contractor's activities in respect of property outside the road reserve provided by the Employer (continued)

- Complies with all the environmental requirements and all other applicable legislation and regulations.
- Has fulfilled his obligations under any written agreement that the Employer has made with the owner.
- The owner is satisfied that all property occupied has been properly restored.
- All fences, services or any other items moved, altered, damaged or affected in any way has been handed back to the owner in a satisfactory condition.
- Delivers written statements (signed by the owner) to the Engineer confirming that all the above requirements have been met. The obtaining of any such written statements will not relieve the Contractor of the execution of any of his obligations to the satisfaction of the Employer or the owner or authority concerned.

A1.2.3.2 Contractor's activities in respect of property which is not provided by the Employer

Should the Contractor use property which is not provided by the Employer, for haul roads, site offices and workshops, the Engineer's offices and laboratory, or for storing of equipment or materials required for construction or disposal, it shall be subject to the following:

- The Engineer shall agree to the use of any property selected for this purpose.
- Such property shall be physically separated from any production plant or activities and suitably fenced in.
- The area used for the aforesaid purpose shall be surveyed, and, where the land does not belong to the Contractor, he shall sign a lease agreement with the owner of such property in respect of the full period for which such property shall be used for such purpose. The lease agreement shall stipulate that the property owner shall not have any right whatsoever to any material stockpiled on such property during the duration of the contractual lease agreement.

A1.2.3.2 Contractor's activities in respect of property which is not provided by the Employer (continued)

- A lease agreement shall be concluded by the Contractor with the owner or owners of such property for the full period that such property is required. The lease agreement shall provide for possible extensions to match the duration of the contract and shall also provide for the contract being terminated by Contractor's default or liquidation and the possibility for the lease agreement to be taken over by a succeeding Contractor.
- Copies of all lease agreements shall be submitted to the Engineer for comment prior to signature by the signing parties and copies of the final signed agreements shall lodged with the Engineer. Notwithstanding the Engineer's comments on the conditions of a lease the Contractor shall be solely responsible for adhesion to the terms of the lease agreements.
- Suitable permanent reference beacons shall be placed next to any material storage area, at the cost of the Contractor, to demarcate the storage area and, if applicable, for use by the Engineer for taking cross-sections for determining quantities.

A1.2.3.2 Contractor's activities in respect of property which is not provided by the Employer (continued)

- Only material that is to be used for the Works shall be stored on such property.
- The Contractor shall comply with all the requirements of the environmental and any other legislation which is applicable to the property being used.

On completion of his operations, the Contractor shall obtain, from the owner concerned, a signed written statement (copied to the Engineer) to the effect that:

- The Contractor has fulfilled his obligations under any written agreement.
- The owner has received all the compensation he is entitled to and is also satisfied that all property that was occupied has been properly restored and handed over to the owner in a satisfactory condition.
- With respect to fences, services or any other items moved, altered, damaged or affected in any way the owner is satisfied that everything that was affected has been handed back to him in a satisfactory condition.

A1.2.3.3 Environmental management

The Contractor shall ensure that the project complies with all the requirements that have been set out in the Environmental Authorisation (EA), the Environmental Management Plan (EMP) and the Water Use Licenses.

Before any construction may commence the Contractor shall ensure that he has a copy of all licenses and permits required. The Contractor shall supply a copy of all required licenses and permits to the Engineer for his records.

Where specified the Contractor shall carry out a search and rescue of environmentally sensitive/endangered vegetation and prepare all necessary rehabilitation plans.

All Contractors are required to comply with all the applicable current rules, regulations, standards, policies and legislation, especially those contained in the following Acts and in any subsequent amendments thereto.

A1.2.3.3 Environmental management (continued)

- **The National Environmental Management Act No. 107 of 1998 (regulates duty of care principle).**
- **The National Water Act No. 36 of 1998 (guides the management of water and its associated resources in South Africa).**
- **The National Environmental Waste Act 59 of 2008.**

All waste material shall be disposed of in accordance with the applicable legislation and requirements. The Contractor shall have a written waste management and disposal plan. Hazardous waste must be disposed of at an approved hazardous waste site.

If specified in the Contract Documentation, the Contractor shall also provide a dedicated, full time environmental officer who will be responsible for the environmental monitoring, compliance and reporting duties.

A1.2.3.4 Extension of time for delays caused by rainfall

There are three methods that may be used depending on the size of the contract and on the requirements of the Employer. The method chosen must be specified in the Special / Particular Conditions of Contract.

Method 1 (Rainfall formula) V = (Nw - Nn) + [(Rw - Rn) ÷ X]

V = Delay per month due to rain in calendar days.

Nw = Actual number of days during the month with Y mm or more of rain.

Rw = Actual rainfall in mm for the month.

Nn = Average number of days in the relevant month, as per the rainfall records provided in the Contract on which a rainfall of Y mm or more per day has been recorded in the past (usually over the previous 10 years)

Rn = Average total rainfall in mm for the relevant month, as per the rainfall records.

X = 20, unless specified otherwise in the Contract Documentation.

Y = 10, unless specified otherwise in the Contract Documentation.

A1.2.3.4 Extension of time for delays caused by rainfall (continued)

Method 2 (Critical path method with consequential delays)

A delay caused by rainfall conditions will be regarded as a delay only if all progress on an item or items of work on the critical path of the Contractor's programme has been brought to a halt for part of a day or a full day. Delays on programmed and actually planned working days only will be taken into account for the extension of time. Each day, or portion of a day so agreed will accrue as 'n' days of delay over the duration of the contract.

The Contractor shall make provision in the programme of work for an expected delay of "N" working days caused by predictable normal rainy weather, for which the Contractor will not receive any extension of time. The value of "N" shall be given in the Contract Documentation.

Extension of time for rainfall delays will be the agreed cumulative actual delays 'n' days less the expected delays of "N" workings days allowed for in the programme during the contract period, up to the issue of the Taking-over Certificate.

A1.2.3.4 Extension of time for delays caused by rainfall (continued)

Method 3 (Critical path method without consequential delays)

Delays caused by rainfall may be considered as extension to the time for completion only if the Engineer agrees that the event (and not the consequence of the event) occurred during the working day within the contract period and caused all progress on an item or items of work on the critical path of the Contractor's programme brought to a halt.

No limitation is placed on the quantity, severity or duration of the rainfall event as being the cause of delay. Expressly excluded from the measurement of 'n' days are consequential delays, which are taken to mean delays to critical path activities attributable to the rainfall event but occurring after (i.e. outside of and distinctly separate from) the duration of the rainfall event itself.

The Contractor shall make provision in the programme of work for an expected delay of "N" working days caused by predictable normal rainy weather, for which the Contractor will not receive any extension of time. The value of "N" shall be given in the Contract Documentation.

Method 3 (Critical path method without consequential delays) (continued)

Any extension to the time for completion caused by rainfall delays will only be considered once the agreed cumulative 'n' delays during the contract period up to the issue of the Taking-over Certificate exceed "N" working days.

This method does not take into account any flood damage, which could cause further or concurrent delays and which should be treated separately in so far as extension of time is concerned. It also does not deal with other types of weather which may cause delays, for instance snowfalls, abnormally strong wind and extreme temperatures.

All such delays shall be dealt with separately in accordance with the terms of the Conditions of Contract.

A1.2.3.5 Handing-over of the site

The site will be handed over to the Contractor for construction purposes, subject to such conditions as may be specified in the Contract Documentation regarding matters such as:

- **the sequence in which sections will be handed over and must be completed,**
- **the maximum total length and number of temporary deviations (and/or partial width construction sections) that will be allowed to be in operation at any time,**
- **The minimum length of full width unrestricted roadway open to traffic between any partial width construction sections, and**
- **any other matters relating to the Contractor's use and occupation of the road reserve.**

A1.2.3.6 Health and safety

The Contractor shall always comply with the requirements of the health and safety plan, drawn up by the Contractor in compliance with the health and safety legislation, the Employer's health and safety specification (if provided) and the Contractor's own health and safety requirements to ensure that he complies with all current legislation and regulations as well as with any additional health and safety requirements that are specified in the Contract Documentation.

The Contractor's health and safety plan shall be developed to address all risks specific to the Works as identified in risk assessments carried out by the Contractor and/or by the Employer.

The Employer and /or his construction health and safety agent may also monitor the Contractor's compliance with the requirements stipulated in the Employer's health and safety specification (if provided) as well as the requirements set out in the Contractor's health and safety plan.

A1.2.3.7 Legal and contractual requirements and responsibility to the public and the Employer

The Contractor shall comply with all the legislative and regulatory requirements of all the relevant statutory bodies pertaining to his site establishment and to the execution of the Works.

The Contractor shall also comply with the requirements given in the Contract Documentation and with his legal and general obligations to the public, particularly with regard to obtaining and maintaining all the insurances and sureties required for the duration of the Contract and the Defects Notification Period.

A1.2.3.8 Tolerances

The work specified in all the chapters of these Standard Specifications shall comply with the various dimensional and other tolerances specified in each case. Where no tolerances are specified, the standard of workmanship shall be in accordance with normal good practice.

No representation is made that the full specified tolerances will be available independently of each other, and the Contractor is cautioned that the liberal or full use of any one or more tolerances may deprive him of the full or any use of tolerances relating to other aspects of the work. The latter would apply particularly in respect of level tolerances on layer work and the related requirements regarding layer thicknesses.

A1.2.3.9 Monthly reports

The Contractor shall prepare monthly reports on progress, delays incurred, plant returns, OHS and EMP compliance, staff training, empowerment, capacity building, small Contractor development, labour and staff returns and any other information required by the Employer and/or the Engineer which is specified in the Contract Documentation.

The Contractor's monthly reports shall be submitted to the Engineer at least two working days prior to the applicable scheduled monthly site meetings.

A1.2.3.10 Notices, signs and advertisements

The Contractor shall not erect any signs, notices or advertisements on the Works or the site of the Works without the written approval of the Engineer.

Details of the official contract sign boards (if any) that should be erected will be given in the Contract Documentation or issued by the Engineer. These signs are to be erected in positions determined by the Engineer not later than one month after the Contractor has been given access to the site.

No signboards other than those specified above will be permitted on or adjacent to the Works, except that the Contractor may permit each of his subcontractors to display one signboard, and one only, of less than 2 m^2 at the Works office.

All advertisements, notices and temporary signs shall be removed by the Contractor immediately upon completion of the Works.

A1.2.3.11 Ordering of daywork

Daywork shall be undertaken strictly in accordance with the provisions of the Conditions of Contract. No daywork shall be undertaken unless specified by the Engineer. Such a written instruction shall include a full description of the work to be carried out.

Before commencing any daywork the Contractor shall obtain the Engineer's agreement regarding the estimated duration of the dayworks, the numbers of each category of staff to be employed, the materials to used and the construction equipment and vehicles that will be required to carry out the work.

The Contractor shall provide the actual duration, numbers of staff and materials, equipment and vehicles on a daily basis for approval of the dayworks.

A1.2.3.12 Ownership of assets and disposal of non-usable assets

Unless otherwise stated in the Contract Documentation the Employer is the owner of all existing moveable and immoveable assets in the road reserve.

Non-useable assets are assets that have reached the end of their economic life, are no longer needed or need to be replaced. A disposal plan for these non-useable assets will be given in the Contract Documentation.

The Contractor shall submit rates for the disposal of each of the identified non-useable assets listed in the Contract Documentation. The tendered rates could be positive or negative depending on the cost of disposing of them against the value that the Contractor may wish to place upon them.

A provisional sum may also be provided to cover the cost of the disposal of any non-useable assets that may be identified during the construction of the Works. Any income derived from the sale of these assets will be offset against the provisional sum.

A1.2.3.13 Prevention of damage to nearby properties and services

All buildings that could be affected by excessive ground vibrations generated during the construction operations will be identified in the Contract Documentation, or by the Engineer, and categorised in accordance with the descriptions given in Table A1.2.3-1 below.

Before commencing any construction work on the site of the Works which involves the use of vibratory or impact compaction equipment, pavement breakers, piling equipment, pneumatic drills and hammers and excavators or overhead cranes in the vicinity of any public or privately owned buildings the Contractor shall arrange with the property owner for an inspection, and, if permitted by such owner, a photographic survey, of all the items on the property that could be affected by the construction equipment and/or construction processes that the Contractor intends to use.

A1.2.3.13 Prevention of damage to nearby properties and services (cont.)

Written and photographic records must be made of any existing defects, cracks or any other potential weaknesses and the Contractor shall discuss with the property owner and record in writing what preventive and/or mitigation measures that will be taken to avoid or prevent any damage from occurring to the items on the property as a result of the construction work.

The Contractor and the property owner should sign and date these records and a copy shall then be submitted to the Engineer for comments if required and for record purposes.

The Contractor shall prepare a written and photographic record of any overhead services or other obstructions on or near the property boundaries that could be affected by the construction activities. These records shall be given to the Contractor's safety officer and the safety plans shall be amended to include preventative measures for any damage to property or any injuries to the Contractor's personnel and members of the public that could occur.

A1.2.3.13 Prevention of damage to nearby properties and services (cont.)

The Contractor shall note the presence of any underground pipelines which may be affected by the construction activities, in particular jointed pipes. The Contractor shall comply with the provisions of Clause A2.3.1.2d)(ii) of Chapter 2 with respect to the location and protection of existing services.

All vulnerable underground services shall be exposed by hand excavation so that their condition and potential vulnerability to heavy vibrations can be assessed. The Contractor shall discuss with the relevant service authority and record in writing what preventive and/or mitigation measures will be taken to prevent any damage to the vulnerable services that could occur due to the proposed compaction or blasting operations.

The Contractor and the service authority owner should sign and date these proposed preventive and/or mitigation measures and a copy shall then be submitted to the Engineer for comments if required and for record purposes.

A1.2.3.13 Prevention of damage to nearby properties and services (cont.)

The Contractor shall use suitable construction equipment and/or modify the working methods to ensure that the maximum peak particle velocities generated by the construction equipment, as measured on the ground surface with a triaxial seismograph vibration monitor placed at the corner of the building closest to the source of the vibration, or directly above the pipeline, do not exceed the values given in Table A1.2.3-1.

At the start of any work involving equipment that will generate ground vibrations all vulnerable structures must be monitored closely by the Contractor. If there are any signs that any damage is being caused by the ground vibrations the work shall be stopped immediately and the Engineer shall be informed. The level of the ground vibrations generated at the closest corner of the affected building shall then be measured and checked against the allowable limits given in Table A1.2.3-1. The Engineer shall then decide if work may continue of if the Contractor must alter his working methods to reduce the ground vibration levels.

STRUCTURE TYPE AND CONDITION	MAXIMUM PEAK PARTICLE VELOCITY (PPV) (MM/SEC)	
	SINGLE EVENT (I.E. BLASTING)	CONTINUOUS / FREQUENT INTERMITTENT EVENT (I.E. VIBRATORY COMPACTION / PILE DRIVING)
FRAGILE BUILDINGS (OLD AND / OR POORLY CONSTRUCTED)	5,0	2,5
OLD / HISTORIC BUILDINGS	12,5	6,5
OLD RESIDENTIAL STRUCTURES	12,5	7,5
NEW RESIDENTIAL STRUCTURES / OLD INDUSTRIAL BUILDINGS	25,0	12,5
NEW STRUCTURES ON THE SITE OF THE WORKS	25,0	12,5
MODERN INDUSTRIAL BUILDINGS	50,0	12,5

A1.2.3.13 Prevention of damage to nearby properties and services (cont.)

Any damage that may occur to buildings, structures, fencing, walls, services and anything else on the property that may be affected by the construction activities shall be repaired or rectified to the satisfaction of the owner at the Contractor's expense unless the Engineer is satisfied that all the necessary and specified precautions were taken by the Contractor and the damage was unavoidable.

NOTE:

This is a new specification that was not covered in the previous specification. The specified maximum vibration limits need to checked out in practice and may have to be modified as more data becomes available. Discretion in its application is advised in order to be fair to the Contractor.

A1.2.3.14 Remedial work

The Contractor shall replace, repair or make good any part of the Works or any equipment or material that is found not to conform to the specified requirements, or is damaged so that it no longer conforms to the specified requirements, in accordance with the Conditions of Contract before the Taking-Over Certificate will be issued.

A1.2.3.15 Routine maintenance

In addition to the Contractor's maintenance responsibility stemming from his obligations under care of the Works, the Contractor shall also be responsible for all routine maintenance of the public roads within the site of the Works and other public roads being used as detours from the date of handing over of the site until the completion of the Works. An agreement may be reached whereby an existing routine maintenance contractor may continue to perform certain responsibilities for which the Contractor shall make allowance in his construction activities and Works programme.

A1.2.3.16 Site meetings

The Contractor shall attend regular (at least monthly) meetings on the site with the Employer and the Engineer, at dates and times to be determined by the Employer and/or the Engineer.

Such meetings will be held for evaluating the progress of the Works, compliance with the environmental management and the health and safety regulations and for discussing matters pertaining to the contract which any of the parties represented may wish to raise.

To this effect the Contractor will be obliged to compile a formal monthly report, drafted in consultation with the Engineer where necessary, and to submit these monthly reports to the Engineer at least two working days before each site meeting.

A1.2.3.17 Site security

The Contractor is responsible for keeping unauthorised persons off the Site of the Works in accordance with the requirements of the Conditions of Contract. The Contractor shall therefore carefully assess the security measures of whatever nature that may be required at the location of the Engineer's site office and laboratory, the Contractor's offices, stores and workshops, the Site of the Works including quarries, borrow pits, stockpile sites and manufacturing yards as well as any traffic accommodation site facilities and equipment which may be placed on the approaches to / exits from the Site of the Works.

The Contractor shall then make all necessary arrangements to provide adequate security measures which will prevent access to the Site of the Works and to the Contractor's and Engineer's site facilities by any unauthorised persons and will also prevent damage to, or theft of, any facilities, equipment, plant, materials and parts of the Works which have not yet been handed over to the Employer.

A1.2.3.17 Site security (continued)

The security measures provided for the Engineer's site offices and laboratories, and for the Engineer's site accommodation situated on or adjacent to the Site of the Works, shall include security fencing and gates, security lights and burglar alarm systems linked to an armed response company and a night watchman.

The security measures provided for the Engineer's rented housing shall consist of an acceptable burglar alarm system linked to an armed response company.

A1.2.3.18 Stakeholder liaison

The initial stakeholder liaison required for the Contract Documentation will normally be undertaken by the Employer and/or the Engineer. The outcomes and agreements resulting from all such stakeholder liaison will be taken into account and included in the Contract Documentation.

When the Contract has been awarded the Contractor shall undertake further stakeholder liaison to develop and manage relationships with all stakeholders and individuals who are or may be impacted by the project.

The Contractor shall also identify all other potential stakeholders in addition to those already identified in the Contract Documentation. Stakeholders include the road users who will be affected by the Works, pedestrians and non-motorised traffic that may need to traverse or cross the site of the Works as well as some or all of the following persons, parties or entities:

(Refer to list given in this clause).

A1.2.3.18 Stakeholder liaison (continued)

As part of the stakeholder liaison process the Contractor shall:

- **Listen to and record the stakeholder's concerns regarding how they may be affected by the Works and to inform them on what measures the Contractor can and will take to alleviate their concerns and mitigate any adverse effects of the Works that are identified.**
- **Inform and educate all affected parties about the safety risks associated with the Works in so far as the Works will impact on the local road users, residents and school children.**

The Contractor shall analyse the influence of all stakeholders on the project and develop strategies to communicate with them and to manage competing expectations so that he can mitigate issues that would otherwise delay the project. All stakeholders shall be provided with relevant information about the Works via community meetings, newspaper advertisements, radio broadcasts, electronic communication media and information leaflets as appropriate.

A1.2.3.18 Stakeholder liaison (continued)

Where a PLC has been established by the Employer, the Contractor shall use the PLC as the official communication channel, with the assistance of the PLO where one has been appointed by the Employer/Engineer. The Contractor shall delegate someone to participate in the PLC meetings and to assist and/or hold the PLC accountable for the organisation of community meetings and the effective dissemination of relevant information to all stakeholders and affected communities.

The stakeholder liaison process may also include issues related to the employment of local labourers and sub-contractors chosen by the Contractor and/or employed in accordance with any targeted labour recruitment and/or targeted enterprises selection requirements that may be specified in the Contract Documentation. All labour and sub-contractor related matters, and any associated risks, are and shall remain the responsibility of the Contractor irrespective of the Employer's and/or Engineer's role/assistance provided in establishing a PLC and/or providing a PLO.

A1.2.3.19 Temporary drainage

The Contractor shall be responsible for the provision of temporary drainage works such as drains, open channels, banks etc, and for providing and operating temporary pumps and such other equipment as may be necessary for adequately protecting, draining and dewatering the Works and any temporary Works, deviations and detours on existing roads if required.

The Contractor shall ensure that any temporary drainage works and/or dewatering operations do not cause erosion or flooding of other parts of the Works or adversely affect the stability of any excavated trenches or slopes. If the Contractor becomes aware of any potential signs of slope / trench instability he shall immediately suspend the work and withdraw all personnel from the area and fence and/or barricade it to prevent access.

Unless specifically reflected in the pricing schedule, all such measures shall be deemed to be included in the rates for the Works.

A1.2.3.20 Traffic safety audits (new requirement)

Two traffic safety audits shall be carried out on the Contract, namely

- **a work zone traffic management audit before any construction work commences and**
- **a pre-opening stage traffic safety audit when the construction work is almost complete.**

(The methodology for conducting these two audits is given in this clause.)

A1.2.3.21 Water

The Contractor shall make his own arrangements for procuring, transporting, storing, distributing and applying the water needed for construction and other purposes, except where otherwise specified.

Obtaining water from streams, rivers, dams or boreholes shall be subject to the Contractor obtaining the required permit from the relevant authority.

Obtaining water from a municipal or other water supply authority shall be subject to the Contractor entering into a supply agreement with the relevant supply authority.

The suitability of water for construction purposes shall be determined in accordance with the applicable acceptance parameters given in relevant Chapters of the Standard Specification.
(A list of clauses for the various water specifications in each Chapter is provided here in this clause.)

A1.2.3.22 Wayleaves/Agreements and permits

a) Wayleaves/Agreements (Planning and Design Approvals)

The Employer will be responsible for obtaining the necessary planning and design approvals for the work (wayleaves) described in the Contract Documentation or shown on the drawings.

If specified in the Contract Documentation, the Contractor shall be responsible for applying for certain wayleaves and complying with the wayleave application processes specified by the responsible road authority.

The applications for such wayleaves shall be submitted timeously by the Contractor to ensure that wayleaves can be issued before the work is programmed to start.

The Contractor shall pay all fees and charges for wayleaves to the road authority responsible for the road reserve or to any other service authority/provider whose services exist in the road reserve.

A1.2.3.22 Wayleaves/Agreements and permits (continued)

b) Permits and other approvals (Construction or Work Permits)

The Contractor shall be responsible for obtaining the necessary approvals, permissions or authorisations ("construction permits" or "work permits") to carry out the work from all the relevant road authorities or service authorities/providers whose services are known to exist in the road reserve.

The applications for construction and/or work permits shall be submitted to the relevant road authority or service authority/provider timeously to ensure that construction permits can be issued before the Works are programmed to start.

The Contractor shall pay all fees and charges for construction and/or work permits to the road authority responsible for the road reserve or to the relevant service authority/provider.

A1.2.3.22 Wayleaves/Agreements and permits (continued)

b) Permits and other approvals (Construction or Work Permits)

The Contractor shall comply with all conditions included in the construction and/or work permits that may be imposed by the road authorities or by the service authorities/providers.

The Contractor shall familiarize himself with, and comply with, all local by-laws applicable to work in the road reserve.

Only work described in a construction/work permit may be done and only at the locations covered by the permit.

The work described in the permit shall commence and shall be completed within the period stipulated by the road authority or service authority/provider, failing which the construction/work permit may lapse and re-application for the permit will then be required.

A1.2.3.23 Work in restricted areas

The Contractor shall programme the work and select the working methods and equipment taking due cognizance of all restrictive conditions indicated in the Contract Documentation regarding the location, size and spacing of the various construction areas, any specific work sequences that may be required and any traffic accommodation or other factors that may affect the programme of work.

As stated in Clause C1.1.3.2 no additional compensation shall be made for work that could be considered as partial width construction or for construction in restricted narrow, short and/or confined areas unless otherwise specified in the Contract Documentation.

A1.2.4 DESIGN BY CONTRACTOR / PERFORMANCE BASED SYSTEMS

A1.2.4.1 Designs and drawings for the permanent Works provided by the Contractor

This clause specifies the requirements where the Contractor is required to produce drawings for the permanent Works. These drawings are usually done by the Employer's design office or his consulting engineer but when a proprietary product is specified the Contractor is usually asked to submit design drawings for the Engineer to consider and comment on.

A1.2.4.2 Designs and drawings for temporary works provided by the Contractor

This clause specifies the requirements for drawings required for the temporary works such a shuttering, traffic accommodation arrangements etc.

A1.2.4.3 Performance based systems

The specifications pertaining to the provision and implementation of performance based systems are given in Part D of the various sections of each of the chapters of these Standard Specifications.

A1.2.5 MATERIALS

A1.2.5.1 General

The Contractor, before using manufactured articles or materials that are required to comply with any specification, shall furnish the Engineer with certificates showing that the materials do comply with that specification. Where so specified, materials shall bear the official mark of the appropriate authority. All materials and products which should comply with a South African National Standard Specification (SANS) shall carry the certification mark of a SANAS accredited certification body.

All manufactured articles or materials supplied by the Contractor for the permanent Works shall be new and unused unless stated otherwise in the Contract Documentation. Should they be damaged during manufacture, delivery or by the Contractor during handling, transportation, storage, installation or testing they shall be replaced, or repaired to comply with the original specification, by the Contractor at his own cost.

A1.2.5.2 Mix designs

Unless otherwise specified in the Contract Documentation, the Contractor shall be responsible for the design of all material mixes. The Contractor shall make allowance for the mix design approval process in his programme.

Before commencing with the associated construction activities, the Contractor shall be responsible for the following procedures in connection with the design of material mixes:

- **Sampling and testing of construction materials to determine their properties and suitability for use in materials mixes and in the Works, all according to relevant standard methods and procedures.**
- **Production of the required mix designs - in conjunction with the Engineer if required.**
- **Production of laboratory, production/plant and/or trial mixes.**
- **Adjustments to the mix designs and reproduction of the required laboratory, production/plant and/or trial mixes.**
- **Construction and testing of trial sections and/or other trials as required.**
- **Submission of duplicate samples and the proposed mix designs to the Engineer for review and comment, and approval if so specified in the Contract Documentation.**
- **Verification of the mix designs, trials and/or trial sections before commencing with the permanent Works.**

A1.2.6 CONSTRUCTION VEHICLES AND EQUIPMENT

The Contractor shall submit a list of the construction vehicles and equipment to be used on the site of the Works to the Engineer for review before the commencement of the Works.

The Contractor shall ensure that all construction vehicles and equipment used on the site of the Works and on public roads shall comply with all current legislation and regulations. The Contractor shall also ensure that all construction vehicles and equipment are suitable for their intended purpose, maintained in good working order, inspected daily by the operator or driver the inspection records shall be kept in the vehicle or item of equipment, and are equipped with the following:

- **flashing amber LED lights or light bars of an approved design. The flashing lights / light bars shall be mounted so that they are clearly visible in daylight from all directions. They shall be switched on continuously while the vehicles are on site, are manoeuvring in or out of traffic or are travelling or parked alongside roads open to public traffic;**
- **a warning sign with the wording CONSTRUCTION VEHICLE in red letters at least 200mm high on a white background shall be mounted in a visible position at the rear of every vehicle and item of construction plant which travel on public roads and**
- **an automatic acoustic reversing alarm.**

The Contractor shall confirm to the Engineer in writing that all the construction vehicles and mobile equipment to be used on the site of the Works comply with all the legal and other specified requirements.

A1.2.7 EXECUTION OF THE WORKS

A1.2.7.1 Programme of work

This specification makes provision for two schemes:
Scheme 1 where the programme may be kept relatively simple
and Scheme 2 with more extensive requirements for complex or high value projects.

Whether Scheme 1 or Scheme 2 is required will be indicated in the Contract Documentation. Scheme 1 will apply if nothing is indicated in the Contract Documentation.

If only Scheme 1 is indicated in the Contract Documentation the Contractor is still free to incorporate some or all the requirements applicable to Scheme 2 in the programme if he so wishes.

Scheme 1

The Contractor's programme shall be in the form of a bar chart with logic links identifying critical activities forming the critical path. The Contractor is encouraged to prepare the programme using scheduling software but this is not a requirement.

All significant activities must be reflected on the programme. The degree to which these activities are broken down into sub-activities is left to the discretion of the Contractor, but it is pointed out that too little detail will impact on the degree to which the programme can be used to manage time on the project, and to assess the impact of any delays.

The equipment and labour resources which are compatible with the planned rates of production and activity durations should be allocated to all the major programmed activities.

Scheme 2

The initial / first programme to be submitted by the Contractor at the start of the contract shall include all the activities required for at least the first three months of work in detail, and need only show the major activities for the balance of the work. The Engineer will then comment on the Contractor's initial programme and the Contractor shall revise the programme if necessary.

Within six weeks of the commencement of the Works on site the Contractor shall submit a full programme which covers all the activities required to complete the full Works in the necessary detail. The Engineer will then comment on the Contractor's full programme and the Contractor shall revise the programme if necessary.

The initial and full programmes should be drawn up using the software specified in the Contract Documentation. (You can specify that the Contractor uses his own software if you want to.)

The main activities, and all activities where any delay is likely to lead to a delay in the completion of the Works, shall be resourced.

Scheme 2 (continued)

The resourcing input should contain details of the Contractor's resource requirements in terms of manpower, gang sizes, tradesmen, production rates, items of construction equipment and materials and quantities of work allowed for in sufficient detail to explain the Contractor's assumed rates of production and activity durations.
(Refer to the detailed requirements given in the Specifications.)

Updating the programme (both schemes)

The Contractor shall submit an updated programme at the end of every month which indicates the current status of the Works and the updated programmed completion date.
When using a Scheme 2 programme the Contractor shall provide with each monthly programme update a schedule that compares the float values on all key activities with the float values on corresponding items on the updated programme of the previous month.

A1.2.7.2 Setting out of the Works and the protection of beacons

This clause contains the requirements for checking all survey beacons before commencing the Works as well as methods to be used to ensure that the Works are set out correctly.

It includes the requirements for protecting the survey bacons required for setting out the Works as well as other beacons such as property boundary beacons.

It also sets out the procedure for establishing new reference beacons for any beacons that will be displaced by the Works.

A1.2.7.3 Services

The specifications relating to the location, identification, protection of and/or moving and reinstating of existing services that may be affected by the construction of the Works are given in Clause A2.1.3.2 in Chapter 2.

A1.2.7.4 Work on, over, under or adjacent to utilities

All work carried out on, over, under or adjacent to utilities shall be carried out strictly in accordance with the latest edition of the official specifications of the utility owner, a copy of which will normally be included in the Contract Documentation.

Where no such copy is included in the Contract Documentation, or where the copy included in the Contract Documentation is amended or superseded by another, the Contractor shall obtain the latest edition from the utility owner, which shall be kept on the site, before any work of this nature is commenced.

The Contractor's attention is drawn particularly to the requirements contained in the Contract Documentation, or provided by the statutory authority, regarding the approval that must be obtained from the utility owner for issuing a work permit, allowing occupation of its property, particulars of programmed activities during occupation, approval of the Contractor's work and/or construction methods, the design and/or specifications of any temporary Works that may be required and all measures required to protect the utilities that may be affected by the construction of the Works.

A1.2.7.5 Use of explosives – compliance with legislation and regulations

The Contractor shall ensure that he complies fully with all current legislation and regulations pertaining to the manufacture, purchasing, transport, storage and use of explosives, including:

- The latest version of the Explosives Regulations R 1604 dated 08h September 1972 issued under the Explosives Act (Act No. 26 of 1956 as amended in R 2371 dated 14th December 1973 and in any further subsequent amendments that have been issued up until the start date of the Contract.
- The latest version of the Explosives Regulations R 109 dated 17th January 2003 issued under Section 43 of the Occupational Health and Safety Act (Act No. 85 of 1993) as amended in any amendments that have been issued up until the start date of the Contract.
- The latest version of the Explosives Act No. 15 of 2003 and as amended in any amendments that have been issued up until the start date of the Contract.
- The latest versions of all other applicable national, provincial or municipal legislation, regulations and by-laws.

Specifications for blasting shall be in accordance with the requirements in Section A12.10 of Chapter 12.

A1.2.8 WORKMANSHIP

(Refer to the Specifications for the full details of this control process.)

The quality of the workmanship, products, elements and goods provided by the Contractor shall be controlled by a process control system executed by the Contractor as well as by a system of acceptance control executed by the Employer, the Engineer or any other appointed agent as specified below.

A1.2.8.1 Process quality control

The Contractor shall institute a quality management system and provide experienced engineers, technicians, foremen, inspectors and other technical staff, under the control of a designated quality manager, to give effect to and manage the quality management system.

A1.2.8.2 Acceptance quality control

Acceptance quality control shall be conducted by the Employer and/or the Engineer and it shall consist of visual inspections, sampling, testing and measurements in terms of the methods and procedures specified in Chapter 20 of these Standard Specifications and/or in the Contract Documentation .

1.2 GENERAL REQUIREMENTS AND PROVISIONS

PART B: LABOUR ENHANCEMENT

PART B: LABOUR ENHANCEMENT

B1.2.1 SCOPE

Any requirements for the labour enhancement of some of the work activities will be stated in the Contract Documentation. The Contractor shall indicate how these specified requirements will be met in his Works programme.

B1.2.2 DEFINITIONS

Definitions as provided in Clause A1.2.2 shall also apply.

B1.2.3 GENERAL

Any activity specified in PART A, where hand work is given as an alternative, shall be executed in such a way as to maximise labour.

B1.2.4 DESIGN BY CONTRACTOR/PERFORMANCE BASED SYSTEMS

Not required for Section A1.2.

B1.2.5 MATERIALS

The provisions of Part A shall apply.

PART B: LABOUR ENHANCEMENT (continued)

B1.2.6 CONSTRUCTION EQUIPMENT

Where reference is made in Part A to appropriate equipment, the use of light/hand operated equipment shall be evaluated during trial sections. The specifications in Part A shall be equally applicable.

B1.2.7 EXECUTION OF THE WORKS

As specified in Clauses A1.2.7.1.1b) and c) the labour force shall be allocated as a resource to each of the major activities shown in the Contractor's programme.

B1.2.8 WORKMANSHIP

The provisions of Part A shall apply.

1.2 GENERAL REQUIREMENTS AND PROVISIONS

PART C: MEASUREMENT AND PAYMENT

PART C: MEASUREMENT AND PAYMENT

(i) Preamble

The tendered rate for each item shall include full compensation for providing, operating, maintaining and decommissioning upon completion, of all the construction 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.

NOTE: This preamble is standard to all the measurement and payment sections throughout the document so it will not be shown again.

C1.2 PART C: MEASUREMENT AND PAYMENT

(ii) Items that will not be measured separately (These all refer to specifications given in this section.)

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

- **Cleaning and removal to spoil of all spilt construction materials off public or privately owned roads which are used as haul roads, access roads and detours or trafficked areas which are adjacent to the construction area when partial or half width construction is carried out.**
- **Compliance with the requirements related to the Contractor's activities on properties outside the road reserve.**
- **Carrying out any remedial work required to defective or rejected work.**
- **Attendance at site meetings.**
- **The provision, transport and application of construction water.**
- **All work in restricted areas unless provided for in the Contract Documentation.**
- **The design of any permanent work that may be specified to be designed by the Contractor in the Contract Documentation.**
- **The design and construction of all temporary work.**
- **The preparation and submission of design calculations and drawings for temporary and permanent work designed by the Contractor.**
- **Setting out of the Works and the protection of beacons.**
- **Obtaining wayleaves, work and/or construction permits where specified to be obtained by the Contractor.**
- **Compliance with the requirements relating to work on, over, under or adjacent to utilities.**
- **The Contractor's process control testing.**

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

Table C1.2-1: Payment items from other chapters or sections

ACTIVITY	SECTION A1.2 CLAUSE REFERENCE	SECTION – PAY ITEM REFERENCE
PROVISION AND LATER REMOVAL OF THE CONTRACT SIGN BOARDS.	A1.2.3.12	SECTION C1.3 – ITEM C1.3.2
PROVISION OF ALL SITE SECURITY MEASURES FOR THE CONTRACTOR.	A1.2.3.17	SECTION C1.3 – ITEMS C1.3.3.1 & C1.3.3.2
PROVISION OF SITE SECURITY FOR THE ENG.	A1.2.3.17	SECTION C1.4 – ITEM C1.4.8
OBTAINING WAYLEAVES AND PERMITS	A1.2.3.22 b)	SECTION C2.1 – ITEM C2.1.3
IDENTIFICATION, PROTECTION AND RELOCATION OF EXISTING SERVICES	A1.2.7.3	SECTION C2.1 – ITEMS C2.1.1 & C2.1.2
ACCEPTANCE QUALITY CONTROL – SAMPLING AND TESTING REQUESTED BY THE ENGINEER	A1.2.8.2	SECTION C20.1 – ITEM C20.1.2

(iv) Items specifically for this section of the Specifications

Item	Description	Unit
C1.2.1	Environmental Management	
C1.2.1.1	Monitoring of compliance with and reporting on the EMP	month
C1.2.1.2	Dedicated environmental officer (if specified in the Contract Documentation)	month
C1.2.2	Programming and Reporting (THIS IS NOW A PAID ACTIVITY)	
C1.2.2.1	Submission of a Scheme 1 Programme	lump sum
C1.2.2.2	Reviewing and updating a Scheme 1 Programme	month
C1.2.2.3	Submission of a Scheme 2 Initial Programme	lump sum
C1.2.2.4	Submission of a Scheme 2 Full Programme	lump sum
C1.2.2.5	Reviewing and updating a Scheme 2 programme every month	month
C1.2.2.6	Preparation and submission of all information and reports specified in the Contract Documentation	month

Item	Description	Unit
C1.2.3	Routine road maintenance of existing public roads within the site limits of the Works or used as detours	
C1.2.3.1	Grass cutting	hectare (ha)
C1.2.3.2	Drain cleaning	kilometre (km)
C1.2.3.3	Cleaning out culverts	cubic metre (m^3)
C1.2.3.4	Collection of rubbish / litter	kilometre (km)
C1.2.3.5	Base patching using crushed stone material stabilised with bitumen emulsion and cement	cubic metre (m^3)
C1.2.3.6	Base and/or surface patching using cold premixed asphalt	kilogram (kg)
C1.2.3.7	Base and/or surface patching using hot plant mixed asphalt	tonne (t)
C1.2.3.8	Replacement of damaged guardrails including posts	metre (m)
C1.2.3.9	Grading of temporary gravel deviations and existing roads used as detours	kilometre (km)
C1.2.3.10	Watering of temporary gravel deviations and existing roads used as detours	kilolitre (kl)
C1.2.3.11	Other road maintenance work ordered by the Engineer	provisional sum
C1.2.3.12	Handling cost, profit and all other charges in respect of item C1.2.3.11	percentage (%)
C1.2.3.13	Liaison with the routine road maintenance contractor	Month

Item	Description	Unit
C1.2.4	Stakeholder liaison	month
C1.2.5	Safety	
C1.2.5.1	Health and safety plan	lump sum
C1.2.5.2	Implementation of health and safety plan	month
C1.2.6	Work adjacent to properties	
C1.2.6.1	Survey of adjacent properties	number (No.)
C1.2.6.2	Preventive and/or mitigation measures	provisional sum
C1.2.6.3	Handling cost, profit and all other charges in respect of item C1.2.6.2	percentage (%)

Item	Description	Unit
C1.2.7	Road safety audits	
C1.2.7.1	Stage 4 work zone traffic management audit	provisional sum
C1.2.7.2	Handling cost, profit and all other charges in respect of item C1.2.6.1	percentage (%)
C1.2.7.3	Stage 5 pre-opening stage traffic safety audit	provisional sum
C1.2.7.4	Handling cost, profit and all other charges in respect of item C1.2.6.3	percentage (%)
C1.2.8	Dayworks	
C1.2.8.1	Personnel	
C1.2.8.2	Construction equipment	
C1.2.8.3	Vehicles	
C1.2.8.4	Materials	

1.2 GENERAL REQUIREMENTS AND PROVISIONS

PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

D1.2.1 SCOPE

No performance guarantees or compliance certificates are required for Section 1.2.

1.3 CONTRACTOR'S SITE ESTABLISHMENT AND GENERAL OBLIGATIONS

PART A: SPECIFICATIONS

A1.3.1 SCOPE

This Section covers the establishment of the Contractor's organization, construction camps and constructional plant and their removal on completion of the contract.

It also includes payment items to cover certain general obligations, risks and liabilities and general items of cost that are included in, but not covered directly by the payment items in the other chapters.

A1.3.2 DEFINITIONS

Construction camps - Construction camps are all areas used for erecting offices, stores, workshops, testing facilities, plant parking areas, and equipment and material storage areas.

General Obligations - The Contractor's general obligations shall include the following: (All the Contractor's obligations with regard to his site establishment are listed in this clause.)

A1.3.3 GENERAL

A1.3.3.1 Construction camps

The Contractor shall establish the construction camps either at the specific sites and borrow areas identified in the Contract Documentation or at locations chosen by the Contractor. The exact location of these facilities shall be subject to the approval of the Engineer and such approval will not be unreasonably withheld.

The Contractor shall make his own arrangements for the use of any property outside the road reserve for erection of the construction camp/s, as well as for the provision of adequate means of access, security and the installation and supply of water, electricity and telephone services required by the Contractor.

Before commencing with the construction of any camps the Contractor shall comply with all the requirements in Clauses A1.2.3.2 and/or A1.2.3.3 ***(property not provided by Employer and environmental management).***

A1.3.3.1 Construction camps (continued)

If Employer-owned land can be made available for the use of the Contractor for the construction camps, the use of such land will not be treated as a lease but will form part of the contract. In this regard the Contractor shall complete the prescribed agreement and comply with all the conditions thereof as if it is part of the Contract. The availability of any Employer owned land will be indicated in the Contract Documentation.

On completion of the Works, all constructional plant, buildings, fencing and other temporary structures erected by the Contractor shall be removed and the construction camp site shall be restored to its original condition and left neat and tidy. The Contractor shall also comply with all the requirements related to the completion of the operations specified in Clause A1.2.3.2 and/or Clause A1.2.3.3.

A1.3.3.2 Housing

The Contractor shall not erect any housing or other accommodation facilities on the site in urban areas and shall make all the necessary arrangements for accommodation of his personnel and site staff off the site, unless otherwise stated in the Contract Documentation.

The Contractor shall not erect any housing or other accommodation facilities on the site before he has obtained the written permission of the Employer and, where applicable, the land owner and has complied fully with all applicable legislative and regulatory requirements.

A1.3.3.3 Maintenance of the Contractor's facilities

The Contractor shall maintain the construction camps and all the Contractor's other facilities in a clean, neat and tidy condition for the duration of the Contract.

The Contractor shall also maintain all the access roads to the Contractor's site facilities, including any publicly or privately owned roads that the Contractor is making use of.

The Contractor shall ensure that the access roads to the Contractor's facilities are always in a safe and passable condition for normal cars under all weather conditions.

A1.3.3.4 Contractor's own security arrangements

The Contractor shall provide all the security measures required for the Contractor's own facilities and equipment on the Site of the Works, including quarries, borrow pits, and for the traffic accommodation site facilities and equipment, as he deems necessary.

The provision of security measures for the duration of the Works shall be included in the Contractor's General Obligations as defined in Clause A1.3.2.

A1.3.4 DESIGN BY THE CONTRACTOR / PERFORMANCE BASED SYSTEMS

The Contractor shall be responsible for the design of the site facilities. All applicable legislative and regulatory requirements related to building standards and health and safety shall be complied with.

A1.3.5 MATERIALS

The Contractor shall be responsible for the selection and purchase of all materials required to construct the site facilities. All applicable legislative and regulatory requirements with regard to building standards and health and safety shall be complied with.

A1.3.6 CONSTRUCTION EQUIPMENT

Not applicable for Section A1.3.

A1.3.7 EXECUTION OF THE WORKS

All work required for the Contractor's site facilities and for the Contractor's site establishment of staff, vehicles and equipment shall be carried out in compliance with all applicable legislative and regulatory requirements and with the requirements of the Contractor's environmental management and health and safety plans.

A1.3.8 QUALITY OF MATERIALS AND WORKMANSHIP

The Contractor shall control the quality of materials and workmanship used for the construction and fitting out of the construction camps to ensure that the applicable legislative and regulatory requirements related to building standards and health and safety are adhered to.

1.3 CONTRACTOR'S SITE ESTABLISHMENT AND GENERAL OBLIGATIONS

PART B: LABOUR ENHANCEMENT

B1.3.1 SCOPE

There are no additional labour enhancement requirements for Section A1.3.

B1.3.2 DEFINITIONS

Definitions as provided in Clause A1.3.2 shall also apply.
Clauses B1.3.3 to B1.3.8 are not applicable to this Section.

1.3 CONTRACTOR'S SITE ESTABLISHMENT AND GENERAL OBLIGATIONS

PART C: MEASUREMENT AND PAYMENT

PART C: MEASUREMENT AND PAYMENT

(i) Preamble

(ii) Items that will not be measured separately

There are no activities mentioned in this Section that are not measured in this section.

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

There are no payment related items mentioned in this Section that are measured in other sections of the Specifications.

(iv) Items specifically for this section of the Specifications

Item	Description	Unit
C1.3.1	The Contractor's general obligations	
C1.3.1.1	Fixed obligations	lump sum
C1.3.1.2	Value-related obligations	lump sum
C1.3.1.3	Time-related obligations	month
C1.3.2	Contract sign boards	number (No.)

NOTE : Item C1.3.1 shall also include for all security arrangements required on the site and at the Contractor's site camps.

1.3 CONTRACTOR'S SITE ESTABLISHMENT AND GENERAL OBLIGATIONS

PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

D1.3.1 SCOPE

No performance guarantees or compliance certificates are required for Section 1.3.

1.4 FACILITIES FOR THE ENGINEER

PART A: SPECIFICATIONS

A1.4.1 SCOPE

This Section covers the provision by the Contractor of facilities for the Engineer and the Engineer's staff. These facilities shall include the necessary site accommodation, laboratories and offices, all the necessary furnishings and services, as well as all the arrangements in connection with the property, buildings and/or land, on which the Engineer's facilities will be provided.

The specifications for the site accommodation and the site laboratory and office buildings, together with all the fittings and furnishing required, are specified in this section. If necessary, additional details and requirements will be specified in the Contract Documentation or provided by the Engineer.

A1.4.2 DEFINITIONS

Engineer's site facilities - The Engineer's site accommodation, laboratories and offices are temporary buildings provided on site, or existing buildings on or near the site. Together with the required water, sewage, telecommunication, internet and electricity services these shall be known as the Engineer's site facilities.

A1.4.3 GENERAL

Where not already provided in the Contract Documentation, the Engineer shall furnish the Contractor with full details, in writing, regarding the number, type, layouts and furnishing of all site accommodation, laboratories and offices required for the use of the Engineer's site personnel.

The Contractor shall not order or make any arrangements for the provision of any buildings, materials, equipment or fittings on the basis of what is specified or scheduled without written confirmation by the Engineer. No buildings shall be rented, purchased, erected, refurbished or altered without the Engineer's written approval of the of the buildings.

Buildings for staff accommodation, laboratories and offices may comprise one or more of the following:

- **Rented existing permanent structures in residential, business, industrial or farming areas.**
- **Temporary structures erected on property rented by the Contractor or provided by the Employer.**
- **Mobile structures parked on property rented by the Contractor or provided by the Employer.**
- **Permanent structures provided by the Employer.**

Existing permanent structures may require refurbishment and partitioning to suit the requirements of the Engineer.

All buildings provided for the Engineer's staff accommodation, laboratories and offices shall where possible be located in an area where landline and/or cellular telecommunication and internet connectivity is available. If any of these services are not available dedicated services to that effect shall be provided.

Should the Contractor decide to move the construction camp to a new site, the buildings erected for the use of the Engineer shall be moved to the new site and re-erected if required by the Engineer, or alternative buildings which meet the specified and the Engineer's requirements shall be provided by the Contractor.

No additional costs related to moving the Engineer's site facilities shall be incurred by the Employer or by the Engineer and all such costs shall be borne by the Contractor.

The Contractor shall be responsible for servicing the Engineer's site facilities and for maintaining the facilities in a serviceable condition for the duration of the contract.

The Contractor shall provide adequate security measures to prevent unauthorised entry to the Engineer's offices, laboratories and site accommodation. Security shall be provided as specified in Clause A1.2.3.17 in Section A1.2.

A1.4.4 DESIGN BY CONTRACTOR / PERFORMANCE BASED SYSTEMS

Where no specific designs for the Engineer's site facilities are provided in the Contract Documentation or are provided by the Engineer, the Contractor shall be responsible for the design of the Engineer's site facilities. All the specified requirements shall be met and all applicable legislative and regulatory requirements, building standards and health and safety requirements shall be complied with.

A1.4.5 MATERIALS

The Contractor shall be responsible for the selection and purchase of all materials required to provide the Engineer's site facilities. The Contractor shall ensure that the specified standards are met and that all applicable legislative and regulatory requirements, building standards and health and safety requirements are complied with.

A1.4.6 CONSTRUCTION EQUIPMENT

Not applicable to this Section.

A1.4.7 Execution of the Works

A1.4.7.1 Offices and laboratories

This clause contains a general description of what is required for the Engineer's offices and laboratories followed by comprehensive specifications for the offices, laboratories, car ports, the areas around offices and laboratories, ablution units and kitchen units.

A1.4.7.2 Housing

(a) Prefabricated houses

This clause contains comprehensive specifications for the provision and furnishing of prefabricated housing for the Engineer's site staff.

Standard house configurations are provided so that the Contractor can tender correctly to provide the type of accommodation required.

(See table on the next slide)

ROOMS REQUIRED AND MINIMUM FLOOR AREAS (M^2)	HOUSE TYPE A	HOUSE TYPE B	HOUSE TYPE C
	NUMBER OF ROOMS	NUMBER OF ROOMS	NUMBER OF ROOMS
MAIN BEDROOM (20 M^2)	1	1	1
SECOND BEDROOM (12 M^2)	2	1	0
LOUNGE (20 M^2)	1	1	1
DINING ROOM (12 M^2)	1	1	0
KITCHEN (12 M^2)	1	1	1
BATHROOM (9 M^2)	1	1	1
COVERED VERANDA (12 M^2)	1	1	1
LOCKABLE STOREROOM (6 M^2)	1	0	0
COVERED CAR PORT (20 M^2)	1	1	0
TOTAL FLOOR AREA (M^2)	135	117	73

(b) Rented accommodation

The Engineer shall usually be responsible for providing suitable accommodation for his site staff in a hotel, guesthouse, rented house or a rented apartment in the nearest town or on a nearby farm.

The Engineer may instruct the Contractor to pay for any hotel or other accommodation or leased houses required. If so instructed by the Engineer the Contractor shall enter into the necessary contracts for the lease of such accommodation as may be required and shall not unreasonably object to the terms and conditions of such leases to be negotiated by the Engineer.

Where appropriate, and in the case where the rented accommodation is not deemed to be the primary residence of the site staff member, the lease agreement shall include full compensation for a periodic garden service.

A1.4.7.3 Services

This clause contains the specifications for the sanitary arrangements and for the provision of water, electricity and gas required at the Engineer's site offices, laboratories and prefabricated site housing.

A1.4.7.4 Maintenance

This clause contains the specifications for the cleaning and maintenance by the Contractor of the Engineer's site offices, laboratories and prefabricated site housing.

A1.4.7.5 Office staff

If specified in the Contract Documentation the Contractor, in consultation with the Engineer, shall appoint an office secretary/receptionist and the requested number of technical assistants to provide a continuous service to the Engineer's site personnel. These staff shall be paid by the Contractor including the provision of transport and other all other costs and benefits.

A1.4.7.6 Site inspection transport

The Contractor shall provide a bus, mini-bus or combi van as and when required by the Engineer for site inspections and other technical meetings for the use by him, the Employer, the Engineer and other invited persons.

The vehicle provided shall be in a mechanically sound condition, clean inside and outside, provided with a dedicated driver with the required licence and PDP papers. It shall have all the necessary safety equipment and sufficient fuel to transport the passengers across the site and surrounding areas as required by the Engineer.

A1.4.8 Workmanship

The applicable legislative and regulatory requirements regarding building standards and health and safety shall be complied with.

1.4 FACILITIES FOR THE ENGINEER

PART B: LABOUR ENHANCEMENT

B1.4.1 SCOPE

There are no additional labour enhancement requirements for Section A1.4.

B1.4.2 DEFINITIONS

Definitions as provided in Clause A1.4.2 shall also apply.
Clauses B1.4.3 to B1.4.8 are not applicable to this Section.

1.4 FACILITIES FOR THE ENGINEER

PART C: MEASUREMENT AND PAYMENT

PART C: MEASUREMENT AND PAYMENT

(i) Preamble

(ii) Items that will not be measured separately

Dismantling, moving and re-erecting any or all of the Engineer's facilities that may become necessary due to the Contractor's decision to relocate his own facilities will not be measured separately. The Engineer's facilities will only be paid for once unless otherwise specified in the Contract Documentation or if the Engineer specifically requests that they be moved for reasons other than relocation of the Contractor's own facilities.

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

There are no payment related items mentioned in this Section that are measured in other Sections of the specifications.

(iv) Items specifically for this section of the Specifications

Item	Description	Unit
C1.4.1	Site accommodation	
C1.4.1.1	Offices and conference room	square metre (m^2)
C1.4.1.2	Laboratories	square metre (m^2)
C1.4.1.3	Open concrete working floors and verandas	square metre (m^2)
C1.4.1.4	Roofs over open concrete working floors and verandas	square metre (m^2)
C1.4.1.5	Store rooms inside the laboratory	square metre (m^2)
C1.4.1.6	Car ports	Number (No.)
C1.4.1.7	Ablution unit (equipped as specified)	Number (No.)
C1.4.1.8	Change room with a shower	Number (No.)
C1.4.1.9	Kitchen unit (equipped as specified)	Number (No.)
C1.4.1.10	Type A prefabricated house (equipped as specified	Number (No.)
C1.4.1.11	Type B prefabricated house (equipped as specified)	Number (No.)
C1.4.1.12	Type C prefabricated house (equipped as specified)	Number (No.)
C1.4.1.13	Rented housing paid for by the Contractor	provisional sum
C1.4.1.14	Contractor's handling costs, profit and all other charges in respect of item C1.4.1.13	percentage (%)

Item	Description	Unit
C1.4.2	Items measured by area (see list of sub-items in document)	
C1.4.3	Items measured by number (see list of sub-items in the document)	
C1.4.4	Prime cost items (office equipment listed)	
C1.4.5	Services at site offices, laboratories and site accommodation	
C1.4.5.1	Fixed costs	lump sum
C1.4.5.2	Running costs	month
C1.4.6	Office staff	
C1.4.6.1	Secretary / receptionist	month
C1.4.6.2	Technical assistant	month

Item	Description	Unit
C1.4.7	Site inspection transport	
C1.4.7.1	Provision of a bus, mini-bus or combi van for site inspection purposes (specify type and size of vehicle)	per day
C1.4.7.2	Travel on site	kilometre (km)
C1.4.8	Site security measures for the Engineer	
C1.4.8.1	Supply and installation of security measures at site offices and laboratories	lump sum
C1.4.8.2	Provision of security guards and an armed response service at site office and laboratories	month
C1.4.8.3	Supply and installation of security measures at Engineer's site accommodation	lump sum
C1.4.8.4	Provision of security guards and an armed response service at Eng.'s site accommodation	month
C1.4.8.5	Supply and installation of an alarm system at Eng's rented accommodation for "n" houses	lump sum
C1.4.8.6	Provision of an armed response service at Eng's rented accommodation for "n" houses	month

1.4 FACILITIES FOR THE ENGINEER

PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

D1.4.1 SCOPE

Certificates showing compliance with the applicable SANS Specifications referred to in Clause A1.4.7 in this Section shall be provided by the Contractor if requested by the Employer or the Engineer.

Regulatory compliance certificates for the electrical wiring and gas supply installations at the site accommodation, laboratories and offices shall be submitted to the Engineer upon completion of the various facilities and before any payment is made for these facilities.

1.5 ACCOMMODATION OF TRAFFIC

PART A: SPECIFICATIONS

A1.5.1 SCOPE

This Section covers the accommodation of vehicular and non-motorised traffic and pedestrians on, over or through the site of the Works. This involves:

- **the construction, maintenance and eventual removal of temporary deviations and detours,**
- **the construction and eventual removal, if required, of temporary gates, fences, drainage Works and other incidental items that may be required,**
- **the provision, erection, relocation, maintenance and eventual removal of traffic control facilities and traffic safety items,**
- **painting and eventual removal, if required, of temporary road markings and placing temporary road studs,**
- **the issuing of public notices,**
- **liaison with the relevant traffic authorities, motorists and other affected persons and**
- **the removal and reinstatement/landscaping of temporary deviations as they become redundant.**

The purpose of providing the traffic accommodation measures discussed in this section is to ensure the safety of road users, pedestrians and the Contractor's and Engineer's employees who are engaged on the Works.

A1.5.2 DEFINITIONS

Barriers – Barriers consist of concrete, plastic or steel sections which are placed across or along the road to stop or divert the traffic or alongside / around the work area to separate the traffic and pedestrians from the work area. Barriers may be used either as channelization devices or as vehicle restraining systems depending on their type and on their fixing arrangements.

Channelization devices – moveable channelization devices for diverting and/or separating vehicles, non-motorized traffic and pedestrians from the work areas include barriers, delineators and traffic cones. These channelization devices may be supplemented by temporary road markings and road studs.

Delineators – are rectangular warning signs with a directional chevron on one or both sides which indicates which side of the roadway is open for use by the vehicles, non-motorized traffic and/or pedestrians.

Detour - A detour is any section of another existing road onto which traffic is diverted around the work areas. *(This is not the same as a temporary deviation which runs through or alongside the site of the Works.)*

Road markings – include all the regulatory road markings painted on the surface of existing or newly constructed roads as well as temporary road markings painted on the surface of deviations and detours.

Partial-width or half-width construction - this is a construction strategy wherein part of a roadway is constructed or reconstructed/rehabilitated as a phase without encroaching on the remaining width of the roadway in order to accommodate traffic. (Typically, a two-lane two-way road will be constructed in two half-width phases whereas a multi-lane road will be constructed in several partial-width phases.)

Road signs - Road signs include all the regulatory road signs erected along existing or newly constructed roads as well as the temporary road signs erected along temporary deviations and detours.

Road restraint systems - temporary road restraint systems used for preventing vehicles from leaving the permitted lanes, or for separating two opposing streams of traffic, during the construction of the Works may consist of either movable precast concrete or steel barriers or steel guardrails that comply with the specifications given in Chapter 11.

Temporary deviation - a temporary deviation can be partial width, single or multi-lane roads that are used to accommodate vehicular and non-motorised traffic while the Works are in progress. They are either a portion (part width) of the road that is under construction or they are new roads constructed alongside or in close proximity to the road Works construction area.

Traffic – means all vehicles, non-motorised vehicles and pedestrians that need to pass around, alongside or through the work areas.

Traffic control facilities - Traffic control facilities include flagmen, portable STOP and GO signs, portable barriers, temporary road signs and traffic signals.

Traffic calming devices – are used to reduce vehicle speeds and they generally consist of temporary or permanent rumble strips, humps or circular bumps placed in an overlapping strip pattern across the width of the traffic lane/s.

Traffic safety devices - include flashing warning lights, illuminated and/or flashing traffic arrows and signs, electronic variable message boards, vehicle restraint systems, impact attenuation devices and guardrails.

A1.5.3 GENERAL

A1.5.3.1 Access to properties

The Contractor shall provide and maintain access to all public and private properties which fall within or adjoin the Works at all times, unless alternate provision is specified in the Contract Documentation.

A1.5.3.2 General requirements

The Contractor may not commence any part of the Works until adequate provision has been made for the accommodation of vehicular, non-motorised and pedestrian traffic. Traffic shall be accommodated in accordance with the requirements given in the Contract Documentation unless the Contractor has submitted an alternative incorporating an amended method of traffic accommodation and this alternate method has been accepted by the Employer.

A1.5.3.2 General requirements (continued)

The Contractor shall ensure that all employees and all visitors to the site are equipped with approved safety vests / jackets utilizing retro-reflective and/or fluorescent panels in red, yellow, white and/or silver and that the safety vests/ jackets are worn whenever his personnel and visitors are on the site of the Works. Any person found not wearing a safety vest/jacket while on the site of the Works, including any of the Engineer's or the Employer's staff, shall be instructed to leave the site until they are in possession of and wearing a safety vest/jacket.

The Contractor shall be responsible for maintaining all existing or temporary road surfaces within, and on the approaches to, the Works area in a safe and trafficable condition at all times of the day or night for the duration of the contract. Any construction material that is driven onto or spilt on temporary roads, public roads or privately-owned roads during the haul of material, or while any construction operations are being carried out, shall be cleaned off the road surface as soon as practically possible and removed to an approved spoil site.

A1.5.3.2 General requirements (continued)

During non-working hours, or when construction work is not taking place on a certain section of road, all superfluous obstructions to the traffic shall be removed and all signs no longer applicable to the situation shall be removed to an approved safe location or effectively covered with an opaque, weather proof material bag made from durable material that is firmly fixed over the sign.

The overnight parking of construction vehicles and/or equipment within the road reserve may be permitted in areas alongside the road carriageway, in consultation with the Engineer. The minimum clearance between the parked vehicles and/or equipment and the edge of the nearest traffic lane shall be 6,0 m. The parked equipment and vehicles shall be placed behind reflective chevron delineators which are placed to face the traffic at a maximum spacing of 10m between each delineator.

A1.5.3.2 General requirements (continued)

If the construction vehicles and/or equipment need to be parked overnight closer than 6,0 m from the nearest traffic lane, then they shall be separated from the lane by guardrails correctly installed on guardrail posts or by vehicle restraining systems which consist of concrete or steel barriers correctly placed, assembled and fastened together in a sufficient length to create an effective vehicle restraint system. The guardrails or vehicle restraining systems shall be fitted with red reflectors or reflective chevron signs which are fixed to face the traffic at a maximum spacing of 10 m between each reflector or reflective chevron sign. The use of drums, lightweight plastic barriers, concrete or steel barriers that are not correctly placed and fastened together or guardrails that are not attached to correctly installed guardrail posts will not be permitted.

When requested by the Engineer, the Contractor shall provide lane closures for road inspections and testing. This must be done in advance of the actual time programmed for the inspection and testing work.

A1.5.3.3 Lane width

The clear width of any traffic lane which is provided along any section of a detour, a temporary deviation or any partial- / half-width construction shall not be less than 3,5 m unless a narrower width is specified in the Contract Documentation or approved by the Engineer in writing. If a lane width less than 3,5 m is specified or approved by the Engineer then temporary width restriction warning signs shall be erected at approved locations along the narrow section of the detour or temporary deviation.

A1.5.3.4 Late occupation of traffic lanes, interchange ramps and cross roads

If specified in the Contract Documentation the Contractor shall be charged a lane occupation levy for any occupation of traffic lanes, interchange ramps and any cross roads beyond the completion dates and times agreed with the Employer (or for late occupations required for remedial work). The lane occupation levies shall be specified in the Contract Documentation and they shall be deducted from payments due on the relevant interim payment certificates.

A1.5.3.5 Legal requirements

In addition to the specifications given in the Contract Documentation all traffic accommodation arrangements shall also conform to the specifications and provisions given in the latest edition of the South African Road Traffic Signs Manual (SARTSM) and all other current legislation and regulations.

The Contractor shall make use of approved methods to control the movement of his equipment and vehicles so as not to constitute a hazard on the road.

His staff and operators shall obey the permanent and temporary road traffic signs at all times and shall not consider themselves exempt from the road traffic laws and regulations because the Contractor has been given occupation of the site of the Works.

A1.5.3.5 Legal requirements (continued)

The Contractor shall indemnify the Employer against all proceedings, claims, actions, damages to vehicles or property, injury or death of persons and all costs which may arise from, or be related to:

- **the absence, improper functioning or incorrect placement of road traffic signs, barriers, channelization devices, road markings, traffic control facilities, traffic safety devices and vehicle restraint systems;**
- **any construction related items, materials or surfacing aggregates that were dropped, deposited, spilt, left or come loose from any access roads, haul roads, detours, temporary deviations and newly opened sections of completed roads.**

The Contractor shall submit written confirmation that his insurance cover complies with the requirements specified in the Contract Documentation and shall supply a copy of the relevant insurance policy/policies to the Engineer for his records.

The Contractor shall within seven calendar days after receipt of a third-party claim acknowledge receipt to the claimant and submit the claim to his insurance company for processing. The Contractor shall then follow up the processing of the claim and inform the claimant of the outcome as soon as the matter has been dealt with by the Contractor's insurance company. The Engineer shall be copied on all correspondence regarding third party claims. The Contractor shall report on the latest status and outcome of all the third-party claims at every site meeting.

A1.5.3.6 Other traffic control measures ordered by the Engineer

The Engineer may instruct the Contractor to provide any other road sign, reflective tape, etc. not measured in standard payment items. Such road signs shall conform to the requirements of the SARTSM and/or specified in the Contract Documentation or by the Engineer in writing. To ensure that the travelling public is kept fully informed and warned on matters relating to the accommodation of traffic, construction sign posting and the effect of the construction on the free flow of traffic through the site, the Engineer may instruct the Contractor to arrange for advertising in the press, on the local radio stations and/or for other forms of publicity.

A1.5.3.7 Penalty events

Whenever the Contractor fails or refuses to take the necessary steps to ensure the safety and convenience of the public and/or to accommodate the traffic, pedestrians and non-motorised traffic and maintain the temporary detours, deviations, traffic accommodation facilities and traffic safety devices correctly the Contractor shall be subject to fixed & time related penalties.

A1.5.3.8 Property pegs and survey beacons

Temporary deviations shall be constructed so as not to damage or displace existing cadastral beacons or trigonometrical-survey beacons.

A1.5.3.9 Right of way

The travelling public shall have the right of way on public roads, existing roads used as detours and on all temporary deviations for the entire contract period.

A1.5.3.10 Safety of the public and the Contractor's employees

The safety of the travelling public, and of the Contractor's and the Engineer's employees, is of paramount importance and shall take priority over all aspects of the Works. The Contractor shall be responsible for the safe and easy passage of all vehicular, non-motorised and pedestrian traffic past and/or over the Works in a manner which will protect the road users, pedestrians, the Contractor's and the Engineer's employees.

A1.5.3.11 Services

Services affected by temporary deviations shall be located, protected and relocated in a similar manner as services affected by the permanent Works as specified in Clause A2.1.3.2 in Section A2.1 of Chapter 2.

The requirements given in the Contract Documentation shall also be applicable to any services affected by the construction of temporary deviations.

A1.5.3.12 The use of public roads by the Contractor

The Contractor shall have the right to use public roads, including any detours and temporary deviations open to public traffic, subject to the provisions and restrictions stated in Clause A4.1.7.1. in Section A4.1 of Chapter 4.

A1.5.3.13 Traffic over completed pavement layers and structures

Traffic over the completed pavement layers and structures on an uncompleted road shall be restricted to the vehicles and equipment required for the construction of the remaining Works. All construction vehicles will be restricted to the maximum axle loads permitted on public roads by the statutory provisions.

If it is necessary to temporarily accommodate public traffic over the completed pavement layers and structures on an uncompleted road this shall only be done if agreed to by the Engineer.

The Contractor shall be responsible for protecting and maintaining the pavement layers. Any damage to the layers shall be repaired or rectified at the Contractor's own cost unless the Engineer agrees in writing to pay for some or all of these costs.

A1.5.3.14 Vertical clearance

The minimum vertical clearance over any section of a temporary deviation shall be 5,2 m. If the minimum vertical clearance is less than 5,2 m then approved warning signage shall be erected at approved locations on the overhead obstruction itself as well as in advance of the obstruction. The advance warning signs shall be erected at distances of 1,0 km, 400 m and 200 m in advance of the overhead obstruction.

The warning signs shall show the actual clearance height in metres (to 2 decimal places) less a safety allowance of at least 75 mm.

Where the overhead obstruction or its support structure is likely to collapse if it is struck by a vehicle or by its load, and thereby represent a danger to the public or to the persons working on the site, then such an obstruction shall, in addition to the warning signs, have an approved height restriction warning gantry erected at least 200 m in advance of the overhead construction, or at the distance specified in the Contract Documentation or specified on site by the Engineer.

A1.5.3.14 Vertical clearance (continued)

The lower edge of the warning gantry shall be at least 5,2 m above the road surface and reflective chevron plates, spaced not more than 0,3 m apart, shall be suspended beneath the gantry to the same height above the road surface as the overhead obstruction less a safety allowance of 75 mm. The warning gantry shall be fitted with a beam triggered alarm that is audible to all employees working on the obstruction over the road. A properly trained flagman shall also be placed on the side of the road 50 m after the warning gantry to wave down and stop any vehicles whose loads touch any of the chevron warning plates.

Where the temporary deviation passes under a high voltage electric powerline the minimum vertical clearance height specified by the service owner shall be provided.

A1.5.4 DESIGN BY CONTRACTOR

If, during the Contract, the Contractor would like to amend any of the specified traffic accommodation arrangements he shall provide his reasons for doing so in writing and obtain the Engineer's prior written approval.

If the Engineer's prior written approval has been obtained, the Contractor will be remunerated for the revised traffic accommodation arrangements in accordance with the contract rates only up to an amount that does not exceed the tendered amount for the specified traffic accommodation arrangements that have been replaced.

A1.5.5 MATERIALS

A1.5.5.1 Material used for construction of temporary deviations

All material required for the construction of temporary deviations, which includes the earthworks, pavement layers, stabilised layers, asphalt and bituminous surfacing layers shall comply with the specifications for these materials given in Chapters 4, 9 and 10 respectively.

A1.5.5.2 Temporary culverts

Temporary culverts of the type and size required shall comply with the specifications given in Section A3.2 of Chapter 3 as well as with any additional specifications that may be given in the Contract Documentation.

A1.5.5.3 Temporary road restraint systems

Where specified in the Contract Documentation or instructed by the Engineer, the Contractor shall provide, install, move and re-install and subsequently remove temporary road restraint systems, if so required for the construction of temporary deviations. All work shall be carried out in accordance with the specifications given in Section A11.4 of Chapter 11.

A1.5.5.4 Temporary fencing and gates

Where specified in the Contract Documentation or instructed by the Engineer, the Contractor shall provide either new fencing and gates, or move and subsequently reinstate existing fencing and gates, if so required for the construction of temporary deviations.

All work shall be carried out in accordance with the specifications given in Section A11.5 of Chapter 11.

A1.5.5.5 Temporary road signs

Temporary road signs shall comply with the specifications given for road signs given in Section A11.6 of Chapter 11.

A1.5.5.6 Temporary road markings and road studs

Temporary road markings and road studs shall comply with the specifications given for permanent road markings and road studs given in Section A11.7 of Chapter 11.

A1.5.5.7 Traffic accommodation facilities and safety devices

All road signs, barriers, channelization devices, guardrails, reflectors and other traffic safety devices shall be manufactured with materials that comply with the specifications given in the latest current edition of Volume 2 of the SARTSM, or any applicable international design standards that may be given in the Contract Documentation, and in accordance with the specifications given in Sections A11.4.5 and A11.6. of Chapter 11 as well as any additional specifications that are given in the Contract Documentation.

A1.5.6 CONSTRUCTION EQUIPMENT

A1.5.6.1 Traffic control facilities

a) Barriers

Barriers manufactured from plastic and ballasted with sand or water, shall only be used to barricade work areas to close off sections of the Works from members of the public and non-motorised traffic. They shall not be used to prevent vehicular traffic from encroaching on or entering the work zone except at stop/go points where they may be used to supplement the stop/go sign or traffic signal which is operated by the traffic controller.

Where specified in the Contract Documentation, steel guardrails may be used as channelization devices provided they comply with the specified requirements and are installed as specified in Clauses A11.4.4, A11.4.5 and A11.4.7.2 of Chapter 11. They may not be affixed to drums or other moveable objects. Guardrails shall not be used for the purpose of preventing heavy vehicles from leaving the permitted lanes or deviations and the Contractor shall use approved vehicle restraining systems for this purpose.

Vehicle restraining systems which are erected for the purpose of preventing vehicles from leaving the permitted lanes or deviations shall be movable barriers manufactured from steel or concrete with an approved safety shape design (e.g. New Jersey, F-shape or single slope). The movable barriers shall be obtained from approved suppliers and placed between the trafficked lane/s and/or the construction areas. They shall comply with the specified requirements and be installed as specified in Section A11.4 of Chapter 11 which refers to either of the following specifications:

- The European Specification EN 1317 with a minimum containment level H1 or as indicated in the Contract Documentation or
- The American Federal Highways Administration Specification NCHRP Report 350 with a minimum containment level TL4 or as indicated in the Construction Documentation.

The terminal sections of the moveable barriers may be a proprietary type or may be Contractor designed to attenuate head-on impacts of at least NCHRP Test Level 1 (50 km/h, 2 000 kg) or EN1317 Containment Level H1 (80 km/h, 1 500 kg) or as specified in the Contract Documentation.

(b) Delineators

Delineators shall comply with the manufacturing and reflective requirements of SANS 1555. In addition, they shall also:

- have blades that are reversible with dimensions as specified in the SARTSM and/or as indicated in the Contract Documentation,
- be manufactured from durable, impact resistant plastic material,
- be designed such that they, together with their mounting base, will collapse in a safe manner under traffic impact,
- have the lower edge of the reflective part of the delineator mounted at least 100 mm above the road surface and
- be capable of withstanding the movement of passing heavy vehicles travelling at speeds of up to 80 km/hr and gusting winds with a wind speed of up to 60 km/h without falling over. The base area shall be at least 0,18 m^2 and ballasted by its own weight or with durable sandbags filled with fine, clean sand of adequate mass. The sand bags shall be partially filled to ensure a flattish surface without bulging and they shall not be filled with anything other than fine, clean sand.

(c) Temporary signs

All temporary signs shall be manufactured to the sizes and in accordance with the specifications given in Volume 2 of the SARSTM and in Section A11.6 of Chapter 11 as well as with any specifications that are given in the Contract Documentation.

(d) Traffic cones

Traffic cones shall be manufactured in a fluorescent red-orange or red impact resistant plastic material. The minimum height of traffic cones shall be 750 mm. The design and weight of the traffic cone shall be such that it will not be displaced or blown over by passing heavy vehicles travelling at speeds of up to 80 km/hr and gusting winds with a wind speed of up to 60 km/h.

(e) Traffic signals

Temporary traffic signals shall conform with the requirements of traffic signals and conform to the size and visibility requirements specified for permanent traffic signals in Volume 3 of the SARTSM. The traffic signals shall be provided with either a permanent electricity supply or with a generator and/or batteries that are capable of powering the signals continuously while operational.

(f) Traffic control stations

Traffic control stations shall be provided at each traffic control point that is in operation during hours of darkness. They shall have the following:

- a trained traffic controller;
- an effective communication system that allows the controllers at each end of the deviation to communicate effectively with each other;
- an all-weather shelter fitted with a clear window facing the oncoming traffic that can be opened if required, and a portable chemical toilet;
- a red/green stop/go electric traffic signal system mounted on 3 m high steel poles complete with all electrical wiring;
- a 400W metal halide or 100W LED floodlight mounted on a 9 m high pole to illuminate the traffic control point as well as the approach to the traffic control station where the traffic will start to queue. Additional 400W metal halide or 100W LED floodlights mounted on 9 m high poles shall be provided to adequately illuminate the full length of the vehicle queuing area;
- a moveable barrier fitted with a STOP sign facing the oncoming traffic.

A1.5.6.2 Illuminated traffic signs and safety devices

a) Flashing illuminated arrow board

The illuminated arrow board shall be made up of LED light sources powered by battery or other suitable means, mounted on a backing board. A single shaft arrow will be required that can be used for both left and right directions. This illuminated flashing arrow board shall be used at lane drops on multi-lane highways or at other locations as directed by the Engineer.

b) Illuminated road signs

The illuminated road signs shall be made up of LED light sources powered by battery or other suitable means, mounted on a backing board. The illuminated colours must match the regulation sign colours specified in the SARTSM. If specified in the Contract Documentation, these illuminated road signs shall be used on multi-lane and/or heavily trafficked highways during nighttime hours.

A1.5.6.2 Illuminated traffic signs and safety devices (continued)

c) Mobile Variable Message Sign

The Variable Message Sign (VMS) shall be mounted on a trailer and located in a safe position where it is easily seen by the travelling public. It is used to provide information regarding the road and/or traffic conditions ahead or to inform a motorist of his actual travelling speed.

The mobile VMS system must be equipped with solar panels combined with deep cycle batteries to provide an output of at least 600W. It shall be capable of withstanding shocks up to 3G and wind speeds up to 120 km/h.

The sign face shall not be less than 3,0 m^2 to provide a full matrix LED with at least 2050 pixels per square metre. Each pixel shall have a LED and the pixel spacing shall not be less than 25 mm. The sign shall be able to display any configuration which contains letters, symbols, icons etc. The cone of vision is to be 30º and the light intensity must be automatically controlled by a daylight sensor; the light intensity shall also be capable of being controlled manually.

A1.5.6.2 Illuminated traffic signs and safety devices (continued)

The lower edge of the VMS sign face shall be at least 1,5 m above ground level.

The information displayed on the VMS sign face shall be controllable remotely from a computer via an internet connection.

d) Sign mounted flashing lights

Sign mounted flashing lights shall consist of two rectangular amber flashing lights, each at least 120 mm wide x 45 mm high using 10W LED's. The lights shall be visible from a distance of at least 800 m.

Depending on the width of the advance warning signs, the two flashing lights shall be mounted either 900 mm apart centre to centre on a 1 200 mm wide x 200 mm high white non-reflective sign board or mounted 600 mm apart centre to centre on a 900 mm wide x 150 mm high white non-reflective sign board.

A1.5.6.2 Illuminated traffic signs and safety devices (continued)

The sign board with the two flashing lights shall be mounted on top of each of the first advance warning signs positioned before the start of temporary deviations, lane closures, stop/go points for one-way traffic zones, vertical height restrictions and at any other potentially hazardous positions. They shall be placed where specified in the Contract Documentation or by the Engineer.

The lights shall have a separate solar panel power source with batteries that are mounted in a lockable steel box mounted on the back of the sign board. The power supply shall be sufficient to power the lights for at least 12 hours and the batteries shall be replaced or recharged as necessary to ensure that the flashing lights are always operating when required.

The lights shall be operated during all the hours of darkness and also during daylight hours if specified in the Contract Documentation or by the Engineer.

A1.5.6.2 Illuminated traffic signs and safety devices (continued)

e) Warning flags

Flags shall be made from durable, bright red material and shall be square with a minimum side length of 600 mm. The flag shall be attached to a flagpole staff at least 1,0 m in length. The warning flags shall be replaced whenever they become dirty or worn to the point where they are no longer easily visible and effective.

f) LED strobe light wands

LED strobe light wands shall be hand held, battery powered LED wands with an amber lamp tube at least 200 mm in length which can be operated in continuous or flashing mode.

A1.5.6.3 Traffic safety vehicle

The traffic safety vehicle to be used for transporting, placing, relocating and removing the traffic accommodation facilities and the traffic safety devices shall be a truck with a load capacity of at least 5 tons fitted with:

- **A high visibility rear panel in accordance with the requirements specified in the SARTSM.**
- **A rear mounted impact attenuation device which is capable of attenuating head-on impacts of at least Test Level TL2 (70 km/hr) in accordance with AASHTO MASH, or NCHRP 350 where no MASH compliant product is available.**
- **An amber-coloured flashing LED light or light bar mounted on top of the roof of the cab, or on top of the rear canopy whichever is the highest, which shall be clearly visible in daylight in all directions for a distance of at least 800 m. It shall be switched on continuously while the vehicle is on site, is manoeuvring in or out of traffic or is travelling or parked alongside roads open to public traffic within the work areas.**
- **A warning sign with the wording TRAFFIC CONTROL in retro-reflective Class 3 red letters at least 200 mm high on a retro-reflective Class 3 white background, mounted in a visible position at the rear of the vehicle.**

A1.5.6.4 Traffic safety officer's vehicle

The traffic safety officer's vehicle shall be provided for his sole use to enable him to carry out his supervisory duties.

The traffic safety officer's vehicle shall both be equipped with the following:

- **An amber-coloured flashing LED light or light bar mounted on top of the roof of the cab, or on top of the rear canopy whichever is the highest, which shall be clearly visible in daylight in all directions for a distance of at least 800 m and it shall be switched on continuously while the vehicle is on site, is manoeuvring in or out of traffic or is travelling or parked alongside roads open to public traffic within the work areas.**

- **A warning sign with the wording TRAFFIC CONTROL in retro-reflective Class 3 red letters at least 200 mm high on a retro-reflective Class 3 white background, mounted in a visible position at the rear of the vehicle.**

A1.5.7 EXECUTION OF THE WORKS

A1.5.7.1 Accommodation of pedestrian traffic

The Contractor shall pay specific attention to the accommodation of pedestrian traffic wherever the safety of pedestrians could be compromised. Safe, correctly marked and signposted pedestrian crossing points shall be provided at locations agreed to by the local community and the Engineer to ensure that the pedestrians are safeguarded and shall be able to cross the site without being endangered. The pedestrians should not be able to enter areas where Works are taking place.

Should a walkway be required, it shall have a clear opening of at least 1,2 m wide and 2,1 m high and shall be uniformly illuminated during hours of darkness. The surface of the walkway shall be free from obstructions and shall be clearly signposted to guide the pedestrians towards the walkway. If steps are required to reach the level of the walkway, these shall comply with the occupational health and safety requirements and have proper handrails. No ramps shall be steeper than 1 (vertical) to 8 (horizontal).

A1.5.7.1 Accommodation of pedestrian traffic (continued)

Where specified by the Engineer a traffic safety meeting shall be organised to inform persons living in the local community about the safe use of the designated pedestrian crossing points and to highlight all dangers associated with getting too close to the construction vehicles and equipment.

(Note: This is usually required in a rural community or in a residential area. It will not always be practical in an urban business area.)

A1.5.7.2 Accommodation of non-motorised traffic

In areas where non-motorised traffic is present, the Contractor shall ensure that there is sufficient width available to permit vehicles to pass the slow moving non-motorised traffic safely.

If this is not possible then the Contractor shall provide separate temporary deviations or alternative detours to accommodate the non-motorised traffic.

A1.5.7.3 Accommodation of traffic where the road is constructed in half or partial widths

Where, for reasons related to traffic, geometric or other restraints, the provision of a detour or the construction of a temporary deviation is not possible or impractical, the Contractor shall construct the Works on a half or partial width of the existing road so as to allow public and construction traffic to use that remainder of the road which is currently not under construction.

The length of the half or partial width construction sections and the number of one-way sections under construction at any one time shall not exceed the length specified in the Contract Documentation.

Two-way traffic sections of at least 2.0 km in length shall be provided between each of the one-way construction sections.

The start and end points of the half or partial width construction sections shall be specified is the Contract Documentation or as decided on site by the Engineer. ***(Note that the Contractor does not make these decisions.)***

Comprehensive specifications are also provided for all of the following:

A1.5.7.4	**Crossing the median or the road centreline**
A1.5.7.5	**Display of existing permanent signs**
A1.5.7.6	**Maintenance of existing roads used as detours**
A1.5.7.7	**Liaison with traffic authorities**
A1.5.7.8	**Informing the road users**
A1.5.7.9	**Lighting of construction access points during night work**
A1.5.7.10	**Construction of temporary deviations (incl. maint. & removal)**
A1.5.7.11	**Temporary traffic control facilities**
	(Erection of delineators, restraint systems and signs as well as placing of flagmen and traffic control measures at deviations)
A1.5.7.12	**Traffic safety officer (Important duties - see next five slides)**
A1.5.7.13	**Towing of public vehicles**

A1.5.7.12 Traffic safety officer

The Contractor shall appoint a knowledgeable, experienced and conscientious person as his traffic safety officer who shall be responsible for the arrangements and maintenance of all accommodation of traffic measures required for the duration of the contract. The Contractor shall submit details of the person's qualifications, training and experience to the Engineer for comment before appointing him.

The traffic safety officer shall be able to communicate in the languages of the area and shall be a dedicated official who shall have no other responsibilities on site unless permitted otherwise on small projects in the Contract Documentation or by the Engineer.

The traffic safety officer shall be equipped with a dedicated vehicle and a cellular telephone and shall have sufficient labour and a Traffic Safety Vehicle, as specified in Clause A1.5.6.2, at his disposal 24 hours a day.

The traffic safety officer shall always have a direct line of communication with the police and traffic officers responsible for the area within limits of the contract and shall be responsible for maintaining liaison with them in accordance with the requirements given in Clause A1.5.7.7.

The traffic safety officer will be required to perform the following duties and this list shall not be deemed to be comprehensive. He shall:

- **Ensure that all the Contractor's personnel, all the Engineer's site staff and all visitors are wearing approved, clean safety jackets utilizing retro-reflective and/or fluorescent panels in red, yellow and/or white when they are on the site of the Works.**
- **Make himself available to discuss road safety and traffic accommodation matters whenever required by the Engineer and shall be responsible for keeping the temporary traffic accommodation requirements up to specification 24 hours a day 7 days a week.**
- **Set out and record the position of each sign, barricade, delineator, cone, amber flicker light, guardrail and permanent or temporary painted road marking feature and every other traffic control facility for each closure or temporary deviation as specified on the drawings and Contract Documentation. The position of each facility shall be adequately referenced from the marker boards or other surveyed points on the site of the Works.**

- **Take digital photographs and/or video footage covering the full extent of the temporary traffic accommodation arrangements on the site of the Works whenever any new arrangements are made. The digital photographs / video footage shall be submitted to the Engineer in electronic format for his records.**
- **Inspect the position and condition of each traffic accommodation feature on the whole site of Works twice per work shift, once before the start of the morning and evening peak traffic periods and again during the middle of the work shift if both day and night shifts are in operation.**
- **Record all irregularities discovered and the remedial action taken and then date and sign the record sheets off as correct and submit copies to the Engineer by 10h00 the following working day. The above inspections must at least take place before the commencement of peak traffic periods.**
- **Collate and submit the daily labour returns of flagmen, stop/go, and traffic signal control personnel to the Engineer each morning.**

- **Exercise control in terms of traffic safety over the safe movement of personnel, visitors and plant on site including the wearing of high visibility clothing, safety jackets, the operation of amber flashing lights and the display and cleanliness of "Construction Vehicle" signs, all as specified.**
- **Ensure that all road signs, delineators, barrier reflectors and traffic cones are always kept clean and visible as specified in Clause A1.5.7.11d).**
- **Attend to the training and performance of flagmen and all other personnel involved in the control of traffic.**
- **Attend to all complaints and claims from the public with respect to traffic safety and report on such matters to the Engineer.**
- **Ensure that all obstructions that are caused by Contractor's vehicles, equipment, materials and tools or other objects related to the work activities are removed out of and away from the trafficked area, or suitably barricaded off as specified, so that the roads are safe to use by the travelling public.**

- **Arrange for the removal of stationary or broken down vehicles off the roadway in conjunction with the traffic authorities.**

In the event of an accident within the Site of the Works, the traffic safety officer shall implement any actions requested by the traffic authorities with respect to the work to be carried out and he shall be responsible for the erection and maintenance of all traffic signs necessary for the accommodation of traffic.

He shall record in a written report the details of the accident and record the position of all temporary road signs, barricades, delineators, flagmen and any other devices used for traffic accommodation. The report shall include a neat, accurate dimensional sketch, photographs and notes about any identifiable permanent features related to the accident, together with any other relevant information.

As soon as it is available he shall obtain the accident case number from the traffic authorities and attach it to the report before submitting a copy of the report to the Engineer for his records.

A1.5.8 WORKMANSHIP

The Contractor shall implement a process control system which shall ensure that all traffic control facilities and signs are erected in the correct position and are regularly maintained and kept clean.

The Contractor's process control system shall also ensure that all safety personnel are correctly trained and that they are carrying out their duties correctly.

1.5 TRAFFIC ACCOMMODATION

PART B: LABOUR ENHANCEMENT

B1.5.1 SCOPE

The nature of the work required to accommodate traffic is labour intensive and no additional labour enhancement requirements for Section A1.5.

B1.5.2 DEFINITIONS

Definitions as provided in Clause A1.5.2 shall also apply.
Clauses B1.5.3 to B1.5.8 are not applicable to this Section.

1.5 TRAFFIC ACCOMMODATION

PART C: MEASUREMENT AND PAYMENT

PART C: MEASUREMENT AND PAYMENT

(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. Removal of any material that is driven onto or spilt on any temporary roads, public roads or privately owned roads that are being used to accommodate traffic during the haul of material or while any construction operations are being carried out,
2. The provision of lighting for construction access and exit points during night work.
3. The provision of the flashing amber lights / light bars and "Construction Vehicle" warning boards which shall be fitted to the Contractor's vehicles and construction equipment.
4. The provision of safety clothing, warning flags and amber LED strobe light wands for traffic safety officers, flagmen and traffic controllers; the cost of these shall be included in the rate for providing these personnel.

(ii) Items that will not be measured separately (continued)

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:

5. The cleaning, repair or replacement of any traffic control facilities damaged by the Contractor's staff and/or vehicles and construction equipment or were dirtied / damaged because they were:

- not correctly stored, handled or transported,
- not correctly attached to their support bases, poles or frames,
- not correctly erected or ballasted OR
- erected in the incorrect position and/or not maintained in their correct position which made them likely to be damaged by passing vehicles.

6. The replacement of any traffic control facilities that are stolen from the Site of the Works. (All traffic control facilities provided on the Site of the Works shall be covered by the Contractor's insurances or by the Contractor should he elect not to insure them.)

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

For activities shown in Table C1.5-1 payment items specified in other chapters or sections of the Specifications, where they relate to work under this section, will be listed in the Pricing Schedule.

Table C1.5-1: Items from other chapters or sections

ACTIVITY	SECTION A1.5 CLAUSE REFERENCE	SECTION – ITEM REFERENCE
IDENTIFICATION, PROTECTION AND RELOCATION OF EXISTING SERVICES	A1.5.3.11	SECTION C2.1 - ITEMS C2.1.1 & C2.1.2

ACTIVITY	SECTION A1.5 CLAUSE REFERENCE	SECTION - ITEM REFERENCE
TEMPORARY DEVIATIONS	A1.5.5.1	CHAPTERS 1, 3, 4, 5, 9 & 10 - ALL RELEVANT PAY ITEMS AS APPLICABLE
TEMPORARY CULVERTS	A1.5.5.2	C3.2.1 TO C3.2.24 OF CHAPTER 3 AS APPLICABLE
TEMPORARY ROAD RESTRAINT SYSTEMS	A1.5.5.3 & A1.5.6.1(A)	C11.4.1 TO C11.4.15 OF CHAPTER 11 AS APPLICABLE
TEMPORARY FENCING AND GATES	A1.5.5.4	C11.5.1 TO C11.5.10 OF CHAPTER 11 AS APPLICABLE
TEMPORARY ROAD SIGNS AND REMOVAL, STORAGE, COVERING AND RE-ERECTION OF EXISTING ROAD SIGNS	A1.5.5.5 & A1.5.6.1(C)	C11.6.1.8, C11.6.1.10, C11.6.1.12, C11.6.2, C11.6.3, C11.6.5, C11.6.6. C11.6.7 & C11.6.10 OF CHAPTER 11 AS APPLICABLE
TEMPORARY ROAD MARKINGS AND ROAD STUDS	A1.5.5.6	C11.7.1 TO C11.7.10 OF CHAPTER 11 AS APPLICABLE

(iv) Items specifically for this section of the Specifications

Item	Description	Unit
C1.5.1	Accommodation of pedestrian and non-motorised traffic	
C1.5.1.1	Accommodation of pedestrian and non-motorised traffic	month
C1.5.1.2	Construction of temporary pedestrian walkways and/or cycle paths:	
(a)	Gravel surfaced pedestrian walkways / cycle paths	square metre (m^2)
(b)	Bitumen surfaced pedestrian walkways / cycle paths	square metre (m^2)
(c)	60 mm concrete block paved pedestrian walkways / cycle paths	square metre (m^2)

Item	Description	Unit
C1.5.2	Accommodation of vehicular traffic	month
C1.5.3	Liaison with traffic authorities	month
C1.5.4	Construction of temporary deviations The applicable payment items required for the construction of temporary deviations shall be taken from the relevant chapters and sections in Chapters 1, 3, 5, 9 and 10 and inserted into the Pricing Schedule here. Each payment item for the construction of temporary deviations shall be preceded by the main payment item number C1.5.4 / followed by the payment number for the applicable payment item.	

Item	Description	Unit
C1.5.5	Maintenance of temporary deviations	
C1.5.5.1	Grass cutting	hectare (ha)
C1 5.5.2	Drain cleaning	kilometre (km)
C1.5.5.3	Cleaning out culverts	cubic metre (m^3)
C1.5.5.4	Collection of rubbish / litter	kilometre (km)
C1.5.5.5	Base patching using crushed stone material stabilised with bitumen emulsion and cement	cubic metre (m^3)
C1.5.5.6	Base and/or surface patching using cold premixed asphalt	kilogram (kg)
C1.5.5.7	Base and/or surface patching using hot plant mixed asphalt	tonne (t)

Item	Description	Unit
C1.5.5	Maintenance of temporary deviations (continued)	
C1.5.5.8	Replacement of damaged guardrails	metre (m)
C1.5.5.9	Grading of temporary deviations and existing roads used as detours	kilometre (km)
C1.5.5.10	Watering of temporary deviations and existing roads used as detours	kilolitre (kl)
C1.5.5.11	Other road maintenance work ordered by the Engineer	provisional sum
C1.5.5.12	Handling cost, profit and all other charges in respect of item C1.5.6.11	percentage (%)
C1.5.6	Removal of temporary deviations	kilometre (km)

Item	Description	Unit
C1.5.7	Temporary traffic control facilities	
C1.5.7.1	Delineators including mounting bases and ballast:	
(a)	Single sided, reversible left or right (size indicated)	number (No)
(b)	Double sided, reversible left or right (size indicated)	number (No)
C1.5.7.2	Traffic cones, minimum height 750 mm	number (No)
C1.5.7.3	Flagmen	man-shift
C1.5.7.4	Traffic controllers	man-shift

Item	Description	Unit
C1.5.7.5	Provision of illuminated traffic signs:	
(a)	Sign mounted flashing amber lights (2 lights with the specified power supply) mounted on a backing board which is:	
	(i) 900 mm wide x 150 mm high	number (No)
	(ii) 1 200 mm wide x 200 mm high	number (No)
(b)	Flashing LED illuminated arrow board	number (No)
(c)	Illuminated road sign – R & TR series (diameter indicated)	number (No)
(d)	Illuminated road sign – TW series (length of sides indicated)	number (No)
(e)	Mobile variable message sign	number (No)
(f)	Mobile variable message sign with a speed measuring and display capability	month

Item	Description	Unit
C1.5.7.6	Maintenance of illuminated traffic signs:	
(a)	Sign mounted flashing amber lights (a pair of two lights mounted on a separate backing board)	month
(b)	Flashing LED illuminated arrow board	month
(c)	Illuminated road sign – R & TR series (diameter indicated)	month
(d)	Illuminated road sign – TW series (length of sides indicated)	month
(e)	Mobile variable message sign	month
(f)	Mobile variable message sign with a speed measuring and display capability	month
C1.5.7.7	Traffic calming devices:	
(a)	25 mm high x 100 mm wide asphalt rumble strips	metre (m)
(b)	50 mm high x 500 m wide asphalt rumble strips	metre (m)
(c)	150 mm high x 3 m wide asphalt speed control humps	metre (m)
C1.5.7.8	Traffic control stations	month
C1.5.7.9	Cleaning of traffic control facilities	month

Item	Description	Unit
C1.5.8	Traffic safety officer	Man-month
C1.5.9	Traffic safety vehicle	month
C1.5.10	Tow trucks	
C1.5.10.1	Provision of a tow truck on call for light vehicles weighing less than two tonnes	month
C1.5.10.2	Provision of a tow truck on call for heavy vehicles weighing two tonnes or more	month
C1.5.11	Provision of safety equipment for visitors	
C1.5.11.1	Provision of reflective safety vests for visitors	number (No.)
C1.5.11.2	Provision of hard hats for visitors	number (No.)

Item	Description	Unit
C1.5.12	Additional traffic accommodation facilities ordered by the Engineer:	
C1.5.12.1	Provision of additional traffic accommodation facilities	prov sum
C1.5.12.2	Handling cost, profit and all other charges in respect of item C1.5.12.1	percentage (%)

1.5 TRAFFIC ACCOMMODATION

PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

D1.5.1 SCOPE

The product quality and safety compliance certificates mentioned in Clauses A1.5.5 and A1.5.6 shall be provided if requested by the Employer or the Engineer.

1.6 CLEARING AND GRUBBING

PART A: SPECIFICATIONS

A1.6.1 SCOPE

This Section covers the clearing of the site and the grubbing necessary for construction of the Works. This includes the following:

- **Clearing and grubbing in watercourses and for hydraulic structures,**
- **removal of rubbish, unsuitable or waste material, weeds and other vegetation in urban road/street reserve areas,**
- **clearing and grubbing of service trench and designated excavation areas,**
- **clearing and grubbing of borrow pits and quarries,**
- **clearing and grubbing of the road prism,**
- **clearing outside the road prism to improve sight distances,**
- **clearing and grubbing of fence lines and other ancillary work areas,**
- **preparation of topsoil stockpile areas and**
- **the stockpiling of topsoil and windrowing of topsoil.**

The clearing and grubbing of areas required for site offices, laboratories and the Engineer's site accommodation shall be included in the work required to erect these facilities.

A1.6.2 DEFINITIONS

Clearing - Clearing is the removal and disposal of all trees (except designated trees), brush, other vegetation, rubbish, rocks and boulders of up to 0,15 m^3 in size which are exposed or lying on the surface, fences, road signs, guardrails and all other unsuitable or waste material above ground level, and are specified by the Engineer to be cleared. In urban areas clearing may also include the removal of kerbing, paving etc. in addition to rubbish, weeds and alien vegetation. Clearing shall also include the removal of existing buildings, walls and other structures which encroach on or obstruct the Works and which can be broken down and removed with a medium sized bulldozer. Removal of temporary works installed by the Contractor shall not be considered to be clearing.

Designated trees - Designated trees are indigenous trees that may not be removed without the approval of the relevant local authority.

Protected trees - Protected trees are trees as listed in the Forest Act 1984 that may not be pruned or removed without the permission of the Minister of Agriculture, Fisheries and Forestry.

Designated spoil areas - Designated spoil areas are spoil or dump sites identified by the Employer in the Contract Documentation or identified by the Engineer on site and those identified by the Contractor in the Contractor's materials management and utilisation plan, as prepared in accordance with the environmental regulations and the environmental management plan. There are two types of designated spoil areas:

- **General unsuitable material spoil areas identified near the site of the Works which have been agreed to by the Engineer. In urban or peri-urban areas the use of the spoil areas shall be approved by the local municipal authority in writing before any general unsuitable material is deposited there.**
- **Hazardous waste spoil areas which shall be commercial or municipal waste sites that are registered to receive and dispose of hazardous waste material.**

Grubbing - is the removal and loading of all stumps and roots in areas where clearing has been carried out and the Engineer has confirmed in writing that grubbing is also required. Grubbing also includes the removal and loading of all non-reinforced building foundations and floor slabs, buried rubbish and other unsuitable or waste material.

Hazardous waste material - material that is cleared and grubbed shall be classified as hazardous waste material if it falls into the hazardous waste categories identified in SANS 10228.

Stockpile - is a pile of material pushed into a large heaped pile or off-loaded onto a heaped pile so that the material can be temporarily stored for later re-use in the Works. Where specified the material to be placed in a stockpile shall be placed in evenly spread layers of a specified layer thickness, up to the specified maximum height and to the specified shape.

Stockpile site - is a designated site that shall be prepared as specified in Chapter 4, Clause A4.1.7.3a).

Topsoil - is fertile, loamy soil obtained from areas with good soil coverage of natural vegetation, preferably grasses. It shall be free of deleterious matter, such as stiff/heavy clays, large stones, large roots, refuse, rubble and construction material or waste, which will adversely affect its suitability for the planting of grass.

Windrow - is a pile of material which has been excavated and pushed a relatively short distance to a prepared area alongside the borrow pit, quarry, cutting or roadbed area so that the material can be temporarily stored for re-use, usually close to where it is windrowed.

A1.6.3 GENERAL

Not required for Section A1.6.

A1.6.4 DESIGN BY CONTRACTOR / PERFORMANCE BASED SYSTEMS

Not required for Section A1.6.

A1.6.5 MATERIALS

Not required for Section A1.6.

A1.6.6 CONSTRUCTION EQUIPMENT

The provisions of Clause A1.2.6 of Section A1.2 shall apply to this Section A1.6.

A1.6.7 EXECUTION OF THE WORKS

A1.6.7.1 Areas to be cleared and grubbed

The portions of the road or street reserve falling within the limits of the road prism or site limits as well as certain borrow areas shall be cleared and grubbed as specified in the Contract Documentation or as indicated by the Engineer.

Areas designated to be cleared and grubbed may also include existing water courses, inlets and outlets of hydraulic structures, sidewalks, service trenches, designated excavations as defined in Clause A4.2.2 of Section A4.2 in Chapter 4, fence lines and other ancillary road works which may fall outside the limits of the road prism.

The Contractor shall note that the presence of subsurface and / or surface water may prohibit the use of conventional machines for this work and the contract rates should make allowance for alternative working methods and equipment where required.

A1.6.7.1 Areas to be cleared and grubbed (continued)

Grubbing of part or all of the previously cleared areas may not always be necessary. Before commencing the grubbing operation, the Contractor shall ask for a written instruction from the Engineer to confirm the position and extent of the cleared area/s that also need to be grubbed. Only these area/s so confirmed in writing shall be grubbed and measured for payment.

Clearing, and grubbing where necessary, of new fence lines shall be done over a 2,0 m wide strip, 1,0 m either side of the staked fence line, as described in Clause A11.5.7.3 of Chapter 11.

Clearing, and grubbing for new service trenches shall be carried out as specified in Clause A2.1.7.1e) of Chapter 2.

Where existing roads are to be widened the area to be cleared and grubbed shall also include the slope of the existing embankment where the widening will take place.

Existing road lanes, whether surfaced or not, as well as existing sidewalks shall not be regarded as areas to be cleared and grubbed.

A1.6.7.1 Areas to be cleared and grubbed (continued)

The Contractor shall identify all designated and protected trees, as defined in Clause A1.6.2, in consultation with the relevant authority. The Contractor shall submit the details to the Engineer so that the Engineer can confirm in writing all the trees which must be left standing and uninjured. Where the relevant permission has not been obtained to remove any designated and/or protected trees these trees shall be marked for protection with plastic danger tape or other suitable means.

As stated in the Government Gazette dated 8th September 2017 (or in any later amendments that may be published) issued in terms of Clause 15.3 in Chapter 3, Part 3 of the National Forests Act No. 84 of 1988, the Contractor will be liable for a fine or a period of imprisonment of up to three years for every protected tree which is unnecessarily removed or damaged.

All trees that are to be removed and that are equal to or greater than 1,0 m in girth shall be marked and counted. The tree count shall be agreed with the Engineer for additional payment over the tendered clearing rate before the trees are cut down. All trees with a girth of less than 1,0 m shall not be counted and shall be removed as part of the main clearing operation. The tree girth shall be measured at a height of 1,5 m above the highest point where the tree trunk emerges from the ground. Where the tree is divided into two or more trunks, or has several trunks growing from one stump or root base, the total girth for payment purposes shall be the sum of the individual girths of each trunk measured at a height of 1,5 m above the highest point where each of the tree trunks emerge from the ground.

A1.6.7.1 Areas to be cleared and grubbed (continued)

The Contractor shall be responsible for keeping the cleared and grubbed areas free of weeds and alien vegetation until the Works have been completed and have been taken over by the Employer.

A1.6.7.2 Clearing

Clearing, as defined in Clause A1.6.2, shall be done with equipment which suits the type of material and terrain to be cleared and in a manner which will result in minimal loss of topsoil. The cleared material shall be separated into re-usable material, unsuitable material and hazardous waste and it shall be loaded and removed from the site immediately and transported to a designated stacking area, a designated spoil area or an approved hazardous waste site as appropriate.

All undesignated trees, together with those protected trees or designated (indigenous or heritage) trees where the required permission to remove them has been obtained, shall be cut down unless instructions have been given to retain any particular trees in the Contract Documentation or by the Engineer.

The Contractor shall take the necessary precautions to prevent damage to structures and other private or public property. If necessary, the trees shall be cut in sections from the top downwards.

A1.6.7.2 Clearing (continued)

The branches of any trees outside the roadbed area that are designated to be left standing shall be trimmed to provide a 7,0 m clearance above the finished road level. The trimming of branches shall be done neatly by saw cutting as near as possible to the base of the branches.

Where clearing and grubbing would involve the cutting down of indigenous forest or commercial plantations the Contractor shall inform the relevant authority or owner at least two months in advance before commencing with clearing and grubbing of such areas to allow them time to salvage any usable timber before the trees are removed.

Where specified by the Engineer or in the Contract Documentation, clearing of hydraulic structures, where such work requires working to prescribed levels or working without damaging existing structures, shall be carried out as specified in Chapter 3.

The removal, breaking up and disposal of existing kerbing, channelling, down-chutes etc. shall be carried out as specified in Chapter 3.

A1.6.7.2 Clearing (continued)

All re-usable fencing wire shall be neatly wound into reels and all such wire, together with all fence posts and other usable material shall be removed as specified in Clause A11.5.7.9 of Chapter 11 and neatly stacked at sites indicated by the Engineer.

All re-usable road furniture such as road signs, guardrails, down-chutes etc. shall also be removed as specified in Clauses A11.4.7.3 and A11.6.7.7 of Chapter 11 and neatly stacked at sites indicated by the Engineer.

All existing buildings and structures which encroach on or obstruct the Works shall be removed. All buildings and structures that must be removed will be identified in the Contract Documentation and shall be confirmed with the Engineer in writing before the Contractor demolishes and/or removes any structures or buildings.

A1.6.7.3 Conservation of vegetation

Prior to any clearing, any plants encountered in the road reserve and borrow areas that have been designated for preservation in the Contract Documentation, or in the environmental approval process, shall be carefully removed, correctly stored and maintained in a temporary nursery until they are replanted within the road reserve as specified in Clause A11.8.7.5 of Chapter 11 or as specified by the Engineer.

A1.6.7.4 Grubbing

All stumps and roots, including matted roots, in the roadbed area shall be removed to a depth of at least 1 m below the cleared roadbed surface. Outside the roadbed area all stumps and roots exceeding 75 mm in diameter shall be removed to a depth of at least 75 mm below the original ground level. The foundations of any buildings or structures, buried rubbish, old rubbish tips, rubble or other unsuitable material shall be removed to their full depth unless otherwise instructed by the Engineer.

The grubbed material shall be loaded and removed from the site immediately and disposed of at a designated spoil area.

A1.6.7.5 Clearing and grubbing in water courses and hydraulic structures

Clearing out existing culverts and bridges shall be carried out by hand to avoid damaging the structure apron slabs or headwalls. All sand and silt cleaned out from the hydraulic structures may be disposed of by spreading it out inside the road reserve in suitable areas where the spoil material does not block up the outlet drain. The spoil material shall not be deposited upstream of the structure where it can be washed back into the structure by storm water run-off.

All unsuitable material cleaned out of the hydraulic structures shall be loaded and removed from the site immediately and taken to a designated spoil area. It shall not be left buried in the spoil material near the structure.

While working in or near a water course the Contractor shall take care not to unduly disturb the vegetation which is preventing erosion or to contaminate the water course with any hazardous material such as oil or fuel from his vehicles and equipment. The Contractor shall also ensure that none of his clearing and grubbing operations block any waterways.

A1.6.7.6 Conservation of topsoil

Where suitable topsoil occurs within the limits of the areas to be cleared and grubbed, the Contractor shall do the clearing and grubbing without removing any more topsoil than is absolutely necessary.

At the commencement of the Works the Contractor shall confirm with the Engineer the quantity of topsoil that is required and from where the topsoil shall be selected and removed by the Contractor. All suitable topsoil available from the roadbed areas and cuttings on site, as well as from areas that are to be cleared for borrow pits and quarries, shall then be removed as specified in the Contract Documentation and/or by the Engineer. If the Contractor fails to conserve all the available topsoil he shall obtain suitable substitute topsoil from other sources at his own cost.

The depth of topsoil excavation or removal shall be controlled to suit the thickness of suitable material available and shall not exceed a maximum depth of 400 mm.

A1.6.7.6 Conservation of topsoil (continued)

The topsoil shall either be bladed to windrow or excavated, loaded, hauled, off-loaded and stockpiled in loose heaps as off-loaded from the haul vehicles or in neatly shaped stockpiles that do not exceed 2,0 m in height. Care must be taken to ensure that no topsoil is compacted by vehicles driving over the windrows or stockpiles of topsoil.

Any deleterious material, such as stiff/heavy clays, large stones, large roots, refuse, rubble and construction material or waste, which will adversely affect its suitability for the planting of grass shall be removed before the topsoil is excavated.

Before removing any topsoil to stockpile, designated topsoil stockpile sites shall be prepared as specified in Clause A4.1.7.3a) of Chapter 4. The topsoil stockpile sites shall either be situated immediately alongside the borrow pits and quarries or situated as close as possible to the cuttings and roadbed preparation areas, unless otherwise specified by the Engineer.

A1.6.7.6 Conservation of topsoil (continued)

Topsoil infested with weeds shall be stockpiled or windrowed separately so that the weeds can be removed. All the topsoil stockpiles and windrows, as well as the area immediately surrounding the stockpiles and windrows, shall be kept free of weeds and shall not be contaminated with any spoil material or construction material, especially gravel, crushed stone and bitumen.

When no longer required the topsoil stockpile sites shall then be reinstated as specified in Clause A4.1.7.3c) of Chapter 4.

Where the existing in-situ topsoil is intended to be re-used nearby, such as for reinstating borrow pits and quarries for example, the Engineer may specify that the topsoil should be pushed directly into windrows alongside the area from which it is excavated.

A1.6.7.7 Disposal of material

Material obtained from clearing and grubbing shall be separated into organic material, reusable material, unsuitable material and hazardous waste material and immediately disposed of as follows:

- **Organic matter shall be disposed of in designated spoil areas or in borrow pit excavations prior to their rehabilitation, as instructed by the Engineer. The organic matter shall be spread evenly over the designated dumping area and covered up with soil to a depth of at least 150 mm, unless otherwise instructed by the Engineer. The burning of organic matter will not normally be permitted and may be done only with the prior written approval of the Engineer and the local fire control authority and strictly in accordance with the environmental management plan. All statutory provisions regarding air pollution shall be carefully observed. If specified in the Contract Documentation, selected organic matter obtained from clearing and grubbing shall be mulched.**

A1.6.7.7 Disposal of material (continued)

- **Reusable material shall be transported to a designated storage site and neatly stacked.**
- **Non-hazardous unsuitable material such as building rubble etc. shall be disposed of in designated spoil areas or placed in temporary stockpiles for use elsewhere in the Works, as instructed by the Engineer.**
- **Hazardous waste shall be disposed of in commercial or municipal waste sites that are registered to receive and dispose of hazardous waste material.**

A1.6.7.8 Re-clearing vegetation

The Contractor shall carry out the clearing and grubbing at the last practicable stage before each part of the construction work commences. All re-clearing that is required because the initial clearing was carried out too soon shall not be measured for payment.

When portions of the road reserve, borrow or other areas have been cleared in accordance with the specifications but vegetation grows again during the construction period, the Engineer may, if he considers it necessary, order that the area be re-cleared.

A1.6.8 WORKMANSHIP

Reserved for future use.

1.6 CLEARING AND GRUBBING

PART B: LABOUR ENHANCEMENT

B1.6.1 SCOPE

Where specified in the Contract Documentation labour enhancement methods shall be used to carry out the applicable clearing and grubbing operations or parts of these operations.

B1.6.2 DEFINITIONS

Definitions as provided in Clause A1.6.2 shall also apply.

B1.6.3 GENERAL

Any activity specified in PART A, where hand work is given as an alternative, shall be executed in such a way as to maximise labour.

B1.6.4 DESIGN BY CONTRACTOR/PERFORMANCE BASED SYSTEMS

Not required for Section A1.6.

B1.6.5 MATERIALS

Not required for Section A1.6.

B1.6.6 CONSTRUCTION EQUIPMENT

Where reference is made in PART A to appropriate equipment, the use of light equipment shall be evaluated during trial sections.

The specifications in Part A shall be equally applicable.

B1.6.7 EXECUTION OF THE WORKS

Operations such as the clearing of hydraulic structures, cutting down of trees and removal of fencing, road signs, guardrails etc. are all classed as labour enhancement operations.

B1.6.8 WORKMANSHIP

Not required for Section A1.6.

1.6 CLEARING AND GRUBBING

PART C: MEASUREMENT AND PAYMENT

PART C: MEASUREMENT AND PAYMENT

(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. **Loading and offloading of cleared material and grubbed material.**
2. **Keeping the cleared and grubbed areas free of weeds and alien vegetation until the Works have been completed and have been taken over by the Employer, as specified in Clause A1.6.7.1.**
3. **Removing deleterious or unsuitable material that was not properly removed during the clearing and grubbing operation from areas where topsoil is to be stockpiled or windrowed, as specified in Clause A1.6.7.6.**
4. **Keeping topsoil stockpiles and windrows free of weeds, as specified in Clause A1.6.7.6.**
5. **Re-clearing areas that were cleared and grubbed too far in advance of the Works, as specified in clause A1.6.7.8.**

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

Table C1.6-1: Items from other chapters or sections

ACTIVITY	SECTION 1.6 REFERENCE	SECTION ITEM REFERENCE
CLEARING AND GRUBBING FOR SITE OFFICES, LABORATORIES AND SITE ACCOMMODATION	A1.6.1	INCLUDED IN ITEM C1.4.1 OF CHAPTER 1
HAULING OF CLEARED AND GRUBBED MATERIAL TO DESIGNATED SPOIL AREAS	A1.6.7.2, A1.6.7.4, A1.6.7.5	C1.7.2 OF CHAPTER 1
CLEARING AND SHAPING ACCUMULATED SEDIMENT IN EXISTING UNLINED OPEN DRAINS	A1.6.7.2	C3.1.2 OF CHAPTER 3
EXCAVATING AND CLEARING ACCUMULATED SEDIMENT IN EXISTING LINED DRAINS AND DRAINAGE SYSTEMS	A1.6.7.2	C3.1.3 OF CHAPTER 3

Table C1.6-1: Items from other chapters or sections (continued)

ACTIVITY	SECTION 1.6 REFERENCE	SECTION ITEM REFERENCE
REMOVAL, BREAKING UP, LOADING, TRANSPORTING AND DISPOSAL OF CONCRETE KERBING, CHANNELLING, DOWN-CHUTES ETC.	A1.6.7.2	C3.3.16 OF CHAPTER 3
REMOVAL, LOADING, TRANSPORTING, OFFLOADING AND STACKING OF GUARDRAILS	A1.6.7.2	C11.4.7 OF CHAPTER 11
MOVING OR REMOVAL AND LOADING, TRANSPORTING, OFFLOADING AND STACKING OF FENCING AND GATES	A1.6.7.2	C11.5.3 & C11.5.4 OF CHAPTER 11
REMOVAL, LOADING, TRANSPORTING, OFFLOADING AND STORAGE OF ROAD SIGNS	A1.6.7.2	C11.6.6, C11.6.7 & C11.6.10 OF CHAPTER 11

Table C1.6-1: Items from other chapters or sections (continued)

ACTIVITY	SECTION 1.6 REFERENCE	SECTION ITEM REFERENCE
REPLANTING OF SHRUBS AND TREES FROM A SITE NURSERY	A1.6.7.3	C11.8.9.2 OF CHAPTER 11
PREPARATION OF TOPSOIL STOCKPILE SITES	A1.6.7.6	C4.1.10 & C4.1.11 OF CHAPTER 11
REINSTATEMENT OF TOPSOIL STOCKPILE SITES	A1.6.7.6	C4.1.13, C4.1.14 AND C4.1.15.1(C) / C4.1.15.2(C) OF CHAPTER 4 AS APPLICABLE
HAULING TOPSOIL TO STOCKPILE	A1.6.7.6	C1.7.2.1(A) OF CHAPTER 1

(iv) Items specifically for this section of the Specifications

Item	Description	Unit
C1.6.1	Clearing	
C1.6.1.1	Clearing with machines and some hand labour where necessary	hectare (ha)
C1.6.1.2	Clearing with hand labour only when labour enhanced work is specified	hectare (ha)
C1.6.1.3	Clearing for new fence lines (over a width of 2,0 m)	kilometre (km)
C1.6.1.4	Clearing for service trenches (over the agreed width)	square metre (m^2)
C1.6.2	Grubbing	
C1.6.2.1	Grubbing with machines and some hand labour where necessary	hectare (ha)
C1.6.2.2	Grubbing with hand labour when labour enhancement work is specified or it is not practical to use a machine	hectare (ha)
C1.6.2.3	Grubbing by hand for new fence lines (width of 2,0 m)	kilometre (km)
C1.6.2.4	Grubbing by hand for service trenches (width required)	square metre (m^2)

(iv) Items specifically for this section of the Specifications (continued)

Item	Description	Unit
C1.6.3	Removal and grubbing of large trees and tree stumps:	
C1.6.3.1	Girth equal to or exceeding 1,0 m up to and including 2,0 m	number (No)
C1.6.3.2	Girth exceeding 2,0 m up to and including 3,0 m	number (No)
C1.6.3.3	Girth exceeding 3,0 m	number (No)
C1.6.3.4	Removal of trees in forests and plantations	hectare (ha)
C1.6.4	Removal of buildings and structures	
C1.6.4.1	(Identify type and location of each building or structure with a separate sub-item)	lump sum
C1.6.5	Spreading organic matter and covering with soil	cubic metre (m^3)
C1.6.6	Mulching selected organic matter	cubic metre (m^3)
C1.6.7	Re-clearing of previously cleared areas	hectare (ha)

(iv) Items specifically for this section of the Specifications (continued)

Item	Description	Unit
C1.6.8	Conservation of vegetation:	
C1.6.8.1	Establishment of a temporary nursery	number (No)
C1.6.8.2	Removal, storage and maintenance of shrubs	number (No)
C1.6.8.3	Removal, storage and maintenance of trees, girth up to and including 1,0 m	number (No)
C1.6.8.4	Removal, storage and maintenance of trees, girth exceeding 1,0 m up to and including 2,0 m	number (No)
C1.6.8.5	Removal, storage and maintenance of trees, girth exceeding 2,0 m up to and including 3,0 m	number (No)
C1.6.8.6	Removal, storage and maintenance of trees, girth exceeding 3,0 m	number (No)

(iv) Items specifically for this section of the Specifications (continued)

Item	Description	Unit
C1.6.9	Conservation of topsoil:	
C1.6.9.1	Stockpiling topsoil	cubic metre (m^3)
C1.6.9.2	Windrowing topsoil	cubic metre (m^3)
C1.6.10	Disposal of hazardous waste material:	
C1.6.10.1	Disposal of hazardous waste material at an approved hazardous waste material facility.	provisional sum
C1.6.10.2	Handling cost, profit and all other charges in respect of item C1.6.10.1	percentage (%)

1.6 CLEARING AND GRUBBING

PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

No specific items in this Section. Where applicable, details must be provided in the Contract Documentation.

1.7 LOADING AND HAULING

PART A: SPECIFICATIONS

A1.7.1 SCOPE

This Section covers the loading and hauling of construction materials on the site of the Works.

A1.7.2 DEFINITIONS

Hauling - is the moving of loaded construction material from the point of excavation, or from a stockpile, to the point of use on the site or to designated spoil areas. The hauling operation shall include the off-loading of the material at the point of use on site, at temporary stockpiles or at designated spoil sites.

Haul roads - Haul roads are temporary roads constructed by the Contractor, or existing public or privately owned roads, or any part or section of the road under construction, used for the purposes of hauling construction materials or for carting material to spoil.

Loading - Loading is the operation of picking up the material from an excavation or a stockpile and placing it in a haul vehicle.

A1.7.3 GENERAL

A1.7.3.1 Measurement of haul distance

The haul distance shall usually be measured from the centre of volume (centroid) of the excavation in the cutting (or part of a cutting), trench or borrow pit, or from the centre of the stockpile position where applicable, to the centroid of the fill (or part of a fill), to the mid-point along the road centreline of the section of the road layer where the material is placed, to the centre of the temporary stockpile position in a borrow pit, quarry or on site or to the centre of the designated spoil area where the material is off loaded as applicable. The haul distance will be measured to the nearest 0,1 km.

For those operations where the material is usually disposed of, and/or reused, near the source of the material the relevant pay item may state that the cost of hauling the material for the first 1,0 km shall be included in the contract rate for that pay item.

A1.7.3.1 Measurement of haul distance (continued)

For these operations the hauling of the material shall only be measured if the actual haul distance exceeds 1,0 km and the haul distance to be measured for payment shall be measured from a point starting 1,0 km from the centre of volume (centroid) of the excavation in the trench or borrow pit, or from the centre of the stockpile position where applicable, up to the centroid of the fill (or part of a fill), up to the mid-point along the road centreline of the section of the road layer where the material is placed or up to the centre of the designated spoil area where the material is off loaded as applicable. The haul distance will be measured to the nearest 0,1 km.

The haul distance shall be measured along the shortest route as instructed by the Engineer as being safe and practical. The haul distance shall include any distance that the haul vehicle must travel to make use of a safe turning point or the next off ramp before making the return trip. Should the Contractor choose to haul material over some other longer route, computations for payment shall nevertheless be based on the haul distance measured along the shortest route instructed by the Engineer.

A1.7.3.2 Haul and construction access roads

The construction, use and later closure / reinstatement of any haul roads and construction access roads that are required by the Contractor shall be carried out in accordance with the requirements given in Clause A4.1.7.1 of Chapter 4.

The requirements for the use of any existing public roads by the Contractor to haul material are given in Clause A1.5.3.12.

The requirements for the use of haul roads not on existing public roads are given in Clause A1.2.3.2.

A1.7.4 DESIGN BY CONTRACTOR / PERFORMANCE BASED SYSTEMS

Not required for Section A1.7.

A1.7.5 MATERIALS

Not required for Section A1.7.

A1.7.6 CONSTRUCTION EQUIPMENT

The provisions of Clause A1.2.6 in Section A1.2 shall apply to this Section.

A1.7.7 EXECUTION OF THE WORKS

The loading, hauling, off-loading and spreading of all material shall be carried out in any suitable manner chosen by the Contractor provided no excessive segregation or contamination of the material occurs during any of these operations. ***(If segregation occurs the Contractor must change his methods.)***

In addition to the material origin and destination records, a daily record of the registration numbers, measured level load volumes and the number of trips made by haul vehicles taking material to spoil shall also be kept by the Contractor for all volumes that are measured by loose volume in the haul vehicle. All the records shall be submitted to the Engineer daily before 10h00.

The Contractor shall ensure that the vehicles used to haul construction materials are not overloaded and the legal axle loads are not exceeded.

Unless otherwise specified in the Contract Documentation any truck that is overloaded shall not be allowed to discharge/off-load its load and the overloaded truck shall return to the borrow pit/quarry/depot/batching plant for adjustment of the load. In addition, a penalty shall be applied for the overload as stated in the Contract Documentation.

1.7 LOADING AND HAULING

PART B: LABOUR ENHANCEMENT

B1.7.1 SCOPE

Where specified in the Contract Documentation, or where it is more practical to do so, the loading operations shall be carried out using hand labour instead of construction equipment.

B1.7.2 DEFINITIONS

Definitions as provided in Clause A1.7.2 shall also apply.

B1.7.3 GENERAL

Any activity specified in PART A, where hand work is given as an alternative, shall be executed in such a way as to maximise labour.

B1.7.4 DESIGN BY CONTRACTOR/PERFORMANCE BASED SYSTEMS

Not required for Section A1.7.

B1.7.5 MATERIALS

Not required for Section A1.7.

B1.7.6 CONSTRUCTION EQUIPMENT

Where reference is made in PART A to appropriate equipment, the use of light equipment shall be evaluated during trial sections. The specifications in Part A shall be equally applicable.

B1.7.7 EXECUTION OF THE WORKS

The loading of small volumes of material obtained from the excavation for services, clearing of hydraulic structures, loading of spoil from minor works operations and final clearing and grubbing operations are suitable components for labour enhancement.

B1.7.8 WORKMANSHIP

Not required for Section A1.7.

1.7 LOADING AND HAULING

PART C: MEASUREMENT AND PAYMENT

PART C: MEASUREMENT AND PAYMENT

(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 of these activities in other pay items as already specified for the appropriate pay item or as deemed appropriate by the Contractor:

- **The loading and hauling of commercial materials from either Employer or Contractor identified suppliers/sources shall not be measured for payment.**
- **The loading of materials on site will not be measured and paid for separately except for loading already stockpiled material and for loading material that has been placed in heaps or windrows where the relevant payment item in other Chapters specifically states that the loading will be paid for separately.**
- **The hauling of materials on site will not be measured and paid for separately where the relevant payment item specifically states that the hauling operation is included in that payment item.**

(ii) Items that will not be measured separately (continued)

- **The hauling of materials on site over a localised distance of up to 1,0 km will not be measured and paid for separately where the relevant payment item specifically states that the initial haul of the material over a distance of up to 1,0 km is included in the pay item.**

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

There are no items mentioned in this section that are measured and paid for elsewhere in this Standard Specification.

(iv) Items specifically for this section of the Specifications

Item	Description	Unit
C1.7.1	Loading	
C1.7.1.1	Loading from stockpile using machines and some hand labour where necessary	cubic metre (m^3)
C1.7.1.2	Loading from heaps or windrows using machines and some hand labour where necessary	cubic metre (m^3)
C1.7.1.3	Loading by hand only from stockpile or heaps where labour enhancement work is specified or it is not possible to use machines	cubic metre (m^3)

Item	Description	Unit
C1.7.2	Hauling	
C1.7.2.1	Hauling material for use in the Works and off-loading it on the site of the Works:	
(a)	Soil, gravel, crushed stone and pavement layer material	cubic metre - kilometre (m^3 - km)
(b)	Boulders and hard material	cubic metre - kilometre (m^3 - km)
C1.7.2.2	Hauling material to spoil and off-loading it at a designated spoil area:	
(a)	Cleared and grubbed material (organic matter and all other unsuitable or waste material)	cubic metre - kilometre (m^3 - km)
(b)	Soil and gravel material	cubic metre - kilometre (m^3 - km)
(c)	Boulders and hard material	cubic metre - kilometre (m^3 - km)

1.7 LOADING AND HAULING

PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

Clauses D1.7.1 to D1.7.10 are not applicable to this Section.