

FOREWORD

The Roads Department is constantly striving to increase the efficiency and effectiveness with which the management and maintenance of the road network are carried out. This is motivated by the recognition that the country's Public Highway Network of over 18,300 km constitutes one of the largest assets owned by the Government (estimated value in 2009 of 15 billion Pula), and that a less-than-optimal system for the management and maintenance of that asset, results in huge losses for the national economy. This occurs not only in the form of road deterioration and substantial reductions in road asset value but, even more so, in the form of increased vehicle operation costs which have to be borne by road users and which reduce the competitiveness of the country in an increasingly global economy.

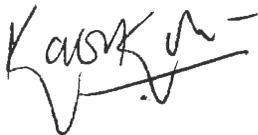
In exercising its vision "to have world class roads leading to prosperity", its mission "the Roads Department exists to enable provision of safe, reliable and cost effective road infrastructure in an environmentally sustainable manner" and its values "botho, transparency, accountability and integrity", the Roads Department has directed the development of a series of Design Manuals, Guidelines and Standards of which the **Botswana Roads Maintenance Manual (BRMM)** is one.

The purpose of the BRMM is to serve as a nationally recognised document, the application of which is deemed to serve as a standard reference and source of good practice for road management and maintenance by both public and private sector practitioners.

The major benefits to be gained in applying the BRMM are the harmonisation of professional practice and the ensuring of cost effective execution of maintenance operations to appropriate standards. This approach will contribute directly to the preservation of the substantial investments made in road provision and facilitate the attainment of appropriate levels of service on the road network and, ultimately, preservation of the substantial investments made in road provision.

The Manual, by its very nature, will require periodic updating to take account of the dynamic nature of developments in road technology. The Roads Department, therefore, would welcome comments and suggestions from any stakeholders as feedback on all aspects of the Manual during its implementation. All feedback will be carefully reviewed by professional experts with a view to amending future updates of the Manual.

Gaborone, May 2010



Mr. Kabo Phillip Kote
Ag. DIRECTOR OF ROADS
Roads Department
Ministry of Transport and Communication

Acknowledgements

This Manual is one of a series of technical manuals and guidelines produced under the Institutional Co-operation Agreement between the Roads Department and the Norwegian Public Roads Administration (NPRA). This Agreement fell under a NORAD Technical Assistance Programme to Roads Department that was co-funded by the Kingdom of Norway and the Government of the Republic of Botswana.

The Roads Department gratefully acknowledges the valuable contributions made by the Steering Committee that guided the project and reviewed the Manual as well as the Project Team that was responsible for writing the Manual.

Steering Committee

Roads Department

E. Masimega (Chairman)	M. Kowa	J. Nwako
P.G. Alpajora	G.L. Letsatsi	M.P. Ramolefhe
M.S. Baele	K.M. Mmopa	O. Ramontsho
O.S. Dijokota	T. Moilwa	A. Saha
T. Giddie	B. Mokgethi	J. R. Sello
J. Kamona	B. Moetse	T. Sikalesele
B. Kemsley	P. Mungoo	D. Silanda
K.P. Kotokwe	A. Nkaro	

Gaborone City Council

K.C. Jain
M. Katorah

Norwegian Public Roads Administration (NPRA)

J. Dahlen
C. Overby

Project Team

Gicon A/S, Norway (Lead Consultant)

O. Kr. Sylte (Gicon)

InfraAfrica (Pty) Ltd (Sub-Consultant)

M. I. Pinard (InfraAfrica)

Group Consult, Botswana (Regional Consultant)

M.E. Chiwanga
D.K.H. Mungure
H.G. Urio

Photographs

C. Overby, J. Dahlen (NPRA); H.G. Urio (Group Consult); V. Arya, A. Kalasi, M. Sarma, M.S. Baele (Roads Department).

Abbreviations

A

AADT	Annual Average Daily Traffic
A/C	Asphalt Concrete

B

BMS	Bridge Maintenance System
BRMS	Botswana Road Management System
BRMM	Botswana Road Maintenance Manual
BRDM	Botswana Road Design Manual
BOBS	Botswana Bureau of Standards

C

cd	Candela
----	---------

D

DERU	D = Degree of defect E = Extent of defect R = Relevance of defect U = Urgency of remedial work
------	---

G

GCC	General Conditions of Contract
-----	--------------------------------

I

IRI	International Roughness Index
-----	-------------------------------

K

km	Kilometre
KPI	Key Performance Indicator

L

lux	SI unit of illuminance
LSSG	Lower Selected Subgrade

M

MOD	Modified
MSRBW	Maintenance Standards for Roads and Bridge Work
MSSRBW	Maintenance Standard Specifications for Roads and Bridge Work
MOPRBW	Maintenance Operational Procedures for Roads and Bridge Work

Maintenance Standard Specifications for Road and Bridge Works

N

NORAD	Norwegian Agency for International Development
NPRA	Norwegian Public Roads Administration
N/A	Not Applicable

O

OPRC	Output and Performance Based Road Contract
------	--

P

P	Pula (currency of Botswana)
PIARC	Permanent International Association of Road Congresses
PHN	Public Highway Network

R

RD	Roads Department
----	------------------

S

SABS	South African Bureau of Standards
SADC	Southern African Development Community
SAMI	Stress Absorbing Membrane Interlayer
SSRBW	Standard Specifications for Road and Bridge Works (Botswana)

T

TRL	Transport Research Laboratory (UK)
-----	------------------------------------

U

URMC	Unit Rate Maintenance Contract
USSG	Upper Selected Subgrade

V

vpd	Vehicles per day
-----	------------------

TABLE OF CONTENTS

Foreword	i
Acknowledgements	ii
Abbreviations	iii
1. Introduction	1
1.1 The Road Network	1
1.2 The Road Asset	1
1.3 Importance of Maintenance	1
1.4 Need for a Road Maintenance	1
2. The Road Maintenance Manual	2
2.1 Purpose	2
2.2 Structure and Contents of Manual	2
2.3 Development of the Manual	3
2.4 Benefits of Using the Manual	3
2.5 Service Levels for the BRMM	3
2.6 Updating the Manual	3
2.7 Sources of Information	3
3. Introduction to Part D - Maintenance Standard Specifications	4
3.1 Introduction	4
3.2 Objectives	4
3.3 Users of the Manual	4
3.4 Coding	4
4 Maintenance Standard Specifications for Road and Bridge Works	5
8000 GENERAL PROVISIONS	5
8001 Scope	5
8010 GENERAL REQUIREMENTS AND PROVISIONS	5
8011 Definitions and Terms	5
8012 Maintenance Works and Services	5
8013 Utility Services	6
8014 Programme of Work	6
8015 Workmanship and Quality Control	6
8017 Notices, Signs and Advertisement	6
8018 Environmental Considerations	7

Maintenance Standard Specifications for Road and Bridge Works

8020	CONTRACTOR'S ESTABLISHMENT ON SITE AND OTHER GENERAL OBLIGATIONS	8
8021	Camps, Plant and Testing Facilities	8
8022	Maintenance of Facilities During Execution of Work.....	8
8023	Legal and Contractual Requirements and Responsibility to the Public.....	8
8030	ACCOMODATION OF SUPERVISORY STAFF AND SERVICES TO SUPERVISORY STAFF.....	9
8031	Offices and Laboratories.....	9
8032	Housing.....	10
8033	Number of Units Required	13
8034	Services.....	13
8035	Furniture and Equipment.....	13
8036	Motor Vehicles for Supervisory Staff	13
8037	General Requirments for Accomdation of Supervisory Staff and other Services to Supervisory Staff.....	13
8040	ACCOMMODATION OF TRAFFIC.....	15
8041	General Requirements for Accommodation of Traffic	15
8042	Barricades and Traffic Signs.....	16
8043	Construction and Maintenance of Bypasses.....	16
8044	Temporary Drainage Works.....	17
8045	Accommodation of Traffic Where the Execution of Works is in Half Widths.....	18
8046	Temporary Fencing, Gates and Grid Gates.....	18
8047	Obliteration of Bypasses.....	18
8050	OVERHAUL	19
8060	CLEARING AND GRUBBING	19
8070	MEASUREMENT AND PAYMENT	20
8071	Work Measurement	20
8072	Measurement and Payment of an OPRC.....	20
8073	Measurement and Payment of a URMC	20
8100	ROAD RESERVE	31
8101	Scope	31
8110	Vegetation Control	33
8111	Grass Cutting	34
8112	Creeper Grass Removal	36
8113	Bush Clearing.....	37
8114	Trees Trimming.....	38
8115	Trees Removal	39
8116	Morama Tuber Removal.....	40
8117	De-stumping.....	41

Maintenance Standard Specifications for Road and Bridge Works

8120	Animals Control	42
8121	Fence Repair.....	43
8122	Gate Repair	44
8123	Cattle Grid Repair	45
8124	Keeping Animals off Road Reserve	46
8125	Moles Control	47
8130	Rest Area Maintenance	48
8131	Rest Area Cleaning.....	49
8132	Rest Area Facilities Repair.....	50
8133	Rest Area Reshaping	51
8134	Rest Area Regravelling.....	52
8135	Rest Area Resealing	53
8136	Rest Area Fogspray	54
8137	Rest Area Bituminous Overlay	55
8140	Litter Control and Obstacles Removal	56
8141	Litter Collection and Removal	57
8142	Obstacles Collection and Removal	58
8143	Dead Animals Removal	59
8144	Abandoned Vehicles and Scrap Removal.....	60
8145	Anthills Removal.....	61
8146	Illegal Signs and Other Encroachments Removal	62
8150	Slopes Maintenance	63
8151	Slope Erosion Prevention	64
8152	Slope Erosion Repair	66
8160	Landscaped Areas Maintenance	67
8161	Trees, Grass and Flowers Planting.....	68
8162	Trees, Grass and Flowers Watering.....	69
8163	Trees, Grass and Flowers Cutting and Trimming.....	70
8164	Special Features Maintenance.....	71
8165	Landscaped Areas Cleaning	72
8200	PAVED ROADWAY	73
8201	Scope.....	73
8210	Bituminous Paved Roadway Routine Maintenance.....	75
8211	Bituminous Paved Roadway Cleaning.....	76
8212	Rutting and Depression Repair	77
8213	Pothole Patching, Edge Damage and Surface Failure Repair.....	79
8214	Unpaved Shoulder Maintenance.....	81
8215	Crack Sealing	82
8216	Bleeding Repair.....	84

Maintenance Standard Specifications for Road and Bridge Works

8217	Salt Blisters Repair.....	85
8220	Bituminous Paved Roadway Periodic Maintenance	86
8221	Fogspray	87
8222a	Resealing - Chip Seal.....	88
8222b	Resealing - Slurry Seal	90
8222c	Resealing - Sand Seal	92
8222d	Resealing - Otta Seal	94
8222e	Resealing - Cape Seal.	96
8223	Bituminous Overlay.....	98
8224	Unpaved Shoulder Regravelling and Edge Drop Repair	100
8225	Unpaved Shoulder Reshaping.....	101
8230	Concrete Paved Roadway Maintenance	102
8231	Concrete Roadway Cleaning.....	103
8232	Concrete Roadway Crack Sealing.....	104
8233	Concrete Roadway Spalling Repair.....	105
8234	Concrete Roadway Pothole Repair	106
8235	Concrete Roadway Joint Stepping Repair.....	107
8236	Concrete Roadway Slab Repair	108
8240	Block Paved Roadway Maintenance	109
8241	Block Paved Roadway Cleaning	110
8242	Block Paved Roadway Deformation Repair	111
8243	Paving Blocks Replacement.....	112
8244	Block Paved Roadway Grass Removal.....	113
8250	Paved Footpath and Cycle Path Maintenance.....	114
8251	Paved Footpath and Cycle Path Cleaning	115
8252	Paved Footpath and Cycle Path General Surface Repair	116
8300	UNPAVED ROADWAY	117
8301	Scope	117
8310	Unpaved Roadway Routine Maintenance	118
8311	Dragging	119
8312	Maintenance of Sand Cushioning Layer.....	120
8313	Dry Grading.....	121
8314	Unpaved Roadway Pothole Patching	122
8315	Unpaved Roadway Erosion Runnels Repair.....	123
8316	Dust Prevention	124

Maintenance Standard Specifications for Road and Bridge Works

8320	Unpaved Roadway Periodic Maintenance	125
8321	Wet Grading	126
8322	Reshaping	127
8323	Regravelling	128
8324	Sand Cushioning	129
8330	Unpaved Footpath and Cycle Path Maintenance	130
8331	Unpaved Footpath and Cycle Path Cleaning	131
8332	Unpaved Footpath and Cycle Path General Surface Repair.....	132
8400	DRAINAGE FACILITIES	133
8401	Scope	133
8410	Culvert Maintenance	134
8411	Culvert Cleaning	135
8412	Culvert Headwall, Wing Wall and Marker Post Repainting.....	136
8413	Culvert Headwall, Wing Wall, Inlet and Outlet Structure Repair	137
8414	Culvert Repair	138
8415	Culvert Marker Post Reinstatement/Replacement.....	139
8416	Culvert Marker Post Reflector Replacement.....	140
8420	Drain Maintenance	141
8421	Drain Clearing, Cleaning and Desilting	142
8422	Unlined Drain Erosion Repair	143
8423	Unlined Drain Reshaping	144
8424	Drain Lining Repair	145
8425	Concrete Lining Joints Repair	146
8426	Concrete Lining Weep Holes Cleaning.....	147
8427	Drain Cover Repair/Replacement.....	148
8430	Catchpit, Manhole and Drainage Pipe Maintenance	149
8431	Catchpit, Manhole and Drainage Pipe Cleaning and Clearing	150
8432	Manhole/Catchpit Cover Replacement.....	151
8433	Drainage Pipe Relaying/Replacement.....	152
8434	Catchpit/Manhole Repair	153
8435	Drainage Pipe Repair	154
8440	Erosion Protection Works Maintenance	155
8441	Stone Pitching Repair	156
8442	Concrete Erosion Protection Works Repair	157
8443	Gabion Repair.....	158
8444	Scour Check and Chute Repair.....	159
8445	Berm Maintenance	160

Maintenance Standard Specifications for Road and Bridge Works

8500	BRIDGES	161
8501	Scope	161
8510	Bridge Routine Maintenance	163
8511	Bridge Deck Cleaning	164
8512	Bridge Joints, Scupper Drains and Weep Holes Cleaning	165
8513	Bridge Bearings Cleaning	166
8514	Bridge Erosion Repair	167
8515	Bridge Concrete Repair	168
8516	Bridge Wearing Surface Maintenance	169
8517	Bridge Rail, Safety Barrier and Parapet Maintenance and Minor Repairs	170
8518	Bridge Steel Component Repair	171
8520	Bridge Periodic Maintenance	172
8521	Bridge Bearings Realignment and Replacement	173
8522	Bridge Rust Removal and Repainting	174
8523	Bridge Steel Component Replacement	175
8524	Bridge Inspection	176
8530	Waterway Maintenance and Repair	177
8531	Waterway Debris and Obstacles Removal	178
8532	Waterway Erosion Repair	179
8533	Waterway Desilting	180
8600	MISCELLANEOUS STRUCTURES	181
8601	Scope	181
8610	Drift, Causeway and Ferry Landing Maintenance	182
8611	Drift/Causeway and Ferry Landing Structure Damages Repair	183
8612	Waterway Cleaning and Clearing	184
8613	Unlined Drift Reshaping	185
8614	Marker/Guide Post Reinstatement/Replacement	186
8615	Marker/Guide Post Repainting	187
8616	Marker/Guide Post Reflector Replacement	188
8617	Grouted Stone Pitching Repair	189
8620	Retaining Wall Maintenance	190
8621	Retaining Wall Minor Repairs	191
8622	Retaining Wall Weep Holes Cleaning	192
8623	Retaining Wall Vegetation Clearing	193
8630	Railway Crossing Maintenance	194
8631	Railway Crossing General Repair	195

Maintenance Standard Specifications for Road and Bridge Works

8640	Veterinary Dip Maintenance.....	196
8641	Veterinary Dip General Repair.....	197
8650	Subway Maintenance	198
8651	Subway General Repair.....	199
8660	Weighbridge Area Maintenance.....	200
8661	Weighbridge Area General Repair	201
8700	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	202
8701	Scope.....	202
8710	Road Furniture Maintenance	203
8711	Guardrail Maintenance.....	204
8712	Kerbstone Maintenance	206
8713	Kerb Maintenance.....	207
8714	Distance Marker Maintenance.....	208
8715	Pedestrian Railing Maintenance	209
8716	Street Lighting Maintenance	210
8717	Traffic Signalling Devices Maintenance	211
8720	Road Signs Maintenance.....	213
8721	Road Sign Cleaning	214
8722	Road Sign Repainting	215
8723	Road Sign Repairs	216
8724	Road Sign Replacement.....	217
8730	Road Marking Maintenance	218
8731	Road Marking Repainting	219
8732	Reflective Stud Maintenance	221
8740	Rumble Strips and Speed Hump Maintenance	223
8741	Rumble Strips Maintenance	224
8742	Speed Hump Maintenance.....	225
8800	EMERGENCIES	226
8801	Scope.....	226
8810	Flooding and Washout Repair	226
8811	Traffic Control, Safety Measures and Notification	226
8812	Construction of Diversions	226
8813	Excavation and Removal of Unsuitable Material	226
8814	Reinstatement of Roadway Structure.....	226
8820	Land Slide Removal	226
8821	Traffic Control, Safety Measures and Notification	226

Maintenance Standard Specifications for Road and Bridge Works

8822	Construction of Diversions	226
8823	Excavation and Removal of Material from Roadway	226
8824	Reinstatement of Roadway Structure	227
8830	Major Obstacles Removal	227
8831	Traffic Control, Safety Measures and Notification	227
8832	Construction of Diversions	227
8833	Removal of Obstacle	227
8834	Repair Damage to Pavement	227
8840	Damaged/Washed Out Culvert Replacement	227
8841	Traffic Control, Safety Measures and Notification	227
8842	Construction of Diversions	227
8843	Removal of Existing Culvert.....	227
8844	Repair and Replacement of Culvert.....	227
8845	Excavation and Backfilling	227
8846	Reinstatement of Pavement and Embankments.....	227
8850	Damaged/Washed Out Miscellaneous Structures Replacement	227
8851	Traffic Control, Safety Measures and Notification	227
8852	Construction of Diversions	227
8853	Removal of Existing Structure	227
8854	Repair and Replacement of Structure.....	227
8855	Excavation and Backfilling	227
8856	Reinstatement of Pavement and Embankments.....	227
8860	Repair to Damaged Utilities Within the Road Reserve	227
8861	Traffic Control, Safety Measures and Notification	227
8862	Construction of Diversions	227
8863	Repair of Damaged Utilities Within the Road Reserve.....	227
8864	Reinstatement of Roadway Structure	227
8890	Other Emergencies	227
8900	MISCELLANEOUS FEATURES	229
8901	Scope	229
8910	Traffic Control and Safety Measures	229
8911	Placement of Warning Signs Only	229
8912	Lane Closure.....	229
8913	Barricading Work Area.....	229
8914	Diversions	229

Maintenance Standard Specifications for Road and Bridge Works

8920	Procurement of Materials for Maintenance Works	229
8921	Determining Materials Required	229
8922	Identifying Sources of Material	229
8923	Procurement of Materials.....	229
8924	Storage of Materials	229
8925	Transportation of Materials to Site	229
8930	Process and Quality Control Testing	229
8931	Process Control Testing	229
8932	Quality Control Testing.....	229
8940	Sourcing and Extraction of Borrow Materials	229
8941	Investigation of Potential Borrow Area/Quarry.....	229
8942	Selection of the Most Suitable Borrow Area/Quarry	229
8943	Opening of Borrow Pit/Quarry and Extraction of Materials.....	229
8944	Loading and Hauling Borrow Materials	229
8945	Rehabilitation and Closure of Borrow Area/Quarry.....	229
8950	Tools and Equipment	229
8951	Safety and Health Tools.....	229
8952	Monitoring and Supervision Tools and Equipment.....	229
8953	Working Tools and Equipment.....	229
8954	Usage and Maintenance of Hand Tools.....	229
8955	Usage of Equipment and Vehicles	229
8956	Maintenance of Equipment and Vehicles.....	229
8960	Labour	230
8961	Recruitment of Labour	230
8962	Conditions of Work	230
8963	Safety and Health of Personnel.....	230
8964	Payment of Wages	230
8970	Reporting Forms	230
8971	Resource Requirements and Cost Estimates for Maintenance Works.....	230
8972	Work Report and Resources Utilization.....	230
8990	Other Miscellaneous Features	230
5.	ANNEXES:	
	Annex A –References.....	231
	Annex B – Glossary of Terms.....	232
	Annex C – List of Maintenance Features, Interventions and Activities	243

1. INTRODUCTION

1.1 The Road Network

1.1.1 Botswana has developed a modern, functionally classified, Public Highway Network (PHN) of approximately 18,300 km (2009) of Primary, Secondary, Tertiary and Access roads. Responsibility for the management of the PHN is shared between Central Government, administered by Roads Department, and Local Government, administered by the City Council and a number of Town and District Councils. In addition to the PHN, there are over 3000 km of primary and secondary roads and streets in urban areas (city, towns and villages) which are the responsibility of the City, Town or District Councils. There are also some 15,000 km of access tracks, quasi-private roads, minor tracks, etc. Thus, the total length of the road network in Botswana is approximately 36,500 km (2010).

1.2 The Road Asset

1.2.1 Currently, the road network represents one of the country's largest public sector assets with replacement costs of the main (primary and secondary) roads alone amounting to more than P15 billion (2009). This astronomical investment in the road network reflects its multi-purpose role in the national economy involving social, business and commercial travel as well as freight and private transport, all of which use the same network. This network provides the dominant mode of freight and passenger transport and carries approximately 90% of the total volume of passengers transported.

1.3 Importance of Maintenance

1.3.1 With the backbone of the national road network in place, development expenditure in relation to recurrent expenditure has begun to taper off. Thus, in order to preserve the huge investments that have been made in the provision of road infrastructure, maintenance funding will continue to rise and to eventually exceed development expenditure (ref. Figure 1.1). This will require that emphasis is placed on carrying out road maintenance in a proactive and efficient manner. Moreover, it will also require that cognizance be taken of international developments and trends in road maintenance in which the private sector is playing an increasingly significant role.

1.4 Need for a Maintenance Manual

1.4.1 The need for a comprehensive Road Maintenance Manual to assist roads agencies in maintaining the road network in an efficient manner has long been recognized as being of critical importance to all stakeholders in both the public sector (Roads Department and other roads agencies) and the private sector (consultants, contractors, materials suppliers, etc.). To this end, the Ministry of Transport and Communication, with the support of the Norwegian Public Roads Administration (NPRA) has embarked on the development of such a Manual and has engaged consultants to undertake this task under the direction of a Steering Committee from Roads Department.

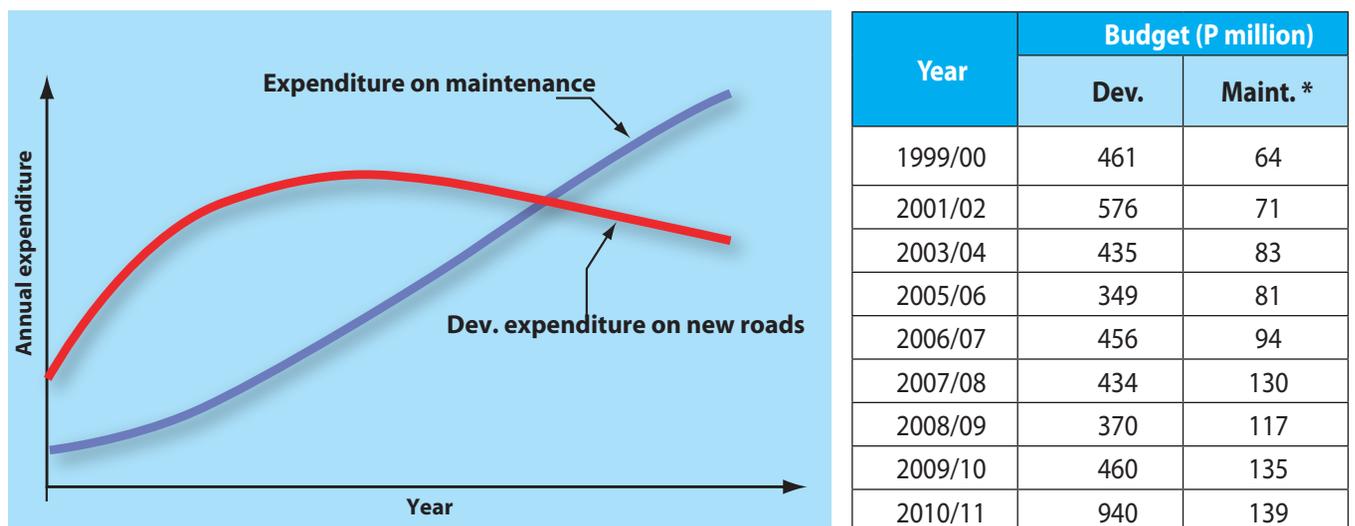


Figure 1.1 – General trend in expenditure on roads

* Money given from vote no 00811 Roads.

2. THE ROAD MAINTENANCE MANUAL

2.1 Purpose

2.1.1 The main purpose of the Botswana Road Maintenance Manual (BRMM) is to serve as a nationally recognized document, the application of which is deemed to serve as a standard reference and ready source of good practice for road maintenance management and operations. In so doing, the objective is to *improve the efficiency and effectiveness of road maintenance in Botswana*. In this regard, the Manual provides guidance to a spectrum of stakeholders on maintenance standards, specifications and operational procedures for maintenance works on both paved and unpaved roads. The Manual is based on maintenance activities relevant to the Botswana environment and is tailored for execution of maintenance works by either in-house units, by contracts based on unit rates or by Output and Performance-Based Road Contracts (OPRC).

2.2 Structure and Contents of Manual

2.2.1 The Manual is divided into four separate parts as follows:

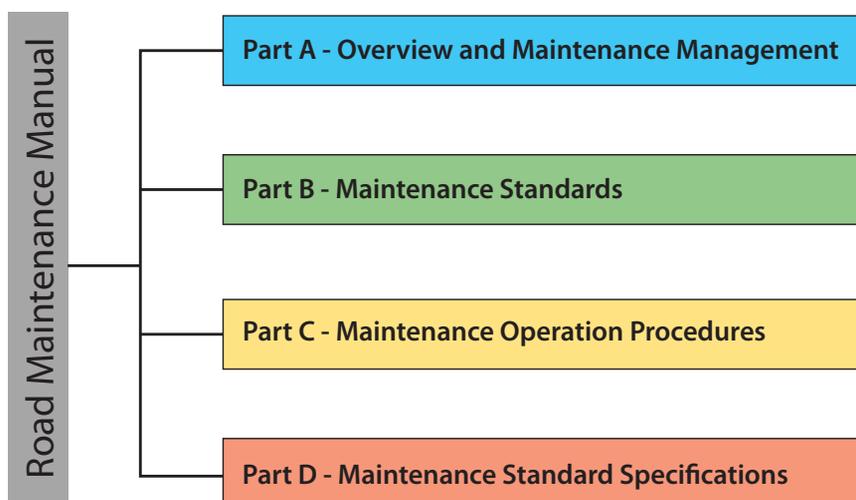


Figure 2.1 – Components of the Road Maintenance Manual

2.2.2 The contents of the Manual are as follows:

Part A – Overview and Maintenance Management

Section A: Provides a general introduction to the Manual including its purpose and scope, approach to its development and means of updating.

Section B: Presents an introduction to maintenance management in Botswana and summarizes the general policies and objectives of the Roads Department that seek to optimize the overall performance of the road network over time. Also reviews the planning, programming, preparation and operations functions carried out by the department.

Part B – Maintenance Standards: Provides service quality standards defined through threshold levels and response times in relation to road function and traffic levels for a complete set of maintenance activities.

Part C – Maintenance Operational Procedures: Provides a description of the operational procedures for a complete set of maintenance activities applicable to both labour and equipment based methods. For each method, a description is provided for the required resources, work procedure and average production.

Part D – Maintenance Standard Specifications: Contains details of the standard specifications related to a wide range of both routine and periodic maintenance activities on both paved and unpaved roads as well as bridges and drainage structures.

Parts B, C and D collectively provide a complete, inter-related set of maintenance standards, operational procedures and maintenance specifications for an extensive range of maintenance features and related interventions and activities as listed in Annex C.

2.3 Development of the Manual

2.3.1 The means of achieving the purpose of the Manual hinges critically on its adoption by stakeholders in practice. To this end, the Manual has been developed with a high level of participation by local practitioners, led by a Steering Committee at Roads Department. As a result, it has been possible to incorporate a significant amount of local, practical knowledge in the document based on local best practice.

2.4 Benefits of Using the Manual

2.4.1 The major benefits to be gained in applying the Manual are harmonization of professional practice and the execution of maintenance activities in a holistic manner. This will ensure uniform execution of the various maintenance activities and facilitate the attainment of appropriate levels of service and cost-effective preservation of Botswana's road asset.

2.4.2 The Manual will be of interest to a range of stakeholders at roads authorities as well as in the private sector including the following:

- Top level management of roads authorities.
- Regional maintenance engineers.
- Road maintenance supervisors & technicians.
- Road maintenance consultants.
- Road maintenance contractors.
- Training institutions.
- Community leaders.
- Road users.

2.5 Service Levels for the BRMM

2.5.1 Three *Service Levels* are adopted in the Manual for both paved and unpaved roads. These Service Levels are used to define a measure of the extent of *Deficiencies* and *Defects* the Road Authority is willing to tolerate over a specified time span on individual roads, depending on traffic levels and road function. The three Service Levels are as follows:

- Level A: All strategic/reference routes A1, A2 and A3 and any other road with AADT \geq 1000 vpd.
- Level B: $500 < \text{AADT} < 1000$ vpd.
- Level C: $\text{AADT} \leq 500$ vpd.

2.6 Updating of the Manual

2.6.1 There are continuing developments in maintenance management and practice as a result of which it will be necessary to update the Manual periodically to reflect current best practices. The format of the Manual enables its expansion, refinement and updating over time on the basis of experience.

2.6.2 The intention is to issue amendments periodically which replace or amplify particular aspects of the manual. Either full sections or particular figures, tables or appendices may be replaced. When this is done the information will be advertised by the Department and made available to the user.

2.7 Sources of Information

2.7.1 In addition to the references cited at the end of each part of the manual, a bibliography has also been compiled for those readers who wish to obtain additional information on any of the topics dealt with in the manual.

3. INTRODUCTION TO PART D: MAINTENANCE STANDARD SPECIFICATIONS

3.1 Introduction

3.1.1 The Maintenance Standard Specifications for Road and Bridge Works (MSSRBW) are standard for all public road maintenance works and services in Botswana awarded by all relevant authorities. The requirements stated herein may be revised or amended from time to time, but only to the extent permitted under the special provisions included in the specific contract.

3.2 Objectives

3.2.1 The objectives of the Maintenance Standard Specifications are:

- To improve the efficiency and effectiveness of road maintenance in Botswana.
- To provide verifiable standards for a complete range of maintenance activities.

3.3 Users of the Manual

3.3.1 Users should note that the MSSRBW, by themselves, do not provide a complete record of all processes and procedures related to the delivery of maintenance activities. They should be read in conjunction with the Standard Specifications for Road and Bridge Works, issued by the Director of Roads, herein referred to as SSRBW. Similarly to reference shall be made to the Botswana Bureau of Standards and herein referred to as BOBS.

3.4 Coding

3.4.1 The coding (i.e. numbering of activities) used in the MSSRBW is based on a three tier system. A FEATURE embraces all the INTERVENTIONS which include all the Activities that fall under it. (The same coding is used also for Part B – Maintenance Standards for Road and Bridge Works (MSRBW)). For example FEATURE 8100, ROAD RESERVE, embraces the following INTERVENTIONS:

- 8110 Vegetation Control
- 8120 Animals Control
- 8130 Rest Area Maintenance
- 8140 Litter Control and Obstacles Removal
- 8150 Slopes Maintenance
- 8160 Landscaped Areas Maintenance.

3.4.2 And INTERVENTION 8110, Vegetation Control embraces the following Activities:

- 8111 Grass Cutting
- 8112 Creeper Grass Removal
- 8113 Bush Clearing
- 8114 Trees Trimming
- 8115 Trees Removal
- 8116 Morama Tuber Removal
- 8117 De-stumping
- 8119 Other Vegetation Control

3.4.3 Each Activity has a standard format. For example Activity 8111, Grass Cutting includes:

- 8111.1 Scope
- 8111.2 Description and Requirements
- 8111.3 Standards, Materials and Tolerances
- 8111.4 Measurement and Payment

3.4.4 Activities ending with the number "9", for example "8119 Other Vegetation Control" have been reserved for any new activities that may be considered necessary to be executed, but are currently not covered by other activities.

4. MAINTENANCE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE WORKS

8000 GENERAL PROVISIONS

The following Sections of General Provisions are applicable for a maintenance contract. All Works shall be carried out in accordance with these Maintenance Standard Specifications for Road and Bridge Works (MSSRBW) as contained herein, supplemented by the Standard Specifications for Road and Bridge Works (SSRBW) and the Botswana Road Design Manual, (BRDM) or as amended in the Special Provisions. If there is conflict between the Standard Specifications and the Special Provisions, then the Special Provisions shall govern.

8001 SCOPE

The General Provisions cover general obligations, risks, liabilities and general cost items not covered elsewhere. Definitions, phrases or wording which would otherwise require repetition in other sections of the Specifications are also covered in this section. Matters covered by the General Conditions of Contract are not repeated in this section, except where necessary for providing information that is more detailed.

8010 GENERAL REQUIREMENTS AND PROVISIONS.

Unless otherwise provided for herein, the relevant general requirements contained in the SSRBW shall be complied with in full. The following particular clauses have been included in these MSSRBW for ease of reference.

8011 Definitions and Terms

"Employer" shall mean the person defined in the Conditions of Contract and the legal successors in title to such person.

"Engineer" shall mean the person appointed by the Employer to act as Engineer or his duly authorized representatives or assignees.

"Activity" shall mean the amount of related Work that applies to a specific road or bridge maintenance operation and may involve one or more pay items.

"Approved Tenderer" shall mean the Tenderer approved for award of Tender by the competent tender adjudicating authority in accordance with the applicable Conditions of Tender and has complied with the conditions in every respect for the appropriate category and value of the works.

"Contractor" shall mean the person, firm or company who's Tender has been accepted to carry out the Contract works and shall include his or their legal representatives, administrators and/or assignees.

"Site" shall mean the land and/or buildings placed at the disposal of the Contractor, from time to time, for the purpose of executing the works.

"Tenderer" shall mean any person or persons, partnership, firm or company who has submitted a tender with rates or sums in the Bills of Quantities in accordance with the Conditions of Tender, Conditions of Contract and Specifications for the work specified as in the contract documents.

"Works" shall mean the works described in the Contract Documents. This shall include all labour plant and material to complete the work.

"Maintenance Services" shall mean all interventions and activities on the roads and appurtenances, excluding Rehabilitation Works, Improvement Works and Emergency Works, which are to be executed by the Contractor in order to achieve and maintain the Service Levels defined in the contract specifications and drawings.

8012 Maintenance Works and Services

The MSSRBW may be used in connection with the procurement of Maintenance Works and Services for the award of a normal Unit Rate Maintenance Contract (URMC) or for an Output and Performance Based Road Contract (OPRC). The Works under an URMC will cover the roads indicated in the tender documents which will consist of quantified maintenance activities measured and paid for in accordance with relevant pay items in the Bill of Quantities.

Maintenance Standard Specifications for Road and Bridge Works

The Works and Services under an OPRC will cover the roads indicated in the tender documents and will consist of:

- Maintenance Services consisting of all interventions on the roads which are to be carried out by the Contractor in order to achieve and maintain the Maintenance Performance Standards defined by the Service Levels included in the MSRBW (Maintenance Standards for Road and Bridge Works).
- Rehabilitation Works shall be as defined and specified in the contract documents.
- Improvement Works shall be as defined and specified in the contract documents.
- Emergency Works shall be as defined and specified in the contract documents.

8013 Utility Services

The positions of existing underground utility services shall be ascertained by the contractor before the commencement of any of the works in that region. The Contractor shall take all necessary precautions to protect all utilities during the execution of the works. The Contractor will be held responsible and liable for any damage caused to utilities caused by his working. No payments will be made for delays to the works caused by the removal or diversion of utilities or interference of the works from utilities. The responsibility for the protection utilities remain firmly with the Contractor.

8014 Programme of Work

In accordance with the Conditions of Contract the Contractor shall produce a fully detailed programme of work within 14 working days. The programme shall be in a form and contain such detail as specified in the contract documents or otherwise in a form and to the detail acceptable to the Engineer.

8015 Workmanship and Quality Control

It is the Contractor's responsibility to produce work which conforms in quality to the requirements of the Specifications and Drawings. The Contractor, shall, at his own expense, institute and maintain a quality control system staffed by experienced personnel and provided with sufficient transport and materials to operate efficiently.

The cost of all process and quality control, including testing, so carried out by the Contractor shall be deemed to be included in the rates in the Bill of Quantities. Specialised testing may be required from time to time as instructed by the Engineer and these will be paid for at agreed rates.

The Contractor's attention is drawn to the provisions of the various sections of the Specifications regarding the minimum frequency of testing that will be required or process control. The Contractor shall, at his own discretion, increase this frequency where necessary to ensure adequate control.

It is a condition of this contract that the contractor shall file the results of tests in a logical manner and submit these files to the Engineer on completion of the works.

8016 Setting Out of Work and Protection of Beacons

It is the Contractor's responsibility to set out the works in accordance with the drawings and specifications and that the costs of this are deemed to be included in the rates.

8017 Notices, Signs and Advertisements

It is the contractor's responsibility to provide the contract information boards as described in the drawings and specifications and these will be paid for at the appropriate rates in the Bill of Quantities.

All other signs relating to safety and traffic control are the responsibility of the contractor and payments for these are deemed to be included in the rates for the work in the Bill of Quantities.

There shall be no advertising signs of any nature displayed along the works which are, or have been, erected by the contractor.

8018 Environmental Considerations

The Contractor shall comply with the Statutory Regulations in force in Botswana regarding environmental protection and waste disposal and shall liaise with the responsible National and Local Authorities with regard to environmental work.

The Contractor shall also adhere to the requirements of the approved project specific Environmental Management Plan and code of conduct with respect to the environment.

The Contractor shall for those of his activities which have, or are likely to have, an impact on the environment, keep records relating to:

- The amount of waste and by-products generated by the activity
- The economic value of the activity
- The observable effects of the environment
- Records of disposal of materials which, in the opinion of the Engineer, are likely to damage the environment.

The Contractor shall afford the Engineer free access to inspect the project site, plant, workshops and the like to monitor compliance with specifications and measurement.

8020 CONTRACTOR'S ESTABLISHMENT ON SITE AND OTHER GENERAL OBLIGATIONS

8021 Camps, Plant and Testing Facilities

The Contractor shall establish his site camps, offices, accommodation, stores, testing facilities, plant yards and workshops as required for purposes of the Contract. It is the Contractor's responsibility to acquire land for such facilities and for all temporarily works and for the reinstatement of such land on the completion of the Contract to the satisfaction of the land owners and other relevant authorities. The Contractor shall obtain the approval of the Engineer for the location of these site camps, offices, accommodation, stores, testing facilities, plant yards, workshops and temporarily works before such land is acquired and shall indemnify the Employer against all claims and charges in respect of occupation, use and reinstatement of the land.

The Contractor shall be solely responsible for the provision of accommodation, ablutions, and other facilities that comply with the statutory requirements of all relevant authorities and the approval of the Engineer with respect to the location and condition of these facilities.

Upon completion of the work, all plant and equipment, buildings, fencing and other temporary structures shall be removed from site and the camp site restored to its original condition and left in a neat tidy condition all to the approval of the Engineer and the concerned authorities.

8022 Maintenance of Facilities during Execution of the Works

The Contractor shall maintain the Contractor's camps, offices, accommodation, stores, testing facilities, plant yards, workshops and other facilities in a safe, neat and tidy condition.

8023 Legal and Contractual Requirements and Responsibility to the Public

The Contractor shall take all necessary steps to comply with the Conditions of Contract, particularly in respect of the insurances and indemnities required, and shall comply with all regulations of statutory authorities.

8030 ACCOMODATION OF SUPERVISORY STAFF AND OTHER SERVICES TO SUPERVISORY STAFF

The Section covers the provision of accommodation and facilities for the supervisory staff of the Engineer and for the Employer.

8031 Offices and Laboratories

a) General Requirements

The Contractor shall provide, furnish, equip and maintain for the duration of the Contract a site office, laboratory and site cabin(s) for the sole use of the Engineer's resident site staff and for the Employer. The office and laboratory shall be located adjacent to the Contractor's main site office and the Contractor shall make available to the Engineer all services provided for his own offices including road access, fencing, hard-standing, water, power, telephone and sewerage, subject to the provisions of this section of the Specifications.

Buildings for offices and laboratories shall be constructed of timber, bricks and/or other approved materials. Materials containing asbestos shall not be used.

After erection, office and laboratory buildings shall be painted with an approved paint and the paintwork shall be maintained during the contract period. Each door shall be provided with a lock and at least two keys.

The various units of accommodation and the fittings shall be constructed in accordance with the details shown on the Drawings or provided by the Engineer.

The situation and the orientation of all offices, laboratories, housing and other accommodation shall be to the Engineer's satisfaction and shall be decided upon in consultation with the Engineer and confirmed in writing before erection. All accommodation shall include the provision of 220 V 50 Hz electricity and, where required, fresh clean potable water and sewerage, including septic tanks if necessary, which will be considered part and parcel of the accommodation provided and will not be paid for separately, except insofar as the cost thereof is covered under Section 8034 ('Services') of these Standard Specifications.

The clear height of all accommodation units between floor and ceiling shall be 2.4 m minimum. All windows shall be of the type that can open over the full window area.

All accommodation shall meet with the approval of the Engineer.

b) Site Office

The office shall have a net floor area of minimum 200 m² and consist of rooms and offices as detailed in the Special Provisions. All rooms shall be provided with through ventilation and electrical lighting of a minimum of 100 watts per room.

The office units shall be constructed in accordance with 8031(a) above. Window space shall be a minimum of 15 % of floor area. All windows shall be mosquito-proofed.

A potable water supply shall be provided to toilets, each of which shall contain a wash-hand basin, and to the tearoom which shall contain a sink with built-in cupboards and working surfaces. An electric geyser shall be provided in the tearoom to supply hot water to both the tearoom and toilets. A waterborne sewerage system shall connect to a septic tank at least 30 m from the building. The store shall be fitted with suitable shelving.

The office shall be provided with a telephone, independent from the Contractor's telephone, with switchboard and extensions to five rooms and the laboratory.

Maintenance Standard Specifications for Road and Bridge Works

The contractor shall provide a suitable hardstanding area, constructed of concrete reinforced sufficiently to withstand the weight of project vehicles to be used as a wash bay. The hardstanding shall be provided with running water and be provided with adequate drainage all to the satisfaction of the Engineer.

c) Laboratories

The Laboratory shall have a net floor area of minimum 300 m² and consist of offices and laboratory rooms as detailed in the Special Provisions. The unit shall be constructed in accordance with the provisions of Section 8031(a) of these Standard Specifications. Window space shall be a minimum of 15 % of office floor area and 10 % of laboratory room floor area. The working area for the laboratory testing activities shall have a concrete floor.

All rooms shall be provided with through ventilation and electrical lighting of a minimum of 150 watts per room. One telephone shall be provided in the laboratory as an extension to the site office telephone.

Each laboratory shall be equipped with the furniture and fitting detailed in the Special Provisions.

d) Car ports

Car ports shall be so constructed that the vehicle parked under them will at times be protected against the direct rays of the sun. The car ports shall be at least 20 m² in area and the floors shall consist of a layer of broken stone to alleviate dusty and muddy conditions.

e) Areas around office

The access and other roads around the offices shall be treated to make them dust free, either by using crushed stone, an approved dust-control agent or bituminous surfacing or by other approved means. They shall be well-drained and kept trafficable and free from mud at all times. Footpaths shall be similarly treated to provide convenient access to all buildings.

f) Air-conditioning units and heaters

Where required by the Engineer, the Contractor shall provide and install air-conditioning units and heaters.

The air-conditioning unit shall be an electricity operated compressor type with closed circuit or any other type approved by the Engineer, but not an evaporation type. The capacity of the air-conditioning units shall be at least 2.2 kW each.

The contractor may also be required to install air-conditioning units in any housing provided.

g) Site cabins

Mobile site cabins shall be as specified in the SSRBW or as otherwise specified by the Engineer.

8032 Housing

The houses shall be of a floor area of 120 m² minimum and dimensioned to the approval of the Engineer.

The Contractor shall provide housing for the Engineer's resident staff of the type and quantity specified in the Special Provisions and in accordance with the details below.

a) Prefabricated houses

Prefabricated houses shall be constructed of wood and other approved materials and shall have double walls filled with insulating material. Materials containing asbestos shall not be used. Each house shall have a clear height from floor to ceiling of at least 2.74 m.

Maintenance Standard Specifications for Road and Bridge Works

Glass-fibre insulating material shall also be provided on top of the ceilings. Floors shall be of timber or alternatively of concrete covered with suitable cork or vinyl tiles.

The main frame of each house shall be of steel or light alloy. All timber used shall be of a good quality, properly oven-dried and treated against pests. All fittings shall be accurately installed.

After erection, each house shall be properly painted inside and outside with an approved paint and the paintwork shall be maintained during the contract period. Unless otherwise specified in the Special Provisions, each house shall be provided with the following:

- i) Bath and shower with drain and inside flush toilet.
- ii) Wash basin with drain pipe
- iii) Metal kitchen-sink unit with stainless-steel basin and draining board and cupboard.
- iv) Kitchen dresser, linen cupboard and built-in wardrobes in the bedrooms.
- v) Suitable hot-water geyser, kitchen stove and refrigerator as specified in the SSRBW or as otherwise directed by the Engineer.
- vi) Cold-water pipes from an outside source to the bath, wash basin, toilet and sink units, complete with taps where required.
- vii) Hot-water pipes from the geyser, wash basin and sink unit, complete with taps.
- viii) Electric lights and plug points as specified in the SSRBW or as otherwise directed by the Engineer. The house shall be fully wired and connected to a 220/250 V AC power source.
- ix) Good-quality locks on all doors.
- x) Where the water supply of the house is not connected to a water main, an external cold-water storage tank as specified in the SSRBW or as otherwise directed by the Engineer.
- xi) Suitable mosquito screens on all outside doors and windows.

b) Outbuildings

Unless otherwise specified in the Special Provisions, where required, outbuildings relating to accommodation and facilities for supervisory staff shall be provided as specified in the relevant clauses of the SSRBW or as otherwise directed by the Engineer.

c) Plan dimensions for prefabricated houses

Unless otherwise specified in the Special Provisions and Drawings, plan dimensions for prefabricated houses shall be as specified in the relevant clauses of the SSRBW or as otherwise directed by the Engineer.

d) Rented accommodation

- i) Instead of the houses specified above, the Contractor may provide, in the nearest town or elsewhere, suitable rented or purchased houses approved by the Engineer, which will provide the same standard of comfort as the prefabricated houses.

The terms of any lease for such accommodation shall be subject to the Engineer's approval and, if agreed to by the owner, shall contain provision for extension of the lease, on terms agreed on beforehand, during any extended time for completion of the Contract, as well as provision for the lease to be taken over by the Engineer or another Contractor in the event of default by or insolvency of the Contractor. Notwithstanding the Engineer's approval of the conditions of the lease, the Contractor shall be solely responsible for

Maintenance Standard Specifications for Road and Bridge Works

providing the accommodation for the full period required and for suitable substitute accommodation should the alternative accommodation no longer be unavailable. The Engineer must receive a copy of any lease agreement.

The Contractor shall also be responsible for the cost of any additional travelling expenses arising from the use of alternative or substitute permanent housing. Such costs may be subtracted from any moneys due to the Contractor for providing housing.

- ii) The Engineer may also order the Contractor to pay for any hotel or other accommodation or leased houses required and available. This accommodation may be in addition to or instead of the accommodation specified. 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, which shall be negotiated by the Engineer.

The cost of drawing up and entering into such leases shall be refundable if paid by the Contractor. Where such accommodation is contemplated in advance, allowance shall be made for the cost thereof by the inclusion of a suitable provisional sum. The provision of such accommodation shall be classed as "extra work" and payment shall be made as specified in the Conditions of Contract.

- iii) The Contractor's attention is drawn to the distinction made between alternative accommodation offered by him in terms of 8032(d) (i) above and accommodation he is ordered to provide in terms of 8032(d) (ii) above, as far as the method of payment, his obligations and risks and the period for which the accommodation is to be provided and paid for is concerned.

e) Alternative housing provided by the Employer

Unless otherwise specified in the Special Provisions, the provisions for alternative housing provided by the Employer with regard to accommodation and facilities for supervisory staff shall be as specified in the relevant clauses of the SSRBW or as otherwise directed by the Engineer.

f) Permanent housing

Instead of prefabricated housing, the Engineer may require that permanent housing, similar to the type detailed under 8032(a) above, be constructed using approved permanent materials. Where permanent housing is to be built, details of materials to be used shall be given in the Special Provisions. As soon as the Engineer's resident staff vacate the permanent housing, the houses shall be painted and cleaned up for handing over to the Employer.

g) Housing for the Engineer's labour staff

Unless otherwise specified in the Special Provisions, the provisions for housing for the Engineer's labour staff shall be as specified in the relevant clauses of the SSRBW or as otherwise directed by the Engineer. However, materials containing asbestos shall not be used.

h) Plan dimensions for labour staff houses

Unless otherwise specified in the Special Provisions, the plan dimensions for labour staff houses shall be as specified in the relevant clauses of the SSRBW or as otherwise directed by the Engineer.

i) Ablution unit

Unless otherwise specified in the Special Provisions, the provisions for the ablution unit with regard to accommodation and facilities for supervisory staff shall be as specified in the relevant clauses of the SSRBW or as otherwise directed by the Engineer. However, materials containing asbestos shall not be used.

j) Kitchen unit

Unless otherwise specified in the Special Provisions, the provisions for the kitchen units with regard to accommodation and facilities for supervisory staff shall be as specified in the relevant clauses of the SSRBW or as otherwise directed by the Engineer. However, materials containing asbestos shall not be used.

8033 Number of Units Required

The Engineer shall immediately after the award of the Contract, instruct the Contractor regarding the number of units of each kind of units of accommodation required on the site of the Works. In the event of the Employer exercising his right to provide accommodation for the resident staff in accordance with Sub-section 8032(e) of these Standard Specifications, the Contractor shall be so advised within seven days of the award of the Contract.

The attention of the Contractor is drawn to the provisions of Sub-section 8037(c) of these Standard Specifications with regard to the time in which housing is to be provided.

8034 Services

Unless otherwise specified in the Special Provisions, the provisions for services with regard to accommodation and facilities for supervisory staff shall be as specified in the relevant clauses of the SSRBW or as otherwise directed by the Engineer. However, in terms of measurement and payment Sub-section 8073.20 below shall apply.

8035 Furniture and Equipment

The offices, laboratory, site cabins and houses shall be furnished and equipped as detailed in the lists provided in the Special Provisions for each type of office, site cabin, house and laboratory.

8036 Motor Vehicles for Supervisory Staff

Motor vehicles of the make and type shown in the Schedule of Quantities shall be supplied, serviced and maintained in good running order by the Contractor for the full period of the Contract. The specified vehicles shall during the contract period, at all times be made available to the Engineer's resident staff and, during breakdowns and servicing periods, equivalent alternative vehicles shall be provided at no extra cost. In the event that the Contractor defaults on this obligation, the Engineer shall be authorised to hire a substitute vehicle of similar make and type for the period of non-availability of the vehicles, and the cost incurred thereof shall be recovered from the Contractor.

The Contractor shall supply fuel for the vehicles and maintain a convenient fuelling point within the main camp to which the Engineer's resident staff shall be given reasonable access for the purpose of refuelling vehicles supplied to the Engineer by the Contractor under the Contract.

Drivers shall be fully licensed and insured to operate on public roads. The vehicles shall be insured, fully comprehensive, for any driver employed by the Engineer.

Upon completion of the Contract, the Engineer's vehicles specified herein shall revert to either the Contractor or the Employer as provided for in the Special Provisions.

8037 General Requirements for Accommodation of Supervisory Staff and Other Services to Supervisory Staff

- a) At the time the Contract is awarded the Engineer shall give the Contractor full details in writing regarding the number, type and layout of all housing units required, including details of the fittings, furniture and equipment required. The Contractor shall not order any housing, materials, equipment or fittings on the basis of what is specified or scheduled without written confirmation from the Engineer. No buildings shall be erected without the Engineer's written instructions as to the exact position and orientation of the buildings.
- b) Unless otherwise agreed the offices and laboratories shall be erected in close proximity to the Contractor's offices and laboratories. If the Contractor should decide to move his own offices and/or laboratories to a new site, the

Maintenance Standard Specifications for Road and Bridge Works

offices laboratories and other buildings erected for the use of the Engineer shall also be moved to the new site and re-erected, if required, at no additional charge.

- c) Housing supplied by the Contractor shall be ready for use within six weeks from the date of the instruction to commence the works, but the Contractor may not proceed with the permanent works before the required offices and laboratories have been erected by him. If the houses for the Resident Engineer and his staff are not ready for occupation when the permanent works commence, the Contractor shall provide suitable temporary board and lodging at his own expense. If any further accommodation is required during the course of the Contract, the Engineer shall inform the Contractor at least three months before such additional accommodation is required for use.
- d) Unless otherwise agreed the offices and laboratories shall be erected in close proximity to the Contractor's offices and laboratories. If the Contractor should decide to move his own offices and/or laboratories to a new site, the offices, laboratories and other buildings erected for the use of the Engineer shall also be moved to the new site and re-erected if required, at no additional charge.

8040 ACCOMMODATION OF TRAFFIC

This section covers the construction and maintenance of the necessary detours and bypasses, barricades and signs, and all necessary for the safe and easy passage of all public traffic during the period of carrying out the works and during the maintenance period, and also the removal and reinstatement of bypasses as they become redundant.

8041 General Requirements for Accommodation of Traffic

(a) Handing over of road reserve

The road reserve will be handed over to the Contractor in lengths as specified in the Special provisions.

(b) Provision of bypasses

Except where the existing road is to remain in use for through traffic, the Contractor shall provide, construct or put in order such bypasses as may be required to divert traffic from such portions of the road as are handed over to him.

The Contractor shall be responsible for the safe and easy passage of public traffic past and/or over sections of roads of which he has occupation. During all his operations and the use of his equipment the Contractor shall at all times maintain these bypasses/diversions and take the necessary care to protect the public and to facilitate adequate flow of traffic.

(c) Minimum vertical clearance

The minimum vertical clearance over any portion of a bypass shall be 4.9m

(d) Property and Survey beacons

Where possible, bypasses shall be constructed so as not to damage or displace property or trigonometrical survey beacons. In exceptional cases where this is not possible, the Contractor shall notify the Engineer in advance in order that he may arrange to have these suitably referenced before they are displaced.

(e) Access to properties

The Contractor shall also provide and allow access to persons whose properties fall within or adjoin the area over which he is working and in this respect the Contractor's attention is drawn to the General Conditions of Contract. No separate payment shall be made for the provision and maintenance of such accesses and facilities, except where they extend beyond the road reserve and directed by the Engineer.

(f) Approval of bypasses

The need for bypasses and details concerning all bypasses shall be approved by the Engineer before construction of the bypass commences and the Contractor shall satisfy himself before tendering that he can arrange for bypasses as may be necessary for the safe and convenient passage of traffic.

(g) Failure to comply with provisions

The failure or refusal of the Contractor to construct and/or to maintain bypasses at the proper time, or to take the necessary precautions for the safety and convenience of public traffic as required by statutory authorities or as ordered by the Engineer, shall be sufficient cause for the closing down of all work under the Contract until all provisions prescribed have been complied with to the satisfaction of the Engineer.

(h) Temporary works

The bypasses provided by the Contractor shall include the construction of temporary gates, grid gates, fences, drainage works and other incidental work considered necessary by the Engineer.

Maintenance Standard Specifications for Road and Bridge Works

(i) Public services

Unless otherwise provided for in the Special Provisions, the Contractor shall arrange for the moving of all public services such as power lines, telephone lines, water mains, etc. where this is required for the construction of bypasses, and he shall be solely responsible for the safety of such services. No payment will be made for any additional expenses caused by delays in the moving of services. In cases where there is no diversion of services required, the Contractor shall clearly indicate where such services (if any) cross the bypass so that these points are clearly visible to all staff, drivers of equipment and labour.

8042 Barricades and Traffic Signs

- (a) The Contractor shall provide, erect and maintain barricades, traffic signs and warning boards at positions required and to the approval of the Engineer and of the sizes and dimensions prescribed in the Road Traffic (Signs) Regulations, issued in accordance with the Road Traffic Act, Cap. 69:01 of the Laws of Botswana.
- (b) Warning lights and sufficient number of flagmen shall be provided by the Contractor and he shall take all necessary further precautions for the protection of the Works and for the safety of the travelling public. Warning lights shall be maintained to operate 24 hours a day and seven days a week.
- (c) The wording on traffic signs shall be in the English language.
- (d) Where specified in the Special provisions, traffic lights shall be provided at the positions shown on the Drawings. The Contractor shall make all arrangements for the provision and installation of traffic lights and shall co-operate with the local authority in each particular case. Traffic lights shall be maintained to operate 24 hours a day and seven days a week.
- (e) Drums: At some positions steel drums, painted red and white, shall be placed as specified by the Engineer, with reference to the SSRBW.
- (f) All road signs as specified in the Road Traffic (Signs) Regulations shall be in accordance with the SSRBW or as otherwise directed by the Engineer.

8043 Construction and Maintenance of Bypasses

a) Width of bypasses

Unless otherwise specified in the Special Provisions and/or Drawings, the width of bypasses shall be as specified in the relevant sections of the SSRBW or as otherwise directed by the Engineer.

b) Earthworks for bypasses

The Contractor shall shape and grade the bypass making full use of all material obtained from the vicinity of the bypasses, from side cut or from the immediate vicinity. If sufficient material cannot be obtained in this manner, he shall import material from other sources. Where necessary, cuttings shall be made to obtain a satisfactory vertical alignment. The Contractor shall also do the necessary clearing and grubbing, including the removal of all trees and stumps. Where the subgrade is not sufficiently dense in its natural condition, it shall be given a three-pass roller compaction as specified in the SSRBW. Alignments must be to the approval of the Engineer prior to the commencement of construction.

All material shall be watered, mixed and compacted with suitable compaction equipment to give sufficient density to the material so that it will be capable of carrying traffic without undue wear or distress. In case of disagreement between the Engineer and the Contractor as to the adequacy of this compaction, a dry density of 90% of modified AASHTO density shall be taken as the required minimum density.

Any fills which may be necessary for any reason, e.g. for the construction of drifts, shall be constructed and compacted by the Contractor as described above. Wherever possible, drifts shall be constructed of rockfill or coarse material so as to limit as far as possible damage due to flood waters. The Contractor shall construct cuttings where required.

Maintenance Standard Specifications for Road and Bridge Works

c) Gravelling of bypasses or of existing roads used as bypasses

When the earthworks for bypasses as described in Section 8043(b) above have been completed, those portions of the bypasses and existing gravel roads used as bypasses, which are indicated by the Engineer, shall be provided with a wearing course of suitable gravel approved by the Engineer.

The contractor shall provide, spread, water, mix and compact such material to a density at which it can carry traffic without undue wear and tear. In case of disagreement between the Engineer and the Contractor as to the adequacy of the compaction, a dry density equal to 93% of modified AASHTO density shall be taken as the required minimum density.

d) Existing roads used as bypasses

Where existing roads are to be used as bypasses, the Contractor shall carry out any repairs, alterations or additions to such roads needed to bring them in a condition suitable for traffic. This work is paid for as stipulated hereinafter.

e) Maintenance of gravel bypasses

All earth or gravel bypasses including existing gravel roads used as bypasses shall be maintained in a safe trafficable condition by the Contractor. Whenever required by the Engineer, the bypasses shall be bladed by means of self-propelled graders, and re-compacted, to provide a smooth riding surface free of corrugations. All potholes shall be properly repaired.

The Engineer may also instruct the Contractor to water the bypasses to keep down the dust or in order to facilitate the proper reworking of the surface. All drainage works shall be maintained in good working order.

Reworking of surfaces of gravel bypasses and the application gravel and water shall be measured and paid for separately, but all other maintenance shall be deemed to be included in the rate tendered for Item 8073.31 – "Accommodation of traffic and maintenance of bypasses".

f) Maintenance of bitumen-surfaced roads used as bypasses

All existing bitumen-surfaced roads used as bypasses shall be maintained in a good and safe trafficable condition by the Contractor, for the duration such roads are used as bypasses. Maintenance shall include the patching and repair of the bitumen surfacing, the clearing of shoulders, the clearing of all drains, including culvert inlet and outlet drains, and others incidental work and, unless otherwise specified in the Special Provisions, the care and maintenance of all road markings, marker posts and guardrails.

The cost of all maintenance bitumen-surfaced bypasses shall be included in the payments made under Item 8073.31 – "Accommodation of traffic and maintenance of bypasses", except for the cost of repairs to the bituminous surfacing and pavement which shall be paid for separately under Item 8073.35.

g) The Contractor's use of bypasses

Unless otherwise specified in the Special Provisions, provisions pertaining to the Contractor's use of bypasses shall be as specified in the SSRBW or as otherwise directed by the Engineer.

8044 Temporary Drainage Works

The Contractor shall construct the necessary temporary drainage works, such as side drains, catch-water drains, mitre drains, culverts etc. to deal adequately with any surface run-off.

Temporary culverts, preferably corrugated metal pipes, shall be installed on existing drainage channels wherever required by the Engineer and shall be of sizes and types approved by the Engineer. Any suitable metal or precast concrete culverts salvaged from an existing road or abandoned bypass may be re-used if in a good condition and approved by the Engineer.

Maintenance Standard Specifications for Road and Bridge Works

Any damage caused to bypasses due to the inability of temporary culverts, installed in accordance with the Engineer's instructions, to cope with floods shall be repaired by the Contractor and the Contractor shall be paid for the cost of such work at applicable rates or where no such rates exist, in accordance with the relevant provisions of the Conditions of Contract.

Payment for the construction of temporary culverts will be made under the applicable items provided in payment Item 8073.37 of these Standard Specifications and payment for the construction of the other drainage works for bypasses and for the maintenance of all drainage works shall be included in the rates tendered for Item 8073.31 – "Accommodation of traffic and maintenance of bypasses"

8045 Accommodation of Traffic where the Execution of Works is in Half Widths

Where the construction of bypasses is not necessary, uneconomical or is not feasible the Contractor shall, upon written instruction of the Engineer, carry out the works in half widths, allowing traffic to use the half of the road on which no works are being carried out at the time. The lengths of the half-width over which works are carried out shall be kept to a minimum and at frequent intervals provision shall be made for traffic travelling in opposite directions to pass one another. The sections of road which are being constructed in half widths shall control traffic by means of traffic lights which are manned 24 hours per day and seven days a week.

The Contractor shall so arrange his work that the traffic will at all times, while the works are being carried out have free one-way access to at least half the width of the roadway. He shall maintain that half of the road which is being used for traffic in a sound trafficable manner to the satisfaction of the Engineer.

The Contractor shall ensure that the whole road width is open at night and that at the end of each day's work it is left in a good and safe trafficable condition to the satisfaction of the Engineer.

Should the road not be in a safe trafficable condition for two-way traffic over the whole width at the end of each day's work, the Contractor shall supply adequate flagmen, signs, barriers, lights staff and the necessary staff at his own cost to ensure a reasonable free flow of traffic alternatively in each direction throughout the whole period that the roadway is open to one-way traffic only.

8046 Temporary Fencing, Gates and Grid Gates

Unless otherwise specified in the Special Provisions, provisions pertaining to temporary fencing, gates and grid gates necessary for accommodation of traffic shall be as specified in the SSRBW or as otherwise directed by the Engineer. However, in terms of measurement and payment Sub-section 8073.30 below shall apply.

8047 Obliteration of Bypasses

When traffic is routed permanently onto the new road following the completion of the works, the bypasses which are no longer required and such sections of obsolete roads and markings as instructed by the Engineer shall be removed and the land reinstated to an arable condition in accordance with the SSRBW.

8050 OVERHAUL

Unless stated otherwise in the Conditions of Contract the relevant provisions relating to overhaul in the SSRBW shall be complied with. However, the free haul distance shall be 3.0 km in the case of all overhaul material, except cut and borrow to fill, cut to spoil and selected subgrade material where the free haul distance is 0.5 km. Furthermore, in terms of measurement and payment Sub-section 8073.40 below shall apply.

8060 CLEARING AND GRUBBING

Unless stated otherwise in the Conditions of Contract all the relevant provisions relating to the clearing and grubbing in the SSRBW shall be complied with. However, in terms of measurement and payment Sub-section 8073.50 below shall apply. The Engineer must inspect areas that have been cleared and grubbed and the contractor must seek prior approval to proceed with earthworks.

8070 MEASUREMENT AND PAYMENT

8071 Work Measurement

Units of measurements for all work shall be in accordance with the SI system of metric units.

The quantities set out in the Schedule of Quantities are estimated quantities and are used for the comparison of tenders and awarding the Contract. It must be clearly understood that only the actual quantities of work done or materials supplied shall be measured for payment, and that the scheduled quantities may be increased or decreased as provided in the General Conditions of Contract. Measurement of completed work shall be in accordance with the requirements of the SSRBW and the conditions of contract.

8072 Measurement and Payment in an OPRC

In an Output and Performance Based Road Contract (OPRC), the **Maintenance Services** will not be measured in volume. Payment will be affected by compliance with the Maintenance Performance Criteria and Standards pursuant to the Conditions of Contract. An OPRC may include rehabilitation works, improvement works or emergency works that may be measured and paid in volume, if the contract deems, but the Maintenance Services shall be billed in fixed monthly amounts. Payments for maintenance services will be made with specified reductions if the Performance Standards are not achieved, as defined in the Performance Criteria or Specifications. The specified reductions for non-compliance with the Performance Standards will be applied in accordance with the methodology specified in the Performance Criteria or Specifications.

Rehabilitation Works will be measured on the basis indicated in the conditions of contract, based on the quantity of actual work outputs as defined in the Specifications, concluded by the Contractor and approved by the Engineer. The prices shall be those stated in the Bill of Quantities.

Improvement Works will be measured on the basis indicated in the conditions of contract and in accordance with the unit of measurement used for product unit price included in the Bill of Quantities. The prices shall be those stated in the Bill of Quantities.

Emergency Works will not normally be measured and shall be billed in accordance with the Schedule of Payments agreed for each specific Emergency Work as approved by the Employer.

Monthly Payments (OPRC)

The Contractor shall submit to the Engineer monthly statements in the format indicated in the Contract, of the estimated value of Maintenance Services, Rehabilitation Works, Improvement Works, and Emergency Works in separate items covering the Works and Services for the corresponding month. The value of Services executed shall be certified by the Engineer taking into account the monthly amount included in the Bill of Quantities for Maintenance Services and the achievement of the Performance Standards for the Maintenance Services adjusted for any payment reductions in accordance with the conditions of contract.

The value of Works executed shall be certified by the Engineer taking into account the value of the quantities of products executed and the prices in the Bill of Quantities.

Payments shall be adjusted for deductions for advance payments, retention, and reductions for not achieving Performance Standards for Maintenance Services, including taxes and levies.

8073 Measurement and Payment in a URMC

In a Unit Rate Maintenance Contract (URMC), maintenance interventions will be measured and paid for in accordance with tendered unit rates and bill of quantities, and the relevant clauses of the SSRBW shall apply:

Contract Rates; In computing the final contract amount, payments shall be based only on actual quantities of authorized work done in accordance with the applicable specifications and drawings.

Maintenance Standard Specifications for Road and Bridge Works

Rates to be Inclusive; The Contractor shall accept the payment provided in the Contract and represented by the rates tendered by him as payment in full for executing and completing the work as specified, for procuring and furnishing all materials, labour, supervision, plant, tools and equipment for wastage, transport, loading and off-loading, handling, maintenance, temporary work, testing, quality control including process control, overheads, profit, risk and other obligations and for all other incidentals necessary for the completion of the work.

Pay Items; The descriptions under the pay items in the various sections of applicable specifications, indicating the work to be allowed for 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 described in applicable specifications.

Provisional Sums and Prime Cost Items; Provisional sums may be entered as a preliminary allowance to cover the cost of work, materials, goods or services to be provided by the Contractor but which have not been fully specified or measured, or to cover the cost of unforeseen items of work or contingent expenditure for which no rates are applicable but for which the Contractor is to be paid according to the applicable provisions of the Contract. Prime Cost Items may be entered as a preliminary allowance to cover the cost of work, materials, goods and services to be provided by a nominated subcontractor, or the cost of articles or goods to be purchased by the Contractor in execution of a written order by the Engineer, who may specify a particular source of supply or brand of article.

Rates Only Items; Where no quantity is given for an item but a "rate only" is required, the Contractor shall fill in a rate or price which will constitute payment for any work which may be ordered by the Engineer under this item.

General Pay Items (URMC)

General pay items below are those items that are carried out during the whole project, but do not form part of the permanent work.

8073.10 Contractor's Establishment on Site and Other General Obligations

Pay Item No	Pay Item	Pay Unit
8073.11	Fixed obligations	lump sum
8073.12	Value-related obligations	lump sum
8073.13	Time-related obligations	lump sum per month

Payment for Contractor's Establishment on Site and Other General Obligations shall be a lump sum to provide for the Contractor's expenses in connection with establishment of the Contractor's organization, camps and plant on site, and the removal thereof after completion. It also concerns the cost of general obligations, liabilities and risks which are not covered elsewhere.

Payment of the lump sums tendered under Items 8073.11, 8073.12 and 8073.13 shall be for the full compensation for all the contractor's charges in respect of the following items, collectively termed the "contractor's general obligations"

- Setting up and maintaining his organization, camps, accommodation and construction plant on the site and their removal on completion of the contract.
- Complying with the requirements of the general conditions of contract and Section 8010 of the specifications, including the effecting of insurances and providing the sureties required.
- All general site and office overheads, profit, financing costs, risks, legal and contractual responsibilities and other costs and obligations of a preliminary or general nature which are not specifically measured for payment under any other items of payment.

The lump sum tendered under item 8073.11 above shall represent full compensation for the fixed part of the contractor's general obligations, i.e. that part which is substantially fixed and is not a function of the time required for the completion of the contract or of the value of the work. This item shall not be subject to any variation whatsoever.

Maintenance Standard Specifications for Road and Bridge Works

- i) The first instalment, 50% of the lump sum, will be paid in the first payment certificate after the contractor has met all his obligations under this section and has made a substantial start with works in accordance with the approved programme.
- ii) The second instalment, 35% of the lump sum, will be paid when the value of the work done reaches one half of the tendered amount, excluding contingencies.
- iii) The third and final instalment, 15% of the lump sum, will be paid when the works have been completed and the contractor has fulfilled all the requirements of this section.

Before any payment is made under this item, the contractor shall satisfy the engineer that he has provided camps and constructional plant of good quality on the site, the value of which exceeds that of the first instalment.

The contractor may also be required to furnish documentary proof that he owns the camps and constructional plant on the site, the value of which shall exceed that of the first instalment.

In the event of the contractor not being able to satisfy the engineer as to the ownership of the camps and constructional plant, the engineer shall have the right to withhold parts of any payments to be made under this sub-item, until the works have been completed.

The lump sum tendered under Item 8073.12 shall represent full compensation for that part of the contractor's general obligations, which are a function of only the value of the work, but not of the period of completion. Should the final value of the work increase or decrease in relation to the tendered amount, the lump sum tendered for Item 8073.12 will be increased or decreased pro rata in full settlement of any difference in value-related general obligations resulting from an increased or decreased value of the work.

The lump sum tendered in Item 8073.12 will be payable monthly in instalments in relation to the value of work done.

The tendered rate per month for Item 8073.13 represents full compensation for that part of the contractor's general obligations which are mainly a function of the time for execution of the works. The tendered sum will be paid monthly, pro rata for parts of a month, from the Commencement Date until the end of the period for completion of the works, plus any extension thereof as provided in the Conditions of Contract, provided that –

- (a) should the works be certified as having been completed before the contractual date for completion of the works, the contractor will then be entitled to payments in regard to the unexpired period for completion;
- (b) should the progress of the contractor in terms of the value of work done be in arrear in regard to his approved original programme, payments in respect of this item may be limited to payment for this period, which, in his original programme (after suitable adjustments in respect of the extension of time granted) agree with the actual value of work done.

Any payment made under Contractor's Establishment on Site and Other General Obligations will not be taken into account when determining whether the value of a certificate complies with the "minimum amount of interim payment certificate", as laid down in the Conditions of Contract. The adjustments specified in Items 8073.12 and 8073.13 will be made only if the value of the work or the period for completion were to change and it is agreed that such adjustments will be in full settlement of the changed compensation for amended general obligations.

Maintenance Standard Specifications for Road and Bridge Works

8073.20 Accommodation for Supervisory Staff and Services to Supervisory Staff

Pay Item No	Pay Item	Pay Unit
8073.21	Office and Laboratory accommodation	
	Provision of accommodation as specified, including roof, external and internal walls, windows and glazing, doors with locks and fittings, painting, floors, provision of 220/250 V electrical installation with wiring, switchboards, etc., water and sewerage installation, complete as per Drawings and Specifications except for items scheduled elsewhere	lump sum

Payment of the lump sum tendered for Item 8073.21 shall be for the full compensation for supplying and erecting all office and laboratory accommodation as specified, for the proper maintenance thereof and for the subsequent removal thereof from Site on completion of the Works.

Pay Item No	Pay Item	Pay Unit
8073.22	Office and laboratory furniture, fittings, installations and equipment	
8073.22a	<i>Office and laboratory furniture, fittings, installations and equipment as specified complete as per Drawings and Specifications.</i>	<i>lump sum</i>
8073.22b	<i>Provisional sum to cover the cost of local and trunk calls</i>	<i>provisional sum</i>

Payment of the lump sum tendered for Item 8073.22a shall be for the full compensation for supplying, erecting and maintaining/repairing all furniture, fittings, installations and equipment as specified and shown in the Drawings and/or as instructed by the Engineer and the use thereof, together with all minor fittings, brackets, connections, leads, mountings, etc., including any related fixed and usage charges payable.

The provisional sum tendered for Item 8073.22b shall be to cover for the cost local and trunk calls.

Pay Item No	Pay Item	Pay Unit
8073.23	Car ports (as specified)	Number

The unit of measurement for Item 8073.23 shall be the number of car ports provided as specified.

Pay Item No	Pay Item	Pay Unit
8073.24	Housing for Engineer's labour staff	
8073.24a	<i>Housing units as specified including ablution unit and cooking unit complete as per Drawings and Specifications</i>	<i>Number</i>
8073.24b	<i>Prefabricated houses with out-buildings as specified under 8032</i>	<i>Number</i>

The unit of measurement for Item 8073.24a shall be the number of complete housing units supplied and erected according to the Specifications and Drawings.

The unit of measurement for Item 8073.24b shall be the number of prefabricated houses, complete as specified, which are provided on the Engineer's instructions.

Maintenance Standard Specifications for Road and Bridge Works

Pay Item No	Pay Item	Pay Unit
8073.25	Rented, hotel and other accommodation	
	Provision of rented, hotel and other accommodation as described under Section 8032 of these Standard Specifications	provisional sum

Payment for expenditure under Item 8073.25 shall be made in full as and when the money is expended, subject to written proof by the Contractor of payment of the amounts.

Work done under Item 8073.25 shall only be executed upon a written order by the Engineer, which order shall also specify the method of payment. Expenditure with respect to Item 8073.25 shall be entirely at the discretion of the Engineer.

8073.26	Services	
	Provision of water, electricity, L.P. Gas, sewerage, septic tanks, sewage and rubbish removal, cleaning services, maintenance and repairs, all as specified under Section 8034 of these Standard Specifications and including the construction and maintenance of access roads, footpaths, etc.:	
8073.26a	<i>Services for office and laboratories</i>	<i>lump sum</i>
8073.26b	<i>Services for pre-fabricated houses</i>	<i>Number</i>
8073.26c	<i>Services for rented houses</i>	<i>Number</i>
8073.26d	<i>Services for labourers' accommodation and on Site</i>	<i>lump sum</i>

Payment for services provided under Item 8073.26 shall be made in four equal instalments when the value of the permanent work done, excluding escalation, reaches 25%, 50% and 75% of the contract amount; final payment shall be made when all accommodation provided has been removed from the Site.

Payment of the lump sum tendered for Items 8073.26a, 8073.26b, 8073.26c and 8073.26d shall be in full compensation for providing the services specified.

Pay Item No	Pay Item	Pay Unit
8073.27	Combined office and laboratory accommodation (Alternative to use of items 8073.21 up to and including 8073.24 when so required in the Special Provisions)	
	Offices and laboratory accommodation, including fittings, furniture and equipment, car ports and housing for labourers, in accordance with the details given in the Special Provisions and on Drawings	lump sum

The tendered lump sum for Item 8073.27 shall be in full compensation for supplying and erecting the accommodation, fittings and furniture as specified in the Specifications and shown on the Drawings, for the proper maintenance thereof and for the subsequent removal thereof from Site on completion of the Works.

Maintenance Standard Specifications for Road and Bridge Works

Pay Item No	Pay Item	Pay Unit
8073.28	Motor vehicles	
8073.28a	<i>Provision of motor vehicles (type of vehicle to be identified)</i>	<i>lump sum</i>
8073.28b	<i>Kilometres travelled by motor vehicles (type of vehicle to be identified)</i>	<i>km</i>
8073.28c	<i>Provision of driver</i>	<i>man-days</i>

The unit of measurement for Item 8073.28a shall be the number of vehicles (type of vehicle specified), complete as specified which are provided on the Engineer's instructions.

The unit of measurement for Item 8073.28b shall be the number of kilometres run in each type of vehicle supplied on the Engineer's instructions.

The unit of measurement for Item 8073.28c shall be the number of drivers multiplied by the number of days for which the drivers are provided. Payment for Item 8073.28c shall be for full compensation for providing a driver separately from the provision of drivers covered under Item 8073.28b.

Pay Item No	Pay Item	Pay Unit
8073.29	Furniture for housing accommodation	
	Provision of furniture for housing accommodation as specified in the Special Provisions, including maintenance:	
8073.29a	<i>Plan 1 house furniture unit</i>	<i>Number</i>
8073.29b	<i>Plan 2 house furniture unit</i>	<i>Number</i>
8073.29c	<i>Plan 3 house furniture unit</i>	<i>Number</i>
8073.29d	<i>Plan 4 house furniture unit</i>	<i>Number</i>
8073.29e	<i>Plan 5 house furniture unit</i>	<i>Number</i>

The unit of measurement for Items 8073.29a, 8073.29b, 8073.29c, 8073.29d and 8073.29e shall be the number of furniture units supplied for each house Plan type, as specified.

Payment under Items 8073.21, 8073.22, 8073.23, 8073.24 and 8073.27 shall be made as follows:

80% of the amount shall be paid when the item is provided and erected, fitted or installed to the Engineer's satisfaction. A further 10% shall be paid when the value of all permanent work done, excluding escalation, exceeds one-half of the tendered amount and the remaining 10% shall be payable in the certificate which follows the removal of the items from the Site.

Payment under Items 8073.28a, 8073.29a, 8073.29b, 8073.29c, 8073.29d and 8073.29e shall be made as follows:

60% of the amount shall be paid when the item has been provided or installed to the satisfaction of the Engineer's. The balance of 40% for each item shall be paid monthly in the proportion of the time elapsed from the date of supply to the length of the Contract Period remaining at that date, except that 10% of the tendered amount will be retained to provide for possible extension to the Contract.

The tendered rate for Item 8073.28b shall include all running costs not included in Item 8073.28a, such as fuel, oils, tyres, repairs, driver's wages, etc. Payment shall be made monthly in arrears based on the actual number of kilometres travelled in each vehicle as recorded daily by the Engineer's Resident staff.

Payment at tendered unit rates for the various items of payment scheduled in this section shall be in the full compensation for providing, procuring, erecting, installing and/or fitting the item or service as may be required or specified, for the use of the item or service, including replacements when defective, and finally the dismantling and removal of each item, including all transport, handling and other costs.

Maintenance Standard Specifications for Road and Bridge Works

Payment for Items 8073.26a and 8073.26d shall be increased pro rata at the time they are required during any extended time of execution of the works for which extension of time has been approved and granted.

Payment for Items 8073.26b and 8073.26c and for the alternative accommodation provided in terms of Section 8032(d) of these Standard Specifications shall be adjusted pro rata the time they are required during the period of execution of the works or any extension thereof for which an extension of time has been approved and granted.

8073.30 Accommodation of Traffic

Pay Item No	Pay Item	Pay Unit
8073.31	Accommodation of traffic and maintenance of bypasses	km

The unit of measurement shall be the kilometre, measured along the centre line of the road on which the works are to be carried out, where public traffic has to be accommodated by means of temporary bypasses, execution of the Works in half widths of existing roads used as bypasses. It shall not include sections along which the traffic is diverted onto existing roads and where the Contractor is not responsible for the maintenance of such existing roads.

The tendered rate for the accommodation of traffic and maintenance of bypasses shall include full compensation for all general obligations and incidental items of cost necessary for the accommodation of traffic and the construction and maintenance of bypasses, including existing roads used as bypasses, during the period for execution of the works and during the maintenance period where such items of cost are not specifically paid for under the pay items provided under this section in the Bill of Quantities. It shall also include full compensation for the provision of flagmen, traffic lights, signs, barriers and, where necessary, communications equipment required to regulate traffic, for the provision and maintenance of temporary drainage, arranging for the moving of services, attending to traffic problems, complying with the requirements of the Road Traffic Regulations and the requirements of other local authorities and for providing temporary access to private property.

Payment shall be made in two equal instalments in respect of each section. The first instalment shall be made when suitable bypasses have been approved for use by the Engineer or when traffic is taken over the half-width execution of the works. The second instalment shall become due when the traffic can be accommodated on the new road, all bypasses have been removed and the land reinstated and all general obligations of the Contractor have been complied with, all to the satisfaction of the Engineer.

Pay Item No	Pay Item	Pay Unit
8073.32	Construction of gravel bypasses	
8073.32a	<i>Shaping of bypasses</i>	<i>km</i>
8073.32b	<i>Cut and borrow to fill</i>	<i>m³</i>
8073.32c	<i>Cut to spoil</i>	<i>m³</i>
8073.32d	<i>Gravelling of bypasses</i>	<i>m³</i>

The unit for measurement for Shaping of bypasses shall be the kilometre of bypasses shaped, compacted and constructed in accordance with the provisions of Section 8043 of these Standard Specifications. Where the Contractor has to provide access roads to private property, the length of such access roads outside the road reserve shall be included in the quantity measured for payment. The tendered rate shall include full compensation for clearing and grubbing where necessary, the removal of small trees and stumps, for shaping and grading, watering, mixing and compacting the material for all cuts and fills constructed from material obtained from alongside the bypasses or side cut, but including only such portions of the fill that is less than 0.5 m in height.

The unit of measurement for Cut and borrow to fill shall be the cubic metre of fill measured in situ from levelled cross-sections taken before and after construction where such material is either imported from a position more than 100 m from point of use or is utilized in a portion of fill which is more than 0.5 m above ground level. Where measurements by cross-

Maintenance Standard Specifications for Road and Bridge Works

section is impractical, the volume can be measured by taking 70 % of the loose volume measured in trucks in the case of soil and gravel material, and 50 % of the loose volume in trucks in the case of hard material consisting predominantly of particles 100 mm and more maximum dimension. The tendered rates shall include full compensation for acquiring and placing of all classes of material, including transporting over a distance of 0.5 km.

The unit of measurement for Cut to spoil shall include full compensation for excavating in all classes of material, loading, transporting, off-loading, including the shaping and levelling of spoil material and transporting over a free distance of 0.5 km.

The unit of measurement for Gravelling of bypasses shall be the cubic metre of gravel provided as wearing course for the surfacing of bypasses, computed from the dimensions of the layer as actually constructed in place in accordance with the Engineer's instructions. Where measurement by the above method is not considered practicable by the Engineer, the volume may be computed by taking 70 % of the loose volume of the gravel as measured in the hauling vehicles. The tendered rates shall include full compensation for procuring, furnishing and placing the gravel wearing course, including a free haul of 3,0 km.

Pay Item No	Pay Item	Pay Unit
8073.33	Existing roads used as bypasses	provisional sum

The provisional sum for Item 8073.33 is allowed to cover the cost of work ordered by the Engineer. Where the exact nature of the work can be determined beforehand, provision may be made in the Special Provisions for suitable rates to be tendered in lieu of allowing a provisional sum.

Pay Item No	Pay Item	Pay Unit
8073.34	Maintenance of gravel bypasses	
8073.34a	<i>Watering of bypasses</i>	<i>k-litre</i>
8073.34b	<i>Grading of bypasses by motor grader</i>	<i>km-pass</i>

The unit of measurement for use of a motor grader to grade the surfaces of bypasses shall be the kilometre-pass, i.e. each kilometre of full-width bypass of which the whole surface has been bladed by one pass of the motor grader to the satisfaction of the Engineer. In case of bypasses constructed as two separate one-way roads, they together shall be considered as one full-width bypass for purposes of measurement. Only the number of kilometre-passes actually authorized by the Engineer in writing shall be measured and paid for.

Where the grading and compaction of bypasses has not been carried out satisfactorily and the surfaces has not been improved as much as can reasonably be expected from such an operation, the Contractor shall carry out further grader work at his own expense until a standard is achieved which is acceptable to the Engineer.

The tendered rate shall include full compensation for the provision of the motor graders, rollers and operators, flagmen, guards, barriers, signs and all other costs incidental thereto and for the grading of the bypasses to a smooth compacted surface free of corrugations and potholes.

Pay Item No	Pay Item	Pay Unit
8073.35	Maintenance of surfacing and pavement of existing bitumen-surfaced roads used as bypasses	provisional sum

The provisional sum for Item 8073.35 is allowed to cover the cost of work ordered by the Engineer in terms of Sub-section 8043(f) of these Standard Specifications for repairing and maintaining the bituminous surfacing and pavement of existing bitumen-surfaced roads used as bypasses.

Maintenance Standard Specifications for Road and Bridge Works

Pay Item No	Pay Item	Pay Unit
8073.36	Barricades, traffic signs, drums and traffic lights	
8073.36a	<i>Provision of new barricades</i>	
8073.36b	<i>Provision of new traffic signs</i>	Number
8073.36c	<i>Provision of new drums</i>	Number
8073.36d	<i>Re-use of barricades</i>	Number
8073.36e	<i>Re-use of traffic signs</i>	Number
8073.36f	<i>Re-use of drums</i>	Number
8073.36g	<i>Traffic lights</i>	provisional sum

The unit of measurement for *Provision of new barricades*, *Provision of new traffic signs* and *Provision of new drums* shall be the number of items 8073.36a, 8073.36b and 8073.36c actually provided in accordance with the Engineer's instructions and the Specifications and Drawings.

The tendered rates shall include full compensation for the procuring, furnishing, erecting, first use, all maintenance and later removal of these items when no longer required. 75 % of the tendered rate will be paid when these items are installed and the remaining 25 % when they are no longer required and have been removed. The tendered rates for traffic signs shall include full compensation for the supply, erection and subsequent dismantling and removal of any supports or supporting framework.

The unit of measurement for Re-use of barricades, traffic signs and drums shall be the number of times each item is re-used, excluding its use as originally installed. Payment shall only be made where barricades and signs have to be taken down and re-erected and when drums have to be moved to an entirely different location. Drums moved to a different position at the same location will not be paid for as drums re-used.

The tendered rates shall, in the case of barricades, traffic signs, include full compensation for the taking down, transporting, off-loading and re-erection, including any supporting frame-work, and in the case of drums for the emptying, loading, transporting, off-loading, repositioning and re-ballasting. The rate tendered for Sub-item 8073.36e above shall not apply to guide and informative signs as specified in the Road Traffic (Signs) Regulations and as shown on the Drawings.

The provisional sum allowed for Item 8073.36g is to cover the cost of providing traffic lights.

Pay Item No	Pay Item	Pay Unit
8073.37	Temporary culverts	
8073.37a	<i>Supply and lay temporary prefabricated culverts complete (state type, size, and type of bedding)</i>	m
8073.37b	<i>Re-use of prefabricated culverts complete (state type, size and type of bedding)</i>	m

The unit of measurement for Item 8073.37a shall be the metre of culverts furnished and installed by the Contractor. The tendered rate shall include full compensation for procuring and furnishing new culverts, all excavations, bedding, laying and backfilling and the eventual removal of the culverts, including excavation, loading, transporting off Site and reinstating of surfaces.

The unit of measurement for Item 8073.37b shall be the metre of culvert installed. The tendered rate shall include full compensation for taking up of the culverts in the positions originally installed in bypasses and installing the culverts in a new position, including all excavation, backfilling and bedding, the loading, transporting and off-loading of the culverts, the eventual removal of the culverts, including excavation, loading, transporting, off-loading and stacking at a suitable site, and reinstatement of surfaces.

Maintenance Standard Specifications for Road and Bridge Works

Pay Item No	Pay Item	Pay Unit
8073.38	Accommodation of traffic where the execution of the Works is in half widths	km

The unit of measurement for the accommodation of traffic where the execution of the Works is in half widths shall be the kilometre measured along the centre line of the road where the execution of the Works is in half widths on the written instructions of the Engineer. The tendered rate shall include full compensation for the supply of all plant, equipment, tools, transport, labour, supervision, flagmen, guards, signs, lights, barriers and all other incidentals necessary for the proper and safe handling of traffic as specified, and shall include full compensation for all additional costs and work resulting from execution of the Works in half widths.

Pay Item No	Pay Item	Pay Unit
8073.39	Temporary fencing, gates and grid gates	
8073.39a	<i>Temporary fencing</i>	<i>km</i>
8073.39b	<i>Temporary gates</i>	<i>Number</i>
8073.39c	<i>Temporary grid gates</i>	<i>Number</i>

The unit of measurement for Temporary fencing shall be the kilometre of temporary fencing erected by the contractor. The tendered rate shall include full compensation for procuring, furnishing and erecting new or second hand fencing and subsequently removing it, or for moving and re-erecting existing fencing when permitted by the Engineer and subsequently reinstating such fencing with quality similar to its original condition, in positions as may be required.

The unit of measurement for Temporary gates shall be the number of temporary gates provided by the Contractor. The tendered rate shall include full compensation for either procuring, furnishing and erecting new or second-hand gates and subsequently removing them and reinstating by fencing, or for moving existing gates where permitted and subsequently removing them, reinstating fencing where they were installed or re-erecting the gates in new positions.

The unit of measurement for Temporary grid gates shall be the number of temporary grid gates constructed by the Contractor. The tendered rate shall include full compensation for erecting the grid gates from new or second-hand material, in accordance with the Drawings and, if required, demolishing and removing the grid gates and reinstating any fencing taken down where the grid gates were erected.

Pay Item No	Pay Item	Pay Unit
8073.41	Overhaul	
8073.41a	<i>Overhaul on cut and borrow to fill and on cut to spoil material hauled in excess of the free haul distance of 0.5 km</i>	<i>m³-km</i>
8073.41b	<i>Overhaul on material hauled in excess of the free haul distance of 3.0 km</i>	<i>m³-km</i>

The unit of measurement and payment for Item 8073.41a shall be the cubic metre of overhaul material hauled in excess of 0.5 km multiplied by the overhaul distance.

The unit of measurement and payment for Item 8073.41b shall be the cubic metre of overhaul material hauled in excess of 3.0 km multiplied by the overhaul distance.

Overhaul material in excess of that required for the completion of the Works or otherwise not authorised by the Engineer will not be measured for payment purposes. The rate tendered and paid for shall be in full payment for hauling material in excess of the free haul distance.

Maintenance Standard Specifications for Road and Bridge Works

8073.50 Clearing and Grubbing

Pay Item No	Pay Item	Pay Unit
8073.51	Clearing and grubbing	ha

The unit of measurement for Clearing and grubbing shall be the hectare. The quantity shall be taken as the area in hectare (to the nearest 0.1 ha) designated by the Engineer and cleared and grubbed in accordance with these Specifications. The tendered rate shall include full compensation for all work necessary for the clearing of the surface, the removal and grubbing of trees and tree stumps (except large trees and stumps as defined below), cutting of branches, the removal of anthills, backfilling of cavities, demolishing and disposal of structures except where otherwise provide for in the Special Provisions, and the removal, transporting and disposal of material, all as specified in Section 8060 is these Standard Specifications.

Pay Item No	Pay Item	Pay Unit
8073.52	Removing and grubbing of large trees and tree stumps	
8073.52a	<i>Girth larger than 1 m up to and including 2 m²</i>	<i>Number</i>
8073.52b	<i>Girth larger than 2 m up to and including 3 m</i>	<i>Number</i>

The girth of trees or stumps shall be measured at the point of the tree or stump one metre above general ground level. Trees and stumps with a girth in excess of 1 m shall be measured individually and classified according to size in increments of 1 m, as indicated above.

Where the works are carried out through plantations or where the number of trees with a girth of more than 1 m renders individual measurements impracticable, the Special Provisions will provide that the clearing and grubbing of trees in such areas be measured in hectare. If this method of measurement is used, the areas to which it is applicable will be shown on the Drawings, stated in the Special Provisions or be indicated to the Tenderers at the site inspection.

The tendered rate shall include full compensation for all work necessary for the clearing and grubbing of trees and stumps of all sizes, the backfilling of holes and the removal and disposal of material, all as described in Section 8060 is these Standard Specifications.

Where the Special Provisions provide for payment of clearing and grubbing of large trees per hectare in certain specific cases, the tendered rate shall include full compensation for all work in connection with individual trees, as described above.

8100 ROAD RESERVE

8101 Scope

Feature 8100 Road Reserve covers interventions in the entire road reserve, including vegetation control, control of straying animals, maintenance of rest areas, including bus stops and lay-byes, litter control and obstacles removal, maintenance of slopes and maintenance of landscaped areas.

The feature "Road Reserve" shall be defined as per the Botswana Road Design Manual (BRDM) and the Standard Specifications for Road and Bridge Works (SSRBW).

The feature 8100 Road Reserve covers the following interventions and activities:

8110 Vegetation Control

- 8111 Grass Cutting
- 8112 Creeper Grass Removal
- 8113 Bush Clearing
- 8114 Trees Trimming
- 8115 Trees Removal
- 8116 Morama Tuber Removal
- 8117 De-stumping
- 8119 Other Vegetation Control

8120 Animals Control

- 8121 Fence Repair
- 8122 Gate Repair
- 8123 Cattle Grid Repair
- 8124 Keeping Animals off Road Reserve
- 8125 Moles Control
- 8129 Other Animals Control

8130 Rest Area Maintenance

- 8131 Rest Area Cleaning
- 8132 Rest Area Facilities Repair
- 8133 Rest Area Reshaping
- 8134 Rest Area Regravelling
- 8135 Rest Area Resealing
- 8136 Rest Area Fogspray
- 8137 Rest Area Bituminous Overlay
- 8139 Other Rest Area Maintenance

8140 Litter Control and Obstacles Removal

- 8141 Litter Collection and Removal
- 8142 Obstacles Collection and Removal
- 8143 Dead Animals Removal
- 8144 Abandoned Vehicles and Scrap Removal

Maintenance Standard Specifications for Road and Bridge Works

- 8145 Anthills Removal
- 8146 Illegal Signs and Other Encroachments Removal
- 8149 Other Litter Control and Obstacles Removal

8150 Slopes Maintenance

- 8151 Slope Erosion Prevention
- 8152 Slope Erosion Repair
- 8159 Other Slopes Maintenance

8160 Landscaped Areas Maintenance

- 8161 Trees, Grass and Flowers Planting
- 8162 Trees, Grass and Flowers Watering
- 8163 Trees, Grass and Flowers Cutting and Trimming
- 8164 Special Features Maintenance
- 8165 Landscaped Areas Cleaning
- 8169 Other Landscaped Areas Maintenance

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	VEGETATION CONTROL	CODE:	8110

Scope

This maintenance intervention comprises the following maintenance activities:

- 8111 Grass Cutting
- 8112 Creeper Grass Removal
- 8113 Bush Clearing
- 8114 Trees Trimming
- 8115 Trees Removal
- 8116 Morama Tuber Removal
- 8117 De-stumping
- 8119 Other Vegetation Control

Activity 8119 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	VEGETATION CONTROL	CODE:	8110
Activity	Grass Cutting	Code:	8111

8111.1 Scope

Grass Cutting includes mowing of grass and vegetation by hand-mower and /or brush cutter (or other hand equipment) in medians, drains and around roadside furniture and signs or elsewhere as required. Grass shall be cut within width W m from the shoulder breakpoint on both sides of the road and on danger points (inside sharp curves, junctions, bus stops, lay-byes and railway crossings), the grass must not exceed height H mm at any time throughout the year. (W and H are defined in the MSRBW 8111). The Activity also includes cutting of grass by tractor or other mechanical means. Grass shall be defined as any plant having a girth of not more than 60 mm measured at a height of 300 mm above ground level.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- Mowing of all required areas to a height that meets the quality standards specified.
- All other operations necessary in accordance with applicable specifications.
- Clean up of site including disposal of any waste or any excavated material.

8111.2 Description and Requirements

Work method for Grass Cutting shall be in accordance with MOPRBW 8111 and will normally include but will not be limited to the following operations:

- It shall be done within the entire road reserve between the boundaries or to such other width as determined by the Engineer. Grass shall be cut within the specified area or otherwise as directed by the Engineer and in conformity with the applicable Maintenance Standards.
- Uprooting of all shrubs to prevent re-growth.
- Distribution of all cut grass evenly by raking and leaving to rot. Burning of grass is prohibited unless approved by relevant authority.
- Removing cut grass from the carriageway, side drains, mitre drains and inlet and outlet structures of culverts/drainage structures to be disposed of at designated spoil areas or as directed by the Engineer.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- The mower shall travel in the direction of traffic when any part of the equipment is on the roadway surface.
- When cutting by labour, the gang should be distributed across the width to be cut and move forward at an even pace to ensure that all the grass is cut evenly and around all fixed objects. Obstructions must be removed as they are encountered.
- Grass shall be cut while facing the road so that any flying objects due to slashing are not thrown onto the carriageway. When cutting grass workmen shall ensure that no damage is caused to fixed objects such as road signs, kilometre marker posts, guardrails, etc.
- Burning of grass is prohibited.
- Tidy up the site.
- Remove all temporary signs and devices.

Maintenance Standard Specifications for Road and Bridge Works

8111.3 Standards, Materials and Tolerances

- The grass shall be cut evenly and to a maximum height of approximately 50 mm above ground level.
- Cut grass and vegetation shall be removed from side drains and placed away from the road. It shall not be allowed to block any drains or drainage structures. Caution must be taken not to remove the grass roots on areas where the grass is needed for erosion protection, i.e. on side slopes, in drains etc.
- Care shall be taken not to damage roadside fixtures, such as signs and posts. Cutting of grass around such fixtures is included in the Activity.
- All road reserve areas, medians and raised islands and drains shall be mowed to meet the described maintenance performance standards at the intended Service Levels.
- Salvaged material shall be placed in a manner which will not create a hazard to traffic and shall be removed within two weeks of being produced.

Grass Cutting in designated areas shall be performed to meet the Maintenance Performance Standard for the intended Service Level as described in MSRBW 8111.

8111.4 Measurement and Payment

The unit rate for Grass Cutting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works.

Measurement and payment for Grass Cutting shall be per square metre of area cut.

Pay Item No	Pay Item	Pay Unit
8111.41	Grass Cutting when left to rot	m ²
8111.42	Grass Cutting to be transported away	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	VEGETATION CONTROL	CODE:	8110
Activity	Creeper Grass Removal	Code:	8112

8112.1 Scope

Creeper Grass Removal includes removal of creeper grass and other harmful weed from the paved or unpaved roadway, roadside or median to prevent the grass from establishing itself and roots penetrating the surface and pavement layer.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- Removal of creeper grass of all required areas to a height that meets the quality standards specified.
- All other operations necessary in accordance with applicable specifications.
- Clean up of site including disposal of any waste or any excavated material.

8112.2 Description and Requirements

Work method for Creeper Grass Removal shall be in accordance with MOPRBW 8112 and will normally include but shall not be limited to the following operations:

- Creeper grass and other harmful weed shall be removed from the specified area at the end of the rainy season or otherwise as directed by the Engineer and in conformity with the applicable Maintenance Performance Standards and Service Level.
- Cutting of creeper grass and removing of upper grass roots along a corridor 500 mm from shoulder break point.
- Tracing the roots of the creeper grass and using pick-axe to remove grass roots to prevent regrowth.
- Applying approved weed killer along a corridor 500 mm from shoulder break point.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Remove cut grass away from the road by raking and using wheel barrow haul and spread evenly along the fence, or remove to a designated area.
- Burning of grass is prohibited.
- Tidy up the site.
- Remove all temporary signs and devices.

8112.3 Standards, Materials and Tolerances

Applicable Specifications:

Care shall be taken not to damage roadside fixtures, such as signs and posts.

Salvaged material shall be placed in a manner which will not create a hazard to traffic and shall be removed within two weeks of being produced.

Cut vegetation shall be removed from side drains, placed away from the road. It shall not be allowed to block any drains or drainage structures.

Creeper Grass Removal in designated areas shall be performed to meet the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8112.

8112.4 Measurement and Payment

The unit rate for Creeper Grass Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of shoulder where creeper grass is removed.

Pay Item No	Pay Item	Pay Unit
8112.41	Creeper Grass Removal	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	VEGETATION CONTROL	CODE:	8110
Activity	Bush Clearing	Code:	8113

8113.1 Scope

Bush Clearing shall consist of removal and disposal of bushes on shoulders, medians, in side drains and within the road reserve to maintain safe sight distance, visibility of signs, markers and animals within the road reserve and to maintain a pleasing appearance of the road side areas. It includes the disposal of all materials resulting from the clearing.

Bush shall be defined as any plant with girth more than 60 mm but less than or equal to 300 mm measured at 300 mm from the ground. Bush Clearing shall include removal of stumps and root system to a minimum depth of 500 mm from the ground so as to prevent their re-growth.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for bush clearing.
- Clean up of site including disposal of any waste or any excavated material.

8113.2 Description and Requirements

Work methods for Bush Clearing shall be in accordance with MOPRBW 8113 and will normally include but not be limited to the following operations:

- Bushes shall be cut down to ground level and the root system removed to prevent their re-growth.
- Collecting the cut down material in heaps to be discarded as soon as possible. The heaps should not obstruct visibility to traffic.

Operational Requirements:

- Take the required safety precautions in accordance with the safety Instructions in MOPRBW 8900.
- Workmen must ensure that no damage is caused to fixed objects such as road signs, kilometre marker posts, guardrails etc when removing bushes.
- All big trees, protected species and those trees growing reasonably isolated shall be left to grow to provide shade for rest areas and visual aesthetics.
- Burning is prohibited.
- Tidy up the site.
- Remove all temporary signs and devices.

8113.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials shall be in accordance with SSRBW: SECTION 1700: CLEARING AND GRUBBING.

Designated areas shall be cleared to meet the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8113.

8113.4 Measurement and Payment

The unit rate for Bush Clearing shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area cleared.

Pay Item No	Pay Item	Pay Unit
8113.41	Bush Clearing	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	VEGETATION CONTROL	CODE:	8110
Activity	Trees Trimming	Code:	8114

8114.1 Scope

Trees Trimming shall consist of removal and disposal of branches and limbs of trees that affect sight distance, as well as dead or diseased branches and limbs that will hinder the healthy normal growth of as directed or in accordance with the applicable Maintenance Standard. It includes the disposal of all materials resulting from the trimming.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for trimming of trees.
- Clean up of site including disposal of any waste or any excavated material.

8114.2 Description and Requirements

Work methods for Trees Trimming shall be in accordance with MOPRBW 8114 and will normally include but not be limited to the following operations:

- Cuts shall be made flush at the collar of the supporting trunk or limb. Damage to the bark, limbs, and roots of trees and shrubs that are to remain shall cut in a manner acceptable to the Engineer.
- The cut down material shall be collected in heaps to be removed as soon as possible. The heaps should not obstruct visibility to traffic.
- Burning is prohibited unless approved by relevant authorities, in which case it must be carried out so that the fires are kept under control.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Cut tree branches to ensure a minimum headroom clearance of 5 m and a minimum lateral clearance from the edge of the road of 2 m on a straight road section. On the inside of a bend, this lateral dimension shall be increased to maintain the specified sight distance for the road. Precaution must be taken to ensure that no damage is caused to fixed objects such as road signs, kilometre marker posts, guardrails, etc.
- Operations and equipment used to perform selective trimming shall not damage trees and shrubs that are to remain. Climbing spurs or spikes shall not be used. Load and transport to designated or approved places away from the roadway.
- Tidy up the site.
- Remove all temporary signs and devices.

8114.3 Standards, Materials and Tolerances

Trees to be trimmed to give a pleasing appearance.

Applicable Specifications:

Workmanship and materials shall be in accordance with SSRBW: SECTION 1700: CLEARING AND GRUBBING.

Trees shall be trimmed to meet the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8114.

8114.4 Measurement and Payment

The unit rate for Trees Trimming shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of trees trimmed.

Pay Item No	Pay Item	Pay Unit
8114.41	Trees Trimming	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	VEGETATION CONTROL	CODE:	8110
Activity	Trees Removal	Code:	8115

8115.1 Scope

Trees Removal shall consist of removal and disposal of individual trees as directed by the Engineer to improve sight distance or create open vistas, or improve the appearance. Trees removed shall be salvaged and removed to a designated place. The tree stumps and roots shall also be removed. Excavation remaining from the removal of trees shall be backfilled with suitable material and compacted. All vegetation shall be disposed of.

A tree is defined as a plant with a girth of more than 300 mm measured 300 mm from the ground.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for trees removal.
- Clean up of site including disposal of any waste or any excavated material.

8115.2 Description and Requirements

Work methods for Trees Removal shall be in accordance with MOPRBW 8115 and will normally include but shall not be limited to the following operations:

- Trees shall be cut down to ground level and removed. Uprooting of stumps, see Activiy 8117. Cutting into pieces of not more than 2 m length all felled trees and uprooted stumps and loading and transporting to designated places away from the roadway.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Decide on the direction in which the tree should fall to ensure that no damage will be caused to existing fixed objects in the vicinity of the tree.
- The cut down and uprooted material shall be collected in heaps to be removed as soon as possible. The heaps should not obstruct visibility to traffic.
- Burning is prohibited.
- Tidy up the site.
- Remove all temporary signs and devices.

8115.3 Standards, Materials and Tolerances

Large trees and stumps shall be cut in such a manner that no stumps remain.

Applicable Specifications:

Workmanship and materials shall be in accordance with SSRBW: SECTION 1700 CLEARING AND GRUBBING

Designated areas shall be cleared to meet the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8115.

8115.4 Measurement and Payment

The unit rate for Trees Removal shall be full compensation for all labour, equipment, tools, transport and incidentals required to complete the works prescribed, including backfilling, compaction and transport to place of removal and/or storage. It shall be measured and paid per number of trees removed.

Pay Item No	Pay Item	Pay Unit
8115.41	Trees Removal	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	VEGETATION CONTROL	CODE:	8110
Activity	Morama Tuber Removal	Code:	8116

8116.1 Scope

Morama Tuber Removal shall consist of removal to a minimum depth of 500 mm, and disposal of individual morama tubers as directed to prevent undermining of the pavement structure. Tubers shall be salvaged and removed to a place of storage. Excavation remaining from the removal of morama tubers shall be backfilled with suitable material and compacted. All debris shall be disposed as directed by the Engineer.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for the removal of morama tubers.
- Clean up of site including disposal of any waste or any excavated material.

8116.2 Description and Requirements

Work methods for Morama Tuber Removal shall be in accordance with MOPRBW 8116 and will normally include but shall not be limited to the following operations:

- The excavated material shall be collected in heaps to be disposed of as soon as possible.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Removed tubers shall be disposed of in a designated dumping area or as directed by the Engineer.
- Tidy up the site.
- Remove all signs and safety devices.

8116.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials shall be in accordance with SSRBW: SECTION 1700 CLEARING AND GRUBBING.

If the tuber is outside the roadway, backfill morama tuber hole to original ground level. If the tuber is within the roadway, backfill in 150 mm layers with excavated materials while compacting to 90 % MOD AASHTO up to LSSG then backfill in 150 mm layers using natural gravel with specifications equal or above the existing pavement materials and compact to 93 % MOD AASHTO for USSG, 95 % for subbase and 98 % for base course then seal with bitumen surface similar to existing.

Designated areas shall be cleared of morama tubers to meet the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8116.

8116.4 Measurement and Payment

The unit rate for Morama Tuber Removal shall be full compensation for all labour, tools, transport and incidentals required to complete the works prescribed, including backfilling, compaction and transport to place of removal and/or storage. It shall be measured and paid per number of morama tubers removed.

Pay Item No	Pay Item	Pay Unit
8116.41	Morama Tuber Removal	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	VEGETATION CONTROL	CODE:	8110
Activity	De-stumping	Code:	8117

8117.1 Scope

De-stumping shall include removal of stumps and roots of bushes and trees which have been left within the road reserve from previous bush clearing activities to prevent re-growth and prolong the bush clearing cycles. De-stumping shall be done within the entire road reserve.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for the de-stumping.
- Clean up of site including disposal of any waste or any excavated material.

8117.2 Description and Requirements

Work methods for de-stumping shall be in accordance with MOPRBW 8117 and will normally include but shall not be limited to the following operations:

- The root system of trees shall be removed to prevent re-growth. Roots shall be removed to a depth of at least 0,5 m below the natural ground level. Removal of the stump shall be by physical removal and disposed of in a designated area.
- After removal of the stumps, the resulting hole shall be backfilled to the level of the natural ground. The backfill material shall be taken from immediately around the stump and lightly compacted.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Cut all uprooted stumps into manageable sizes for loading and transporting to designated or approved disposal places away from the roadway.
- Tidy up the site.
- Remove all temporary signs and devices.

8117.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials shall be in accordance with SSRBW: SECTION 1700 CLEARING AND GRUBBING

Designated areas shall be de-stumped to meet the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8117.

8117.4 Measurement and Payment

The unit rate for De-stumping for the number of stumps and roots removed shall be full compensation for all labour, equipment, tools, transport and incidentals required to complete the works prescribed, including backfilling, compaction and transport to place of removal and/or storage. It shall be measured and paid per number of stumps removed and disposed of in accordance with specifications.

Pay Item No	Pay Item	Pay Unit
8117.41	De-stumping	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	ANIMALS CONTROL	CODE:	8120

Scope

This maintenance intervention comprises the following maintenance activities:

- 8121 Fence Repair
- 8122 Gate Repair
- 8123 Cattle Grid Repair
- 8124 Keeping Animals off Road Reserve
- 8125 Moles Control
- 8129 Other Animals Control

Activity 8129 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	ANIMALS CONTROL	CODE:	8120
Activity	Fence Repair	Code:	8121

8121.1 Scope

Fence Repair includes maintenance of fences to ensure their function in keeping animals away from the road reserve. It includes re-erecting and replacing fence posts, repairing fence wires, repairing and replacing droppers and other minor repair that may be carried out while keeping intact the function of the fence.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for repair of fences.
- Clean up of site including disposal of any waste or any excavated material.

8121.2 Description and Requirements

Fence Repair shall include:

- Minor Repair that includes fastening of bolts, rewiring of netting, fixing of posts etc.
- Intermediate Repair that includes all works to restore the functioning of fences before a permanent repair or replacement can be made.
- Full Replacement of damaged fence.

Work methods for Fence Repair shall be in accordance with MOPRBW 8121 and will normally include but shall not be limited to the following operations:

- Removing all wire, posts and staples from the worksite.
- Replacing broken posts.
- Carrying out necessary repairs.
- Backfilling holes and compacting with suitable material to restore the compacted surface to its original condition.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- If necessary, place temporary barriers on short sections of fence or around gates, until the repair has been carried out.
- Remove temporary barriers.
- Tidy up the site.
- Remove all signs or move them to the next section.

8121.3 Standards, Materials and Tolerances

Defects on fences shall be repaired as and when required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW.

When fences require repair, material declared suitable by the Engineer shall be re-used. The repaired fences shall be plumb, taut, true to line and ground contour, with all posts, standards and stays firmly set. Fencing wires shall not vary by more than 10 mm from their prescribed relative vertical position.

Applicable Specifications:

Workmanship and all materials used for repair of existing fences shall be in accordance with SSRBW: SECTION 5500A FENCING.

8121.4 Measurement and Payment

The unit rate for Fence Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of fence repaired or replaced. To be measured before works start.

Pay Item No	Pay Item	Pay Unit
8121.41	Fence Minor Repair	m
8121.42	Fence Intermediate Repair	m
8121.43	Fence Full Replacement	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	ANIMALS CONTROL	CODE:	8120
Activity	Gate Repair	Code:	8122

8122.1 Scope

Gate Repair includes maintenance of gates to ensure their function in keeping animals away from the road reserve. It includes re-erecting and replacing gate posts, repairing gate wires, and other minor repair that may be carried out while keeping intact the function of the gate.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for repair of gates.
- Clean up of site including disposal of any waste or any excavated material.

8122.2 Description and Requirements

Work methods for Gate Repair shall be in accordance with MOPRBW 8122 and will normally include but shall not be limited to the following operations:

- Carrying out necessary repairs.
- Replacing damaged gate, damaged beyond repair.
- Removing all wire, posts and fasteners from the worksite.
- Backfilling holes and compacting with suitable material to restore the compacted surface to its original condition.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove all signs or move them to the next section.

8122.3 Standards, Materials and Tolerances

Defects on gates shall be repaired as and when required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8122.

When gates require repair, material declared suitable by the Engineer shall be re-used. The repaired gate shall be plumb, taut, true to line and ground contour and fully functional.

Applicable Specifications:

Workmanship and all materials used for repair of existing gates shall be in accordance with SSRBW: SECTION 5511A INSTALLING GATES.

8122.4 Measurement and Payment

The unit rate for Gate Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of gates repaired.

Pay Item No	Pay Item	Pay Unit
8122.41	Gate Repair	Number
8122.42	Gate Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	ANIMALS CONTROL	CODE:	8120
Activity	Cattle Grid Repair	Code:	8123

8123.1 Scope

Cattle Grid Repair shall consist of cleaning out the trench, inspecting the cattle grid and performing minor repair to grid or concrete structure if necessary, as well as reinstatement of pavement.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for repair of cattle grids.
- Clean up of site including disposal of any waste or any excavated material.

8123.2 Description and Requirements

Work methods for Cattle Grid Repair shall be in accordance with MOPRBW 8123 and will normally include but shall not be limited to the following operations:

- Tighten loose fasteners on the cattle grid. Re-weld ruptured welds, and weld localized cracks.
- Cleaning under the cattle grid and removing silt and debris and disposing it away from the road without polluting the environment.
- Re-welding or replacing ruptured or loose rails to their original positions using a minimum 6 mm continuous fillet weld. Re-tightening loose bolts to railings.
- Reinstatement of pavement.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove all temporary signs and devices.

8123.3 Standards, Materials and Tolerances

Cattle Grids shall be repaired when required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8123.

Applicable Specifications:

All materials and construction requirements shall be in accordance with SSRBW:
SECTION 5500B CATTLE GRIDS.

8123.4 Measurement and Payment

The unit rate for Cattle Grid Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of cattle grids repaired.

Pay Item No	Pay Item	Pay Unit
8123.41	Cattle Grid Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	ANIMALS CONTROL	CODE:	8120
Activity	Keeping Animals off Road Reserve	Code:	8124

8124.1 Scope

Keeping Animals off Road Reserve shall consist of driving domestic animals (cattle, horses, donkeys, goats and sheep) and any wild animals outside the road reserve and/or outside fences to maintain traffic safety. It also includes ensuring that the fence is always intact and that gates are closed and secured at all times.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for keeping animals off the road reserve.
- Clean up of site including disposal of any waste or any excavated material.

8124.2 Description and Requirements

Keeping animals off road reserve may be carried out through patrols by bicycle or horse back or by use of a light duty patrol vehicle as described below. Work methods shall be in accordance with MOPRBW 8124 and will normally include but not be limited to the following operations:

- Investigating sources of animals along the road section.
- Sensitizing the owners not to let their animals stray into the road reserve.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- The light duty patrol vehicle shall have two retro-reflective signs of red reflective text (to read "ANIMAL PATROL VEHICLE") and border on white non-reflector zed background, one at the rear and the other in front of the vehicle and properly secured such that they would be visible to approaching vehicles. A rotating beacon giving out amber light, with a minimum intensity of 100 W shall be properly secured on the roof and to be switched on for the full duration of the night patrol, so as to give warning to approaching traffic. The vehicle shall also be fitted with movable flood lights mounted on the vehicle to search for animals during night patrols. Use of vehicle full lights to search for animals is prohibited.
- At night the patrol vehicle shall be well lit with the flashing hazard light switched on so as to give warning to traffic approaching from both directions.
- When using bicycle, motorcycle or horse for patrolling, appropriate safety gear including reflective clothing shall be used.
- All animals found straying within the road reserve shall immediately be driven back behind the boundary fence and secured there by closing the gates.
- Where the road reserve is unfenced especially in villages, the straying animals shall be driven to a minimum of 100 m from the centreline of the road.
- The full length of the road to be controlled.

8124.3 Standards, Materials and Tolerances

Road reserve shall be kept free of roaming domestic animals in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8124.

Applicable Specifications:

Workmanship and materials shall be in accordance with SSRBW: SECTION 5504A PROTECTION OF LIVESTOCK

8124.4 Measurement and Payment

The unit rate for Keep Animals off Road Reserve shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per kilometre per day of fenced or unfenced road kept clear of domestic animals.

Pay Item No	Pay Item	Pay Unit
8124.41	Keep Animals off Road reserve	km/day

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	ANIMALS CONTROL	CODE:	8120
Activity	Moles Control	Code:	8125

8125.1 Scope

Moles Control shall consist of controlling moles from entering the roadway or the road reserve adjacent to the road, removing moles that have entered these areas and reinstating the pavement that may have been damaged from burrows.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for control of moles.
- Clean up of site including disposal of any waste or any excavated material.

8125.2 Description and Requirements

Work methods for Moles control shall be in accordance with MOPRBW 8125 and will normally include but not be limited to the following operations:

- Excavation using pick axes or excavator at mole holes positions to entire depth of the hole in order to destroy the moles breeding area.
- Spraying of approved pesticide or the use of pellets to prevent the moles from re-establishing within the road reserve.
- Backfilling with excavated material.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove signs and safety devices.

8125.3 Standards, Materials and Tolerances

Roadway shall be kept free of moles in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8125.

Applicable Specifications:

Reinstatement of the pavement shall, if applicable, be carried out in accordance with relevant specifications for pothole patching.

8125.4 Measurement and Payment

The unit rate for Moles Control shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of mole holes destroyed. Payment for reinstatement of pavement layers shall be in accordance with pay items for Pothole Patching under Activity 8213.

Pay Item No	Pay Item	Pay Unit
8125.41	Moles Control	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	REST AREA MAINTENANCE	CODE:	8130

Scope

This maintenance intervention comprises the following maintenance activities:

- 8131 Rest Area Cleaning
- 8132 Rest Area Facilities Repair
- 8133 Rest Area Reshaping
- 8134 Rest Area Regravelling
- 8135 Rest Area Resealing
- 8136 Rest Area Fogspray
- 8137 Rest Area Bituminous Overlay
- 8139 Other Rest Area Maintenance

Activity 8139 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	REST AREA MAINTENANCE	CODE:	8130
Activity	Rest Area Cleaning	Code:	8131

8131.1 Scope

Rest Area Cleaning shall consist of cleaning of rest areas, necessary for the safety and convenience of the public. It shall include general up-keep and maintenance of rest areas, bus stops and lay-byes including removal of litter and debris, cleaning, emptying of litter bins and minor repair and maintenance to ensure a pleasing appearance and attractive facilities for the public.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for cleaning of rest areas.
- Clean up of site including disposal of any waste or any excavated material.

8131.2 Description and Requirements

Work methods for Rest Area Cleaning shall be in accordance with MOPRBW 8131 and will normally include but not be limited to the following operations:

- Emptying of litterbins and collecting and removing all litter, debris and disposed objects from and in the immediate vicinity of the areas meant for use by the public. Unpaved areas should be raked to remove all debris. Paved areas should be swept clean of loose sand, stones and other debris.
- Collecting the litter and debris in appropriate litterbags. Small amounts of natural debris may be disposed of in a safe location outside the road reserve.
- Draining away standing water from areas meant for use by the public.
- Making sure that all shelters and furniture are standing in their intended position and are safe to the public.
- Collecting the litterbags by the end of each working day to a temporary storage area/facility to ensure that animals do not open the bags.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Transport the litterbags to a designated waste disposal pit.
- Tidy up the site.
- Remove safety devices on completion of the job.

8131.3 Standards, Materials and Tolerances

Rest areas, bus stops and lay-byes and their immediate surrounding areas shall generally be clean and have a pleasing appearance. Shelters, furniture and litter bins shall be functional and in good repair. Records of the daily production shall be kept for reference and quality control.

Rest areas, bus stops and lay-byes shall be cleaned satisfactorily by regularly empty litter bins, collect and remove all litter, debris and other disposed objects from the areas meant for the public and their immediate vicinity in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8131.

8131.4 Measurement and Payment

The unit rate for Rest Area Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of rest areas, bus stops and lay-byes cleaned.

Pay Item No	Pay Item	Pay Unit
8131.41	Rest Area Cleaning	Number
8131.42	Bus Stop Cleaning	Number
8131.43	Lay-bye Cleaning	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	REST AREA MAINTENANCE	CODE:	8130
Activity	Rest Area Facilities Repair	Code:	8132

8132.1 Scope

Rest Area Facilities Repair shall include general up-keep and maintenance of facilities on rest areas, bus stops and lay-byes, necessary for the safety and convenience of the public. It includes maintenance and repair of all rest area facilities such as tables, benches, toilet, buildings and shelters, necessary for the convenience of the public.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for rest areas facilities repair.
- Clean up of site including disposal of any waste or any excavated material.

8132.2 Description and Requirements

Work methods for Rest Area Facilities Repair shall be in accordance with MOPRBW 8132 and will normally include but not be limited to the following operations:

- Checking shelters, furniture and litter bins for defects and carrying out such minor repair as may be required.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8132.3 Standards, Materials and Tolerances

Rest area facilities shall be functional and in good repair.

Rest area facilities shall be maintained satisfactorily in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8132.

8132.4 Measurement and Payment

The unit rate for Rest Area Facilities Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of furniture pieces repaired at rest areas, bus stops and lay-byes to be maintained.

Pay Item No	Pay Item	Pay Unit
8132.41	Rest Area Facilities Repair	Number
8132.42	Rest Area Building and Toilet Repair	Number
8132.43	Bus Stop Facilities Repair	Number
8132.44	Lay-bye Facilities Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	REST AREA MAINTENANCE	CODE:	8130
Activity	Rest Area Reshaping	Code:	8133

8133.1 Scope

Rest Area Reshaping shall consist of light and medium grading to reinstate the correct profile of rest areas, bus stops and lay-byes, including watering and compaction. (It does not include scarifying or addition of imported gravel/material from outside the work site to build up the existing material, which is included in Activity 8134 Rest Area Regravelling).

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for rest areas reshaping.
- Clean up of site including disposal of any waste or any excavated material.

8133.2 Description and Requirements

Work methods for Rest Area Reshaping shall be in accordance with MOPRBW 8133 and will normally include but not be limited to the following operations:

- Filling local depressions with approved gravel material.
- Watering and compacting at optimum moisture content all loose material using hand rammers or rollers.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove all temporary signs and safety devices.

8133.3 Standards, Materials and Tolerances

Rest area surfaces shall be free of potholes, rutting, ravelling, wash-boarding or ponding of water.

Rest area surfaces shall be maintained satisfactorily in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8133.

8133.4 Measurement and Payment

The unit rate for Rest Area Reshaping shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of rest areas, bus stops and lay-byes reshaped.

Pay Item No	Pay Item	Pay Unit
8133.41	Rest Area Reshaping	m ²
8133.42	Bus Stop Reshaping	m ²
8133.43	Lay-bye Reshaping	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	REST AREA MAINTENANCE	CODE:	8130
Activity	Rest Area Regravelling	Code:	8134

8134.1 Scope

Rest Area Regravelling shall consist of addition of imported material to rest areas, bus stops and lay-byes surfaces to reinstate the correct profile, including removal of any vegetation and preparation of the existing formation, watering and compaction.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for rest areas regravelling.
- Clean up of site including disposal of any waste or any excavated material.

8134.2 Description and Requirements

Work methods for Rest Area Regravelling shall be in accordance with MOPRBW 8134 and will normally include but not be limited to the following operations:

- Grading the rest area surface to provide a firm, regular base on which to work.
- Adding approved material if required and spreading by using shovels and rakes or by motor grader and watering to optimum water content and compacting to specified degree of compaction.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove all temporary signs and safety devices.

8134.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 3800 GRAVEL SHOULDERS AND WEARING COURSE.

Lumps or stone larger than 37.5 mm shall be broken down or removed.

Rest area surfaces shall be free of potholes, rutting, ravelling, wash-boarding or ponding of water.

Rest areas shall meet with the Quality Service Level as described in the applicable Maintenance Standard.

Rest area, bus stops and lay-byes surfaces shall be maintained satisfactorily in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8134.

8134.4 Measurement and Payment

The unit rate for Rest Area Regravelling shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cubic metre of compacted gravel on rest areas, bus stops and lay-byes regravelled.

Pay Item No	Pay Item	Pay Unit
8134.41	Rest Area Regravelling	m ³
8134.42	Bus Stop Regravelling	m ³
8134.43	Lay-byes Regravelling	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	REST AREA MAINTENANCE	CODE:	8130
Activity	Rest Area Resealing	Code:	8135

8135.1 Scope

Rest Area Resealing shall consist of an appropriate bituminous surfacing to surfaced rest areas, bus stops and lay-byes. Where necessary, general repair such as pothole patching, shall be carried out before resealing work.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for rest areas resealing.
- Clean up of site including disposal of any waste or any excavated material.

8135.2 Description and Requirements

Work methods for Rest Area Resealing shall be in accordance with MOPRBW 8135 and will include but not be limited to the following operations:

- Sweeping the area to be sealed using hand brooms and/or mechanical brooms.
- Spraying bitumen using a spraying container or a bitumen distributor as directed by the Engineer.
- Spreading the approved aggregate uniformly over the binder either using wheel barrows, shovels and rakes or by use of mechanical chip spreading equipment as directed by the Engineer.
- Alternatively applying slurry as directed by the Engineer.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove all signs and safety devices.

8135.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 4000 ASPHALT PAVING AND BITUMINOUS SURFACING.

Rest area surfaces shall be free of potholes, rutting, ravelling, wash-boarding or ponding of water.

Rest areas shall meet with the Quality Service Level as described in the applicable Maintenance Standard.

Rest area surfaces shall be maintained satisfactorily in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8135.

8135.4 Measurement and Payment

The unit rate for Rest Area Resealing shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of rest areas, bus stops and lay-byes re-sealed. The unit of measurement of binder with respect to variation in application shall be the litre measured at spraying temperature, and the unit for variation in aggregate application shall be per m³.

Pay Item No	Pay Item	Pay Unit
8135.41	Rest Area Resealing	m ²
8135.42	Bus Stop Resealing	m ²
8135.43	Lay-bye Resealing	m ²
8135.44	Variation in Binder Application	litre
8135.45	Variation Aggregate Application	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	REST AREA MAINTENANCE	CODE:	8130
Activity	Rest Area Fogspray	Code:	8136

8136.1 Scope

Rest Area Fogspray shall consist of supplying and applying a diluted emulsion to the bituminous surface of rest areas, bus stops and lay-byes that look lean and "hungry" according to the Engineer, whereby loss of aggregate is eminent. Where necessary, general repair such as pothole patching, shall be carried out before fogspray work.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for rest areas fogspray, including preparation of existing surface.
- Clean up of site including disposal of any waste or any excavated material.

8136.2 Description and Requirements

Work methods for Rest Area Fogspray shall be in accordance with MOPRBW 8136 and will normally include but not be limited to the following operations:

- Brooming the surface to be fogsprayed to remove loose particles and carting away to spoil in an environmentally friendly manner.
- Spraying the diluted emulsion onto the rest area surface at the specified rate.

Operational Requirements

- Place warning signs in accordance with guidelines given in Section 8900 for safety of workmen and traffic control.
- Carry out a rate spread test for the binder distributor and provide a driver's chart.
- On the rest area adjust the height of the spray bar to ensure that each point on the surface is sprayed by binder from three separate jets.
- Adjust the angle of spray bar so that it is parallel to the rest area surface to obtain a good transverse distribution of the binder.
- Adjust the width covered by the spray bar so that 1/3 of the spray from the last jet on the bar overlaps the previous spray.
- Traffic shall not be allowed onto the fogsprayed area within 4 hours to avoid splashing on vehicles.
- Tidy up the site.
- Remove warning signs and safety devices.

8136.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials and construction for Rest Area Fogspray shall be in accordance with SSRBW: SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING

Rest Area Fogspray shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8136.

8136.4 Measurement and Payment

The unit rate for Rest Area Fogspray shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of rest areas, bus stops and lay-byes fogsprayed.

The unit of measurement of binder with respect to variation in application shall be the litre measured at spraying temperature.

Pay Item No	Pay Item	Pay Unit
8136.41	Rest Area Fogspray	m ²
8136.42	Bus Stop Fogspray	m ²
8136.43	Lay-bye Fogspray	m ²
8136.44	Variation in Binder Application	litre

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	REST AREA MAINTENANCE	CODE:	8130
Activity	Rest Area Bituminous Overlay	Code:	8137

8137.1 Scope

Rest Area Bituminous Overlay shall consist of supply and furnishing of all materials for the overlay of existing paved roadway surfaces on rest areas, bus stops and lay-byes. Where necessary, general repair such as pothole patching, shall be carried out before bituminous overlay work.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for bituminous overlay on rest areas, including preparation of existing surface.
- Clean up of site including disposal of any waste or any excavated material.

8137.2 Description and Requirements

Work methods for Rest Area Bituminous Overlay shall be in accordance with MOPRBW 8137 and will include but not be limited to the following operations:

- Preparation of the existing surface.
- Transportation, heating, spraying, paving and all other operations necessary in accordance with applicable specifications.
- At completion of work, the overlay must be smoothly run into the existing rest area surface over a length of 2 – 5 m by excavating the existing surface and replacing it with overlay premix material.

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Tidy up the site.
- Remove safety devices on completion of the job.

8137.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING.

Rest area surfaces shall be free of potholes, rutting, ravelling, wash-boarding or ponding of water.

Rest areas shall meet with the Quality Service Level as described in the applicable Maintenance Standard.

Rest area surfaces shall be maintained satisfactorily in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8137.

8137.4 Measurement and Payment

The unit rate for Rest Area Fogspray shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of rest areas, bus stops and lay-byes fogsprayed.

The unit of measurement of binder with respect to variation in application shall be the litre measured at spraying temperature.

Pay Item No	Pay Item	Pay Unit
8137.41	Rest Area Bituminous Overlay	m ²
8137.42	Bus Stop Bituminous Overlay	m ²
8137.43	Lay-bye Bituminous Overlay	m ²
8137.44	Tack Coat Variation	litre
8137.45	Asphalt Mix Variation	ton

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LITTER CONTROL AND OBSTACLES REMOVAL	CODE:	8140

Scope

This maintenance intervention comprises the following maintenance activities:

- 8141 Litter Collection and Removal
- 8142 Obstacles Collection and Removal
- 8143 Dead Animals Removal
- 8144 Abandoned Vehicles and Scrap Removal
- 8145 Anthills Removal
- 8146 Illegal Signs and Other Encroachments Removal
- 8149 Other Litter Control and Obstacles Removal

Activity 8149 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LITTER CONTROL AND OBSTACLES REMOVAL	CODE:	8140
Activity	Litter Collection and Removal	Code:	8141

8141.1 Scope

Litter Collection and Removal shall consist of the collection and disposal of litter, whether from bins located along the road reserve, or from the road reserve itself.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for litter collection and removal.
- Clean up of site including disposal of any waste or any excavated material.

8141.2 Description and Requirements

Work methods for Litter Collection and Removal shall be in accordance with MOPRBW 8141 and will normally include but not be limited to the following operations:

- Removing of all foreign articles, debris and litter from the roadway and road reserve at intervals sufficiently frequent to reach the prescribed Service Level for the Activity. This shall also include the emptying of litter bins and cleaning of all containers. Sufficient litter bags and the necessary equipment such as sharp pointed steel rods for picking up plastic bags and paper items shall be provided. All bottles, tins inter alia hidden by the grass and shrubs, shall be removed.
- Emptying of litter bins and collecting and removing of all litter from and in the immediate vicinity of the areas meant for use by the public.
- Collecting the litter in appropriate litter bags. Small amounts of natural debris may be disposed of in a safe location outside the road reserve.
- Placing the litter bags on the roadside just below the shoulder breakpoint for ease of collection.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- The litter bag collection vehicle shall travel off the surfaced width of the road as far as possible and the bag collection operation shall be organised in such a way that filled bags left on the side of the road do not have to be carried across the road to the vehicle.
- No dumping sites will be permitted within the reserve area and the contractor shall be responsible for removing the filled bags to the nearest approved dumping site.
- Collect the litter bags by the end of each working day to be transported to a temporary storage area/facility to ensure that animals do not open the bags.
- Transport the litter bags to a designated waste disposal pit.

8141.3 Standards, Materials and Tolerances

The standard for litter collection and removal shall generally meet with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8141.

The following particular standards shall be observed:

- No litter that are potentially hazardous to traffic shall remain on the roadway.
- No litter shall remain in the vicinity of sensitive locations, such as water sources, hospitals, school, heritage sites etc.

8141.4 Measurement and Payment

The unit rate for Litter Collection and Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per month for kilometre of road maintained.

Pay Item No	Pay Item	Pay Unit
8141.41	Litter Collection and Removal	km - month

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LITTER CONTROL AND OBSTACLES REMOVAL	CODE:	8140
Activity	Obstacles Collection and Removal	Code:	8142

8142.1 Scope

Obstacles Collection and Removal shall consist of removal of obstacles such as fallen trees and branches and large stones from the road reserve to maintain traffic safety, and protect the public from health hazards and maintain a pleasing appearance of the road reserve

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for obstacles collection and removal.
- Clean up of site including disposal of any waste or any excavated material.

8142.2 Description and Requirements

Work methods for Obstacles Collection and Removal shall be in accordance with MOPRBW 8142 and will normally include but not be limited to the following operations:

- Removal of obstacles defined as any object or material occurring on the roadway or within the road reserve which interfere with the flow of traffic and necessitates immediate removal. Such obstacles include but are not limited to: spilt substances, fallen trees or branches, rockfall, loose aggregate and sand, broken signs. It does not include removal of smaller obstacles, which shall be done in connection with the routine litter collection or other activities as directed by the Engineer.
- Removal of isolated obstacles such as stripped tyres, loose boulders, and broken road furniture which should be manually lifted or dragged from the roadway and carted away for disposal at designated places.
- Removal of cargo spilled from trucks which should be removed for disposal at designated places.
- Carting away of soil deposited on the roadway to designated places away from the side drains.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove all temporary signs and safety devices.

8142.3 Standards, Materials and Tolerances

Obstacles shall be collected and removed from the road reserve areas, medians and raised islands to meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8142.

The following particular standards shall be observed:

- No obstacles that are potentially hazardous to traffic shall remain on the roadway.

8142.4 Measurement and Payment

The unit rate for Obstacles Collection and Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per month for kilometre of road kept clear of obstacles.

Pay Item No	Pay Item	Pay Unit
8142.41	Obstacles Collection and Removal	km - month

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LITTER CONTROL AND OBSTACLES REMOVAL	CODE:	8140
Activity	Dead Animals Removal	Code:	8143

8143.1 Scope

Dead Animals Removal shall consist of removal of dead animals from the roadway and road reserve to maintain traffic safety, protect the public from health hazards and maintain a pleasing appearance of the road reserve

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for removal of dead animals.
- Clean up of site including disposal of any waste or any excavated material.

8143.2 Description and Requirements

Work methods for Dead Animals Removal shall be in accordance with MOPRBW 8143 and will normally include but will not be limited to the following operations:

- Lifting or dragging the dead animal away from the roadway.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Remove the dead animal to a safe location outside the roadway. (Dead animals should not be removed further until the police has arrived).
- Dispose of the dead animal on approved disposal site or as directed by the Engineer.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8143.3 Standards, Materials and Tolerances

Dead animals shall be removed from the road reserve areas, medians and raised islands to meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8143.

The following particular standards shall be observed:

- No dead animals shall remain on the roadway or within the road reserve.

8143.4 Measurement and Payment

The unit rate for Dead Animals Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per month for kilometre of road removed of dead animals.

Pay Item No	Pay Item	Pay Unit
8143.41	Dead Animals Removal	km - month

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LITTER CONTROL AND OBSTACLES REMOVAL	CODE:	8140
Activity	Abandoned Vehicles and Scrap Removal	Code:	8144

8144.1 Scope

Abandoned Vehicles and Scrap Removal shall consist of removal of abandoned vehicles or scrap left on the roadway or the road reserve to maintain traffic safety, protect the public from hazards and maintain a pleasing appearance of the road reserve.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for removal of abandoned vehicles and scrap.
- Clean up of site including disposal of any waste or any excavated material.

8144.2 Description and Requirements

Work methods for Abandoned Vehicles and Scrap Removal shall be in accordance with MOPRBW 8144 and will normally include but shall not be limited to the following operations:

- Pushing and/or pulling abandoned vehicles or scrap from the roadway to the roadside area pending arrangements for their complete removal from the road reserve.
- Making arrangements to tow abandoned vehicles or scrap to a designated place in an environmentally friendly and lawful manner.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Place warning signs in front and rear of the abandoned vehicle if it is within three metres (3 m) of the carriageway.
- Tidy up the site.
- Remove all temporary signs and safety devices.

8144.3 Standards, Materials and Tolerances

Abandoned vehicles and scrap shall be removed from the road reserve areas, medians and raised islands to meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8144.

8144.4 Measurement and Payment

The unit rate for Abandoned Vehicles and Scrap Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. Abandoned vehicles shall be paid per number of vehicles removed. Scrap shall be measured and paid per month for kilometre of road maintained clear of abandoned vehicles and scrap.

Pay Item No	Pay Item	Pay Unit
8144.41	Abandoned Vehicles Removal	km - month
8144.42	Scrap Removal	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LITTER CONTROL AND OBSTACLES REMOVAL	CODE:	8140
Activity	Anthills Removal	Code:	8145

8145.1 Scope

Anthills Removal shall consist of removal of anthills within the road reserve and killing of ants by use of approved pesticide to prevent ants from undermining the road and ingress of water. It includes the disposal of all materials resulting from the removal.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for removal of anthills.
- Clean up of site including disposal of any waste or any excavated material.

8145.2 Description and Requirements

Work methods for Anthills Removal shall be in accordance with MOPRBW 8145 and will normally include but not be limited to the following operations:

- Treating the area covered by anthills, after excavation and before backfilling of cavities, with an approved ant control chemical.
- Removing the part of the anthill above the ground and opening a hole into the nest at least 0.75 m below ground.
- Mixing of approved pesticide with water in the prescribed proportions and pouring into the hole until the anthill is saturated. If deemed necessary, open more than one hole.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Dispose of loose material outside the road reserve.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8145.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship shall be in accordance with SSRBW: SECTION 1700 CLEARING AND GRUBBING (1703 (c)).

Materials:

- Ant-termite poison as approved by the Engineer.

Anthills within the road reserve areas, medians and raised islands and drains shall be removed in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8145.

8145.4 Measurement and Payment

The unit rate for Anthills Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be paid per number of anthills removed.

Pay Item No	Pay Item	Pay Unit
8145.41	Anthill Removal	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LITTER CONTROL AND OBSTACLES REMOVAL	CODE:	8140
Activity	Illegal Signs and Other Encroachments Removal	Code:	8146

8146.1 Scope

Illegal Signs and Other Encroachments Removal shall consist of removal of illegal signs, buildings of any type, obstructions, offensive material or material causing unpleasant smell, fire, digging, planting or sowing or other encroachment left within road reserve, or affecting the road reserve from the road reserve. It includes the disposal of all materials resulting from the removal.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for removal of illegal signs and other encroachments, incl. notification as required, and disposal to designated site.
- Clean up of site including disposal of any waste or any excavated material.

8146.2 Description and Requirements

Work methods for Illegal Signs and Other Encroachments Removal shall be in accordance with MOPRBW 8146 and will normally include but not be limited to the following operations:

- Notify relevant owner/person responsible for placing such signs or encroachments.
- Follow legal procedure for removal, incl. contact with relevant authority.
- Removal of illegal signs or encroachments by excavation or breaking and carting removed materials to designated areas or as directed by the Engineer.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Dismantle, cut and excavate to remove the sign, or break to remove an encroachment using appropriate tools.
- Dispose of loose material to designated areas, or as directed by the Engineer.
- Tidy up the site.
- Remove all safety devices on completion of the work.

8146.3 Standards, Materials and Tolerances

Illegal signs and other encroachments within the road reserve areas, medians and raised islands and drains shall be removed in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8146

8146.4 Measurement and Payment

The unit rate for Illegal Signs and Other Encroachments Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be paid per kilometre per month of road kept free of illegal signs and other encroachments.

Pay Item No	Pay Item	Pay Unit
8146.41	Illegal Signs and Other Encroachments Removal	km - month

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	SLOPES MAINTENANCE	CODE:	8150

Scope

This maintenance intervention comprises the following maintenance activities:

- 8151 Slope Erosion Prevention
- 8152 Slope Erosion Repair
- 8159 Other Slopes Maintenance

Activity 8159 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	SLOPES MAINTENANCE	CODE:	8150
Activity	Slope Erosion Prevention	Code:	8151

8151.1 Scope

Slope Erosion Prevention includes all works to keep slope erosion prevention structures effective, including minor repair that may be carried out while keeping intact the function of the prevention device.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for slope erosion prevention.
- Clean up of site including disposal of any waste or any excavated material.

8151.2 Description and Requirements

Work methods for Slope Erosion Prevention shall be in accordance with MOPRBW 8151 and will normally include but not limited to the following operations:

- Carrying out erosion prevention works; i.e. berms, cut-off ditches, turfing, wattling, stone pitching or kerbs as instructed by the Engineer.
- Building a berm from soil excavated from a location that will not cause ponding or seepage of water near the slope.
- A cut-off ditch will require excavation to about 500 mm depth. The sides of the ditch must not be too steep, otherwise they will collapse into the ditch and cause blockage.
- Where turfing is directed by the Engineer, the area to be turfed shall be prepared to required level and slope.
- Where no top soil is present, hauling of suitable topsoil to site and spreading evenly to a depth of not less than 50 mm, including watering as required.
- Covering the area with freshly cut sods without weeds. Sods are to have thickly matted roots which should not have dried out. Use stakes to hold sods in position.
- Tamping sods with tamper or using hand roller.
- Watering the turfs at intervals until the grass takes hold.
- Stone pitching starting at the bottom of the slope with the larger stones. Stones should be supported by soil, making use of smaller stones to wedge them in place. Larger stones should be buried deeper so that the final top surface will be uniform.
- A kerb or channel drain may be built at the edge of the carriageway or at the shoulder break point to control flow of water over the embankment slope as directed by the Engineer.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Clean and tidy up worksite.
- Remove all temporary signs and safety devices.

8151.3 Standards, Materials and Tolerances

Applicable Specifications:

Construction and Materials shall be in accordance with SSRBW SERIES 3000: EARTHWORKS, SUBBASES, SHOULDERS AND BASES. Erosion prevention shall be repaired as and when required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8151.

Maintenance Standard Specifications for Road and Bridge Works

8151.4 Measurement and Payment

The unit rate for Slope Erosion Prevention shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid as follows:

Pay Item No	Pay Item	Pay Unit
8151.41	Berms of Specified Cross Section	m
8151.42	Cut-off Ditch of Specified Cross Section	m
8151.43	Turfing	m ²
8151.44	Stone Pitching	m ²
8151.45	Kerbs - Channel Drain	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	SLOPES MAINTENANCE	CODE:	8150
Activity	Slope Erosion Repair	Code:	8152

8152.1 Scope

Slope Erosion Repair includes all works necessary to repair minor slope erosion, including excavation of unstable material, backfill the slope and restore shoulders and pavement. It does not cover any major cut or fill failures where total reconstruction is necessary.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for repair of slope erosion.
- Clean up of site including disposal of any waste or any excavated material.

8152.2 Description and Requirements

Work methods for Slope Erosion Repair shall be in accordance with MOPRBW 8152 and will normally include but not be limited to the following operations:

- Carefully removing of loose slope material to firm material at the base and sides of the erosion runnels to the depths as directed by the Engineer. The excavated material shall either be stockpiled where it shall be dried out if necessary for later re-use, or transported to spoil if so ordered by the Engineer. The surfaces in excavations shall at all times be formed to shed water without ponding.
- During the placing of the backfill material, the surfaces of layers shall at all times be formed to shed water without ponding. Unless otherwise instructed by the Engineer, fill layers shall be bonded by benching into the existing face to depth at the face equal to the layer thickness. Layer thicknesses are restricted to 150 mm after compaction with heavy compaction equipment or to 100 mm if smaller hand held compaction equipment is used.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in Section 8900 of OP to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove all temporary signs and safety devices.

8152.3 Standards, Materials and Tolerances

The re-instatement of cut and fill erosion repair shall require a standard of workmanship to produce repair work not liable to settle after reconstruction.

Applicable Specifications:

All materials used for repair of erosion failures shall be in accordance with the SSRBW.

Fallen slope material classified as "emergency"; i.e. the quantity of the material is above 100 m³ or where the material slide blocks all lanes and interrupts the road traffic, shall be attended to without delay in accordance with procedures for emergency works in Section 8800.

Erosion repair shall be carried out as and when required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8152.

8152.4 Measurement and Payment

The unit rate for Slope Erosion Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid as follows:

Pay Item No	Pay Item	Pay Unit
8152.41	Repair of Berms of Specified Cross Section	m
8152.42	Repair of Cut-off Ditch of Specified Cross Section	m
8152.43	Repair of Turfing	m ²
8152.44	Repair of Stone Pitching	m ²
8152.45	Repair of Kerbs – Channel Drain	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LANDSCAPED AREAS MAINTENANCE	CODE:	8160

Scope

This maintenance intervention comprises the following maintenance activities:

- 8161 Trees, Grass and Flowers Planting
- 8162 Trees, Grass and Flowers Watering
- 8163 Trees, Grass and Flowers Cutting and Trimming
- 8164 Special Features Maintenance
- 8165 Landscaped Areas Cleaning
- 8169 Other Landscaped Areas Maintenance

Activity 8169 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LANDSCAPED AREAS MAINTENANCE	CODE:	8160
Activity	Trees, Grass and Flowers Planting	Code:	8161

8161.1 Scope

Trees, Grass and Flowers Planting shall consist of planting of trees, grass and flowers that have either withered or been destroyed in landscaped areas.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for planting of trees, grass and flowers.
- Clean up of site including disposal of any waste or any excavated material.

8161.2 Description and Requirements

Work methods for Trees, Grass and Flowers Planting shall be in accordance with MOPRBW 8161 and will normally include but not be limited to the following operations:

- Removing of withered or damaged trees, grass and flowers and replacing these in accordance with plans for landscaped areas or as directed by the Engineer.
- Scarifying of the tree hole or grass area to specified depth, mixing thoroughly the scarified soil with fertilizer, including adding of adequate amount of water and letting the mixture to soak overnight.
- Planting of trees or grass on prepared areas as specified by the relevant authorities.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Clean and tidy up worksite.
- Remove all temporary signs and safety devices.

8161.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials and construction shall be in accordance with SSRBW: SECTION 5800 LANDSCAPING AND GRASSING/5806 Establishment and Maintenance of the Grass.

Trees, Grass and Flowers Planting shall in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8161.

8161.4 Measurement and Payment

The unit rate for Trees, Grass and Flowers Planting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid as follows:

Pay Item No	Pay Item	Pay Unit
8161.41	Trees Planting	Number
8161.42	Grass Planting	m ²
8161.43	Flowers Planting	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LANDSCAPED AREAS MAINTENANCE	CODE:	8160
Activity	Trees, Grass and Flowers Watering	Code:	8162

8162.1 Scope

Trees, Grass and Flowers Watering shall consist of watering trees, grass and flowers in landscaped areas to keep the area aesthetically pleasing and to promote a healthy growth.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for watering of trees, grass and flowers.
- Clean up of site including disposal of any waste or any excavated material.

8162.2 Description and Requirements

Work methods for Trees, Grass and Flowers Watering shall be in accordance with MOPRBW 8162 and will normally include but not be limited to the following operations:

- Watering of trees, grass and flowers using hose reel connected from water bowser with shower rose attachment. In areas inaccessible with a water bowser, water the trees and grass using watering cans with shower rose spouts.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Clean and tidy up worksite.
- Watering shall be carried out at appropriate time of the day, depending on season.

8162.3 Standards, Materials and Tolerances

Applicable Specifications:

Work methods shall be as described in MOPRBW 8162.

All materials shall be in accordance with SSRBW: SECTION 5800 LANDSCAPING AND GRASSING/5806 Establishment and Maintenance of the Grass.

Water shall be from approved source.

Trees, Grass and Flowers Watering shall be in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8162.

8162.4 Measurement and Payment

The unit rate for Trees, Grass and Flowers Watering shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid as follows:

Pay Item No	Pay Item	Pay Unit
8162.41	Trees and Watering	Number
8162.42	Grass and Flowerbed Watering	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LANDSCAPED AREAS MAINTENANCE	CODE:	8160
Activity	Trees, Grass and Flowers Cutting and Trimming	Code:	8163

8163.1 Scope

Trees, Grass and Flowers Cutting and Trimming includes all works associated with trimming of trees and shrubs planted within the landscaped areas of the road reserve, including trimming of flowerbed that extends over a wide area.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for trimming of trees, grass and flowers.
- Clean up of site including disposal of any waste or any excavated material.

8163.2 Description and Requirements

Work methods for Trees, Grass and Flowers Trimming shall be in accordance with MOPRBW 8163 and will normally include but not be limited to the following operations:

- Trimming and cutting of trees, grass and flowers as directed by the Engineer.
- Weeding out unwanted vegetation around trees and within grass manually or using garden tools.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove all temporary signs and safety devices.

8163.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials and construction shall be in accordance with SSRBW: SECTION 5800 LANDSCAPING AND GRASSING/5806 Establishment and Maintenance of the Grass.

Trees, Grass, and Flowers Cutting and Trimming shall be in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8163.

8163.4 Measurement and Payment

The unit rate for Tress, Grass and Flowers Cutting and Trimming shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid as follows:

Pay Item No	Pay Item	Pay Unit
8163.41	Landscaped Areas Grass Cutting	m ²
8163.42	Trees Cutting and Trimming	Number
8163.43	Flowerbed Cutting and Trimming	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LANDSCAPED AREAS MAINTENANCE	CODE:	8160
Activity	Special Features Maintenance	Code:	8164

8164.1 Scope

Special Features Maintenance shall consist of all works associated with maintenance and repair of stonework, concrete work, metalwork and timberwork in landscaped areas.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for maintenance of special features.
- Clean up of site including disposal of any waste or any excavated material.

8164.2 Description and Requirements

Work methods for Special Features Maintenance shall be in accordance with MOPRBW 8164 and will normally include but not be limited to the following operations:

- Repairing bent, broken, cracked or spalled special features in the landscaped areas as directed by the Engineer.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Clean and tidy up worksite.
- Remove all temporary signs and safety devices.

8164.3 Standards, Materials and Tolerances

- Special features in landscaped areas shall be in good repair and have no visible defects.
- They shall not obstruct the roadway, signs or traffic lights.

Special Features in Landscaped Areas shall be kept in satisfactory condition and defects shall be repaired in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8164.

8164.4 Measurement and Payment

The unit rate for Special Features Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid for as follows:

Pay Item No	Pay Item	Pay Unit
8164.41	Concrete Feature Repair	Number
8164.42	Metal Feature Repair	Number
8164.43	Timber Feature Repair	Number
8164.44	Stone Feature Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD RESERVE	CODE:	8100
INTERVENTION	LANDSCAPED AREAS MAINTENANCE	CODE:	8160
Activity	Landscaped Areas Cleaning	Code:	8165

8165.1 Scope

Landscaped Areas Cleaning shall consist of cleaning of landscaped areas necessary for the safety and convenience of the public. It shall include general upkeep and maintenance of Landscaped Areas, including removal of litter and debris, cleaning, emptying of litter bins and minor repair and maintenance to ensure a pleasing appearance and adequate facilities for the public.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for cleaning of landscaped areas.
- Clean up of site including disposal of any waste or any excavated material.

8165.2 Description and Requirements

Work methods for Landscaped Areas Cleaning shall be in accordance with MOPRBW 8165 and will include but not be limited to the following operations:

- Emptying of litter bins and collecting and removing all litter, debris and disposed objects from and in the immediate vicinity of the areas meant for use by the public. Unpaved areas should be raked to remove all debris. Paved areas should be swept clean of loose sand, stones and other debris.
- Draining away standing water from areas meant for use by the public.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Collect the litter bags by the end of each working day to a temporary storage area/facility to ensure that animals do not open the bags.
- Transport the litter bags to a designated waste disposal pit.

8165.3 Standards, Materials and Tolerances

Landscaped Areas and their immediate surrounding areas shall generally be clean and have a pleasing appearance. Shelters, furniture and litter bins shall be functional and in good repair.

Landscaped Areas shall be cleaned satisfactorily by regularly empty litter bins, collect and remove all litter, debris and other disposed objects from the areas meant for the public and their immediate vicinity in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8165

8165.4 Measurement and Payment

The unit rate for Landscaped Areas Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of Landscaped Areas cleaned.

Pay Item No	Pay Item	Pay Unit
8165.41	Landscaped Areas Cleaning	m ²

8200 PAVED ROADWAY

8201 Scope

Feature 8200 Paved Roadway covers routine maintenance interventions and activities to keep the paved roadway clean and smooth and free of localised rutting, cracks, bleeding, depressions and potholes. It also covers maintenance of shoulders including removal of unwanted grass. The term paved roadway includes concrete paved roadways and block paved roadways. The feature further covers periodic maintenance activities, such as fogspray and bituminous overlays, as well as all types of resealing including Chip Seal, Slurry Seal, Sand Seal, Otta Seal and Cape Seal. All periodic maintenance activities shall generally be carried out in accordance with Standard Specifications for Road and Bridge Works (SSRBW) when required and as directed by the Engineer.

The feature "Paved Roadway" shall be defined as per the Botswana Road Design Manual (BRDM) and the Standard Specifications for Road and Bridge Works (SSRBW).

Feature 8200 Paved Roadway covers the following interventions and activities:

8210 Bituminous Paved Roadway Routine Maintenance

- 8211 Paved Roadway Cleaning
- 8212 Rutting and Depression Repair
- 8213 Pothole Patching, Edge Damage and Surface Failure Repair
- 8214 Unpaved Shoulder Maintenance
- 8215 Crack Sealing
- 8216 Bleeding Repair
- 8217 Salt Blisters Repair
- 8219 Other Bituminous Paved Roadway Routine Maintenance

8220 Bituminous Paved Roadway Periodic Maintenance

- 8221 Fogspray
- 8222 Resealing
 - 8222a Chip Seal
 - 8222b Slurry Seal
 - 8222c Sand Seal
 - 8222d Otta Seal
 - 8222e Cape Seal
- 8223 Bituminous Overlay
- 8224 Unpaved Shoulder Regravelling and Edge Drop Repair
- 8225 Unpaved Shoulder Reshaping
- 8229 Other Bituminous Paved Roadway Periodic Maintenance

Maintenance Standard Specifications for Road and Bridge Works

8230 Concrete Paved Roadway Maintenance

- 8231 Concrete Roadway Cleaning
- 8232 Concrete Roadway Crack Sealing
- 8233 Concrete Roadway Spalling Repair
- 8234 Concrete Roadway Pothole Repair
- 8235 Concrete Roadway Joint Stepping Repair
- 8236 Concrete Roadway Slab Repair
- 8239 Other Concrete Paved Roadway Maintenance

8240 Block Paved Roadway Maintenance

- 8241 Block Paved Roadway Cleaning
- 8242 Block Paved Roadway Deformation Repair
- 8243 Paving Blocks Replacement
- 8244 Block Paved Roadway Grass Removal
- 8249 Other Block Paved Roadway Maintenance

8250 Paved Footpath and Cycle Path Maintenance

- 8251 Paved Footpath and Cycle Path Cleaning
- 8252 Paved Footpath and Cycle Path General Surface Repair
- 8259 Other Paved Footpath and Cycle Path Maintenance

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8210

Scope

This maintenance intervention comprises the following maintenance activities:

- 8211 Paved Roadway Cleaning
- 8212 Rutting and Depression Repair
- 8213 Pothole Patching, Edge Damage and Surface Failure Repair
- 8214 Unpaved Shoulder Maintenance
- 8215 Crack Sealing
- 8216 Bleeding Repair
- 8217 Salt Blisters Repair
- 8219 Other Bituminous Paved Roadway Routine Maintenance

Activity 8219 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8210
Activity	Paved Roadway Cleaning	Code:	8211

8211.1 Scope

Paved Roadway Cleaning shall consist of keeping the paved roadway clean and clear of loose sand, stones, aggregates and debris to maintain traffic safety and a pleasing appearance of the road.

The Activity includes the removal and disposal (in accordance with applicable regulations/requirements) of all loose materials < 100 cm²; i.e. build up of gravel/soil at intersections, broken glass and similar accumulated on the road surface, by hand or by mechanical sweeping. (Removal of larger types of materials, i.e. tyre pieces, wood etc. > 100 cm², will be undertaken under Activity 8142 Obstacles Collection and Removal).

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for cleaning of paved roadway.
- Clean up of site including disposal of any waste or any excavated material.

8211.2 Description and Requirements

Paved Roadway Cleaning shall be carried out throughout the year as required or as directed by the Engineer. Work methods shall be in accordance with MOPRBW 8211 and will normally include but not be limited to the following operations:

- Special attention should be kept to junctions, railway crossings, sharp curves and other potential danger points where loose sand and other debris may cause vehicles to skid and/or increase the stopping distance.
- Cleaning the road using the rotary broom or other specialised equipment while driving slowly on one lane of the road in the direction of traffic. Apply water where necessary to soften cemented soil. The soil accumulated in the tank shall be deposited at designated places. Cleaning shall be carried out during traffic off-peak hours.
- Sweeping the road using a broom so as to remove accumulated soil and other deposits and collecting them in small heaps close to the shoulder breakpoint.
- Alternatively by labour based methods using a shovel, load the heaped soil onto wheel barrow for disposal within the road reserve if it is environmentally acceptable. Otherwise load the heaped soil onto the trailer or pick-up or truck, haul and dispose at designated areas.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Cleaning operations shall be carried out in the same direction as the flow of traffic and in a manner which prevents material from being cast into the flow of traffic or into drainage inlets.
- Remove safety devices on completion of the job.

8211.3 Standards, Materials and Tolerances

The roadway shall be clean and free of hazards caused by large amounts of loose material and debris. All loose material shall be removed from the paved roadway.

Loose material shall be removed from the roadway in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8211.

8211.4 Measurement and Payment

The unit rate for Paved Roadway Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area cleaned.

Pay Item No	Pay Item	Pay Unit
8211.41	Paved Roadway Cleaning	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8210
Activity	Rutting and Depression Repair	Code:	8212

8212.1 Scope

Rutting and Depression Repair shall consist of removal of deteriorated pavement and/or asphalt, and replacement with new pavement materials and asphalt or an appropriate seal, to profile. It may also include treatment of subgrade materials and reworking, as appropriate.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- Supply and application of bitumen emulsion, tack coat as per applicable specification.
- All works required for rutting and depression repair.
- Clean up of site including disposal of any waste or any excavated material.

8212.2 Description and Requirements

Work methods for Rutting and Depression Repair shall be in accordance with MOPRBW 8212 and will normally include but not be limited to the following operations:

- Removing loose debris or other objectionable material from the areas to be patched, by brooming or other methods, and a prime or tack coat applied. Any failed pavement or road base in the area to be patched shall be removed as directed by the Engineer. For patching on existing pavement surfaces, the tack coat shall extend a sufficient distance beyond the edge of the repaired area to allow for a smooth transition of the patching material to the existing pavement surface.
- The area may be reinstated to acceptable shape with premix placed and compacted on the existing surface, or by removal of existing surface materials followed by placement and compaction of unbound base material to acceptable shape and appropriate surface material.
- Where newly constructed patches obliterate existing painted roadway lines, interim painted traffic markings shall be painted on the patched area immediately upon completion of the patching work. All painting must be applied using the same colour of paint as the permanent marking in accordance with the applicable specifications.
- Filling in the depression by placing the cold or hot mix asphalt concrete, or any other surface material as ordered by the engineer within the marked outline and leaving an excess thickness of about 1/3 of the depth of the depression to allow for compaction.
- Compacting the material until the level is about 3 mm proud of the surrounding surface.
- Sealing the repair in accordance with the procedure in MOPRBW 8222 to prevent penetration of water into the pavement.
- Removing of loose material.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Remove all temporary signs and safety devices.

8212.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials used for Rutting and Depression Repair shall be in accordance with SSRBW: SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING.

The final surfacing shall be of the same type as the surrounding pavement. There shall be no depressions in the finished surface that will allow water to pond. The existing road crossfall shall be maintained. The deviation when measured with a 2 m straight edge shall not be greater than 5 mm, and there shall be no sharp ridges.

Rutting and Depression Repair shall be carried out as directed and in accordance with the intended Service Level as described in MSRBW 8212.

Maintenance Standard Specifications for Road and Bridge Works

8212.4 Measurement and Payment

The unit rate for Rutting and Depression Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved rutting and depression repaired.

Pay Item No	Pay Item	Pay Unit
8212.41	Rutting and Depression Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8210
Activity	Pothole Patching, Edge Damage and Surface Failure Repair	Code:	8213

8213.1 Scope

Pothole Patching, Edge Damage and Surface Failure Repair shall consist of the repair with asphalt or premix or other surfacing seals of isolated potholes, edge damage or surface failures in the paved surface that is otherwise in a relatively sound condition. Work consists of the vertical cutting, excavation and disposal of existing pavement, excavation and disposal of unsuitable base and sub-base material and repair of the surfacing, base course and subbase. Damaged edges shall be restored to line and level. Necessary repainting of traffic markings is included.

Distinction shall be made between temporary and permanent repair of potholes. Temporary repair shall only be undertaken if instructed or authorised by the Engineer.

The following operations shall be included as part of this Activity:

- Traffic control.
- Removal of any cracked or loose material from the area to be repaired.
- Supply, placement and compaction of all materials.
- All works required for pothole patching, edge damage and surface failures repair.

8213.2 Description and Requirements

Work methods for Pothole Patching, Edge Damage and Surface Failure Repair shall be in accordance with MOPRBW 8213 and will normally include but not be limited to the following operations:

- Removing of any ponding water in the pothole or other areas to be repaired.
- Trimming loose and cracked edges back to a neat rectangular shape, parallel and perpendicular to the centre line of the road to sound surrounding surface or base layer. All edges shall be cut to a minimum depth of 50 mm below the road surface. All cracked or loose material shall be removed from the area to be repaired. A vertical face at least 50 mm high shall be formed along the edge of the existing sealed pavement.
- Cutting and removing all material from within the marked out area by hand or by use a power cutter to cut within the marked out area of the road surface of the road surface until firm, dry material is met. Trim the walls of the hole so that they are firm and vertical.
- Trimming the bottom of the hole to make it flat and horizontal and free from any loose material.
- Spraying the horizontal and vertical face of the area to be repaired shall with a tack coat of bitumen emulsion and the tack coat shall overlap the existing seal.
- Compacting the bottom of the hole using a vibrating roller, plate compactor, or rammers depending on the size of the hole.
- Backfilling the hole with a selected and approved material and applying approved surfacing.

Operational Requirements:

- Place warning signs in accordance with guidelines given in Section 8900 for safety of workmen and traffic control.
- Remove all temporary signs and safety devices

Maintenance Standard Specifications for Road and Bridge Works

8213.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials used for Pothole Patching, Edge Brake Repair and Surface Failure Repair shall be in accordance with SSRBW: 4000 or as otherwise directed by the Engineer.

The repaired area shall be rectangular in shape. The finished surface area shall be proud of the immediate surrounding road surface by not more than 3 mm. When tested with a 2 m strait edge laid parallel to or at right angle to the road centreline, the surface of the area shall not deviate from the bottom of the strait edge by more than 3 mm.

To be acceptable, the patch shall be of the required structure and thickness, and provide a dense, smooth and level transition between the treated area and the adjacent undisturbed pavement surface, and all debris and loose materials shall have been removed and properly disposed of.

Pothole Patching, Edge Damage and Surface Failure Repair shall be performed as required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8213.

8213.4 Measurement and Payment

The unit rate for Pothole Patching, Edge Damage and Surface Failure Repair etc. shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured as follows:

Pay Item No	Pay Item	Pay Unit
8213.41	Pothole Patching	m ²
8213.42	Shoving	m ²
8213.43	Isolated Severe Crocodile Cracking	m ²
8213.44	Edge Damage	m
8213.45	Ravelling	m ²
8213.46	Surface Failure Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8210
Activity	Unpaved Shoulder Maintenance	Code:	8214

8214.1 Scope

Unpaved Shoulder Maintenance shall consist of removal of unsuitable material, digging out potholed areas, wash outs or drop-offs in square or rectangular blocks and filling with approved shoulder material.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for unpaved shoulder maintenance.
- Clean up of site including disposal of any waste or any excavated material.

8214.2 Description and Requirements

Work methods for Unpaved Shoulder Maintenance shall be in accordance with MOPRBW 8214 and will normally include but not be limited to the following operations:

- Uprooting and removing of unsuitable material.
- Digging out of potholed area to a depth of at least 50 mm, leaving the sides vertical. The hole shall be filled with approved wearing course gravel and compacted to at least 98% MOD AASHTO in layers not exceeding 150 mm. The shoulder surface shall be reinstated to its original level.
- Repairing washouts >1.0 m² and at least 150 mm deep.
- Repairing drop-off exceeding 50 mm.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the working area.
- Remove all temporary signs and devices.

8214.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and workmanship shall be in accordance with the requirements of SSRBW: SECTION 3800: GRAVEL SHOULDERS AND GRAVEL WEARING COURSE.

Potholes on shoulders, washouts and drop-offs shall be repaired as required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8214.

8214.4 Measurement and Payment

The unit rate for Unpaved Shoulder Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved shoulder maintenance.

Pay Item No	Pay Item	Pay Unit
8214.41	Unpaved Shoulder Maintenance	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8210
Activity	Crack Sealing	Code:	8215

8215.1 Scope

Crack Sealing shall consist of the sealing of cracks in the paved roadway surfacing to prevent damage to the pavement layers. This work consists of restoring the paved surface to a less permeable condition and includes cleaning and filling the crack with bitumen, slurry and where applicable cover with sand.

Crack Sealing is performed where longitudinal and/or transverse cracks or block cracks have developed. The objective is to fill the cracks with sealant or bituminous binder or slurry to prevent water to enter the pavement layers.

The following operations shall be included as part of this Activity:

- Traffic control.
- Clean up of site including disposal of any waste or any excavated material.
- All works required for sealing of cracks.

8215.2 Description and Requirements

Work methods for Crack Sealing shall be in accordance with MOPRBW 8215 and will normally include but not be limited to the following operations:

- Cleaning and drying the crack and surrounding road surface using brooms or compressed air.
- Spreading out of the slurry over the whole of the marked area.
- For isolated cracks, preparing the bituminous binder or emulsion by heating up to the specified temperature.
- Spraying the binder into the crack using a spray lance or watering can in a manner that leaves a tidy appearance.
- Spreading approved aggregate over the strip of binder.

Operational Requirements:

- Distribution of binder should be by spray lance or watering can. The nozzle or spout must be kept close to the road surface to avoid spill and to leave a tidy appearance.
- For closely spaced cracks, produce sealing slurry in accordance with specification or as ordered by the Engineer.
- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Allow slurry to dry completely before opening to traffic.
- Tidy up the work area.
- Remove all temporary signs and safety devices.

8215.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials used for Crack Sealing shall be in accordance with SSRBW: 4000

Type and grade of bituminous material shall be as generally accepted for this work by the Engineer. The use of other materials will be subject to the approval of the Engineer, and in which case the Engineer shall be provided with the following information at least 5 days prior to commencing the Work:

- Name and mailing address of crack sealant supplier and manufacturer.
- Name of crack sealant product to be supplied.
- Written confirmation from the manufacturer that the crack sealant to be supplied meets all specified requirements along with test results that demonstrate that the product meets all specified requirements.

Crack Sealing shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8215.

Maintenance Standard Specifications for Road and Bridge Works

8215.4 Measurement and Payment

The unit rate for Crack Sealing shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of cracked area repaired.

Pay Item No	Pay Item	Pay Unit
8215.41	Crack Sealing	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8210
Activity	Bleeding Repair	Code:	8216

8216.1 Scope

Bleeding Repair shall consist of repairing defects due to bleeding (excess binder on the road surface or aggregate loss) to maintain traffic safety by elimination of slipperiness.

The following operations shall be included as part of this Activity:

- Traffic control.
- Clean up of site including disposal of any waste or any excavated material.
- All works required for repair of bleeding.

8216.2 Description and Requirements

Work methods for Bleeding Repair shall be in accordance with MOPRBW 8216 and will normally include but not be limited to the following operations:

- Bleeding shall be rectified by applying approved aggregate to the road surface as instructed by the Engineer and as relevant for the type of surface.
- Spreading out the approved aggregate so that the excess binder is completely covered and the aggregate is even.
- Rolling by heavy pneumatic-tyre roller shall commence and be continued until the Engineer is satisfied that all aggregate has been properly embedded. If directed by the Engineer, the aggregate may be left to be worked into the excess bitumen binder by traffic. The treatment may have to be repeated and the aggregate be broomed back onto the surfaces to be covered until there are no signs of further bleeding.

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- No rolling shall be done in wet weather, cold weather or in the early morning when the surface is cold.
- Tidy up the working area.
- Remove safety devices on completion of the job.

8216.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials and construction for repair of bleeding shall comply with SSRBW: SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING/4313 Bleeding.

Bleeding Repair shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8216. When bleeding becomes a traffic hazard in the opinion of the engineer, and there is an imminent danger for the road to become slippery, the areas should be blinded immediately.

8216.4 Measurement and Payment

The unit rate for Bleeding Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area treated.

Pay Item No	Pay Item	Pay Unit
8216.41	Bleeding Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8210
Activity	Salt Blisters Repair	Code:	8217

8217.1 Scope

Salt Blisters Repair shall consist of repairing local defects due to salt blisters (caused by soluble salts) to maintain traffic safety and to arrest deterioration of the paved surface.

The following operations shall be included as part of this Activity:

- Traffic control.
- Clean up of site including disposal of any waste or any excavated material.
- All works required for repair of salt blisters.

8217.2 Description and Requirements

Work methods for Salt Blisters Repair shall be in accordance with MOPRBW 8217 and will normally include but not be limited to the following operations:

- For small failures cleaning the area damaged with salt blisters using the hand brooms by removing the loose surfacing of the affected area.
- Resealing the area using penetration grade or cutback bitumen and not emulsions.
- When extensive salt blistering occurs, the Engineer may order the defective surface course to be removed.
- Removing all defective materials and reinstating with approved pavement materials.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Remove safety devices on completion of the job.

8217.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials and construction for repair of blisters shall comply with SSRBW: SERIES 3000: EARTHWORKS, SUBBASES, SHOULDERS AND BASES and SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING.

Salt Blisters Repair shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8217. When salt blisters become a traffic hazard in the opinion of the engineer, and there is an imminent danger for the road to become hazardous, the areas should be attended to without delay.

8217.4 Measurement and Payment

The unit rate for Salt Blisters Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area remedied by rolling or repaired.

Pay Item No	Pay Item	Pay Unit
8217.41	Salt Blisters Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220

Scope

This maintenance intervention comprises the following maintenance activities:

- 8221 Fogspray
- 8222 Resealing
 - 8222a Chip Seal
 - 8222b Slurry Seal
 - 8222c Sand Seal
 - 8222d Otta Seal
 - 8222e Cape Seal
- 8223 Bituminous Overlay
- 8224 Unpaved Shoulder Regravelling and Edge Drop Repair
- 8225 Unpaved Shoulder Reshaping
- 8229 Other Bituminous Paved Roadway Periodic Maintenance

Activity 8229 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Fogspray	Code:	8221

8221.1 Scope

Fogspray shall consist of supplying and applying a diluted emulsion to the surface of paved roadways that is lean and “hungry” owing to age or to shortage of binder. Where a Fogspray covers existing pavement markings, including reflective studs, the work will also include application of temporary marking (spotting).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for fogspray.
- Application of temporary road markings (spotting).

8221.2 Description and Requirements

Work methods for Fogspray shall be in accordance with MOPRBW 8221 and will normally include but not be limited to the following operations:

- Sweeping the surface to be fogsprayed to remove loose particles and carting away to spoil in an environmentally friendly manner.
- Carrying out a rate spread test for the binder distributor and provide a driver’s chart.
- Spray the diluted emulsion onto the road surface at the specified rate.

Operational Requirements:

- Place warning signs in accordance with guidelines given in Section 8900 for safety of workmen and traffic control.
- On the road, adjust the height of the spray bar to ensure that each point on the surface is sprayed by binder from three separate jets.
- Adjust the angle of spray bar so that it is parallel to the road surface to obtain a good transverse distribution of the binder.
- Adjust the width covered by the spray bar so that 1/3 of the spray from the last jet on the bar overlaps the previous spray.
- Protect reflective studs during the entire operation and apply temporary road marking (spotting).
- Traffic shall not be allowed onto the fogsprayed area within 4 hours to avoid splashing on vehicles.
- Tidy up the site.
- Remove warning signs and safety devices.

8221.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials and construction for Fogspray shall be in accordance with SSRBW: SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING.

Fogspray shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8221.

8221.4 Measurement and Payment

The unit rate for Fogspray shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of sealed surface. The unit of measurement with respect to variation in binder application shall be per litre measured at spraying temperature. The unit for temporary marking (spotting) shall be per linear metre:

Pay Item No	Pay Item	Pay Unit
8221.41	Fogspray	m ²
8221.42	Variation in Binder Application	litre
8221.43	Application of Temporary Road Markings (spotting)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Resealing	Code:	8222
Method	Chip Seal	Code:	8222.a

8222.1 a Scope

Resealing by Chip Seal shall consist of supply and furnishing of all materials for the Resealing by Chip Seal of existing paved roadway surfaces. The activity includes the use of SAMI if ordered by the Engineer. Where a Chip Seal covers existing pavement markings, including reflective studs, the work will also include application of temporary marking (spotting).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for resealing, including preparation of existing surface.
- Clean up of site, including disposal of any waste or any excavated material.
- Application of temporary road markings (spotting).

8222.2 a Description and Requirements

Work methods for Resealing by Chip Seal shall be in accordance with MOPRBW 8222a and will normally include but not be limited to the following operations:

- Preparation of the existing surface by patching, if required, and sweeping the full extent of the area to be sealed, using a mechanical broom or hand brooms. Swept materials shall be heaped, loaded onto trucks and disposed in an environmentally friendly manner.
- Spreading a uniform single layer of chippings from the mechanical chip spreader following close behind the bitumen distributor, applying the chippings as soon as possible after the binder is distributed. The chippings can if approved by the Engineer be spread by shovels from stockpiles previously placed on the road shoulder or by casting the chippings by hand from the rear of a truck reversing slowly over the previously laid stone.
- Laying of SAMI if instructed by the Engineer in accordance with the applicable method specifications.
- Embedding the chippings using a pneumatic tyred roller by following close behind the chip spreaders at a speed of 10 – 15 kph.
- Collecting any excess pile of chippings from the road surface.
- Where a Chip Seal covers existing road markings and/or reflective studs, the Activity will also include the application of temporary road markings (spotting).

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- On the road, adjust the height of the spray bar to ensure that each point on the surface is sprayed by binder from three separate jets.
- Adjust the angle of spray bar so that it is parallel to the road surface to obtain a good transverse distribution of the binder.
- Adjust the width covered by the spray bar so that 1/3 of the spray from the last jet on the bar overlaps the previous spray.
- Carry out a rate spread test for the binder distributor and provide a driver's chart.
- Open road to slow moving traffic after 12 hours or as directed by the Engineer and control speed to minimize flick-off of aggregates and damage to vehicle windscreens.
- Tidy up the site.
- Remove warning signs and safety devices.

Maintenance Standard Specifications for Road and Bridge Works

8222.3 a Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 4300: SURFACE TREATMENTS and SECTION 4400: RESEALING EXISTING BITUMINOUS SURFACING.

Paved roadway surfaces shall meet with the required standard and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8222.

8222.4 a Measurement and Payment

The unit rate for Resealing by Chip Seal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved resealing.

The unit of measurement of binder with respect to variation in application shall be per litre measured at spraying temperature. The unit of measurement of aggregate with respect to variation in application shall be per cubic metre measured in the truck. The unit for temporary marking (spotting) shall be per linear metre.

Pay Item No	Pay Item	Pay Unit
8222.41 a	Resealing by Chip Seal	m ²
8222.42 a	Binder Variation	litre
8222.43 a	Aggregate Variation	m ³
8222.44 a	Application of Temporary Road Markings (spotting)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Resealing	Code:	8222
Method	Slurry Seal	Code:	8222.b

8222.1 b Scope

Resealing by Slurry Seal shall consist of supply and furnishing of all materials for the Resealing by Slurry Seal of existing paved roadway surfaces. Where a Slurry Seal covers existing pavement markings, including reflective studs, the work will also include application of temporary marking (spotting).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for resealing, including preparation of existing surface.
- Clean up of site, including disposal of any waste or any excavated material.
- Application of temporary road markings (spotting).

8222.2 b Description and Requirements

Work methods for Resealing by Slurry Seal shall be in accordance with MOPRBW 8222b and will normally include but not be limited to the following operations:

- Preparation of the existing surface by patching, if required, and sweeping the full extent of the area to be sealed, using a mechanical broom or hand brooms. Swept materials shall be heaped, loaded onto trucks and disposed in an environmentally friendly manner.
- Mixing material in a slurry mixer/distributor, or if approved by the Engineer, in a concrete mixer in accordance with the project specifications.
- Spraying a tack coat of 30 % stable-grade emulsion onto the surface to be treated at specified application rate.
- Spreading the slurry seal uniformly using a spreader, or if approved by the Engineer, using squeegees.
- If required, compacting the slurry, using a pneumatic roller as directed by the Engineer.
- Allowing the slurry to cure prior to opening to traffic.
- Removing to spoil at designated places all spilled and excess slurry.
- Where a Slurry Seal covers existing road markings and/or reflective studs, the Activity will also include the application of temporary road markings (spotting).

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Open road to slow moving traffic after 24 hours, or as directed by the Engineer, and control speed to minimize flick-off of aggregates and damage to vehicle windscreens.
- Tidy up the site.
- Remove warning signs and safety devices.

8222.3 b Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 4300: SURFACE TREATMENTS and SECTION 4400: RESEALING EXISTING BITUMINOUS SURFACING.

Paved roadway surfaces shall meet with the required standard and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8222b.

Maintenance Standard Specifications for Road and Bridge Works

8222.4 b Measurement and Payment

The unit rate for Resealing by Slurry Seal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved resealing. The unit of measurement for slurry seal variation shall be per cubic metre of saturated fine aggregate. The unit for temporary marking (spotting) shall be per linear metre.

Pay Item No	Pay Item	Pay Unit
8222.41 b	Resealing by Slurry Seal	m ²
8222.42 b	Slurry Variation	m ³
8222.43 b	Application of Temporary Road Markings (spotting)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Resealing	Code:	8222
Method	Sand Seal	Code:	8222.c

8222.1 c Scope

Resealing by Sand Seal shall consist of supply and furnishing of all materials for the resealing of existing paved roadway surfaces. Where a Sand Seal covers existing pavement markings, including reflective studs, the work will also include application of temporary marking (spotting).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for resealing, including preparation of existing surface.
- Clean up of site, including disposal of any waste or any excavated material.
- Application of temporary road markings (spotting).

8222.2 c Description and Requirements

Work methods for Resealing by Sand Seal shall be in accordance with MOPRBW 8222c and will normally include but not be limited to the following operations:

- Preparation of the existing surface by patching, if required, and sweeping the full extent of the area to be sealed, using a mechanical broom or hand brooms. Swept materials shall be heaped, loaded onto trucks and disposed in an environmentally friendly manner.
- Spraying the binder, using a bitumen distributor, at the required rate uniformly over the whole area without stopping until it has reached the end of the spray run.
- Spreading a uniform layer of sand by use of a mechanical chip spreader following close behind the bitumen distributor. If approved by the Engineer, the sand may be spread by shovels from stockpiles previously placed on the road shoulder or by applying the sand by hand from the rear of a truck reversing slowly over the previously laid sand.
- Embedding the sand using a pneumatic tyred roller following close behind the chip spreaders at a speed of 10 – 15 kph, or if approved by the Engineer, carefully rolling the finished work with the empty truck as soon as the sand has been spread.
- Sweeping back dislodged aggregate as directed by the Engineer during the first 8 - 12 weeks.
- Brooming off excess sand as directed by the Engineer after the sand seal has matured (normally 8 - 12 weeks).
- Where a Sand Seal covers existing road markings and/or reflective studs, the Activity will also include the application of temporary road markings (spotting).

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900c for safety of workmen and traffic control.
- Open road to traffic immediately after rolling and control speed to minimize flick-off of aggregates/sand and damage to vehicle windscreens. During the first 8 - 12 weeks aggregate dislodged by traffic shall be broomed back into the wheel tracks as required.
- Tidy up the site.
- Remove warning signs and safety devices.

Maintenance Standard Specifications for Road and Bridge Works

8222.3 c Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 4300: SURFACE TREATMENTS and SECTION 4400: RESEALING EXISTING BITUMINOUS SURFACING.

Paved roadway surfaces shall meet with the required standard and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8222.

8222.4 c Measurement and Payment

The unit rate for Resealing by Sand Seal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved resealing.

The unit of measurement of binder with respect to variation in application shall be per litre measured at spraying temperature. The unit of measurement of sand with respect to variation in application shall be per cubic metre measured in the truck. The unit for temporary marking (spotting) shall be per linear metre.

Pay Item No	Pay Item	Pay Unit
8222.41 c	Resealing by Sand Seal	m ²
8222.42 c	Binder Variation	litre
8222.43 c	Sand Variation	m ³
8222.44 c	Application of Temporary Road Markings (spotting)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Resealing	Code:	8222
Method	Otta Seal	Code:	8222.d

8222.1 d Scope

Resealing by Otta Seal shall consist of supply and furnishing of all materials for the resealing of existing paved roadway surfaces. The activity includes the use of SAMI if ordered by the Engineer. Where an Otta Seal covers existing pavement markings, including reflective studs the work will also include application of temporary marking (spotting).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for resealing, including preparation of existing surface.
- Clean up of site, including disposal of any waste or any excavated material.
- Application of temporary road markings (spotting).

8222.2 d Description and Requirements

Work methods for Otta Seal shall be in accordance with MOPRBW 8222 d and will normally include but not be limited to the following operations:

- Preparation of the existing surface by patching, if required, and sweeping the full extent of the area to be sealed, using a mechanical broom or hand brooms. Swept materials shall be heaped, loaded onto trucks and disposed in an environmentally friendly manner.
- Spray the binder using a bitumen distributor, at the required rate, uniformly over the whole area without stopping until it has reached the end of the spray run. If approved by the Engineer, the binder may be applied evenly by use of squeegees.
- Laying of SAMI if instructed by the Engineer in accordance with the applicable method specifications.
- Spreading a uniform single layer of aggregates from of a mechanical chip spreader following close behind the bitumen distributor. If approved by the Engineer, the aggregate may be spread by shovels from stockpiles previously placed on the road shoulder, or by casting the sand by hand from the rear of a truck reversing slowly over the previously laid aggregate.
- Embedding the aggregates using a pneumatic tyred roller following close behind the chip spreaders at a speed of 10 - 15 kph, or if approved by the Engineer carefully roll the finished work at least fifteen passes with a loaded truck as soon as the aggregate has been spread.
- Sweeping back dislodged aggregate as directed by the Engineer during the first 8 - 12 weeks.
- Brooming off excess aggregate as directed by the Engineer after the Otta seal has matured (normally 8 - 12 weeks).
- Where an Otta Seal covers existing road markings and/or reflective studs, the Activity will also include the application of temporary road markings (spotting).

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Reflective studs shall be protected by use of grease or similar material, and cleaned if necessary. Damaged studs shall be replaced.
- Open road to traffic immediately after rolling and control speed to maximum of 60 kph for 8 - 12 weeks. During the first 8 - 12 weeks aggregate dislodged by traffic shall be broomed back into the wheel tracks as required.
- Tidy up the site.
- Remove warning signs and safety devices.

Maintenance Standard Specifications for Road and Bridge Works

8222.3 d Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 4300: SURFACE TREATMENTS and SECTION 4400: RESEALING EXISTING BITUMINOUS SURFACING.

Paved roadway surfaces shall meet with the required standard and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8222d.

8222.4 d Measurement and Payment

The unit rate for Resealing by Otta Seal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved resealing.

The unit of measurement of binder with respect to variation in application shall be per litre measured at spraying temperature. The unit of measurement of aggregate with respect to variation in application shall be per cubic metre measured in the truck. The unit for temporary marking (spotting) shall be per linear metre.

Pay Item No	Pay Item	Pay Unit
8222.41 d	Resealing by Otta Seal	m ²
8222.42 d	Binder Variation	litre
8222.43 d	Aggregate Variation	m ³
8222.44 d	Application of Temporary Road Markings (spotting)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Resealing	Code:	8222
Method	Cape Seal	Code:	8222.e

8222.1 e Scope

Resealing by Cape Seal shall consist of supply and furnishing of all materials for the resealing of existing paved roadway surfaces. Where a Cape Seal covers existing pavement markings, including reflective studs the work will also include application of temporary marking (spotting).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for resealing, including preparation of existing surface.
- Clean up of site, including disposal of any waste or any excavated material.
- Application of temporary road markings (spotting).

8222.2 e Description and Requirements

Work methods for Resealing by Cape Seal shall be in accordance with MOPRBW 8222e and will normally include but not be limited to the following operations:

- Preparation of the existing surface by sealing of cracks, patching of potholes and repair of edge damage, if required. Sweeping the full extent of the area to be sealed, using a mechanical broom or hand brooms. Swept materials shall be heaped, loaded onto trucks and disposed in an environmentally friendly manner.
- Spraying the hot binder or a bitumen emulsion at the required rate uniformly over the whole area without stopping until it has reached the end of the spray run. If approved by the Engineer, the binder may be applied evenly by use of hand lances or squeegees.
- Spreading a uniform single layer of 13 mm or 19 mm chippings from a mechanical chip spreader following close behind the bitumen distributor. If approved by the Engineer, the aggregate may be spread by labour using shovels from stockpiles previously placed on the road shoulder, or by casting the aggregate by hand from the rear of a truck reversing slowly over the previously laid aggregate.
- Embedding the chippings using a pneumatic tyred roller following close behind the chip spreaders at a speed of 10 - 15 kph, or if approved by the Engineer, carefully roll the finished work at least fifteen times with a pedestrian roller, or with the loaded truck as soon as the aggregate has been spread.
- Collecting any excess pile of chippings from the road surface.
- Applying the slurry seal, consisting of an approved mixture of equal parts of 60 % stable grade emulsion at the required rate, uniformly over the whole area without stopping until it has reached the end of the spray run, as instructed by the Engineer. If approved by the Engineer, the slurry may be applied evenly by use of squeegees.
- Allowing the slurry to cure for 24 hours prior to opening to traffic.
- Removing to spoil at designated places all spilled and excess slurry.
- Where a Cape Seal covers existing road markings and/or reflective studs, the Activity will also include the application of temporary road markings (spotting).

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Open road to slow moving traffic, and control speed to minimize flick-off of aggregates and damage to vehicle windscreens.
- Tidy up the site.
- Remove warning signs and safety devices.

Maintenance Standard Specifications for Road and Bridge Works

8222.3 e Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 4300: SURFACE TREATMENTS and SECTION 4400: RESEALING EXISTING BITUMINOUS SURFACING.

Paved roadway surfaces shall meet the required standard and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8222e.

8222.4 e Measurement and Payment

The unit rate for Resealing by Cape Seal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved resealing.

The unit of measurement of binder with respect to variation in application shall be per litre measured at spraying temperature. The unit of measurement of aggregate with respect to variation in application shall be per cubic metre measured in the truck. The unit of measurement of slurry with respect to variation in application shall be per cubic metre of saturated fine aggregate. The unit for temporary marking (spotting) shall be per linear metre.

Pay Item No	Pay Item	Pay Unit
8222.41 e	Resealing by Cape Seal	m ²
8222.42 e	Binder Variation	litre
8222.43 e	Aggregate Variation	m ³
8222.44 e	Slurry Variation	m ³
8222.45 e	Application of Temporary Road Markings (spotting)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Bituminous Overlay	Code:	8223

8223.1 Scope

Bituminous Overlay shall consist of supply and furnishing of all materials for the overlay of existing paved roadway surfaces. Where a Bituminous Overlay covers existing pavement markings, including reflective studs the work will also include application of temporary marking (spotting).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for bituminous overlay.
- Clean up of site including disposal of any waste or any excavated material.
- Application of temporary road markings (spotting).

8223.2 Description and Requirements

Work methods for Bituminous Overlay shall be in accordance with MOPRBW 8223 and will normally include but not be limited to the following operations:

- Preparation of the existing surface by sealing of cracks and patching if required and sweeping the full extent of the area to be sealed, using a mechanical broom or hand brooms. Swept materials shall be heaped, loaded onto trucks and disposed in an environmentally friendly manner.
- Transporting, heating, spraying, paving and all other operations necessary in accordance with applicable specifications.
- At completion of work, the overlay must be smoothly run into the existing road surface over a length of 2 – 5 m by excavating the existing surface and replacing it with overlay premix material.
- Apply temporary road markings (spotting).

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Where the overlay will be used by traffic between work days, temporary ramps must be provided by tapering out the overlay over a distance of 200 – 400 mm. The ramps must be cut back to transverse joints when the overlay work resumes.
- Tidy up the site.
- Remove safety devices on completion of the job.

8223.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING.

Paved roadway surfaces shall meet with the required standard and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8223.

Maintenance Standard Specifications for Road and Bridge Works

8223.4 Measurement and Payment

The unit rate for Bituminous Overlay shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved overlay. The unit of measurement of binder in respect of tack coat variation shall be per litre and the measurement of asphalt with respect to filler variation shall be per metric ton. The unit for temporary marking (spotting) shall be per linear metre.

Pay Item No	Pay Item	Pay Unit
8223.41	Bituminous Overlay	m ²
8223.42	Tack Coat Variation	litre
8223.43	Asphalt Mix Variation	ton
8223.44	Application of Temporary Road Markings (spotting)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Unpaved Shoulder Regravelling and Edge Drop Repair	Code:	8224

8224.1 Scope

Unpaved Shoulder Regravelling and Edge Drop Repair includes the addition of material to unpaved shoulders to correct excess shoulder crossfall, drop off and/or reduced shoulder width.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for regravelling and repair of edge drop.
- Clean up of site including disposal of any waste or any excavated material.

8224.2 Description and Requirements

Work methods for Unpaved Shoulder Regravelling and Edge Drop Repair shall be in accordance with MOPRBW 8224 and will normally include but not be limited to the following operations:

- Regravelling of gravel shoulders consists of ripping, watering, placing and compacting of in situ shoulder material with or without adding extra material. The shoulders and other areas shall be reinstated to the same level as the existing surfaced edge and with a slope between 3.0 - 4.0 % to shed water away from the road. Reinstatement shall be constructed at least to the same crossfall as the road.
- Addition of new shoulder material, mixing into existing material, moisturing and blading to shape.
- Compaction, trimming and rolling to shape and correct crossfall as specified or as ordered.

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Lumps or stone larger than 50 mm should be broken down using sledge hammers or removed to spoil.
- Grade the shoulder surface to provide a firm, regular base on which to work.
- Water and compact the reshaped surface.
- Dump gravel at regular spacing so as to achieve desired compacted gravel thickness.
- Spread the gravel, and water to optimum moisture content. Lumps or stone larger than 200 mm should be removed manually.
- Compact gravel using the roller to specified degree of compaction.
- Tidy up the site.
- Remove safety devices on completion of the job.

8224.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 3800: GRAVEL SHOULDERS AND GRAVEL WEARING COURSE. The finished surface shall be within + 0 to -10 mm of the height of the adjacent paved surface.

- The existing shoulder material shall be shaped to form a surface parallel to the planned finished surface of the shoulder.
- The surface shall be wide enough to enable completed shoulder to conform to the specified cross-section.

Paved roadway surfaces shall meet with the required standard and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8224.

8224.4 Measurement and Payment

The unit rate for Unpaved Shoulder Regravelling and Edge Drop Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved regavelled area.

Pay Item No	Pay Item	Pay Unit
8224.41	Bituminous Overlay	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BITUMINOUS PAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8220
Activity	Unpaved Shoulder Reshaping	Code:	8225

8225.1 Scope

Unpaved Shoulder Reshaping shall consist of restoring camber on gravel shoulders by returning material from the toe of the shoulder slope. The activity can be carried out using labour based or equipment based methods.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for reshaping of unpaved shoulders.
- Clean up of site, including disposal of any waste or any excavated material.

8225.2 Description and Requirements

Work methods for Unpaved Shoulder Reshaping shall be in accordance with MOPRBW 8225 and will normally include, but not be limited to the following operations:

- Scarifying of the existing surface, if necessary to the depth of any surface defects and loosen the material ready for reshaping.
- Initial cutting passes may be required to bring materials in from the edges of the shoulders.
- If the material is too dry, the material windrows shall be sprayed using water tankers.
- A second application of water may be required to obtain the correct moisture content for compaction.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Remove safety devices on completion of the job.

8225.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials shall be in accordance with the requirements of SSRBW: SECTION 3800: GRAVEL SHOULDERS AND GRAVEL WEARING COURSE.

Unpaved roadway surfaces shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8225.

8225.4 Measurement and Payment

The unit rate for Unpaved Shoulder Reshaping shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved reshaping.

Pay Item No	Pay Item	Pay Unit
8225.41	Unpaved Shoulders Reshaping	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8230

Scope

This maintenance intervention comprises the following maintenance activities:

- 8231 Concrete Roadway Cleaning
- 8232 Concrete Roadway Crack Sealing
- 8233 Concrete Roadway Spalling Repair
- 8234 Concrete Roadway Pothole Repair
- 8235 Concrete Roadway Joint Stepping Repair
- 8236 Concrete Roadway Slab Repair
- 8239 Other Concrete Paved Roadway Maintenance

Activity 8239 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8230
Activity	Concrete Roadway Cleaning	Code:	8231

8231.1 Scope

Concrete Roadway Cleaning shall consist of keeping the concrete roadway clean and clear of loose sand, stones, aggregates and debris to maintain traffic safety and a pleasing appearance of the road, and to prevent vegetation growth. The Activity includes the removal and disposal (in accordance with applicable regulations/requirements) of all loose materials < 100 cm²; i.e. build up of gravel/soil at intersections, broken glass and similar accumulated on the road surface, by hand or by mechanical sweeping. (Removal of larger types of materials, i.e. tyre pieces, wood etc. > 100 cm², will be undertaken under Activity 8142 Obstacles Collection and Removal).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for cleaning of concrete roadway.
- Clean up of site including disposal of any waste or any excavated material.

8231.2 Description and Requirements

Work methods for Concrete Roadway Cleaning shall be in accordance with MOPRBW 8231 and will normally include but not be limited to the following operations:

- Cleaning the road using a rotary broom or other specialised equipment while driving slowly on one lane of the road in the direction of traffic, including applying water where necessary to soften cemented soil. The soil accumulated in the tank shall be deposited at designated places. Cleaning shall be carried out during traffic off-peak hours.
- Alternatively by labour based methods when approved by the Engineer using a shovel, load the heaped soil onto wheel barrow for disposal within the road reserve if it is environmentally acceptable. Otherwise load the heaped soil onto the trailer or pick-up or truck, haul and dispose at designated areas.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Cleaning operations shall be carried out in the same direction as the flow of traffic and in a manner which prevents material from being cast into the flow of traffic or into drainage inlets.
- Special attention should be kept to junctions, railway crossings, sharp curves and other potential danger points where loose sand and other debris may cause vehicles to skid and/or increase the stopping distance.

8231.3 Standards, Materials and Tolerances

The roadway shall be clean and free of hazards caused by loose material and debris. All loose material shall be removed from the paved roadway.

Loose material shall be removed from the roadway in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8231.

8231.4 Measurement and Payment

The unit rate for Concrete Roadway Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area cleaned.

Pay Item No	Pay Item	Pay Unit
8231.41	Concrete Roadway Cleaning	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8230
Activity	Concrete Roadway Crack Sealing	Code:	8232

8232.1 Scope

Concrete Roadway Crack Sealing shall consist of the sealing of longitudinal and transverse cracks in the concrete paved roadway surfacing to prevent damage to the pavement layers. This work consists of restoring the paved surface to a less permeable condition and includes cleaning and filling of cracks with sealant.

Crack sealing of concrete roadway is performed where isolated or multiple cracks have developed. The objective is to fill the cracks as completely as possible to prevent water to enter the underlying layers.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for crack sealing.
- Clean up of site including disposal of any waste or any excavated material.

8232.2 Description and Requirements

Work methods for Concrete Roadway Crack Sealing shall be in accordance with MOPRBW 8232 and will normally include but not be limited to the following operations:

- Sweeping the area by hand brooms and cleaning out the cracks using compressed air.
- Spraying a silicone sealant or polymer modified bitumen or other sealant approved by the Engineer into the crack using a spray lance. Hold the nozzle of the spray lance as close as possible to the road surface and keep the width of spread as small as possible.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- The crack and surrounding road surface must be clean and dry. Distribution of sealant should be by spray lance or watering can. The nozzle or spout must be kept close to the road surface to avoid spill. The width of spread should be limited as much as possible.
- Alternatively the fill material may be injected under pressure by approved specialised equipment.
- Tidy up the work area.
- Remove all temporary signs and safety devices.

8232.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials used for crack sealing shall be in accordance with SSRBW: SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING or as otherwise directed by the Engineer.

Crack sealing of concrete roadway shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8232.

8232.4 Measurement and Payment

The unit rate for Concrete Roadway Crack Sealing shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per metre of transverse and longitudinal cracking repaired.

Pay Item No	Pay Item	Pay Unit
8232.41	Concrete Roadway Crack Sealing	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8230
Activity	Concrete Roadway Spalling Repair	Code:	8233

8233.1 Scope

Concrete Roadway Spalling Repair shall consist of repairing the spalled concrete surface by casting concrete over the spalled area in order to reinstate the original concrete thickness and restore the structural integrity of the concrete surface

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for spalling repair.
- Clean up of site including disposal of any waste or any excavated material.

8233.2 Description and Requirements

Work methods for Concrete Roadway Spalling Repair shall be in accordance with MOPRBW 8233 and will normally include but not be limited to the following operations:

- Removing of spalled concrete and cutting or chiselling to sound material.
- Construction of formwork around the damaged area, if required.
- Allowing concrete to set, and curing the concrete by watering, leaving the formwork in place for 3 days.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- Tidy up the work area.
- Remove all temporary signs and safety devices.

8233.3 Standards, Materials and Tolerances

All materials used for spalling repair shall be as directed by the Engineer.

Concrete Roadway Spalling Repair shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8233.

8233.4 Measurement and Payment

The unit rate for Concrete Roadway Spalling Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of concrete cast over spalled area.

Pay Item No	Pay Item	Pay Unit
8233.41	Concrete Roadway Spalling Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8230
Activity	Concrete Roadway Pothole Repair	Code:	8234

8234.1 Scope

Concrete Roadway Pothole Repair shall consist of the repair of potholes in the concrete surface that is otherwise in a relatively sound condition. Work consists of the vertical cutting, excavation and disposal of existing concrete pavement, excavation and disposal of unsuitable material, and repair of the concrete pavement. Necessary repainting of traffic markings is included.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for pothole repair.
- Clean up of site including disposal of any waste or any excavated material.

8234.2 Description and Requirements

Work methods for Concrete Roadway Pothole Repair shall be in accordance with MOPRBW 8234 and will normally include but not be limited to the following operations:

- Cutting the designated area using a method which does not disturb or damage the adjoining pavement. The existing material shall be removed in a neat rectangle. All sides shall be perpendicular or parallel to the road centre line.
- Cutting using a concrete cutting machine or chisel to shape the pothole to square or rectangular shape and to sound material.
- Construction of formwork around the damaged area, if required.
- Placing concrete in the pothole and compacting the concrete by tamping to reduce air voids.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- Allow concrete to set, and cure the concrete by watering, leaving the formwork in place for 3 days.
- Tidy up the work area.
- Remove all temporary signs and safety devices.

8234.3 Standards, Materials and Tolerances

The repaired area shall be rectangular in shape. The finished surface area shall be proud of the immediate surrounding road surface by not more than 3 mm. No loose material shall be left on the paved roadway. When tested with a 2 m strait edge laid parallel to or at right angles to the road centreline the surface of the area shall not deviate from the bottom of the strait edge by more than 5 mm.

Applicable Specifications:

All materials used for pothole repair shall be as directed by the Engineer.

Concrete Roadway Pothole Repair shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8234.

8234.4 Measurement and Payment

The unit rate for Concrete Roadway Pothole Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of pothole area repaired.

Pay Item No	Pay Item	Pay Unit
8234.41	Concrete Roadway Pothole Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8230
Activity	Concrete Roadway Joint Stepping Repair	Code:	8235

8235.1 Scope

Concrete Roadway Joint Stepping Repair shall consist of manual or mechanical repair, as directed by the Engineer, to remove slab joint faulting or stepping to restore the edges to line and level.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for stepping repair.
- Clean up of site, including disposal of any waste or any excavated material.

8235.2 Description and Requirements

Work methods for Concrete Roadway Joint Stepping Repair shall be in accordance with MOPRBW 8235 and will normally include but not be limited to the following operations:

One of the following methods may be applicable, as directed by the Engineer;

- Mudjacking without removing the slabs; cement grout pumped through holes drilled into the slabs.
- Sub-sealing by asphalt.
- Grinding.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Remove safety devices on completion of the job.

8235.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials used for Concrete Roadway Joint Stepping Repair shall be as directed by the Engineer.

The finished surface shall conform to the surrounding concrete paved area.

Concrete Roadway Joint Stepping Repair shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8235.

8235.4 Measurement and Payment

The unit rate for Concrete Roadway Stepping Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per liner metre of joint repaired. Concrete for joint repair shall be paid per cubic metre of concrete used.

Pay Item No	Pay Item	Pay Unit
8235.41	Concrete Roadway Stepping Repair	m
8235.42	Concrete Cast for Joint Repair	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8230
Activity	Concrete Roadway Slab Repair	Code:	8236

8236.1 Scope

Concrete Roadway Slab Repair shall consist of manual or mechanical repair of failed concrete pavements as directed by the Engineer. The work shall consist of removing designated areas of defective concrete pavement and unstable underlying layers' material, replacing underlying layers' material where required, and replacing pavement with concrete in accordance with these specifications and as directed by the Engineer.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for slab repair.
- Clean up of site, including disposal of any waste or any excavated material.

8236.2 Description and Requirements

Work methods for Concrete Roadway Slab Repair shall be in accordance with MOPRBW 8236 and will normally include but not be limited to the following operations:

- Two different types of slab repair may be applicable:
 - (i) Damaged Slab; Removing existing slab and carrying out required repair of the underlying layer.
 - (ii) Slab Subsidence Failure; Injection of appropriate material under the slab without removal of existing slab.
- Braking into pieces of existing concrete pavement to be disposed of at locations approved by the Engineer. Where the existing joint dowel assembly is to be removed, existing concrete shall be saw cut and removed at least 250 mm on each side of transverse joints. Undisturbed portions of pavement adjacent to the area to be patched shall be left with straight, vertical sides.
- Scarifying exposed gravel to 100 mm depth, add natural gravel or material with specifications equal to or more than existing materials, add water to obtain optimum moisture content, and compact to at least 98% MOD AASHTO density such that the final level is flush with existing base course level.
- Asphalt plant mixed material may be used for surface repair to rigid pavement when ordered by the Engineer, generally in cases of sunken slabs or extensive slab breakage. Before making any asphalt repair to rigid pavements, the surface must be well cleaned and sprayed with a tack coat to ensure a good bond between the concrete surface and the asphalt concrete.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.

8236.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials for the underlying layers shall conform to the requirements of the SSRBW SERIES 3000:

EARTHWORKS, SUBBASES, SHOULDERS AND BASES.

Paving concrete shall conform to the requirements of SSRBW.

Concrete Roadway Slab Repair shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8236.

8236.4 Measurement and Payment

The unit rate for Concrete Roadway Slab Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of concrete pavement repaired.

Pay Item No	Pay Item	Pay Unit
8236.41	Concrete Roadway Slab Repair; Damaged Slab	m ²
8236.42	Concrete Roadway Slab Repair; Slab Subsidence Failure	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	BLOCK PAVED ROADWAY MAINTENANCE	CODE:	8240

Scope

This maintenance intervention comprises the following maintenance activities:

- 8241 Block Paved Roadway Cleaning
- 8242 Block Paved Roadway Deformation Repair
- 8243 Paving Blocks Replacement
- 8244 Block Paved Roadway Grass Removal
- 8249 Other Block Paved Roadway Maintenance

Activity 8249 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8240
Activity	Block Paved Roadway Cleaning	Code:	8241

8241.1 Scope

Block Paved Roadway Cleaning shall consist of keeping the paved roadway clean and clear of loose sand, stones, aggregates and debris to maintain traffic safety and a pleasing appearance of the road, and to prevent vegetation growth.

The Activity includes the removal and disposal (in accordance with applicable regulations/requirements) of all loose materials < 100 cm²; i.e. build up of gravel/soil at intersections, broken glass and similar accumulated on the road surface, by hand or by mechanical sweeping. (Removal of larger types of materials, i.e. tyre pieces, wood etc. > 100 cm², will be undertaken under Activity 8142 Obstacles Collection and Removal).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for cleaning of block paved roadway.
- Clean up of site including disposal of any waste or any excavated material.

8241.2 Description and Requirements

Work methods for Block Paved Roadway Cleaning shall be in accordance with MOPRBW 8241 and will normally include but not be limited to the following operations:

- Cleaning the road using a rotary broom or other specialised equipment while driving slowly on one lane of the road in the direction of traffic, applying water where necessary to soften cemented soil. The soil accumulated in the tank shall be deposited at designated places. Cleaning shall be carried out during traffic off-peak hours.
- Alternatively by labour based methods using a shovel, load the heaped soil onto wheel barrow for disposal within the road reserve if it is environmentally acceptable. Otherwise load the heaped soil onto the trailer or pick-up or truck, haul and dispose at designated areas.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Cleaning operations shall be carried out in the same direction as the flow of traffic and in a manner which prevents material from being cast into the flow of traffic or into drainage inlets.
- Remove safety devices on completion of the job.

8241.3 Standards, Materials and Tolerances

The roadway shall be clean and free of hazards caused by loose material and debris. All loose material shall be removed from the paved roadway.

Loose material shall be removed from the roadway in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8241.

8241.4 Measurement and Payment

The unit rate for Block Paved Roadway Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area cleaned.

Pay Item No	Pay Item	Pay Unit
8241.41	Block Paved Roadway Cleaning	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8240
Activity	Block Paved Roadway Deformation Repair	Code:	8242

8242.1 Scope

Block Paved Roadway Deformation Repair shall consist of reinstating the deformed surface of a block paved roadway to level, including replacement of damaged or missing paving blocks.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for deformation repair of paving blocks.
- Clean up of site, including disposal of any waste or any excavated material.

8242.2 Description and Requirements

Block Paved Roadway Deformation Repair shall be carried out throughout the year as required or as directed by the Engineer.

Work methods for Block Paved Roadway Deformation Repair shall be in accordance with MOPRBW 8242 and will normally include but not be limited to the following operations:

- Scarifying the exposed deformed area to approximately 50 mm depth, adding gravel to make up levels, add watering and mixing thoroughly to obtain optimum moisture content, compacting with pedestrian roller to specified density and to level with surrounding pavement.
- Relaying bedding sand to original thickness.
- Relaying paving blocks, where necessary, replacing any broken with new paving blocks.
- Spreading fine sand over the re-laid paving blocks to fill the joints.
- Tamping the re-laid paving blocks with hand rammers to pack them properly.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- Tidy up the site.
- Remove all temporary signs and safety devices.

8242.3 Standards, Materials and Tolerances

Materials and workmanship for Block Paved Roadway Deformation Repair shall generally conform to the requirements of SSRBW.

Paving blocks of same type and standard shall be used in accordance with the approved manufacturer's standards.

Deformations shall be repaired as required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8242.

8242.4 Measurement and Payment

The unit rate for Block Paved Roadway Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area cleaned.

Pay Item No	Pay Item	Pay Unit
8242.41	Block Paved Roadway Deformation Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8240
Activity	Paving Blocks Replacement	Code:	8243

8243.1 Scope

Paving Blocks Replacement includes the removal and installation of damaged or missing paving blocks; i.e. interlocking blocks and bricks, paving slabs and other pre-cast concrete products of similar nature, used for vehicular travel.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for replacement of paving blocks.
- Clean up of site including disposal of any waste or any excavated material.

8243.2 Description and Requirements

Work methods for Paving Blocks Replacement shall be in accordance with MOPRBW 8243 and will normally include but not be limited to the following operations:

- Removing marked paving blocks and stockpiling them away for disposal.
- Reinstating of underlying layers.
- Laying new paving blocks in gaps left by removed broken paving blocks and ensuring adequate interlocking.
- Spreading fine sand over the re-laid paving blocks to fill the joints.
- Tamping the re-laid paving blocks with hand rammers to pack them properly.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site and haul removed paving blocks to approved spoil area.
- Remove safety devices on completion of the job.

8243.3 Standards, Materials and Tolerances

Paving blocks shall be of the same type and standard as the ones replaced and shall comply with the approved manufacturer's standard. Block thickness and required crushing strength shall be as ordered by the Engineer. Normal block thickness ranges from 60 to 85 mm and crushing strength from 10 to 30 MPa depending on traffic. Block dimensions shall not differ from their nominal dimension by more than +/- 1 mm in any dimension.

Paving blocks shall be replaced as required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8243.

8243.4 Measurement and Payment

The unit rate for Paving Blocks Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of paving blocks replaced.

Pay Item No	Pay Item	Pay Unit
8243.41	Paving Blocks Replacement	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	CONCRETE PAVED ROADWAY MAINTENANCE	CODE:	8240
Activity	Block Paved Roadway Grass Removal	Code:	8244

8244.1 Scope

Block Paved Roadway Grass Removal shall consist of removal of grass from the block paved roadway.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required to remove grass from the block paved roadway.
- Clean up of site including disposal of any waste or any excavated material.

8244.2 Description and Requirements

Block Paved Roadway Grass Removal shall be carried out throughout the year as required or as directed by the Engineer. Work methods shall be in accordance with MOPRBW 8244 and will normally include but not be limited to the following operations:

- Uprooting and removing grass by grubbing using shovels and/or pick axes.
- If required, taking out of paving blocks, removing of grass, reinstatement of bedding and replacement of paving blocks.
- Raking the uprooted grass, loading it on wheel barrow, transporting and spreading it evenly on the roadside away from the shoulder breakpoint and leaving to rot, or to a designated dumping area.
- Spraying herbicide approved by relevant authority on areas where vegetation has started to germinate in accordance with manufacturer's specification.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Collect and temporarily stockpile loose material and debris off the paved surface.
- Transport stockpiled material and debris for disposal outside the road reserve or in designated dumping areas.
- Spraying shall not be carried out when the vegetation is wet, or when it appears that rain may be expected within 6 hours.
- Remove safety devices on completion of the job.

8244.3 Standards, Materials and Tolerances

The roadway shall generally be free of growing grass. All grass shall be removed from the block paved roadway.

Grass shall be removed from the roadway in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8244.

8244.4 Measurement and Payment

The unit rate for Block Paved Roadway Grass Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of removal of grass from block paved roadway.

Pay Item No	Pay Item	Pay Unit
8244.41	Block Paved Roadway Grass Removal	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	PAVED FOOTPATH AND CYCLE PATH MAINTENANCE	CODE:	8250

Scope

This maintenance intervention comprises the following maintenance activities:

- 8251 Paved Footpath and Cycle Path Cleaning
- 8252 Paved Footpath and Cycle Path General Surface Repair
- 8259 Other Paved Footpath and Cycle Path Maintenance

Activity 8259 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	PAVED FOOTPATH AND CYCLE PATH MAINTENANCE	CODE:	8250
Activity	Paved Footpath and Cycle Path Cleaning	Code:	8251

8251.1 Scope

Paved Footpath and Cycle Path Cleaning consist of keeping the paved footpaths and cycle paths clean and clear of loose sand, soil, stones, vegetation, aggregate and debris for the convenience of the users and a pleasing appearance of the paths.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for cleaning of paved footpaths and cycle paths.
- The removal and disposal (in accordance with applicable regulations/requirements) of all loose materials < 100 cm²; i.e. broken glass and similar accumulated on the path surface, by hand or by mechanical sweeping.
- Clean up of site including disposal of any waste or any excavated material.

8251.2 Description and Requirements

Work methods for Paved Footpath and Cycle Path Cleaning shall be in accordance with MOPRBW 8251 and will normally include but not be limited to the following operations:

- Cleaning the path using the rotary broom or other specialised equipment, applying water where necessary to soften cemented soil.
- Sweeping the path using a broom so as to remove accumulated soil and other deposits.
- Alternatively by labour based methods using a shovel, load the heaped soil or other deposits onto wheel barrow for disposal within the road reserve if it is environmentally acceptable. Otherwise load the heaped soil onto the trailer or pick-up or truck, haul and dispose at designated areas.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove safety devices on completion of the job.

8251.3 Standards, Materials and Tolerances

The paved footpaths and cycle paths shall be clean and free of hazards caused by unwanted material and debris. All unwanted material shall be removed from the paved roadway.

Unwanted material shall be removed from the paths in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8251.

8251.4 Measurement and Payment

The unit rate for Paved Footpath and Cycle Path Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area cleaned.

Pay Item No	Pay Item	Pay Unit
8251.41	Paved Footpath and Cycle Path Cleaning	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	PAVED ROADWAY	CODE:	8200
INTERVENTION	PAVED FOOTPATH AND CYCLE PATH MAINTENANCE	CODE:	8250
Activity	Paved Footpath and Cycle Path General Surface Repair	Code:	8252

8252.1 Scope

Paved Footpath and Cycle Path General Surface Repair consist of repair of shoving, rutting or depression of paved footpath or cycle path surfacing by removal of deteriorated material and replacement with new materials, as approved by the Engineer to profile.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for cleaning of paved footpaths and cycle paths.
- Clean up of site including disposal of any waste or any excavated material.

8252.2 Description and Requirements

Work methods for Paved Footpath and Cycle Path General Surface Repair shall be in accordance with MOPRBW 8252 and will normally include but not be limited to the following operations:

- Removing loose debris or other objectionable material from the areas to be repaired, by brooming or other methods.
- The area may be reinstated to acceptable shape with premix placed and compacted on the existing surface, or by removal of existing surface materials followed by placement and compaction of unbound base material to acceptable shape and appropriate surface material.
- Filling depression by placing the cold or hot mix asphalt concrete or any other surface material as ordered by the Engineer within the marked outline and leaving an excess thickness of about 1/3 of the depth of the depression to allow for compaction.
- Compacting the material until the finished surface area is proud of the immediate surrounding road surface by not more than 3 mm. No loose material shall be left on the paved roadway.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Tidy up the site.
- Remove safety devices on completion of the job.

8252.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials used for Paved Footpath and Cycle Path General Surface Repair shall be in accordance with SSRBW: SERIES 4000: ASPHALT PAVING AND BITUMINOUS SURFACING. For other type of surfacing, as directed by the Engineer.

The final surfacing shall be of the same type as the surrounding path surface. There shall be no depressions in the finished surface that will allow water to pond.

Paved Footpath and Cycle Path General Surface Repair shall be carried out in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8252.

8252.4 Measurement and Payment

The unit rate for Paved Footpath and Cycle Path General Surface Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metres of area repaired.

Pay Item No	Pay Item	Pay Unit
8252.41	Bituminous Paved Footpath and Cycle Path General Surface Repair	m ²
8252.42	Concrete Paved Footpath and Cycle Path General Surface Repair	m ²
8252.43	Paving Blocks Paved Footpath and Cycle Path General Surface Repair	m ²

8300 UNPAVED ROADWAY

8301 Scope

Feature 8300 Unpaved Roadway covers routine maintenance activities to keep the unpaved roadway free of potholes, corrugations and localised erosion runnels to provide a smooth running surface. It also covers periodic maintenance activities in the form of grading, reshaping, regravelling or sand cushioning. All periodic maintenance activities shall generally be carried out in accordance with Standard Specifications for Road and Bridge Works when required and as directed by the Engineer.

The feature "Unpaved Roadway" shall be defined as per the Botswana Road Design Manual (BRDM) and the Standard Specifications for Road and Bridge Works (SSRBW).

Feature 8300 Unpaved Roadway covers the following interventions and activities:

8310 Unpaved Roadway Routine Maintenance

- 8311 Dragging
- 8312 Maintenance of Sand Cushioning Layer
- 8313 Dry Grading
- 8314 Unpaved Roadway Pothole Patching
- 8315 Unpaved Roadway Erosion Runnels Repair
- 8316 Dust Prevention
- 8319 Other Unpaved Roadway Routine Maintenance

8320 Unpaved Roadway Periodic Maintenance

- 8321 Wet Grading
- 8322 Reshaping
- 8323 Regravelling
- 8324 Sand Cushioning
- 8329 Other Unpaved Roadway Periodic Maintenance

8330 Unpaved Footpath and Cycle Path Maintenance

- 8331 Unpaved Footpath and Cycle Path Cleaning
- 8332 Unpaved Footpath and Cycle Path General Surface Repair
- 8339 Other Unpaved Footpath and Cycle Path Maintenance

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8310

Scope

This maintenance intervention comprises the following maintenance activities:

- 8311 Dragging
- 8312 Maintenance of Sand Cushioning Layer
- 8313 Dry Grading
- 8314 Unpaved Roadway Pothole Patching
- 8315 Unpaved Roadway Erosion Runnels Repair
- 8316 Dust Prevention
- 8319 Other Unpaved Roadway Routine Maintenance

Activity 8319 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8310
Activity	Dragging	Code:	8311

8311.1 Scope

Dragging shall consist of smoothing out minor defects in the unpaved road surface and redistribution of loose material to improve the running surface. It includes dragging of the unpaved roadway surface by a tractor or by specially made drags such as tyre or steel frame drags or sledge drags made from old tyres or tree branches.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for dragging.
- Clean up of site including disposal of any waste or any excess material.

8311.2 Description and Requirements

Work methods for Dragging shall be in accordance with MOPRBW 8311 and will normally include but not be limited to the following operations:

- Removing unwanted material, such as obstructions from the path of the tractor and clear the drag of any debris.
- Dragging of specially made drags such as old tyres or steel beam drags ("spoor machine" for sand tracks only) by tractor or other appropriate equipment at a speed of up to 10 km/h in the direction of traffic.
- Removing any pieces of material which break off the drag from the road surface.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in Section 8900 to ensure safety of workmen and traffic control.
- Remove safety devices on completion of the job.

8311.3 Standards, Materials and Tolerances

Unpaved roadway surfaces shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8311.

8311.4 Measurement and Payment

The unit rate for Dragging shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear kilometre of road completed and approved dragging.

Pay Item No	Pay Item	Pay Unit
8311.41	Dragging (Earth/Gravel Roads)	km
8311.42	Dragging (Sand Track)	km

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8310
Activity	Maintenance of Sand Cushioning Layer	Code:	8312

8312.1 Scope

Maintenance of Sand Cushioning Layer shall consist of maintaining a uniformly distributed layer of approved sand over the entire carriageway surface on gravel roads to maintain a smooth surface and prevent rapid deterioration of the gravel wearing course.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required to maintain a sand cushion.
- Clean up of site including disposal of any waste or any excess material.

8312.2 Description and Requirements

Work methods for Maintenance of Sand Cushioning Layer shall be in accordance with MOPRBW 8312 and will normally include but not be limited to the following operations:

- Bringing back dislodged sand and distributing evenly at a sand layer thickness of 10 – 40 mm, using a grader or by dragging.
- If rain is expected during the operation, cutting through the windrows at approximately 10 m intervals along the edge of the road to drain the road surface.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- The sand layer shall be evenly distributed, in a layer of 10 – 40 mm to cover the full width of the carriageway.
- Windrows shall not be longer than 2 km at a time and shall not be left overnight, as this is a safety hazard to traffic.
- Remove safety devices on completion of the job.

8312.3 Standards, Materials and Tolerances

Unpaved roadway surfaces shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8312.

8312.4 Measurement and Payment

The unit rate for Maintenance of Sand Cushioning Layer shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear kilometre of road completed and approved.

Pay Item No	Pay Item	Pay Unit
8312.41	Maintenance of Sand Cushioning Layer	km

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8310
Activity	Dry Grading	Code:	8313

8313.1 Scope

Dry Grading shall consist of smoothing out minor defects in the unpaved road surface of a gravel or earth road and removing loose material to improve the running surface. It includes grading by a motor grader or by a towed grader.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for dry grading.
- Clean up of site including disposal of any waste or any excess material.

8313.2 Description and Requirements

Work methods for Dry Grading shall be in accordance with MOPRBW 8313 and will normally include but not be limited to the following operations:

- Grading the road starting from one edge and work towards the other edge.
- The number of passes shall be sufficient to restore a smooth running surface. Normally at least two passes are required for each side of wide roads.
- Crossfall shall be between 4 – 5 %.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- If rain is expected during the grading operation, cuts through the windrows shall be made at approximately 10 m intervals along the edge of the road to drain the road surface
- During the rainy season the windrows should be mixed back into the road surface through a full grading operation as described for Activity 8321 Wet Grading.
- Windrows shall not be longer than 2 km at a time and shall not be left overnight as this is a safety hazard to traffic.
- Remove safety devices on completion of the job.

8313.3 Standards, Materials and Tolerances

Unpaved roadway surfaces shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8313.

8313.4 Measurement and Payment

The unit rate for Dry Grading shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear kilometre of completed and approved grading.

Pay Item No	Pay Item	Pay Unit
8313.41	Dry Grading	km

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8310
Activity	Unpaved Roadway Pothole Patching	Code:	8314

8314.1 Scope

Unpaved Roadway Pothole Patching shall consist of excavating to remove unsuitable material, digging out potholed area in square or rectangular blocks and filling with approved material on relatively small isolated areas of less than 20 m² on the surface of unpaved roads (gravel and earth roads). Large areas or with numerous potholes shall be reinstated by reshaping as described for Activity 8322.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for pothole patching.
- Clean up of site including disposal of any waste or any excavated material.

8314.2 Description and Requirements

Work methods for Unpaved Roadway Pothole Patching shall be in accordance with MOPRBW 8314 and will normally include but not be limited to the following operations:

- Digging out the area to a depth of at least 80 mm and the sides shall be vertical. The hole shall be filled with approved wearing course gravel or soil, and compacted in layers not exceeding 150 mm after compaction. The roadway surface shall be reinstated to its original level.
- Using a sharp tool such as pickaxe, marking out squares or rectangles around area to be patched, making at least two sides parallel to the direction of traffic flow. The marks should extend to at least 150 mm from the edge of the damaged area and within sound and undamaged material.
- Cutting the sides vertical and levelling the bottom of the hole ensuring that the hole is clean, hard and dry.

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Patching work started shall not be left unfinished overnight.
- Tidy up the worksite.
- Remove warning signs and safety devices.

8314.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials shall be in accordance with the requirements of SSRBW: SECTION 3800: GRAVEL SHOULDERS AND GRAVEL WEARING COURSE.

- The gravel or soil material to be used for patching should have a moisture content of about 6 - 8 % (normal gravel) or 10 - 12 % (calcrete) by weight.
- The finished patch shall be approximately 20 mm above the existing pavement level to allow for subsequent subsidence.

Potholes shall be patched to meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8314.

8314.4 Measurement and Payment

The unit rate for Unpaved Roadway Pothole Patching shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved pothole patched.

Pay Item No	Pay Item	Pay Unit
8314.41	Unpaved Roadway Pothole Patching	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8310
Activity	Unpaved Roadway Erosion Runnels Repair	Code:	8315

8315.1 Scope

Unpaved Roadway Erosion Runnels Repair shall consist of excavating to remove unsuitable material and fill erosion Runnels formed in the roadway with approved material to restore a smooth running surface.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for repair of erosion runnels.
- Clean up of site including disposal of any waste or any excavated material.

8315.2 Description and Requirements

Work methods for Unpaved Roadway Erosion Runnels Repair shall be in accordance with MOPRBW 8315 and will normally include but not be limited to the following operations:

- Filling of the erosion Runnels with approved wearing course gravel or soil, and compacted in layers not exceeding 150 mm after compaction.
- Reinstatement of the roadway surface to its original level.

Operational Requirements:

- Place warning signs in accordance with guidelines given in MOPRBW 8900 for safety of workmen and traffic control
- Patching work started shall not be left unfinished overnight.
- Tidy up the worksite.
- Remove warning signs and safety devices.

8315.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials shall be in accordance with the requirements of SSRBW: SECTION 3800: GRAVEL SHOULDERS AND GRAVEL WEARING COURSE.

- The gravel or soil material to be used for filling of erosion runnels shall have a moisture content of about 6 – 8 % (normal gravel) or 10 – 12 % (calcrete) by weight.
- The finished patch shall be approximately 20 mm above the existing pavement level to allow for subsequent subsidence.

Erosion runnels shall be filled to meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8315.

8315.4 Measurement and Payment

The unit rate for Unpaved Roadway Erosion Runnels Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of completed and approved erosion runnels repaired where no material is added, or paid per cubic metre where material is added.

Pay Item No	Pay Item	Pay Unit
8315.41	Unpaved Roadway Erosion Runnels Repair (no material added)	m ²
8315.42	Unpaved Roadway Erosion Runnels Repair (material added)	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY ROUTINE MAINTENANCE	CODE:	8310
Activity	Dust Prevention	Code:	8316

8316.1 Scope

Dust Prevention shall consist of applying moisture or specified material for the purpose of allaying dust on gravel/earth roads. (Chemicals shall only be used on the written approval of the Engineer).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for dust prevention.
- Clean up of site including disposal of any waste or any excess material.

8316.2 Description and Requirements

Work methods for Dust Prevention shall generally be in accordance with MOPRBW 8316 and will normally include but not be limited to the following operations:

- Spraying water or approved liquid stabilizing chemical on the road surface
- Carrying out of dust prevention work in accordance with the material supplier's recommended application rates, methods of roadway preparation and placing of material, unless otherwise directed by the Engineer.
- Carrying out of chemical stabilization and coating with deliquescent salts as described in SSRBW SECTION 3300.
- When using waste local materials such as lime, charcoal or molasses scarifying of the existing surface to a depth as ordered by the Engineer before offloading and spreading stabilizing material is required.
- Mixing of the stabilizing material with existing excavated materials.
- Compacting of mixed material using the roller to specified degree of compaction.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Align the spray bar with an outer edge of the road. Open the spray bar and drive slowly the water bowser or tractor and towed water bowser in the direction of traffic such that the road surface is soaked and dust is suppressed.
- The length of road covered by the width of the spray bar shall not exceed 2 km before the remaining section of the road is watered.
- Remove safety devices on completion of the job.

8316.3 Standards, Materials and Tolerances

Applicable Specifications:

Material for chemical stabilization and coating with deliquescent salts as described in SSRBW SECTION 3300, or otherwise as recommended by the supplier, or as directed by the Engineer.

The completed treatment shall provide a smooth and relatively dust free surface.

Dust Prevention shall be carried out to meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8316.

8316.4 Measurement and Payment

The unit rate for Dust Prevention shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of roadway treated.

Pay Item No	Pay Item	Pay Unit
8316.41	Dust Prevention	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8320

Scope

This maintenance intervention comprises the following maintenance activities:

- 8321 Wet Grading
- 8322 Reshaping
- 8323 Regravelling
- 8324 Sand Cushioning
- 8329 Other Unpaved Roadway Periodic Maintenance

Activity 8329 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8320
Activity	Wet Grading	Code:	8321

8321.1 Scope

Wet Grading shall consist of removing surface unevenness on gravel roads by grading moistened road surface using a motor grader in order to remove corrugations and improve riding quality.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for wet grading.
- Clean up of site including disposal of any waste or any excavated material.

8321.2 Description and Requirements

Work methods for Wet Grading shall be in accordance with MOPRBW 8321 and will normally include but not be limited to the following operations:

- Spraying the road surface with water using water bowser to dampen the surface and suppress dust.
- Grading the road starting from one edge and work towards the other edge.
- Spraying water on the windrowed material and using a motor grader mixing the windrow in order to obtain optimum moisture content.
- Spreading the mixed material to a crossfall between 3 – 4 %, or as instructed by the engineer, and compacting to specified density.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Windrows shall not be longer than 2 km at a time and shall not be left overnight as this is a safety hazard to traffic.
- Remove safety devices on completion of the job.

8321.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials shall be in accordance with the requirements of SSRBW: SECTION 3800: GRAVEL SHOULDERS AND GRAVEL WEARING COURSE. Unpaved roadway surfaces shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8321.

8321.4 Measurement and Payment

The unit rate for Wet Grading shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per kilometre of road of completed and approved wet grading.

Pay Item No	Pay Item	Pay Unit
8321.41	Wet Grading	km

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8320
Activity	Reshaping	Code:	8322

8322.1 Scope

Reshaping shall consist of restoring camber on earth and gravel roads including sand track surfaces by returning material from the sides towards the centre of the road. The activity can be carried out using labour based or equipment based methods.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for reshaping.
- Clean up of site including disposal of any waste or any excavated material.

8322.2 Description and Requirements

Work methods for Reshaping shall be in accordance with MOPRBW 8322 and will normally include but not be limited to the following operations:

- Preparing of the road surface to be reshaped by patching all large potholes and depressions in accordance with procedures in Activity 8314 Unpaved Roadway Pothole Patching.
- If necessary, using the grader rippers, scarifying of the existing surface to the depth of any surface defects and loosen the material ready for reshaping.
- If the material is too dry, the material windrows shall be sprayed using water tankers.
- The windrow shall be spread back across the road depositing all the material to give the correct camber. The road shall be cambered to fall away from the centre at a rate of 50 to 60 mm for each metre from the centre before compaction or 30 to 40 mm after compaction. On bends the surface must be straight from edge to edge (at 3 – 4 %) with the outer edge being higher.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Windrows shall not be longer than 2 km at a time, and shall not be left overnight as this is a safety hazard to traffic.
- Remove safety devices on completion of the job.

8322.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials shall be in accordance with the requirements of SSRBW: SECTION 3800: GRAVEL SHOULDERS AND GRAVEL WEARING COURSE.

Unpaved roadway surfaces shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8322.

8322.4 Measurement and Payment

The unit rate for Reshaping shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of road of completed and approved reshaping.

Pay Item No	Pay Item	Pay Unit
8322.41	Reshaping	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8320
Activity	Regravelling	Code:	8323

8323.1 Scope

Regravelling shall consist of replacement of previously imported material to the road surface, placing and spreading approved material to reinstate the correct profile, including removal of any vegetation and preparation of the existing formation, watering and compaction.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for regravelling.
- Clean up of site including disposal of any waste or any excavated material.

8323.2 Description and Requirements

Work methods for Regravelling shall be in accordance with MOPRBW 8323 and will normally include but not be limited to the following operations:

- Preparing of the existing road surface to provide a firm surface and the road edge should be 'boxed' to provide support to the new gravel. Scarifying of the existing surface may be required.
- Hauling the material to site and dumping the material at a predetermined spacing so as to give the required thickness of compacted gravel over the complete road width.
- Adding the predetermined amount of water to the material in order to attain correct moisture content for compaction.
- Mixing the material using a grader by windrowing while adding water where necessary until moisture content is correct for compaction.
- Compacting the material when correct crossfall 3 – 4 % and moisture has been achieved by towed roller, by hand operated vibrating roller or by pneumatic roller as directed by the Engineer.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Remove safety devices on completion of the job.

8323.3 Standards, Materials and Tolerances

The completed treatment shall provide a smooth surface without potholes and depressions.

Applicable Specifications:

Materials and construction shall be in accordance with the requirements of SSRBW: SECTION 3800 GRAVEL SHOULDERS AND GRAVEL WEARING COURSE.

Gravel road surfaces shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8323.

8323.4 Measurement and Payment

The unit rate for Regravelling shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cubic metre of compacted gravel on the road regravelled.

Pay Item No	Pay Item	Pay Unit
8323.41	Regravelling	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED ROADWAY PERIODIC MAINTENANCE	CODE:	8320
Activity	Sand Cushioning	Code:	8324

8324.1 Scope

Sand Cushioning shall consist of providing a uniformly distributed layer of sand over the entire carriageway surface on gravel roads to maintain a smooth surface and prevent rapid deterioration of the gravel wearing course.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to provide a sand cushion.
- Clean up of site including disposal of any waste or any excavated material.

8324.2 Description and Requirements

Work methods for Sand Cushioning shall be in accordance with MOPRBW 8324 and will normally include but not be limited to the following operations:

- Hauling of approved sand to site, dumping and spreading the material on the road in a uniform layer of 40 mm in thickness.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- The sand layer shall be evenly distributed, in a layer thickness of 40 mm to edges of carriageway.
- Remove safety devices on completion of the job.

8324.3 Standards, Materials and Tolerances

The sand cushion layer shall be 40 mm thick and placed on a gravel wearing course free of potholes, rutting and corrugations.

Sand suitable for the construction of a sand cushion layer is normally available beside the road. Where this sand is not available by the road, it shall be brought in from nearby sources.

The sand used for the cushion shall have a maximum size of 1.0 mm and free of clay lumps or organic matter as approved by the Engineer. Commonly used sand for cushioning is Kalahari sand. Sand Cushioning shall be carried out as directed and shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8324.

8324.4 Measurement and Payment

The unit rate for Sand Cushioning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of road sand cushioned.

Pay Item No	Pay Item	Pay Unit
8324.41	Sand Cushioning	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED FOOTPATH AND CYCLE PATH MAINTENANCE	CODE:	8330

Scope

This maintenance intervention comprises the following maintenance activities:

- 8331 Unpaved Footpath and Cycle Path Cleaning
- 8332 Unpaved Footpath and Cycle Path General Surface Repair
- 8339 Other Unpaved Footpath and Cycle Path Maintenance

Activity 8339 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED FOOTPATH AND CYCLE PATH MAINTENANCE	CODE:	8330
Activity	Unpaved Footpath and Cycle Path Cleaning	Code:	8331

8331.1 Scope

Unpaved Footpath and Cycle Path Cleaning consist of keeping the footpaths and cycle paths clean and clear of loose sand, stones, aggregates and debris for the convenience of the users and a pleasing appearance of the paths.

The Activity includes the removal and disposal (in accordance with applicable regulations/requirements) of all loose materials < 100 cm²; i.e. broken glass and similar accumulated on the path surface, by hand sweeping.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean unpaved footpaths and cycle paths.
- Clean up of site including disposal of any waste or any excavated material.

8331.2 Description and Requirements

Work methods for Unpaved Footpath and Cycle Path Cleaning shall be in accordance with MOPRBW 8331 and will normally include but not be limited to the following operations:

- Sweeping the path using labour based method using a broom or a shovel, load the heaped soil onto wheel barrow for disposal within the road reserve if it is environmentally acceptable. so as to remove accumulated soil and other deposits. Otherwise load the heaped soil onto the trailer or pick-up or truck, haul and dispose at designated areas.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Remove safety devices on completion of the job.

8331.3 Standards, Materials and Tolerances

The unpaved footpaths and cycle paths shall be clean and free of hazards caused by loose material and debris. All loose material shall be removed from the paved roadway.

Loose material shall be removed from the paths in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8331.

8331.4 Measurement and Payment

The unit rate for Unpaved Footpath and Cycle Path Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of area cleaned.

Pay Item No	Pay Item	Pay Unit
8331.41	Unpaved Footpath and Cycle Path Cleaning	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	UNPAVED ROADWAY	CODE:	8300
INTERVENTION	UNPAVED FOOTPATH AND CYCLE PATH MAINTENANCE	CODE:	8330
Activity	Unpaved Footpath and Cycle Path General Surface Repair	Code:	8332

8332.1 Scope

Unpaved Footpath and Cycle Path General Surface Repair consist of repair of potholes, rutting or depressions and inadequate crossfall of unpaved footpath or cycle path surfacing by reinstating defective area to profile with approved material, and replacement with new materials, as approved by the Engineer, to profile.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean unpaved footpaths and cycle paths.
- Clean up of site including disposal of any waste or any excavated material.

8332.2 Description and Requirements

Work methods for Unpaved Footpath and Cycle Path General Surface Repair shall be in accordance with MOPRBW 8332 and will normally include but not be limited to the following operations:

- Reinstatement of the area to acceptable shape with approved materials placed and compacted on the existing surface, or by removal of existing surface materials followed by placement and compaction of approved materials to acceptable shape.
- Compacting of the materials until level with the surrounding surface.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 to ensure safety of workmen and traffic control.
- Remove safety devices on completion of the job.

8332.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials shall be in accordance with the requirements of SSRBW: SECTION 3800: GRAVEL SHOULDER AND GRAVEL WEARING COURSE. For an ungravelled surface (earth), as instructed by the Engineer.

The final surfacing shall be of the same type as the surrounding footpath or cycle path surface. There shall be no depressions in the finished surface that will allow water to pond.

Unpaved Footpath and Cycle Path General Surface Repair shall be carried out in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8332.

8332.4 Measurement and Payment

The unit rate for Unpaved Footpath and Cycle Path General Surface Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metres of area repaired.

Pay Item No	Pay Item	Pay Unit
8332.41	Unpaved Footpath and Cycle Path General Surface Repair	m ²

8400 DRAINAGE FACILITIES

8401 Scope

Feature 8400 Drainage Facilities covers routine maintenance interventions and activities to keep culverts and drains and associated drainage elements free of debris and in good repair to ensure free flow of water. It covers all types of culverts, including metal, concrete, wooden or polystyrene and all types of drains including side drains, median drains, cut-off drains, mitre drains and rectangular covered drains. It also covers cleaning, repair and necessary replacement and/ or relaying of catchpits, manholes and subsurface drainage in urban areas. All periodic maintenance activities shall generally be carried out in accordance with Standard Specifications for Road and Bridge Works when required and as directed by the Engineer.

The feature "Drainage Facilities" shall be defined as per the Botswana Road Design Manual (BRDM) and the Standard Specifications for Road and Bridge Works (SSRBW).

Feature 8400 Drainage Facilities covers the following interventions and activities:

8410 Culvert Maintenance

- 8411 Culvert Cleaning
- 8412 Culvert Headwall, Wing Wall and Marker Post Repainting
- 8413 Culvert Headwall, Wing Wall, Inlet and Outlet Structure Repair
- 8414 Culvert Repair
- 8415 Culvert Marker Post Reinstatement/Replacement
- 8416 Culvert Marker Post Reflector Replacement
- 8419 Other Culvert Maintenance

8420 Drain Maintenance

- 8421 Drain Clearing, Cleaning, and Desilting
- 8422 Unlined Drain Erosion Repair
- 8423 Unlined Drain Reshaping
- 8424 Drain Lining Repair
- 8425 Concrete Lining Joints Repair
- 8426 Concrete Lining Weep Holes Cleaning
- 8427 Drain Cover Repair/Replacement
- 8429 Other Drain Maintenance

8430 Catchpit, Manhole and Drainage Pipe Maintenance

- 8431 Catchpit, Manhole and Drainage Pipe Cleaning and Clearing
- 8432 Manhole/Catchpit Cover Replacement
- 8433 Drainage Pipe Relaying/Replacement
- 8434 Catchpit/Manhole Repair
- 8435 Drainage Pipe Repair
- 8439 Other Catchpit, Manhole and Drainage Pipe Maintenance

8440 Erosion Protection Works Maintenance

- 8441 Stone Pitching Repair
- 8442 Concrete Erosion Protection Works Repair
- 8443 Gabion Repair
- 8444 Scour Check and Chute Repair
- 8445 Berm Maintenance
- 8449 Other Erosion Protection Works Maintenance

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CULVERT MAINTENANCE	CODE:	8410

Scope

This maintenance intervention comprises the following maintenance activities:

- 8411 Culvert Cleaning
- 8412 Culvert Headwall, Wing Wall and Marker Post Repainting
- 8413 Culvert Headwall, Wing Wall, Inlet and Outlet Structure Repair
- 8414 Culvert Repair
- 8415 Culvert Marker Post Reinstatement/Replacement
- 8416 Culvert Marker Post Reflector Replacement
- 8419 Other Culvert Maintenance

Activity 8419 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CULVERT MAINTENANCE	CODE:	8410
Activity	Culvert Cleaning	Code:	8411

8411.1 Scope

Culvert Cleaning shall consist of the removal of silt or debris from culvert inlet and outlet structures, cleaning of head walls and culvert marker posts to restore proper drainage.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean culverts.
- Clean up of site including disposal of any waste or any excavated material.

8411.2 Description and Requirements

Work methods for Culvert Cleaning shall be in accordance with MOPRBW 8411 and will normally include but not be limited to the following operations:

- Removal of debris, sediment and other obstructions from culverts to maintain the unimpeded flow of water through the structure and to prevent damage to the roadway or the structures.
- Full drain cleaning to be scheduled in connection with this activity.
- Removal of debris, sediment and other obstructions accumulated in inlet and outlet structures and disposal of them away from the drainage system in an environmentally friendly manner.

Operational Requirements:

- Place warning signs in accordance with section 8900 before commencing with any activity for safety of workmen and traffic control.
- Deposit the debris, sediment and other obstructions outside the road reserve downstream of the culvert away from outlet channels.
- Remove all signs on completion of the job or move them to the next section.

8411.3 Standards, Materials and Tolerances

Culvert Cleaning shall be carried out as directed and shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8411.

8411.4 Measurement and Payment

The unit rate for Culvert Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of culverts cleaned. (Length of each culvert shall be measured at the bottom inclusive of inlet and outlet).

Pay Item No	Pay Item	Pay Unit
8411.41	Culvert Cleaning (Span ≤ 2 m)	m
8411.42	Culvert Cleaning (Span > 2 m, < 4 m)	m
8411.43	Culvert Cleaning (Span ≥ 4 m)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CULVERT MAINTENANCE	CODE:	8410
Activity	Culvert Headwall, Wing Wall and Marker Post Repainting	Code:	8412

8412.1 Scope

Culvert Headwall, Wing Wall and Marker Post Repainting shall consist of cleaning and repainting to ensure their intended function and to provide a pleasing appearance.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repaint headwalls, wing walls and marker posts.
- Clean up of site including disposal of any waste.

8412.2 Description and Requirements

Work methods for Culvert Headwall, Wing Wall and Marker Post Repainting shall be in accordance with MOPRBW 8412 and will normally include but not be limited to the following operations:

- Preparing of the surfaces to be painted by cleaning them using squeegees, brushes, water and cloth. Use detergents to remove dirt that is difficult to clean by plain water.
- Cleaning of the culvert headwalls and wing walls with a brush or broom and, if necessary, washing down with water. Bitumen or oil streaks may be washed off with kerosene, and then washed down with water.
- Removing loose paint and dirt from surfaces and wiping off the surface to be painted to ensure that the surface is dry and clean before applying anti-corrosive paint.
- Applying primer and paint in accordance with manufacturer's recommendations.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW section 8900 before commencing with any activity for safety of workmen and traffic control.
- Remove all safety devices on completion of the job.

8412.3 Standards, Materials and Tolerances

Applicable Specification:

Workmanship and materials shall be in accordance with SSRBW SECTION 7200: PAINTING.

Culvert Headwall, Wing Walls and Marker Post Repainting shall be carried out as directed and shall meet with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8412.

8412.4 Measurement and Payment

The unit rate for Headwall, Wing Wall and Marker Post Repainting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid as follows:

Pay Item No	Pay Item	Pay Unit
8412.41	Culvert Headwall and Wing Wall Repainting	m ²
8412.42	Culvert Marker Post Repainting	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CULVERT MAINTENANCE	CODE:	8410
Activity	Culvert Headwall, Wing Wall, Inlet and Outlet Structure Repair	Code:	8413

8413.1 Scope

Culvert Headwall, Wing Wall, Inlet and Outlet Structure Repair shall consist of repair to damaged headwalls and wing walls to prevent collapse and subsequent slippage of retained material, and to repair inlet and outlet structures to control scouring.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair culvert headwalls, wing walls, inlet and outlet structures.
- Clean up of site including disposal of any waste or any excavated material.

8413.2 Description and Requirements

Work methods for Culvert Headwall, Wing Wall, Inlet and Outlet Structure Repair shall be in accordance with MOPRBW 8413 and will normally include but not be limited to the following operations:

- Repairing stone or masonry structures, concrete structures or other inlet/outlet structures.
- Removing all loose stones/masonry, damaged concrete and cut back to sound material.
- Repairing of structure using removed stones or masonry.
- The stones should have a long flat shape with a minimum dimension of 150 mm. If necessary, shape the stone using a mason's hammer.
- Lay stones for masonry with a bond allowing minimum overlap of ¼ the length of the smaller stone.
- Joints should be a minimum of 10 mm. No stone should touch another stone but should be laid fully on a mortar bed.
- Construction if required of formwork around the damaged area and cast concrete of approved strength.
- Removing of all temporary signs and safety devices.
- Rebuilding of inlet/outlet structures using similar materials to original as described above.
- Grouting up of all joints with mortar (1 cement : 4 sand by volume).

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8413.3 Standards, Materials and Tolerances

Concrete culverts shall be repaired as required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8413.

8413.4 Measurement and Payment

The unit rate for Culvert Headwall, Wing Wall, Inlet and Outlet Structure Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of culvert headwalls, wing walls, inlet and outlet structures repaired in masonry, and per cubic metre of culvert headwalls, wing walls, inlet and outlet structures repaired in concrete.

Pay Item No	Pay Item	Pay Unit
8413.41	Culvert Headwall, Wing Wall, Inlet and Outlet Structures Repair; masonry	m ²
8413.42	Culvert Headwall, Wing Wall, Inlet and Outlet Structures Repair; concrete	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CULVERT MAINTENANCE	CODE:	8410
Activity	Culvert Repair	Code:	8414

8414.1 Scope

Culvert Repair shall consist of repair or replacement of broken or failed culvert elements or culvert bases in order to preserve structural integrity of culvert structure and ensure smooth flow of water in the culvert. The activity includes repair of all types of culverts; including but not limited to metal culverts, concrete culverts, wooden culverts and polystyrene culverts.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair culverts.
- Clean up of site including disposal of any waste or any excavated material.

8414.2 Description and Requirements

Work methods for Culvert Repair shall be in accordance with MOPRBW 8414 and will normally include but not be limited to the following operations:

- Removing rust from steel sections and carefully removing broken culvert elements.
- Excavating to expose the damaged or failed culvert, stockpiling the excavated material on the road side for re-use in backfilling.
- Repairing of all types of culverts of appropriate material such as bitumen coating, concrete, polystyrene or wood. It also includes repair of collapsed culverts, including buckled metal culverts.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Mark the area on road surface under which the culvert base slab or culvert has broken or failed.
- Excavate to expose the broken culvert or the failed base slab. Stockpile excavated material on the road side for re-use in backfilling in layers of maximum 150 mm thickness.
- Remove all safety devices on completion of the job.

8414.3 Standards, Materials and Tolerances

Culverts shall be repaired as required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8414.

8414.4 Measurement and Payment

The unit rate for Culvert Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of culverts repaired according to the type of culvert material used. The span of the culvert shall be the length between the outer edges. For multiple openings the span shall be defined as the length between the outer edges of the outer openings.

Pay Item No	Pay Item	Pay Unit
8414.41	Culvert Repair (Span ≤ 2 m)	Number
8414.42	Culvert Repair (Span > 2 m, <4 m)	Number
8414.43	Culvert Repair (Span ≥ 4 m)	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CULVERT MAINTENANCE	CODE:	8410
Activity	Culvert Marker Post Reinstatement/Replacement	Code:	8415

8415.1 Scope

Culvert Marker Post Reinstatement/Replacement shall consist of replacing of missing, removal of broken or damaged marker posts and supply and erection of new marker posts.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to reinstate/replace culvert marker posts.
- Clean up of site including disposal of any waste or any excavated material.

8415.2 Description and Requirements

Work methods for Culvert Marker Post Reinstatement/Replacement shall be in accordance with MOPRBW 8415 and will normally include but not be limited to the following operations:

- Cleaning of holes for marker/guide posts and excavation if required, for posts to be placed in its original position.
- Placing of the post into hole to correct alignment.
- Backfilling of holes in layers not exceeding 50 mm from the bottom.
- Disposal of surplus excavated material shall be as directed.
- Painting of posts immediately after placing.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8415.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials used for reinstatement/replacement of marker posts shall be in accordance with SSRBW: SECTION 5300: MARKER POSTS. Marker posts shall be reinstated/replaced as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8415.

8415.4 Measurement and Payment

The unit rate for Culvert Marker Post Reinstatement/Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of marker posts reinstated.

Pay Item No	Pay Item	Pay Unit
8415.41	Replacement of Culvert Marker Posts	Number
8415.42	Repair and Reinstallation of Culvert Marker Posts	Number
8415.43	Realignment of Culvert Marker Posts	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CULVERT MAINTENANCE	CODE:	8410
Activity	Culvert Marker Post Reflector Replacement	Code:	8416

8415.1 Scope

Culvert Marker Post Reflector Replacement shall consist of replacing damaged or missing reflectors on marker or guide posts used in connection with culverts.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to replace reflectors.
- Clean up of site including disposal of any waste or any excavated material.

8416.2 Description and Requirements

Work methods for Culvert Marker Post Reflector Replacement shall be in accordance with MOPRBW 8416 and will normally include but not be limited to the following operations:

- Cleaning of the marker post surface.
- Fixing of the marker post reflector using screw or glue as appropriate.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8416.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials shall be in accordance with SSRBW SECTION 5300: MARKER POSTS.

Culvert marker post reflectors shall be replaced as required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8416.

8416.4 Measurement and Payment

The unit rate for Culvert Marker Post Reflector Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of reflectors replaced.

Pay Item No	Pay Item	Pay Unit
8416.41	Culvert Marker Post Reflector Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	DRAIN MAINTENANCE	CODE:	8420

Scope

This maintenance intervention comprises the following maintenance activities:

- 8421 Drain Clearing, Cleaning, and Desilting
- 8422 Unlined Drain Erosion Repair
- 8423 Unlined Drain Reshaping
- 8424 Drain Lining Repair
- 8425 Concrete Lining Joints Repair
- 8426 Concrete Lining Weep Holes Cleaning
- 8427 Drain Cover Repair/Replacement
- 8429 Other Drain Maintenance

Activity 8429 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	DRAIN MAINTENANCE	CODE:	8420
Activity	Drain Cleaning, Clearing and Desilting	Code:	8421

8421.1 Scope

Drain Cleaning, Clearing and Desilting shall consist of all works to clear and clean drains to remove obstructions to ensure free flow of storm-water.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clear and clean drains.
- Clean up of site including disposal of any waste or any excavated material.

8421.2 Description and Requirements

Work methods for Drain Cleaning, Clearing and Desilting shall be in accordance with MOPRBW 8421 and will normally include but not be limited to the following operations:

- Removing all vegetation from lined drains.
- Removing all trees, bush or shrubs within the unlined drain. Grass should be trimmed to a height of less than 50 mm leaving a short grass cover on the side slope.
- Removing silt from the drain and sumps and disposing off the material evenly in the road reserve at least 5 m away from the outside edge of the drain. Removing the silt until the desired drain invert is attained, and carting away to spoil at approved spoil pit.
- Clearing drain outfall to facilitate routing of water.
- Removing all debris and cut vegetation from the drain and disposing off at least 5 m from the outside edge of the drain and where they cannot be blown back into the drain.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Grass growing in the flat bottom of a trapezoidal drain shall be removed.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8421.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials used for drains shall be in accordance with SSRBW: SERIES 2000: DRAINAGE, or as directed by the Engineer..

The drain shall be free of all material that could block the flow of water into the drain and along it. The base of the drain shall be at least 450 mm below the edge of the road shoulder or as directed by the Engineer and shall be evenly sloped to allow water to flow to the outlet.

Drain Cleaning, Clearing and Desilting shall be carried out as directed in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8421.

8421.4 Measurement and Payment

The unit rate for Drain Cleaning, Clearing and Desilting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of drains cleared.

Pay Item No	Pay Item	Pay Unit
8421.41	Drain Cleaning, Clearing and Desilting	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	DRAIN MAINTENANCE	CODE:	8420
Activity	Unlined Drain Erosion Repair	Code:	8422

8422.1 Scope

Unlined Drain Erosion Repair shall consist of repair of existing drains that have become ineffective due to erosion.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair erosion.
- Clean up of site including disposal of any waste or any excavated material.

8422.2 Description and Requirements

Work methods for Unlined Drain Erosion Repair shall be in accordance with MOPRBW 8422 and will normally include but not be limited to the following operations:

- Repairing areas exposed to erosion.
- Loading and transporting fill material to the work area making sure the material is off-loaded away from the roadway area.
- Backfilling the eroded section by imported fill material, and tamping the fill to attain a dense surface.
- Shaping the drain where necessary to required profile. Working in the direction of water flow in the drain, starting by shaping the outside slope of the drain, windrowing the material to the bottom of the drain and repeating until desired invert is attained.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8422.3 Standards, Materials and Tolerances

The drain shall be free of all material that could block the flow of water into the drain and along it. The base of the drain shall be at least 450 mm below the edge of the road shoulder or as directed by the Engineer and shall be evenly sloped to allow water to flow to the outlet.

Unlined Drain Erosion Repair shall generally be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8422.

8422.4 Measurement and Payment

The unit rate for Unlined Drain Erosion Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cubic metre of material brought in.

Pay Item No	Pay Item	Pay Unit
8422.41	Unlined Drain Erosion Repair	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	DRAIN MAINTENANCE	CODE:	8420
Activity	Unlined Drain Reshaping	Code:	8423

8423.1 Scope

Unlined Drain Reshaping shall consist of reshaping of existing drains that have become ineffective.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to reshape unlined drains.
- Clean up of site including disposal of any waste or any excavated material.

8423.2 Description and Requirements

Work methods, using either labour based or equipment based, shall be in accordance with section MOPRBW 8423.

- Shaping the drain either by labour based methods or using a grader to the correct cross-section at the new grade by either cutting or adding materials.
- Removing excavated material and spreading well clear of drain.
- Clearing drain outfall to facilitate routing of water from the roadway.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- Check the drain depth, longitudinal gradient and side slopes and make corrections as necessary to ensure free flow of water.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8423.3 Standards, Materials and Tolerances

The drain shall be free of all material that could block the flow of water into the drain and along it. The base of the drain shall be at least 450 mm below the edge of the road shoulder or as directed by the Engineer and shall be evenly sloped to allow water to flow to the outlet.

Unlined Drain Reshaping shall generally be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8423.

8423.4 Measurement and Payment

The unit rate for Unlined Drain Reshaping shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of drains reshaped.

Pay Item No	Pay Item	Pay Unit
8423.41	Unlined Drain Reshaping	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	DRAIN MAINTENANCE	CODE:	8420
Activity	Drain Lining Repair	Code:	8424

8424.1 Scope

Drain Lining Repair shall consist of repairing damaged sections of drain lining to prevent erosion of the slopes and potential destruction of the drain. It includes all types of drainage lining materials.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair drain lining.
- Clean up of site including disposal of any waste or any excavated material.

8424.2 Description and Requirements

Work methods for Drain Lining Repair shall be in accordance with MOPRBW 8424 and will normally include but not be limited to the following operations:

- Removing all silt and debris from the drain to be repaired.
- Preparing the lining material (concrete or precast elements) and replacing the lining to correct line and level.
- Grouting up any open joints with mortar or other sealant.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8424.3 Standards, Materials and Tolerances

Drain lining shall be fully functional to prevent erosion and ensure free flow of water. Material used for repair of lining shall be as directed by the Engineer.

Drain Lining Repair shall generally be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8424.

8424.4 Measurement and Payment

The unit rate for Drain Lining Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of drains lined repaired.

Pay Item No	Pay Item	Pay Unit
8424.41	Drain Lining Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	DRAIN MAINTENANCE	CODE:	8420
Activity	Concrete Lining Joints Repair	Code:	8425

8425.1 Scope

Concrete Lining Joints Repair shall consist of repairing of joints by resealing drain lining joints to prevent ingress of water under the lining, which may cause heaving to the drain lining and eventual damage to the drain.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair concrete lining joints.
- Clean up of site including disposal of any waste or any excavated material.

8425.2 Description and Requirements

Work methods for Concrete Lining Joints Repair shall be in accordance with MOPRBW 8425 and will normally include but not be limited to the following operations:

- Removing all silt and debris from the joints to be repaired.
- Preparing the lining material (concrete or precast elements) and replacing the lining to correct line and level.
- Grouting up any open joints with mortar or other sealant.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8425.3 Standards, Materials and Tolerances

Concrete lining joints shall be fully functional to prevent erosion by the ingress of water and ensure free flow of water. Joint filler material, such as bitumen, polystyrene or grout sealant, shall be as directed by the Engineer.

Concrete lining joints repair shall generally be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8425.

8425.4 Measurement and Payment

The unit rate for Concrete Lining Joints Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of drains lining joints repaired.

Pay Item No	Pay Item	Pay Unit
8425.41	Concrete Lining Joints Repair	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	DRAIN MAINTENANCE	CODE:	8420
Activity	Concrete Lining Weep Holes Cleaning	Code:	8426

8426.1 Scope

Concrete Lining Weep Holes Cleaning shall consist of removal of all blockages in weep holes on lined drain sides and restore their functionality.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean weep holes of concrete linings.
- Clean up of site including disposal of any waste or any excavated material.

8426.2 Description and Requirements

Work methods for Concrete Lining Weep Holes Cleaning shall be in accordance with MOPRBW 8426 and will normally include but not be limited to the following operations:

- Removal of all silt and debris from the section to be cleaned in order to identify weep holes.
- Cleaning of the weep holes.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8426.3 Standards, Materials and Tolerances

Concrete lining weep holes shall be fully functional to prevent erosion.

Concrete Lining Weep Holes Cleaning shall generally be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8426.

8426.4 Measurement and Payment

The unit rate for Concrete Lining Weep Holes Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of weep holes cleaned.

Pay Item No	Pay Item	Pay Unit
8426.41	Concrete Lining Weep Holes Cleaning	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	DRAIN MAINTENANCE	CODE:	8420
Activity	Drain Cover Repair/Replacement	Code:	8427

8427.1 Scope

Drain Cover Repair/Replacement shall consist of removal of drain covers damaged beyond repair, realignment or repair of covers that can be reinstated, and replacement with new covers (if necessary) to restore the functionality of the drain.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to remove, realign, repair or replace drain covers, including clearing of blockage.
- Clean up of site including disposal of any waste or any excavated material.

8427.2 Description and Requirements

Work methods for Drain Cover Repair/Replacement shall be in accordance with MOPRBW 8427 and will normally include but not be limited to the following operations:

- Removal of all silt, debris and broken covers from the section to be repaired.
- Cleaning and repair, if required, of cover beds or frames.
- Clearing of blockage at the location of the drain cover repair.
- Repair and reinstatement of covers.
- Replacement with new covers, if required.
- Sealing up of joints.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8427.3 Standards, Materials and Tolerances

Drain covers shall be fully functional to ensure safety of road users and to prevent filling up of drains with unwanted material.

Drain Cover Repair/Replacement shall generally be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8427.

8427.4 Measurement and Payment

The unit rate for Drain Cover Repair/Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of drain covers repaired and reinstated, and per number of drain covers being replaced.

Pay Item No	Pay Item	Pay Unit
8427.41	Drain Cover Repaired and Reinstated	m
8427.42	Drain Cover Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CATCHPIT, MANHOLE AND DRAINAGE PIPE MAINTENANCE	CODE:	8430

Scope

This maintenance intervention comprises the following maintenance activities:

- 8431 Catchpit, Manhole and Drainage Pipe Cleaning and Clearing
- 8432 Manhole/Catchpit Cover Replacement
- 8433 Drainage Pipe Relaying/Replacement
- 8434 Catchpit/Manhole Repair
- 8435 Drainage Pipe Repair
- 8439 Other Catchpit, Manhole and Drainage Pipe Maintenance

Activity 8439 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CATCHPIT, MANHOLE AND DRAINAGE PIPE MAINTENANCE	CODE:	8430
Activity	Catchpit, Manhole and Drainage Pipe Cleaning and Clearing	Code:	8431

8431.1 Scope

Catchpit, Manhole and Drainage Pipe Cleaning and Clearing include the clearing and cleaning of debris and silt impeding the free flow of water through catchpits, manholes and drainage pipes.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean and clear catchpits, manholes and drainage pipes.
- Clean up of site including disposal of any waste or any excavated material.

8431.2 Description and Requirements

Work methods for Catchpit, Manhole and Drainage Pipe Cleaning and Clearing shall be in accordance with MOPRBW 8431 and will normally include but not be limited to the following operations:

- Removal of deposited material such as silt, sand and other obstructions as directed by the Engineer. Material shall be removed to a place where it can no longer cause silting and obstruct the free flow of water.
- Entering manhole or catchpit and clearing all debris, silt and stagnant water.
- Clearing of all debris and silt from underground drainage pipes using the procedure described in MOPRBW 8431.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Before entering manhole, check to ensure that it is free from dangerous objects and noxious gases.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8431.3 Standards, Materials and Tolerances

The drainage pipes and catchpits and their inlets and outlets shall be free from all material that could block the free waterway. Cleaning and clearing of catchpits, manholes and drainage pipes shall generally be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8431.

8431.4 Measurement and Payment

The unit rate for Catchpit, Manhole and Drainage Pipe Cleaning and Clearing shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of pipes cleaned and cleared, and number of catchpits and manholes cleaned and cleared.

Pay Item No	Pay Item	Pay Unit
8431.41	Catchpit, Manhole Cleaning and Clearin	Number
8431.42	Drainage Pipes Cleaning and Clearing	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CATCHPIT, MANHOLE AND DRAINAGE PIPE MAINTENANCE	CODE:	8430
Activity	Manhole/Catchpit Cover Replacement	Code:	8432

8432.1 Scope

Manhole/Catchpit Cover Replacement includes the removal and installation of damaged covers (or missing) on catchpits or manholes.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to replace covers on manholes and catchpits.
- Clean up of site including disposal of any waste or any excavated material.

8432.2 Description and Requirements

Work methods for Manhole/Catchpit Cover Replacement shall be in accordance with MOPRBW 8432 and will normally include but not be limited to the following operations:

- Removing the damaged cover, including parts that may have fallen into the manhole/catchpit.
- Dipping of frames and covers in an approved preservative before fixing.
- Painting of covers and frames with two coats of bituminous paint.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8432.3 Standards, Materials and Tolerances

Applicable Specification:

Manhole covers shall comply with the requirements of SSRBW SECTION 2200: PREFABRICATED CULVERTS/2213 (e).

Covers on catchpits or manholes shall be installed when required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8432.

8432.4 Measurement and Payment

The unit rate for Manhole/Catchpit Cover Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of covers or frames replaced.

Pay Item No	Pay Item	Pay Unit
8432.41	Manhole/Catchpit Cover Replacement	Number
8432.42	Manhole/Catchpit Frame Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CATCHPIT, MANHOLE AND DRAINAGE PIPE MAINTENANCE	CODE:	8430
Activity	Drainage Pipe Relaying/Replacement	Code:	8433

8433.1 Scope

Drainage Pipe Relaying/Replacement includes the excavation and removal of existing damaged pipes and installation of new pipes of the same type and dimensions or as otherwise directed by the Engineer.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to relay/replace drainage pipes.
- Clean up of site including disposal of any waste or any excavated material.

8433.2 Description and Requirements

Work methods for Drainage Pipe Relaying/Replacement shall be in accordance with MOPRBW 8433 and will normally include, but not be limited to the following operations:

- Removing broken blocked or damaged drainage pipe beyond repair.
- Laying new drainage pipe of approved type.
- If the pipe element has been joined using concrete, cure for at least three days.
- Backfilling using excavated materials or imported approved materials in layers not exceeding 150 mm compacted to the density equal to or above the density of surrounding soil.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8433.3 Standards, Materials and Tolerances

Applicable Specification:

Relaying of pipes shall be carried out in accordance with SSRBW: SECTION 2100: DRAINS.

Subsurface drains shall be reinstated as and when required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8433.

8433.4 Measurement and Payment

The unit rate for Drainage Pipe Relaying/Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of relayed or replaced pipes according to material used.

Pay Item No	Pay Item	Pay Unit
8433.41	Drainage Pipe Relaying	m
8433.42	Drainage Pipe Replacement	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CATCHPIT, MANHOLE AND DRAINAGE PIPE MAINTENANCE	CODE:	8430
Activity	Catchpit/Manhole Repair	Code:	8434

8434.1 Scope

Catchpit/Manhole Repair includes all works required to repair catchpits or manholes, including backfill and restoration of pavement layers and shoulders as required

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for repair of catchpits and manholes.
- Clean up of site including disposal of any waste or any excavated material.

8434.2 Description and Requirements

Work methods for Catchpit/Manhole Repair shall be in accordance with MOPRBW 8434 and will normally include but not be limited to the following operations:

- Removing damaged portion of structure.
- Rebuilding structure using similar materials to original as described.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8434.3 Standards, Materials and Tolerances

Applicable Specification:

Catchpits and manholes shall comply with the requirements of SSRBW SECTION 2200: PREFABRICATED CULVERTS/2213 (e) INLET AND OUTLET STRUCTURES, CATCHPITS AND MANHOLES.

Catchpits, manholes and drainage pipes shall be fully functional and of a standard in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8434.

8434.4 Measurement and Payment

The unit rate for Catchpit/Manhole Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of catchpits and manholes repaired.

Pay Item No	Pay Item	Pay Unit
8434.41	Catchpit/Manhole Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	CATCHPIT, MANHOLE AND DRAINAGE PIPE MAINTENANCE	CODE:	8430
Activity	Drainage Pipe Repair	Code:	8435

8435.1 Scope

Drainage Pipe Repair includes all works required to repair drainage pipes, including backfill and restoration of pavement layers and shoulders as required.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair drainage pipes.
- Clean up of site including disposal of any waste or any excavated material.

8435.2 Description and Requirements

Work methods for Drainage Pipes Repair shall be in accordance with MOPRBW 8435 and will normally include but not be limited to the following operations:

- Repairing broken or damaged drainage pipes made of concrete, steel, polystyrene or any other material.
- Backfilling with either excavated material or approved imported material in layers not exceeding 150 mm compacted to 93% MOD AASHTO for fill and subgrade layers, 95% MOD AASHTO for subbase layers and 98% MOD AASHTO for base course layers.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8435.3 Standards, Materials and Tolerances

Applicable Specification:

Workmanship and materials shall comply with SSRBW SECTION 2100: DRAINS.

Drainage pipes shall be repaired as and when required in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8435.

8435.4 Measurement and Payment

The unit rate for Drainage Pipe Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of repaired pipe according to material used.

Pay Item No	Pay Item	Pay Unit
8435.41	Drainage Pipe Repair	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	EROSION PROTECTION WORKS MAINTENANCE	CODE:	8440

Scope

This maintenance intervention comprises the following maintenance activities:

- 8441 Stone Pitching Repair
- 8442 Concrete Erosion Protection Works Repair
- 8443 Gabion Repair
- 8444 Scour Check and Chute Repair
- 8445 Berm Maintenance
- 8449 Other Erosion Protection Works Maintenance

Activity 8449 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	EROSION PROTECTION WORKS MAINTENANCE	CODE:	8440
Activity	Stone Pitching Repair	Code:	8441

8441.1 Scope

Stone Pitching Repair includes all works required to repair stone pitching used as erosion protection along drains.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair of stone pitching.
- Clean up of site including disposal of any waste or any excavated material.

8441.2 Description and Requirements

Work methods for Stone Pitching Repair shall be in accordance with MOPRBW 8441 and will normally include but not be limited to the following operations:

- Repairing stone pitching by removing all loose stones from damaged area.
- Cleaning the area to remove loose particles.
- Repairing masonry using removed stones or alternatively additional stones/masonry brought to worksite.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8441.3 Standards, Materials and Tolerances

Applicable Specification:

SSRBW: SECTION 5100: PITCHING, STONEMASONRY AND PROTECTION AGAINST EROSION.

- The stones should have a long flat shape with a minimum dimension of 150 mm. If necessary, shape the stones using a mason's hammer.
- Joints should be a minimum of 10 mm. No stone should touch another stone, but should be laid fully on a mortar bed.

Stone pitching shall be functional and without defects in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8441.

8441.4 Measurement and Payment

The unit rate for Stone Pitching Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of repaired stone pitching.

Pay Item No	Pay Item	Pay Unit
8441.41	Stone Pitching Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	EROSION PROTECTION WORKS MAINTENANCE	CODE:	8440
Activity	Concrete Erosion Protection Works Repair	Code:	8442

8442.1 Scope

Concrete Erosion Protection Works Repair includes all works required to repair concrete structures used as erosion protection along drains.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair erosion protection structures made from concrete or concrete blocks.
- Clean up of site including disposal of any waste or any excavated material.

8442.2 Description and Requirements

Work methods for Concrete Erosion Protection Works Repair shall be in accordance with MOPRBW 8442 and will normally include but not be limited to the following operations:

- Repairing of damaged concrete structure.
- Cutting back damaged concrete structures to sound material and if required, construction of formwork around the damaged area.
- Placing of concrete in the damaged area and tamping to reduce air voids.
- Repairing of inlet/outlet structures by removing damaged portion of structure and rebuilding structure using concrete or concrete blocks similar to original as described above.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8442.3 Standards, Materials and Tolerances

Applicable Specification:

SSRBW: SECTION 5100: PITCHING, STONWORK AND PROTECTION AGAINST EROSION.

Concrete structures for erosion protection shall be functional and without defects in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8442.

8442.4 Measurement and Payment

The unit rate for Erosion Protection Works Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of repaired concrete erosion protection works.

Pay Item No	Pay Item	Pay Unit
8442.41	Concrete Erosion Protection Works Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	EROSION PROTECTION WORKS MAINTENANCE	CODE:	8440
Activity	Gabion Repair	Code:	8443

8443.1 Scope

Gabion Repair includes all works required to repair gabions used for erosion protection along drains.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair gabion boxes or mattresses.
- Clean up of site including disposal of any waste or any excavated material.

8443.2 Description and Requirements

Work methods for Gabion Repair shall be in accordance with MOPRBW 8443 and will normally include but not be limited to the following operations:

- Repair work to existing gabions shall be carried out as directed by the Engineer. It may include removal of stone from the cages, repacking, placing and tying of new gabion mesh.
- Removing all loose or unsuitable material and cart away to spoil.
- Replacing missing stones to fill up gabion baskets in a way that leaves the least possible space.
- Stitching together the gabion cages using the binder wire along the touching edges.
- Where gabions are to be replaced from the ground level, prepare the foundation by levelling and compacting the ground using hand rammers.
- Hand-fill the baskets with the stones and tie them together with the binder wire.
- Gabions should be laid with broken bonds to avoid continuous joints.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8443.3 Standards, Materials and Tolerances

Applicable Specification:

Workmanship and all materials used for repair of gabions shall be in accordance with SSRBW: SECTION 5200: GABIONS.

Each repaired gabion structure shall present a neat exposed face true to line and free from excessive bulges.

Gabion Repair shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8443.

8443.4 Measurement and Payment

The unit rate for Gabion Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cubic metre of gabion box or mattress repaired.

Pay Item No	Pay Item	Pay Unit
8443.41	Gabion Box Repair	m ³
8443.42	Gabion Mattress Repair	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	EROSION PROTECTION WORKS MAINTENANCE	CODE:	8440
Activity	Scour Check and Chute Repair	Code:	8444

8444.1 Scope

Scour Check and Chute Repair includes all works required to repair eroded scour checks using original material such as masonry, wood, stone or concrete in order to control scour.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair scour checks and chutes.
- Clean up of site including disposal of any waste or any excavated material.

8444.2 Description and Requirements

Work methods for Scour Check and Chute Repair shall be in accordance with MOPRBW 8444 and will normally include but not be limited to the following operations:

- Remove and dispose of unwanted material.
- Filling the eroded sections by soil brought to worksite and compacting. Levelling the filled area with adjacent sides using a straight edge.
- If necessary and if instructed by the Engineer, building of a scour check by excavating a 200 mm wide slot across the drain to 100 mm below drain invert level and filling it with stones, masonry or vertical wooden stakes until the slot is fully covered up-to a level of about 100 mm below top edge of drain.
- Building of a 0.5 m wide stone apron immediately downstream of the scour check to prevent scouring in the area.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Keep the concrete wet by watering and leave formwork in place for at least 3 days.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8444.3 Standards, Materials and Tolerances

Applicable Specification:

Workmanship and all materials used for Scour Check and Chute Repair shall be in accordance with SSRBW: SECTION 5100: PITCHING, STONEMASONRY AND PROTECTION AGAINST EROSION.

Scour checks and chutes shall be functional and without defects in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8444.

8444.4 Measurement and Payment

The unit rate for Scour Check and Chute Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of scour checks and chutes repaired and per cubic metre of fill material used.

Pay Item No	Pay Item	Pay Unit
8444.41	Scour Check and Chute Repair	Number
8444.42	Fill Material for Erosion Protection	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	DRAINAGE FACILITIES	CODE:	8400
INTERVENTION	EROSION PROTECTION WORKS MAINTENANCE	CODE:	8440
Activity	Berm Maintenance	Code:	8445

8445.1 Scope

Berm Maintenance includes all works required to repair and rebuild as necessary, eroded or otherwise damaged berms, in order to restore its function as a cut-off barrier for storm-water drainage.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to maintain berms.
- Clean up of site including disposal of any waste or any excavated material.

8445.2 Description and Requirements

Work methods for Berm Maintenance shall be in accordance with MOPRBW 8445 and will normally include but not be limited to the following operations:

- Excavating materials at the toe of the berm.
- If materials cannot be excavated at the toe of the berm, hauling of material from approved sources shall be deposited at the toe of the berm close to eroded area.
- Filling on eroded sections of the berm.
- Shaping the berm to obtain uniform slope and height.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8445.3 Standards, Materials and Tolerances

Applicable Specification:

Workmanship and materials shall be in accordance with SSRBW: SECTION 5100: PITCHING, STONEMASONRY AND PROTECTION AGAINST EROSION.

Berms shall be functional and without defects in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8445.

8445.4 Measurement and Payment

The unit rate for Berm Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cubic metre of material used to repair berms.

Pay Item No	Pay Item	Pay Unit
8445.41	Berm Maintenance	m ³

8500 BRIDGES

8501 Scope

Feature 8500 Bridges covers routine maintenance activities to keep bridges clean and in good repair. The feature further covers periodic maintenance activities, such as replacement of bearings, major rust removal and replacement of components when required. All periodic maintenance activities shall generally be carried out in accordance with Standard Specifications for Road and Bridge Works when required and as directed by the Engineer, and as scheduled in accordance with Activity 8524 Bridge Inspection.

It covers both vehicular and foot/pedestrian/cycle path bridges and flyovers of all types of construction materials including steel, concrete and timber. Reference shall be made to Botswana Roads Department's Bridge Repair Material Specification Manual for approved materials for bridge repair works.

The feature "Bridges" shall be defined as per the Botswana Roads Design Manual (BRDM) and Standard Specifications for Road and Bridge Works (SSRBW).

("A structure erected over a depression, river, watercourse, railway line, road or other obstacles for carrying motor, railway, pedestrian or other traffic, or services, and having a length, measured between the abutment faces along the centre line at girder bed level, of 6 meters or more, except that road-over-rail or rail-over-road structures are always classified as bridges").

Feature 8500 Bridges covers the following interventions and activities:

8510 Bridge Routine Maintenance

- 8511 Bridge Deck Cleaning
- 8512 Bridge Joints, Scupper Drains and Weep Holes Cleaning
- 8513 Bridge Bearings Cleaning
- 8514 Bridge Erosion Repair
- 8515 Bridge Concrete Repair
- 8516 Bridge Wearing Surface Maintenance
- 8517 Bridge Rail, Safety Barrier and Parapet Maintenance and Minor Repairs
- 8518 Bridge Steel Component Repair
- 8519 Other Bridge Routine Maintenance

8520 Bridge Periodic Maintenance

- 8521 Bridge Bearings Realignment and Replacement
- 8522 Bridge Rust Removal and Repainting
- 8523 Bridge Steel Component Replacement
- 8524 Bridge Inspection
- 8529 Other Bridge Periodic Maintenance

8530 Waterway Maintenance and Repair

- 8531 Waterway Debris and Obstacles Removal
- 8532 Waterway Erosion Repair
- 8533 Waterway Desilting
- 8539 Other Waterway Maintenance and Repair

Maintenance Standard Specifications for Road and Bridge Works

Intervention 8510 Bridge Routine Maintenance consists of routine maintenance on “bridge structures” which typically includes all types of bridges, bridge size culverts, foot/pedestrian bridges, steel bridges and flyovers.

Bridges shall be inspected as directed in Activity 8524 Bridge Routine Maintenance in accordance with the BMS, which will define the degree and extent of defects, the relevancy of defects and the urgency to carry out remedial work.

Intervention 8520 Bridge Periodic Maintenance will be scheduled as required from the outcome of the visual assessment.

Intervention 8530 Waterway Maintenance and Repair consists of routine maintenance at waterways.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGE	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510

Scope

This maintenance intervention comprises the following maintenance activities:

- 8511 Bridge Deck Cleaning
- 8512 Bridge Joints, Scupper Drains and Weep Holes Cleaning
- 8513 Bridge Bearings Cleaning
- 8514 Bridge Erosion Repair
- 8515 Bridge Concrete Repair
- 8516 Bridge Wearing Surface Maintenance
- 8517 Bridge Rail, Safety Barrier and Parapet Maintenance and Minor Repairs
- 8518 Bridge Steel Component Repair
- 8519 Other Bridge Routine Maintenance

Activity 8519 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510
Activity	Bridge Deck Cleaning	Code:	8511

8511.1 Scope

Bridge Deck Cleaning shall consist of removal and disposal of all dirt, debris and deleterious material, and washing of bridge decks, including sidewalks.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean bridge decks.
- Clean up of site including disposal of any waste or any excavated material.

8511.2 Description and Requirements

Work methods for Bridge Deck Cleaning shall be in accordance with MOPRBW 8511 and will normally include but not be limited to the following operations:

- Cleaning and removal of the following surfaces of all dirt, debris and deleterious material and washing with water:
 - bridge decks, sidewalks, curbs, gutters and the exterior surfaces of footpaths, cycle paths or curbs,
 - railings and truss members to a minimum height of three metres above the deck surface, including the bottom chord,
 - the approaches to the bridge and all associated bridge elements for a distance of ten metres, as measured from the abutment joint, including approach guardrail, and expansion joints and deck joints, including troughs and seals.
- Transporting dirt and debris for disposal outside the road reserve or in designated dumping areas.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Collect and temporarily stockpile loose material and debris off the roadway.
- Cleaning operations shall be carried out in the same direction as the flow of traffic and in a manner which prevents material from being cast into the flow of traffic or into drainage inlets.
- Disposal of such material in or near watercourses will only be done with the appropriate permit.
- Tidy up the site.
- Remove safety devices on completion of the job.

8511.3 Standards, Materials and Tolerances

The bridge deck shall be clean and free of hazards caused by loose material and debris.

Loose material shall be removed from the bridge deck, and scupper drains cleaned in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8511.

8511.4 Measurement and Payment

The unit rate for Bridge Deck Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of bridge decks cleaned (also for sidewalks).

Pay Item No	Pay Item	Pay Unit
8511.41	Bridge Deck Cleaning	m ²
8511.42	Bridge Sidewalk Cleaning	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510
Activity	Bridge Joints, Scupper Drains and Weep Holes Cleaning	Code:	8512

8512.1 Scope

Bridge Joints, Scupper Drains and Weep Holes Cleaning shall consist of the cleaning of mentioned bridge elements as required, to remove all dirt, debris and deleterious materials that constitute or has the potential to create an unsafe condition to the road users or affects the integrity of the structure.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean joints, scupper drains and weep holes.
- Clean up of site including disposal of any waste or any excavated material.

8512.2 Description and Requirements

Work method for Bridge Joints, Scupper Drains and Weep Holes Cleaning shall be in accordance with MOPRBW 8512 and will normally include but not be limited to the following operations:

- Removal of all accumulated dirt from the bridge joints to be disposed of as directed.
- Prodding of all dirt and debris from scupper drains and weep holes using steel rods or similar to make them drain freely.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8512.3 Standards, Materials and Tolerances

Conditions of bridge joints, scupper drains and weep holes shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8512.

8512.4 Measurement and Payment

The unit rate for Bridge Joints, Scupper Drains and Weep Holes Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cleaned metre of joints cleaned, and number of scupper drains and weep holes cleaned.

Pay Item No	Pay Item	Pay Unit
8512.41	Bridge Joints Cleaning	m
8512.42	Bridge Scupper Drains and Weep Holes Cleaning	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510
Activity	Bridge Bearings Cleaning	Code:	8513

8513.1 Scope

Bridge Bearings Cleaning shall consist of cleaning and lubrication of bridge bearings and their components. (Realignment and replacement of bridge bearings is included in Activity 8521). The Activity covers all types of bearings.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for cleaning of bearings.
- Clean up of site including disposal of any waste or any excavated material.

8513.2 Description and Requirements

Work methods for Bridge Bearings Cleaning shall be in accordance with MOPRBW 8513 and will normally include but not be limited to the following operations:

- Removing all dirt, debris, bird and animal wastes and loose material around the bridge bearings, and on top of piers and abutments
- Disposal of all accumulated dirt from the bridge bearings as directed.
- Lubricating of bridge bearing in accordance with the manufacturer's instructions or as ordered by the Engineer.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8513.3 Standards, Materials and Tolerances

Conditions of bridge bearings shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8513.

8513.4 Measurement and Payment

The unit rate for Bridge Bearings Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of bridge bearings cleaned.

Pay Item No	Pay Item	Pay Unit
8513.41	Bridge Bearings Cleaning	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510
Activity	Bridge Erosion Repair	Code:	8514

8514.1 Scope

Bridge Erosion Repair shall consist of all works required to repair damaged bridge embankments caused by erosion and includes repair of erosion prevention structures.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for bridge erosion repair.
- Clean up of site including disposal of any waste or any excavated material.

8514.2 Description and Requirements

Work methods for Bridge Erosion Repair shall be in accordance with MOPRBW 8514 and will normally include the following operations:

- Repairing eroded sections located around piers and abutments and erosion protection structures by filling with soil and compacting. The soil can be imported or can be sourced from adjacent areas in the riverbed provided this will not cause further erosion.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8514.3 Standards, Materials and Tolerances

Conditions of erosion prevention structures shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8514.

8514.4 Measurement and Payment

The unit rate for Bridge Erosion Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cubic metre of materials used to repair of damaged bridge embankments or other erosion protection structures.

Pay Item No	Pay Item	Pay Unit
8514.41	Bridge Erosion Repair	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510
Activity	Bridge Concrete Repair	Code:	8515

8515.1 Scope

Bridge Concrete Repair shall consist of all works to repair spalled or damaged concrete on abutments, piers and bridge superstructure (excluding the bridge wearing surface, see Activity 8516) to maintain the structural integrity of these bridge elements.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for repair of bridge concrete elements.
- Clean up of site including disposal of any waste material.

8515.2 Description and Requirements

Work methods for Bridge Concrete Repair shall be in accordance with MOPRBW 8515 and will normally include but not be limited to the following operations:

- Removing damaged concrete and cutting back to sound material.
- Construction if required of formwork around the damaged area.
- Fixing of mesh reinforcement if required over the damaged area, as instructed by the Engineer.
- Placing of concrete in accordance with specifications or as ordered by the Engineer.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Cure the concrete by water, leaving the formwork in place for 3 days.
- Remove safety devices on completion of the job.

8515.3 Standards, Materials and Tolerances

Applicable Specification:

All materials and workmanship shall be in accordance with the SSRBW SECTION 6800 BEARINGS FOR STRUCTURES.

Conditions of concrete on abutments, piers and bridge superstructure shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8515.

8515.4 Measurement and Payment

The unit rate for Bridge Concrete Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of bridges repaired.

Pay Item No	Pay Item	Pay Unit
8515.41	Bridge Concrete Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510
Activity	Bridge Wearing Surface Maintenance	Code:	8516

8516.1 Scope

Bridge Wearing Surface Maintenance shall consist of all works necessary to provide a uniform, even and durable wearing surface for vehicular, pedestrian and cyclist traffic, to keep the bridge deck fully functional.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for maintenance of bridge wearing surfaces.
- Clean up of site including disposal of any waste or any excavated material.

8516.2 Description and Requirements

Work methods for Bridge Wearing Surface Maintenance shall be in accordance with MOPRBW 8516 and will normally include but not be limited to the following operations:

- Preparation of the surface to be repaired.
- Repairing potholes, cracking and deformations on asphalt concrete and concrete bridge wearing surfaces in accordance with the requirements for the applicable activity, or as directed by the Engineer.
- Repairing or replacing damaged planks for the timber bridge decks as directed by the Engineer. Damages include but are not limited to: broken, worn, crushed, split or cracked planks.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8516.3 Standards, Materials and Tolerances

Applicable Specification:

Materials and workmanship shall be in accordance with the SSRBW SERIES 6000.

Conditions of bridge wearing surface shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8516.

8516.4 Measurement and Payment

The unit rate for Bridge Wearing Surface Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of bridge wearing surface maintained.

Pay Item No	Pay Item	Pay Unit
8516.41	Bridge Wearing Surface Maintenance: Concrete	m ²
8516.42	Bridge Wearing Surface Maintenance: Timber	m ²
8516.43	Bridge Wearing Surface Maintenance: Fogspray	m ²
8516.44	Bridge Wearing Surface Maintenance: Resealing	m ²
8516.45	Bridge Wearing Surface Maintenance: Bituminous Overlay	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510
Activity	Bridge Rail, Safety Barrier and Parapet Maintenance and Minor Repairs	Code:	8517

8517.1 Scope

Bridge Rail, Safety Barrier and Parapet Maintenance and Minor Repairs shall consist of maintenance of bridge rails, safety barriers and parapets as required to ensure a safe barrier between vehicles and pedestrians and cyclists, and includes minor repairs of all installations. Minor repairs include but will not be limited to repair of the following defects: bent, broken or missing posts, loose or missing fasteners, paint flaking off, cracking, spalling or visible rust spots on elements.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for bridge rail, safety barrier and parapet maintenance and minor repairs.
- Clean up of site including disposal of any waste or any excavated material.

8517.2 Description and Requirements

Work methods for Bridge Rail, Safety Barrier and Parapet Maintenance and Minor Repairs shall be in accordance with MOPRBW 8517 and will normally include but not be limited to the following operations:

- Preparation of component to be repaired.
- Repairing and maintaining the components using approved methods to restore them to their original state. If not repairable, replacing them with new similar elements.
- Reinstate the repaired or new rails, barriers, or parapets elements.
- If it is steel, priming and painting repaired or replaced members to match colour with existing members.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8517.3 Standards, Materials and Tolerances

Applicable Specification:

All materials and workmanship shall be in accordance with the SSRBW SERIES 6000 AND 7000: STRUCTURES.

Conditions of bridge components shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8517.

8517.4 Measurement and Payment

The unit rate for Bridge Rail, Safety Barrier and Parapet Maintenance and Minor Repairs shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of bridges maintained.

Pay Item No	Pay Item	Pay Unit
8517.41	Bridge Rail Maintenance and Minor Repairs	Number
8517.42	Bridge Safety Barrier Maintenance and Minor Repairs	Number
8517.43	Bridge Parapet Maintenance and Minor Repairs	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE ROUTINE MAINTENANCE	CODE:	8510
Activity	Bridge Steel Component Repair	Code:	8518

8518.1 Scope

Bridge Steel Component Repair shall consist of maintenance of bridge structural steel components as required, to ensure their full functionality.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for repair of steel structural components.
- Clean up of site including disposal of any waste or any excavated material.

8518.2 Description and Requirements

Work methods for Bridge Steel Component Repair shall be in accordance with MOPRBW 8518 and will normally include but not be limited to the following operations:

- Removing the damaged structural steel component without damaging the connecting components.
- Repairing the damaged components using approved methods to restore them to their original shape and state. If not repairable, replacing them with new similar components.
- Reinstatement of the repaired or new structural steel bridge component.
- Priming and painting of the fixed component to match colour with existing components.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8518.3 Standards, Materials and Tolerances

Applicable Specification:

All materials and workmanship shall be in accordance with the SSRBW SERIES 6000 AND 7000: STRUCTURES.

Conditions of bridge components shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8518.

8518.4 Measurement and Payment

The unit rate for Steel Component Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of bridges maintained.

Pay Item No	Pay Item	Pay Unit
8518.41	Bridge Steel Component Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGE	CODE:	8500
INTERVENTION	BRIDGE PERIODIC MAINTENANCE	CODE:	8520

Scope

This maintenance intervention comprises the following maintenance activities:

- 8521 Bridge Bearings Realignment and Replacement
- 8522 Bridge Rust Removal and Repainting
- 8523 Bridge Steel Component Replacement
- 8524 Bridge Inspection
- 8529 Other Bridge Periodic Maintenance

Activity 8529 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE PERIODIC MAINTENANCE	CODE:	8520
Activity	Bridge Bearings Realignment and Replacement	Code:	8521

8521.1 Scope

Bridge Bearings Realignment and Replacement shall consist of all works required to realign and/or replace defective bridge bearings as required and includes provision of all applicable materials and bearings components. It includes all types of bridge bearings.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to realign or replace bridge bearings.
- Clean up of site including disposal of any waste or any excavated material.

8521.2 Description and Requirements

Bridge Bearings Realignment and Replacement shall be in accordance with SSRBW SECTION 6800: BEARINGS FOR STRUCTURES. Work methods shall be in accordance with MOPRBW 8521 and will normally include but not be limited to the following operations:

- Preparing and erecting platforms for supporting the jacks. Where necessary, erecting of scaffolding to the required platform level for the jacks.
- Placing the jacks to align with lifting points under the bridge deck. Use stiff beams to distribute jacking forces on the deck where necessary.
- Using jacks, lifting of one end of the deck to a height that will enable the existing bearings to be realigned or removed and replaced.
- With the deck lifted, carefully realigning existing bearings, or removing the worn out bearings, cleaning with brushes or repairing the bearing seat as necessary and replacing with new bearings.
- Carefully lowering the deck until it rests on the bearings.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8521.3 Standards, Materials and Tolerances

Applicable Specification:

All materials and installation of bridge bearings shall be in accordance with the SSRBW SECTION 6800 BEARINGS FOR STRUCTURES.

Conditions of bridge bearings shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8521.

8521.4 Measurement and Payment

The unit rate for Bridge Bearings Realignment and Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of bridge bearings realigned or replaced.

Pay Item No	Pay Item	Pay Unit
8521.41	Bridge Bearing Replacement	Number
8521.42	Bridge Bearing Realignment	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE PERIODIC MAINTENANCE	CODE:	8520
Activity	Bridge Rust Removal and Repainting	Code:	8522

8522.1 Scope

Bridge Rust Removal and Repainting shall consist of all works required to clean, remove rust and repaint structural steel bridge components as required, and includes all applicable materials.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean, remove rust and repaint structural steel bridge components.
- Clean up of site including disposal of any waste or any excavated material.

8522.2 Description and Requirements

Work methods for Bridge Rust Removal and Repainting shall be in accordance with MOPRBW 8522 and will normally include but not be limited to the following operations:

- Scraping off rust and loose paint from steel surfaces.
- Applying a film of paint primer on exposed wire brushed steel surfaces.
- Applying at least two coats of paint on the steel surfaces.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Leave the surface to dry for a period recommended by paint manufacturers.
- Tidy up the site.
- Remove safety devices on completion of the job.

8522.3 Standards, Materials and Tolerances

Applicable Specification:

Paint shall be in accordance with the SSRBW: SECTION 6800 BEARINGS FOR STRUCTURES.

Conditions of bridge components shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8522.

8522.4 Measurement and Payment

The unit rate for Bridge Rust Removal and Repainting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of steel components removed of rust and repainted.

Pay Item No	Pay Item	Pay Unit
8522.41	Bridge Rust Removal and Repainting	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE PERIODIC MAINTENANCE	CODE:	8520
Activity	Bridge Steel Component Replacement	Code:	8523

8523.1 Scope

Bridge Steel Component Replacement shall consist of all works required to replace defective structural steel bridge components and includes all applicable materials, excluding steel bearings.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to replace bridge structural steel bridge components.
- Clean up of site including disposal of any waste or any excavated material.

8523.2 Description and Requirements

Work methods for Bridge Steel Component Replacement shall be in accordance with MOPRBW 8523 and will normally include but not be limited to the following operations:

- Supporting temporarily the steel bridge section with damaged components to enable removal and replacement of the damaged components.
- Repairing the damaged components using approved methods to restore them to their original shape and state. If not repairable, replacing them with new similar components.
- Reinstatement of the repaired or new steel bridge components.
- Priming and painting of the fixed components to match colour with existing components.
- Removing the temporary supports.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8523.3 Standards, Materials and Tolerances

Applicable Specification:

Materials and workmanship shall be in accordance with the SSRBW: SECTION 7100: STRUCTURAL STEELWORK.

Conditions of bridge steel components shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8523.

8523.4 Measurement and Payment

The unit rate for Bridge Steel Component Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of bridges for which steel components have been replaced.

Pay Item No	Pay Item	Pay Unit
8523.41	Bridge Steel Component Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	BRIDGE PERIODIC MAINTENANCE	CODE:	8520
Activity	Bridge Inspection	Code:	8524

8524.1 Scope

Bridge Inspection shall consist of all work required to carry out scheduled inspection of bridges (in addition to normal compliance inspection of maintenance service) in accordance with the Bridge Management System, Visual Assessment Manual (BMS) or as ordered by the Engineer, including reporting in the approved format.

The following operations shall be included as part of this Activity:

- Traffic control.
- All works required to undertake bridge inspection.
- Clean up of site including disposal of any waste or any excavated material.

8524.2 Description and Requirements

The objective of Bridge Inspection is to identify defects on a bridge so as to prioritise remedial and preventative measures. The inspection under Activity 8524 shall be carried out in accordance with the BMS and the «DERU» system, where:

D = Degree of defect

E = Extent of defect

R = Relevance of defect; and

U = Urgency for remedial work.

Bridge Inspection comes in addition to the following types of bridge inspection that are included in the rates for other items:

- Drive-by inspection or walk-about inspection to identify defects for normal routine maintenance work.
- Inspection after accident or vehicle collision with bridge structure.
- Inspection in connection with unusual/severe weather conditions or natural disasters.
- Inspection where a structural integrity or safety issue is suspected.
- Inspection in connection with flooding/debris jams.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Carry out scheduled inspection in accordance with the BMS.
- Remove safety devices on completion of the job.
- Submit inspection report.

8524.3 Standards, Materials and Tolerances

Bridge Inspection shall be carried out as ordered by the Engineer and in accordance with the Bridge Maintenance System, Visual Assessment Manual (BMS).

8524.4 Measurement and Payment

The unit rate for Bridge Inspection shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of bridges inspected. .

Pay Item No	Pay Item	Pay Unit
8524.41	Bridge Inspection	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGE	CODE:	8500
INTERVENTION	WATERWAY MAINTENANCE AND REPAIR	CODE:	8530

Scope

This maintenance intervention comprises the following maintenance activities:

- 8531 Waterway Debris and Obstacles Removal
- 8532 Waterway Erosion Repair
- 8533 Waterway Desilting
- 8539 Other Waterway Maintenance and Repair

Activity 8539 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	WATERWAY MAINTENANCE AND REPAIR	CODE:	8530
Activity	Waterway Debris and Obstacles Removal	Code:	8531

8531.1 Scope

Waterway Debris and Obstacles removal shall consist of all works required to remove debris and obstacles, such as loose boulders and any logs from waterways to prevent damage and to keep design clearance under the bridge. The activity includes all clearing of the waterway under the bridge and at least 100 m upstream and 50 m downstream.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to remove debris and obstacles from waterways.
- Clean up of site including disposal of any waste or any excavated material.

8531.2 Description and Requirements

Work methods for Waterway Debris and Obstacles Removal shall be in accordance with MOPRBW 8531 and will normally include but not be limited to the following operations:

- Manually lifting or dragging isolated obstacles such as loose boulders and small logs from the waterway and carting away for disposal at designated places.
- Cutting trees and branches into manageable pieces and either dragging away or disposing of at designated places.
- Removal and disposal of all material at designated spoil sites approved by the Engineer. When instructed by the Engineer vegetation and debris shall be cut to size for transporting purposes.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8531.3 Standards, Materials and Tolerances

Conditions of waterways shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8531.

8531.4 Measurement and Payment

The unit rate for Waterway Debris and Obstacles Removal shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of bridge waterways cleared of debris and obstacles.

Pay Item No	Pay Item	Pay Unit
8531.41	Waterway Debris and Obstacles Removal	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	WATERWAY MAINTENANCE AND REPAIR	CODE:	8530
Activity	Waterway Erosion Repair	Code:	8532

8532.1 Scope

Waterway Erosion Repair shall consist of all works required to repair damaged bridge waterway caused by erosion and includes repair of erosion prevention structures. The activity includes all erosion repair of the waterway under the bridge and at least 100 m upstream and 50 m downstream.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for erosion repair of waterways.
- Clean up of site including disposal of any waste or any excavated material.

8532.2 Description and Requirements

Work methods for Waterway Erosion Repair shall be in accordance with MOPRBW 8532 and will normally include the following operations:

- Repairing and restoring eroded sections located away from piers and abutments by filling with soil and compacting. The soil can be imported or can be sourced from adjacent areas in the riverbed provided this will not cause further erosion.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Where erosion is likely to recur, protect the area with proper erosion protection in accordance with MSSRBW 8440.
- Tidy up the site.
- Remove safety devices on completion of the job

8532.3 Standards, Materials and Tolerances

Conditions of waterways shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8532.

8532.4 Measurement and Payment

The unit rate for Waterway Erosion Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cubic metre of materials used to repair bridge waterways.

Pay Item No	Pay Item	Pay Unit
8532.41	Waterway Erosion Repair	m ³

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	BRIDGES	CODE:	8500
INTERVENTION	WATERWAY MAINTENANCE AND REPAIR	CODE:	8530
Activity	Waterway Desilting	Code:	8533

8533.1 Scope

Waterway Desilting shall consist of all works required to remove silt in order to keep design clearance under the bridge. The activity includes all work required to carry out desilting operations of the waterway under the bridge and at least 100 m upstream and 50 m downstream.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- Clean up of site including disposal of any waste or any excavated material.

8533.2 Description and Requirements

Work methods for Waterway Desilting shall be in accordance with MOPRBW 8533 and will normally include but not be limited to the following operations:

- Removal of silt from waterways which shall either be loaded and transported to designated spoil sites, or disposed of adjacent to waterways where it cannot wash back into the channel within the road reserve, as approved by the Engineer.
- Where material is spoiled adjacent to waterways, spreading of the material neatly and well clear of the top of the waterway. Vegetation growing in channels and cracks shall be removed with roots to prevent re-growth.
- Removing of undesirable vegetation with roots and to be spoiled where directed by the Engineer.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8533.3 Standards, Materials and Tolerances

Conditions of waterways shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8533.

8533.4 Measurement and Payment

The unit rate for Waterway Desilting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per cubic metre of silt removed from bridge waterways.

Pay Item No	Pay Item	Pay Unit
8533.41	Waterway Desilting	m ³

8600 MISCELLANEOUS STRUCTURES

8601 Scope

Feature 8600 Miscellaneous Structures covers routine maintenance interventions and activities to keep miscellaneous structures and associated elements, such as marker posts, stone pitching and retaining walls; functional and in good repair.

The feature "Miscellaneous Structures" covers drifts, causeways and ferry landings of all kinds, including vented types, retaining walls, railway crossings, veterinary dips and subways maintenance.

Feature 8600 Miscellaneous Structures covers the following interventions and activities:

8610 Drift, Causeway and Ferry Landing Maintenance

- 8611 Drift, Causeway and Ferry Landing Structure Damage Repair
- 8612 Waterway Cleaning and Clearing
- 8613 Unlined Drift Reshaping
- 8614 Marker/Guide Post Reinstatement/Replacement
- 8615 Marker/Guide Post Repainting
- 8616 Marker/Guide Post Reflector Replacement
- 8617 Grouted Stone Pitching Repair
- 8619 Other Drift, Causeway and Ferry Landing Maintenance

8620 Retaining Wall Maintenance

- 8621 Retaining Wall Minor Repairs
- 8622 Retaining Wall Weep Holes Cleaning
- 8623 Retaining Wall Vegetation Clearing
- 8629 Other Retaining Wall Maintenance

8630 Railway Crossing Maintenance

- 8631 Railway Crossing General Repair
- 8639 Other Railway Crossing Maintenance

8640 Veterinary Dip Maintenance

- 8641 Veterinary Dip General Repair
- 8649 Other Veterinary Dip Maintenance

8650 Subway Maintenance

- 8651 Subway General Repair
- 8659 Other Subway Maintenance

8660 Weighbridge Area Maintenance

- 8661 Weighbridge Area General Repair
- 8669 Other Weighbridge Area Maintenance

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	DRIFT, CAUSEWAY AND FERRY LANDING MAINTENANCE	CODE:	8610

Scope

This maintenance intervention comprises the following maintenance activities:

- 8611 Drift, Causeway and Ferry Landing Structure Damage Repair
- 8612 Waterway Cleaning and Clearing
- 8613 Unlined Drift Reshaping
- 8614 Marker/Guide Post Reinstatement/Replacement
- 8615 Marker/Guide Post Repainting
- 8616 Marker/Guide Post Reflector Replacement
- 8617 Grouted Stone Pitching Repair
- 8619 Other Drift, Causeway and Ferry Landing Maintenance

Activity 8619 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	DRIFT, CAUSEWAY AND FERRY LANDING MAINTENANCE	CODE:	8610
Activity	Drift, Causeway and Ferry Landing Structure Damage Repair	Code:	8611

8611.1 Scope

Drift, Causeway and Ferry Landing Structure Damage Repair shall include all repair of structural damages to drifts, causeways and ferry landings.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for repair of damages on drifts, causeways and ferry landings structures.
- Clean up of site including disposal of any waste or any excavated material.

8611.2 Description and Requirements

Work methods for Drift, Causeway and Ferry Landing Structure Damage Repair shall be in accordance with MOPRBW 8611 and will normally include but not be limited to the following operations:

- Removing loose materials from damaged area.
- Repairing general defects which include but shall not be limited to: spalling, cracking, bent, broken, twisted, delaminated, damaged or missing components, and loose fasteners.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Repair of ferry landings should be carried out during the period of low tide.
- Tidy up the site.
- Remove safety devices on completion of the job.

8611.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials shall be in accordance with SSRBW SERIES 6000 AND 7000 : STRUCTURES.

Conditions of drifts, causeways and ferry landings shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8611.

8611.4 Measurement and Payment

The unit rate for Drift, Causeway and Ferry Landing Structure Damage Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of drifts, causeways and ferry landings repaired.

Pay Item No	Pay Item	Pay Unit
8611.41	Drift Structure Damage Repair	Number
8611.42	Causeway Structure Damage Repair	Number
8611.43	Ferry Landing Structure Damage Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	DRIFT, CAUSEWAY AND FERRY LANDING MAINTENANCE	CODE:	8610
Activity	Waterway Cleaning and Clearing	Code:	8612

8612.1 Scope

Waterway Cleaning and Clearing shall include all work to maintain a free flowing waterway at least 100 m upstream and 50 m downstream of drifts, causeways and ferry landings by cleaning the waterway of vegetation and debris and grading to ensure proper shape of the waterway.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to clean and clear waterways.
- Clean up of site including disposal of any waste or any excavated material.

8612.2 Description and Requirements

Work methods for Waterway Cleaning and Clearing shall be in accordance with MOPRBW 8612 and will normally include but not be limited to the following operations:

- Removing all debris, silt and obstacles from the running surface, using either labour based method or equipment based method using a grader to dispose of debris and silt at least 50 m downstream of the structure. The material should be spread out to the general shape of the streambed.
- Cleaning and clearing of the running surface ensuring that the windrows are spread clear of the structure and downstream of the crossing, to allow free passage of water.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8612.3 Standards, Materials and Tolerances

Conditions of waterways for drifts, causeways and ferry landings shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8612.

8612.4 Measurement and Payment

The unit rate for Waterway Cleaning and Clearing shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of waterways of drifts, causeways and ferry landings cleaned and cleared.

Pay Item No	Pay Item	Pay Unit
8612.41	Waterway Cleaning and Clearing	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	DRIFT, CAUSEWAY AND FERRY LANDING MAINTENANCE	CODE:	8610
Activity	Unlined Drift Reshaping	Code:	8613

8613.1 Scope

Unlined Drift Reshaping shall include restoration of the shape of earth/gravel drifts by grader or manual labour to remove accumulation of silt or other material to ensure adequate driving conditions and road safety. If required, it includes adding of new material to restore a uniform running surface.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to reshape unlined drifts.
- Clean up of site including disposal of any waste or any excavated material.

8613.2 Description and Requirements

Work methods for Unlined Drift Reshaping shall be in accordance with MOPRBW 8613 and will normally include but not be limited to the following operations:

- Shaping the drift to its original shape by excavating or scarifying material from the sides and bottom of the drift, and use the material to fill depressions on the surface of the drift.
- If required, adding material from borrow pit to fill all depressions and shape the drift to required shape.
- Compacting of all loose material on the surface.
- Shaping the drift surface to provide a gentle slope toward the downstream side of the crossing.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8613.3 Standards, Materials and Tolerances

Conditions of drifts shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8613.

8613.4 Measurement and Payment

The unit rate for Unlined Drift Reshaping shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of drifts reshaped.

Pay Item No	Pay Item	Pay Unit
8613.41	Unlined Drift Reshaping	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	DRIFT, CAUSEWAY AND FERRY LANDING MAINTENANCE	CODE:	8610
Activity	Marker/Guide Post Reinstatement/Replacement	Code:	8614

8614.1 Scope

Marker/Guide Post Reinstatement/Replacement shall consist of removal of broken or damaged marker posts, and supply and erection of new marker posts.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to reinstate or replace marker/guide posts.
- Clean up of site including disposal of any waste or any excavated material.

8614.2 Description and Requirements

Work methods for Marker/Guide Post Reinstatement/Replacement shall be in accordance with MOPRBW 8614 and will normally include but not be limited to the following operations:

- Locating the position of the marker post/guide post by setting it at the shoulder break point about 5 m from the outside edge of the drift/causeway.
- Excavating the post holes to a minimum depth of 300 mm from ground level in soil.
- Placing the post in the hole and backfilling the hole by hand ramming thin layers, and ensuring that the post is finally in a vertical position and square to the road centreline.
- If marker posts are fixed into concrete, steel, wood or any other material, reinstate or replace with appropriate method.
- Spreading out any surplus soil away from the road shoulder.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Posts shall be painted immediately after placing.
- Tidy up the site.
- Remove safety devices on completion of the job.

8614.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for reinstatement/replacement of marker posts shall be in accordance with SSRBW: SECTION 5300: MARKER POSTS.

Holes for marker/guide posts shall be cleaned and excavated and posts shall be placed in its original position. Holes shall be backfilled in layers not exceeding 50 mm from the bottom.

Marker/Guide Posts shall be reinstated or replaced as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8614.

8614.4 Measurement and Payment

The unit rate for Marker Post Reinstatement/Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of marker posts replaced, repaired, reinstated or realigned.

Pay Item No	Pay Item	Pay Unit
8614.41	Replacement of Marker/Guide Post	Number
8614.42	Repair and reinstallation of Marker/Guide Post	Number
8614.43	Realignment of Marker/Guide Post	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	DRIFT, CAUSEWAY AND FERRY LANDING MAINTENANCE	CODE:	8610
Activity	Marker/Guide Post Repainting	Code:	8615

8615.1 Scope

Marker/Guide Post Repainting shall consist of repainting of marker posts or guide posts used on drifts, causeways and ferry landings.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repaint marker/guide posts.
- Clean up of site including disposal of any waste or any excavated material.

8615.2 Description and Requirements

Work methods for Marker/Guide Post Repainting shall be in accordance with MOPRBW 8615 and will normally include but not be limited to the following operations:

- Preparing surfaces to be painted by cleaning those using brushes, water and cloth. Use detergents to remove dirt that is difficult to clean by plain water.
- Applying primer and painting in accordance with manufacturer's recommendations.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8615.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for reinstatement/replacement of marker posts shall be in accordance with SSRBW: SECTION 5300: MARKER POSTS.

Marker/guide Posts shall be repainted as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8615.

8615.4 Measurement and Payment

The unit rate for Marker Post Repainting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of marker post repainted.

Pay Item No	Pay Item	Pay Unit
8615.41	Marker/Guide Post Repainting	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	DRIFT, CAUSEWAY AND FERRY LANDING MAINTENANCE	CODE:	8610
Activity	Marker/Guide Post Reflector Replacement	Code:	8616

8616.1 Scope

Marker/Guide Post Reflector Replacement shall consist of replacing damaged or missing reflectors on marker/guide posts used on drifts, causeways and ferry landings.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works to replace marker/guide post reflectors.
- Clean up of site including disposal of any waste or any excavated material.

8616.2 Description and Requirements

Work methods for Marker/Guide Post Reflector Replacement shall be in accordance with MOPRBW 8616 and will normally include but not be limited to the following operations:

- Cleaning the guide/marker post surface using water, cleaning cloth and detergent.
- Fixing the marker post reflector using screws/ or glue as appropriate.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8616.3 Standards, Materials and Tolerances

Applicable Specifications:

Reflectors on marker/guide post shall be in accordance with SSRBW: SECTION 5300: MARKER POSTS.

Marker/Guide Post Reflectors shall be replaced in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8616.

8616.4 Measurement and Payment

The unit rate for Marker/Guide Post Reflector Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of marker posts replaced.

Pay Item No	Pay Item	Pay Unit
8616.41	Marker/Guide Post Reflector Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	DRIFT, CAUSEWAY AND FERRY LANDING MAINTENANCE	CODE:	8610
Activity	Grouted Stone Pitching Repair	Code:	8617

8617.1 Scope

Grouted Stone Pitching Repair shall consist of all works required to repair of masonry and grouted stone pitching used in connection with drifts, causeways and ferry landings.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for repair of grouted stone pitching.
- Clean up of site including disposal of any waste or any excavated material.

8617.2 Description and Requirements

Work methods for Grouted Stone Pitching Repair shall be in accordance with MOPRBW 8617 and will normally include but not be limited to the following operations:

- Removing all loose stones from damaged area.
- Cleaning the area to remove loose particles.
- Stone pitching of the area using removed stones to repair the structure. Lay stones with a bond allowing minimum overlap of $\frac{1}{4}$ the length of the smaller stone.
- Grouting up all joints with mortar.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8617.3 Standards, Materials and Tolerances

Applicable Specifications:

All materials and workmanship shall comply with SSRBW: SECTION 5103: Stone Pitching.

- Additional stones, if required, shall have a long flat shape with a minimum dimension of 150 mm.
- Joints shall have a width of minimum 10 mm.

The condition of grouted stone pitching on drifts, causeways and ferry landings shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8617.

8617.4 Measurement and Payment

The unit rate for Grouted Stone Pitching Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of stone pitching repaired.

Pay Item No	Pay Item	Pay Unit
8617.41	Grouted Stone Pitching Repair	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	RETAINING WALL MAINTENANCE	CODE:	8620

Scope

This maintenance intervention comprises the following maintenance activities:

- 8621 Retaining Wall Minor Repairs
- 8622 Retaining Wall Weep Holes Cleaning
- 8623 Retaining Wall Vegetation Clearing
- 8629 Other Retaining Wall Maintenance

Activity 8629 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	RETAINING WALL MAINTENANCE	CODE:	8620
Activity	Retaining Wall Minor Repairs	Code:	8621

8621.1 Scope

Retaining Wall Minor Repairs shall include all minor repairs to retaining walls.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to carry out minor repairs to retaining walls.
- Clean up of site including disposal of any waste or any excavated material.

8621.2 Description and Requirements

Work methods for Retaining Wall Minor Repairs shall be in accordance with MOPRBW 8621 and will normally include but not be limited to the following operations:

- Repairing of minor defects that include, but shall not be limited to: cracking, spalling, scaling, delaminating, leaking or damaged seal in expansion joints.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8621.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and workmanship shall comply with SSRBW: SERIES 6000 AND 7000: STRUCTURES.

The conditions of retaining walls shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8621.

8621.4 Measurement and Payment

The unit rate for Retaining Wall Minor Repairs shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of retaining walls repaired.

Pay Item No	Pay Item	Pay Unit
8621.41	Retaining Wall Minor Repairs	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	RETAINING WALL MAINTENANCE	CODE:	8620
Activity	Retaining Wall Weep Holes Cleaning	Code:	8622

8622.1 Scope

Retaining Wall Weep Holes Cleaning shall include the cleaning of weep holes constructed on retaining walls to drain water.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for weep holes cleaning.
- Clean up of site including disposal of any waste or any excavated material.

8622.2 Description and Requirements

Work methods for Retaining Wall Weep Holes Cleaning shall be in accordance with MOPRBW 8622 and will normally include but not be limited to the following operations:

- Prodding and removing the debris in the weep hole.
- Collecting debris and disposing as directed by the Engineer.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8622.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and workmanship shall comply with SSRBW: SERIES 6000 AND 7000: STRUCTURES.

The condition of weep holes in retaining walls shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8622.

8622.4 Measurement and Payment

The unit rate for Retaining Wall Weep Holes Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of weep holes cleaned.

Pay Item No	Pay Item	Pay Unit
8622.41	Retaining Wall Weep Holes Cleaning	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	RETAINING WALL MAINTENANCE	CODE:	8620
Activity	Retaining Wall Vegetation Clearing	Code:	8623

8623.1 Scope

Retaining Wall Vegetation Clearing shall include the clearing of vegetation above and around retaining walls to prevent damage by plant roots and to expose the wall for maintenance purposes.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for vegetation clearing.
- Clean up of site including disposal of any waste or any excavated material.

8623.2 Description and Requirements

Work methods for Retaining Wall Vegetation Clearing shall be in accordance with MOPRBW 8623 and will normally include but not be limited to the following operations:

- Cutting all overgrown vegetation above and around the retaining wall. Grass should be trimmed to a height of less than 50 mm leaving a short grass cover in the wall surroundings.
- Uprooting and removing bushes to ensure that all bush is cleared and uprooted to prevent re-growth.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- All cut vegetation should be removed from the retaining wall and disposed of at least 20 m from the outside edge of the wall.
- Tidy up the site.
- Remove safety devices on completion of the job.

8623.3 Standards, Materials and Tolerances

The condition of retaining walls shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8623.

8623.4 Measurement and Payment

The unit rate for Retaining Wall Vegetation Clearing shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of vegetation cleared.

Pay Item No	Pay Item	Pay Unit
8623.41	Retaining Wall Vegetation Clearing	m ²

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	RAILWAY CROSSING MAINTENANCE	CODE:	8630

Scope

This maintenance intervention comprises the following maintenance activities:

- 8631 Railway Crossing General Repair
- 8639 Other Railway Crossing Maintenance

Activity 8639 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by activity 8631.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	RAILWAY CROSSING MAINTENANCE	CODE:	8630
Activity	Railway Crossing General Repair	Code:	8631

8631.1 Scope

Railway Crossing General Repair shall include regular maintenance and all repair required to keep the railway crossings functional and safe.

The following operations shall be included as part of this Activity:

- Liaison with Botswana Railway Authorities to ensure correct work procedures.
- Traffic control.
- All works required for railway crossing maintenance.
- Supply of all materials.
- Clean up of site including disposal of any waste or any excavated material.

8631.2 Description and Requirements

Work methods for Railway Crossing General Repair shall be in accordance with MOPRBW 8631.

- General repair shall include but not be limited to the following operations:
 - i. Grass cutting at railway crossing.
 - ii. Cleaning.
 - iii. Pothole patching and repair of rutting, ravelling and depressions on riding surface.
 - iv. Maintenance of speed humps and rumble strips.
 - v. Maintenance of signs.
 - vi. Repair of railway crossing facilities as instructed by the Engineer and the Botswana Railway Authorities.
- Damage to railway crossings shall promptly be reported to the Engineer and the Botswana Railway Authorities.

Operational Requirements:

- Take the required safety precautions in accordance with instructions from the Botswana Railway Authorities and the safety instructions in MOPRBW 8900.
- Report any damage to the relevant authorities.
- Tidy up the site.
- Remove safety devices on completion of the job.

8631.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and workmanship shall comply with SSRBW: SERIES 6000 AND 7000: STRUCTURES, or as otherwise directed by the Botswana Railway Authorities.

The condition of railway crossings shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8631.

8631.4 Measurement and Payment

The unit rate for Railway Crossing General Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of railway crossings maintained and repaired.

Pay Item No	Pay Item	Pay Unit
8631.41	Railway Crossing General Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	VETERINARY DIP MAINTENANCE	CODE:	8640

Scope

This maintenance intervention comprises the following maintenance activities:

- 8641 Veterinary Dip General Repair
- 8649 Other Veterinary Dip Maintenance

Activity 8649 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by activity 8641.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	VETERINARY DIP MAINTENANCE	CODE:	8640
Activity	Veterinary Dip General Repair	Code:	8641

8641.1 Scope

Veterinary Dip General Repair shall include regular maintenance and all repair required to keep the veterinary dips within the road reserve functional and safe.

The following operations shall be included as part of this Activity:

- Liaison with relevant Authorities to ensure correct work procedures.
- Traffic control.
- Supply of all materials.
- All works required for maintenance and repair of veterinary dips.
- Clean up of site including disposal of any waste or any excavated material.

8641.2 Description and Requirements

Work methods for Veterinary Dip General Repair shall be in accordance with MOPRBW 8641.

- General repair shall include but not be limited to the following operations:
 - i. Removal of all overgrown vegetation around the installations to prevent damage by plant roots and to expose the structures for maintenance purposes.
 - ii. Pothole patching.
 - iii. Cleaning of the dip.
 - iv. Repair of defects on dips such as spalling, cracking and delaminating.
 - v. Repair of leaking, settlement and scouring.
 - vi. Maintenance of speed humps and rumble strips.
 - vii. Maintenance of road markings and signs.

Operational Requirements:

- Take the required safety precautions in accordance with instructions from the relevant authorities and the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8641.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and workmanship shall comply with SSRBW: SERIES 6000 AND 7000: STRUCTURES.

The condition of veterinary dips shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8641.

8641.4 Measurement and Payment

The unit rate for Veterinary Dip General Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of veterinary dips maintained and repaired.

Pay Item No	Pay Item	Pay Unit
8641.41	Veterinary Dip General Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	SUBWAY MAINTENANCE	CODE:	8650

Scope

This maintenance intervention comprises the following maintenance activities:

- 8651 Subway General Repair
- 8659 Other Subway Maintenance

Activity 8659 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by activity 8651.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	SUBWAY MAINTENANCE	CODE:	8650
Activity	Subway General Repair	Code:	8651

8651.1 Scope

Subway General Repair shall include regular maintenance and all minor repairs of subways, whether for the purpose of vehicular traffic, cyclists or pedestrians, power cables or water or gas mains.

The following operations shall be included as part of this Activity:

- Liaison with relevant Authorities to ensure correct work procedures.
- Traffic control.
- Supply of all materials.
- All works required for subways maintenance.
- Clean up of site including disposal of any waste or any excavated material.

8651.2 Description and Requirements

Work methods for Subway General Repair shall be in accordance with MOPRBW 8651.

- General repair operations shall include but not be limited to the following operations:
 - i. Removal of all overgrown vegetation around the subway structures to prevent damage by plant roots and to expose the structures for maintenance purposes.
 - ii. Repair of defects on subway structure such as missing or damaged electrical appliances, spalling or cracking on concrete or masonry structures.
 - iii. Cleaning of subway structure.
 - iv. Repair of broken, bent, twisted, delaminated, damaged or missing subway structure components.
 - v. Maintenance of signs and road markings.

Operational Requirements:

- Take the required safety precautions in accordance with instructions from the relevant authorities and the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8651.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and workmanship shall comply with SSRBW: SERIES 6000 AND 7000: STRUCTURES.

The condition of subways shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8651.

8651.4 Measurement and Payment

The unit rate for Subway General Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of subways maintained and repaired.

Pay Item No	Pay Item	Pay Unit
8651.41	Subway General Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	WEIGHBRIDGE AREA MAINTENANCE	CODE:	8660

Scope

This maintenance intervention comprises the following maintenance activities:

- 8661 Weighbridge Area General Repair
- 8669 Other Weighbridge Area Maintenance

Activity 8669 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by Activity 8661.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	MISCELLANEOUS STRUCTURES	CODE:	8600
INTERVENTION	WEIGHBRIDGE AREA MAINTENANCE	CODE:	8660
Activity	Weighbridge Area General Repair	Code:	8661

8661.1 Scope

Weighbridge Area General Repair shall include regular maintenance and all repair required to keep the weighbridge areas within the road reserve functional and safe.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for maintenance and repair of weighbridge and associated area.
- Clean up of site including disposal of any waste or any excavated material.

8661.2 Description and Requirements

Work methods for Weighbridge Area General Repair shall be in accordance with MOPRBW 8661.

- General repair shall include but not be limited to the following operations:
 - i. Removal of all overgrown vegetation around the installations to prevent damage by plant roots and to expose the structures for maintenance purposes.
 - ii. Maintenance of area for pedestrians and vehicular traffic, and weighbridge pit such as cleaning, litter collection, repair of potholes, depressions, cracks, spalling, replacement of blocks, kerbs and kerbstones on the paved surfaces.
 - iii. Maintenance of drainage, including drainage of weighbridge pit and repair of stone pitching.
 - iv. Repair of entrance gate, fencing and cattle grids.
 - v. Maintenance of street lighting and traffic signalling devices.
 - vi. Maintenance of road markings and signs.
 - vii. Maintenance of rumble strips and speed humps.
 - viii. Removal of moles and anthills.

Operational Requirements:

- Take the required safety precautions in accordance with instructions from the relevant authorities and the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8661.3 Standards, Materials and Tolerances

Applicable Specifications:

Materials and workmanship shall comply with SSRBW: SERIES 6000 AND 7000: STRUCTURES.

The condition of weighbridge and associated area shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRWB 8661.

8661.4 Measurement and Payment

The unit rate for Weighbridge Area General Repair shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of weighbridge areas maintained and repaired.

Pay Item No	Pay Item	Pay Unit
8661.41	Weighbridge Area General Repair	Number

8700 ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS

8701 Scope

Feature 8700 Road Furniture, Signs and Traffic Markings covers routine maintenance interventions and activities to keep elements essential for road safety clean, functional and in good repair. It covers repair and replacement if necessary of elements, such as guardrail, kerbstones or distance markers. It also covers normal routine and scheduled preventive maintenance of street lights and traffic signalling devices in urban areas. It further covers normal maintenance, repair and replacement if necessary of all types of sign, including overhead signs and traffic mirrors on sharp curves, road marking and signs painted on the road as well as replacement of reflective studs.

All signs, whether regulatory, guidance, warning or information signs, as well as traffic signalling devices, shall be in accordance with the latest version of Botswana Road Traffic Act: Chapter 69:01.

Feature 8700 Road Furniture, Signs and Traffic Markings covers the following interventions and activities:

8710 Road Furniture Maintenance

- 8711 Guardrail Maintenance
- 8712 Kerbstone Maintenance
- 8713 Kerb Maintenance
- 8714 Distance Marker Maintenance
- 8715 Pedestrian Railing Maintenance
- 8716 Street Lighting Maintenance
- 8717 Traffic Signalling Devices Maintenance
- 8719 Other Road Furniture Maintenance

8720 Road Signs Maintenance

- 8721 Road Sign Cleaning
- 8722 Road Sign Repainting
- 8723 Road Sign Repairs
- 8724 Road Sign Replacement
- 8729 Other Road Signs Maintenance

8730 Road Marking Maintenance

- 8731 Road Marking Repainting
- 8732 Reflective Stud Maintenance
- 8739 Other Road Marking Maintenance

8740 Rumble Strips and Speed Hump Maintenance

- 8741 Rumble Strips Maintenance
- 8742 Speed Hump Maintenance
- 8749 Other Rumble Strips and Speed Hump Maintenance

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD FURNITURE MAINTENANCE	CODE:	8710

Scope

This maintenance intervention comprises the following maintenance activities:

- 8711 Guardrail Maintenance
- 8712 Kerbstone Maintenance
- 8713 Kerb Maintenance
- 8714 Distance Marker Maintenance
- 8715 Pedestrian Railing Maintenance
- 8716 Street Lighting Maintenance
- 8717 Traffic Signalling Devices Maintenance
- 8719 Other Road Furniture Maintenance

Activity 8719 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD FURNITURE MAINTENANCE	CODE:	8710
Activity	Guardrail Maintenance	Code:	8711

8711.1 Scope

Guardrail Maintenance shall consist of keeping guardrails functional and in good repair to prevent vehicles from accidentally driving off the road at hazardous spots or from crossing into the opposite traffic lane, and to reduce the damage to vehicles when such accidents occur. It includes maintenance of markings and reflectors on the guardrails. It shall include replacement of rails, posts and reflectors as required, re-painting and panel beating if necessary.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for guardrail maintenance.
- Clean up of site including disposal of any waste or any excavated material.

8711.2 Description and Requirements

Work methods for Guardrail Maintenance shall be in accordance with MOPRBW 8711 and will normally include but not be limited to the following operations:

- Removing section of guardrail to be repaired or replaced.
- Digging and removing guardrail posts from holes and cleaning out holes.
- Panel beating of the guardrail to restore it to original shape, if deformed.
- Reinstating the guardrail posts into holes.
- Lifting of guardrail into position and bolting to post with overlap in the direction of traffic.
- Making 1 : 3 : 6 concrete to backfill half the post hole and compacting the concrete with tamping rods.
- Re-painting of the guardrail as directed.
- Guardrails shall be installed according to the drawings and within 20 mm of plumb and grade. The galvanized surface integrity of the material shall not be broken. Reflectors should be installed as specified.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- When guardrails need to be removed, all rails, reflective plates and end units shall be carefully dug out and the holes shall be filled and compacted in 100 mm layers. Where material is intended for re-use, it shall first be unpacked for inspection by the Engineer for deciding which material will be suitable for re-use. Suitable material shall then be stored separately from material, which is unsuitable for re-use.
- Tidy up the site.
- Remove safety devices on completion of the job.

8711.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for repair of guardrail shall be in accordance with SSRBW: SECTION 5400: GUARDRAILS.

The repaired guardrail shall have a neat appearance and shall not show any visible deviation from the required grade. The guardrails shall overlap in the direction of traffic and the end wings bolted firmly on top of the guardrail. All guardrail posts shall be rigid and vertical and the guardrail shall be firmly fixed to the post.

Guardrails shall be maintained as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8711.

Maintenance Standard Specifications for Road and Bridge Works

8711.4 Measurement and Payment

The unit rate for Guardrail Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. No additional payment will be made for renovating the guardrails and timber posts. It shall be measured and paid per liner metre of guardrail maintained.

Pay Item No	Pay Item	Pay Unit
8711.41	Guardrail Maintenance	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD FURNITURE MAINTENANCE	CODE:	8710
Activity	Kerbstone Maintenance	Code:	8712

8712.1 Scope

Kerbstone Maintenance shall consist of all work to keep kerbstones in good repair. Kerbstones are individual concrete cubes normally laid at bell mouths to protect the edge of the carriageway.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for kerbstone maintenance.
- Clean up of site including disposal of any waste or any excavated material.

8712.2 Description and Requirements

Work methods for Kerbstone Maintenance shall be in accordance with MOPRBW 8712 and will normally include but not be limited to the following operations:

- Removing tilted/shifted or broken kerbstone and clean out the hole.
 - For tilted/shifted kerbstones, relaying the removed kerbstones on concrete bedding at the desired position. Tamping the concrete with tamping rod to compact it.
 - For broken kerbstones, replacing with new ones and laying on concrete at the desired position. Tamping the concrete with tamping rod to compact it.
- Re-painting of the kerbstone as directed.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8712.3 Standards, Materials and Tolerances

Kerbstones shall be maintained as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8712.

8712.4 Measurement and Payment

The unit rate for Kerbstone Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of kerbstones maintained.

Pay Item No	Pay Item	Pay Unit
8712.41	Kerbstone Maintenance	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD FURNITURE MAINTENANCE	CODE:	8710
Activity	Kerb Maintenance	Code:	8713

8713.1 Scope

Kerb Maintenance shall consist of all work to keep kerbs in place and in good repair. Kerbs consist normally of a line of concrete beams cast linearly abutting each other. Kerbs shall be maintained to ensure their function in separating motorised traffic from other road users, and in demarcating the edge of the roadway. It includes minor masonry/concrete repair and repainting of kerbs for visibility.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to maintain kerbs.
- Clean up of site including disposal of any waste or any excavated material.

8713.2 Description and Requirements

Work methods for Kerb Maintenance shall be in accordance with MOPRBW 8713 and will normally include but not be limited to the following operations:

- Removing the damaged kerb and cleaning out the trench.
- For shifted/tilted kerbs, relaying the removed kerbs on concrete bedding in line with the kerb line and providing concrete haunch behind the kerbs. Tamping the concrete with tamping rod to compact it.
- Replacing broken kerbs with new ones and laying on concrete in line with the kerb line and providing concrete haunch. Tamping the concrete with tamping rod to compact it.
- If the existing kerbs are painted, applying paint to the new kerbs according to the Road Traffic Act and the SADC Specifications.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8713.3 Standards, Materials and Tolerances

Applicable Specifications:

Paint shall be in accordance with the specifications in the Road Traffic Act and the SADC Specifications.

Kerbs shall be maintained as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8713.

8713.4 Measurement and Payment

The unit rate for Kerb Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of kerbs maintained.

Pay Item No	Pay Item	Pay Unit
8713.41	Kerb Maintenance	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD FURNITURE MAINTENANCE	CODE:	8710
Activity	Distance Marker Maintenance	Code:	8714

8714.1 Scope

Distance Marker Maintenance shall consist of cleaning, repainting, repair, replacement, if necessary, and all other work to maintain distance markers, including posts and plates.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All work to maintain distance markers.
- Clean up of site including disposal of any waste or any excavated material.

8714.2 Description and Requirements

Work methods for Distance Marker Maintenance shall be in accordance with MOPRBW 8714 and will normally include but not be limited to the following operations:

- Cleaning of surfaces to be painted by using brushes, water and cloth. Detergents shall be used to remove dirt that is difficult to clean by plain water.
- Applying primer and paint in accordance with manufacturer's recommendations.
- Excavation of holes for the markers when reinstatement of distance markers is required. Holes shall be excavated to a minimum depth of 300 mm from ground level.
- Placing the distance marker in the hole and backfilling by hand ramming thin layers and ensure that the marker is finally in a vertical position and the distance marked face is oriented towards the road.
- Removing damaged distance marker plates from the posts and fix new plates.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Existing distance markers shall be cleaned using water, cleaning cloth and an ammonia based detergent.
- Tidy up the site.
- Remove safety devices on completion of the job.

8714.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials shall be in accordance with SSRBW: SECTION 5300: MARKER POSTS.

Distance Marker Post shall be maintained as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8714.

8714.4 Measurement and Payment

The unit rate for Distance Marker Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of distance markers maintained.

Pay Item No	Pay Item	Pay Unit
8714.41	Distance Marker Cleaning	Number
8714.42	Distance Marker Repainting	Number
8714.43	Distance Marker Replacement	Number
8714.44	Distance Marker Plates Replacement	Number
8714.45	Other Maintenance of Distance Marker	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD FURNITURE MAINTENANCE	CODE:	8710
Activity	Pedestrian Railing Maintenance	Code:	8715

8715.1 Scope

Pedestrian Railing Maintenance shall consist of keeping it functional and in good repair. It includes maintenance of markings and reflectors on the rails, if installed. It shall include replacement of rails, posts and reflectors as required and panel beating if necessary. (Maintenance of pedestrian railings on bridges shall be included under Feature 8500 BRIDGE MAINTENANCE).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to maintain pedestrian railings.
- Clean up of site including disposal of any waste or any excavated material.

8715.2 Description and Requirements

Work methods for Pedestrian Railings Maintenance shall be in accordance with MOPRBW 8715 and will normally include but not be limited to the following operations:

- Removing damaged railing, if required.
- Repairing damaged railing or replacement with new railing.
- Lifting repaired or replaced rails into position and bolting to post with overlap in the direction of traffic.
- Tightening nuts and bolts and checking the horizontal and vertical alignment of post and rails.
- Painting the rails as directed.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- Tidy up the site.
- Remove safety devices on completion of the job.

8715.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for repair of pedestrian railing shall be in accordance with SSRBW: SECTION 5400: GUARDRAILS, SECTION 5500: FENCING and SERIES 6000 AND 7000: STRUCTURES as applicable.

The repaired pedestrian railing shall have a neat appearance and shall not show any visible deviation from the required grade. Pedestrian rail posts shall be rigid and vertical and the rail shall be firmly fixed to the post.

The standard of pedestrian railings shall comply with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8715.

8715.4 Measurement and Payment

The unit rate for Pedestrian Railing Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of pedestrian railing maintained, replaced and painted.

Pay Item No	Pay Item	Pay Unit
8715.41	Pedestrian Railing Maintenance	m
8715.42	Pedestrian Railing Replacement	m
8715.43	Pedestrian Railing Painting	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD FURNITURE MAINTENANCE	CODE:	8710
Activity	Street Lighting Maintenance	Code:	8716

8716.1 Scope

Street Lighting Maintenance shall consist of cleaning, repair, reinstatement and all other work required maintaining street lights. The following operations shall be included as part of this Activity:

- Traffic control.
- All works required for maintenance of street lighting.
- Supply of all materials.
- Clean up of site including disposal of any waste or any excavated material.

8716.2 Description and Requirements

Work methods for Street Lighting Maintenance shall be in accordance with MOPRBW 8716 and will normally include, but not be limited to the following operations:

- Routine replacement of lamps, including routine cleaning of all street lighting elements and equipment.
- Replacement of damaged poles, faulty lamps, burnt fuses or damaged cables.
- Repairing and/or replacement of accident damaged equipment; including electrical pits and covers.
- After hours call out. The after hours call out shall include inspection of damaged street lighting due to a fault report to ascertain fault and/or damage, and make site safe, but not including remedial action required.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove safety devices on completion of the job.

8716.3 Standards, Materials and Tolerances

The installation and all materials used for maintenance of street lighting shall comply with the statutory regulations and those of the Local Authority.

- Replacement lamps shall have characteristics equivalent to the original lamp.
- Poles, columns and outreach arms shall be similar to the original for reasons of uniformity.
- Routine replacement of lamps, including cleaning of street lighting elements shall be carried out in accordance with a schedule approved by the Engineer.

Applicable Specifications:

Workmanship and all materials shall be as instructed by the Local Authority.

Street Lighting shall be maintained as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8716.

8716.4 Measurement and Payment

The unit rate for Street Lighting Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of street lighting devices maintained.

Pay Item No	Pay Item	Pay Unit
8716.41	Street Lighting Bulb Replacement	Number
8716.42	Lantern Cleaning and Repair	Number
8716.43	Lantern Replacement	Number
8716.44	Lantern Support Pole Repair/Realignment	Number
8716.45	Lantern Support Pole Replacement	Number
8716.46	Electrical Repair	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD FURNITURE MAINTENANCE	CODE:	8710
Activity	Traffic Signalling Devices Maintenance	Code:	8717

8717.1 Scope

Traffic Signalling Devices Maintenance shall consist of cleaning, repair, reinstatement and all other work required to avert faults, enhance traffic safety, and to maintain a high level of service.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for maintenance of traffic signalling devices.
- Clean up of site including disposal of any waste or any excavated material.

8717.2 Description and Requirements

Work methods for Traffic Signalling Devices Maintenance shall be in accordance with MOPRBW 8717 and will normally include but not be limited to the following operations:

- Preventive scheduled maintenance on a regular basis of the signal installations, including repair or replacement of all components of lantern assemblies; posts, mast arms, controllers, cabinets, vehicle detection systems and all interconnecting cabling.
- Replacement of faulty lamps.
- Repairing and realigning barrier posts.
- Repairing and/or replacing of accident damaged equipment, including electrical pits and covers.
- Traffic lights not functioning, do not include single lamp failures, pedestrian lamp repair, minor visor damage.
- After hours call out. The after hours call out shall include inspection of damaged or not functioning traffic signalling due to a fault report to ascertain fault and/or damage and make site safe, but not including remedial action required.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- No controller time setting shall be carried out except as instructed by the Engineer.
- Tidy up the site.
- Remove safety devices on completion of the job.

8717.3 Standards, Materials and Tolerances

The installation and all materials used for maintenance of traffic signalling devices shall comply with the statutory regulations including the Local Authority.

- Preventive scheduled maintenance of traffic signalling devices shall be carried out in accordance with the Engineer's instructions.
- Replacement lamps shall have characteristics equivalent to the original lamp.
- Poles, columns and mast arms shall be similar to the original for reasons of uniformity.

Applicable Specifications:

Workmanship and all materials shall be in accordance with SSRBW.

Traffic signalling devices shall be maintained as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8717.

Maintenance Standard Specifications for Road and Bridge Works

8717.4 Measurement and Payment

The unit rate for Traffic Signalling Devices shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid for each traffic signalling device maintained.

Pay Item No	Pay Item	Pay Unit
8717.41	Traffic Signalling Devices Bulb Replacement	Number
8717.42	Lamp Replacement	Number
8717.43	Casing Repair/Replacement	Number
8717.44	Signalling Devices Post Realignment/Replacement	Number
8717.45	Barrier Post Repair/Realignment/Replacement	Number
8717.46	Repair/Replacement of Electrical or Electronic Components	Number
8717.47	Repair of Controller	Number
8717.48	Replacing of Controller	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD SIGNS MAINTENANCE	CODE:	8720

Scope

This maintenance intervention comprises the following maintenance activities:

- 8721 Road Sign Cleaning
- 8722 Road Sign Repainting
- 8723 Road Sign Repairs
- 8724 Road Sign Replacement
- 8729 Other Road Signs Maintenance

Activity 8729 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD SIGNS MAINTENANCE	CODE:	8720
Activity	Road Sign Cleaning	Code:	8721

8721.1 Scope

Road Sign Cleaning shall consist of cleaning of signs (including street name signs) and reflectors to ensure their intended function in providing warning, instruction and information to the public.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for road signs cleaning.
- Clean up of site including disposal of any waste or any excavated material.

8721.2 Description and Requirements

Work methods for Road Sign Cleaning shall be in accordance with MOPRBW 8721 and will normally include but not be limited to the following operations:

- Cleaning the signs. The reflective side of the signs shall be cleaned with a soft brush or cloth using sufficient water and, if necessary, a mild detergent. Bitumen or oil streaks may be washed off with kerosene, and then washed down with water. Care must be taken not to scrape, damage or apply paint to the reflective face of signs. Sign posts can be cleaned with a brush or broom and, if necessary, washed down with water.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Sign faces shall be cleaned using a non-abrasive cleaner with a pH value between 6 and 8.
- Approved sign cleaning equipment shall be used. All loose dirt shall be washed from the sign.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8721.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for cleaning of road signs shall be in accordance with SSRBW: SECTION 5600 ROAD SIGNS.

Road signs cleaning shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8721.

8721.4 Measurement and Payment

The unit rate for Road Sign Cleaning shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of signs cleaned.

Pay Item No	Pay Item	Pay Unit
8721.41	Road Sign Cleaning, Regulatory and Warning Signs	Number
8721.42	Road Sign Cleaning, Direction or Information Signs < 2 m ²	Number
8721.43	Road Sign Cleaning, Direction or Information Signs 2 m ² - 10 m ²	Number
8721.44	Road Sign Cleaning, Direction or Information Signs > 10 m ²	Number
8721.45	Road Sign Cleaning: Street Name Signs	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD SIGNS MAINTENANCE	CODE:	8720
Activity	Road Sign Repainting	Code:	8722

8722.1 Scope

Road Sign Repainting shall consist of cleaning and repainting of signs, incl. street name signs, road signs painted on the road surface, sign posts and reflectors to ensure their intended function in providing warning, instruction and information to the public. (Repainting of surfaces for corrosion protection and visibility shall be included in Activity 8722).

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repaint road signs.
- Clean up of site including disposal of any waste or any excavated material.

8722.2 Description and Requirements

Work methods for Road Sign Repainting shall be in accordance with MOPRBW 8722 and will normally include but not be limited to the following operations:

- Preparing surfaces to be painted by cleaning them using steel brushes, scrapping or sand paper to remove oxidation and scales. Removal of loose paint, dirt and rust from metallic surfaces with a wire brush and/or sand paper. If necessary wash down with water. Wipe off the surface to be painted to ensure that the surface is dry and clean before applying anti-corrosive paint.
- Applying primer and painting in accordance with manufacturer's recommendations.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- Sign faces shall be cleaned using a non-abrasive cleaner with a pH of 6 to 8. Scrub with clean water using a bristle brush and allowed to dry.
- All loose dirt shall be washed from the sign.
- Approved sign cleaning equipment shall be used.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8722.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for repainting of road signs shall be in accordance with SSRBW: 5600 ROAD SIGNS.

Road Sign Repainting shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8722.

8722.4 Measurement and Payment

The unit rate for Road Sign Repainting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of signs repainted.

Pay Item No	Pay Item	Pay Unit
8722.41	Road Sign Repainting Regulatory and Warning Signs	Number
8722.42	Road Sign Repainting, Direction or Information Signs < 2 m ²	Number
8722.43	Road Sign Repainting, Direction or Information Signs 2 m ² – 10 m ²	Number
8722.44	Road Sign Repainting, Direction or Information Signs > 10 m ²	Number
8722.45	Sign Post/Overhang Support Repainting	Number
8722.46	Road Sign Repainting on Road Surface	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD SIGNS MAINTENANCE	CODE:	8720
Activity	Road Sign Repairs	Code:	8723

8723.1 Scope

Road Sign Repairs shall consist of the repair of damaged or deteriorated signs (incl. street name signs) and/or supports. Repainting is included in Activity 8722.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to repair damaged road signs.
- Clean up of site including disposal of any waste or any excavated material.

8723.2 Description and Requirements

Repair of road signs shall be carried out strictly in accordance with details and instructions on the drawings and as directed by the Engineer. Work methods for Road Sign Repair shall be in accordance with MOPRBW 8723 and will normally include but not be limited to the following operations:

- Re-positioning of signs and posts/overhangs to their original position and direction, and ensure that they are properly secured.
- Removing damaged signs and posts/overhangs, if required, and repair.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8723.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for repainting of road signs shall be in accordance with SSRBW: 5600 ROAD SIGNS.

Road Sign Repainting shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8722.

8723.4 Measurement and Payment

The unit rate for 8723 Road Sign Repairs shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of signs repaired.

Pay Item No	Pay Item	Pay Unit
8723.41	Road Sign Repairs Regulatory and Warning Signs	Number
8723.42	Road Sign Repairs Direction or Information Signs < 2 m ²	Number
8723.43	Road Sign Repairs, Direction or Information Signs 2 m ² - 10 m ²	Number
8723.44	Road Sign Repairs Direction or Information Signs > 10 m ²	Number
8723.45	Sign Post/Overhang Support Repair	Number
8723.46	Sign Post/Overhang Support Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD SIGNS MAINTENANCE	CODE:	8720
Activity	Road Sign Replacement	Code:	8724

8724.1 Scope

Road Sign Replacement shall consist of the replacement of damaged, missing or deteriorated signs (incl. street name signs) and/or supports.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required to replace road signs.
- Clean up of site including disposal of any waste or any excavated material.

8724.2 Description and Requirements

Road Sign Replacement shall be carried out strictly in accordance with details and instructions on the drawings and as directed by the Engineer. Work methods shall be in accordance with MOPRBW 8724 and will normally include but not be limited to the following operations:

- Dismantling and disposal of existing sign as directed by the Engineer.
- Excavation of new post foundation in accordance with specifications or as directed by the Engineer.
- Erecting of new sign post or overhang support, placing concrete around post and compacting with hand rammers.
- Replacing of road sign face and frame.

Operational Requirements:

- Take the required safety precautions in accordance with the Safety Instructions in MOPRBW 8900.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8724.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for replacement of road signs shall be in accordance with SSRBW: SECTION 5600: ROAD SIGNS.

Road Sign Replacement shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8724.

8724.4 Measurement and Payment

The unit rate for Road Sign Replacement shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of signs replaced.

Pay Item No	Pay Item	Pay Unit
8724.41	Road Sign Replacement, Regulatory and Warning Signs	Number
8724.42	Road Sign Replacement, Direction or Information Signs < 2 m ²	Number
8724.43	Road Sign Replacement, Direction or Information Signs 2 m ² –10 m ²	Number
8724.44	Road Sign Replacement, Direction or Information Signs > 10 m ²	Number
8724.45	Sign Post/Overhang Support Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD MARKING MAINTENANCE	CODE:	8730

Scope

This maintenance intervention comprises the following maintenance activities:

- 8731 Road Marking Repainting
- 8732 Reflective Stud Maintenance
- 8739 Other Road Marking Maintenance

Activity 8739 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD MARKING MAINTENANCE	CODE:	8730
Activity	Road Marking Repainting	Code:	8731

8731.1 Scope

Road Marking Repainting shall consist of repainting of permanent marking of the road surface with white or yellow marking where required or as directed by the Engineer.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works required for Road Marking Repainting.
- Clean up of site including disposal of any waste or any excavated material.

8731.2 Description and Requirements

Work methods for Road Marking Repainting shall be in accordance with MOPRBW 8731 and will normally include but not be limited to the following operations:

- Using hand brooms or a mechanical broom or air compressor, cleaning of the road surface of all dust and debris to provide a dry surface.
- Pre-marking of lines, symbols, figures or marks on the road surface by means of paint spots of the same colour as that of the final lines and marks.
- Painting of road marking. Painting shall be performed using a template or other method that will achieve the dimensions shown in the drawings, without overspray.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control. Painting shall not be performed when wind conditions cause overspray or during periods of rainfall.
- Areas to be painted shall be clean and dry during the application of paint.
- The paint shall be stirred before application in accordance with the manufacturer's instructions.
- Where retro-reflective paint is required, the beads shall be applied by a pressure sprayer type machine in one continuous operation immediately after the paint has been applied.
- Paint shall not be applied at temperatures lower than 10° C, or under very strong wind conditions, or when visibility is dangerously impeded by mist or smog.
- Traffic shall be kept off painted messages until the paint has dried and will not track under traffic.
- Tidy up the site.
- Remove all safety devices on completion of the job.

Maintenance Standard Specifications for Road and Bridge Works

8731.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and all materials used for road marking shall be in accordance with SSRBW: 5700 – ROAD TRAFFIC MARKINGS, or as directed by the Engineer in accordance with the latest version of the Botswana Road Traffic Act: Chapter 69.01.

The Engineer shall be provided with the following information prior to commencing the work:

- Names and mailing addresses of the suppliers and manufacturers.
- Paint formulation to be supplied.
- Written confirmation from the manufacturer that the materials to be supplied meet all specified requirements.

No paint formulation shall be diluted or mixed with a different formulation or with any other material without the prior approval of the Engineer.

All painted messages shall be uniform in thickness with no splatter, excessive overspray or other defects. To produce a uniform appearance of colour and reflectivity, paint and glass beads must be uniformly applied such that the beads do not contact the pavement surface. (Typically, this can be achieved using an application rate of about 0.40 l/m² for the paint and 800 g of glass beads per litre of paint).

Road markings shall be repainted as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8731.

8731.4 Measurement and Payment

The unit rate for Road Marking Repainting shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per square metre of pedestrian crossings, symbols, figures or marks on the road surface repainted. It shall be measured and paid per linear metre of lines on the road surface repainted.

Pay Item No	Pay Item	Pay Unit
8731.41	Ordinary Road Marking Repainting: Symbols, Figures, Marks, Pedestrian Crossings	m ²
8731.42	Thermoplastic Road Marking Repainting: Symbols, Figures, Marks, Pedestrian Crossings	m ²
8731.43	Ordinary Road Marking Repainting: Lines	m
8731.44	Thermoplastic Road Marking Repainting: Lines	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	ROAD MARKING MAINTENANCE	CODE:	8730
Activity	Reflective Stud Maintenance	Code:	8732

8732.1 Scope

Reflective Stud Maintenance shall consist of all work to clean or replace damaged or missing road studs.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works to clean or replace reflective road studs.
- Clean up of site including disposal of any waste or any excavated material.

8732.2 Description and Requirements

Work methods for Reflective Stud Maintenance shall be in accordance with MOPRBW 8732 and will normally include but not be limited to the following operations:

- Cleaning of reflective studs:
 - i. Clean stud by using soft brush, water, cleaning cloth and ammonia based detergent.
 - ii. Use hard broom to remove all dirt and detergent from the surface of the road.
- Replacement of reflective studs:
 - i. Removing damaged road studs using crowbars and other hand tools leaving the stud area flush with the road surface with no protrusion or depression.
 - ii. Backfilling of the stud hole with an asphalt mixture thoroughly compacted by means of a heavy steel tamping rod.
 - iii. Cleaning of the new stud position and making it clean and dry completely free from any soil, grease, oil or any material which would be detrimental to bonding of the stud adhesive material.
 - iv. Fixing of the studs to the road surface by means of an approved adhesive material, in accordance with the manufacturer's instructions. The adhesive shall be applied to the road surface using a 1 mm thick steel template so that, after installation, the pad of adhesive is clearly visible around the circumference of the road stud. The installed studs shall be protected against impact until the adhesive has achieved the necessary strength, and not less than three hours.

Operational Requirements:

- Take the required safety precautions in accordance with the safety instructions in MOPRBW 8900.
- Locate the position of the new stud about 150 mm longitudinally away from the position of the old stud.
- Install the road stud on top of the adhesive and protect the stud against impact for a minimum period of three hours for the adhesive to achieve the necessary strength.
- Tidy up the site.
- Remove safety devices on completion of the job.

Maintenance Standard Specifications for Road and Bridge Works

8732.3 Standards, Materials and Tolerances

Applicable Specifications:

Road studs shall be of similar type as existing road studs on the road surface or as directed by the Engineer.
Cleaning equipment and detergent shall be non-abrasive to the surface of the road stud.

Workmanship and all materials shall be in accordance with SSRBW: SECTION 5709: ROAD STUDS.

Reflective studs shall be maintained as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8732.

8732.4 Measurement and Payment

The unit rate for Reflective Stud Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per number of road studs maintained.

Pay Item No	Pay Item	Pay Unit
8732.41	Reflective Stud Cleaning	Number
8732.42	Reflective Stud Replacement	Number

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	RUMBLE STRIPS AND SPEED HUMP MAINTENANCE	CODE:	8740

Scope

This maintenance intervention comprises the following maintenance activities:

- 8741 Rumble Strips Maintenance
- 8742 Speed Hump Maintenance
- 8749 Other Rumble Strips and Speed Hump Maintenance

Activity 8749 is reserved for any new activity that may be considered necessary to be executed within the above intervention but is not covered by other activities in the intervention.

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	RUMBLE STRIPS AND SPEED HUMP MAINTENANCE	CODE:	8740
Activity	Rumble Strips Maintenance	Code:	8741

8741.1 Scope

Rumble Strips Maintenance shall consist of repairing worn out rumble strips in order to restore their functionality of warning traffic hazards ahead.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All works to repair worn out rumble strips.
- Clean up of site including disposal of any waste or any excavated material.

8741.2 Description and Requirements

Work methods for Reflective Studs Maintenance shall be in accordance with MOPRBW 8741 and will normally include but not be limited to the following operations:

- Sweeping clean along the worn out or damaged rumble strip.
- Priming along the rumble strip.
- Placing and compacting with hand rammer the premix asphalt concrete to form a hump of size similar to existing rumble strip. Alternatively use a bituminous seal as directed by the Engineer. Use string to control the height of the rumble strips.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8741.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials shall be as directed by the Engineer.

Rumble Strips Maintenance shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8741.

8741.4 Measurement and Payment

Applicable Specifications:

The unit rate for Rumble Strips Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of rumble strips maintained (for each rumble strip length).

Pay Item No	Pay Item	Pay Unit
8741.41	Rumble Strips Maintenance (Chips)	m
8741.42	Rumble Strips Maintenance (Asphalt Concrete)	m

Maintenance Standard Specifications for Road and Bridge Works

FEATURE	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	CODE:	8700
INTERVENTION	RUMBLE STRIPS AND SPEED HUMP MAINTENANCE	CODE:	8740
Activity	Speed Hump Maintenance	Code:	8742

8742.1 Scope

Speed Hump Maintenance shall consist of repairing worn out speed humps in order to restore their functionality of controlling the speed of traffic through an area.

The following operations shall be included as part of this Activity:

- Traffic control.
- Supply of all materials.
- All work to repair worn out speed humps.
- Clean up of site including disposal of any waste or any excavated material.

8742.2 Description and Requirements

Work methods for Speed Hump Maintenance shall be in accordance with MOPRBW 8742 and will normally include but not be limited to the following operations:

- Removing the worn out speed hump.
- Cleaning the area where the worn out hump has been removed to remove loose particles.
- Applying primer.
- Spreading premix asphalt concrete using rakes to form the shape of a hump.
- Compacting the premix using hand rammers or roller.
- Alternatively build the speed hump using gravel, concrete or metal in accordance with MOPRBW 8742 and as ordered by the Engineer.

Operational Requirements:

- Place warning signs in accordance with the guidelines given in MOPRBW 8900 before commencing with any activity, for safety of workmen and traffic control.
- Tidy up the site.
- Remove all safety devices on completion of the job.

8742.3 Standards, Materials and Tolerances

Applicable Specifications:

Workmanship and materials shall be in accordance with the latest version of the Botswana Road Traffic Act: Chapter 69.01.

Speed Hump Maintenance shall be carried out as directed and in accordance with the Maintenance Performance Standards for the intended Service Level as described in MSRBW 8742.

8742.4 Measurement and Payment

The unit rate for Speed Hump Maintenance shall be full compensation for labour, equipment, tools and transport required to carry out the prescribed works. It shall be measured and paid per linear metre of speed humps maintained and per number of steel speed humps maintained.

Pay Item No	Pay Item	Pay Unit
8742.41	Speed Hump Maintenance, Asphalt Concrete	m
8742.42	Speed Hump Maintenance, Concrete	m
8742.43	Speed Hump Maintenance, Gravel	m
8742.44	Speed Hump Maintenance, Steel	Number

8800 EMERGENCIES

8801 Scope

Feature 8800 Emergencies covers interventions for Emergency Works to be carried out as called for by the Engineer or as required in terms of the contract in case of emergency situations in order to ensure safety of road users and to safeguard the road assets.

All emergency activities shall be carried out in accordance with the Standard Specifications for Road and Bridge Works (SSRBW) or as directed by the Engineer.

Emergency Works are designed to repair those damages to the roads which are caused directly by unforeseen natural or other phenomena with imponderable consequences occurring either in the area of the roads or elsewhere, but with a direct impact on the roads. "Unforeseen Natural or Other Phenomena" include, but are not necessarily restricted to, the following:

- Rain and wind of an extraordinary intensity and/or duration accepted as such for the project area by the meteorological office or with a return period of 20 years or more.
- Flooding from rivers resulting in surcharging of structures and overtopping of embankments constructed to agreed longitudinal profiles.
- Landslides or earthquakes originating outside the road corridor.
- Interruption to traffic from major obstacles on the road resulting from major accidents.
- Interruption to traffic from washouts resulting from exceptional rainfall where the amount of material displaced exceeds a volume of 100 cubic metres.
- The damage of a drainage structure or road embankment constructed to agreed reference levels due to water surcharging resulting in an interruption of road traffic.
- Damage to bridge from washouts or other serious incidents will in general be subject to separate tender and is not regarded as a maintenance activity, unless directed by the engineer. However, until that bridge contractor is in place, the maintenance contractor will, as part of the maintenance contract, be responsible for Traffic Control, Safety Measures and Notification and Construction of Diversions as described under Activities 8841 and 8842 for Culverts.

Actual quantities for Emergency Works will be specified in Work Orders, issued by the Engineer. The basis of payment for Emergency Works will be the actual quantities of work ordered and carried out, as measured and verified by the Engineer and valued at the unit rates and prices bid in the priced Bill of Quantities, where applicable, and otherwise at such unit rates and prices as may be agreed or determined by the Engineer under the provisions of the Contract.

Feature 8800 Emergencies covers the following interventions:

8810 Flooding and Washout Repair

- 8811 Traffic Control, Safety Measures and Notification
- 8812 Construction of Diversions
- 8813 Excavation and Removal of Unsuitable Material
- 8814 Reinstatement of Roadway Structure
- 8819 Other Flooding and Washout Repair

8820 Land Slide Removal

- 8821 Traffic Control, Safety Measures and Notification
- 8822 Construction of Diversions
- 8823 Excavation and Removal of Material from Roadway

8824 Reinstatement of Roadway Structure

8829 Other Land Slide Removal

8830 Major Obstacles Removal

8831 Traffic Control, Safety Measures and Notification

8832 Construction of Diversions

8833 Removal of Major Obstacle

8834 Repair Damage to Pavement

8839 Other Major Obstacles Removal

8840 Damaged/Washed Out Culvert Replacement

8841 Traffic Control, Safety Measures and Notification

8842 Construction of Diversions

8843 Removal of Existing Culvert

8844 Repair and Replacement of Culvert

8845 Excavation and Backfilling

8846 Reinstatement of Pavement and Embankments

8849 Other Damaged/Washed Out Culvert Replacement

8850 Damaged/Washed Out Miscellaneous Structures Replacement

8851 Traffic Control, Safety Measures and Notification

8852 Construction of Diversions

8853 Removal of Existing Structure

8854 Repair and Replacement of Structure

8855 Excavation and Backfilling

8856 Reinstatement of Pavement and Embankments

8859 Other Damaged/Washed Out Miscellaneous Structures Replacement

8860 Repair to Damaged Utilities Within the Road Reserve

8861 Traffic Control, Safety Measures and Notification

8862 Construction of Diversions

8863 Repair of Damaged Utilities Within the Road Reserve

8864 Reinstatement of Roadway Structure

8869 Other Repair to Damaged Utilities Within the Road Reserve

8890 Other Emergencies

Maintenance intervention 8890 is reserved for any emergency that may be considered necessary to be executed within the road reserve, but is not covered by other interventions.

Procedure for Requesting Emergency Works:

If damages clearly caused by "Unforeseen Natural Phenomena" result in a reduction of service quality levels below the normal threshold values specified in the contract, the Contractor may make a formal request to the Engineer to carry out Emergency Works designed specifically to remedy those damages. If the Contractor decides to make a request for Emergency Works, he must:

- (i) immediately inform the Engineer of his intention to do so, by telephone, radio or other means,
- (ii) record the circumstances of the Force Majeure event and the damages caused, through photographs, video and other suitable means,
- (iii) prepare a written request, stating the type of works he intends to carry out, their exact location and the

Maintenance Standard Specifications for Road and Bridge Works

estimated quantities and costs, including photographic documentation. In any case, a request for Emergency Works must be made immediately after the Contractor gains knowledge of the existence of damages caused by "Unforeseen Natural Phenomena".

The Engineer, upon receipt of the request and not later than 24 hours thereafter, will evaluate the request made by the Contractor based on a site visit, and issue an order to carry out the Emergency Works. The order will specify the type of works, their estimated quantities, the remuneration to be paid to the Contractor, and the time allowed for their execution.

Remuneration of Emergency Works:

Emergency works are remunerated by the Employer on a lump sum basis for each work order established on the basis of estimated quantities and the unit prices stated in the Bill of Quantities, in accordance with the relevant clauses of the GCC. The work items and the unit prices to be applied are specified in the Bill of Quantities of the tender document.

Provision of Emergency Works:

The total contract amount will include a fixed Provisional Sum for Emergency Works during the contract period, in accordance with the relevant clause of the tendering data. The financial bids to be submitted shall exclude the amount of the provision.

Obligations of Contractor during Emergencies and Emergency Works:

Given the fact that Emergency Works are remunerated separately, the Contractor will, during the execution of Emergency Works, continue to be responsible for assuring the normal service quality levels on all roads included in the contract. In particular, the Contractor will do everything reasonably possible in order to ensure the normal use of all the roads under contract, including the sections affected by emergencies. If road traffic has been interrupted because of an emergency, the Contractor will take the measures necessary:

- (i) to reopen the road to traffic in the shortest time possible, and
- (ii) to maintain the road open during emergency works, without being entitled to a specific compensation for those measures. This is valid specifically for trees or other objects which may have fallen on the road, damage to access ramps to bridges, erosion of embankments, collapse of slopes, traffic accidents, flooding, etc.

Minor Repairs Made Necessary by "Unforeseen Natural Phenomena":

If the works necessary to remedy damages caused by "Unforeseen Natural Phenomena" are below certain threshold values, as defined in MSSRBW, the Contractor will carry out those works as part of his normal obligations and without having the right to invoke the provision of the contract concerning emergencies and the remuneration of emergency works. In these cases the consent of the Engineer is not needed and the Contractor will simply carry out the works on his own initiative. He will nevertheless inform the Engineer of the damages occurred and the remedial measures taken.

The threshold values for minor repair per incident are as shown in the table below:

INTERVENTION	CODE	Incident	Unit	Quantity
FLOODING AND WASHOUT REPAIR	8810	Loss of embankment material	m ³	100
LAND SLIDE REMOVAL	8820	Materials onto the road	m ³	100
MAJOR OBSTACLES REMOVAL	8830	Road blocked	Number of incidents	1
DAMAGED/WASHED OUT CULVERT REPLACEMENT	8840	Road not passable	Number of culverts	1
DAMAGED/WASHED OUT MISCELLANEOUS STRUCTURES REPLACEMENT	8850	Road not passable	Number of misc. structures	1
DAMAGED UTILITIES	8860	Road not blocked	Number of utilities	1

8900 MISCELLANEOUS FEATURES

8901 Scope

Feature 8900 Miscellaneous Features covers interventions necessary for the successful implementation of all maintenance activities. Most importantly they would include all works required to implement safety and traffic control measures required at the work sites to warn and protect road users and workmen when maintenance works are being carried out on or close to the carriageway. It also includes preparatory activities such as planning, resources, materials, quality control and reporting necessary for successful implementation of road maintenance activities.

Feature 8900 – Miscellaneous Features comprises the following interventions and activities:

8910 Traffic Control and Safety Measures

- 8911 Placement of Warning Signs Only
- 8912 Lane Closure
- 8913 Barricading Work Area
- 8914 Diversions
- 8919 Other Traffic Control and Safety Measures

8920 Procurement of Materials for Maintenance Works

- 8921 Determining Materials Required
- 8922 Identifying Sources of Material
- 8923 Procurement of Materials
- 8924 Storage of Materials
- 8925 Transportation of Materials to Site
- 8929 Other Procurement of Materials for Maintenance Works

8930 Process and Quality Control Testing

- 8931 Process Control Testing
- 8932 Quality Control Testing
- 8939 Other Process and Quality Control Testing

8940 Sourcing and Extraction of Borrow Materials

- 8941 Investigation of Potential Borrow Area/Quarry
- 8942 Selection of the Most Suitable Borrow Area/Quarry
- 8943 Opening of Borrow Pit/Quarry and Extraction of Materials
- 8944 Loading and Hauling Borrow Materials
- 8945 Rehabilitation and Closure of Borrow Area/Quarry
- 8949 Other Sourcing and Extraction of Borrow Materials Issues

8950 Tools and Equipment

- 8951 Safety and Health Tools
- 8952 Monitoring and Supervision Tools and Equipment
- 8953 Working Tools and Equipment
- 8954 Usage and Maintenance of Hand Tools
- 8955 Usage of Equipment and Vehicles
- 8956 Maintenance of Equipment and Vehicles
- 8959 Other Tools and Equipment

Maintenance Standard Specifications for Road and Bridge Works

8960 Labour

- 8961 Recruitment of Labour
- 8962 Conditions of Work
- 8963 Safety and Health of Personnel
- 8964 Payment of Wages
- 8969 Other Labour

8970 Reporting Forms

- 8971 Resource Requirements and Cost Estimates for Maintenance Works
- 8972 Work Report and Resources Utilization
- 8979 Other Reporting Forms

8990 Other Miscellaneous Features

Intervention 8990 is reserved for any miscellaneous feature that may be considered necessary to be executed within the above feature, but is not covered by other interventions in the feature.

REFERENCES

- Standard Specifications for Road and Bridge Works (1983).** Roads Department, Gaborone, Botswana.
- Botswana Roads Department (1996): **1996 Maintenance and Rehabilitation Plan for the Botswana Paved Road network.** Roads Department, Gaborone, Botswana.
- HAAS, R., HUDSON, W. R. and ZANIEWSKI, J. (1994). **Modern Pavement Management**, Kriegeler Publishing Co. Florida, USA.
- International Road Federation (2004). **The Organisation of Road Maintenance**, Washington D.C., USA.
- Morosiuk, G, M Riley and J B Odoki (2001). **Modelling road deterioration and works effects.** Draft Volume 6 of the HDM-4 series of publications. PIARC ISOHDM. World bank, Washington, D.C, USA.
- OECD (1994). **Road maintenance and rehabilitation: Funding and allocation strategies.** OECD, Paris, France.
- Paterson, WDO and T Scullion (1990). **Information systems for road management: draft guidelines on system design and data issues.** Infrastructure and Urban Development Department. Report No INU 77. The World Bank. Washington DC, USA.
- PIARC (2000). HDM-4. **Highway Development and Management Series.** The World Road Association (PIARC), Paris, France.
- Robinson, R, U Danielson and M Snaith (1998). **Road Maintenance Management, Concepts and Systems.** MacMillan Press Ltd, Basingstoke, UK.
- Rohde, G.T., Pinard, M.I. and E. Sadzik (1996). **Long-term Network Performance – A Function of Maintenance Strategy.** Proceedings Roads 96 Conference, Christ Church, New Zealand, 2-6 September, 1996.
- SADC (2003). **Guideline on Low-volume Roads.** SADC Secretariat, Gaborone, Botswana.
- TRL (1987). **Maintenance management for district engineers.** Overseas Road Note 1. Transport Research Laboratory. Crowthorne, UK.
- World Bank: (2001). **Technical Paper No. 496 – Design and Appraisal of Rural Transport Infrastructure: Ensuring Basic Access for Rural Communities.** World Bank, Washington, D.C., USA.

GLOSSARY OF TERMS

Abutment

A structure that provides support to a bridge deck and retains the road embankment.

Activity

Works to rectify a defect.

Adhesion

The action by means of which a fluid or plastic substance sticks to the surface of a solid body, for example, holding aggregate to the binder in chip sealing. It arises through intermolecular attraction between the contact surfaces.

Adhesion Agent (Anti-Stripping Agent)

A substance used for the purpose of improving the adhesion between a bituminous binder and the aggregate in the presence of water. It may be added to the binder or coated on to the aggregate in a solvent.

Aggregate

A granular material produced from deposits of sand, gravel, rock or metallurgical slag, using one or more of the following processes: selective extraction, screening, blasting, crushing.

Apron

Floor of concrete, masonry or stone at the inlet or outlet of a culvert or water way to prevent scour.

Asphalt Concrete

A mixture to predetermined proportions of aggregate, mineral filler and bituminous binder material prepared off the road and usually placed by means of a paving machine.

Base Course

A layer of material of defined thickness and width constructed on top of the subbase or, in the absence thereof, on top of the subgrade. A base may extend to or outside the carriageway.

Benching

A stepped platform cut in an embankment to prevent earth slipping. Can also be used as stepping to provide a level base for additional fill material.

Berm

A low ridge or bund of soil to redirect surface water.

Bicycle Path

A delineated path which may be part of or separate from the main carriageway of a road which is reserved for use by bicyclist.

Binder

Bitumen or bitumen emulsion, used to bind a wearing course, usually aggregate, to the pavement surface which may or may not have been previously primed or sealed. A binder is also used to hold aggregate together in bituminous mixtures.

Bitumen

Bitumen is a black to dark brown sticky material composed principally of high-molecular-weight hydrocarbons. Most bitumen is derived from the distillation of crude oil. Bitumen is a thermoplastic material that gradually liquefies when heated.

Bleeding

The exuding of the bituminous binder of a sealed pavement to such an extent that the binder may be picked up and spread by the traffic. This occurs mainly in warm weather.

Blind

To spread a thin layer of suitable material to absorb excess binder or to assist in remedying a slippery or loose condition, or to fill excess surface voids.

Borrow Area

An area within designated boundaries, approved for the purposes of obtaining borrow material. A borrow pit is the excavated pit in the borrow area.

Borrow Material

Any gravel, sand, soil, rock or ash obtained from borrow areas, dumps or sources other than cut within the road prism and which is used in the construction of the works. It does not include crushed stone or sand obtained from commercial sources.

Box Culvert

A culvert of rectangular cross-section constructed of reinforced concrete.

Bridge

A structure erected over a depression, river, water course, railway line, road or other obstacle for carrying motor, railway, pedestrian or other traffic, or services, and having a length measured between the abutment faces along the centre line at girder bed level, of 6 m or more, except that road-over-rail or rail-over-road structures are always classed as bridges.

Brooming

The use of a broom for distributing aggregate over the surface of a pavement or removal of loose material from a pavement prior to or after the application of a bituminous treatment.

Camber

The road cross-section in which each lane is sloping down from the crown towards shoulder breakpoint on a section of straight road alignment.

Cause

The reason that a defect has arisen.

Causeway

Low-level structure constructed across streams or rivers with openings to permit water to pass below road level.

Carriageway

The area normally travelled by vehicles and consisting of one or a number of contiguous traffic lanes but excluding shoulders.

Catchment Area

The area from which water runs off the surface by gravity to a collecting point.

Catch Drain

A surface drain constructed along the high side of a road or embankment outside the batter to intercept surface water.

Catchpit

A covered, accessible chamber with a sump for collection of silt forming part of the drainage system and permitting inspection and maintenance of underground drainage pipes.

Centre-line

The middle of the carriageway of an engineered road.

Compaction

Tamping of soil by hand rammers or mechanical rollers to increase the soil density.

Corrugation

A surface deformation into marked wave-like shapes at approximately equal distances and transverse to the line of traffic. (More common in unsealed gravel surfaces).

Crazing (Crocodiling)

The cracking of a surface seal into small irregularly shaped contiguous areas.

Annex B - Glossary of term

Cross-fall

The transverse gradient or fall across a formation or pavement or carriageway.

Cross-section

Section through the road construction at right angles to the centreline.

Crown

The highest part of a cambered surface, usually on or near road centreline.

Crushed Gravel

A gravel in which all or some of the particles have been crushed.

Crushed Rock

An aggregate made by crushing rock, as distinct from crushed gravel.

Crusher Run

An aggregate produced by crushing without subsequent screening.

Crusher Dust

The dust or fine particles produced by the crushing of gravel or rock.

Culvert

A structure, other than a bridge, which provides an opening under the carriageway or median for drainage or other purposes.

Cut (Cutting)

Excavation from the road prism, including side drains, excavations for crossroads, interchanges and, where classified as cut, excavations for open drains.

Cut-back Bitumen

Bitumen, the viscosity of which has been temporarily reduced by the addition of a suitable volatile diluents, usually power kerosene.

Cut-off drain

A drain cut to intercept surface water flowing from adjacent land and to prevent it reaching a pavement or other prepared surface.

Cut-off Wall

An impervious wall to prevent seepage or movement of water under or past a structure.

Cut Slope

A soil/rock plane cut at an angle to the horizontal.

Cycle Path (Cycle lane)

A track which is used mainly for bicycle traffic. The track is separated from the rest of the road by kerb stone, similar structures or road marking.

Defect

The term Defect refers to the visible evidence of an undesirable condition in a Road Feature. A Defect may affect the safety, the serviceability, structural capacity or appearance of the asset.

Ditch (Drain)

A long narrow excavation designed or intended to collect and drain off surface water.

Drainage

The interception and removal of ground and surface water by artificial or natural means.

Drainage Channel

A waterway or gutter to carry away surface water.

Drift

A stream or river crossing at bed level over which the stream or river water can flow.

Dry Grading

Removing surface unevenness or corrugations using a grader without adding moisture.

Dry Grading (Spoor)

Making furrows in the sand track to assist drivers maintain position in the track.

Edge Break

The failure of the edge of the surfacing up to a minimum width of 300 mm from the continuous edge of the surfacing.

Edge Damage

Damage to the road edge surface by potholes, erosion runnels, corrugations, loss of cross-fall, edge drops and grass growing on unpaved shoulder.

Edge Fretting

Loss of the seal and pavement material along the edge of a pavement which may vary in depth and severity.

Earthworks

General term of construction works involving excavation, loading, hauling, spreading and compaction of soil and rock.

Embankment Slope

An artificially constructed soil plane at an angle to the horizontal.

Emergency Works

Any repair needed without delay for the purpose of ensuring public safety, relieving unnecessary traffic congestion, or maintaining structural integrity of a part of the road.

Emulsified Bitumen

The suspension of bitumen, in a state of extremely fine division, in water by means of one or more suitable emulsifying or stabilising agents. There are two types of emulsified bitumen: Anionic in which the bitumen particles are negatively charged and Cationic in which the bitumen particles are positively charged.

Encroachment

Unauthorized placing and leaving wilfully on the road or road reserve of signs or other objects, materials, physical structures or interventions of any kind, fire or matters causing offensive smell or other offensive matter.

Enrichment Seal (Fogspray)

A light application of bituminous material, with or without a fine aggregate cover for the purpose of increasing the binder content of a bituminous road surface.

Fatty Surface

A sealed pavement containing an excess of bituminous binder which may be in contact with the traffic. The wearing course is either partly or completely submerged.

Fill (Embankment)

The portion of the subgrade composed of approved imported material which lies above the road bed and is bounded by the side slopes, shown on the typical cross-sections on the Drawings, running downwards and outwards from the outer shoulder breakpoints and on which the selected subgrade, subbase, base, shoulders and, in the case of dual carriageways, the median are to be constructed. Material which is imported to replace unsuitable material excavated from the roadbed is also classified as fill.

Annex B - Glossary of term

Foamed Bitumen

Hot bitumen greatly expanded in volume by the introduction of steam.

Footbridge

The overpass bridge crossing carriageway/railway to ensure the safety of pedestrian and smooth passage of vehicular traffic.

Footpath (Walkway, Footpath)

A track used for passage of pedestrians. The track may be separated from other parts of the road by kerb stone, similar structures or road marking.

Gabion

A steel mesh cage filled with cobble stone or crushed stone and mainly used for revetment and slope protection.

Gravel

A non-cohesive coarse granular material, resulting from natural disintegration of rock with or without fine material.

Guardrail

A safety barrier on an embankment or river crossing, footbridge, pedestrian way, etc.

Gutter

A shallow waterway provided at the edge of the road to carry surface water away from the road.

Headwalls

The walls located on the top of outlet/inlet of culvert. The walls of inlet direct the flow into the culvert while the walls of outlet provide a transition from the culvert to the outlet channel. Headwalls also protect the embankment from erosion by flood waters.

Heaving

Upward movement of material caused by expansion of displacement resulting from causes such as moisture absorption.

Hungry Surface

A surface in which the binder appears deficient, or to have hardened and become rigid and which may be cracked and crazed but is otherwise sound. The surface may be porous.

Inlet

The point at which surface water enters a culvert.

Invert

The lowest point of the internal cross section of a ditch or culvert, etc.

Key Performance Indicators (KPI)

The term Key Performance Indicators is used in the manual to describe performance indicators that are selected to enforce an OPRC by verifying if the agreed Service Levels have been complied with by the contractor, without having to monitor the performance of all activities. KPIs have been selected for each Intervention and generally from the activity or activities that most affect the performance of the Intervention.

Labour Based Methods

Work methods which use a combination of equipment and labour. The combination is often chosen to achieve a balance between employment generation and productivity while remaining cost effective.

Labour Intensive Methods

Work methods which use labour wherever possible and machinery only when necessary.

Lane

The width of carriageway required to accommodate one line of traffic.

Maintenance

All works of every description which are required for the preservation and upkeep of a road or its associated works or both, so as to prevent the deterioration of quality and efficiency to a noticeable extent below that which pertained immediately after construction.

Maintenance Standards (MS)

The term Maintenance Standards is a generic term used in the manual to embrace all other terms that define when, why and how maintenance activities should be carried out.

Maintenance Performance Standards (MPS)

The RD's minimum maintenance operational standards for all defined maintenance Activities at three different Service Levels (SL). The MPS for each Activity includes a description of the maintenance intervention and the objective of doing it; the Defect(s) that necessitate the Activity, its Causes and Effects as well as defined Threshold Levels and Response Times. The methods to be used for each repair Activity, the materials, workmanship and miscellaneous other requirements are described in MOPRBW.

Maintenance Performance Indicators (MPI)

Describes the tool used to verify or evaluate compliance with set goals and objectives.

Manhole

Accessible chamber with a cover forming part of the drainage system and permitting inspection and maintenance of underground drainage pipes.

Measurement Contract

A contract where payment is made on the basis of the quantity of work completed to a technical specification.

Mitre Drain

Drain constructed at an angle to the centre line of the road to divert water from the side drains. Mitre drains include mitre banks placed across side drains.

Nominal Size

A designation of an aggregate, chosen to give an indication of the largest size particle present.

Open Sub-soil Drain

An open drain provided for the collection and removal of sub-soil water rather than surface water.

Original Ground Level

Line of natural ground.

Outfall

The point at which water discharges from a pipe or box culvert

Outlet

Channel along which water is discharged from culverts, stormwater conduits and minor bridges.

Paved Road

For the purpose of this manual a paved road is a road with a concrete surface, concrete block, bituminous surface or surface dressing.

Pavement

The upper layers of the road comprising the selected subgrade, subbase, base, shoulders and surfacing.

Pavement Distress

The deterioration of the pavement evidenced by visible surface defects.

Annex B - Glossary of term

Patching

The filling up or repair of depressions, holes, or other defective places in a carriageway with additional material to restore the surface.

Pedestrian Path

A track used for passage of pedestrians. The track may be separated from other parts of the road by road marking, kerb stone, or similar structures.

Performance Contract

A contract where payment is made when the condition of the road is at or above a defined performance standard or level of service.

Performance Specifications.

The term used for what is part of the standard bidding documents for OPRC and would typically include:

- (i) A specification of the Service Levels (Maintenance Standards) required on the roads included in the contract;
- (ii) the methods and procedures to be applied for measuring compliance with service quality levels;
- (iii) the penalties and/or payment reductions applied in case of non-compliance,
- (iv) the initial rehabilitation works and the improvement works the contractor will have to carry out in addition to the general Management and Maintenance Services and Works, and
- (v) other aspects, such as the internal organization of the contractor, etc. (Items (i) and (ii) above would be included in the MSRBW).

Periodic Maintenance

Activities that are required only at intervals of several years. need to be carried out on a road after a number of years. For example regravelling of unpaved roads or resealing of paved roads.

Pedestrian Way

A walkway permitting pedestrians to go from one place to another without passing through traffic.

Pipe Culvert

A culvert of circular cross section usually constructed in precast concrete.

Polished Surface

A sealed surface where traffic has so worn the exposed aggregate that there is insufficient frictional grip between the aggregate wearing course and the traffic tyres, especially in a wet condition.

Pothole

A hole in the surface of a pavement frequently rounded in shape, resulting from loss of pavement material, which is the initial stage may be the depth of the seal only, or in the advancing stages may result in the loss of pavement material, the subgrade and the shoulder pavement edge support.

Precoating

The coating of aggregate with a liquid to improve the rate at which it is wetted by a bituminous binder.

Premix

Premix is a paving material manufactured by mixing aggregates, filler and bitumen. Most premix is mixed and placed hot. Premix is used in the construction of wearing course, binder courses and base courses.

Prime

A low viscosity binder applied to a prepared pavement prior to the initial application of a seal.

Profile

The shape of a pavement surface or layer measured as vertical distances from some datum. Profiles may be longitudinal (parallel to the traffic flow) or transverse (at right angles to the traffic flow).

Railway Crossing

Level intersection of road and railway tracks.

Ravelling

The loosening of stones or particles forming the wearing course of a sealed pavement.

Reflection Cracking

A visible crack in the wearing course resulting from the propagation of cracks in the underlying pavement layer.

Recurrent Maintenance

Activities that are required at intervals throughout the year, but whose frequency varies with traffic. Examples include grading of unpaved roads or pothole repairs on a paved road.

Reseal

A sprayed seal applied to an existing sealed surface.

Regravelling

Adding a layer of gravel to a gravel surfaced road.

Reshaping

Heavy grading to restore the road formation.

Response Time (RT).

The term Response Time is used in the manual to describe the maximum time, from the time the deficiency was detected or reported until such time when the Contractor (or RD) must complete the described Maintenance Activity by repairing the Deficiency/Defects indicated. For periodic maintenance activities, or for routine maintenance activities that require a long time to complete, the response time is defined the maximum time from the time the deficiency/defect was detected or reported as until the Contractor or the Road Authority undertakes the execution of the intervention as set out in the applicable Maintenance Standard.

Retaining Wall

A wall built to hold back earth or other solid material.

Road Feature

The term Road (Maintenance) Feature is used to identify a physical element of the road infrastructure asset which is the subject of a maintenance Intervention/Activity, e.g. Road Feature = Road Reserve - Code 8100; Road Intervention = Road Area Maintenance - Code 8130; Road Activity = Rest Area Cleaning - Code 8131.

Road Furniture

Road or street furniture e.g. traffic sign, traffic board, traffic signal, lane marking, guardrail, street light, etc.

Road Reserve (Servitude)

The area of land reserved for the construction and maintenance of the road and for the accommodation of utility services.

Roadway

The area normally used by vehicles and consisting of one or a number of contiguous traffic lanes, including auxiliary lanes and shoulders.

Routine Maintenance

Activities that are likely to be required irrespective of the engineering characteristics of the road or the volume of traffic. Examples include grass cutting and drain cleaning.

Rutting

The vertical deformation of a pavement surface measured in a wheel path relative to a straight edge placed at right angles to the traffic flow and across the wheel path.

Annex B - Glossary of term

Sand

Natural mineral particles which will pass through a defined sieve (normally 4.75 mm or 2.36 mm sieve) and which are free of appreciable quantities of clay and silt.

Sand-asphalt

A mixture of bitumen and sand, with or without a filler.

Sand Cushioning

Laying a thin layer of sand on a hard gravel surface.

Scour Checks

The structures to prevent scouring of drains. Simple scour checks may be constructed of wood pegs or stones. All scour checks should have an apron downstream built of stones or grass turfs pinned to the ditch invert with wooden pegs.

Segregation

Separation of the coarse aggregate from the remainder of the bituminous mix.

Service Quality Standard (SQS).

The term Service Quality Standard is used at activity level to describe the desired standard of a road (maintenance) feature. A Defect on a road feature means that the required SQS is not attained.

Shoulder

(a) When the shoulder is referred to as a surface: The area between the outside edge of the carriageway and the shoulder breakpoint. (b) When shoulder is referred to as a pavement layer: The layer on top of the subbase or, in the absence of a subbase, on top of the subgrade and lying between the outside edge of the base and the shoulder breakpoint.

Shoulder Drain

A drain through the shoulder to drain the pavement and/or the subgrade.

Shoving

Lateral displacement of a pavement structure (usually bitumen bound) by braking, accelerating or turning vehicles.

Side Drain

Open longitudinal drain situated adjacent to and at the bottom of cut or fill slopes.

Slick Surface

A surface that reflects light to the extent that the motorist is aware of the condition. Droppings of oil, petrol and grease from traffic can sometimes cause these conditions.

Slope

Unless otherwise stated, slope is given in terms of the ratio of vertical difference in elevation between any two points and the horizontal distance between them.

Slurry

A road surface treatment consisting of a thin layer of a mixture of bitumen emulsion, water and fine aggregate applied to a surfacing in the form of a slurry.

Spot Improvements

Maintenance or rehabilitation activities at isolated sites along a road to provide basic access. The appearance of the road will vary along its length.

Stripping

The loss under traffic of the aggregate wearing course from a bituminous sealed pavement.

Stockpile

A heap or stack of material held in stock for future use.

Straight-run Bitumen

The bitumen obtained after the final stage of distillation of a crude petroleum.

Subbase

The layer of material of specified dimensions on top of the subgrade and below the base and shoulders.

Subgrade

The earthworks constructed on the roadbed up to the floor of the subbase or, in the absence of a subbase, up to the floor of the base and shoulders.

Subway

A structure providing passage for vehicular and/or pedestrian traffic under an existing road, railway, etc.

Superelevation

The raising of the outside level of the road on curves to reduce the effect of centrifugal forces and improve road holding quantities.

Surfacing

Top layer of the pavement. Consists of wearing course, and sometimes a base course or binder course.

Surfacing (Treatment)

The sealing or resealing of the carriageway or shoulders by means of one or more successive applications of bituminous binder or tar and crushed stone aggregate, natural gravel, river sand, crusherdust or Kalahari Sand.

Table Drain

A side-drain of a road adjacent to the shoulders, and part of the formation.

Threshold Level (TL)

The term Threshold Level (TL) describes the maximum tolerable deficiency, such as roughness, rutting and cracking on a paved road.

Tack Coat

Asphalt material to bond lower layer (asphalt material or cement) and upper layer (asphalt mixture). It is sprayed on surface of lower layer.

Technical Specification

Describes the detail (dimensions, materials, etc.) of a road, or the output of a maintenance or rehabilitation activity.

Traffic Lane

The portion of the carriageway defined by road marking for the movement of a single line of vehicles.

Transverse Joint

A joint at right angles to the road centreline.

Transverse Joint Taper

Slope or ramp of asphalt mix at the end of a freshly laid asphalt course.

Unpaved Road

For the purpose of this manual an unpaved road refers to a road with a gravel or earth/sand surface.

Upgrading

Activities to increase capacity or arise a road to a higher road type, for instance providing an improved surface to a gravel road.

Veterinary Dip

A concrete structure constructed as a drift on the carriageway or off the roadway used for animal disease control purposes.

Annex B - Glossary of term

Water Table

The level at which ground water would finally stand in an unpumped hole or depression.

Wearing Course

The part of the road surface in contact with traffic wheels.

Wing Wall

A wall at a bridge or culvert abutment to retain and protect the embankment fills behind the abutment.

Waterway

The area along a river or a stream.

Wet Grading

Removal of surface unevenness by grading a moistened surface.

LIST OF MAINTENANCE FEATURES, INTERVENTIONS AND ACTIVITIES

8100 ROAD RESERVE	8210 Bituminous Paved Roadway Routine Maintenance
8101 Scope	8211 Paved Roadway Cleaning
8110 Vegetation Control	8212 Rutting and Depression Repair
8111 Grass Cutting	8213 Pothole Patching, Edge Damage and Surface Failure Repair
8112 Creeper Grass Removal	8214 Unpaved Shoulder Maintenance
8113 Bush Clearing	8215 Crack Sealing
8114 Trees Trimming	8216 Bleeding Repair
8115 Trees Removal	8217 Salt Blisters Repair
8116 Morama Tuber Removal	8219 Other Bituminous Paved Roadway Routine Maintenance
8117 De-stumping	8220 Bituminous Paved Roadway Periodic Maintenance
8119 Other Vegetation Control	8221 Fogspray
8120 Animals Control	8222 Resealing
8121 Fence Repair	8223 Bituminous Overlay
8122 Gate Repair	8224 Unpaved Shoulder Regravelling and Edge Drop Repair
8123 Cattle Grid Repair	8225 Unpaved Shoulder Reshaping
8124 Keeping Animals off Road Reserve	8229 Other Bituminous Paved Roadway Periodic Maintenance
8125 Moles Control	8230 Concrete Paved Roadway Maintenance
8129 Other Animals Control	8231 Concrete Roadway Cleaning
8130 Rest Area Maintenance	8232 Concrete Roadway Crack Sealing
8131 Rest Area Cleaning	8233 Concrete Roadway Spalling Repair
8132 Rest Area Facilities Repair	8234 Concrete Roadway Pothole Repair
8133 Rest Area Reshaping	8235 Concrete Roadway Joint Stepping Repair
8134 Rest Area Regravelling	8236 Concrete Roadway Slab Repair
8135 Rest Area Resealing	8239 Other Concrete Paved Roadway Maintenance
8136 Rest Area Fogspray	8240 Block Paved Roadway Maintenance
8137 Rest Area Bituminous Overlay	8241 Block Paved Roadway Cleaning
8139 Other Rest Area Maintenance	8242 Block Paved Roadway Deformation Repair
8140 Litter Control and Obstacles Removal	8243 Paving Blocks Replacement
8141 Litter Collection and Removal	8244 Blocked Paved Roadway Grass Removal
8142 Obstacles Collection and Removal	8249 Other Block Paved Roadway Maintenance
8143 Dead Animals Removal	8250 Paved Footpath and Cycle Path Maintenance
8144 Abandoned Vehicles and Scrap Removal	8251 Paved Footpath and Cycle Path Cleaning
8145 Anthills Removal	8252 Paved Footpath and Cycle Path General Surface Repair
8146 Illegal Signs and Other Encroachments Removal	8259 Other Paved Footpath and Cycle Path Maintenance
8149 Other Litter Control and Obstacles Removal	8300 UNPAVED ROADWAY
8150 Slopes Maintenance	8301 Scope
8151 Slope Erosion Prevention	8310 Unpaved Roadway Routine Maintenance
8152 Slope Erosion Repair	8311 Dragging
8159 Other Slopes Maintenance	8312 Maintenance of Sand Cushioning Layer
8160 Landscaped Areas Maintenance	8313 Dry Grading
8161 Trees, Grass and Flowers Planting	8314 Unpaved Roadway Pothole Patching
8162 Trees, Grass and Flowers Watering	8315 Unpaved Roadway Erosion Runnels Repair
8163 Trees, Grass and Flowers Cutting and Trimming	8316 Dust Prevention
8164 Special Features Maintenance	8319 Other Unpaved Roadway Routine Maintenance
8165 Landscaped Areas Cleaning	8320 Unpaved Roadway Periodic Maintenance
8169 Other Landscaped Areas Maintenance	8321 Wet Grading
8200 PAVED ROADWAY	8322 Reshaping
8201 Scope	8323 Regravelling

Annex C - List of Maintenance Features, Interventions and Activities

8324	Sand Cushioning	8515	Bridge Concrete Repair
8329	Other Unpaved Roadway Periodic Maintenance	8516	Bridge Wearing Surface Maintenance
8330	Unpaved Footpath and Cycle Path Maintenance	8517	Bridge Rail, Safety Barrier and Parapet Maintenance and Minor Repairs
8331	Unpaved Footpath and Cycle Path Cleaning	8518	Bridge Steel Component Repair
8332	Unpaved Footpath and Cycle Path General Surface Repair	8519	Other Bridge Routine Maintenance
8339	Other Unpaved Footpath and Cycle Path Maintenance	8520	Bridge Periodic Maintenance
8400	DRAINAGE FACILITIES	8521	Bridge Bearings Realignment and Replacement
8401	Scope	8522	Bridge Rust Removal and Repainting
8410	Culvert Maintenance	8523	Bridge Steel Component Replacement
8411	Culvert Cleaning	8524	Bridge Inspection
8412	Culvert Headwall, Wing Wall and Marker Post Repainting	8529	Other Bridge Periodic Maintenance
8413	Culvert Headwall, Wing Wall, Inlet and Outlet Structure Repair	8530	Waterway Maintenance and Repair
8414	Culvert Repair	8531	Waterway Debris and Obstacles Removal
8415	Culvert Marker Post Reinstatement/Replacement	8532	Waterway Erosion Repair
8416	Culvert Marker Post Reflector Replacement	8533	Waterway Desilting
8419	Other Culvert Maintenance	8539	Other Waterway Maintenance and Repair
8420	Drain Maintenance	8600	MISCELLANEOUS STRUCTURES
8421	Drain Clearing, Cleaning, and Desilting	8601	Scope
8422	Unlined Drain Erosion Repair	8610	Drift, Causeway and Ferry Landing Maintenance
8423	Unlined Drain Reshaping	8611	Drift, Causeway and Ferry Landing Structure Damage Repair
8424	Drain Lining Repair	8612	Waterway Cleaning and Clearing
8425	Concrete Lining Joints Repair	8613	Unlined Drift Reshaping
8426	Concrete Lining Weep Holes Cleaning	8614	Marker/Guide Post Reinstatement/Replacement
8427	Drain Cover Repair/Replacement	8615	Marker/Guide Post Repainting
8429	Other Drain Maintenance	8616	Marker/Guide Post Reflector Replacement
8430	Catchpit, Manhole and Drainage Pipe Maintenance	8617	Grouted Stone Pitching Repair
8431	Catchpit, Manhole and Drainage Pipe Cleaning and Clearing	8619	Other Drift, Causeway and Ferry Landing Maintenance
8432	Manhole/Catchpit Cover Replacement	8620	Retaining Wall Maintenance
8433	Drainage Pipe Relaying/Replacement	8621	Retaining Wall Minor Repairs
8434	Catchpit/Manhole Repair	8622	Retaining Wall Weep Holes Cleaning
8435	Drainage Pipe Repair	8623	Retaining Wall Vegetation Clearing
8439	Other Catchpit, Manhole and Drainage Pipe Maintenance	8629	Other Retaining Wall Maintenance
8440	Erosion Protection Works Maintenance	8630	Railway Crossing Maintenance
8441	Stone Pitching Repair	8631	Railway Crossing General Repair
8442	Concrete Erosion Protection Works Repair	8639	Other Railway Crossing Maintenance
8443	Gabion Repair	8640	Veterinary Dip Maintenance
8444	Scour Check and Chute Repair	8641	Veterinary Dip General Repair
8445	Berm Maintenance	8649	Other Veterinary Dip Maintenance
8449	Other Erosion Protection Works Maintenance	8650	Subway Maintenance
8500	BRIDGES	8651	Subway General Repair
8501	Scope	8659	Other Subway Maintenance
8510	Bridge Routine Maintenance	8660	Weighbridge Area Maintenance
8511	Bridge Deck Cleaning	8661	Weighbridge Area General Repair
8512	Bridge Joints, Scupper Drains and Weep Holes Cleaning	8669	Other Weighbridge Area Maintenance
8513	Bridge Bearings Cleaning		
8514	Bridge Erosion Repair		

Annex C - List of Maintenance Features, Interventions and Activities

8700	ROAD FURNITURE, SIGNS AND TRAFFIC MARKINGS	8843	Removal of Existing Culvert
8701	Scope	8844	Repair and Replacement of Culvert
		8845	Excavation and Backfilling
8710	Road Furniture Maintenance	8846	Reinstatement of Pavement and Embankments
8711	Guardrail Maintenance	8849	Other Damaged/Washed Out Culvert Replacement
8712	Kerbstone Maintenance		
8713	Kerb Maintenance	8850	Damaged/Washed Out Miscellaneous Structures Replacement
8714	Distance Marker Maintenance	8851	Traffic Control, Safety Measures and Notification
8715	Pedestrian Railing Maintenance	8852	Construction of Diversions
8716	Street Lighting Maintenance	8853	Removal of Existing Structure
8717	Traffic Signalling Devices Maintenance	8854	Repair and Replacement of Structure
8719	Other Road Furniture Maintenance	8855	Excavation and Backfilling
		8856	Reinstatement of Pavement and Embankments
8720	Road Signs Maintenance	8859	Other Damaged/Washed Out Miscellaneous Structures Replacement
8721	Road Sign Cleaning		
8722	Road Sign Repainting	8860	Repair to Damaged Utilities Within the Road Reserve
8723	Road Sign Repairs	8861	Traffic Control, Safety Measures and Notification
8724	Road Sign Replacement	8862	Construction of Diversions
8729	Other Road Signs Maintenance	8863	Repair of Damaged Utilities Within the Road Reserve
		8864	Reinstatement of Roadway Structure
8730	Road Marking Maintenance	8869	Other Repair to Damaged Utility Within the Road Reserve
8731	Road Marking Repainting		
8732	Reflective Stud Maintenance	8890	Other Emergencies
8739	Other Road Marking Maintenance		
		8900	MISCELLANEOUS FEATURES
8740	Rumble Strips and Speed Hump Maintenance	8901	Scope
8741	Rumble Strips Maintenance		
8742	Speed Hump Maintenance	8910	Traffic Control and Safety Measures
8749	Other Rumble Strips and Speed Hump Maintenance	8911	Placement of Warning Signs Only
		8912	Lane Closure
8800	EMERGENCIES	8913	Barricading Work Area
8801	Scope	8914	Diversions
		8919	Other Traffic Control and Safety Measures
8810	Flooding and Washout Repair	8920	Procurement of Materials for Maintenance Works
8811	Traffic Control, Safety Measures and Notification	8921	Determining Materials Required
8812	Construction of Diversions	8922	Identifying Sources of Material
8813	Excavation and Removal of Unsuitable Material	8923	Procurement of Materials
8814	Reinstatement of Roadway Structure	8924	Storage of Materials
8819	Other Flooding and Washout Repair	8925	Transportation of Materials to Site
		8929	Other Procurement of Materials for Maintenance Works
8820	Land Slide Removal	8930	Process and Quality Control Testing
8821	Traffic Control, Safety Measures and Notification	8931	Process Control Testing
8822	Construction of Diversions	8932	Quality Control Testing
8823	Excavation and Removal of Material from Roadway	8939	Other Process and Quality Control Testing
8824	Reinstatement of Roadway Structure		
8829	Other Land Slide Removal	8940	Sourcing and Extraction of Borrow Materials
		8941	Investigation of Potential Borrow Area/Quarry
8830	Major Obstacles Removal	8942	Selection of the Most Suitable Borrow Area/Quarry
8831	Traffic Control, Safety Measures and Notification	8943	Opening of Borrow Pit/Quarry and Extraction of Materials
8832	Construction of Diversions	8944	Loading and Hauling Borrow Materials
8833	Removal of Major Obstacle	8945	Rehabilitation and Closure of Borrow Area/Quarry
8834	Repair Damage to Pavement	8949	Other Sourcing and Extraction of Borrow Materials
8839	Other Major Obstacles Removal		
8840	Damaged/Washed Out Culvert Replacement		
8841	Traffic Control, Safety Measures and Notification		
8842	Construction of Diversions		

Annex C - List of Maintenance Features, Interventions and Activities

8950 Tools and Equipment

- 8951 Safety and Health Tools
- 8952 Monitoring and Supervision Tools and Equipment
- 8953 Working Tools and Equipment
- 8954 Usage and Maintenance of Hand Tools
- 8955 Usage of Equipment and Vehicles
- 8956 Maintenance of Equipment and Vehicles
- 8959 Other Tools and Equipment

8960 Labour

- 8961 Recruitment of Labour
- 8962 Conditions of Work
- 8963 Safety and Health of Personnel
- 8964 Payment of Wages
- 8969 Other Labour

8970 Reporting Forms

- 8971 Resource Requirements and Cost Estimates for Maintenance Works
- 8972 Work Report and Resources Utilization
- 8979 Other Reporting forms

8990 Other Reporting Forms

