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JABATAN KERJA RAYA

JKR
SARAWAK

GUIDELINE FOR QUALITY ASSURANCE AND QUALITY CONTROL IN PROJECT IMPLEMENTATION

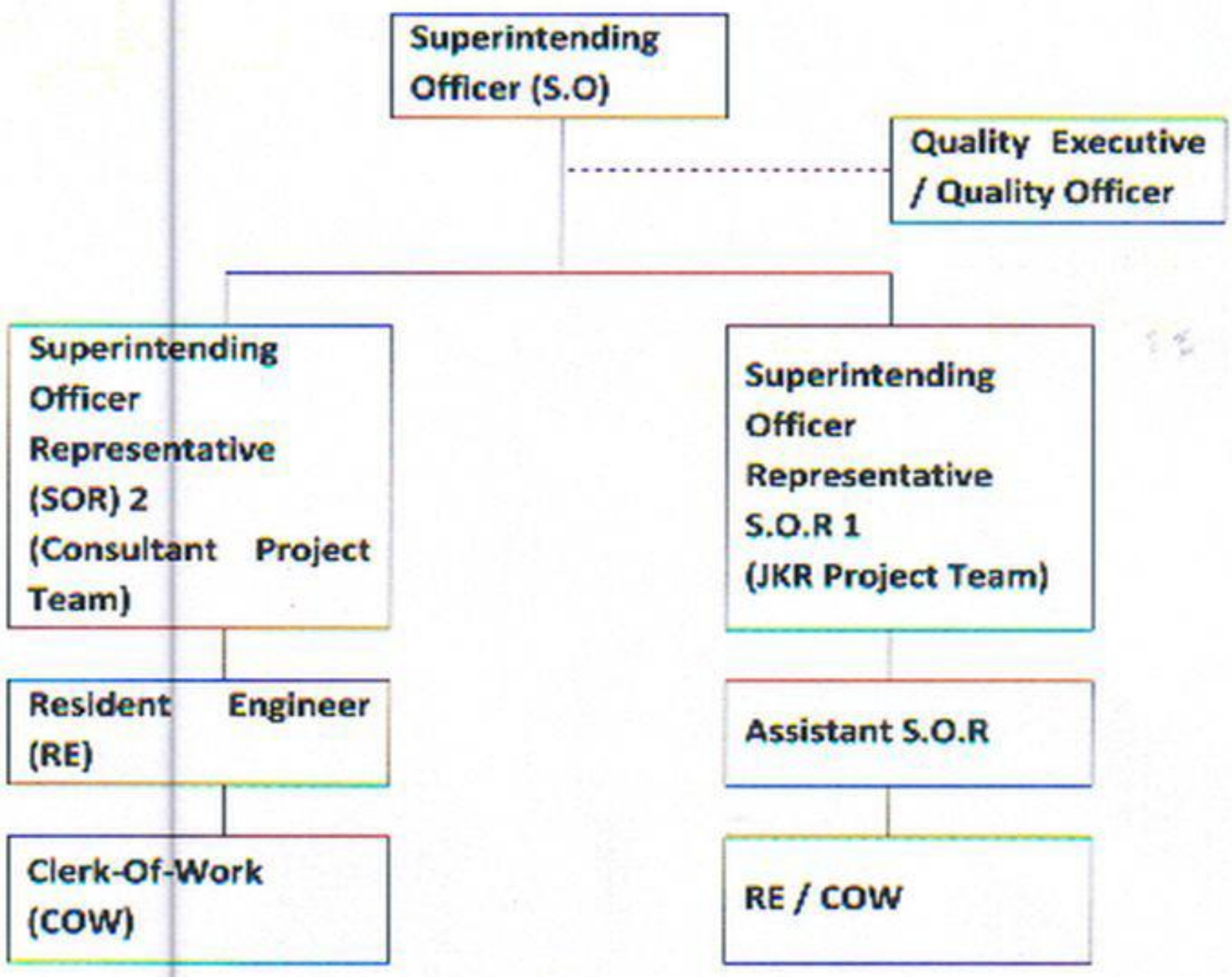
GUIDELINE ON QUALITY ASSURANCE & QUALITY CONTROL IN PROJECT IMPLEMENTATION

1.0 INTRODUCTION

A workshop session was arranged comprising of some of the experienced and competent QA/QC practitioners in JKR project implementation arm at Headquarter, Regional and Divisional level. The team's main aim was to compile all relevant, user-friendly, practical and comprehensive forms for construction materials and works inspection, processes, testing and checking purposes. Apart from that, a feasible framework and regulation is also formulized for the Department's project implementation undertaking. It shall then serve as the unanimous standards for the use of all project implementation/supervision personnel.

2.1 Organizational Structure

The diagram below depicts a typical organization structure of the supervision team based on the common construction management practice employed by JKR's Regional and Divisional offices contractually.



2.1.1 Role And Responsibility (Tabulated below)

Appointed officers and personnel in project supervision are empowered and entrusted to carry our supervision of the construction to ensure final end product is of quality according to the contract specification. It is thus, imperative that every key personnel's role are clearly spelt out, understood and embraced diligently by the appointees respectively.

Their respectively role and responsibilities are:

2.1.1.1 Superintending Officer (S.O)

- **Overall responsible for the quality of end product of the project**
- **Responsible for the QA/QA management and implementation of the project**
- **Check and endorse the Quality Assurance Plan by contractor**
- **Check the QA/QC monthly report by contractor**
- **Delegate and assign QA/QC duties and responsibilities wherever applicable**

2.1.1.2 Representative of Superintending Officer (S.O.R)

- Responsible for the quality of end product of the project
- Responsible for the QA/QA management and implementation of the project
- Assist S.O. to check and endorse the Quality Assurance Plan by contractor
- Assist S.O. to check the QA/QC monthly report by contractor
- Approval of construction materials by contractor
- Delegate and assign QA/QC duties and responsibilities wherever applicable

2.1.1.3 Quality Executive

- Ensure all projects are implemented with a Quality Assurance Plan from contractor
- Carry out random audit on project's QA/QC documentation and implementation
- Carry out checking and closure of Non Conformity report
- Report to S.O. on the status of QA/QC implementation

2.1.1.4 Assistant to Representative of Superintending Officer (A.S.O.R)/ Residence Engineer (R.E)

- Assist S.O. and S.O.R. in all duties and responsibilities with respect to QA/QC implementation at the site
- Issue Non Conformity Report to contractor in all violation of QA/QC matters
- Check and endorse approval chit by contractor
- Check all delivery of construction material to site
- Witness all trial mix and related testing prior to mix approval
- Supervise all works on site on regular basis

2.1.1.5 Clerk of Work (C.O.W)

- Inspect and check all construction material on site
- Witness all site testing and lab testing (randomly)
- Check and recommend for works to ASOR/RE
- Check and recommend for Non conformity on site
- Full time supervision of works on site

2.2 Documentation

Proper documentation ensures consistent and relevant communication of intent between the Supervision Team and contractor with respect to the contract specification requirement of the project. It will enable repeatability and traceability, objective evidence and appropriate evaluation of the conformity of the contractor's output.

2.2.1 Quality Assurance Plan (QAP)

Quality Assurance Plan is to be prepared and submitted by Contractor within two (2) weeks after the Pre-Construction meeting. The content of QAP shall have the following items:

- **Contractor Organization Chart (Role and Responsibility)**
- **QA/QC Team (Role and Responsibility)**
- **Master Work Program**
- **Resource (human, plants & machineries, etc) Utilities Plan**
- **QA/QC Plan (testing program/frequency, method of statement, Accredited Laboratory, Calibrated equipment, etc.)**
- **Forms and Checklist relevant to the project, extracted from JKR Standard QA/QC Forms/ Checklist relevant**

2.2.2 Monthly Quality Assurance/Quality Control Report

This report shall be prepared on monthly basis and submitted by contractor to the S.O. The report shall contain the following:

- **List of approval chits**
- **List of testing done**
- **All testing requests and results**
- **All Non conformity reports and its status**

2.2.3 JKR Sarawak Standard QA/QC Forms/Checklist

This is a compilation of all the necessary forms and checklist used for quality assurance and control on site for actual works done. There include forms for material testing and approval, works testing and approval, testing results form, inspection checklists and the likes. These standard records encompass all civil engineering works including concrete works, road works, foundation works, water supply works and building works (not

including architectural finishes). Where works required very specialized engineering input beyond the scope of common civil engineering works, custom-tailored forms may be used to the discretion of the S.O.

These records are the recognized mandatory standard for JKR Sarawak project which the contractor must include in their QAP and be incorporated in their construction processes. They are exhibited in the Appendix of the Manual. The standard forms/checklist are subdivided and listed below:

2.2.3.1 Quality Assurance Records

No	Description	Form Ref
1.	Site Instruction	QA / 01
2.	Site Memo	QA / 02
3.	Approval Chit	QA / 03
4.	Non-Conformance Report Status Log *(Cumulative)*	QA / 04(a)
5.	Non-Conformance Report (NCR)	QA / 04(b)
6.	Inspection Report *(Earthworks / Pavement Works / Drainage Works)*	QA / 05(a)
7.	Inspection Report *(Reinforced Concrete Works)*	QA / 05(b)
8.	Joint Inspection Report *(Post Concreting Works)*	QA / 05(c)
9.	Summary of Culvert Verification Reports	QA / 06(a)
10.	Culvert Verification Report	QA / 06(b)
11.	Summary of Micropile / Bored Pile Drilling Records	QA / 07
12.	Summarised Settlement Records – Rod Settlement Gauge *(Embankment Fill / Surcharge)*	QA / 08
13.	Surcharge Settlement Records - Surface Settlement Marker *(Summary Report)*	QA /09

14.	Asphalt Concrete Works *(Thickness and Compaction Verification / Summarised Report)*	QA / 10
15.	List of Defects / Deficiencies in Permanent Works – Cumulative Report *(Road Works/ Bridge Works)*	QA / 11
16.	Design Change Request Register	QA / 12(a)
17.	Design Change Request	QA / 12(b)

2.2.3.2 Quality Control Records

No.	Description	Form Ref
1.	Quality control tests - Summary Chart (Cumulative)	QC-1
2.	Summary of field density tests	QC-2
3.	Suitability of soil as fill material from proposed borrow pits	QC-3a
4.	Suitability of aggregates for road pavement works	QC-3b
5.	Suitability of coarse aggregates for concrete works	QC-3c
6.	Natural moisture content	QC-4
7.	Particle size distribution	QC-5a
8.	Particle size distribution graph	QC-5b
9.	Liquid limit (Casagrande method) & Plastic limit test	QC-6a
10.	Liquid limit (Cone penetrometer test) & Plastic limit test	QC-6b
11.	C. B. R. test (4-Days Soaked Test)	QC-7a
12.	C. B. R. test (4-Days Soaked Test) -Graph	QC-7b
13.	Standard compaction test	QC-8
14.	Field density test	QC-9
15.	Concrete cube test result	QC-10
16.	Summary of Concrete cube test results	QC-11
17.	Reinforced concreting report	QC-12
18.	Precast pile driving record	QC-13a
19.	Bored pile driving record	QC-13b
20.	Micro pile driving record	QC-13c
21.	Bakau piling record	QC-13d
22.	Flakiness index & Elongation index	QC-14
23.	Aggregate crushing value	QC-15
24.	Beam / Girder stressing record	QC-16
25.	Bitumen spraying rate test results	QC-17
26.	Summary of Bitumen spraying rate test results	QC-18
27.	Marshall test results	QC-19
28.	Supply & laying of ready-mix asphaltic concrete	QC-20
29.	Summary of Marshall test results	QC-21

30.	Bitumen stripping test	QC-22a
31.	Quantitative extraction of Bitumen	QC-22b
32.	Coring & In-situ compaction record	QC-23
33.	Monitoring of surcharge settlement (Surface Settlement Marker)	QC-24a
34.	Monitoring of settlement (Rod Settlement Gauge)	QC-24b
35.	Water Main Pressure and Leakage Test Report	QC-25
36.	Water Reticulation Inspection Form	QC-26
37.	Pipeline Chlorination Test	QC-27
38.	Flushing of Pipeline	QC-28

APPENDICES

JABATAN KERJA RAYA

JKR SARAWAK

Standard Quality Assurance/Quality Control Forms & Checklist For Construction Project

INTRODUCTION

This is a compilation of all the necessary forms and checklist used for quality assurance and control on site for actual works done. There include forms for material testing and approval, works testing and approval, testing results form, inspection checklists and the likes. These standard records encompass all civil engineering works including concrete works, road works, foundation works, water supply works and building works.

These records are the recognized mandatory standard for JKR Sarawak project which the contractor must include in their QAP and be incorporated in their construction processes.

1.0 Quality Assurance

Quality assurance in construction involves all those planned and systematic actions necessary to provide confidence that the facility will perform satisfactorily in service. Quality assurance in construction addresses the overall problem of obtaining the quality of the facility to be built in the most efficient, economical, and satisfactory manner possible. The list of quality records required for quality assurance are listed below:

1.1 Quality Assurance Records

No	Description	Form Ref	Related Field
1.	Site Instruction	QA / 01	Common
2.	Site Memo	QA / 02	Common
3.	Approval Chit	QA / 03	Common
4.	Non-Conformance Report Status Log *(Cumulative)*	QA / 04(a)	Common
5.	Non-Conformance Report (NCR)	QA / 04(b)	Common
6.	Inspection Report *(Earthworks / Pavement Works / Drainage Works)*	QA / 05(a)	Road/civil
7.	Inspection Report *(Reinforced Concrete Works)*	QA / 05(b)	RC
8.	Joint Inspection Report *(Port Concreting Works)*	QA / 05(c)	RC
9.	Summary of Culvert Verification Reports	QA / 06(a)	Culvert
10.	Culvert Verification Report	QA / 06(b)	Culvert
11.	Summary of Micropile / Bored Pile Drilling Records	QA / 07	Foundation
12.	Summarised Settlement Records – Rod Settlement Gauge *(Embankment Fill / Surcharge)*	QA / 08	Road/geotechnic
13.	Surcharge Settlement Records - Surface Settlement Marker *(Summary Report)*	QA / 09	Road/geotechnic
14.	Asphalt Concrete Works *(Thickness and Compaction Verification / Summarised Report)*	QA / 10	Road
15.	List of Defects / Deficiencies in Permanent Works – Cumulative Report *(Road Works/ Bridge Works)*	QA / 11	Road/bridge
16.	Design Change Request Register	QA / 12(a)	Common
17.	Design Change Request	QA / 12(b)	Common

Jabatan Kerja Raya SARAWAK

Project :

Contract No. :

SITE INSTRUCTION

From : RESIDENT ENGINEER / QUALITY ASSURANCE ENGINEER *

To : PROJECT MANAGER / CONSTRUCTION MANAGER / SITE AGENT * (Contractor)

Attn. :

S.I. No. :

Date :

S.M. Ref : (if any)

You are instructed to carry out * / omit the following work :

REMARKS :

Distribution List :-

Copy to :

- ☐ Clerk of Work (COW)
- ☐ Lab. Tech. (LT)
- ☐ Survey Tech. (ST)
- ☐ _____

Action :

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Attachment :

- ☐ TO : ...../...../..... Sketch
- ☐ TO : ...../...../..... Drawing
- ☐ TO : ...../...../..... Others (specify) _____

Method of Payment :

1. Bill of Quantities Item No. : ____ ☐
2. Rate to be agreed upon ☐
3. Dayworks ☐
4. No Additional Payment(s) ☐
5. _____ (any other) _____ ☐

Issued By :

Signature : _____
RE/ARE/QAE *

Name : _____

Date : ___/___/___

Received for Contractor;

Signature : _____
Project Manager/Construction Manager/Site Agent

Name : _____

Date : ___/___/___

* delete as appropriate

QA/02

Jabatan Kerja Raya SARAWAK	Project : Contract No. :

SITE MEMO

Ref No. : SM/	Date : / /
TO : PROJECT MANAGER / CONSTRUCTION MANAGER / SITE AGENT* (Contractor) ATTN. :	

Signature : _____
RE / ARE / QAE*

Name : _____

Distribution List :

Copy to :			Action :	
1	☐	Clerk of Works (COW)	☐	_____
2	☐	Lab. Tech. (LT)	☐	_____
3	☐	Survey Tech. (ST)	☐	_____
4	☐	_____	☐	_____

Attachment :

- ☐ TO ..... / ...../ ..... Sketch
- ☐ TO ..... / ...../ ..... Drawing
- ☐ TO ..... / ...../ ..... Others : (specify)

_____

_____

Received for Contractor :

Signature : _____
Project Manager / Construction Manager / Site Agent*

Name : _____

Date : / /

REMARKS : _____

Note : * A formal Site Instruction, signed by RE/ARE / QAE*, shall follow if contents of the Memo is of a contractual nature.

Jabatan Kerja Raya SARAWAK

Project : _____

Contract No. : _____

APPROVAL CHIT

(EARTH WORKS / PAVEMENT WORKS / DRAINAGE WORKS / BRIDGE WORKS / OTHER WORKS)*

IT NO. : _____

PART A : *(To be filled by Contractor)*

From : PROJECT MANAGER / CONSTRUCTION MANAGER / SITE AGENT * (Contractor)

To : RESIDENT ENGINEER / ASSISTANT RESIDENT ENGINEERQUALITY ASSURANCE ENGINEER *

We request for inspection and permission to proceed with the following work:

_____

_____

_____

_____

_____

_____

Submitted by :- Signature : _____

( )

Checked by :- Signature _____

Project Manager/Construction Manager/Site Agent*

Time : Date : ___ / ___ / ___

PART B : *(To be filled by Consulting Engineer/Engineer's Staff)**

Received by:- Signature : _____ Time : Date : ___ / ___ / ___

Name : _____

Comments :-

Survey & Setting Out :	Inspection of Prior Work :	Testing of Prior Work :
_____	_____	_____
Signature : _____ (Survey Technician/CO//)	Signature : _____ (Clerk of Works)	Signature : _____ (Laboratory Technician)

PART C : *(To be filled by Engineer / Quality Assurance Engineer)**

From : RESIDENT ENGINER/ASSISTENT RESIDENT ENGINEER / QUALITY ASSURANCE ENGINEER *

To : PROJECT MANAGER / CONSTRUCTION MANAGER / SITE AGENT * (Contractor)

Your request to proceed with the above mentioned work } IS APPROVED
IS NOT APPROVED

Remarks : _____

_____

_____

_____

Received for Contractor

Signature : _____

Project Manager/Construction Manager/Site Agent*

Time : Date : ___ / ___ / ___

Signature : _____

PM/RE/ARE/QAE *

Time : Date : ___ / ___ / ___

Neither the endorsement of this Form nor anything written on it is intended to convey final approval for any part of the Works, nor does it relieves the Contractor of his responsibility to comply with the quality requirements of the Works.

* delete as applicable

	Project :
Jabatan Kerja Raya SARAWAK	Contract No. :

NON-CONFORMANCE REPORT STATUS LOG (CUMULATIVE)

(Only Non-Conformances of Major Nature are identified here)

As at : ...../...../.....

NCR SERIAL NO.	DATE ISSUED	NON-CONFORMITY (Details)	CORRECTIVE ACTION		FOLLOW-UP DATE	NCR STATUS (Closed out/Pending)	NCR Closed Out Date	REMARKS
			PROPOSAL	DUE DATE				
/								
/								
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/								

* delete as appropriate

JKR SARAWAK

Project : _____

Contract No. : _____

Control of Non-Conformance Products (Major)

NON-CONFORMANCE REPORT (NCR)

Reference : S I No. _____

NCR Serial No : _____ / _____

Date of Issue : ____ / ____ / 200____

SUBJECT : _____

PART A : DETAILS OF NON-CONFORMANCE (to be completed by Engineer's / C.E's Staff)

(Refer to relevant inspection and results, if appropriate) _____

Received by :

Signature : _____

Name : _____
for Contractor

Issued by :

Signature : _____

Name : _____
PM/RE/ARE/QAE

PART B : PROPOSED CORRECTIVE ACTION (to be completed by Contractor & QAE)

1. Rework to meet Specification ☐
2. Scrap ☐
3. Repair ☐
4. Others ☐

If others, please clarify : _____

DATE CORRECTIVE ACTION TO BE COMPLETED : ____ / ____ / ____

Signature : _____

Name : _____
for Contractor

Date : ____ / ____ / ____

Accepted by :

Signature : _____

Name : _____
PM/RE/ARE/QAE

ACTION TO BE TAKEN TO PREVENT RECURRENCE : _____

DATE ACTION TO PREVENT RECURRENCE TO BE COMPLETED : ____ / ____ / ____

Signature : _____

Name : _____
for Contractor

____ / ____ / ____
Date

PART C : FOLLOW-UP, CLOSE OUT & VERIFICATION OF CORRECTIVE ACTION
(to be completed by Engineer's / C.E's Staff)

PROPOSED FOLLOW-UP DATE : ____ / ____ / ____

NCR CLOSED OUT? : YES / NO *

CLOSED OUT DATE : ____ / ____ / ____

Remarks : _____

Verified by : _____
PM/RE/ARE/QAE

* delete as applicable

Jabatan Kerja Raya SARAWAK

Project :

Contract No. :

INSPECTION REPORT

(Earth Works/Pavement Works / Drainage Works)*

Report No :

WORK / OPERATION INSPECTED	DATE & TIME	CHECKS DONE 1	2	3	4	5	6	7	8	9	10	COMMENTS (Deficiencies, Degree of Completion, Weather, others)
												Ref : Approval Ckt No
												Ref : Approval Ckt No
												Ref : Approval Ckt No
												Ref : Approval Ckt No

CHECK LIST

1. SETTING OUT
2. PRIOR WORK
3. DIMENSIONS
4. EQUIPMENT
5. LABOUR
6. MATERIALS
7. TESTING
8. COMPACTION
9. WORKMANSHIP
10. _____

CHECK MARKS

ALL AS REQUIRED	_____	O. K.
DEFICIENT	_____	X
NOT APPLICABLE	_____	-
NOT CHECKED	_____	O

Checked by

Signature : _____

Clerk of Works

Name : _____

Date : _____

_____

Date : _____

* Select as appropriate

Jabatan Kerja Raya SARAWAK

Project : _____

Contract No. : _____

INSPECTION REPORT
(Reinforced Concrete Works)

Report No : _____

Structure : _____ Element / Component* : _____ / _____ Chainage/Location * : _____

Concrete Volume : _____ Grade of Concrete : _____ / _____ Source of Supply : _____

Item	Drawing No. Ref.: ..... Work Components	Date & Time	Acceptability OK (✓)	Acceptability Not OK (X)	Ref. Approval Chit No. _____ COMMENTS (Deficiencies, Degree of Completion, Weather, Others)
1.	**SETTING OUT / POSITION** 1.1 Alignment 1.2 Lines & Levels				
2.	**FORMWORK** 2.1 Dimensions & Alignment 2.2 Rigidity & Alignment, Bracing and Working Platform 2.3 Sealing of Joints 2.4 Application of Debonding Agent 2.5 Tightness 2.6 Screeding Lines and Guides 2.7 Chamfers and Splays 2.8 Acceptability of Surface of Forms				
3	**BLINDING** 3.1 Dry 3.2 Clean 3.3 Thickness & Level				
4	**REINFORCEMENT** 4.1 Type/Bar Dia. /Length/Spacing (According to Drawing?) 4.2 Tying and Rigidity 4.3 Cover Spacers (Bottom & Sides) / Correct Cover 4.4 Cleanliness form Loose Rust, Soil, Oil 4.5 Starter Bars 4.6 Lap Lengths				
5	**INSERTS** 5.1 Shape, Number & Position				
6	**JOINTS** 6.1 Expansion Joint / Location / Cleaned & Roughered 6.2 Construction Joint / Location / Cleaned & Roughered				
7	**FALSEWORK / TEMPORARY SUPPORT** 7.1 Safety 7.2 Rigicity 7.3 Stability				
8	**GENERAL CLEANLINESS & GROUND WATER CONTROL**				
9	**ACCESS TO POUR (ncluding for Labour & Material) & SAFETY**				
10	**JUST PRIOR TO CONCRETING** 10.1 Availability of Material & Labour 10.2 Are Slump Cone & Cube Moulds Available? / Dimens on OK? 10.3 Proposed Method of Concreting / Curing Arrangements 10.4 Availability of Plant & Equipment (including vibrators) 10.5 Standby Equipment for Contingencies (including rain)				

Checked by:

Signature : _____

Clerk of Works

Signature : _____

Engineer / QAE / Asst. QAE *

* Delete as appropriate

Jabatan Kerja Raya SARAWAK

Project :

Contract No. :

JOINT INSPECTION REPORT

(Post Concreting Works)

Report No :

Structure :

Component/Element :

Location :

Date of Concreting :

Date of Inspection : (Post Concreting) - / /

(Corrective Work) - / /

Post Concreting Checks	Acceptability	Comments	Corrective Work (if any)	
			Acceptable (3)	Not Acceptable (5)
CONCRETE CURING - Curing membrane in place? - Water curing adequate?	Y / N *			
CONCRETE STRENGTH Is cube strength > minimum requirement for removal of formwork	Y / N *			
CONCRETE FINISH Shrinkage Cracks	Y / N *			
Structural Cracks	Y / N *			
Segregation	Y / N *			
Honeycombing	Y / N *			
Serious Discoloration / Blemishes due to cement grout leakage/blow holes	Y / N *			
ALIGNMENT Visual check of alignment	O. K. / Not O. K. *			
ROUGHENING (Construction Joints)	O. K. / Not O. K. *			
STARTER BAR CLEANLINESS	O. K. / Not O. K. *			
VOID FORMERS REMOVED	Y / N *			
REMOVAL OF GROUT HOSES & SPILT GROUT	Y / N *			

Remarks on Corrective Work (if any) :

Signature :

CLERK OF WORK (COW)

Name :

Date : / /

Signature :

RE/ARE / QAE / Asst. QAE *

Name :

Date : / /

* Select as appropriate

QA/06(a)

Jabtan Kerja Raya SARAWAK

Project :

Contract No :

SUMMARY OF CULVERT VERIFICATION REPORTS

As at ..../........................./.........

Culvert No.	Chainage (CH)		Culvert Size (m)		Type		Class		Length (m)		Skew Angle		Fill Height Above Crown (m)		Inlet Invert Level (m)		Outlet Invert Level (m)	
	As Design	As Built	As Design	As Built	As Design	As Built	As Design	As Built	As Design	As Built	As Design	As Built	As Design	As Built	As Design	As Built	As Design	As Built

* [illegible]

Jabtan Kerja Raya SARAWAK

Project : _____

_____

_____

Contract No. : _____

CULVERT VERIFICATION REPORT

Culvert No. : ..... *(AS IDENTIFIED IN THE DRAWINGS / NEW INCLUSION)**

CULVERT DETAILS :

Location : _____

	AS PROPOSED IN DRAWINGS	AS DECIDED AT SITE/AS CONSTRUCTED (*)
Chainage :		
Type / Size :	/	/
Length :		
Up Stream I. L. :		
Down Stream I. L. :		
Skew :		
Embankment Fill Height Above Culvert :		

* **NOTE** : For the changes made relative to the Drawing / Contract Requirement :-

Date Contractor has been instructed : ____ / ____ / ____

SITE DETAILS : (As observed status during pre-construction stage)

Foundation Condition : _____

Results of Probing : _____

Flow Condition : _____

Upstream Site Details : _____

Downstream Site Details : _____

Remarks : - Piling recured (Refer sketches attached) / Piling not required)* _____

: - _____

PILING DETAILS (as constructed) :

File Type / Size / Nos. : ____ / ____ / ____ Commencement Date : ____ / ____ / ____

Specified Load Capacity : _____ Completion Date : ____ / ____ / ____

SKETCH

[Section of Culvert showing Ground Profiles (original and as constructed), Length & Invert Levels, Embankment Fill above with Heights & Widths)

_____

Surveyor / Survey Technician / Clerk of Work

Date : ____ / ____ / ____

_____

PM/RE/ARE/QAE

Date : ____ / ____ / ____

* Select as appropriate

Jabtan Kerja Raya SARAWAK Consulting Engineer/Engineer/S.O *	Project : _____ _____ _____ Contract No. : _____

SUMMARY OF MICROPILE / BORED PILE DRILLING RECORDS

Location : _____ Serial No. : _____

No.	Pile ref. no.	Drilling/Coring platform level (A)	RL of rock level (B)	RL of toe level (C)	RL of cut-off level (D)	Total drill depth (A - C)	Soil drilling (A - B)	Rock drilling depth (B - C)	Reinforcement length (D - C) + starter extension bar	Length of permanent casing (if any)	Date drilled/cored	Date grouted or concreted	Remarks

Recorded By :

_____
(Clerk of Work)

Date : / /

Jointly Agreed By :

(1) _____
(Contractor)

Date : / /

(2) _____
(RE/ARE/OAE)

Date : / /

* select as appropriate

	Project :
Jabtan Kerja Raya SARAWAK	Contract No :

SUMMARISED SETTLEMENT RECORDS - Rod Settlement Gauge
(EMBANKMENT FILL/SURCHARGE)

For the period from ..... / ..... / 200 ..... to ..... / ..... / 200 ....

Permanent Settlement Reference Station					No.:			Reduced Level :						
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	
Reading Nos. (for the period)	Settlement Gauge Rod No	Chainage / Offset from Centreline	Date of Installation	R.L. of Original Ground (Initial) (m)	Designed Formation Level (m)	R.L. of Top of Fill (at present) (m)	R.L. of Top of Settlement Gauge (m)	Height of Settlement Gauge Rod (m)	R.L. of Original Ground (at present) (m) (h-i)	Depth of Fill (m) (g-j)	Cumulative Settlement at end of period (at present) (m) (e-k)	Cumulative Settlement at beginning of period (previous reporting) (m)	Settlement During the Period (m) (l-m)	Remarks
to		/												
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* select as appropriate

	Project :
Jabtan Kerja Raya **SARAWAK**	Contract No :

SURCHARGE SETTLEMENT RECORDS - Surface Settlement Marker
(Summary Report)

as at ...../...../20.....

PERMANENT SETTLEMENT REFERENCE STATION	NO :	REDUCED LEVEL :

Surface Settlement Marker (SSM)			Reduced Level At top of surcharge (m) (immediately after construction)	Designed formation level (m) (at centreline)	Surcharge Removal Date (proposed)	R/L at Top of SSM (m)					Settlement (m)		Remarks
Ref. No.	Chainage / Offset from centreline	Date of installation				First Reading (a)	Reading at last reporting (b)	Current Reading (c)	Reading No	Reading Date	for the period (c) - (b)	Cummulative (c) - (a)	
	/												
	/												
	/												
	/												
	/												
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	/												
	/												
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	/												
	/												
	/												
	/												
	/												
	/												
	/												

* select as appropriate

QA/10

	Project :
Jabtan Kerja Raya SARAWAK	Contract No :

ASPHALT CONCRETE WORKS

(THICKNESS & COMPACTION VERTIFICATION / SUMMARISED REPORT)

As at ..../......................../..................

CHAINAGE	ACBC 28		ACWC 20		TOTAL THICKNESS mm	REMARKS
	THICKNESS mm	COMPACTION ACHIEVED (%)	THICKNESS mm	COMPACTION ACHIEVED (%)		

* select as appropriate

Jabtan Kerja Raya SARAWAK	Project : _____ Contract No. : _____

LIST OF DEFECTS / DEFICIENCIES IN PERMANENT WORKS - CUMULATIVE REPORT

(Road Works / Bridge Works) *

As at : ...../...../.....

Item No	S.I. Ref. / Date	Chainage / Item / Element *	Description of Defect / Deficiency	Action Required	Present Status	Remarks
1						
2						
3						
etc.						

Received by :

Signature : _____

Project Manager (for Contractor)

Name : _____

Date : _____

Issued by :

Signature : _____

PM/RE/ARE/DAE

Name : _____

Date : _____

* Select as appropriate.

QA/12(a)

	Project :
Jabtan Kerja Raya SARAWAK	Contract No. :

DESIGN CHANGE REQUEST REGISTER

As at : ..../..................../..........

DCR No.	Date	Subject	Response

* select as appropriate

Jabtan Kerja Raya SARAWAK	Project : _____ Contract No. : _____

DESIGN CHANGE REQUEST

NO : _____

PART A : *(To be filled by the Contractor)*

From : **PROJECT MANAGER / CONSTRUCTION MANAGER / SITE AGENT * (Contractor)**

To : **RESIDENT ENGINEER / ASSISTANT RESIDENT ENGINEER/QUALITY ASSURANCE ENGINEER ***

Subject :

Drawing Ref. No. :

We Hereby request for the following design change :

_____

_____

_____

_____

Submitted by :

Signature : _____

Name : _____

( )

Checked by :

Signature : _____

Name : _____

* Project Manager/Construction Manager/Site Agent *

Date : ____ / ____ / ____

PART B : *(To be filled by Engineer / QAE) **

From : **RESIDNENT ENGINEER / ASSISTANT RESIDENT ENGINEER/QUALITY ASSURANCE ENGINEER ***

To : **PROJECT MANAGER/CONSTRUCTION MANAGER/SITE AGENT* (CONTRACTOR)**

Your request for the above design change **IS APPROVED** / **IS NOT APPROVED** *

Remarks : _____

_____

_____

_____

Received for Contractor :

Signature : _____

* Project Manager/Construction Manager/Site Agent *

Date : ____ / ____ / ____

Signature : _____

PWR/ARE/QAE

Date : ____ / ____ / ____

cc to : Engineer under the Contract (Main Head Office) : JKR : _____

* select as appropriate

2.0 Quality Control

Quality control in construction typically involves insuring compliance with minimum standards of material and workmanship in order to insure the performance of the facility according to the design. These minimum standards are contained in the specifications. For the purpose of insuring compliance, random samples or statistical methods are commonly used as the basis for accepting or rejecting work completed and batches of materials. Rejection of a batch is based on non-conformance or violation of the relevant design specifications. Quality records for this quality control practice are listed in the following:

2.1 Quality Control Records

No.	Description	Form Ref	Related Field
1.	Quality control tests - Summary Chart (Cumulative)	QC-1	Road
2.	Summary of field density tests	QC-2	Road
3.	Suitability of soil as fill material from proposed borrow pits	QC-3a	Road/civil
4.	Suitability of aggregates for road pavement works	QC-3b	Road
5.	Suitability of coarse aggregates for concrete works	QC-3c	RC
6.	Natural moisture content	QC-4	Road/geotechnic
7.	Particle size distribution	QC-5a	Road/geotechnic
8.	Particle size distribution graph	QC-5b	Road/geotechnic
9.	Liquid limit (Casagrande method) & Plastic limit test	QC-6a	Road/geotechnic
10.	Liquid limit (Cone penetrometer test) & Plastic limit test	QC-6b	Road/geotechnic
11.	C. B. R. test (4-Days Soaked Test)	QC-7a	Road/geotechnic
12.	C. B. R. test (4-Days Soaked Test) -Graph	QC-7b	Road/geotechnic
13.	Standard compaction test	QC-8	Road/geotechnic
14.	Field density test	QC-9	Road/geotechnic
15.	Concrete cube test result	QC-10	RC
16.	Summary of Concrete cube test results	QC-11	RC
17.	Reinforced concreting report	QC-12	RC
18.	Precast pile driving record	QC-13a	Foundation
19.	Bored pile driving record	QC-13b	Foundation
20.	Micro pile driving record	QC-13c	Foundation
21.	Bakau piling record	QC-13d	Foundation
22.	Flakiness index & Elongation index	QC-14	Road
23.	Aggregate crushing value	QC-15	Road
24.	Beam / Girder stressing record	QC-16	Bridge
25.	Bitumen spraying rate test results	QC-17	Road
26.	Summary of Bitumen spraying rate test results	QC-18	Road
27.	Marshall test results	QC-19	Road
28.	Supply & laying of ready-mix asphaltic concrete	QC-20	Road

Continued....

No.	Description	Form Ref	Related Field
29.	Summary of Marshall test results	QC-21	Road
30.	Bitumen stripping test	QC-22a	Road
31.	Quantitative extraction of Bitumen	QC-22b	Road
32.	Coring & In-situ compaction record	QC-23	Road
33.	Monitoring of surcharge setdement (Surface Settlement Marker)	QC-24a	Road/goetechnic
34.	Monitoring of settlement (Rod Settlement Gauge)	QC-24b	Road/geotechnic
35.	Water Main Pressure and Leakage Test Report	QC-25	Water
36.	Water Reticulation Inspection Form	QC-26	Water
37.	Pipeline Chlorination Test	QC-27	Water
38.	Flushing of Pipeline	QC-28	Water
39.	Quality Control checklist For Architectural Works	QC-29	Building/ Architectural

Jabtan Kerja Raya SARAWAK

Project :

Contract No. :

QUALITY CONTROL TESTS - SUMMARY CHART (Cumulative)

The Quality Control Tests carried out in the Material Selection and During Construction Stage

Up to : / / 200

Page No. : ____ of ____

Item of Work	TEST		CHAINAGE (m)															
			0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	etc....
Asphaltic Wearing Course	Marshall Test	(prod. & laying stages)																
	Laboratory Test	(prod. & laying stages)																
	Compacted Density	(core sample)																
	Thickness	(core sample)																
Asphaltic Binder Course	Marshall Test	(prod. Stage)																
	Laboratory Test	(prod. Stage)																
	Compacted Density	(core sample)																
	Thickness	(core sample)																
Road Base	Gradation																	
	P.I.																	
	Agg. Crushing Value																	
	Flakiness Index																	
	CBR - 4 Days Soaked Test																	
	B.S. 1377 Compaction Test																	
	Field Density	- Top Layer ( )																
	Field Density	- Bottom Layer (150mm)																
Sub Base	Gradation																	
	L.L./P.I.																	
	Agg. Crushing Value																	
	CBR - 4 Days Soaked Test																	
	B.S. 1377 Compaction Test																	
	Field Density	- Top Layer ( )																
	Field Density	- Bottom Layer (150mm)																
Top 300mm Subgrade	Gradation																	
	L.L./P.I.																	
	CBR - 4 Days Soaked Test																	
	B.S. 1377 Compaction Test																	
	Field Density	- Top Layer (150mm)																
	Field Density	- Bottom Layer (150mm)																
			← Identify Cut and Fill Areas along the Chainage →															
Embankment Fill Below Top 300mm	Gradation																	
	L.L./P.I.																	
	CBR - 4 Days Soaked Test																	
	B.S. 1377 Compaction Test																	
	.... Etc.																	
	Field Density	1200 ..... (etc.)																
	Field Density	900 - 1200mm																
	Field Density	600 - 900mm																
	Field Density	300 - 600mm																
	Field Density	0 - 300mm																
Shoulders	L.L./P.I.																	
	CBR - 4 Days Soaked Test																	
	B.S. 1377 Compaction Test																	
	Field Density																	

* delete as appropriate

NOTES : 1. P.I. - Indicates the test has been carried out. The nearest location reference for approximate chainage where the test has been performed [A - up to previous month : 0 - current month]

2. L.L./P.I. - Liquid Limit / Plasticity Index

3. First Layer of Embankment fill is referred to as 0-300mm (existing ground taken as Datum 0)

	Project :
Jabtan Kerja Raya SARAWAK	Contract No. :

SUMMARY OF FIELD DENSITY TESTS (Covering Period : from ...../...../..... to ...../...../..... 20 ...)

(..... Works)

Page No. : of

From St. Compaction Test			Test No.	Date	Chainage	Offset from Centre (m)	# Layer Reference	Field Density			M.C. Achieved (%)	Passed / Failed (1st Test)	Test Passing (Re-Test)					Remarks
Sample No.	MDD (Mg/m³)	OMC %						Mg/m³	% of MDD				Test No.	Date	Field Density		M.C. Achieved (%)	
									Achieved	Target					Mg/m³	% of MDD		
			FDT/										FDT/					
			FDT/										FDT/					
			FDT/										FDT/					
			FDT/										FDT/					
			FDT/										FDT/					
			FDT/										FDT/					
			FDT/										FDT/					
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			FDT/										FDT/					
			FDT/										FDT/					
			FDT/										FDT/					
			FDT/										FDT/					

* select as appropriate

Notes : 1. # - Identify the layers as (0-300), (300-600), etc. First layer of 'Embankment Fill' is referred to as 0-300mm (existing ground taken as Datum=0)

2. M.D.D. - Maximum Dry Density

3. O.M.C. - Optimum Moisture Content

Jabtan Kerja Raya SARAWAK	Project : _____ Contract No. : _____

SUITABILITY OF COARSE AGGREGATES FOR CONCRETE WORKS

SUMMARIZED REPORT UP TO ...../...../20 .....

(Cumulative Report)

Sample No.	Source / Location*	Stockpile No.	Material Classification	Gradation (.....mm single size)	Elongation Index	Flakiness Index	Water Absorption	Clay, Silt and Dust	Organic Impurities	Aggregate Crushing Value	Soundness Test (Sodium Sulphate)	Chloride Content	Sulphate Content	Remarks
				Acceptability (OK / Not OK)	Result (OK / Not OK)	Result (OK / Not OK)	Result (OK / Not OK)	Result (OK / Not OK)	Result (OK / Not OK)	Result (OK / Not OK)	Result (OK / Not OK)	Result (OK / Not OK)	Result (OK / Not OK)	

* select as appropriate

Specification Requirements	Table 9.1 of SSRW	30%	25%	1.5%	2%	0.4%	20%	12%	0.06%	0.4%

Note : Identify those tests performed during the month of reporting with a (**) in the respective columns

Jabatan Kerja Raya SARAWAK	Project : _____ _____ Contract No. :

SUITABILITY OF AGGREGATES FOR ROAD PAVEMENT WORKS

(Sub Base / Road Base Works) *

SUMMARIZED REPORT UP TO ...../...../20 .....

(Cumulative Report)

Sample No.	Source	Stock Pile No./ Chainage*	Material Classification	Gradation		Liquid Limit	Plasticity Index	MDD (Mg/m³)	OMC (%)	Soaked CBR (%)	Flakiness Index	Aggregate Crushing Value	Sodium Sulphate	Remarks
				Zone/ Type*	Acceptability OK / Not Ok	Result OK / Not Ok	Result OK / Not Ok			Result OK / Not Ok	Result OK / Not Ok	Result OK / Not Ok	Result OK / Not Ok	

* select as appropriate

Specification Requirements	Subbase	Table 4.1 of SSRW	20%	6		30	N / A	35	N / A
	Roadbase	Table 4.12d SSRW	N / A	6		50	30	30	12%

Note : Identify those tests performed during the month of reporting with a [**] in the respective column(s)

QC-3c

	Project :
Jabtan Kerja Raya SARAWAK	Contract No. :

SUITABILITY OF SOIL AS FILL MATERIAL FROM PROPOSED BORROW PITS
(Embankment / Subgrade Works) *

SUMMARISED REPORT UP TO : .... / .... / 20 ......

(Cumulative Report)

Page No : ____ of

Sample No.	Borrow Pit No. / Depth / Chainage*	Soil Classification	Natural M. C. (%)	Gradation (%)			Liquid Limit (%)	Plasticity Index	MDD (Mg/m³)	OMC (%)	CBR (4-Days Soaked) (%)	Remarks
				Gravel	Sand	Silt & Clay						

* select as appropriate

Notes :
1. Sample numbers identified with (#) in column - 1 refers to samples taken from the top 300mm Subgrade of cut formation.
2. Identify those tests performed during the month of reporting with a (**) in the respective column.

Jabtan Kerja Raya SARAWAK	Project : _____ Contract No. : _____

NATURAL MOISTURE CONTENT

Sample Location (Chainage / Borrow Pit No.)* :								
Date of Test								
Sample No.								
Specimen No.								
Container No.								
Mass of Wet Soil + Container	W2 (g)							
Mass of Dry Soil + Container	W3 (g)							
Mass of Moisture	W2 - W3 (g)							
Mass of Container	W1 (g)							
Mass of Dry Soil	W3 - W1 (g)							
MOISTURE CONTENT	$w_c = \frac{W2 - W3}{W3 - W1} \times 100\ (\%)$							
Avg. MOISTURE CONTENT	w (%)							

Sample Location (Chainage / Borrow Pit No.)* :								
Date of Test								
Sample No.								
Specimen No.								
Container No.								
Mass of Wet Soil + Container	W2 (g)							
Mass of Dry Soil + Container	W3 (g)							
Mass of Moisture	W2 - W3 (g)							
Mass of Container	W1 (g)							
Mass of Dry Soil	W3 - W1 (g)							
MOISTURE CONTENT	$w_c = \frac{W2 - W3}{W3 - W1} \times 100\ (\%)$							
Avg. MOISTURE CONTENT	w (%)							

Sample Location (Chainage / Borrow Pit No.)* :								
Date of Test								
Sample No.								
Specimen No.								
Container No.								
Mass of Wet Soil + Container	W2 (g)							
Mass of Dry Soil + Container	W3 (g)							
Mass of Moisture	W2 - W3 (g)							
Mass of Container	W1 (g)							
Mass of Dry Soil	W3 - W1 (g)							
MOISTURE CONTENT	$w_c = \frac{W2 - W3}{W3 - W1} \times 100\ (\%)$							
Avg. MOISTURE CONTENT	w (%)							

Tested by : _____

(_____)

Date : _____ / _____ / _____

Witnessed by : _____

(_____)

Date : _____ / _____ / _____

* Delete as appropriate

QC-5a

Jabtan Kerja Raya SARAWAK	Project : _____ Contract No. : _____

PARTICLE SIZE DISTRIBUTION

- SIEVE ANALYSIS (Dry / Wet Sieving Method)*
BS 1377 Part 2 : 1990 (Cl. 9.2, 9.3)

Date of Test : ___ / ___ / ___

Test No. :

Material Tested For : _____ Road Section : _____

SA/ _____ / (sample ref. no.)

Sample Location (Chainage / Depth / Borrow Pit No. / Stock Pile No) * : _____

Soil Description : _____

Sample Ref. No : _____

Sample Preparation : (air dried / oven dried / other)*

Envelope : (Zone / Type)*

B. S. Sieve	Mass Retained (g)	(%) Retained	(%) Passing	Specified Limits (%)
75.0 mm				
63.0 mm				
50.0 mm				
37.5 mm				
28.0 mm				
25.0 mm				
20.0 mm				
14.0 mm				
12.5 mm				
10.0 mm				
9.5 mm				
8.3 mm				
5.0 mm				
4.75 mm				
3.35 mm				
2.36 mm				
2.00 mm				
1.18 mm				
600 µm				
425 µm				
300 µm				
212 µm				
150 µm				
75 µm				
63 µm				
Pan				

Total		

Weight of specimen before dry / wet * sieving	: _____ g	Soil Constituent :-	Gravel _____ %
Weight of specimen after dry / wet * sieving	: _____ g		Sand _____ %
Weight of silt and clay	: _____ g		Silt & Clay _____ %

Tested & Witnessed By : 1. _____ ( ) : 2. _____ ( )

Remarks :

Signature : _____

Name : _____

Laboratory Technician

Date : ___ / ___ / ___

* Select as appropriate

	Project :
Jabtan Kerja Raya SARAWAK	Contract No. :

PARTICLE SIZE DISTRIBUTION GRAPH

SIEVE ANALYSIS (Wet / Dry Sieving Method) *

BS 1377 : Part 2 : 1990 *(Cl 9.2, 9.3)*

Material Tested For : Road Section :

Sample Location (*Chainage / Depth / Borrow Pit No. / Stock Pile No.*) :

Soil Description :

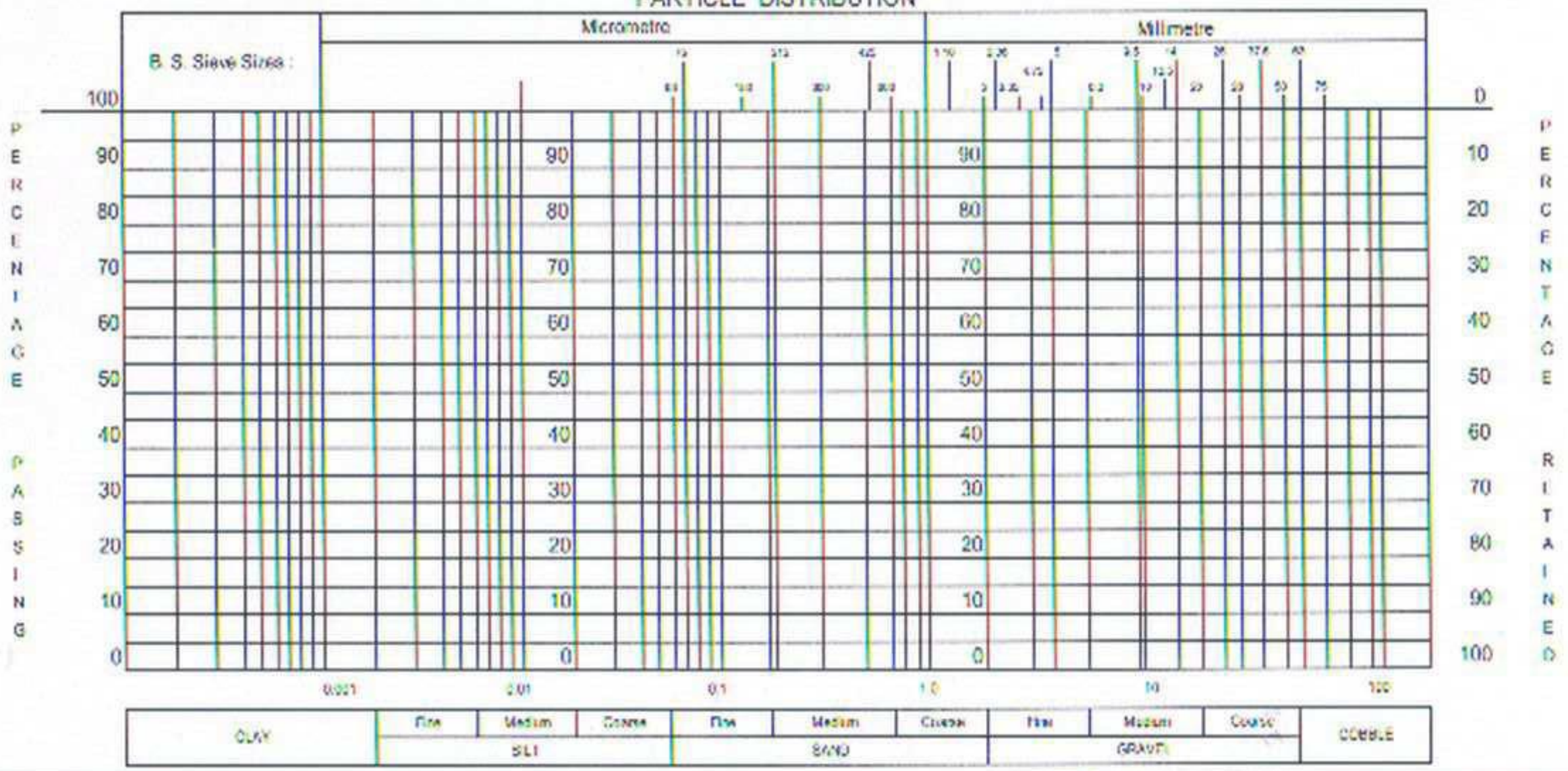
Date of Test : / /

Test No. : SA / / (sample ref. no.)

Sample Ref. No. :

Envelope (Zone / Type) * :

PARTICLE DISTRIBUTION



Soil Consist of :

GRAVEL : %

SAND : %

SILT & CLAY : %

Tested and Witnessed By :

1 : 2 :

( ) ( )

Signature :

Name :

Laboratory Technician

Date : / /

* Delete as appropriate

Jabtan Kerja Raya SARAWAK

Project : _____

Contract No. : _____

LIQUID LIMIT (*CASAGRANDE METHOD*) & PLASTIC LIMIT TEST

BS 1377 : Part 2 : 1990 *(Cl. 4.5)*

Date of Test : ___ / ___ / ___

Material Tested For : _____ Road Section : _____

Test No. : LL/PI _____ (sample ref. no.)

Sample Location (Chainage / Depth / Borrow Pit No. / Stock Pile No.) * : _____

Soil Description : _____

Sample Ref. No : _____

Plastic

Specimen No.			1	2	3
Container No.					
Mass of Wet Soil + Container	(w2)	g			
Mass of Dry Soil + Container	(w3)	g			
Mass of Container	(w1)	g			
Mass of Dry Soil	(w3 - w1)	g			
Mass of Moisture	(w2 - w3)	g			
Moisture Content	$\frac{(w2 - w3)}{(w3 - w1)} \times 100$	%			
Average MOISTURE CONTENT		%			

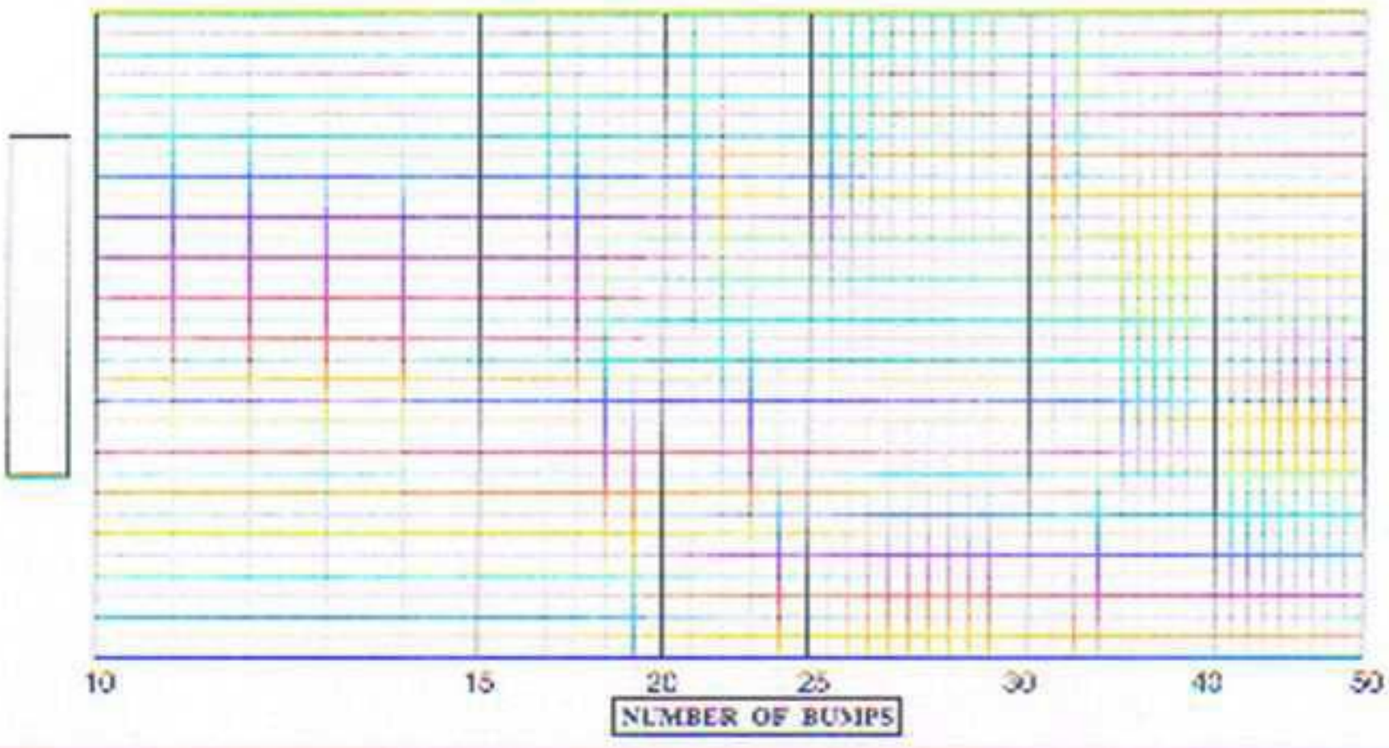
SPECIFICATION LIMITS :-

L.L. - _____ %

P.I. - _____

Liquid

Specimen No.			4	5	6	7	8
Number of Bumps							
Container No.							
Mass of Wet Soil + Container	(m2)	g					
Mass of Dry Soil + Container	(m3)	g					
Mass of Container	(m1)	g					
Mass of Dry Soil	(m3 - m1)	g					
Mass of Moisture	(m2 - m3)	g					
MOISTURE CONTENT	$\frac{(w2 - m3)}{(w3 - m1)} \times 100$	%					



Sample Preparation
(Delete / Identify as appropriate)

As received

Air Dried at _____ °C

Oven Dried at _____ °C

Washed on 63 µm sieve

Proportion passing 63 µm sieve

_____ %

Test Results

LL	%
PL	%
PI	

Remarks : _____

Tested by : _____

( )

Witnessed by : _____

( )

Signature : _____

Name : _____

Laboratory Technician

Date : ___ / ___ / ___

* Delete as appropriate

QC-6b

Jabtan Kerja Raya SARAWAK	Project : _____
	Contract No : _____

LIQUID LIMIT *(CONE PENETROMETER TEST)* & PLASTIC LIMIT TEST

B. S 1377 : Part 2 : 1990

Material Tested For : _____	Date of Test : ____ / ____ / ____
Road Section : _____	Test No. : LL/PI /(semoxie ref. no.)
Sample Location (Chainage / Depth / Borrow Pit No. / Stock Pile No) * : _____	
Soil Description : _____	Sample Ref. No : _____

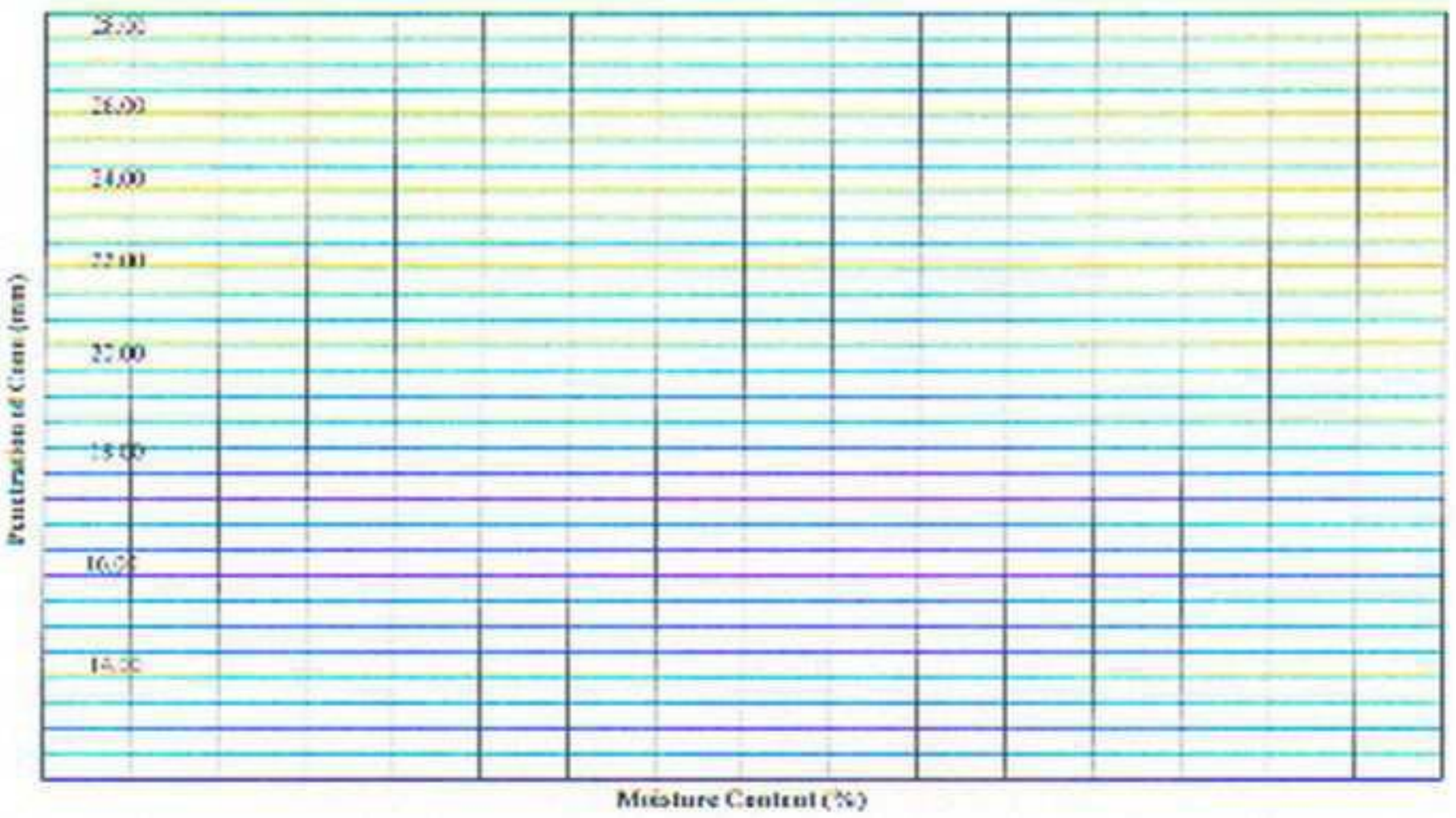
PLASTIC LIMIT -

			Specimen No.	1	2	3	4
			Container No.				
Mass of Wet Soil + Container	(w2)	g					
Mass of Dry Soil + Container	(w3)	g					
Mass of Container	(w1)	g					
Mass of Moisture	(w3 - w1)	g					
Mass of Dry Soil	[(w2 - w3) / (w3 - w1)] x 100	g					
Moisture Content		%					
AVERAGE MOISTURE CONTENT		%					

LIQUID LIMIT -

			Specimen No.	5	6	7	8
Initial dial gauge reading		mm					
Final dial gauge reading		mm					
Cone Penetration		mm					
Average Penetration		mm					
			Container No.				
Mass of Wet Soil + Container	(m2)	g					
Mass of Dry Soil + Container	(m3)	g					
Mass of Container	(m1)	g					
Mass of Moisture	(m2 - m3)	g					
Mass of Dry Soil	(m3 - m1)	g					
Moisture Content	(m2 - m3) / (m3 - m1) x 100	%					

LIQUID LIMIT	:	%	Specification Limits :-
PLASTIC LIMIT	:	%	L. L. :
PLASTICITY INDEX	:		P. I. :



Sample Preparation

(Delete / Identify as appropriate)

As received

Air Dried at _____ °C

Oven Dried at : _____ °C

Washed on 425 µm sieve : _____

Proportion retained on 425 µm sieve : _____ %

Tested & Attested by :

1. _____
( )

2. _____
( )

Signature : _____

Name : _____
Laboratory Technician

Date : ____ / ____ / ____

* Delete as Applicable

Contractor / Turnkey Contractor * :	Project : .....
Jabatan Kerja Raya SARAWAK Consulting Engineer/Engineer/S.O *	Contract No. : .....

C. B. R. TEST (4-Days Soaked Test)

BS 1377 : Part 4 : 1990 (Cl. 7.2 (method-3) 7.3, 7.4, 7.5 & 7.6)

Date of Test : ___ / ___ / ___

Material Tested For : _____ Road Section : _____

Test No. : CBR/ ____ (sample ref. no.)

Sample Location (Chainage / Offset / Depth / Borrow Pit No. / Stock Pile No.) * : _____

Soil Description : _____

Sample Ref. No : _____

SPECIMEN PREPARATION : 4.5 kg Rammer Method (Manual / Mechanical) / Vibrating Hammer Method*

* Target moisture content : _____ % (as certified previously in Test No. _____)

* Compaction effort : No. of Blows / layer = _____ (as certified previously in Test No. _____)

No. of layers = _____

Result of BS Compaction Test :

(Using CBR mould with 62 nos. of blows/layer)

M.D.D. : _____ Mg/m³

O.M.C. : _____ %

BEFORE SOAKING

DENSITY			Mould No.	MOISTURE CONTENT		Container No.	Top face		Bottom face	
Mass of Mould + Base + Compacted Soil	(m_2)	g		Mass of Wet Soil + Container	(w_2)	g				
Mass of Mould + Base	(m_1)	g		Mass of Dry Soil + Container	(w_3)	g				
Mass of Compacted Soil	$(m_2 - m_1)$	g		Mass of Container	(w_1)	g				
Volume of (CBR) Mould	(v)	cm³		Mass of Moisture	$(w_2 - w_3)$	g				
Bulk Density of Soil	$[\rho = (m_2 - m_1) / v]$	Mg/m³		Mass of Dry Soil	$(w_3 - w_1)$	g				
Av. Moisture Content	(w)	%		Moisture Content	$[(w_2 - w_3) / (w_3 - w_1)] \times 100$	%				
Dry Density of Soil	$[\rho d = 100 \rho / (100 + w)]$	Mg/m³		Av. Moisture Content		%				

4- DAYS SOAKED CBR TEST :

Proving Ring Constant : _____ kN/Div

Penetration of plunger (mm)	Gauge Reading (Div)		Force on Plunger (kN)	
	Top	Bottom	Top	Bottom
0				
0.25				
0.50				
0.75				
1.00				
1.25				
1.50				
1.75				
2.00				
2.25				
2.50				
2.75				
3.00				
3.25				
3.50				
3.75				

Penetration of plunger (mm)	Gauge Reading (Div)		Force on Plunger (kN)	
	Top	Bottom	Top	Bottom
4.00				
4.25				
4.50				
4.75				
5.00				
5.25				
5.50				
5.75				
6.00				
6.25				
6.50				
6.75				
7.00				
7.25				
7.50				

Dry Density of the specimen _____ (Mg/m³)

Specimen compacted to : _____ % of

MDD of sample

From the graph

(after correction if appropriate)

CBR Values at penetrations of :

	2.5 mm	5.0 mm
Top face (%)		
Bottom face (%)		

Accepted CBR Value : _____ %

EXPANSION & ABSORPTION DETERMINATION :

Surcharge (if applied)			kg
Gauge reading before soaking	:		mm
Gauge reading after soaking	:		mm
Final swell	:		mm
Mass of Mould + Base + Specimen (before soaking)	m_2	:	g
Mass of Mould + Base + Specimen (after soaking)	m_4	:	g
Mass of Water Absorption	$(m_4 - m_2)$	:	g (%)

Remark : _____

Tested & Witnessed by

1. _____ ; 2. _____

( ) ( )

Signature : _____

Name : _____

Laboratory Technician

Date : ___ / ___ / ___

* Select as appropriate

QC-7b

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No. : .....

C. B. R. TEST (4-Days Soaked Test) - *Graph*

BS 1377 : Part 4 : 1990 (Cl. 7.2 (method 3) 7.3, 7.4, 7.5 & 7.6)

Date of Test : ___ / ___ / ___

Material Tested For : _____ / Road Section : _____

Test No. : CBR/ ____ /(sample ref. no.)

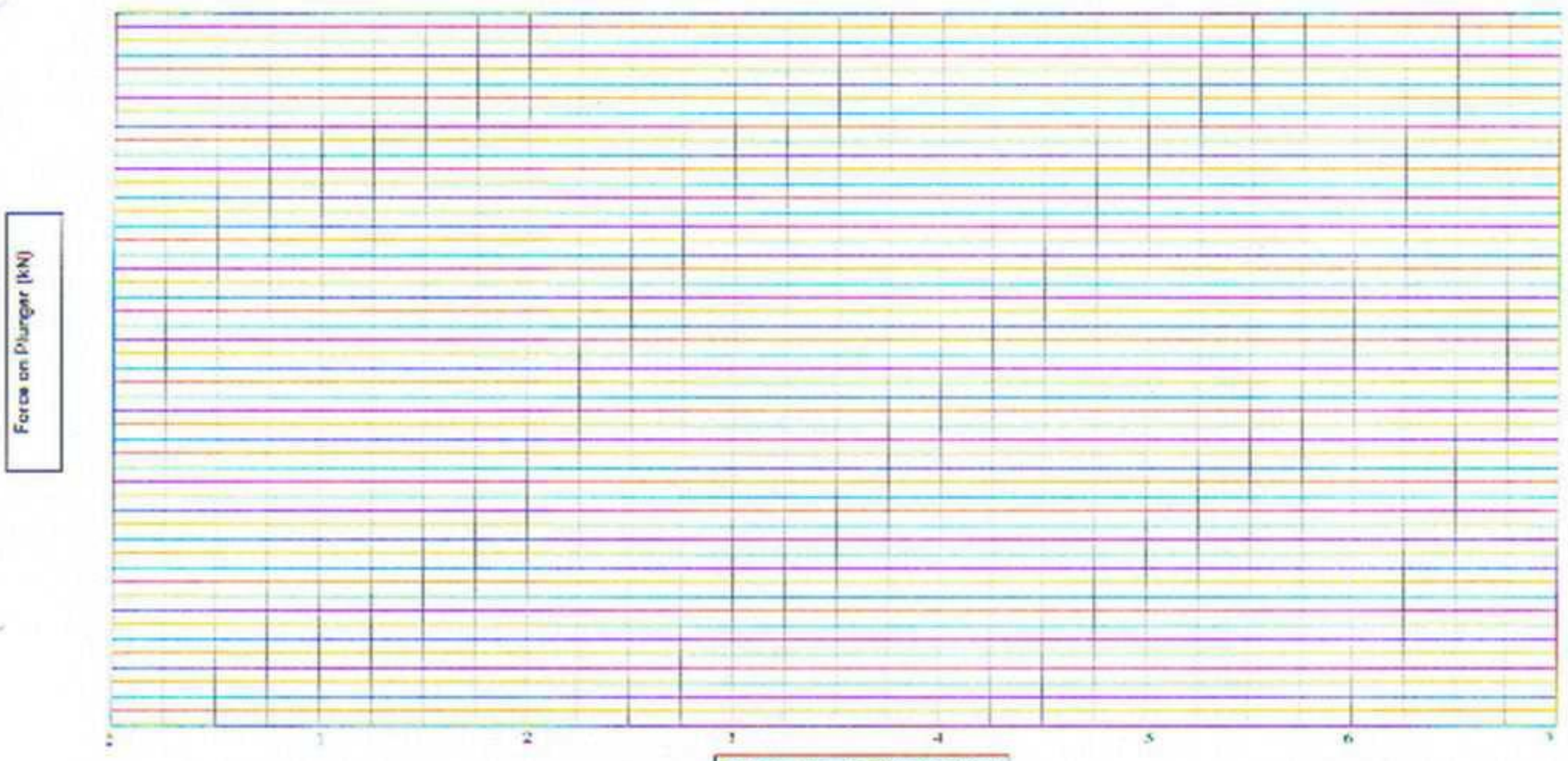
Sample Location (Chainage / Offset / Depth / Borrow Pit No. / Stock Pile No.) * : _____

Soil Description : _____

Sample Ref. No : _____

Dry Density of the Specimen : _____ Mg/m³ ; _____ % of M.D.D. of sample) Moisture Content of the Specimen : _____ %

TEST RESULT CURVES OF TOP & BOTTOM FACES OF SPECIMEN



Calculations : (after corrections if appropriate)	Penetration of plunger	Top Face			Bottom Face		
		Force (kN)	Std. Force (kN) (100% CBR)	CBR Value	Force (kN)	Std. Force (kN) (100% CBR)	CBR Value
	2.5 mm		13.2	(/13.2) x 100 = %		13.2	(/13.2) x 100 = %
	5.0 mm		20	(/20.0) x 100 = %		20	(/20.0) x 100 = %

Remarks : _____

Tested By : _____ ( )

Witnessed By : _____ ( )

Signature : _____

Name : _____ Laboratory Technician

Date : ___ / ___ / ___

* Delete as appropriate

QC-8

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK Consulting Engineer/Engineer/S.O *	Contract No. : .....

STANDARD COMPACTION TEST

BS 1377 : Part 4 : 1990 (Cl. 3.6 & 3.5 - 4.5kg Rammer Method/Cl. 3.7 - Vibrating Hammer Method)*

Date of Test : ___ / ___ / ___

Material Tested For : _____ / Road Section : _____

Test No.: MDD/ ___ /(sample ref. no.)

Sample Location (Chainage / Borrow Pit No. / Depth / Stock Pile No.) * : _____

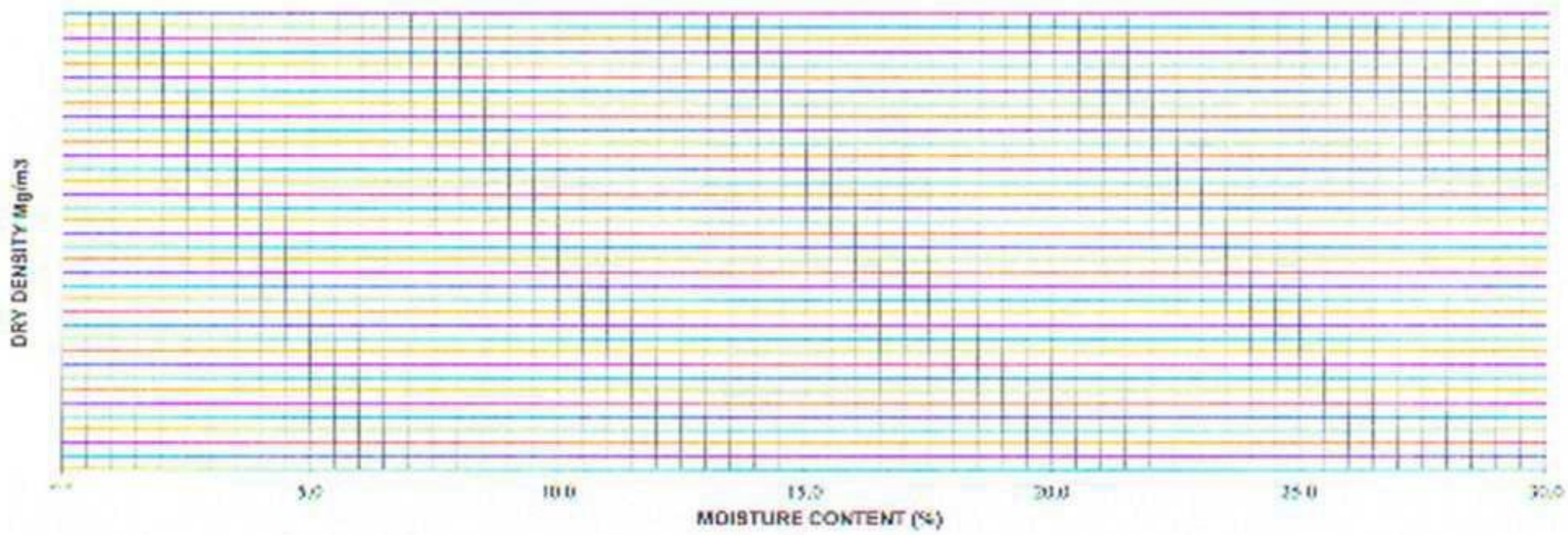
Soil Description : _____

Sample Ref. No : _____

Specimen No.	1	2	3	4	5
DENSITY :					
Amount of Water Added — ml					
Mass of Mould + Base + Compacted Soil — (m_2) — g					
Mass of Mould + Base — (m_1) — g					
Mass of Compacted Soil — $(m_2 - m_1)$ — g					
Volume of Mould (1.0 litre / CBR)* — (V) — cm^3					
BULK DENSITY OF SOIL — $(P = (m_2 - m_1) / V)$ — Mg/m^3					

MOISTURE CONTENT :

Container No.							
Mass of Wet Soil + Container — (w_2) — g							
Mass of Dry Soil + Container — (w_3) — g							
Mass of Moisture — $(w_2 - w_3)$ — g							
Mass of Container — (w_1) — g							
Mass of Dry Soil — $(w_3 - w_1)$ — g							
Moisture Content — $\frac{(w_2 - w_3) \times 100}{(w_3 - w_1)}$ — %							
Average MOISTURE CONTENT — (w) — %							
DRY DENSITY OF SOIL — $(Pd = 100\ P/(100 + w))$ — Mg/m^3							



SPECIMEN PREPARATION :

No. of blows / layer = _____ ; No. of layers = _____

Initial sample mass = _____

Mass retained on (20mm / 37.5mm) * sieve = _____ g (_____ %)

MAX. DRY DENSITY (MDD) = _____ Mg/m^3

OPTIMUM MOISTURE CONTENT (OMC) = _____ %

Remarks : _____

Tested by : _____ ( )

Witnessed by : _____ ( )

Signature : _____

Name : _____

Laboratory Technician

Date : ___ / ___ / ___

* Select as appropriate

Contractor / Turnkey Contractor *	Project : .....
Jabtan Kerja Raya SARAWAK Consulting Engineer/Engineer/S.O *	Contract No : .....
Location : _____	
Work Item : _____ / Chainage : CH _____ To CH _____	Date of Test : ___/ ___/ __

FIELD DENSITY TEST

(SAND REPLACEMENT METHOD)

BS 1377 : Part 9 : 1990 (Cl. 2.1 - *Small Pouring Cylinder* / Cl 2.2 - *Large Pouring Cylinder*)*

SAMPLE REFERENCE

Soil Description : _____	Sample Ref. No : _____
Maximum Dry Density (MDD) : _____ Mg/m³ Optimum Moisture Content (OMC) : _____ %	Test Ref. No : MDD/ ____ / ____
Liquid Limit (L.L.) : _____ % Plasticity Index (P.I.) : _____	Test Ref. No : LL/PI/ ____ / ____
4-Days Soaked CBR Value : _____ % *(indicate if relevant for the work item, if not indicate as N/A)*	Test Ref. No : CBR/ ____ / ____

CALIBRATION

Mean mass of sand in cone of pouring cylinder	(M_2)	g	g	g	: _____	g
Volume of calibrating container	(V)	mL	mL	mL	: _____	mL
Mass of sand in cylinder (before pouring)	(M_1)				: _____	g
Mass of sand remaining in cylinder (after pouring)	(M_3)				: _____	g
Mass of sand to fill calibrating container	($M_c = M_1 - M_3 - M_2$)				: _____	g
Bulk density of sand	($P_s = M_c/V$)				: _____	Mg/m³

DETERMINATION OF FIELD DENSITY

Test Reference :-			FDT/	FDT/	FDT/
	Field Test No				
	Chainage / Off Set from C.L.		/	/	/
	Layer Reference **				
	Depth Excavated	(mm)			
Mass of wet soil from excavated hole	(M_w)	g			
Mass of sand in cylinder (before pouring)	(M_1)	g			
Mass of sand remaining in cylinder (after pouring)	(M_4)	g			
Mass of sand recured to fill hole	($M_c = M_1 - M_4 - M_2$)	g			
Bulk density of soil	($P = (M_w/M_c) \times P_s$)	Mg/m³			
DRY DENSITY OF SOIL	($Pd = 100P / (100 + w)$)	Mg/m³			
Degree of Compaction	(Pd x 100 / MDD)	%			
Degree of compaction required (as per Specification)		%			

DETERMINATION OF MOISTURE CONTENT

			Container No.					
Mass of Wet Soil + Container	(w_2)	g						
Mass of Dry Soil + Container	(w_3)	g						
Mass of Container	(w_1)	g						
Mass of Moisture	($w_2 - w_3$)	g						
Mass of Dry Soil	($w_3 - w_1$)	g						
Moisture Content of Soil	$[(w_2 - w_3) / (w_3 - w_1)] \times 100$	%						
Average MOISTURE CONTENT	(w)	%						

Tested by : _____ ( ) : Witnessed by : _____ ( )

Remarks : *(weather / ground condition etc.)* _____

Signature : _____

Name : _____

Laboratory Technician

Date : ____/ ____/ ____

* Select as appropriate

** First layer of compartment D is referred to as D-300mm, where Datum = 0 is the original ground

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK Consulting Engineer/Engineer/S.O *	Contract No. : .....

CONCRETE CUBE TEST RESULTS

(for each Grade of Concrete)

Source of Supply of Concrete : *Batching Plant (Location)**	Page No. : of

STRUCTURE (Component / Element), LOCATION & CHAINAGE	Slump (mm) (at place of concreting)	CONCRETE CUBE						Compressive Load (kN)	Compressive Strength (N/mm²)		Remarks
		Ref. No.	Date		Age (days)	Weight (g)	Density (kg/m³)				
			Cast	Tested							
		.....	.....	.....	7	.....	.....	.....	.....	28 Days Mean	
		.....	.....	.....	28					}	
					28						
		.....	.....	.....	7	.....	.....	.....	.....	28 Days Mean	
		.....	.....	.....	28					}	
					28						
		.....	.....	.....	7	.....	.....	.....	.....	28 Days Mean	
		.....	.....	.....	28					}	
					28						
		.....	.....	.....	7	.....	.....	.....	.....	28 Days Mean	
		.....	.....	.....	28					}	
					28						
		.....	.....	.....	7	.....	.....	.....	.....	28 Days Mean	
		.....	.....	.....	28					}	
					28						
		.....	.....	.....	7	.....	.....	.....	.....	28 Days Mean	
		.....	.....	.....	28					}	
					28						

Concrete Grade _____ /20 Specified / Designed Slump (mm) ± ___	Jointly Tested and Witnessed By : 1. _____ *(for the Contractor)* ( )	Signature : _____ Laboratory Technician
Cube Dimensions (cm) : 15 x 15 x 15 Cube Volume (cm³) : 3375	2. _____ *(for the Engineer)* ( )	Name : Date : ___ / ___ / ___

* Select as appropriate

Contractor / Turnkey Contractor *:	Project : .....
Jabatan Kerja Raya SARAWAK	Contract No. : .....

SUMMARY OF CONCRETE CUBE TEST RESULTS

(for Design Mix Concrete)

Cumulative Report up to : ___ / _____ / 200 ___

Source of Supply of Concrete : *Batching Plant (Location) / (name of supplier)* *

GRADE OF CONCRETE : / 20 :	Sample	Date of Concreting	Mean Comp. Strength (N/mm²)	Check on Compliance			Remarks
				4 Sample Average		85% of Char. Strength Requirement	
				Ave. Comp. Strength	Compliance to Spec. (OK /Not OK)*	(OK / Not OK)*	
Notes :							
# 85% of Characteristic Strength = ____ N/mm²	1						
	2						
# Specification requirements:	3						
* not more than 5% of the test results shall be allowed to be within 85% & 100% of characteristics strength.	4						
	5						
	6						
	7						
* 4 samples average shall be ≥ specified characteristic strength (+) 50% of current margin	8						
	9						
	etc.						
* A current margin of 12.0 N/mm² is used for evaluation.							

* Strike out as appropriate

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No. : .....

REINFORCED CONCRETING REPORT

Report No : _____

Concrete Supplier : _____

Structure : _____ Compenent / Element : _____ / _____

Date of Concreting : _____ / _____ Location / Chainage : _____ / _____

Specified Concrete Grade : _____ / _____ Specified Slump : _____

Mixer Truck No.	Volume Delivered (m³)	Time of				Measured Slump (at place of concreting) (mm)	Cube Identification No.	Remarks
		Loading	Delivery	Placing				
				Commencement	Completion			

Date for Testing of Cube at : _____ days No. of Cubes : _____

: _____ days No. of Cubes : _____

: 28 days No. of Cubes : _____

Remark : _____

_____

Signature : _____	Signature : _____
Name : _____ Clerk of Works	Name : _____ Laboratory Technician
Date : ____ / ____ / ____	Date : ____ / ____ / ____

* delete as appropriate

QC-13a

*Contractor / Turnkey Contractor **	Project :
Jabtan Kerja Raya SARAWAK Consulting Engineer/Engineer/S.O *	Contract No. :

PRECAST PILE DRIVING RECORD

Location :
Chainage :
Date Driven :
Structure :
Element/Component : /
Start / Finish Time : /

PILE DETAILS :

Type / Size :
Ref. No. :
(ref. sketch attached)
No. of Joints :
Pile Length (Initial) :
Pile Length (Follower) :
Pile Length (Supplied) :

PILING DETAILS :

Ground / Platform Level : m
Cut-Off Level : m
Toe Level : m
Driven Length : m

HAMMER DETAILS :

Type :
Model :
Weight :

Penetration (m)	No. of Blows	Hammer Drop (m)	Penetration (m)	No. of Blows	Hammer Drop (m)	Penetration (m)	No. of Blows	Hammer Drop (m)	Penetration (m)	No. of Blows	Hammer Drop (m)

Remarks :-

Set :
Measured Temporary Compression : mm

Jointly Agreed By :

Signature :
For Contractor
Name :

Signature :
Engineer / Q.A.E *
Name :

Recorded By :

Signature :
Name :
Date : / /

* select as appropriate

Contractor / Turnkey Contractor * :	Project : .....
Jabtan Kerja Raya SARAWAK *Consultant Engineer / Engineer / S.O* *	Contract No. : .....

BORED PILE DRIVING RECORD

Location :	Serial No. : .....

Pile Details

Pile Ref. No.	:	.....
Nominal diameter	:	.....
Date/Time boring start	:	.....
Date/Time boring finish	:	.....
Date/Time concrete start	:	.....
Date/Time concrete finish	:	.....
Tremie or Dry discharge	:	.....

Borehole Data

Existing Working Platform Level (m)	:	.....
Pile Cut-Off level (m)	:	.....
Rock Length	:	.....
Ground Water Level (m)	:	.....
Bottom of Casing Level if any (m)	:	.....
Length of Casing (m)	:	.....

Reinforcement Data

Type and size of reinforcement	:	.....
Steel cage	:	.....
Length of steel cage (m)	:	.....
Concrete grade	:	.....

Depth (m)	Soil Description
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Remarks : .....
.....
.....

Recorded By :

.....)

Date : .....

Jointly Agreed By :

(1) .....)

Date : .....

(2) .....)

Date : .....

* select as appropriate

Contractor / Turnkey Contractor * :	Project : .....
Jabatan Kerja Raya SARAWAK *Consultant Engineer/Engineer/S.O **	Contract No. : .....

MICRO PILE DRILLING RECORD

Location :	Serial No. : .....

Pile Details

Pile Reference No. : .....

Nominal Diameter : ..... mm

Date/Time Started : .....

Date/Time Completed : .....

Plant/Equipment

Type of drill rig : .....

Type of bit (dia.) : .....

Method of drilling : *Air/Water/Mud ** .....

Borehole Data

EXISTING WORKING

platform level (m) : .....

Pile cut-off level (m) : .....

Pile toe level (m) : .....

Ground water level (m) : .....

Length of permanent casing (m), if any : .....

Reinforcement Data

Type and size of reinforcement : .....

Length of reinforcement installed : .....

Grouting Data

Date grouted : .....

Water/Cement ratio : .....

Type of additive used : .....

Ratio per 50kg of cement : .....

Bags of cement : .....

Depth (m)	Soil Description
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Remarks : .....

Recorded By :

..... ( )

Date : .....

Jointly Agreed By ;

(1) ..... ( )

Date : .....

(2) ..... ( )

Date : .....

* select as appropriate

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No. : .....

BAKAU PILING RECORD

Location :	Date :	Serial No. .....

Piling Details

Nominal Diameter of Pile : .....

Weight of Hammer : ..... tonnes

Height of Drop : ..... mm

Set Criteria : .....

File Ref. No.	Supply Length			Length Trimmed to Suit			Head to cut-off level	Driven Length	Remarks
	L1	L2	L3	L1	L2	L3			
Total Usable Length							Total Driven Length :		

Recorded By :

.....

( )

Date : .....

Jointly Agreed By :

(1) .....

( )

(for the Contractor)

Date : .....

(2) .....

( )

(for the Engineer)

Date : .....

* *select as appropriate*

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No. : .....

FLAKINESS INDEX & ELONGATION INDEX

(M. S. 30 / B. S. 812 : Part 105 : 1990)

Location : .....

Date of Test : ...../ ...../ .....

Description of Sample : .....

Sample Ref. No. : .....

Material Tested For : .....

Chainage / Stockpile / Source* : .....

Test No. : FI/ EI/

Aggregate Size (mm)			63 to 50	50 to 37.5	37.5 to 28	28 to 20	20 to 14	14 to 10	10 to 6.3	Total (g)
No. of Particles Selected from Each Size		(No.)								
A	Weight of Each Size Selected	(g)								
B	Weight Percentage of Each Size	(%)								
	Thickness Gauges (Width of Slot) (0.6 times the mean sieve)	(mm)	32.9	26.3	19.7	14.4	10.2	7.2	4.9	
C	Weight of Particles Passing the Thickness Gauge	(g)								
D	Weight Percentage of Flaky Particles (100C / A)	%								
E	Weight Percentage of Flaky Particles in Total Aggregate (D x B)	%								
	Length Gauges (Width of Slot) (1.8 times the mean sieve)	(mm)	101.7	78.8	59	43.2	30.6	21.6	14.7	
F	Weight of Particles Retained on the Length Gauge	(g)								
G	Weight Percentage of Elongated Particles (100F / A)	%								
H	Weight Percentage of Elongated Particles in Total Aggregate (G x B)	%								

Specifications : FLAKINESS INDEX - Shall be _____ FLAKINESS INDEX = _____

ELONGATION INDEX - Shall be _____ ELONGATION INDEX = _____

Remarks : .....

.....

.....

Tested By : .....
( )

Witnessed By : .....
( )

Date : ...../ ...../ .....

Signature : .....

.....
Laboratory Technician

Date : ...../ ...../ .....

* Select as appropriate

Contractor / Turnkey Contractor * :	Project : .....
Jabtan Kerja Raya SARAWAK E	Contract No. : .....

AGGREGATE CRUSHING VALUE

(Standard Test)

(M. S. 30 / B. S. 812 : Part 110 : 1990)

Location :				Date of Test : ...../ ...../ .....
Description of Sample :				Sample Ref. No. : .....
Material Tested For :			Chainage / Stockpile / Source * :	Test No. : ACV/
AGGREGATE SIZE TESTED :	Passing Sieve Size :- ..... mm Retained Sieve Size :- ..... mm		APPLIED LOAD : ..... kN	
Specimen No.			1	2
Weight of Mould	W1	(g)		
Weight of Mould + Surface Dried Specimen *(after tamping)*	W2	(g)		
Weight of Surface Dried Specimen	W3 = W2 - W1	(g)		M
Weight of the Fines Passing B.S. 2.36mm Sieve *(after application of load)*	W4	(g)		
Percentage of Fines Passing B.S. 2.36mm Sieve	(W4 / W3) x 100	(%)		
AGGREGATE CRUSHING VALUE	(average)	(%)		

Specification : Aggregate Crushing Value shall be :
- 35% (for Subbase)
- 30% (for Road Base; Surface Dressing; Aggregate for Asphalt Concrete)
- 20% (Aggregate for Concrete)

Remarks : .....

.....

Tested By : ..... ( )

Witnessed By : ..... ( )

Date : ...../ ...../ .....

Signature : .....

Name : ..... Laboratory Technician

Date : ...../ ...../ .....

* Select as appropriate

M Weight of soil to be based on the Specimen No. 1

Contractor / Turnkey Contractor *	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No. : .....

BEAM / GIRDER STRESSING RECORD
(BRIDGE WORKS)

Beam / Girder Identification No. : .....

Diameter of Strand : .....

No. of Strands in Tendon : .....

Maximum Allowed Slip : ..... UTS : ..... (allowed : ..... %)

Jack Type / No : ..... Gauge No : ..... Ram Area : .....

Last Date of Calibration of Stressing Gauge : .....

Date of Stressing	Tendon		Calculated		Force applied to tendon (kN)	UTS (%)	Measured Extension in mm (l_2)	Difference in Extension ($l_1 - l_2$)mm	Slip (mm)		Variation in Slip (mm)
	Ref.	Length	Stress	Extension in mm (l_1)					Calculated	Actual	

Grade of Concrete : ...../ ..... Date of Concreting : .....

(; days cube strength achieved = ... N/mm²

Remarks : .....

.....

Recorded By: (please chop)

Signature : .....

Name : .....
Clerk of Works

Date : ...../ ...../ 200 ....

Checked by:

Signature : .....
Project Manager/Construction Manager/Site Agent*

Name : .....
for Contractor

Date ...../ ...../ 200 ....

Verified by (please chop)

Signature : .....
RE/ARE/QAE

Name : .....

Date : ...../ ...../ 200 .....

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Contractor / Turnkey Contractor *:	Project : ....
Jabatan Kerja Raya SARAWAK	.... Contract No. : ....

BITUMEN SPRAYING RATE TEST RESULTS

Location : ....

Work Item (Application) : ....

Bituminous Material Used
(Prime Coat / Tack Coat)* : ....

Specific Gravity of Bituminous Material
(Prime Coat / Tack Coat)* : ....

Test No	Date of Test	Chainage & Offset from C. L.		Tray No.	Area of Tray	Wt. of Tray + Material	Wt. Of Tray	Wt. Of Material	Volume of Material	Spraying Rate
		from	to		(m²)	(g)	(g)	(g)	(lit)	(lit/m²)
					(a)	(b)	(c)	(d) = (b) - (c)	(e) = $\frac{(d)}{(\text{s.g. of bit})\times 10^3}$	(e) / (a)

Specification (Range) = ______ - ______ litre / m²

Tested and Witnessed By :

1. ....

2. ....

Signature : ....

Name ....
Laboratory Technician

Date : ..../ ..../ ....

* Select as appropriate

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Contractor / Turnkey Contractor *	Project : ....
Jabtan Kerja Raya SARAWAK	Contract No. : ....

SUMMARY OF BITUMEN SPRAYING RATE TEST RESULTS

For the Period From : ________ to ________ 200

Location : ....

Work Item (Application) : ....

Test No.	Date of Test	Chainage		Off Set from Centreline	Spraying Rate (lt/m²)	Remarks
		From	To			

Specification (Range) : ____________ - ____________ litre / m²

* Select as appropriate

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No. : .....

MARSHALL TEST RESULTS

(For Asphaltic Concrete Pavement Works) BS 598 : Part 107 / ASTM D1559-89

Location of Works : ..... (Trial Mix / Laying Mix)*	Test No. :

Mix Type	:	Date Sampled / Tested	: .....
Mix Designation	:	Place of Testing	: .....
Avg. S. G. of Agg. Blend	:	Sp. Gr. Bitumen	: .....
Sample From	:	Pen. Grd. Bitumen	: .....

Mixing Temperature : ..... °C Compacting Temperature : ..... °C

Test Temperature		(°C)								
Specimen No.			a	1	2	3	4	5	Average	Specification Requirement *(for Job Mix Formulae / for Laying Mix.)**
Bitumen Content (% by Total Wt. Of Mix)			b							
Specimen Height (mm)			c							
Wt. in Air (gm)			d							
Wt. in Water (gm)			e							
Bulk Vol (cc)		d - e	f							
Specific Gravity :	Bulk	d / f	g							
	Max. Theoretical		h							
Volume (% of Total)	Bit	b x g / (S. G. Bit)	i							
	Agg.	(100 -b)g / Avg. Sp. Agg.	j							
	Voids	100 - i - j	k							
Voids (%)	in Aggregates	100 - j	l							
	Filled with Bitumen	100 x i / l	m							-
Air Voids in Total Mix		100 - 100g/h	n							-
Stability (kg)		*Correction Factor (as per table)*	o							
(Proving Ring Constant)		*Measured*	p							
= kN/div.)		Corrected o x p	q							> kg
Flow (mm)		*Measured*	r							> 2.0 mm
Stiffness (kg/mm)		q / r	s							> kg/mm

Remarks : .....

.....

Tested & Witnessed By :

1. .....
( )

2. .....
( )

Signature : .....

Name : .....
Laboratory Technician

Date : ...../...../.....

* Delete inapplicable

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Contractor / Turnkey Contractor *:

Jabtan Kerja Raya SARAWAK

Project :

Contract No. :

SUPPLY & LAYING OF READY-MIX ASPHALTIC CONCRETE

(For Pavement Works)

Location of Works :

Date : / /

Chainage / Offset :

Mix Type :

Supply from :

Mix Designation :

Order of Arrival	Truck Registration No.	Time of		Temperature °C			Remarks
		Arrival	Laying	T1	T2	T3	

Notes : T1 : Loading ; T2 : Laying ; T3 : Compacting

Checked/ Recorded By :

Signature :

Name :

Clerk of Works

Verified By :

Signature :

Name :

Engineer / Quality Assurance Engineer *

* select as appropriate

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*Contractor / Turnkey Contractor *:*	Project : ....
	....
Jabtan Kerja Raya SARAWAK	....
	Contract No. : ....

SUMMARY OF MARSHALL TEST RESULTS

(For Asphaltic Concrete Pavement Works - **Laying Mix**)

For the Period from : ______ To ______ / 200___

Mix Type / Designation : AC .... / ....

Location of Work : .... Supply from :

Date of Test & Test No.	Gradation Analysis (O.K. / Not O.K.)*	Bitumen Content (%)	Voids Filled with Bitumen (%)	Air Voids in Mix (%)	Flow Value F (mm)	Stability S (kg)	Stiffness S/F (kg/mm)	Remarks
/								
/								
/								
/								
/								
/								
/								

TRIAL MIX RESULTS :							

SPECIFICATIONS :-

Wearing Course	as per Tolerances given in Table 4.11 of SSRW for Laying Mix	Tolerance : (±)0.2%. Ref. Table - 4.11 of SSRW for Laying Mix	75 - 85	3.0 - 5.0	> 2.0	> 500	> 250
Binder Course			65 - 80	3.0 - 7.0	> 2.0	> 450	> 225

Verified by QAE :

Signature : ....

Name : ....

* select as appropriate

Contractor / Turnkey Contractor * :	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No. : .....

BITUMEN STRIPPING TEST

(STATIC IMMERSION)

[ASTM : D 1664 - 80 (1985)]

Material Tested For :	*Date of Test* : ..... / ..... / .....
Sample Location (From Quarry (Identify location)/ Stock Pile No.) * :	
Material Description :	*Test No.* : .....
	Sample Ref. No. : .....
Type of Bitumen : ..... *Bitumen Temperature* :	*Mixing Temperature* : .....

Initial Weight of Sample	*(g)*	
Weight of Bitumen Used	*(g)*	

Duration of Immersion at Room Temperature of .....

Immersion Commenced	*(Date / Time)*	/
Sample Removed	*(Date / Time)*	/
Duration of Immersion	*(hrs)*	

Visual Examination

Estimated Coated Area	

Remark : .....

.....

.....

Tested and Witnessed by:

1 .....
( )

2 .....
( )

Signature : .....

Name : .....
(Laboratory Technician)

Date : ...../...../.....

* *delete as appropriate*

Contractor / Turnkey Contractor *	Project : .....
Jabtan Kerja Raya SARAWAK . Consulting Engineer/Engineer's O * Contract No. :	

QUANTITATIVE EXTRACTION OF BITUMEN

(For Asphaltic Concrete Pavement Works)

Location of Works	:	Trial Mix / Laying Mix *	: .....
Mix Type / Designation	:	Date of Sampling / Coring	: .....
Sample From	:	Date of Testing	: .....
Chainage / Offset	:	Sample Ref. / Test No.	: .....

		BEFORE TEST	AFTER TEST
Mass of Bowl – Sample	gm	(A)	(D)
Mass of Bowl	gm	(B)	
Mass of Filter	gm	(C)	(E)
Mass of Sample (A - B)	gm		(M)
Mass of Agg. in Bowl (D - B)	gm		(F)
Mass of Agg. in Filter (E - C)	gm		(G)
Mass of Agg (F + G)	gm		(MG)
Mass of Bitumen (M - MG)	gm		(MB)
Bitumen Content (MB / M) x 100			%

SPECIFICATIONS FOR BITUMEN CONTENT

\# For Trial Mix :-

- **ACW 20 (W/C) : 4.5 - 6.5%**
- **ACB 28 (B/C) : 4.0 - 6.0%**

\# For Laying Mix :-

Permissable Variation (% by weight of total design mix) = **± 0.2%**

GRADATION ANALYSIS

B. S. Sieve (mm)	Mass Retained (gm)	% Retained	% Passing (by weight)	Specification Limits # / Variance Allowed **
37.5				
28				
20				
14				
10				
5				
3.35				
1.18				
0.425				
0.15				
0.075				
Pan				

Notes :

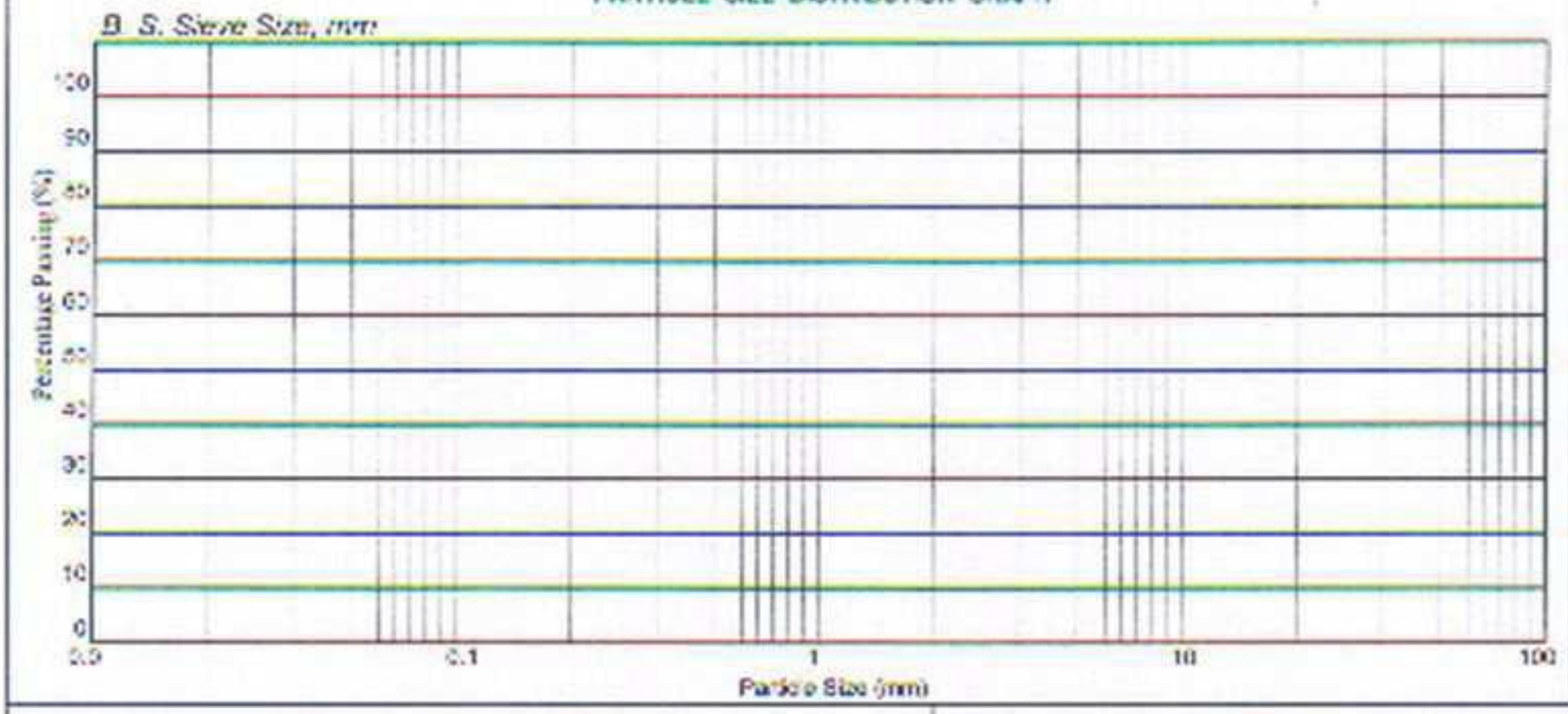
\# TRIAL MIX :-

Refer Table 4.8 (revised) for limits.

** LAYING MIX :-

Refer Table 4.11 for allowed Permissable Variation from the Job Mix Formulae

PARTICLE SIZE DISTRIBUTION GRAPH



Remarks :

Tested By : (.....)

Witnessed By : (.....)

Signature : .....

Name : .....
Laboratory Technician

Date : ...../ ...../ .....

* Select as appropriate

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No. : .....

CORING & IN-SITU COMPACTION RECORD

(for Asphaltic Concrete Pavement Works)

Location : .....

Mix Type / Designation : ..... / .....

Design Bitumen Content (as per Job Mix Formula) : .....

Date of Coring : / /

Date of Test : / /

Specimen No. / Test No.	Chainage	Offset	Compacted Thickness		Bitumen Content (Tolerance : + 0.2%)		Sieving Result (as per Table 4.11 of SSRW)	Weight (gm)		Bulk Vol (c.c.)	Insitu Bulk S. G.	Job Mix Bulk S.G. (Marshall Test)	Compaction Achieved (%)
								In Air	In Water				
			mm	O.K. / Not O.K.*	%	O.K. / Not O.K.*	O.K. / Not O.K.*	W_1	W_2	$W_3=(W_1 - W_2)$	$SG_a = (W_1 / W_3)$	SG_m	$(SG_a/SG_m) \times 100$

SPECIFICATION : Requirement on Compacted Density - **Wearing Course** - 98% to 100% Marshall Density

- **Binder Course** - 95% to 100% Marshall Density

Remarks : .....

.....

Tested & Witnessed By :

1. ..... ( ) ; 2. ..... ( )

Signature : .....

Name : .....
Laboratory Technician

Date : / /

* select as appropriate

Contractor / Turnkey Contractor *:	Project : .....
Jabtan Kerja Raya SARAWAK Consulting Engineer/Engineer/S O *	Contract No : .....

MONITORING OF SURCHARGE SETTLEMENT (Surface Settlement Marker)

PERMANENT SETTLEMENT REFERENCE STATION	No :	Reduced Level :	
SURFACE SETTLEMENT MARKER (SSM)	Ref No :	CHAINAGE :	OFF SET FROM C/L : /
DATE OF INSTALLATION OF SSM			
REDUCED LEVEL AT TOP OF SURCHARGE (Immediately on Completion)			
DESIGNED FORMATION LEVEL			
DATE OF REMOVAL OF SURCHARGE (Proposed)			

SETTLEMENT RECORDS

READING		RL AT TOP OF SURCHARGE	SETTLEMENT DURING THE PERIOD	CUMULATIVE SETTLEMENT	REMARKS
No.	Date	(m)	(m)	(m)	
1			0.00	0.00	Immediately on Completion of Surcharge
2					
3					
4					
etc.					

Checked By ; Signature : ..... Name : ..... for (Contractor)	Verified by: Signature : ..... Name : ..... for Engineer / O.A.E *

Contractor / Turnkey Contractor *	Project : .....
Jabtan Kerja Raya SARAWAK	Contract No : .....

MONITORING OF SETTLEMENT(Rod Settlement Gauge)
(EMBANKMENT FILL / SURCHARGE)

PERMANENT SETTLEMENT REFERENCE STATION	No :	Reduced Level :	
ROD SETTLEMENT GAUGE (RSG)	Ref No :	CHAINAGE :	OFF SET FROM C/L
DATE OF INSTALLATION OF RSG			
DESIGNED FORMATION LEVEL	m		

SETTLEMENT RECORDS

READING		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
NO.	DATE	Reduced Level of Original Ground (Initial) (m)	R.L. of Top of Fill (at present) (m)	R.L. of Top of Settlement Gauge (m)	Height of Settlement Gauge Rod (m)	R.L. of Original Ground (at present) (m) (c-d)	Depth of Fill (m) (b-c)	Settlement during the period (m)	Cummulative Settlement (m) (c-a)	Remarks
1.								0.00	0.00	
2.										
3.										
4.										
etc.										

Checked By :	Verified by :
Signature :	Signature : .....
Name :	Name : .....
for (Contractor)	RE/ ARE/ QAE/ COW

* select as appropriate

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PIHAK BERKUASA BEKALAN AIR JKR SARAWAK

WATER MAIN PRESSURE AND LEAKAGE TEST REPORT

Scheme : .....

Contractor : .....

Contract no. ..... Mains Profile Drawings No : .....

Section f Main under test (Chainage) .....

Diameter of mains (mm) : ..... Type of mains : .....

PRESSURE LEAKAGE TEST RESULT

Date	Time	Pressure (Bar)	Volume of Water Added (Litres)	Testing Officer	Observation
Total Volume of Water Added					

Certified By	Witness For JKR
Signature : ..... Name : ..... Designation : ..... Date :	

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Project:	

Water Reticulation Inspection Form

Location :_____ Date:_____

Type of pipe :_____ Approval chit no.:_____

Size of pipe :_____

Check List

Item	Description	1st Inspection		2nd Inspection		Remarks
		OK	Not OK	OK	Not OK	
1	Setting out					
A	Setting out/ Alignment					
2	Excavation Works					
A	Excavation to designed level					
B	Stability of side of excavated area					
3	Materials					
A	Materials in accordance with specification and drawings					
4	Pipe Laying					
A	Pipe joint					
B	Thrust block					
C	Pipe invert level					
D	Culvert/ Drain crossing					
5	Fittings					
A	Air valve					
B	Sluice valve					
C	Fire Hydrant					
D	Bulk meter/ water meter					
E	Pumps					
6	Chamber					
A	Valve chamber					
B	Wash-out chamber					
7	Backfilling					
A	Backfilling in layers and compacted as specified					
B	Approved fill materials					

General comments:

_____

_____

*Please attach additional document(s) for further clarification, if necessary.

_____	_____	_____
Contractor	C.O.W./Assistant R.E.	Resident Engineer
Date:_____	Date:_____	Date:_____

Contractor:	Project: Contract no.

PIPELINE CHLORINATION TEST

Pipe length: Date:

Pipe type: (ex. D.I./HDPE)

Diameter: mm

Initial sample	Time	Chlorine level	Notes Initial chlorine level to be 20ppM

Initial sample	Time	Chlorine level	Notes Chlorine residual to be present in water sample after 24 hours

Remarks:

Performed by: (for contractor) Signature: Name: ( )	Certified by: (for Quality Assurance team) Signature: Name: ( )

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PROJECT:

FLUSHING OF PIPELINE

Date: Type of pipe: Dia.(mm):

Length(M): Chainage from: _____ to_____

Results:

Date	Washout No.	Start Time(hrs, min)	Finish Time(hrs, min)	Water quality At start	Water quality At finish	Remarks

*Notes: Flushing is considered satisfactory if / when the water in the glass, which is tapped from the washout is visibly clear when it is being shone through a beam of bright light. Colour and turbidity to be specified.

Flushed by

Signature:_____

Name :_____

Designation:_____

Date :_____

Withness by Contractor's Representative

Signature:_____

Name :_____

Designation:_____

Date :_____

Certified by RE/QAE'S representative

Signature:_____

Name :_____

Designation:_____

Date :_____

Withness by JKR's Representative

Signature:_____

Name :_____

Designation:_____

Date :_____

QUALITY CONTROL CHECKLIST FOR ARCHITECTURAL WORKS

INTERNAL FINISHES

Item	Element	Standards	Check (√)	Assessment Tool
I.	**FLOORS**			
A.	**General Requirements**	1) Finishing		
		• No stain marks		Visual
		• Consistent colour tone		Visual
		2) Alignment & Evenness		
		• Evenness of surface		Spirit level and steel rule
		• Falls in wet areas should be in right direction		Water or Spirit level
		• For staircases, the variance in lengths of treads and risers must not exceed 5 mm from dimensions specified in the approved drawings		Steel Measuring Tape or Steel rule
		3) Crack and damage		
		• No visible damage/defects		Visual
		4) Hollowness/Delamination		
		• No hollow sound when tapped with a hard object		Tapping rod
		• No sign of delamination		Visual
		5) Jointing		
		• Consistent skirting thickness and no visible gap between wall & skirting		Visual
		• Edge to be straight and aligned		Spirit level and steel rule
B.	**Screed Finishes**	1) Finishing		
		• Surface should not be unduly rough or patchy		Visual
		• No permanent foreign material visually detected		Visual

Item	Element	Standards	Check (√)	Assessment Tool
	FLOORS			
C.	**Tiled Floor**	1) Finishes		
		• Joints are aligned with skirting and wall tiles		Visual and Caliper
		• Joints are aligned between tiles and consistent size		Visual
		• Consistent and neat marking		Visual
		• Lippage between two tiles		Caliper
D.	**Timber Floor**	• No warpage		Visual
		• Timber strips to rest firmly on joists or screeds		Visual
		• No visible gaps between timber strips		Visual
		• Edges of the floor to properly sealed		Visual
E.	**Carpet**	1) Finishes		
		• Surface should be stretched and even		Spirit level and steel rule
		• Joints should not be visible		Visual
		• All edges should be properly anchored		Visual
F.	**Special Floor Finish**	1) Finishes		
		• Finished texture and colour to be uniform		Visual
		• Follow general requirement where applicable		
G.	**Raised Floor**	1) Finishes		
		• No loose floor panels or rocking		Visual
		• No protrusion/ potential of tripping over floor panels		Visual

Item	Element	Standards	Check (√)	Assessment Tool
II.	**INTERNAL WALLS**			
A.	**General Requirements**	1) Finishing		
		• No stain mark		Visual
		• Consistent colour tone and good paintwork		Visual
		• No rough/patchy surface		Visual
		2) Crack and Damage		
		• No visible damage/defect		Visual
		3) Hollowness/Delamination		
		• No hollow sound when tapped with a hard object		Tapping rod
		• No sign of delamination		Visual
		4) Alignment and Evenness		
		• Evenness of surface		Spirit level and steel rule
		• Verticality of wall		Spirit level and steel rule
		• Walls meet at right angle		L-square and steel rule
		• Edge to be straight and aligned		Alignment laser and steel measuring tape
B.	**Plaster Finishes**	1) Finishes		
		• No visual crack		Visual
C.	**Tiled Finishes**	1) Finishes		
		• Joint are aligned between tiles and consistent size.		Alignment laser and Caliper
		• Consistent and neat marking.		Visual
		• Lippage between 2 tiles should not be more than 1 mm.		Spirit level and Steel rule.

Item	Element	Standards	Check (√)	Assessment Tool
	INTERNAL WALLS			
D.	**Painting**	1) Finishes		
		Surfaces are evenly painted		Visual
		• Good opacity, no patchiness resulted from touch up work		Visual
		• Surface should be free from peeling, blister, chalkiness (No discolouration and fading)		Visual and physical
E.	**Wall Paper**	• Wall paper should be stretched and even surface		Visual and spirit level
		• Joints should not be visible		Visual
		• Edges should be neatly laid and finished		Visual
		• Proper anchoring at all edges		Visual
F.	**Wood/Timber Panels**	• Timber panels should rest firmly on joists or screed		Visual and physical
		• No gaps can be detected between panels		Visual
		• Edges should be properly aligned and sealed		Visual
		• Surface should be smoothly finished		Visual
		• Cracks and warpage should not be detected		Visual
G.	**Cladding**	• Proper anchorage for panels.		Visual
		• Joints aligned and with consistent joint size.		Visual
		• Sealant material compatible with cladding.		Visual
		• Consistent spacing and within allowable tolerance.		Spirit level and steel rule
		• No sign of corrosion		Visual
H.	**Glass Blocks**	• Consistent and neat marking.		Visual
		• Joint should be even.		Visual
		• Glass blocks should be properly aligned.		Spirit level and steel rule
J.	**Architectural Coating**	• Finished texture and colour to be uniform.		Visual

Item	Element	Standards	Check (√)	Assessment Tool
III.		**CEILING**		
A.	**General Requirements**	1) Finishing		Visual
		• No stain marks		Visual
		• Consistent colour tone		Visual
		• No patchy surface		Visual
		2) Alignment and evenness		
		• Surface should be smooth, even, not wavy		
		• Straightness of corners		Visual
		3) Crack and damages		Visual
		• No visible damage e.g. spalling, leaks, cracks, etc		Visual
		4) Roughness		Visual
		• No rough surface		Visual
		5) Jointing		Visual
		• Consistent, aligned and neat		Visual
B.	**Plaster/ Skim Coat/ Boarded Ceiling**	• No pin holes and with no trowel marks		Visual
		• Formwork joints are grounded smooth		Visual
		• Paintwork with good opacity and with no brush marks		Visual
		• Access door joints should be neat and have consistent width		Visual
		• No gap between wall and ceiling		Visual
		• No sign of corrosion		Visual

Item	Element	Standards	Check (√)	Assessment Tool
	CEILING			
C.	**False Ceiling/ Grid System**	• Alignment of rails should be visually straight		Visual
		• Chipped/cracked surfaces or corners should not be detected		Visual
		• Gap between ceiling and wall should not be detected		Visual
		• Panels should not warp and laid neatly into grids		Visual
		• No sign of corrosion		Visual

Item	Element	Standards	Check (√)	Assessment Tool
IV	**DOOR & WINDOW & FIXTURES (INTERNAL)**			
A.	**DOOR**	1) Joints & Gap		
		• Consistent gap between bottom of door leaf and finished floor		Caliper
		• No visible gaps between door frame and wall		Visual
		• Neat joints		Visual
		• Consistent gap between door leaf and frame		Caliper
		2) Alignment & Evenness		
		• Parallel to with the walls		Visual
		• Door frame to be plumb and square		Spirit level and L-square or laser beam
		• Double leaf doors to flush with each other		Visual
		• Door frame and leaf to flush		Visual
		• Door leaf and frame corners maintained at right angles		L=Square
		3) Material & Damages		
		• No stain marks and any visible damage		Visual
		• No sags, warps on door leaf		Visual
		• Door joints and nail holes filled up, properly sanded		Visual
		• Glazing clean and evenly sealed with gasket		Visual
		• No sign of corrosion		Visual
		• Good paintwork (including top and bottom of door leaf)		Visual
		4) Functionality		
		• Ease in opening and closing		Physical
		• No squeaky sound during opening and closing of the door		Physical
		• Lockset should be functional		Physical

Item	Element	Standards	Check (√)	Assessment Tool
	DOOR & WINDOW & FIXTURES (INTERNAL)			
		5) Accessories Defects		
		• Accessories with good fit and no stains		Visual
		• No sign of corrosion		Visual
		• No missing or defective accessories		Visual
		6) For timber frame, no additional timber strip added for site adjustment should be detected		Visual
B.	**WINDOW**	1) Joints & Gap		Visual
		• Consistent gap between window leaf and frame		Caliper
		• No visible gap between window frame and wall		Visual
		• Neat joint between window frame and wall internally and externally		Visual
		2) Alignment & Evenness		Visual
		• Parallel with wall opening		Visual
		• Window frame to be plumb and square		Spirit level and L-square or alignment laser
		• Window leaf and frame corner maintained at right angle		L-square and steel rule
		3) Material & Damages		
		• No stain mark & visible damage / defect		Visual
		• Louvered window with glass panels of correct length.		Visual
		• Glazing clean and evenly sealed with putty or gasket for aluminum windows		Visual
		• No sign of corrosion		Visual
		• Good paintwork		Visual

Item	Element	Standards	Check (√)	Assessment Tool
	DOOR & WINDOW & FIXTURES (INTERNAL)			
		4) Functionality		
		• Ease of opening and closing		Physical
		• No squeaky sound during opening and closing of the window		Physical
		5) Accessories defects		
		• Lock sets with good fit and aligned		Visual
		• No sign of corrosion		Visual
		• No missing or defective accessories		Visual
C.	**FIXTURES (INTERNAL)**	• Internal fixtures such as wardrobe, kitchen cabinet, vanity top, bathtub, water closet, shower screen, railings, basin, etc.		
i.	**General Requirements**	1) Joint & Gap		
		• Consistent joint width & neat joint		Visual
		• No visible gap		Visual
		2) Alignment & Evenness		
		• Level and in alignment		Visual
		3) Material & Damage		
		• No stain mark		Visual
		• No damage/defect		Visual
		• Consistent in colour tone		Visual
		4) Functionality		
		• Function, secured and safe		Visual and physical

Item	Element	Standards	Check (√)	Assessment Tool
	DOOR & WINDOW & FIXTURES (INTERNAL)			
		5) Accessory defect		
		• No missing accessory		Visual
		• No sign of corrosion		Visual
		• No damages/defect		Visual
		• Verticality of balusters		Spirit level and steel rule
		• Railings should be securely anchored		Physical
		• Welding at joint must be grounded or flush		Visual

Item	Element	Standards	Check (√)	Assessment Tool
V.		**ROOF**		
A.	**General Requirements**	1) Finishing		
		• No stain marks		Visual
		• Good paint works		Visual
		2) Rough/ Uneven/ Falls		
		• Look smooth and with no tool marks		Visual
		• Even and level especially no potential in stripping		Visual
		• Falls in right direction		Visual
		3) Crack and damages		
		• No visible damage/ defects e.g. cracks, chip and etc.		Visual
		4) Joint/ Sealant/ Alignment		
		• Consistent joint width, neat and aligned		Visual
		5) Chockage/ Ponding		
		• No sign of chockage / ponding		Visual
		6) Construction		
		• No sign of leaking		Visual
		• Proper dressing for any protrusion		Visual
		• Neat and secured installation of fixtures		Visual
B.	**Flat roof**	• Ponding less than 3 mm		Steel rule
		• Surface to level to avoid tripping		Visual
		• Proper dressing for any protrusion		Visual
		• Openings to be sealed to prevent pest invasion		Visual
		• Clean and no stain marks		Visual

Item	Element	Standards	Check (√)	Assessment Tool
	ROOF			
C.	**Pitched Roof**	• No leaking		Visual
		• No rust or stains		Visual
		• Good painting to roof structural members		Visual
		• Roof tiles in alignment		Visual
		• Openings to be sealed to prevent pest invasion		Visual
		• Consistent colour tone		Visual
		• Proper dressing for any protrusion		Visual
D.	**Waterproofing (exposed)**	• Should be evenly installed, no sharp protrusion		Visual
		• Complete adhesion to base		Visual
		• Good laps at joints and proper vertical abutment details		Visual
		• No leaking and sign of damage to membrane / coating		Visual
		• Clean and no mortar stains		Visual
		• No paint defects		Visual
E.	**Gutters and Rain water down pipes (RWDP)**	• No ponding and chockage		Visual
		• No cracks, chips and any other visible damages/ defects		Visual
		• RWDP inlet should be lower than the surrounding gutter invert level		Visual
		• Gutter and RWDP inlet to be covered to prevent chockage where practical		Visual
		• Clean and no cement stains		Visual

EXTERNAL FINISHES

Item	Element	Standards	Check (√)	Assessment Tool
VI	**EXTERNAL WALLS**			
A.	**General Requirements**	1) Finishing		
		• No stain mark		Visual
		• Consistent colour tone and good paintwork		Visual
		2) Crack and Damage		
		• No visible damage/ defect		Visual
		3) Roughness		
		• Not wavy and not patchy		Visual
B.	**Plaster Finishes**	• As per *General Requirement* above		
C.	**Tiled Finish**	• Joint are aligned between tiles, and consistent size		Alignment laser and caliper
		• Consistent and neat marking.		Visual
		• Lippage between 2 tiles should not be more than 1mm		Caliper
D.	**Cladding/ Curtain Walls**	• Gaps around openings to be properly sealed		Visual
		• Joint of regular widths as specified		Visual
		• Evenness of surface, no dent or scratches		Visual
		• Sealant material compatible with cladding		Visual
		• No sign of corrosion		Visual
E.	**Facing Brickwork**	• 10 mm joint with marking		Steel rule or caliper
		• Weep holes are provided as specified		Visual
		• No efflorescence		Visual

Item	Element	Standards	Check (√)	Assessment Tool
	EXTERNAL WALLS			
F.	**Architectural Coating**	• Finished texture and colour to be uniform		Visual
		• No paint drips and other stains		Visual
G.	**Painting**	• Surfaces are evenly painted; no patchiness due to touch up work		Visual
		• Good opacity, no discolouration and fading		Visual
		• Surface should be free from peeling, blister and chalkiness		Visual and physical
H.	**Fixtures (External)** External fixtures such as signage, emergency lightings, railings, unit nos plate, lift fittings, letter box, lightings, etc.	General Requirements		
		1) Joints and gaps		
		• Consistent joint width & neat joint.		Visual
		• No visible gap		Visual
		2) Alignment and evenness		
		• Even level, align and consistent		Visual
		3) Material and damages		
		• No stain mark		Visual
		• No visible damage / defect		Visual
		• Consistent in colour tone		Visual

Item	Element	Standards	Check (√)	Assessment Tool
	EXTERNAL WALLS			
		4) Functionality		
		• Function, secured and safe		Visual and physical
		5) Accessory Defect		
		• No missing accessory		Visual
		• No sign of corrosion		Visual
		• No visible damage / defect		Visual

Item	Element	Standards	Check (√)	Assessment Tool
VII	**APRONS AND PERIMETER DRAINS**			
A.	**General Requirements**	1) No stain marks and visible damages/ defects		Visual
		2) Finishes must be even, level, align and consistent		Spirit level/ steel rule/ measuring tape/ alignment laser
		3) Consistent joints width and neat		Visual
		4) Paintworks with good opacity, no patchiness and brush marks		Visual
		5) Fixtures installed must be safe, secured and functional		Physical and Visual
		6) Standards defined under Part 1: internal finishes, Part 2: roof and Part 3: External wall shall apply for similar items		
B.	**Perimeter drains and aprons**	1) Drain		
		• Free flowing and no ponding of water		Water or visual
		2) Drain Cover		
		• Level and do not warp or rock		Visual and physical
		• Gap between drain covers		Caliper or measuring tape
		• Gap between sides of drain		Caliper or measuring tape
		• Drain grating properly painted		Visual
		3) Apron		
		• No visible cracks		Visual
		• No water ponding		Visual
		• Bitumen joints with neat edges and sufficient length		Visual