



JABATAN KERJA RAYA MALAYSIA

INSPECTION AND TESTING PLAN (ITP) EDISI TAHUN 2020



**GARIS PANDUAN BAGI
KERJA-KERJA UNTUK
PROJEK JKR**

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PRAKATA

Jabatan Kerja Raya (JKR) sebagai jabatan teknikal terunggul komited dalam memastikan kehendak pelanggan dapat direalisasikan sejajar dengan objektif JKR untuk menyerahkan produk menepati masa, kualiti dan kos yang ditetapkan. Salah satu dokumen yang penting bagi memastikan objektif ini dapat dicapai adalah penyediaan Pelan Pemeriksaan dan Pengujian (*Inspection and Testing Plan, ITP*).

ITP merupakan dokumen sistematik yang perlu disediakan untuk pemeriksaan pengujian, pengujian bahan dan kaedah pemasangan bagi memastikan prosedur untuk melaksanakan aktiviti tersebut mengikut *standard* yang telah ditetapkan. Aktiviti pemeriksaan dan ujian dalam ITP ini merangkumi semua aktiviti sebelum, semasa dan selepas (*i.e: manufacturing, fabrication, construction and installation*) semasa proses penzahiran sesuatu produk.

ITP merupakan salah satu dokumen yang perlu disediakan oleh pihak kontraktor sebagaimana keperluan yang dinyatakan dalam C-plan dan perlu mendapat kelulusan JKR. ITP yang dibangunkan ini merupakan panduan untuk membantu PP/WPP menyemak ITP yang disediakan oleh pihak kontraktor.

Dokumen ITP Edisi 2020 ini telah dibuat penambahbaikan oleh *Subject Matter Expert* (SME) masing-masing berdasarkan spesifikasi terkini jabatan yang mengandungi sepuluh (10) bidang kerja utama bidang kerja utama iaitu Kerja Geoteknik, Kerja Cerun, Kerja Jalan, Kerja Sivil, Kerja Struktur, Kerja Arkitek, Kerja Lapangan Terbang, Kerja Marin, Kerja Mekanikal dan Kerja Elektrik.

Dengan adanya Dokumen ITP Edisi 2020 ini, diharapkan ianya dapat membantu Pegawai JKR dalam pelaksanaan projek dan seterusnya menyumbang ke arah mencapai objektif JKR iaitu “Menyerahkan projek yang menepati kualiti, masa dan kos yang telah ditetapkan”.

Disediakan oleh:

Urus Setia Sistem Pengurusan Bersepadu (SPB)

Bahagian Pengurusan Kualiti, Cawangan Dasar Dan Pengurusan Korporat JKR Malaysia

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PENGHARGAAN

Setinggi-tinggi penghargaan ditujukan kepada *Subject Matter Expert* (SME) Jabatan yang telah memberi komitmen yang tinggi dalam membentuk idea, usaha dan masa dalam mengemaskini Dokumen *Inspection and Testing Plan* (ITP) Edisi Tahun 2020 untuk rujukan kepada pegawai-pegawai tapak bina JKR dalam melaksanakan tugas.

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1.0 KERJA GEOTEKNIK



TRADE

- 1.1 Site Investigation (Revised 1/2020)**
- 1.2 Earthworks**
- 1.3 Ground Improvement**
- 1.4 Kerja Asas / Foundation**
 - 1.4.1 Shallow Foundation
- 1.5 Deep Foundation / Piling Works**
 - 1.5.1 Pre-Cast Driven / Jacked – In Pile
 - 1.5.2 Cast-insitu Bored Pile /Micro Pile

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TRADE : 1.1 SITE INVESTIGATION (Revised 1/2020)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Deep Boring	Number of borehole/ Locations	Refer to drawings (design requirement) & scope of SI Federal Aviation Administration (FAA) AC 150/5320-6E CI 202	Coordinates & Reduce Level	Every test location	Contractor/ Supervising Engineer	As built plan	Federal Aviation Administration (FAA) AC 150/5320-6E CI 202 for Airport Construction
		Method Of Drilling	JKR/SPJ/2013-S17 Clause 17.2 MS2038:2006 Clause 4.2.8	Visual inspection	Every test location	Contractor/ Supervising Engineer	Photos & SI Report	
		Sampling	JKR/SPJ/2013-S17 Clause 17.3 MS2038:2006 Clause 4.3 & 4.4	Visual inspection & Measurement Tools	Every test location	Contractor/ Supervising Engineer	Photos & SI Report	
		Termination Depth	SI Scope Of Work	Tools to measure depth	Every test location	Contractor/ Supervising Engineer	Borelog in SI Report	
		Ground Water Level	JKR/SPJ/2013-S17 Clause 17.4.7	Tools to measure depth	Beginning & End Of Shift	Contractor/ Supervising Engineer	Borelog in SI Report	
2	JKR/ Mackintosh Probe	Number of probe/ Locations	Refer to drawings (design requirement) & scope of SI Federal Aviation Administration (FAA) AC 150/5320-6E CI 202	Coordinates & Reduce Level	Every test location	Contractor/ Supervising Engineer	As built plan in SI Report	
		Setting up	JKR/SPJ/2013-S17 Clause 17.4.5	Visual inspection	Every test location	Contractor/ Supervising Engineer	Photos & SI Report	
		Termination Depth	JKR/SPJ/2013-S17 Clause 17.4.5 MS2038:2006 Clause 5.3.2.2	Digital Counter & Tools to measure depth	Every test location	Contractor/ Supervising Engineer	Probe log in SI Report	
3	Standard Penetration Test	Testing procedures	JKR/SPJ/2013-S17 Clause 17.4.1 MS2038:2006 Clause 5.2.2	Digital Counter & Measurement Tools	Every 1.5m interval depth / SI Scope Of Work	Contractor/ Supervising Engineer	Borelog in SI Report	
4	Trial Pit	Number of trial pit/locations	Refer to construction drawings (design requirement) Federal Aviation Administration (FAA) AC 150/5320-6E CI 202	Coordinates & Reduce Level	Every test location	Contractor/ Supervising Engineer	As built plan in SI Report	Federal Aviation Administration (FAA) AC 150/5320-6E CI 202 for Airport Construction
		Quantity of samples condition/quality of sample	JKR/SPJ/2013-S17 Clause 17.3.8	Weighing Scale	Every layer of soil	Contractor/ Supervising Engineer	Trial Pit Log in SI Report	
5	Vane Shear Test□	Testing procedures	JKR/SPJ/2013-S17 Clause 17.4.1 MS2038:2006 Clause 5.2.3	Measurement Tools	Every 1.0m -1.5m interval depth/ SI Scope Of Work	Contractor/ Supervising Engineer	Vane Shear Test Log in SI Report	
6	Hand Auger□	Sampling	JKR/SPJ/2013-S17 Clause 17.4.9 MS2038:2006 Clause 4.2.4	Tools to measure depth	Every 1.5m interval depth/ SI Scope Of Work	Contractor/ Supervising Engineer	Hand Auger Log in SI Report	

TRADE : 1.2 EARTHWORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Site clearing	Area to be cleared	JKR/SPJ/2013-S2: Clause 2.1.2.1 Refer to construction drawings	Survey equipment	The whole site	Contractor/ Project Manager	Setting out plan	
		Depth of grubbing	Refer to construction drawings or at least 0.5m below ground level	Tools to measure depth			Survey plan	
		Removal of topsoil	Refer to construction drawings or at least 0.1m below ground level	Tools to measure depth			Survey plan	
2	Excavation	Dimensional tolerance (depth)	Width < 300mm than the dimensions shown on the drawings	Tools to measure depth	When required	Contractor/ Project Manager	Survey plan	
		Unsuitable material (If any)	JKR/SPJ/2013-S2: Clause 2.2.1 (d) or JKR 20800-0183-14 Section B Cl. 5.2.3	Trial pit	When required		Material laboratory test	
		Grading of replacement materials	JKR/SPJ/2013-S2: Table 2.1 or JKR 20800-0183-14 Section B Cl. 5.7, Table B1	Particle Size Distribution (Gradation analysis)	When required		Material laboratory test	
		Excavation of hard materials/ rock	JKR/SPJ/2013-S2: Clause 2.2.1 (f) and (g) or JKR 20800-0183-14 Section B Cl. 5.2.5, Cl. 5.2.6, Cl. 5.10	Trial excavation	When required		Trial excavation record	
		Rock blasting	JKR/SPJ/2013-S2: Clause 2.2.3.8 or JKR 20800-0183-14 Section B Cl. 5.1.2	Trial blasting	When required		Trial blasting record	
3	Fill materials	Suitability of materials	JKR/SPJ/2013 - Cl. 2.2.4.1 and 2.2.4.2 or JKR 20800-0183-14 Section B Cl. 5.2.4 or Federal Aviation Administration (FAA) AC 150/5320-6E CI 205	Atterberg limit test	One test/ 1500 m ³ of the material to be used	Contractor/ Project Manager	Material laboratory test	Federal Aviation Administration (FAA) AC 150/5320-6E CI 205 & ICAO A. Manual Part 2 for Airport Construction
				Gradation analysis				
				Compaction test (MS 1056)				
				Soaked CBR test				
			Federal Aviation Administration (FAA) AC 150/5320-6E CI 205 & ICAO A. Manual Part 2	Plate Bearing Test				

TRADE : 1.2 EARTHWORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Construction of embankments	Trial compaction thickness	Maximum loose depth = 300mm; minimum area = 8m x 15m; not required if volume of fill < 100m ³ with approval from SO	Compaction test (MS 1056)	One test/ 1500m ³ of the material to be used	Contractor/ Project Manager	Trial compaction record	
		Degree of compaction for placement of fill materials	> 95% for cohesive material	Compaction test (MS 1056)	One test/ 500m ² of every compacted layer		Compaction records	
			> 100% for cohesionless material					
			Air voids < 5%					
		California Bearing Ratio for subgrade	CBR values as per specified in the drawing or CBR > 10%	Soaked CBR test	One test/ 4000m ² of compacted subgrade			
Shape, super elevation, level, and grade	Within +10mm and -30mm of the required level.	Survey equipment	Completion of work	As built drawings				

TRADE : 1.3 GROUND IMPROVEMENT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Remove and Replace of Unsuitable Materials	Identification of unsuitable material	Refer to SI report	N/A	N/A	Contractor/ Supervising Engineer	Lab test results & drawing	
		Depth of removal and replacement material	MS 1056 : Part 2 : 2005 or JKR/SPJ/2013-S2: Clause 2.2.1 (d) (Criteria for unsuitable materials) or JKR 20800-0183-14 Section B Cl. 5.2.3	Tools to measure depth	Before and after removal work	Contractor/ Supervising Engineer	SI Report & Lab test results & survey records	
2	Piled Embankment	Refer to ITP for Piling Works (Driven/Jacked-in)	Refer to ITP for Piling Works (Driven/Jacked-in)	Refer to ITP for Piling Works (Driven/Jacked-in)	Refer to ITP for Piling Works (Driven/Jacked-in)	Contractor/ Supervising Engineer	As built plan	
3	Surcharging	Thickness of filling materials and compaction works	Construction drawing & JKR/SPJ/2013 Clause 2.2.3.5 & Clause 2.2.2.1(e)	Refer to ITP for Earthworks	Refer to ITP for Earthworks	Contractor/ Supervising Engineer	As built plan	
		Surcharging period	Refer to construction drawings	Degree of consolidation & Time	As per engineer's instruction	Contractor/ Supervising Engineer	Settlement records	
4	Prefabricated Vertical Drain (PVD)	Approval of materials, storage and installation equipment	Refer to engineer's specification, manufacturer's instruction and approved method statement	Visual inspection, lab test on samples	Prior to PVD installation	Contractor/ Supervising Engineer	Quality records, Lab test result	
		PVD installation and depth of driving	Refer to construction drawings	Visual inspection, installation record verification	Every installation point	Contractor/ Supervising Engineer	Quality records	
		Method of testing/acceptance criteria	Refer to engineer's specification, manufacturer's instruction and approved method statement	Visual inspection, installation record verification	Every installation point	Contractor/ Supervising Engineer	Quality records	
5	Basal Reinforcement with High Strength Geotextile / Geogrid	Approval of materials, storage and installation equipment	Refer to engineer's specification, manufacturer's instruction and approved method statement	Visual inspection, lab test on samples	Prior to installation	Contractor/ Supervising Engineer	Quality records, Lab test result	
		Installation method and coverage	Refer to construction drawings, engineer's specification, manufacturer's instruction and approved method statement	Visual inspection, installation record verification	Every installation point	Contractor/ Supervising Engineer	Quality records	
		Method of testing/acceptance criteria	Refer to construction drawings, engineer's specification, manufacturer's instruction and approved method statement	Visual inspection, installation record verification	Refer to construction drawings & method statement	Contractor/ Supervising Engineer	Borelog	

TRADE : 1.3 GROUND IMPROVEMENT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
6	Stone column	Approval of materials, storage and installation equipment	Refer to engineer's specification, manufacturer's instruction and approved method statement	Visual inspection, any test specified by Engineer	Prior to installation	Contractor/ Supervising Engineer	Quality records, Lab test result	
		Installation method and depth	Refer to construction drawings, engineer's specification, manufacturer's instruction and approved method statement	visual inspection, installation record verification	Every installation point	Contractor/ Supervising Engineer	Quality records	
		Method of testing/acceptance criteria	Refer to construction drawings, engineer's specification, manufacturer's instruction and approved method statement	Visual inspection, load test	Refer to construction drawings & method statement	Contractor/ Supervising Engineer	Borelog	
7	Instrumentation	Installation of instrumentation	Refer to construction drawings & JKR/SPJ/2013 Clause 2.2.6.3	Visual inspection, any test specified by Engineer	Prior to installation	Contractor/ Supervising Engineer	Quality records, Lab test result	
		Location of monitoring instruments	At location and level as shown on drawings and protected from disturbances especially from being run down by construction machineries	Visual inspection, installation record verification	Every installation point	Contractor/ Supervising Engineer	Quality records	
		Monitoring record	Refer to construction drawings & JKR/SPJ/2013 Clause 2.2.6.4	visual inspection, installation record verification	Refer to construction drawings & method statement	Contractor/ Supervising Engineer	Monitoring reports	
		Acceptance criteria	Refer to construction drawings	Settlement monitoring results	Refer to construction drawings & method statement	Contractor/ Supervising Engineer	Settlement records	

TRADE : 1.4 KERJA ASAS / FOUNDATION				SUB-TRADE : 1.4.1 SHALLOW FOUNDATION				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Excavation	Verify the founding depth	Refer to construction drawings (design requirement)	Measurement Tape	Every column position	Contractor/ Site Engineer	N/A	
		Verify the soil bearing capacity	Refer to construction drawings (design requirement)	JKR Probe/ Mackintosh Probe or Plate Bearing Test	Every column position (Probe)/ As per specified (PBT)	Contractor/ Site Engineer	Probe record/ Plate bearing test record	
2	Concreting works	Refer to ITP for concrete works	Refer to ITP for concrete works	Refer to ITP for concrete works	Refer to ITP for concrete works	Contractor/ Project Manager	Refer to ITP for concrete works	

TRADE : 1.5 DEEP FOUNDATION / PILING WORKS				SUB-TRADE : 1.5.1 PRE CAST (DRIVEN / JACKED - IN PILE)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Piling equipments (Type/ hammer weight/ pressure requirement)	Approval of piling equipments	Refer to construction drawings & Method statement	Visual inspection	Prior to pile installation	Contractor/ Project Manager	Equipment specification & calibration records	
2	Set criteria (End bearing piles)	Set criteria calculation by contractor	Less than 10 Blows/25mm/ Required pressure (psi) equivalent to 2.5x WL	Hiley's formulae (Driven pile) or equivalent approved by S.O./ Correlation chart (Jacked-in)	Prior to pile installation	Contractor/ Project Manager	Set calculation	
3	Piles	Physical condition of piles (Type/ dimension/ shoes/ defects)	Refer to construction drawings & JKR 20800-0183-14 Section C Cl. 2.2.13 & Cl. 2.2.14	Visual inspection	3 specimens for each batch of delivery or every 40 piles whichever is larger.	Contractor/ Project Manager	Record and defects marking	
		Structural capacity of piles	Refer to construction drawings	Concrete and reinforcement testing equipment	Production stage in factory/ Each batch of delivery		Pile materials testing records & certificate of comformance	
				Pile bending strength test equipment	Material on site/ If necessary		Pile bending test report	
		Handling and storage of piles	JKR 20800-0183-14 Section C Cl. 2.2.15	Visual inspection	Material on site/ If necessary		Construction progress report	
4	Installation of piles	Number of preliminary pile	Refer to construction drawings	Contract document	Prior ro installation of preliminary pile	Contractor/ Project Manager	As built drawing & piling records	
		Pile deviation	< 75mm	Survey equipments	Every pile		As built drawing/ Survey record/ pins/ pegs/ markers	
		Verticality of pile	< 1:75	Survey equipments/ plumb bob			As built drawing	
		Pile extension	JKR 20800-0183-14 Section C Cl. 2.2.16	Visual inspection	Every extension of pile		Welding records	
		Termination of pile	Set criteria (end bearing pile)/ penetration depth as specified in the drawings (friction pile)	Visual inspection	Every pile		Pile driving record	

TRADE : 1.5 DEEP FOUNDATION / PILING WORKS				SUB-TRADE : 1.5.1 PRE CAST (DRIVEN / JACKED - IN PILE)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5	Pile testing (Static load test)	Test method	Refer to construction drawings, Method Statement	Document review	Prior to commencement of testing	Contractor/ Project Manager	Method statement	
		Number of test	Refer to construction drawings	Contract document & Method Statement	Prior to commencement of testing		Load test report	
		Suitability of apparatus	JKR/SPJ/2010-S10: Section 10.9.4 or JKR 20800-0183-14 Section C Cl. 2.9.4	Document review	Prior to commencement of testing		Calibration certificate	
		Testing procedures	JKR/SPJ/2010-S10: Section 10.9.5 or JKR 20800-0183-14 Section C Cl. 2.9.5	Document review	Every pile test		Method statement	
		Allowable capacity of pile (Acceptance of piles)	Residual settlement after removal of test load < (D/120+4)mm or 6.5mm, whichever the lowest	Load Settlement Graph	Every pile test		Load test report	
			Total settlement under design load < 12.5mm					
			Total settlement under 2xWL < 38mm Or 10% x pile diameter; whichever is the lower value.					

TRADE : 1.5 DEEP FOUNDATION / PILING WORKS				SUB-TRADE : 1.5.2 CAST INSITU (BORED PILE/ MICROPILE)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Concrete and reinforcement	Approval of materials	Refer to ITP for concrete works	Refer to ITP for concrete works	Refer to ITP for concrete works	Refer to ITP for concrete works	Refer to ITP for concrete works	
2	Support fluid (Bentonite)	Consistency and batching process	JKR 20800-0183-14 Section C Cl. 2.5.2.4 & MS 28	Visual inspection & consistency test	When required	Contractor/ Project Manager	Manufacturer's certificate & mix propotion	
3	Boring/ drilling operation	Dimension of drilled hole.	Tolerance of +5% to 0%	Measurement tools	Every pile	Contractor/ Project Manager	Boring/ drilling record	
		Depth of boreholes	Refer to construction drawings	Measurement tools	Every pile	Contractor/ Project Manager		
		Depth of rock socket (if required). (Sokected Length)	Refer to construction drawings	Measurement tools	Every pile	Contractor/ Project Manager		
		Level of support fluid	> 1m above the external ground water level.	Measurement tools	Every pile	Contractor/ Project Manager		
		Continuity of construction	Time interval between completion of boring and placing of concrete shall be < 6 hours.	Time measurement tools	Every pile	Contractor/ Project Manager		
		Enlarged pile bases (if any)	Concentric within 10% of shaft diameter.	Measurement tools	Every pile	Contractor/ Project Manager		
			Sloping surface of frustum > 55°					
			Minimum height of base = 150mm					
		Position of reinforcement	If temporary casings are employed, longitundinal reinforcement shall be > 1.0m below the bottom of the casing.	Measurement tools	Every pile	Contractor/ Project Manager		
4	Concreting operations	Workability	JKR/SPJ/2010-S10: Table 10.2 or JKR 20800-0183-14 Section C Cl. 2.5.5.2	Slump test equipment	Refer to ITP for concrete works	Contractor/ Project Manager	Refer to ITP for concrete works	
		Volume of Concrete	Refer to construction drawings	Measurement tools	Every pile	Contractor/ Project Manager	bored pile log	
		Bleeding test on grout	Max. bleed < 5% (BS EN 480-4:2005)	Bleeding test equipment	Every batch of grout	Contractor/ Project Manager	Grouting record	

TRADE : 1.5 DEEP FOUNDATION / PILING WORKS				SUB-TRADE : 1.5.2 CAST INSITU (BORED PILE/ MICROPILE)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5	Pile testing (Static load test)	Test method	Refer to construction drawings	Document review	Prior to commencement of testing	Contractor/ Project Manager	Method statement	
		Number of test	Refer to construction drawings	Contract document & Method Statement	Prior to commencement of testing	Contractor/ Project Manager	Load test report	
		Suitability of apparatus	JKR/SPJ/2010-S10: Section 10.9.4 or JKR 20800-0183-14 Section C Cl. 2.9.4	Document review	Prior to commencement of testing	Contractor/ Project Manager	Calibration certificate	
		Testing procedures	JKR/SPJ/2010-S10: Section 10.9.5 or JKR 20800-0183-14 Section C Cl. 2.9.5	Document review	Every pile test	Contractor/ Project Manager	Method statement	
		Allowable bearing capacity of pile	Residual settlement after removal of test load < (D/120+4)mm or 6.5mm, whichever the lowest	Load Settlement Graph	Every pile test	Contractor/ Project Manager	Load test report	
			Total settlement under design load < 12.5mm					
			Total settlement under 2xWL < 38mm Or 10% x pile diameter; whichever is the lower value.					

2.0 KERJA CERUN



TRADE

2.1 Slope Stabilization

- 2.1.1 Rock Bolt And Rock Dowel
- 2.1.2 Reinforced Soil Slope
- 2.1.3 Reinforced Soil Wall
- 2.1.4 Reinforced Soil Structure
- 2.1.5 Tie Back Wall
- 2.1.6 Ground Anchor
- 2.1.7 Soil Nailing
- 2.1.8 Geocell
- 2.1.9 Guniting
- 2.1.10 Horizontal Drain
- 2.1.11 Hydroseeding

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TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.1 ROCK BOLT AND ROCK DOWEL				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Testing Instrument	i. Testing Method ii. Suitability Apparatus iii. Testing Procedure	i. JKR/SPJ/2013-S16 Cl. 16.5 ii. Construction drawing		Construction drawing	Contractor / SO	i. Method of Statement ii. Instrument Certificate iii. Testing records & Certificate of conformance iv. RFI v. Drilling Record	
2	Material	i. Physical Condition ii. Structural Capacity	i. JKR/SPJ/2013-S16 Cl. 16.5 ii. Construction drawing	JKR/SPJ/2013-S16 Cl.16.5	Material on site	Contractor / SO	i. Method of Statement ii. Instrument Certificate iii. Testing records & Certificate of conformance iv. RFI v. Drilling Record	
3	Installation	Termination of Drilling	i. JKR/SPJ/2013-S16 Cl. 16.5 ii. Construction drawing	Drilling record	Construction drawing	Contractor / SO	i. Method of Statement ii. Instrument Certificate iii. Testing records & Certificate of conformance iv. RFI v. Drilling Record	

TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.2 REINFORCED SOIL SLOPE				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material	i) Physical condition ii) Strength	i. JKR/SPJ/2013- S16 Cl.16.7 ii. Construction Drawing	i. Visual ii. Measurement iii. Testing	Initial and Construction Stage	Contractor / SO	i. Method statement ii. Certificate of conformance	
2	Handling and Storage	i) Visual ii) Measurement	i. JKR/SPJ/2013- S16 Cl.16.7 ii. Construction Drawing	i. Visual ii. Measurement iii. Testing	Initial and Construction Stage	Contractor / SO		
3	Installation	Level and Location	i. JKR/SPJ/2013-S16Cl. 16.7 ii. Construction Drawing	i. Visual ii. Measurement iii. Testing	Initial and Construction Stage	Contractor / SO		
4	Backfill and Compaction	Refer to ITP for Earthwork	Refer to ITP for Earthwork	Refer to ITP for Earthwork	Refer to ITP for Earthwork	Refer to ITP for Earthwork	Refer to ITP for Earthwork	

TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.3 REINFORCED SOIL WALL			
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	EVIDENCE	REMARKS
1	Approval Materials: i) Facing materials ii) Reinforcing element and connections iii) Hot-dip galvanising iv) Joint filler and sealant v) Fill material	Receiving of materials / Visual inspection and manufacturer records	Specification for Reinforced Soil Structures and Slopes	BS 8006	Every panels/no	-	-
2	Construction	Foundation soil / bearing capacity Erection of elemental facing / verticality and horizontally Fill materials Placement of reinforcing elements - tensile test / pull out test Connections	Specification for Reinforced Soil Structures and Slopes & Construction drawings Specification for Reinforced Soil Structures and Slopes & Construction drawings Specification for Reinforced Soil Structures and Slopes, Construction drawings & Manufacturer recommendation Specification for Reinforced Soil Structures and Slopes, Construction drawings & Manufacturer recommendation Specification for Reinforced Soil Structures and Slopes, Construction drawings & Manufacturer recommendation	BS 8006 BS 8006 BS 8006 BS 8006 BS 8006	Initial stage Every layer Every layer Every layer Every layer	-	-

TRADE : 2.1 SLOPE STABILIZATION				SUB TRADE : 2.1.4 REINFORCED SOIL STRUCTURE				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material	i) Physical condition ii) Structure capacity	i. JKR/SPJ/2013- S16 Cl.16.7 ii. Construction Drawing	i. Visual ii. Measurement iii. Testing	Initial and Construction Stage	Contractor / SO	i. Method statement ii. Certificate of conformance	
2	Handling and Storage	i) Visual ii) Measurement	i. JKR/SPJ/2013- S16 Cl.16.7 ii. Construction Drawing	i. Visual ii. Measurement iii. Testing	Initial and Construction Stage	Contractor / SO		
3	Installation	i) Interlocking ii) Alignment	i. JKR/SPJ/2013-S16Cl. 16.7 ii. Construction Drawing	i. Visual ii. Measurement iii. Testing	Initial and Construction Stage	Contractor / SO		
4	Backfill and Compaction	Refer to ITP for Earthwork	Refer to ITP for Earthwork	Refer to ITP for Earthwork	Refer to ITP for Earthwork	Refer to ITP for Earthwork	Refer to ITP for Earthwork	

TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.5 TIE BACK WALL				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material	As per submission	JKR/SPJ/2013- S16 Cl.16.8	As per submission	Initial Stage	Contractor / SO	Test Report	
2	Packaging/Storage	As per submission	JKR/SPJ/2013- S16 Cl.16.8	As per submission	Initial Stage	Contractor / SO	Method Statement	
3	Installation	As per submission	JKR/SPJ/2013- S16 Cl.16.8	As per submission	Initial Stage	Contractor / SO	i. Drawing ii. Method Statement	
4	Testing	As per submission	JKR/SPJ/2013- S16 Cl.16.8	As per submission	Initial Stage	Contractor / SO	Test Report	

TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.6 GROUND ANCHOR				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material i. Tendons ii. Cement Grout iii. Greases iv. Plastics v. Metal Ducting vi. Rubber Rings	Material approval	JKR/SPJ/2013-S16 Cl. 16.6.10.1 – 16.6.10.7	i. Visual ii. Measurement iii. Testing	Once per project	Contractor / SO	Results Report	
2	Handling And Storage	Physical Condition	JKR Specification	i. Visual ii. Measurement	Initial and Construction Stage	Contractor / SO	i. Method Statement ii. Certificate of conformance	
3	Installation	i. End of bore ii. Insertion of tendon iii. Grouting	JKR/SPJ/2013-S16 Cl.16.6.18	i. Visual ii. Measurement iii. Testing	Once per project	Contractor / SO	Records	
4	Anchor Testing	i. Proving tests ii. On-site suitability tests iii. On-site acceptance tests	JKR/SPJ/2013-S16 Cl. 16.6.21	i. Visual ii. Measurement iii. Testing	Once per project	Contractor / SO	Test Report	
5	Monitoring	Monitoring Records submitted within 72 hours of completion of monitoring	JKR/SPJ/2013-S16 Cl. 16.6.22	Visual □	During construction	Contractor / SO	Reports	

TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.7 SOIL NAILING				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Materials i. Reinforcement ii. Cement Grout iii. Centralizers iv. Corrugated HDPE Sheath	Material approval	JKR/SPJ/2013-S16 Cl. 16.3.3.1 to 16. 3.3.4	i. Visual ii. Measurement iii. Testing	Once per project	Contractor / SO	Results Report	
2	Handling And Storage	Physical Condition	JKR/SPJ/2013-S16 Cl. 16.3.3.5	i. Visual ii. Measurement	Initial and Construction Stage	Contractor / SO	i. Method Statement ii. Certificate of conformance	
3	Installation	i. Drilling ii. Inserting reinforcement iii. Grouting iv. Nail Head Construction	JKR/SPJ/2013-S16 Cl. 16.3.4	i. Visual ii. Measurement iii. Testing	Once per project	Contractor / SO	Records	
4	Pull-Out Tests	Checking : i. Equipment ii. Calibration Certificate iii. Competent Installer iv. Test Results	JKR/SPJ/2013-S16 Cl. 16.3.8	i. Visual ii. Measurement iii. Testing	Once per project	Contractor / SO	Test Report	

TRADE : 2.1 SLOPE STABILIZATION

SUB-TRADE : 2.1.8 GEOCELL

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Materials	i. Physical condition ii. Technical Properties	i. JKR/SPJ/2013- S16 Cl. 16.2 ii. Refer Table 16.2.1 and 16.2.2	i. Visual ii. Measurement iii. Testing	Initial Stage	Contractor / SO	i. Inspection Form ii. Consignment Certificate by Manufacturer iii. Test report iv. Method Statement	
2	Packaging/Storage	Visual	JKR/SPJ/2013- S16 Cl. 16.2.4	Visual	Initial and Construction Stage	Contractor / SO	Method Statement	
3	Installation	i. Location ii. Size iii. Infill Material	JKR/SPJ/2013- S16 Cl. 16.2.5	i. Visual ii. Measurement	During construction	Contractor / SO	i. Mock Up ii. As Built Drawing	

TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.9 GUNITING				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Materials	i. Physical condition ii. Technical Properties	JKR/SPJ/2013- S16 Cl. 16.4.2	i. Visual ii. Measurement iii. Testing	Initial Stage	Contractor / SO	i. Inspection Form ii. Consignment Certificate by Manufacturer iii. Test report iv. Method Statement	
2	Packaging/Storage	Visual	JKR/SPJ/2013- S16 Cl. 16.4.2	Visual	Initial and Construction Stage	Contractor / SO	Method Statement	
3	Installation	i. Location ii. Thickness iii. Reinforcement Bar	JKR/SPJ/2013- S16 Cl.16.4.3,16.4.6,16.4.7, 16.4.8,16.4.9	i. Visual ii. Measurement	During construction	Contractor / SO	i. Mock Up ii. As Built Drawing	
4	Testing	i. Rebound Hammer ii. Coring Test	JKR/SPJ/2013- S16 Cl. 16.4.4	Rebound Hammer Coring Machine	During construction	Contractor / SO	Test Report	

TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.10 HORIZONTAL DRAIN				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material	Physical condition	i. JKR/SPJ/2013-S16 Cl. 16.1 ii. Construction Drawing	Visual and Measurement	Initial and Construction Stage	Contractor / SO		
2	Drilling and Installation	Termination of drilling	i. JKR/SPJ/2013- S16 Cl.16.1 ii. Construction Drawing	Drilling Record	Initial and Construction Stage	Contractor / SO	Drilling record	
3	Concrete Lined Chutes	Water Flow	i. JKR/SPJ/2013-S16Cl. 16.1 ii. Construction Drawing	Visual and Measurement	Initial and Construction Stage	Contractor / SO		

TRADE : 2.1 SLOPE STABILIZATION				SUB-TRADE : 2.1.11 HYDROSEEDING				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Materials	Visual	JKR/SPJ/2013- S16 Cl. 16.11.2, 16.11.3	Visual	Initial Stage	Contractor / SO	Photograph	
2	Installation	Visual	JKR/SPJ/2013- S16 Cl. 16.11.4 to 16.11.10	Visual	Initial and Construction Stage	Contractor / SO	Progress Photograph	

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3.0 KERJA JALAN



TRADE

- 3.1 Flexible Pavement
- 3.2 Specialty Mix 1 - Porous Asphalt
- 3.3 Specialty Mix 2 - Stone Mastic Asphalt
- 3.4 Specialty Mix 3 - Gap Graded Asphalt
- 3.5 Specialty Mix 4 - Hot In-Place Recycling
- 3.6 Specialty Mix 5 - Cold In - Place Recycling
- 3.7 Specialty Mix 6 - Polymer Modified
Asphaltic Concrete
- 3.8 Road Shoulders
- 3.9 Road Furniture
 - 3.9.1 Corrugated Sheet Steel Beam Highway
Guardrail (*Revised 1/2020*)
 - 3.9.2 Concrete Kerb (*Revised 1/2020*)
 - 3.9.3 Wire Rope Safety Fence (*Revised 1/2020*)
 - 3.9.4 Road Marking (*Revised 1/2020*)
 - 3.9.5 Traffic Signs (*Revised 1/2020*)
- 3.10 Portland Cement Concrete Pavement (*New Trade*)
- 3.11 Prestressing For Structure (*New Trade*)
- 3.12 Bridge Bearings (*New Trade*)
- 3.13 Expansion Joints (*New Trade*)
- 3.14 Parapet (*New Trade*)

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TRADE : 3.1 FLEXIBLE PAVEMENT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Approval of Sub Base Material	Material Suitability : Gradation Limits Laboratory Compaction : Soaked CBR Test Mechanical Properties : Plasticity Index, Pi 10% Fines Value Passing of No. 4 (4.75 mm) sieve	JKR/SPJ/2008-S4 - CI 4.2.2.2 Table 4.2.2 JKR/SPJ/2008-S4 - CI 4.2.2.2.i JKR/SPJ/2008-S4 - CI 4.2.2.2.ii Not more 12 Not less than 30 kN Not less than 45%	BS1377 : Part 2 : 1990 BS1377 : Part 4 : 1990 (4.5 kg rammer method) BS1377 : Part 2 : 1990 MS 30 : Part 9 : 1995 ASTM D2419	1. Initial stage 2. One test per 750 cu metre stockpile or laid Initial Stage 1. Initial Stage 2. One test per 750 cu metre stock pile or laid	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue	
2	Sub Base Construction	Thickness In Situ Compaction Test Surface Finishes - Shape, Super elevation, Level, Grade	JKR/SPJ/2008-S4 - CI 4.2.2.3 & Table 4.5.1 JKR/SPJ/2008-S4 - CI 4.2.2.3 Not less than 95% max dry density JKR/SPJ/2008-S4 - CI 4.2.2.3 within tolerance as Table 4.5.1	Dipping method BS1377 : Compaction Test Relevant construction drawings	Over any 100 metre length One test per 500 sq metre of each layer laid	Contractor/ Supervision Engineer	Inspection Form/ Record/ Certificate	

TRADE : 3.1 FLEXIBLE PAVEMENT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Approval of Roadbase Material	Physical & Mechanical Properties:- Plasticity Index Aggregate Crushing Value Flakiness Index Loss of weight in magnesium sulphate soundness tests Soaked CBR Test Passing of the No. 4 (4.75mm) sieve Sieve Analysis	JKR/SPJ/2008-S4 - CI 4.2.3.2 Not more than 6 Not more than 25% Not more than 25% Not more than 18% Not less than 80% when compacted to 95% max dry density Not less than 45% Table 4.2.3	BS 1377 : Part 2 : 1990 MS 30 : Part 8 : 1995 MS 30 : Part 5 : 1995 AASHTO Test Method T 104 BS 1377 : Part 4 : 1990 (4.5 kg rammer method) ASTM D 2419 BS 1377 : Part 2 : 1990	1. Initial stage 2. One (1) test per 750 cu.m supplied	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue	
4	Roadbase Construction	Thickness In-Situ Compaction Test Surface Finishes - Shape, Super elevation, Level, Grade	JKR/SPJ/2008-S4 - CI 4.2.3.3 within tolerance as Table 4.5.1 JKR/SPJ/2008-S4 - CI 4.2.2.3 Not less than 95% max dry density JKR/SPJ/2008-S4 - CI 4.2.3.3 within tolerance as Table 4.5.1	Dipping BS1377 : Compaction Test Relevant Construction drawings	Average thickness over any 100 metre length not less than the required thickness One test per 500 sq metre of each layer laid	Contractor/ Supervision Engineer	Inspection Form/ Record/ Certificate	
5	Approval of Prime Coat Material Prime Coat Construction	Material Suitability : Cutback Emulsion Spray Test : Tray Test Spraying Temperature Curing & Opening to Traffic	JKR/SPJ/2008-S4 - CI 4.3.1.2 Table 4.3.1 Table 4.3.2 JKR/SPJ/2008-S4 - CI 4.3.1.4c Between 0.5 to 1.0 litres per sq metre Between 25°C–45°C JKR/SPJ/2008-S4 - CI 4.3.1.4d Left undisturbed for at least 24 hours after application.	MS 159 MS 161	1. Initial Stage 2. Each delivery One test per 16,000 sq.m covered Daily Operation covered	Project Manager / Construction Manager / QAQC Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Certificate /Catalogue /Method of Inspection Form/ Record	

TRADE : 3.1 FLEXIBLE PAVEMENT								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
6	Tack Coat Material Tack Coat Construction	Material Suitability Emulsion Spray Test : Tray Test Spraying Temperature	JKR/SPJ/2008-S4 - CI 4.3.1.2 Table 4.3.2 JKR/SPJ/2008-S4 - CI 4.3.1.4c Between 0.25 to 0.55 litres per sq metre Between 25°C–45°C	MS161	Initial Stage One test per 16,000 sq.m covered Daily Operation covered	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
7	Approval of Binder Course Material (Asphaltic Concrete)	Aggregates Grading Coarse Aggregate Properties:- Los Angeles Abrasion Value Magnesium sulphate soundness test Flakiness Index Water Absorption Fine Aggregates:- Passing of the No. 4 (4.75mm) sieve Fine aggregate angularity Methylene Blue value magnesium sulphate soundness test Water Absorption	JKR/SPJ/2008-S4 - CI 4.3.3.2 Table 4.3.3 JKR/SPJ/2008-S4 - CI 4.3.3.2a Not more than 25% Not more than 18% Not more than 25% Not more than 2% JKR/SPJ/2008-S4 - CI 4.3.3.2 Not less than 45% Not less than 45% Not more than 10mg/g Not more than 18% Not more than 2%	BS1377 : Washing and Sieving Method ASTM C 131: 1996 AASHTO Test Method T 104 MS 30 : Part 5 : 1995 MS 30 ASTM D 2419 ASTM C 1252 Ohio Department of Transportation Standard Test Method AASHTO Test Method T 104 MS 30	i. Initial stage or any change of aggregates source ii. One (1) test per 1,000 cu.m or at least one (1) test for each plant operation session. i. Initial stage ii. One (1) test per 200 tons produced or each plant operation	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue /Method of Statement	

TRADE : 3.1 FLEXIBLE PAVEMENT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
8	Approval of Mix Design	Job Mix Formula Marshall Properties : Bulk Specific Gravity, SG Stability, S Flow, F Stiffness, S/F Air Voids in Mix, VIM Voids in aggregate filled with bitumen, VFB Bitumen Contents Bitumen Extraction Plant Trial Compliance	JKR/SPJ/2008-S4 - CI 4.3.3.3a Table 4.3.5 Not less than 8000N 2.0 – 4.0mm Not less than 2000N/mm 3.0 – 7.0% 65 – 75% JKR/SPJ/2008-S4 - CI 4.3.3.3 Table 4.3.4 JKR/SPJ/2008-S4 - CI 4.3.3.b Minimum of 20 tonnes JKR/SPJ/2008-S4 - CI 4.3.3.c Table 4.3.6	ASTM D 2726 ASTM D 1559 ASTM D 1559 ASTM D 2172	i. Initial stage ii. One (1) test per 200 tons produced or at least one (1) test for each plant operation session. i. Initial stage ii. One (1) test per 200 tons produced or each plant operation Initial Stage Initial stage	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate	
9	Approval of Construction Method	Longitudinal Joints Traverse Joints Compaction In Situ Density Test Thickness Surface Finishes - Shape, Super elevation, Level, Grade Opening to traffic	JKR/SPJ/2008-S4 - CI 4.3.3.5h Overlap by at least 100mm Overlap by at least 500mm JKR/SPJ/2008-S4 - CI 4.3.3.5i 95 – 100% Marshall density JKR/SPJ/2008-S4 - CI 4.3.3.5j i. Average thickness over any 100 metre length $\geq$ required thickness ii. Minimum thickness at any point $\geq$ required thickness minus 5mm JKR/SPJ/2008-S4 - CI 4.2.3.5j JKR/SPJ/2008-S4 - CI 4.2.3.5k	Observation ASTM Test Method D 1188 or ASTM Test Method D 2726 Measurement Relevant Construction drawings Observation	Every completed section or daily operation. One (1) sample per 500 sq.m of mix laid, but not less than two (2) samples for the work completed in each paving session	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate / Catalogue	

TRADE : 3.1 FLEXIBLE PAVEMENT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
10	Approval of Wearing Course Material (Asphaltic Concrete)	Aggregates Grading	JKR/SPJ/2008-S4 - CI 4.3.3.2 Table 4.3.3	BS1377 : Washing and Sieving Method	i. Initial stage or any change of aggregates source ii. One (1) test per 1,000 cu.m or at least one (1) test for each plant operation session.	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue /Method of Statement	
		Coarse Aggregate Properties Los Angeles Abrasion Value Magnesium sulphate soundness test Flakiness Index Water Absorption	JKR/SPJ/2008-S4 - CI 4.3.3.2a Not more than 25% Not more than 18% Not more than 25% Not more than 2%	ASTM C 131: 1996 AASHTO Test Method T 104 MS 30 : Part 5 : 1995 MS 30	i. Initial stage ii. One (1) test per 200 tons produced or each plant operation			
		Fine Aggregates Passing of the No. 4 (4.75mm) sieve	JKR/SPJ/2008-S4 - CI 4.3.3.2 Not less than 45%	ASTM D 2419				
		Fine aggregate angularity Methylene Blue value	Not less than 45% Not more than 10mg/g	ASTM C 1252 Ohio Department of Transportation Standard Test Method				
		magnesium sulphate soundness test	Not more than 18%	AASHTO Test Method T 104				
		Water Absorption	Not more than 2%	MS 30				
11	Approval of Mix Design	Job Mix Formula Marshall Properties : Bulk Specific Gravity, SG Stability, S Flow, F Stiffness, S/F Air Voids in Mix, VIM Voids in aggregate filled with bitumen, VFB	JKR/SPJ/2008-S4 - CI 4.3.3.3 Table 4.3.5 Not less than 8000N 2.0 – 4.0mm Not less than 2000N/mm 3.0 – 5.0% 70 – 80%	ASTM D 2726 ASTM D 1559 ASTM D 1559	i. Initial stage ii. One (1) test per 200 tons produced or at least one (1) test for each plant operation session.	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate	
		Bitumen Contents Bitumen Extraction	JKR/SPJ/2008-S4 - CI 4.3.3.3 Table 4.3.4	ASTM D 2172	i. Initial stage ii. One (1) test per 200 tons produced or each plant operation			

TRADE : 3.1 FLEXIBLE PAVEMENT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
12	Approval of Construction Method	Longitudinal Joints Traverse Joints Compaction In Situ Density Test Thickness Surface Finishes - Shape, Super elevation, Level, Grade Opening to traffic	JKR/SPJ/2008-S4 - CI 4.3.3.5h Overlap by at least 100mm Overlap by at least 500mm JKR/SPJ/2008-S4 - CI 4.3.3.5i 95 – 100% Marshall density JKR/SPJ/2008-S4 - CI 4.3.3.5j i. Average thickness over any 100 metre length $\geq$ required thickness ii. Minimum thickness at any point $\geq$ required thickness minus 5mm JKR/SPJ/2008-S4 - CI 4.3.3.5j JKR/SPJ/2008-S4 - CI 4.3.3.5k	Observation ASTM Test Method D 1188 or ASTM Test Method D 2726 Measurement Relevant Construction drawings Observation	Every completed section or daily operation. One (1) sample per 500 sq.m of mix laid, but not less than two (2) samples for the work completed in each paving session	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue /Method of Statement	
13	Determination of Surface Regularity	International Roughness Index (IRI)	JKR/SPJ/2008-S4 - CI 4.5.3.2 Less than 2m/km for each 100m	ARRB Walking Profiler as outlined in AUSTROAD PAT 01:2001	Before open to traffic	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	

TRADE : 3.2 SPECIALTY MIX 1 - POROUS ASPHALT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material		JKR/SPJ/2008-S4 - Cl. 4.6.2					
	a. Course Aggregate	Course Aggregate Properties : i. Abrasion Loss Los Angeles	Not more than 25% ASTMC 131	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		ii. Water Absorption	Not more than 2% MS 30					
		iii. Flakiness Index	Not more than 25% MS 30					
		iv. Polished Stone Value	Not less than 40 MS 30					
		v. 5 cycles Magnesium Sulphate Soundness test, wt. loss	Not more than 18% AASHTO T 104					
	b. Fine Aggregate	Fine Aggregate Properties : i. Aggregate fraction passing the No.4 Sieve	Not less than 45% ASTM D 2419	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		ii. Aggregate Angularity	Not less than 45% ASTM C 1252					
		iii. Methylene Blue Value	Not more than 10mg/g					
		iv. 5 cycles Magnesium Sulphate Soundness test, wt. loss	Not more than 20% AASHTO T 104					
		v. Water Absorption	Not more than 2% MS 30					

TRADE : 3.2 SPECIALTY MIX 1 - POROUS ASPHALT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1 (cont)	c. Mineral Filler	Measurement	i. Passing 75um sieve : Not less than 70% by weight ii. Amount : Not less than 2% by weight of combined aggregates. If hydrated lime is used, it shall not exceed 2% by weight of combined aggregates	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
	d. Bituminous Binder (PG76)		JKR/SPJ/2008-S4, Cl. 4.6.2.4 Refer to Table 4.6.1	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		i. Prior to Rolling Thin Film Oven Test	i. Viscosity, max. 3 Pa.s, test temperature C. : 135 ASTM 4402 ii. Dynamic shear, G/sin d min. 1.00 kPa, 10 rad/s, test temperature C : 76 AASHTO T 315 iii. Penetration, 100 g, 5 s, 25 C, 0.1 mm. ASTM D 5 iv. Ring and Ball softening point, min. C : 60 ASTM D 36 v. Flash Point, min °C : 230 AASHTO T 48 vi. Moisture sensitivity test, greater than (%) : 80 AASHTO T 283					
		ii. After Rolling Thin Film Oven Test	i. Mass loss, max % : 1.00 AASHTO T 240 ii. Dynamic shear, G/sin d min. 2.20 kPa, 10 rad/s, test temperature C : 76 AASHTO T 315					
	e. Tack Coat Grade RS-3K	Spraying Rate	Spray at a rate of 0.5 to 1.0 litre/m ² MS161	Visual, testing and measurement	200 litres/test	Project Manager	Inspection Form	

TRADE : 3.2 SPECIALTY MIX 1 - POROUS ASPHALT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2	Mix Design	Marshall Test : i. Air Void ii. Binder Drain-Down iii. Cantabro iv. Binder Content v. Grading (sieve analysis)	JKR/SPJ/2008-S4 - Cl. 4.6.4 Design and in-place air voids shall be between 18 - 25%. ASTM D 1559 Not more than 0.3% by weight of the total mix ASTM D 2041 Average loss in mass shall not be more than 15% In the range of 4.0-6.0% Design aggregate gradation that comply with Table 4.6.4	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
3	Trial Lay	- Quantity - Record -Laying and compaction Marshall Test : i. Air Void ii. Binder Drain-Down iii. Cantabro iv. Binder Content v. Grading (sieve analysis)	20 tonnes Record as listed in JKR/SPJ/2008-S4 - Cl 4.6.4.6 Refer Construction Works JKR/SPJ/2008-S4 - Cl. 4.6.4.6 Design and in-place air voids shall be between 18 - 25% Not more than 0.3% by weight of the total mix. Average loss in mass shall not be more than 15% In the range of 4.0-6.0% Design aggregate gradation that comply with Table 4.6.4	Visual, testing and measurement Visual, testing and measurement	Initial stage Once per project	Project Manager Project Manager	Inspection Form and Record Inspection Form/Record	

TRADE : 3.2 SPECIALTY MIX 1 - POROUS ASPHALT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Construction Works		JKR/SPJ/2008 - S4 - Cl. 4.6.6					
	a. Tack Coat	Tray/Sponge	Refer to Table 4.6.2 and Table 4.6.3 MS 161 0.5– 1.0 liter/sq.m	Visual, testing and measurement	1 test per 200 liter	Project Manager	Inspection Form/Record	
	b. Laying	Min. thickness	JKR/SPJ/2008-S4 - Cl. 4.6.6.2 50mm	Visual, testing and measurement		Project Manager	Inspection Form/Record	
	c. Compaction	i. Rollers used	JKR/SPJ/2008 - S4 - Cl. 4.6.6.3 Static steel tandem rollers only	Visual, testing and measurement	1 coring per 500m ² or min 2	Project Manager	Inspection Form/Record	
		ii. Rolling temperature	Not less than 110°C					
		iii. Rolling pattern	In accordance to trial lay record					
		iv. Compaction density	Not less than 97% of the laboratory mix design density					
		v. Thickness	Average over any 100m length not less than specified thickness and minimum thickness at any point shall be not less than the specified thickness minus 5mm.					
5	Surface regularity	International Roughness Index (IRI)	The lane IRI measured for the whole road length and each 100 m section shall be less than 2.0m/km.	Visual, testing and measurement	Each 100 m section	Project Manager	Inspection Form/Record	
6	Opening to traffic	Time	JKR/SPJ/2008-S4 - Cl. 4.6.6.8 Not less than 4 hours.	Visual, testing and measurement	Prior to opening	Project Manager	Inspection Form/Record	

TRADE : 3.3 SPECIALTY MIX 2 - STONE MASTIC ASPHALT								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Materials							
	a.Coarse Aggregate		JKR/SPJ/2008-S4 - Cl 4.7.2.1	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		i. Loss by abrasion	Not more than 25% ASTM C 131					
		ii. Flakiness Index	Not more than 25% MS 30					
		iii. Polished Stone Value	Not less than 40 MS 30					
		iv. Magnesium Sulfate Soundness Test (5 cycles)	Not more than 18% AASHTO T 104					
		v. Water Absorption	Not more than 2% MS 30					
	b.Fine Aggregate		JKR/SPJ/2008-S4 - Cl 4.7.2.2	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		i. Magnesium Sulfate Soundness Test (5 cycles)	Not more than 20% AASHTO T 104					
		ii. Water Absorption	Not more than 2% MS 30					
		iii. Aggregate Fraction	Not less than 45% ASTM D 2419					
		iv. Aggregate Angularity	Not less than 45% ASTM C 1252					
		v) Methylene Blue Value	Not more than 10 mg/g Ohio Department of Transportation Standard Test Method					

TRADE : 3.3 SPECIALTY MIX 2 - STONE MASTIC ASPHALT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1 (cont)	c.Mineral Filler	i. Passing 75um sieve	JKR/SPJ/2008-S4 - CI 4.7.2.3 Not less than 70% by weight	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		ii. Amount	Not less than 8% by weight of combined aggregates. If cement is used, it shall not exceed 2% by weight of combined aggregates.					
	d.Bitumen Binder (PG76)	i. Properties	JKR/SPJ/2008-S4 - CI 4.7.2.4 Refer to Table 4.7.1	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		ii. Fuel Resistance Test Immersion in Octane 97 for 24 hours	JKR/SPJ/2008-S4 - CI 4.7.2.4 (d) Loss of weight after immersion not more than 4%					
	e.Stabilising agent	i. Dosage	JKR/SPJ/2008-S4 - CI 4.7.2.5 0.3% by weight of total mix (± 10%)	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		ii. Properties	Refer to Table 4.7.2 or Table 4.7.3					
	f. Tack Coat		Grade RS-1K MS161	Visual, testing and measurement	Once per project/source	Project Manager	Certificate	
	2	Gradation	Gradation of Combined	JKR/SPJ/2008-S4 - CI 4.7.3	Visual, testing and measurement	Once per project/source	Project Manager	
Aggregate			Refer to Table 4.7.4					

TRADE : 3.3 SPECIALTY MIX 2 - STONE MASTIC ASPHALT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Mix Design	i. Marshall Properties ii. Trial Lay - Quantity - Record -Laying and compaction iii. Compliance	JKR/SPJ/2008-S4 - CI 4.7.4 Refer to Table 4.7.5 ASTM D 2726 ASTM D 1559 i. VIM : 3% - 5% ii. VMA : Min 17% iii. Stability : Min 6200 N iv. Flow : 2 – 4 mm v. Draindown test : Max 0.30% 20 tonnes Record as listed in JKR/SPJ/2008-S4 - CI 4.7.4.4 Refer Construction Works Refer to Table 4.7.6	Visual, testing and measurement Visual, testing and measurement Visual, testing and measurement	Once per project/source Initial stage Initial stage	Project Manager Project Manager Project Manager	Inspection Form/Certificate Inspection Form and Record Report	
4	Construction Works a. Surface Preparation b. Spray Tack Coat c. Laying and Compaction	Visual Spray application i. Temperature ii).Grading iii. Binder contents	JKR/SPJ/2008-S4 - CI 4.7.6.1 Surface clean from loose materials JKR/SPJ/2008-S4 - CI 4.7.6.1 MS 161 0.25 – 0.55 liter/sq.m + 10% @ 25°C – 45°C during spray 120°C -150°C during laying & not less than 116°C during rolling JKR/SPJ/2008-S4 - CI 4.7.3 Refer to Table 4.7.4 ± 0.3% at OBC of JMF	Visual, testing and measurement Visual, testing and measurement Visual, testing and measurement	Prior to spraying of the tack coat 1 spraying test per 200 liters of asphalt emulsion Every load 1 test per 1000 cu.m or at least 1 test for each plant operation session 1 test per 200 tons or at least 1 test/day	Project Manager Project Manager Project Manager	Inspection Form/ Record Inspection Form/ Record Inspection Form/ Record	

TRADE : 3.3 SPECIALTY MIX 2 - STONE MASTIC ASPHALT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4 (cont)		iv. Marshall properties	JKR/SPJ/2008-S4 - CI 4.7.4 Refer to Table 4.7.5 ASTM1559 BS594 i. VIM : 3% - 5% ii. VMA : Min 17% iii. Stability : Min 6200 N iv. Flow : 2 – 4 mm v. Draindown test : Max 0.30%	Visual, testing and measurement	1 test per 200 tons or at least 1 test/day	Project Manager	Inspection Form/Record	Frequency of coring need to be incorporated in JKR/SPJ/2008-S4 CI. 4.7.4
		v. Compaction	JKR/SPJ/2008-S4 - CI 4.7.6.5 Minimum 94% Maximum Theoretical density	Visual, testing and measurement	1 coring per 500m ² per lane or min 2 cores, whichever is greater	Project Manager	Inspection Form/Record	
		vi. Layer Thickness	JKR/SPJ/2008-S4 - CI 4.7.6.6 Average over any 100m length not less than specified thickness and minimum thickness at any point shall be not less than the specified thickness minus 5mm.	Visual, testing and measurement	1 coring per 500m ² per lane or min 2 cores, whichever is greater	Project Manager	Inspection Form/Record	
5	Surface regularity	International Roughness Index (IRI)	JKR/SPJ/2008-S4 - CI 4.7.6.6 The lane IRI measured for the whole road length and each 100 meter section shall be less than 2.0m/km	Visual, testing and measurement	Each 100 m section	Project Manager	Inspection Form/Record	
6	Opening to Traffic	Temperature	JKR/SPJ/2008-S4 - CI 4.7.6.7 Traffic should not be placed on newly compacted surface until the material has cooled to 60°C or lower.	Visual, testing and measurement	Prior to opening	Project Manager	Inspection Form	

TRADE : 3.4 SPECIALTY MIX 3 - GAP GRADED ASPHALT								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Materials a. Coarse Aggregate		JKR/SPJ/2008-S4 - CI 4.8.2	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		i. Loss by abrasion	Not more than 25% ASTM C 131					
		ii. Flakiness Index	Not more than 25% MS 30					
		iii. Polished Stone Value	Not less than 40 MS 30					
		iv. Magnesium Sulfate Soundness Test (5 cycles)	Not more than 18% AASHTO T 104					
	v. Water Absorption	Not more than 2% MS 30	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate		
	b. Fine Aggregate							
		i. Magnesium Sulfate Soundness Test (5 cycles)					Not more than 20% AASHTO T 104	
		ii. Water Absorption					Not more than 2% MS 30	
		iii. Aggregate Fraction Passing 4.75mm sieve					Not less than 45% ASTM D 2419	
		iv. Aggregate Angularity					Not less than 45% ASTM C 1252	
	v. Methylene Blue Value	Not more than 10 mg/g Ohio Department of Transportation Standard Test Method						

TRADE : 3.4 SPECIALTY MIX 3 - GAP GRADED ASPHALT

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1 (cont)	c. Mineral Filler	Hydrated lime		Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		i. Passing 75um sieve	Not less than 70% by weight					
		ii. Amount	Approximately 2% by weight of combined aggregates.					
	d. Bituminous Binder (PG76)		JKR/SPJ/2008-S4 - Cl 4.8.2.4	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		i. Properties	Refer to Table 4.8.1					
		ii. Fuel Resistance TestImmersion in Octane 97 for 24 hours	JKR/SPJ/2008-S4 - Cl 4.8.2.4 (d) Loss of weight after immersion not more than 4%					
	e. Gradation	Gradation of Combined	JKR/SPJ/2008-S4 - Cl 4.8.3	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		Aggregate	Refer to Table 4.8.2					
2	Mix Design		JKR/SPJ/2008-S4 - Cl 4.8.4.1	Visual, testing and measurement		Project Manager		
	a. Job Mix Formula	i. Design Properties	Refer toTable 4.8.3		Once per project/source		Inspection Form/Certificate	
			ASTM D 2726 ASTM D 1559					
			i. Marshall Stability : > 6200 N					
			ii. Marshall Flow : 2 – 4 mm					
			iii. Stiffness : > 1550 N/mm					
			iv. Voids in mix : 3 - 5 %					
			v. Voids filled with bitumen : 76-82 %					
		ii. Optimum Binder Content	The aggregate gradation selected and the optimum binder content determined shall be proposed to the S.O					
		iii.Trial Lay			Initial stage		Inspection Form and Record	
		- Quantity	20 tonnes					
		- Record	Record as listed in JKR/SPJ/2008-S4 -Cl 4.8.4.3					
		-Laying and compaction	Refer Construction Works					
		iv. Compliance	Refer to Table 4.8.4		Initial stage		Report	

TRADE : 3.4 SPECIALTY MIX 3 - GAP GRADED ASPHALT								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Construction Works		JKR/SPJ/2008-S4 - Cl 4.8.6	Visual, testing and measurement		Project Manager		
	a. Laying and Compaction	i. Temperature	Not less than 150°C during laying & not less than 120°C during rolling		Every load		Inspection Form/ Record	
		ii. Compaction	120°C - 150°C during laying & not less than 116°C during rolling		1 coring/500m ² or min 2 cores per paving session		Inspection Form/ Record	
		iii. Density	At least 98% of Marshall density				Inspection Form/ Record	
		iv. Thickness	Average over any 100m length not less than specified thickness and min thickness at any point shall be not less than the specified thickness minus 5mm				Inspection Form/ Record	
4	Surface regularity	International Roughness Index (IRI)	JKR/SPJ/2008-S4 - Cl 4.8.6.7 The lane IRI measured for the whole road length and each 100 meter section shall be less than 2.0m/km	Visual, testing and measurement	Each 100 m section	Project Manager	Inspection Form/ Record	
5	Opening to Traffic	Temperature	JKR/SPJ/2008-S4 - Cl 4.8.6.8 Traffic should not be placed on newly compacted surface until the material has cooled to 60°C or lower.	Visual, testing and measurement	Prior to opening	Project Manager	Inspection Form	

TRADE : 3.5 SPECIALTY MIX 4 - HOT IN-PLACE RECYCLING								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Materials							
	1.1 Recycled Asphalt Mixture		JKR/SPJ/2008-S4 - CI 4.9.2.1					
	a.Coarse Aggregate for Fresh Bituminous Mix	i. Loss by abrasion	Not more than 25%	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
			ASTM C 131					
	ii. Aggregate Crushing Value	Not more than 25%						
		BS 812						
	iii. Flakiness Index	Not more than 25%						
		MS 30						
	iv. Polished Stone Value	Not less than 40						
		MS 30						
	v. Magnesium Sulfate Soundness Test	Not more than 18%						
	AASHTO T 104							
vi. Water Absorption	Not more than 2%							
	MS 30							
b.Fine Aggregate for Fresh Bituminous Mix	i. Magnesium Sulfate Soundness Test	Not more than 20%	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate		
		AASHTO T 104						
ii. Water Absorption	Not more than 2%							
	MS 30							
iii. Aggregate Fraction	Not less than 45%							
	ASTM D 2419							
iv. Aggregate Angularity	Not less than 45%							
	ASTM C 1252							
v. Methylene Blue Value	Not more than 10 mg/g							
	Ohio Department of Transportation Standard Test Method							

TRADE : 3.5 SPECIALTY MIX 4 - HOT IN-PLACE RECYCLING								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1 (cont)	c.Aggregate Properties for Existing Pavement	Physical	Not deviate by more than 20% from values specified in Item a and b	Visual, testing and measurement	Once per project	Project Manager	Inspection Form/Certificate	
	d.Binder	i. Fresh bituminous binder	80 -100 and 50-70 penetration grade bitumen MS 124	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/Certificate	
		ii. Bitumen recovered from the recycled asphalt after laying.	50 - 70 penetration grade bitumen	Visual, testing and measurement	Once per project	Project Manager		
	1.2 Marshall Properties for fresh Bituminous Mix	Marshall Properties	JKR/SPJ/2008-S4 - CI 4.9.2.2	Visual, testing and measurement	Once per project	Project Manager	Inspection Form/Certificate	
		Grading	To comply with Table 4.9.1					
	1.3 Rejuvenating Agent	Physical properties	JKR/SPJ/2008-S4 - CI 4.9.2.3 The blended binder shall comply to Table 4.9.1	Visual, testing and measurement	Once per project	Project Manager	Inspection Form/Certificate	
2	Mix Design	Propose mix design	Shall comply with JKR/SPJ/2008-S4 - CI 4.9.3	Visual, testing and measurement	Once per project	Project Manager	Inspection Form/Record	
3	Job Mix Formula	i. Trial Lay	JKR/SPJ/2008-S4 - CI 4.9.4 over a section of min 150m length	Visual, testing and measurement	Once per project	Project Manager	Inspection Form/Record	
		ii. Gradation iii. Marshall Properties	Shall comply with Table 4.9.1 Shall comply with Table 4.9.2					

TRADE : 3.5 SPECIALTY MIX 4 - HOT IN-PLACE RECYCLING								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Construction Works							
	a.Heating	Temperature	JKR/SPJ/2008-S4 - CI 4.9.6.3 $120 \leq ^\circ\text{C} \leq 180$	Visual, testing and measurement	Once per project	Project Manager	Inspection Form	
	b.Scarifying	Depth	JKR/SPJ/2008-S4 - CI 4.9.6.3 Within 20mm of the alignment of the grade and slope of the finished pavement					
	c.Laying and Compaction	Density	JKR/SPJ/2008-S4 - CI 4.9.7 Not less than 98%					
	d.Joints	Heating	JKR/SPJ/2008-S4 - CI 4.9.8 Heating shall extend at least 100 mm into the adjacent previous mat.					
5	Finished HIPR Surface	i. Thickness	JKR/SPJ/2008-S4 - CI 4.9.9	Visual, testing and measurement	One core per 250 m per lane length or a min of 3 cores	Project Manager	Inspection Form/Record	
			i. Average thickness over 100m length shall be not less than the specified thickness					
			ii. Minimum thickness at any point shall be not less than the specified thickness minus 5mm.					
		ii. Acceptance Criteria	i) Remixing with additional thickness IRI less than 2.0m/km	Visual, testing and measurement	Each 100 m section	Project Manager	Inspection Form/Record	
			ii) Remixing only IRI less than 2.5m/km	Visual, testing and measurement	Each 100 m section	Project Manager	Inspection Form/Record	
6	Opening to Traffic	Time	JKR/SPJ/2008-S4 - CI 4.9.10 Not less than 4 hours after commencement of rolling.	Visual, testing and measurement	Prior to opening	Project Manager	Inspection Form	

TRADE : 3.6 SPECIALTY MIX 5 - COLD IN - PLACE RECYCLING								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Cold In-Place Recycling Testing of materials to be recycled	i. Sieve Analysis ii. Plasticity Index iii. Aggregate Crushing Value iv. Flakiness Index v. CBR	JKR/SPJ/2008-S4 - CI 4.10.3.2 i. Refer to Table 4.10.2 JKR/SPJ/2008-S4 ii. Plasticity index < 6 for unbound material iii. ACV < 25% MS 30 iv. Flakiness Index < 25% MS 30 v. CBR > 80% when compacted to 95% of max. dry density -soaked 4 days under surcharge 4.5 kg BS 1377	Visual, testing and measurement	Early stage/Once per project	Lab Assistant/Project Manager/SOR	Certified test result/report	
2	Stabilising agent material a) Cement	Cement use	Ordinary portland cement MS 522	Visual, testing and measurement	Early stage	SOR	Inspection Form	
	b) Bitumen Emulsion	Parameters i. Viscosity, Saybolt Furol at 25° C (sec) ii. Settlement, 5 days (%) iii. Storage stability test, 24hr (%) iv. Sieve test (%) v. Cement mixing test (%) vi. Distillation for oil, by volume of bitumen emulsion (%): vii. Distillation for residue (%) viii. Penetration for residue (%): ix. Ductility of residue, 25° C, 5cm/min (cm) x. Solubility in trichloroethylene(%) xi. Particle charge test	JKR/SPJ/2008-S4 - CI. 4.10.2.3,c Refer to Table 4.10.1 i. Min 20 sec, Max 100 sec MS 161 ii. Min 0 %, Max 5 % iii. Min 0 %, Max 1 % iv. Min 0 %, Max 0.1 % v. Min 0 %, Max 2 % vi. Min 0 %, Max 5 % vii. Min 60 % viii. Min 60 %, Max 200 % ix. Min 40 cm x. Min 97.5 % xi. Positive	Visual, testing and measurement	Once per project	Lab Assistant/Project Manager/SOR	Certified test result/report	
	c) Foamed Bitumen	Properties i. Expansion Ratio ii. Half Life	JKR/SPJ/2008 - S4 - CI. 4.10.2.3 (d) MS 124 Min 8 times Min 8 seconds	Visual, testing and measurement	Once per project	Lab Assistant/ Project Manager/ SOR	Certified test result/report	

TRADE : 3.6 SPECIALTY MIX 5 - COLD IN - PLACE RECYCLING								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Mix design a) Cement	i. Unconfined Compression Strength Test (UCS) ii. Indirect Tensile Test (ITS) iii. Maximum cement content by weight	JKR/SPJ/2008-S4 - Cl. 4.10.3.3 (b) Refer to Table 4.10.3 i. Range (Minimum-Maximum Strength) 2 - 5 Mpa BS 1881 ii. Min 0.2 Mpa iii. 5 %	Visual, testing and measurement	Once per project	Lab Assistant/Project Manager/SOR	Certified test result/report	
	b) Bitumen Emulsion or Foamed Bitumen	i. Unconfined Compressive Strength ii. Indirect Tensile Test (ITS) (Unsoaked) iii. Indirect Tensile Test (ITS) on cured briquettes, soaked for 24 hours iv. Sieve test (%) v. Maximum cement content by weight	JKR/SPJ/2008-S4 - Cl. 4.10.3.3 (c) Refer to Table 4.10.4/ Table 4.10.5 i. Min Strength 0.7 Mpa BS 1881 ii. Min Strength 0.2 MPa iii. Min Strength 0.15 Mpa v. 2 %	Visual, testing and measurement	Once per project	Lab Assistant/Project Manager/SOR	Certified test result/report	

TRADE : 3.6 SPECIALTY MIX 5 - COLD IN - PLACE RECYCLING								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Trial Section	Parameters i. Gradation of the recycled material ii. Compaction requirements including type of roller and rolling pattern to be employed to achieve the required density; iii. Strength of the recycled layer material in terms of UCS and ITS iv. Recycling depth and compacted thickness of new recycled layer material as specified in detailed pavement design report; v. In-situ moisture content in order to determine the application rate of water to achieve the OMC; vi. Percentage by weight of the stabilising agent used vii. Speed of advance of the recycler machine	JKR/SPJ/2008-S4 - Cl 4.10.3.4 Refer to Table 4.10.2 Refer to Table 4.10.8 BS 1377 Refer to Table 4.10.8 Refer to Table 4.10.8 Refer to Table 4.10.8 BS 1377 Refer to Table 4.10.8 Refer to Table 4.10.8	Visual, testing and measurement	Early stage/Once per project (150m)	SOR	Trial result report/record	
5	Construction Works	 i. Time Limitation between mixing and final compaction ii. Compaction -Initial Compaction -Trimming and Final Compaction iii. Joints iv. Quality of Materials and Workmanship	JKR/SPJ/2008-S4 - Cl 4.10.5 Refer to Table 4.10.8 Refer to Table 4.10.6 JKR/SPJ/2008-S4 - Cl. 4.10.5.3 (a) Refer to Table 4.10.7 JKR/SPJ/2008-S4 - Cl. 4.10.5.3 (b) JKR/SPJ/2008-S4 - Cl. 4.10.5.4 JKR/SPJ/2008-S4 - Cl 4.10.5.6 Refer to Table 4.10.8 & Table 4.10.9	Visual, testing and measurement	Once per project	SOR	Inspection Form	

TRADE : 3.7 SPECIALTY MIX 6 - POLYMER MODIFIED ASPHALTIC CONCRETE								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Materials		JKR/SPJ/2008-S4 - Cl 4.11.2					
	a. Aggregate			Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/ Certificate	
		i. Los Angeles Abrasion	Not more than 25% ASTM C 131					
		ii. Flakiness Index	Not more than 25% MS 30					
		iii. Polished Stone Value	Not less than 40 MS 30					
		iv. Magnesium Sulfate Soundness Test (5 cycles)	Not more than 18% AASHTO T 104					
		v. Water Absorption	Not more than 2% MS 30					
	b. Fine Aggregate			Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/ Certificate	
		i. Magnesium Sulfate Soundness Test (5 cycles)	Not more than 20% AASHTO T 104					
		ii. Water Absorption	Not more than 2% MS 30					
		iii. Aggregate Fraction Passing 4.75mm sieve	Not less than 45% ASTM D 2419					
		iv. Aggregate Angularity	Not less than 45% ASTM C 1252					
		v. Methylene Blue Value	Not more than 10 mg/g Ohio Department of Transportation Standard Test Method					

TRADE : 3.7 SPECIALTY MIX 6 - POLYMER MODIFIED ASPHALTIC CONCRETE								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1 (cont)	c. Mineral Filler	Hydrated lime		Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/ Certificate	
		i. Passing 75um sieve	Not less than 70% by weight					
		ii. Amount	Approximately 2% by weight of combined aggregates.					
	d. Gradation	Gradation of Combined	JKR/SPJ/2008 - S4 - Cl 4.11.2	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/ Certificate	
		Aggregate	Shall comply with Table 4.11.1					
	e. Polymer Modified Binder (PG 76) or higher	i. Properties	Refer to Table 4.11.2 AASHTO - Std M320-02 MS 124 Sampling - MS 539	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/ Certificate	
2	Mix Design a. Job Mix Formula	-Stage 1 i. Gradation ii. Polymer Modified Binder iii. Compliance -Stage 2 i. Indirect tension test for resilient modulus; Total resilient modulus Test temperature Applied load Loading frequency Loading time Rest period Rise time Poisson's ratio No. of preconditioning pulses No. of test pulses Rotation of specimen	JKR/SPJ/2008-S4 - Cl 4.11.3 Shall comply with Table 4.11.1 Shall comply with Table 4.11.3 Shall comply with Table 4.11.4 ASTM D 4123 > 2500 MPa 25 °C 20 N/mm of specimen thickness (max. 1500 N) 1 Hz 0.1 s 0.9 s 70 ms 0.35 50 5 90°	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/ Certificate	

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2 (cont)		ii. Dynamic, unconfined, compressive creep test ; Dynamic creep modulus Slope at steady state Specimen end treatment Silicone based lubricant + graphite dust Pre-conditioning; Test temperature Applied axial stress Loading frequency Loading time Rest period No. of load cycles Testing; Test temperature Applied axial stress Loading frequency Loading time Rest period No. of load cycles	EN 12697-25 Dynamic creep modulus > 75 MPa Slope at steady state < 0.25 40 °C 150 kPa 0.5 Hz 0.2 s 1.8 s 30 Testing; 40 °C 300 kPa 0.5 Hz 0.2 s 1.8 s 3600	Visual, testing and measurement	Once per project/source	Project Manager	Inspection Form/ Certificate	
	b. Plant trials	- Quantity - Record -Laying and compaction iii. Compliance	20 tonnes JKR/SPJ/2008-S4 - Cl 4.11.3(b) Refer Construction Works Refer to Table 4.11.5	Visual, testing and measurement Visual, testing and measurement	Initial stage Initial stage	Project Manager Project Manager	Inspection Form and Record Report	

TRADE : 3.7 SPECIALTY MIX 6 - POLYMER MODIFIED ASPHALTIC CONCRETE								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Construction Works Laying and Compaction	i. Temperature ii. Paving Layer iii. Compaction iv. Density - Wearing course - Binder course v. Thickness	JKR/SPJ/2008-S4 - Cl 4.11.5 Not less than 150°C during laying Compacted Thickness not less than twice aggregate size or not more than 100mm JKR/SPJ/2008-S4 - Cl 4.11.5 Refer to Table 4.11.6 ASTM - Test Method D2726 98 - 100% of Marshall density 95 - 100% of Marshall density Average over any 100m length not less than specified thickness and Min thickness at any point shall be not less than the specified thickness minus 5mm.	Visual, testing and measurement Visual, testing and measurement Visual, testing and measurement	Every load Every layer 1 coring/500m ² or min 2 cores per paving session	Project Manager Project Manager Project Manager	Inspection Form/Record Inspection Form/Record Inspection Form/Record Inspection Form/Record	
4	Surface regularity	International Roughness Index (IRI)	JKR/SPJ/2008-S4 - Cl 4.11.5 (j) The lane IRI measured for the whole road length and each 100 meter section shall be less than 2.0m/km	Visual, testing and measurement	Each 100 meter section	Project Manager	Inspection Form/Record	
5	Opening to Traffic	Time	JKR/SPJ/2008-S4 - Cl 4.11.5 (k) Not less than 4 hours after commencement of rolling.	Visual, testing and measurement	Prior to opening	Project Manager	Inspection Form	

TRADE : 3.8 ROAD SHOULDERS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Types of shoulders							
	i. Paved Shoulders	Refer to Paved Roads JKR/SPJ/2008-S4 - Cl. 4.2	As per drawing JKR/SPJ/2008-S4 - Cl. 4.4.2.1 and Cl. 4.4.3	Visual, testing and measurement	All stages	Project Manager	Inspection Record	
	ii. Gravel Shoulders							
	a) Determining the suitability of materials		JKR/SPJ/2008-S4 - Cl. 4.1.3.2	Visual, testing and measurement	i. Initial Stage ii. One test per 750 cu.m supply	Contractor's QA/QC / Project Manager	Inspection Record	
		i. Liquid Limit, LL	Not more than 35% BS 1377					
		ii. Plasticity Index, PI	Shall be in the range 4 to 10 BS 1377					
		iii. Aggregate crushing value	Not more than 35% MS 30					
		iv. Gradation shall conform to one of the envelopes	Refer to Table 4.1.3 Fraction passing the BS 75 um sieve not greater than 2/3 of the fraction passing the BS 425 um sieve					
		v. Passing of No. 4 (4.75 mm) sieve	Shall be not less than 45% ASTM D 2419					

TRADE : 3.8 ROAD SHOULDERS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1 (cont)	b) Construction of gravel surfacing	i. Thickness Dipping Test ii. In-Situ Compaction Test iii. Surface Finishes - shape, super elevation, level, grade	JKR/SPJ/2008 - S4 - Cl. 4.1.3.3 Within tolerance as Table 4.5.1 Not less than 95% max dry density BS1377 : Compaction Test Refer to relevant construction drawings Within tolerance as Table 4.5.1	Visual, testing and measurement	Average thickness over any 100 m length not less than the required thickness One test per 500 sq metre of each layer laid	SOR	Inspection Record	
	iii. Earth Shoulders a) Detemining the suitability of materials b) Earth Shoulder Construction	i. Thickness Dipping Test ii. In Situ Compaction Test iii. Surface Finishes - shape, super elevation, level, grade	Refer to Sub-section 2.2.1 (e) JKR/SPJ/2008-S4 - Cl 4.4.3 Not less than 95% max dry density BS1377 : Compaction Test Refer to relevant construction drawings	Visual, testing and measurement Visual, testing and measurement	Initial Stage Over 100m length One test per 150 sq. m of each layer laid	Contractor's QA/QC / Project Manager Project Manager	Inspection Record Inspection Record	Refer to Trade Earthwork Item 1

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.1 CORRUGATED SHEET STEEL BEAM HIGHWAY GUARDRAIL (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Approval of Guardrail Material	Beam Element	JKR/SPJ/2017-S6-CI 6.1.2.1, effective length 4000mm (13 feet 1.2 inches)	AASHTO Specification M180 for Class A Type II (galvanised)	1 sample every 200	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue /Method of Statement	
		Steel Posts and Packers	JKR/SPJ/2017-S6-CI-6.1.2.2 and drawing Conforming to the requirement of ASTM 436	Technical specification				
		Post dimension	178mm x 76mm x 6.0mm thick x 1830mm long					
		Packer dimension	Channel section: 178mm x 76mm x 6.0mm thick x 360mm long					
		Nominal thickness	Base metal post and packer - 6.0mm Galvanized post and packer - 6.02m					
		Delineators	JKR/SPJ/2017-S6-CI-6.1.2.3 and drawing Shall be fixed on the beam mounted on the packers or posts and shall be of High Intensity Prismatic retroreflective sheeting or of a higher grade					
2.	Installation of Guardrail	Setting Post (Timber/steel)	JKR/SPJ/2017-S6-CI-6.1.3.1	relevant construction drawing	Every completion section	Contractor/ Supervision Engineer	Inspection Form/ Record	
		Placing Beams	JKR/SPJ/2017-S6-CI-6.1.3.2	relevant construction drawing	Every completion section			
		Anchorage	JKR/SPJ/2017-S6-CI-6.1.3.3	relevant construction drawing	Every completion section			

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.1 CORRUGATED SHEET STEEL BEAM HIGHWAY GUARDRAIL (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.	Determination of Marking, Painting and Storage	Marking	JKR/SPJ/2017-S6-CI-6.1.4.1 JKR logo on each beam element. Each beam shall be identified by following:- i. Name or Brand of Manufacture ii. Identification symbols or code for Heat Number and Coating Lot iii. AASHTO Specification Number	AASHTO Specification M180	Every completion section	Contractor/ Supervision Engineer	Inspection Form/ Record	
		Painting	JKR/SPJ/2017-S6-CI-6.1.4.1					
		Storage	JKR/SPJ/2017-S6-CI-6.1.4.1 1) stored under a cover 2) >300mm space between lowest element and ground surface	Observation	After each delivery			

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.2 CONCRETE KERB (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Approval of Material	Concrete Kerb Bedding	Refer to JKR/SPJ/2017-S6 - CI 6.4.2 Grade 20/20 concrete Grade 10/25 concrete	Relevant Construction Drawing	Initial Stage	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue /Method of Statement	
2.	Installation of Kerb	Excavation Cast In Situ Kerb	Refer to JKR/SPJ/2017-S6 - CI 6.4.3.1 - Required depth and bedding thickness as shown on drawing -Suitable material refer JKR/SPJ/2013 : Section 2 Refer to JKR/SPJ/2017-S6 -CI 6.4.3.2 -Expansion Joint performed joint filler 10mm thickness refer JKR/SPJ/2013 : Section 14 -Concreting refer JKR/SPJ/2017 : Section 9 -Formed removed after 24 hours -Minor defect repaired with mortar 1:2 (1 Portland Cement: 2 Sand) -Curing for a period of 7 days	Relevant Construction drawing Relevant Construction Drawing	Every completion section or daily operation Every completion section or daily operation	Contractor/ Supervision Engineer Contractor/ Supervision Engineer	Inspection Form/ Record Inspection Form/ Record	

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.2 CONCRETE KERB (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
		Precast Concrete Kerb	JKR/SPJ/2017 : Section 6 - CI 6.4.3.3 - Steel mould as shown on drawing - Joints kerb filled with mortar 1:2 - Expansion joints shall be 20mm width	Relevant Construction Drawing	Initial Stage & Every Completion Section or Daily Operation	Contractor/ Supervision Engineer	Inspection Form/ Record	
		Machine Extruded Concrete Kerb	Refer to JKR/SPJ/2017 : S6 - CI 6.4.3.4	Relevant Construction Drawing '-Approved automatic kerbing machine	Initial Stage & Every Completion Section or Daily Operation	Contractor/ Supervision Engineer	Inspection Form/ Record	
		Expansion joint	Refer to JKR/SPJ/2017 : S6 - CI 6.4.3.5 - Maximum 3m intervals for cast in situ and machine extrusion construction. - Provided at both sides of all pits constructed prior to kerb - Shall be 10mm wide and filled with performed filler.	Relevant Construction Drawing	Every completion section or daily operation	Contractor/ Supervision Engineer	Inspection Form/ Record	
		Backfilling	Refer to JKR/SPJ/2017 : S6 - CI 6.4.3.6 -Tamped layer not more than 150mm -Finished level within ± 10 mm	Relevant Construction Drawing	Every completion section or daily operation	Contractor/ Supervision Engineer	Inspection Form/ Record	
3	Kerb Opening & Special Features		Refer to JKR/SPJ/2017 : S6 - CI 6.4.4	Relevant Construction Drawing		Contractor/ Supervision Engineer		
4	Tolerance		Refer to JKR/SPJ/2017 : S6 - CI 6.4.5 - Horizontal and vertical alignment shall not deviate more than ± 25 and ± 10 mm respectively - Cross section within ± 5 mm	Relevant Construction Drawing		Contractor/ Supervision Engineer		

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.2 CONCRETE KERB (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5	Curing and Protecting		Refer to JKR/SPJ/2017 : S6 - CI 6.4.6 - newly concrete surface shall be protected from any disturbance for 24 hours after pouring. - Concrete shall be covered with suitable material and kept moist for 5 days.	Relevant Construction Drawing		Contractor/ Supervision Engineer		
5	Kerb Painting		Refer to JKR/SPJ/2017 : S6 - CI 6.4.7	Relevant Construction Drawing		Contractor/ Supervision Engineer		
6	Kerb Repairs		Refer to JKR/SPJ/2017 : S6 - CI 6.4.8	Relevant Construction Drawing		Contractor/ Supervision Engineer		

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.3 WIRE ROPE SAFETY FENCE (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Approval of Wire Rope Safety Fence Component	Galvanised mild steel posts:	REAM -GL 9/2006 -S6-CI 6.3	NCHRP 350 Test Level 3 (TL-3)	Initial Stage	Project Manager / Construction Manager / QAQC	Form/ Certificate /Catalogue	
			a)OIV (Occupant Impact Velocity)-12m/s (43.2 kph) max b)ORA (Occupant Ridedown Acceleration) 20g max Height of post : 690mm to 710mm		Initial Stage			
		Interwoven wire ropes (Gavanised Pre-tensioned steel)	Shape of post refer to REAM -GL 9/2006 -S6-CI 6.3(iii) Double Curve - form from 6mm thick mild steel Refer to REAM -GL 9/2006 -S6-CI 6.3(iv) 19mm diagram 3x 7 contruction breaking load: > 17.7 tonnes unfitted > 16.7 tonnes fitted Minimun modulus of elasticity: 8300kg/mm2 on the area of 283mm2 after pre-stressing	NCHRP 350 Test Level 3 (TL-3)	Initial stage			
		Anchors	Detail end anchor refer to Appendix 6A		Initial stage Intial Stage			
2	Installation	Wire Rope	Refer to REAM - GL9/2006 : CI 6.3(i) upper ropes 600mm±10mm from ground lower interwoven ropes 500mm±10mm from ground	Measurement	Every complition section or daily operation	Contractor/ Supervision Engineer	Inspection Form/ Record	
		Post	Refer to REAM - GL9/2006 : CI 6.3 (ii) Embedded 400mm into concrete foundation of 950mm Post spacing 2.4 m Minimum post spacing 1m	Measurement	Initial stage			
		Anchors	Refer to REAM -GL 9/2006 -S6-CI 6.3 1) Length of wire rope between anchor < 627mm 2) Detail end anchor refer to Appendix 6A	NCHRP 350 Test Level 3 (TL-3)	Initial stage Intial Stage			

TRADE : 3.9 ROAD FURNITURE				TRADE : 3.9.4 ROAD MARKING (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Approval of Road Marking Material	Thermoplastic Material : Thermoplastic Thermoplastic Material : Glass Bead Road Marking Paint	JKR/SPJ/2017-S6-Cl. 6.3.1 Standard Material Supplied in block form (broken into pieces, each weighing not more than 4kg) or powder. Hydrocarbon resins shall be used within 6 hours Wood and gum resins shall be used within 4 hours To be incorporated in marking materials to road surface application. Additional surface reflectorisation. Standard Material Stirred before application to keep the pigments in uniform suspension, Tinnners or other additives not be permitted	BS EN 1871, BS EN 1436 CLASS A Glass beads, Table 1 of B.S 6088 (Table 6.1) CLASS B Glass beads, Table 2 of B.S 6088 (Table 6.2)		Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue /Method of Statement	
2.	Site Preparation	Clean and dry surface Tack coat Primer or undercoat	JKR/SPJ/2017-S6-Cl. 6.3.3 Not be laid over loose detritus, mud, or extraneous matter or over old material or paint marking incompatible with the paint Refer manufacturer's instructions to avoid bleeding and discoloration , to ensure proper adhesion.			Contractor/ Supervision Engineer	Inspection Form/ Record	

TRADE : 3.9 ROAD FURNITURE				TRADE : 3.9.4 ROAD MARKING (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.	Laying Roadmarking	Center, lane & edge lines Other marking Thickness Thickness of Thermoplastic Material : Synthetic Hydrocarbon Resin Binder Thickness of Thermoplastic Material : Gum or wood resin binder Thickness of Road Marking Paint Width Tolerance	JKR/SPJ/2017-S6- Cl.6.3.5 JKR/SPJ/2017-S6- Cl.6.3.7 Screed lines ; 2 mm < x < 5 mm and Extruded line; 2 mm < x < 5 mm Sprayed lines other than yellow lines ; <1.5 mm Sprayed yellow edge lines (for 'No Parking', 'No Waiting' and etc.) ; < 0.8 mm Screed lines ; 3 mm < x < 5 mm and Extrude lines; 2mm < x < 5mm Sprayed lines other than yellow lines ; < 2.0 mm Sprayed yellow edge lines (for 'No Parking', 'No Waiting' and etc.) ; 2.0 mm < x < 3.0 mm Shall be laied to give a wet film thickness ; 315 micron < x < 400 micron Within the range of + 10% and - 0 %	Mechanical means Brush, spray, screed, hand-propelled or self propelled machines	Carried out on laid road marking at an interval of 250m on each line & on each other marking	Contractor/ Supervision Engineer	Inspection Form/ Record	
4	Protection of Marking	Marking	JKR/SPJ/ 2017-S6-Cl.6.3.6 Must be dried and protected from traffic.			Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
5.	Defective Material / Workmanship	Incorrect dimension and wrong location	JKR/SPJ/2017-S6-Cl. 6.3.11 Must be removed by approved chemical or mechanical means.			Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
6.	Clearing Up	Clean up all spatters, splashes and smirches of marking materials.	JKR/SPJ/2017-S6-Cl. 6.3.12 Satisfaction of the S.O			Contractor/ QAQC/ Supervision Engineer / SO/ SOR	Inspection Form/ Record	

TRADE : 3.9 ROAD FURNITURE				TRADE : 3.9.4 ROAD MARKING (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
7	Retroreflectivity	Coefficient of retroreflected luminance, R_L	JKR/SPJ/2017-S6-6.3.9 (Addendum 1 as SAKPKR Bil.15/2019 dated 15 March 2019 For retroreflection under car headlamp illumination in dry condition; min 300 mcd/m ² /lx For retroreflection under car headlamp illumination in wet condition; min 75 mcd/m ² /lx	BS EN 1424, BS EN 1423, BS EN 1436 Annex B	7 days laying, interval of 250m on each line & on each other marking	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record/ Certificate	
8	Skid Resistance	Effects of traffic & weathering	JKR/SPJ/2017-S6- Cl. 6.3.10 Both permanent & temporary road marking, skid resistance > 45SRT	BS EN 1436	Applicable for road marking with 300mm width or more Carried out not more than 7day after laying	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
9	Opening of traffic	Completed road marking	JKR/SPJ/2017-S6-Cl. 6.3.13 Shall not be opened to traffic until material has fully set. Usually > 1 hour after material has been laid			Contractor/ Supervision Engineer	Inspection Form/ Record	
10	Removal	Unwanted road marking	JKR/SPJ/2017-S6-Cl. 6.3.14 Removal type: a) Burning off is not recommended b) Painted over with paint is not allowed c) Blasting, grinding, scraping Satisfaction of the S.O.			Contractor/ Supervision Engineer/ SO/ SOR	Inspection Form/ Record	

TRADE : 3.9 ROAD FURNITURE					SUB-TRADE : 3.9.5 TRAFFIC SIGNS (Revised 1/2020)			
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Permanent Traffic Signs - General Requirements	Luminance	JKR/SPJ/2017-S6 - CI 6.2.5.1	BS 8442:2006 BS En 12899-1	Initial Stage	Project Manager / Construction Manager / QAQC	Inspection Form/ Certificate /Catalogue /Method of Statement	
2.	Permanent Traffic Signs - Material					Contractor/ Supervision Engineer	Inspection Form/ Record/ Certificate	
	(i) Posts	Tubular hollow section steel	JKR/SPJ/2017-S6 - CI 6.2.5.3 - Not less than 60mm outside diameter	BS EN 10255:2004	Initial Stage			
	(ii) Sign Plates	Thickness Size	JKR/SPJ/2017-S6 - CI 6.2.5.4 - Made of 10 S.W.G sheets of aluminium alloy HS 30-WP with min. thickness 3mm - Not exceeding 1.2m height & 2.4m width shall made from single sheet	Drawings and BS EN 485-2:2013 BS EN 485-2:2013	Initial Stage			
	(iii) Sign Faces	(i) Plastic Sheeting Faces	JKR/SPJ/2017-S6 - CI 6.2.5.5 Accordance with the manufacturer's instructions Up to 1 m in size and no joint.	ASTM D4956 / MS 1216 ASTM D4956 / MS 1216	Initial Stage			
		Joint	Lapping less than 6mm	MS 1216	Construction Stage			
		Colour uniformity	Refer to addendum no.2 S 2.1.7 Refer to addendum no.2 S 2.1.7	MS 1216 MS 1216	Initial Stage After installation			
	(iv) Backing Frames	Material Size	JKR/SPJ/2017-S6 - CI 6.2.5.6 made from aluminium alloy HE9-TE > 600mm ,<1000mm height/width stiffened by angles > 1000 mm height/width use 40mm X 40mmX3mm angles Built in section 8 mm diameter bolt at not more than 200 mm centres	BS EN ISO 1461:2009	Initial Stage Initial Stage			

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.5 TRAFFIC SIGNS (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.	Fluorescent Orange	(i) Photometric-Coefficient or Retroreflection RA Aluminium Test Panels	JKR/SPJ/2017-S6 - CI 6.2.5.5.1 ASTM E 810 table 1.		Initial Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		ii) Daytime colour ASTM 1991	ASTM E 991, ASTM E 308 (for 2° observer) & Table 2		Initial Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		iii) Nighttime Color	ASTM E 811 (calculated the u') ASTM E 308 (calculated the v') & Table 3		Initial Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		iv) Resistance to Accelerated Weathering	ASTM G 26 Type B Method A		Initial Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		v) Impact Resistance	Refer Sheet metal manufacturers recommendations Test Panel of alloy 601-T6 , 0.040" (0.10cm) by 3" (7.6cm) by 5" (12.7cm) and conditioned for 24 hour Shall show no cracking outside the impact area when the face of the panel is subject to an impact of 100 inch-pounds (11.3 Nm) using a weight with a 5/8 in . (15.8 mm) diameter rounded tip dropped from a height necessary to generate an impact of 100 inch-pounds, at test temperatures of both 32° F (0° C and 72° F (22 ° C)		Initial Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		vi) Resistance to Heat	ASTM G 26 Type B Method A exposed to 170 + 5° F (77 + 3°) for 24 hours minimum 70% of the original coefficient.	Air circulating oven	Initial Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		vii) Field Performance	Refer Sheet metal manufacturers recommendations Coefficient of retroreflection is less than 100 when measured at 0.2° observation and -4° entrance at 90° rotation	Moving vehicle under normal day and night driving conditions	After installation	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
4.	Permanent Traffic Signs - Construction and Assembly	Traffic signs	JKR/SPJ/2017-S6 - CI 6.2.5.7 or as shown on drawing	Construction Drawings and BS EN ISO 1461:2009	Every completion section	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		Spacing of rivets	JKR/SPJ/2017-S6 - CI 6.2.5.7 -Not exceed 150mm around the outside edge of any sheet -Not exceed 300mm on cross braces					

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.5 TRAFFIC SIGNS (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5.	Permanent Traffic Signs - Location and Erection	Posts	JKR/SPJ/2017-S6 - CI 6.2.5.8 -Distance from the centre of the post to the edge of the sign plate 300mm diameter -Erected plumb to check verticality - Grade of 20/20 concrete - Within 450mm of the ground surface		Every completion section	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
6.	Permanent Traffic Signs - Covering of permanent traffic signs	Covering Thickness Cover Plates	JKR/SPJ/2017-S6 - CI 6.2.5.9 - 1.5mm (16 S.W.G) thickness JKR/SPJ/2017-S6 - CI 6.2.5.9 - Stainless steel bolts, washers & nuts use 5mm dia bolts not more than 600mm apart. - Non-ferrous rivet use 12mm dia. bolts not more than 600mm apart - 5mm thick plastic distance pieces between the sign face & cover plate.	Observation	Every completion section	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
7.	Temporary Traffic Signs	Location and erection Covering	JKR/SPJ/2017-S6 - CI 6.2.6 - Comply with JKR/SPJ/2017-S6 - CI 6.2.5.8 JKR/SPJ/2017-S6 - CI 6.2.6 - Comply with JKR/SPJ/2017-S6 - CI 6.2.5.9	ARAHAN TEKNIK (JALAN) 2C/85	Every completion section	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	

TRADE : 3.9 ROAD FURNITURE					SUB-TRADE : 3.9.5 TRAFFIC SIGNS (Revised 1/2020)			
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
8.	Traffic Signs On Gantries	Faces of sign plates	JKR/SPJ/2017-S6 - CI 6.2.7	B.S. 873	Initial / Construction Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		Steel backing frames, fitting and purlins	JKR/SPJ/2017-S6 - CI 6.2.7	B.S. 873				
		Steel posts and post housing	JKR/SPJ/2017-S6 - CI 6.2.7	B.S. 873				
9.	Temporary Signs for the work zone	(i) Photometric-Coefficient or Retroreflection RA	ASTM E 810 Test panel complied with Addendum No.3 Table 1		Initial Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	
		ii) Daytime color	ASTM E 991, ASTM E 308 (for 2° observer) & Test panel complied with Addendum No.3 Table II		Initial Stage			
		iii) Nighttime Color	ASTM E 811 (calculated the u') ASTM E 308 (calculated the v') Test panel complied with Addendum No.3 Table III		Initial Stage			
		iv) Resistance to Accelerated Weathering	ASTM G 26 Type B Method A		Initial Stage			
		v) Impact Resistance	Refer Sheeting manufacturers recommendations Addendum No.3-3.1.1 (v) Test Panel of alloy 601-T6 , 0.040" (0.10cm) by 3" (7.6cm) by 5" (12.7cm) and conditioned for 24 hour		Initial Stage			
		vi) Resistance to Heat	Refer Sheeting manufacturers recommendations Addendum No.3-3.1.1 (vi)	Air circulating oven	Initial Stage			
		vii) Field Performance	Refer Sheeting manufacturers recommendations Addendum No.3-3.1.1 (vi)	Moving vehicle under normal day and night driving conditions	After installation			

TRADE : 3.9 ROAD FURNITURE				SUB-TRADE : 3.9.5 TRAFFIC SIGNS (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
10.	Permanent Traffic Signs - Foundations	Type and size of foundations	JKR/SPJ/2017-S6 - Cl 6.2.5.2 Single Post - Installed centrally in 300mm diameter or as shown on drawing - Grade of 20/20 concrete - Depth Within 900mm of the ground surface - Min. three (3) days after placing concrete - Backfilling at least 48 hours after placing the concrete - Pockets plan dimensions shall be 100mm larger	Relevant Construction drawings JKR/SPJ/2017- Section 9 Observation	Initial / Construction Stage	Contractor/ QAQC/ Supervision Engineer	Inspection Form/ Record	

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.0	Materials	All materials shall conform to the relevant requirements in Section 9: Concrete	JKR/SPJ/1988-S5 - Cl. 5.2 Visual, testing and measurement			Contractor - Supplier / Site Engineer	Inspection Form	
1.1	Cement	Certificates Of Tests Transportation And Storage	JKR/SPJ/1988-S5 - Cl. 5.2.1 JKR/SPJ/2018-S9 - Cl. 9.2.1.1 The cement to be used throughout the Works shall be cement obtained from SIRIM-Certified manufacturer. The cement shall be described and complied with MS EN 197-1 as shown in TABLE 9.1. JKR/SPJ/2018-S9 - Cl. 9.2.1.2 The test shall be carried out at any approved laboratory in accordance with MS EN196 JKR/SPJ/2018-S9 - Cl. 9.2.1.3		Additional tests shall be carried out on any cement which appears to have deteriorated through age, damage to containers, improper storage, or any other reason.			

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.2	Aggregate (i) Coarse Aggregates (ii) Fine Aggregates	Coarse aggregate to be used for at least the top 50mm of the slab shall have a polished stone value of not less than 40. Aggregates shall be naturally occurring sand, granite or limestone, crushed or uncrushed For work below ground level, only crushed granite shall be used The property limits Grading The property limits Grading	JKR/SPJ/1988-S5 - Cl. 5.2.2 Tests shall be carried out according to MS 30. JKR/SPJ/2018-S9 - Cl. 9.2.2.1 MS EN 12620 JKR/SPJ/2018-S9 - Cl. 9.2.2.2 TABLE 9.2. JKR/SPJ/2018-S9 - Cl. 9.2.2.4 The grading of coarse aggregates shall be analysed as described in MS 30 and shall be within the limits specified in TABLE 9.3. JKR/SPJ/2018-S9 - Cl. 9.2.2.3 TABLE 9.2. JKR/SPJ/2018-S9 - Cl. 9.2.2.4 The grading of fine aggregates shall be analysed as described in MS 30 and shall be within the limits specified in TABLE 9.3A			Contractor - Supplier / Supervisor / Site Engineer	Inspection Form	
1.3	Joint filler	The expansion joint filler	JKR/SPJ/1988-S5 - Cl. 5.2.3 shall conform to the requirements of AASHTO M153 or M213.			Contractor - Site Engineer		

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.4	Joint sealants and seals	(a) Hot-poured sealant (b) Cold-poured sealants (c) Gunning Grade Sealants (d) Preformed Compression Seals	JKR/SPJ/1988-S5 - Cl. 5.2.4 Joint sealants shall consist of hot or cold-poured compounds or preformed seals as indicated on the Drawings and shall comply with the following requirements: - Hot-poured sealants shall comply with the requirements of B.S.2499 for Type A2 sealants. Cold-poured sealants shall comply with the performance requirements for the Normal type of sealant given in B.S. 5212. Shall be composed of a curing agent and a base resin in such proportions as recommended by the manufacturer. Gunning grade sealants consisting of two-part poly-sulphide-based sealing compounds shall comply with B.S. 4254 material. Preformed compression seals shall be made from natural rubber and shall conform to the requirements contained in Table 5.1		It shall cure within 1 hour and remain active for not less than 4 hours. Shall be applied after the curing period of the primer and within the period that the primer remains active.	Contractor - Site Engineer / Construction Manager Contractor - Supplier / Construction Manager		
1.5	Waterproof Membrane		JKR/SPJ/1988-S5 - Cl. 5.2.5 Plastic sheeting shall have a minimum thickness of 125 um and shall be of a quality as approved by the S.O.			Contractor - Site Engineer / Construction Manager		

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.6	Curing Materials The exposed surface of concrete pavements shall be cured immediately after the surface treatment by the application of one of the following curing materials:-	a) White Pigmented Liquid Membrane-Forming Compound b) Aluminised Curing Compound	JKR/SPJ/1988-S5 - Cl. 5.2.6 White pigmented liquid membrane-forming compound shall conform to the requirements of AASHTO M148, Type 2. Aluminised curing compound shall be stable and impervious to evaporation of water from the concrete surface within 60 minutes after application. The curing compound shall contain sufficient flaked aluminium in finely divided dispersion, shall not react chemically with the concrete to be cured and shall not within 2 weeks after application. crack, peel or disintegrate.	Shall have test certificates from an approved testing laboratory to show that the compound has a curing efficiency of 90%.		Contractor - Supplier / Site Engineer		

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2.0	Production of Concrete							
2.1	Concrete		JKR/SPJ/1988-S5 - Cl. 5.3.1 Concrete shall be of the grade shown on the Drawings and shall comply with the relevant requirements of Section 9: Concrete.			Contractor - Supplier / Site Engineer / Construction Manager	Drawings	
2.2	Equipment		JKR/SPJ/1988-S5 - Cl. 5.3.2 All equipment used such as batching plant and mixers shall comply with the relevant requirements of Section 9: Concrete.					

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.0	Construction							
3.1	Preparation of Subgrade or Subbase	Prior to placing concrete pavement, the underlying subgrade or subbase shall have been shaped and compacted.	JKR/SPJ/1988-S5 - Cl. 5.4.1 Sub-Sections 2.2.7 or 4.1.2 as appropriate and the waterproof membrane laid as required in the Drawings.			Contractor - Supplier / Site Engineer	Drawings	
3.2	Construction by Machine		JKR/SPJ/1988-S5 - Cl. 5.4.2 The concrete slab shall be constructed either by fixed form or slip form paving plant in a continuous process in either one or two layers, as approved by the S.O.			Contractor - Site Engineer / Construction Manager		
3.2.1	Fixed Forms, Rails and Guide Wires For Machine Construction	a) Fixed Forms and Rails b) Guide Wires	JKR/SPJ/1988-S5 - Cl. 5.4.2.1 All forms and rails shall be made of steel and be sufficiently robust and rigid to support the weight and pressure caused by the paving equipment. Be at constant height above and parallel to the required edges of the slab within vertical tolerance of $\pm 3\text{mm}$. Constant horizontal distance from the required edge of the pavement within lateral tolerance of $\pm 10\text{mm}$. Supported from stakes not more than 8m apart by connector of fine horizontal and vertical adjustment.			Contractor - Supplier / Site Engineer / Construction Manager		

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.2.2	Construction By Fixed Form Paving		JKR/SPJ/1988-S5 - Cl. 5.4.2.2 Compacted by vibration to comply with sub-section 5.3.1 throughout the full depth of the slab. Joint grooves shall be constructed in compliance with sub-section 5.5. Beams shall weigh not less than 170kg per linear metre.			Contractor - Supplier		
3.2.3	Construction By Slip Form Paving		JKR/SPJ/1988-S5 - Cl. 5.4.2.3 A slip form paving train shall consist of powered machines which spread, compact and finish the concrete in a continuous operation. Joint grooves shall be constructed in compliance with Sub-Section 5.5.			Contractor - Site Engineer / Construction Manager		
3.3	Construction by Hand - Guided		JKR/SPJ/1988-S5 - Cl. 5.4.3 Internal pokers shall be at points not more than 500 mm apart over the whole area of the slab. Joint grooves shall be constructed in compliance with Sub-Section 5.5. The surface shall be brush-textured as described in Sub-Section 5.6. The concrete shall be cured in compliance with Sub-Section 5.8.					
3.4	Manual Construction		JKR/SPJ/1988-S5 - Cl. 5.4.4 Joint grooves shall be constructed in compliance with Sub-Section 5.5. The concrete shall be cured in compliance with Sub-Section 5.8.			Contractor - Site Engineer		
3.4.1	Side Forms For Manual Construction		JKR/SPJ/1988-S5 - Cl. 5.4.4.1		The forms shall comply with other requirement of Sub-Section 5.4.2.1 as appropriate.			

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4.0	Joints		JKR/SPJ/1988-S5 - Cl. 5.5 Preformed expansion joint filler shall be placed around each structure which extends into or through the pavement over the full interface with the concrete pavement slab before concrete is placed.			Contractor - Site Engineer		
4.1	Tranverse expansion joints		JKR/SPJ/1988-S5 - Cl. 5.5.1 The dowel supports shall be constructed so as to hold dowels in correct alignment, both vertically and horizontally, subject to a tolerance of not more than 1 in 100. Installing template 5 mm above the top of the preformed filler. The filler tolerance not more than 1 in 500			Contractor - Site Engineer		
4.2	Tranverse contraction joints		JKR/SPJ/1988-S5 - Cl. 5.5.2 Transverse contraction joints shall consists of planes of weakness created by forming or cutting grooves in the surface of the pavement.			Contractor - Site Engineer		
4.2.1		Planes of weakness	JKR/SPJ/1988-S5 - Cl. 5.5.2.1 a) Sawn grooves b) Formed grooves					
4.2.2		Load transfer assemblies	JKR/SPJ/1988-S5 - Cl. 5.5.2.2 Load transfer assemblies for transverse contraction joints shall be as shown on the Drawings.				Drawings	

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4.3	Longitudinal Joints		JKR/SPJ/1988-S5 - Cl. 5.5.3 Constructed as shown in the drawings.			Contractor - Site Engineer	Drawings	
4.4	Transverse Construction Joints		JKR/SPJ/1988-S5 - Cl. 5.5.4 When there is an interruption of more than 30 minutes in the concreting operations, a transverse construction joint shall be constructed.					
4.5	Sealing Joints		JKR/SPJ/1988-S5 - Cl. 5.5.5 Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic.					
4.6	Concrete Saw		JKR/SPJ/1988-S5 - Cl. 5.5.6					

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5.0	Surface Texture		JKR/SPJ/1988-S5 - Cl. 5.6			Contractor - Site Engineer		
5.1	Texture of Running Surfaces		JKR/SPJ/1988-S5 - Cl. 5.6.1 brush-textured in a direction at right angles to the centre line of the carriageway. The average texture depth for each set of 10 tests shall not be less than 0.75 mm and not more than one test of each set shall show a texture depth of less than 0.65 mm.				The texture depth shall be determined by the sand patch test. In no case shall the maximum texture depth exceed 2 mm	
5.2 5.2.1 5.2.2	Measurement of texture depth: sand patch method	Apparatus Method	JKR/SPJ/1988-S5 - Cl. 5.6.2 JKR/SPJ/1988-S5 - Cl. 5.6.2.1 JKR/SPJ/1988-S5 - Cl. 5.6.2.1 The surface to be measured shall be dried					
6.0	Rounding of Edges		JKR/SPJ/1988-S5 - Cl. 5.7 Rounded to a radius of 5 mm.				Drawings	
7.0	Curing		JKR/SPJ/1988-S5 - Cl. 5.8 The Exposed Surfaces of Concrete Pavement Curing compound fulfilling the requirements of Sub - Section 5.2.6		Shall be maintained intact for a period of not less than 14 days.	Contractor-Site Engineer	Drawings	

TRADE : 3.10 PORTLAND CEMENT CONCRETE PAVEMENT (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
8.0	Removing Form		JKR/SPJ/1988-S5 - Cl. 5.9 The ends of all expansion joints shall be cleaned of concrete and the full width of the filler exposed for the full depth of the slab. Any areas showing a minor degree of honeycombing shall be repaired with 1:3 cement mortar.		Forms shall not be removed until the freshly placed concrete has set for at least 6 hours			
9.0	Opening To Traffic		JKR/SPJ/1988-S5 - Cl. 5.10		No pavement shall be opened to any traffic earlier than twenty-eight (28) days from the completion of concreting.			
10.0	Treatment of Manholes and Gullies		JKR/SPJ/1988-S5 - Cl. 5.11 Manhole covers, gullies and their frames shall be isolated from the main pavement slab as shown on the Drawings and their surrounds cast in separate operations. Manholes and gully recesses shall be formed by casting the main slab against formwork boxes with vertical sides, placed and fixed accurately.			Contractor-Site Engineer	Drawings	
11.0	Horizontal Alignments, Surface Levels And Surface Regularity		JKR/SPJ/1988-S5 - Cl. 5.12 The alignment, levels and regularity of the finished surface shall be in compliance with Sub- Section 4.4.					

TRADE : 3.11 PRESSTRESSING FOR STRUCTURE (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.0 1.1	Material Prestressing Tendons, Strands, Wire or Steel Bar	i)High tensile steel wire ii)Prestressing steel strand iii)High tensile alloy steel bars	BS 5896/EN 10138-Pt.2, ASTM A416/A416M EN 10138-Pt.3 BS 4486/ASTM A722M Specifications (JKR/SPJ/2017-S11 : Cl.11.4.1).		Initial Stage / one test every unit of manufacture Initial Stage / one test every unit of manufacture Initial Stage / one test every unit of manufacture	(Contractor-Supplier Site Engineer/Cons. Manager) (Consultant- IOW/ARE/RE) (JKR- PTB/JA/WPP/PP)	JKR.PK(O).04-5	
1.2	Material Testing		Specifications JKR/SPJ/2017-S11 :Cl. 11.4.1		28 days before installation	(Contractor-Supplier/ Supervisor /Lab.Tech/Site Engineer Cons.Manager) (Consultant- IOW/ARE/RE) (JKR-PTB/JA WPP/PP)	JKR.PK(O).04- SKC.JB.2A Test certificate	
1.3	Duct Systems		Specification JKR/SPJ/2017-S11 :Cl. 11.4.4		Initial Stage	(Contractor-Supplier/ Site Engineer /Cons.Manager) (JKR- PTB/JA/WPP/PP)	JKR.PK(O).04- SKC.JB.2A Test certificate	
1.4	Anchorage		BS EN 13391:2004 Specification JKR/SPJ/2017-S11 :Cl. 11.4.5		Initial Stage	(Contractor- Supplier/Site Engineer/Cons.Mana ger) (JKR-PTB/JA/WPP/ PP)	JKR.PK(O).04- SKC.JB.2A Test certificate	
1.5	Couplers		BS EN 13391:2004 Specification JKR/SPJ/2017-S11 :Cl. 11.4.6		Initial Stage	(Contractor- Supplier/Site Engineer/Cons.Mana ger) (JKR-PTB/JA/WPP/ PP)	JKR.PK(O).04- SKC.JB.2A Test certificate	
1.6	Grouts For Duct	i) Testing of grouts	BS EN 446, BS EN 447 Specification JKR/SPJ/2017-S11 : Cl.11.4.7 - Table 11.1)		Initial Stage Initial Stage	(Contractor- Supplier/Site Engineer/Cons.Mana ger) (JKR-PTB/JA/WPP/ PP) (Contractor- Supplier/Supervisor/L ab Tech	JKR.PK(O).04- SKC.JB.2A Test certificate JKR.PK(O).04- SKC.JB.2A Test certificate	
1.7	Debonding For Prestressed Cables		Specification JKR/SPJ/2017-S11 : Cl.11.4.8		Initial Stage	(Contractor- Supplier/Site Engineer/Cons.Mana ger) (JKR-PTB/JA/WPP/ PP)	JKR.PK(O).04- SKC.JB.2A Test certificate	

TRADE : 3.11 PRESSTRESSING FOR STRUCTURE (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2.0 2.1	Prestressing Equipment Mould and Formworks		Specification JKR/SPJ/2017-S11 : Cl. 11.5.1		Before casting	(Contractor-Supplier/Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2A	
2.2	Tensioning Equipment		Specification JKR/SPJ/2017-S11 : Cl. 11.5.2		Before tensioning operation	(Contractor-Supplier/Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2A Test certificate	
2.3	Grouting Equipment		Specification JKR/SPJ/2017-S11 : Cl. 11.5.3		Before grouting work	(Contractor-Supplier/Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2A Test certificate	
3.0 3.1	Construction Assembly of Cables and Sheaths	i) Joints in adjacent duct ii) Duct iii) Tendon iv) Grout Vents	Specification JKR/SPJ/2017-S11 : Cl. 11.6.1 At least 300mm apart Not less than 3000mm lengths Tolerance profile height: i) Up to 200mm $\pm$ D/40mm ii) 200 to 1000mm $\pm$ 5mm iii) Over 1000mm $\pm$ 10mm Minimum of 500mm above the highest point on the duct profile		Before tensioning Before tensioning Before tensioning Before tensioning	(Contractor-Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B	
3.2	Preparation of Tendons Before Tensioning		Shop drawing Specification JKR/SPJ/2017-S11 : Cl. 11.6.2		Before tensioning	(Contractor-Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B	
3.3	Preparation of Anchorages Before Tensioning	i) Anchorages position	Tolerance: i) $\pm$ 6mm across and vertical ii) $\pm$ 15mm along the tendon Specification JKR/SPJ/2017-S11 : Cl. 11.6.3		Before tensioning	(Contractor-Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B	

TRADE : 3.11 PRESSTRESSING FOR STRUCTURE (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.4	Pre-tensioning Procedure	i) Initial force to the tendon ii) Elongation iii) Maximum permitted load in tendon	Not exceed 5 % of the minimum breaking load of the tendon Tolerance $\pm 5\%$ for individual tendon Not more than 80% the characteristic tensile strength Specification JKR/SPJ/2017-S11 :Cl. 11.6.4		Before tensioning Before tensioning Before tensioning	(Contractor-Supplier/Site Engineer/Cons.Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B	
3.5	Post-tensioning Procedure	i) Compressive strength test	30N/mm ² at 28 days@27 N/mm ² at 7 days Specification JKR/SPJ/2017-S11 :Cl. 11.6.5			(Contractor-Supplier/Site Engineer/Cons.Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B	
3.6	Records of Stressing	i) Identification number of dynamometers, gauges, pumps and jacks ii) Initial stressing force or pressure when tendons are marked for measurement of elongation iii) Force applied if a dynamometer is used or, alternatively, the pump or jack pressure and area of the piston iv) Before anchoring v) Elongation remaining after anchoring with load-extension curves vi) Records of lift off if required	Specification JKR/SPJ/2017-S11 :Cl. 11.6.6		Within 24 hours after completion of prestressing	(Contractor-Site Engineer/Cons.Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2C	
3.7	Grouting of Ducts	 i) Air Testing of Ducts before Grouting ii) Injecting Grout and Test iii) Record of Grouting Operations	BS EN 446/BSISO 14824-2 Specification JKR/SPJ/2017-S11 :Cl. 11.6.9 i) Pressurised at 0.25MPa for 30 seconds ii) Pressure reduce to 0.1MPa BS EN 445:1997 Within 24 hours after grouting		 Before grouting work Construction stage Completion	(Contractor-Supplier/Supervisor/LabTech/Site Engineer/Cons.Manager) (JKR-PTB/JA/WPP/PP)	 JKR.PK(O).04-SKC.JB.2A JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B	

TRADE : 3.11 PRESSTRESSING FOR STRUCTURE (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4.0	General Requirement For Precast Prestressed Concrete Members							
4.1	Handling and Placing	i) Marking on the outer vertical face ii) Lifting	i) Date of manufacture ii) Identification number iii) Maximum mass of the element members iv) Manufacturer's name or registered mark v) Dimension of precast members i) Pretensioned members shall not be lifted until fully stressed		Factory visit and before delivery to site Before delivery to site	(Contractor-Supplier/Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2A JKR.PK(O).04-SKC.JB.2A	
4.2	Tolerance		BS 5606:1990 Specification JKR/SPJ/2017-S11 :Cl. 11.7.4		Before delivery to site	(Contractor-Supplier/Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2A	
4.3	Off-Site Manufacture	i) Method Statement of Construction and Quality Assurance ii) Cube Test Results	At least 14 working days Submit 28-day cube test results to SO Specification JKR/SPJ/2017-S11 :Cl. 11.7.5		Prior to manufacture of precast concrete elements After casting	(Contractor-Supplier/Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP) (Contractor-Supervisor/Lab Tech /Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B	
4.4	Launching of Precast Elements	i) Method Statement ii) Detailed Programme of Launching Operation	At least one month in advance At least one month in advance Specification JKR/SPJ/2017-S11 :Cl. 11.7.6		Before each launching operation Before each launching operation	(Contractor-Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP) (Contractor-Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B	

TRADE : 3.11 PRESSTRESSING FOR STRUCTURE (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4.5	Inspection and Testing	i) Surface Finish ii) Rebound Hammer iii) Electromagnetic Cover Measuring Devices iv) Gamma Radiography v) Coring Test	BS EN 1992-2:2005 Specification JKR/SPJ/2017-S11 :Cl. 11.7.7 BS 4408-1 BS 4408: Part 3 BS 1881: Part 4		If the quality of the concrete is shown inadequate If the quality of the concrete is shown inadequate If the quality of the concrete is shown inadequate If the quality of the concrete is shown inadequate If the quality of the concrete is shown inadequate	(Contractor-Supervisor/Lab Tech /Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B JKR.PK(O).04-SKC.JB.2B	
4.6	Load Test of Structures or Parts of Structures		After 28 days from the time of placing the concrete Specification JKR/SPJ/2017-S11 :Cl. 11.7.8		Where there is doubt regarding serviceability or strength	(Contractor-Supervisor/Lab Tech /Site Engineer/Cons. Manager) (JKR-PTB/JA/WPP/PP)	JKR.PK(O).04-SKC.JB.2B	

TRADE : 3.12 BRIDGE BEARINGS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.0	Elastomeric Bearings							
1.1	Submission of material for approval		1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S13 : Clause 13.2.2) 3. Approved shop drawing		Before material delivery at site	Contractor - Supplier/Supervisor/ Lab Tech./Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock-Up)	
1.2	Testing shall be carried out at the Malaysian Rubber Board or accredited laboratory approved by the S.O.	Test Methods 1. Stiffness In Compression 2. Stiffness In Shear 3. Tensile Strength and Elongation at Break 4. Shear Modulus	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S13 : Clause 13.2.5) 3. Approved shop drawing 4. Technical submittal (catalogue) Section 13 : Clause 13.2.5 Table 13.1 Appendix B of MS 671 MS ISO 37 MS 1157 : Part 18		Approved of material / shop drawing Section 13 : Clause 13.2.5.2 Shall not be less than specified on the drawing Shall not be greater than specified on the drawing Min. 15.5 Mpa and Min 400% Shall be calculated by multiplying the shear stress at a shear strain of 25% by 4	Contractor - Supervisor/Lab Tech./ Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	

TRADE : 3.12 BRIDGE BEARINGS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
		5. Hardness	MS ISO 7619		45 to 75 hardness range IRHD			
		6. Ageing Test	MS ISO 188		Changes in hardness, tensile strength and elongation at break shall comply requirements of Table 13.1			
		7. Compression set	MS ISO 815		Max 30% after 22h at 70°C, max			
		8. Ozone Resistance	MS 1157 : Part 16		Shall be no visible cracks			
		9. Adhesion Strength	MS ISO 813		The peel bond strength shall be not less than 9 N/mm.			

TRADE : 3.12 BRIDGE BEARINGS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.3	Material on site inspection.	1. Test Certificate (Elastomeric Bearings) 2. Test Certificate (Mild Steel Plates) 3. Test Certificate (Bonding Agent) 4. Product Warranty	To conform as per approved material / testing Design Criteria		Upon delivery at site. Once for each delivery.	Contractor - Supplier/Supervisor/ Lab Tech./Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	JKR.PK(O).04-SKC.JB.1A Borang Pemeriksaan Galas (Bearing) Jambatan (Peringkat Penerimaan)	
1.4	Inspection of installation	1. General : Levels / drops, dimension, straightness / verticality & cleanliness 2. Epoxy mortar bedding of bearing 3. Concrete surface 4. Setting tolerances of bearings 5. Dowel bars 6. Care of bearings	1. Approved shop drawing. 2. Approved method of construction 3. Section 13 : Clause 13.2.7		In-progress and upon completion of installation. Once upon completion	Contractor - Supervisor/Lab Tech./ Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	1. JKR.PK(O).04-SKC.JB.1B Borang Pemeriksaan Galas (Bearing) Jambatan (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.1C Borang Pemeriksaan Galas (Bearing) Jambatan (Produk Siap)	

TRADE : 3.12 BRIDGE BEARINGS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2.0	Mechanical Pot Bearings							
2.1	Submission of material for approval		1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S13 : Clause 13.3). 3. Approved shop drawing 4. Certifications		Before material delivery at site	Contractor - Supplier/Supervisor/ Lab Tech./Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock-Up)	
2.2	Testing by accredited laboratory approved by the S.O.	Procedures and Compliance 1. Load Testing 2. Friction	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S13 : Clause 13.3.6). 3. Approved shop drawing 4. Technical submittal (catalogue)		Approved of material / shop drawing No sign of visible damage or permanent deformation Apparent scratches on sliding surface	Contractor - Supervisor/Lab Tech./ Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	
2.3	Material on Site Inspection.	1. Test Certificate (Mechanical Pot Bearings) 2. Product Warranty	To conform as per approved material / testing Design Criteria		Upon delivery at site. Once for each delivery.	Contractor - Supplier/Supervisor/ Lab Tech./Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	JKR.PK(O).04-SKC.JB.1A Borang Pemeriksaan Galas (Bearing) Jambatan (Peringkat Penerimaan)	

TRADE : 3.12 BRIDGE BEARINGS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2.4	Inspection of Installation	1. Levels / drops 2. Dimension 3. Straightness / verticality 4. Cleanliness 5. Tolerances	1. Approved shop drawing. 2. Approved method of construction 3. Section 13 : Clause 13.3.8		In-progress and upon completion of installation. Once upon completion	Contractor - Supervisor/Lab Tech./ Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	1. JKR.PK(O).04-SKC.JB.1B Borang Pemeriksaan Galas (Bearing) Jambatan (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.1C Borang Pemeriksaan Galas (Bearing) Jambatan (Produk Siap)	

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.0	Epoxy Mortar Bedding of Bearing							
3.1	Submission of material for approval		1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S13 : Clause 13.2.7.3). 3. Approved shop drawing		Before material delivery at site	Contractor - Supplier/Supervisor/ Lab Tech./Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock-Up)	
3.2	Testing by accredited laboratory approved by the S.O.	Trial Mix and Cube Test 1. Compressive Strength	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S13). 3. Approved shop drawing 4. Technical submittal (catalogue) 5. Test certificates Section 13 : Clause 13.2.2.4 BS 1881		Approved of material / shop drawing At least 48 N/mm² at 7 days	Contractor - Supervisor/Lab Tech./ Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	
3.3	Material on Site Inspection.		To conform as per approved material / testing		Upon delivery at site. Once for each delivery.	Contractor - Supplier/Supervisor/ Lab Tech./Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	JKR.PK(O).04-SKC.JB.1A Borang Pemeriksaan Galas (Bearing) Jambatan (Peringkat Penerimaan)	

TRADE : 3.12 BRIDGE BEARINGS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.4	Inspection of Installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing. 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Contractor - Supervisor/Lab Tech./ Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	1. JKR.PK(O).04-SKC.JB.1B Borang Pemeriksaan Galas (Bearing) Jambatan (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.1C Borang Pemeriksaan Galas (Bearing) Jambatan (Produk Siap)	

TRADE : 3.12 BRIDGE BEARINGS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4.0	Dowel Bars							
4.1	Submission of material for approval		1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S13 : Clause 13.2.2.5). 3. Approved shop drawing		Before material delivery at site	Contractor - Supplier/Supervisor/ Lab Tech./Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock-Up)	
4.2	Testing by accredited laboratory approved by the S.O.	Compliance 1. Zinc Coatings	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S13 : 13.2.5.2). 3. Approved shop drawing 4. Technical submittal (catalogue) Section 13 : Clause 13.2.2.5 BS 443 or BS EN ISO 1461 BS 970-1 or PD 970		Approved of material / shop drawing Grade 070M20 Min. average weight of zinc coating 1100 g/m ² Low carbon steel complying Grade 070M20	Contractor - Supervisor/Lab Tech./ Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	
4.3	Material on Site Inspection.		To conform as per approved material / testing		Upon delivery at site. Once for each delivery.	Contractor - Supplier/Supervisor/ Lab Tech./Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	JKR.PK(O).04-SKC.JB.1A Borang Pemeriksaan Galas (Bearing) Jambatan (Peringkat Penerimaan)	

TRADE : 3.12 BRIDGE BEARINGS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4.4	Inspection of Installation	1. Position 2. Direction	1. Approved shop drawing. 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Contractor - Supervisor/Lab Tech./ Site Engineer/Cons. Manager JKR - PTB/JA & WPP/PP	1. JKR.PK(O).04-SKC.JB.1B Borang Pemeriksaan Galas (Bearing) Jambatan (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.1C Borang Pemeriksaan Galas (Bearing) Jambatan (Produk Siap)	

TRADE : 3.13 EXPANSION JOINTS (New Trade)

A) METALS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.2).		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock- Up)	
2	Checked material compliance with manufacturer's requirement.	Tensile Properties 1. Tensile strength 2. Yield strength 3. Elongation 4. Resolution of area	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.2). 3. Approved shop drawing 4. Technical submittal (catalogue) Section 14 : Clause 14.2.2 1. ASTM A3370 - (Min. 415 N/mm ²) 2. ASTM A3370 - (Min. 345 N/mm ²) 3. ASTM A3370 - (Min. 20% in 50mm) 4. ASTM A3370 - (Min. 50%)		Before material approval	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	
3	Material on site inspection.	Product Warranty	1. To conform as per approved material / testing 2. Design Criteria		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.r	JKR.PK(O).04- SKC.JB.3A Borang Pemeriksaan Sendi Renggang (Peringkat Penerimaan)	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Inspection of installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. JKR.PK(O).04-SKC.JB.3B Borang Pemeriksaan Sendi Renggang (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.3C Borang Pemeriksaan Sendi Renggang (Produk Siap)	

B) ELASTOMER

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.3).		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock-Up)	
2	Checked material compliance with manufacturer's requirement.		1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.3). 3. Approved shop drawing 4. Technical submittal (catalogue)		Before material approval	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2 (cont)		Physical Properties 1. Tensile strength 2. Elongation at break 3. Durometer 4. Compression set 5. Oven aging 6. Elongation 7. Hardness 8. Oil swell 9. Strain 10. Low temperature recovery 11. Low temperature recovery 12. High temperature recovery	Section 14 : Clause 14.2.3 : Table 14.1 ASTM D412 - (Min. 14 N/mm ²) 2. ASTM D412 - (250 Type A) 3. ASTM D2240 (modified) - (55 + 5 points) 4. ASTM D395 (modified) - Max. 40%, 70hr at 100°C max 5. Max. 20%, 70hr at 100% tensile strength loss 6. ASTM D412 - (Max. 20% loss) 7. 0 to + 10 Type A durometer (points change) 8. ASTM D471 - (Max. 45%, 3.7hr at 100% weight change) 9. No cracks at 20% strain, 300pphm, in air 70 hrs at 40oC 10. ASTM D2628 - (Min. 88%, 72hrs at -10°C) 11. ASTM D2628 - (Min. 83%, 22hrs at -29°C) 12. ASTM D2628 - (Min. 85%, 72hrs at 100°C)			Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.		
3	Material on site inspection.	Product Warranty	1. To conform as per approved material / testing 2. Design Criteria		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04- SKC.JB.3A Borang Pemeriksaan Sendi Renggang (Peringkat Penerimaan)	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Inspection of installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. JKR.PK(O).04-SKC.JB.3B Borang Pemeriksaan Sendi Renggang (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.3C Borang Pemeriksaan Sendi Renggang (Produk Siap)	
C) EPOXIES								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 Cl.14.2.4).		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock-Up)	
2	Checked material compliance with manufacturer's requirement.		1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.4). 3. Approved shop drawing 4. Technical submittal (catalogue)		Before material approval	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2 (cont)		Physical Properties 1. Average Weight per litre 2. Solid Contents by Weight 3. Material to be fluid 4. Film Strength 5. Elongation 6. Low temperature 60oF	Section 14 : Clause 14.2.4 1. AASHTO M235 - (1.2 kgs +10%) 2. AASHTO M235 - (65%) 3. AASHTO M235 - (from - 15oC to 49°C) 4. AASHTO M235 - (Min. 14 N/mm ²) 5. AASHTO M235 - (250%) 6. AASHTO M235 - (Tensile - Ok and Elongation - Not Brittle)					
3	Material on site inspection.	Product Warranty	1. To conform as per approved material / testing 2. Design Criteria		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-SKC.JB.3A Borang Pemeriksaan Sendi Renggang (Peringkat Penerimaan)	
4	Inspection of installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. JKR.PK(O).04-SKC.JB.3B Borang Pemeriksaan Sendi Renggang (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.3C Borang Pemeriksaan Sendi Renggang (Produk Siap)	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Inspection of installation 1. Dimension 2. Straightness / verticality 3. Cleanliness		1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. JKR.PK(O).04-SKC.JB.3B Borang Pemeriksaan Sendi Renggang (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.3C Borang Pemeriksaan Sendi Renggang (Produk Siap)	

D) EPOXY MORTAR NOSINGS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 Cl.14.2.5). 3. Approved shop drawing		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Pemeriksaan Mock-Up)	
2	Checked material compliance with manufacturer's requirement.	Physical Properties 1. Nosing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.5). 3. Approved shop drawing 4. Technical submittal (catalogue) Section 14 : Clause 14.2.5 BD 33/94		Before material approval	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Material on site inspection.		1. To conform as per approved material / testing		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04- SKC.JB.3A Borang Pemeriksaan Sendi Renggang (Peringkat Penerimaan)	
4	Inspection of installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. JKR.PK(O).04- SKC.JB.3B Borang Pemeriksaan Sendi Renggang (Peringkat Pembinaan) 2. JKR.PK(O).04- SKC.JB.3C Borang Pemeriksaan Sendi Renggang (Produk Siap)	

E) JOINTS FILLER

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.6).		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock- Up)	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
2	Checked material compliance with manufacturer's requirement.	Type Of Filler 1. Nonextruding and resiloent type 2. Bituminous type filler 3. Preformed JOINTSS filler 4. Preformed elastomeric compression JOINTSS seals	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.6). 3. Approved shop drawing 4. Technical submittal (catalogue) Section 14 : Clause 14.2.6 AASHTO M213 (ASTM D1751) AASHTO M213 (ASTM D1751) AASHTO M33 (ASTM D994) AASHTO M220		Before material approval	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	
3	Material on site inspection.		To conform as per approved material / testing		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04- SKC.JB.3A Borang Pemeriksaan Sendi Renggang (Peringkat Penerimaan)	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
4	Inspection of installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. JKR.PK(O).04-SKC.JB.3B Borang Pemeriksaan Sendi Renggang (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.3C Borang Pemeriksaan Sendi Renggang (Produk Siap)	
F) JOINTS SEALING COMPOUND								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.7).		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan Pemeriksaan Mock-Up)	
2	Checked material compliance with manufacturer's requirement.	Rubber Bitumen Sealant 1. Hot poured material	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.7). 3. Approved shop drawing 4. Technical submittal (catalogue) Section 14 : Clause 14.2.7 BS 2499		Before material approval	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Material on site inspection.	Product Warranty	1. To conform as per approved material / testing 2. Design Criteria		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-SKC.JB.3A Borang Pemeriksaan Sendi Renggang (Peringkat Penerimaan)	
4	Inspection of installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. JKR.PK(O).04-SKC.JB.3B Borang Pemeriksaan Sendi Renggang (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.3C Borang Pemeriksaan Sendi Renggang (Produk Siap)	

G) WATER STOPS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.8).		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan/ Pemeriksaan Mock-Up)	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2	Checked material compliance with manufacturer's requirement.	Physical Properties 1. Specific Gravity 2. Durometer Hardness 3. Tensile Strength 4. Elongation 5. Cold Brittleness 6. Stiffness in Flexure	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14 : Cl.14.2.8). 3. Approved shop drawing 4. Technical submittal (catalogue) Section 14 : Clause 14.2.8 ASTM D 792 - (Max. 1.35) ASTM D 2240 - (75 + 5) ASTM D 412 - (Min 12.4 N/mm ²) ASTM D 412 - (350%) ASTM D 746 - (0°C) ASTM D 747 - (Min 2.4 N/mm ²)		Before material approval	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O. Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang). (Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	
3	Material on site inspection.		To conform as per approved material / testing		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O	JKR.PK(O).04- SKC.JB.3A Borang Pemeriksaan Sendi Renggang (Peringkat Penerimaan)	

TRADE : 3.13 EXPANSION JOINTS (New Trade)								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Inspection of installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. JKR.PK(O).04-SKC.JB.3B Borang Pemeriksaan Sendi Renggang (Peringkat Pembinaan) 2. JKR.PK(O).04-SKC.JB.3C Borang Pemeriksaan Sendi Renggang (Produk Siap)	

TRADE : 3.14 PARAPETS (New Trade)

A) CONCRETE PARAPET

i. Concrete

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S15 : Cl. 15.4).		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock- Up)	
2	Checked material compliance with Specifications JKR/SPJ/2017 Pindaan 2018-S9 Section 9 : Concrete	Material 1. Concrete 2. Cement Content 3. Free Water / Cement Ratio 4. Reinforcement	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S15 : Cl.15.4) 3. Approved shop drawing Section 15 : Clause 15.4.2 1. Concrete Grade 40/20 unless otherwise indicated on the Drawings Section 9 : Concrete 2. Section 9 : Clause 9.2.1 3. Section 9 : Table 9.6 & 9.6A 4. Section 9 : Clause 9.6		Approved of material / shop drawing	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	
3	Material on site inspection.	To conform as per approved material / testing	Specifications (JKR/SPJ/2017-S9 : Cl.9.3)		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).06 Borang Pemeriksaan Bahan/ Peralatan di Tapak JKR.PK(O).04- SKC.ST.1A Borang Pemeriksaan Kerja Struktur Konkrit (Peringkat Penerimaan)	

TRADE : 3.14 PARAPETS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Inspection of installation	1. Lines 2. Levels 3. Grades 4. Dimensions	1. Approved shop drawing 2. Approved method of construction 3. Specifications (JKR/SPJ/2013-S15 : Cl.15.4.3)		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	1. Pemeriksaan Tetulang Sebelum Kelulusan Bagi Kerja Konkrit 2. JKR.PK(O).04-SKC.ST.1B Borang Pemeriksaan Kerja Struktur Konkrit (Peringkat Pembinaan) 3. JKR.PK(O).04-SKC.ST.1C Borang Pemeriksaan Kerja Struktur Konkrit (Produk Siap)	

ii) JOINT FILLER

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S15). 3. Approved shop drawing		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
2	Checked material compliance with Specifications JKR/SPJ/2013-S14 Section 14 : Expansion Joint		1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S14). 3. Approved shop drawing 4. Technical submittal (catalogue)		Before material approval	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	

TRADE : 3.14 PARAPETS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2 (cont)		Type Of Filler 1. Nonextruding and resiloent type 2. Bituminous type filler 3. Preformed joint filler 4. Preformed elastomeric compression joint seals	Section 14 : Clause 14.2.6 1. AASHTO M213 (ASTM D1751) - Shall conform 2. AASHTO M213 (ASTM D1751) - Shall conform 3. AASHTO M33 (ASTM D994) - Shall conform 4. AASHTO M220 - Shall conform			Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.		
3	Material on site inspection.	To conform as per approved material / testing	Specifications (JKR/SPJ/2013-S14 Cl. 14.2.6).		Upon delivery at site. Once for each delivery.	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-6 (Borang Permohonan Pemeriksaan Bahan/ Peralatan di Tapak)	
4	Inspection of installation	1. Dimension 2. Straightness / verticality 3. Cleanliness	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-8 (Borang Pemeriksaan Kerja Pembinaan) JKR.PK(O).04-8a (Borang Kelulusan Kerja Pembinaan)	

iii) DOWEL BARS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submission of material for approval	Approved shop drawing	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S15).		Before material delivery at site	Supplier/Supervisor/ Lab Tech. / Site Engineer/ Construction Manager/Project Manager/S.O.	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	

TRADE : 3.14 PARAPETS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2	Checked material compliance with Specifications JKR/SPJ/2013-S13 Section 13 : Bridge Bearings.	Zinc Coating Test	1. Contract Document and Construction Drawing 2. Specifications (JKR/SPJ/2013-S15). 3. Approved shop drawing 4. Technical submittal (catalogue) Section 13 : Clause 13.2.2.5 BS 443 or BS EN ISO 1461 (Min. average weight of zinc coating 1100 g/m ²)		Before material approval	Contractor's QA/QC / Project Manager	(Borang Pemeriksaan / Ujian Alatan Di Makmal / Kilang).	
3	Material on site inspection.		To conform as per approved material / testing		Upon delivery at site. Once for each delivery.	Supplier / Contractor's QA/QC / Project Manager	JKR.PK(O).04-6 (Borang Permohonan Pemeriksaan Bahan/ Peralatan di Tapak)	
4	Inspection of installation	1. Position 2. Direction	1. Approved shop drawing 2. Approved method of construction		In-progress and upon completion of installation. Once upon completion	Contractor's QA/QC / Project Manager	JKR.PK(O).04-8 (Borang Pemeriksaan Kerja Pembinaan) JKR.PK(O).04-8a (Borang Kelulusan Kerja Pembinaan)	

4.0 KERJA SIVIL



TRADE

- 4.1 Drainage Works
- 4.2 Sewerage Works
- 4.3 External Water Reticulation
- 4.4 Internal Road And Hard-standing

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TRADE : 4.1 DRAINAGE WORKS								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Drainage and Culvert Excavation	- Check alignment (position of pegs) Upon completion of excavation: - Check depth of excavation (150mm less than depth in the drawing) - Excavation through rock - backfill rock excavation to required level with concrete or suitable materials - Check alignment (position of pegs) Upon completion of excavation: - Check depth of excavation (600 mm above the top of culverts design levels or to the top of subgrade levels, whichever is lower)	- Construction Drawing and survey record - Standard Specification For Building Works 2014 (SSBW 2014) Section S : Cl. 2.2.3 - "Ditto" (Cl. 2.2.1) - Construction Drawing and survey record - SSBW 2014 Section S : Cl 2.2.4 - 2.2.6	- Survey equipment/pegs/markers/TBM/ measurement equipment - Survey equipment/pegs/markers/TBM/ measurement equipment - Survey equipment/pegs/markers/TBM/ measurement equipment - Survey equipment/pegs/markers/TBM/ measurement equipment	1 in every 20m run or change in direction or gradient - Excavation to required level - Excavation to required level	Kontraktor/ Perunding/PP/WPP/ PTB	Borang Pemeriksaan Kerja-kkerja Saliran ; manufacturer's Certificate	
2	Backfilling	- Backfilling in 150 mm layers of approved materials on both sides of the drain and compacted with mechanical rammers.	SSBW 2014 Section S : Cl. 2.3	- Survey equipment/pegs/markers/TBM/ measurement equipment	- Immediately after completion of drain laying or installation of culverts	Kontraktor/ Perunding/PP/WPP/ PTB	Borang Pemeriksaan Kerja-kkerja Saliran ; manufacturer's Certificate	

TRADE : 4.1 DRAINAGE WORKS								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	(i) Cast in-situ Concrete Drain	- Check concrete grade and length of cast in-situ concrete drain	- SSBW 2014 Section S : Cl. 4.4.3	- Visual inspection	- Every delivery	Kontraktor/ Perunding/PP/WPP/ PTB	Borang Pemeriksaan Kerja-kerja Saliran ; manufacturer's Certificate	
	(ii) Cascade Drain	- "Ditto" (Laid stepping on 150mm mass concrete)	- SSBW 2014 Section S : Cl. 4.4.3	- Relevant Construction Drawing	- during construction			
	(iii) Precast Concrete Drain	- Check concrete grade and length of precast drain unit - Inspect dimension and overall integrity of precast drain unit.	- SSBW 2014 Section S : Cl. 4.4.3 or manufacturer's instruction/brochure (for propriety product) - "Ditto"	- Visual inspection - Delivery Order	- Every delivery - Every delivery			
4	Subsoil Drain	- Check minimum gradient and slope.	- SSBW 2014 Section S : Cl. 5.0	- Relevant Construction Drawing	- during construction	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja-kerja Saliran ; manufacturer's Certificate	
5	Sumps	- Check invert level / sumps depth	- SSBW 2014 Section S : Cl. 6.0	- Relevant Construction Drawing	- during construction	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja-kerja Saliran ; manufacturer's Certificate	

TRADE : 4.1 DRAINAGE WORKS								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
6	Culverts (i) Pipe Culverts	On delivery to site, check: - Class, type, dimension of pipe - Date of manufacture - Approval / compliance of product and material - Cracks, chips and defects Laying of pipe culverts: - Refer to SSBW 2014 Section S : Cl.7.4	- SSBW 2014 Section S : Cl. 7.4 ; Manufacturer's Specification - MS 881 - Test Certificate - SSBW 2014 Section S : Cl. 7.4 - "Ditto"	- Relevant Construction Drawing - N/A - Site daily - Visual inspection - Survey equipment/pegs/markers/TBM/ measurement equipment	- Each pipe culvert - Every delivery - Every delivery - Every delivery - Each pipe culvert	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja-kerja Saliran ; manufacturer's Certificate	
	(ii) Precast Box Culverts	- Size, thickness - Cracks, chips and defects Laying of concrete boxes : - Gap between laid section (<13mm) - Difference in level (< 3mm)	- Manufacturer's Specification / broucher - MS 1293 - SSBW 2014 Section S : Cl. 7.5 - SSBW 2014 Section S : Cl. 7.5 - SSBW 2014 Section S : Cl. 7.5	- Delivery order, Construction Drawing - Visual Inspection - Survey equipment/pegs/markers/TBM/ measurement equipment - Survey equipment/pegs/markers/TBM/ measurement equipment	- Every delivery - Every delivery - Every laid section - Every laid section			
7	On - site Detention Pond	- constructed according to the drawing and conform to the requirement of MSMA.	- SSBW 2014 Section S : Cl. 8.0	- Relevant Construction Drawing	- during construction	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja-kerja Saliran ; manufacturer's Certificate	

TRADE : 4.2 SEWERAGE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION/TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Selection of Product and Materials	Approval of Product and Material before delivery to site	-Malaysian Sewerage Industry Guidelines Volume III: Section 2; -Suruhanjaya Perkhidmatan Air Negara (SPAN), current approved material and product list -Standard Specification For Building Works 2014 (SSBW 2014) Section F : Cl. 2.0		-Before construction	Kontraktor/ Perunding / PP/WPP/ PTB	Borang Pemeriksaan Sistem Pembetulan, SPAN's approval certificate/ document, Manufacturer's Certificate, SIRIM Certificate	ITP shall be read in conjunction with SSBW 2014 : Section F - Sewerage Works, BQ descriptions, Construction Drawings, Manufacturer's Instruction and relevant approving authorities' guidelines/ documents
2	Product and Materials (i) Pipe (ii) Manhole	Delivery on site: - Check for defects - Check against the construction drawings and the delivery docket. - Stacking / storage arrangement	- SSBW 2014 Section F : Cl. 2.0 - Malaysia Sewerage Industries Guidelines (MSIG) Volume III: Section - Manufacturer's instruction	- Visual Inspection - Construction Drawing - Refer to manufacturer's instruction	-Every delivery			
3	Trench excavation and pipe laying	- Check pipe size, pipe type, fittings, alignment, gradient, depth, pipe connection, and width of trench - Check pipe bedding, haunching, concrete surround	- SSBW 2014 Section F : Cl. 3.0, Cl. 4.0, Cl. 5.0, Cl. 6.0, Cl. 7.0, Cl. 9.0 - MISG Volume III: Section 3 - SSBW 2014 Section F : Cl. 8.0 - Construction Drawing	- Survey equipment/ pegs/markers/ TBM/measurement equipment - Construction Drawing	1 in every 20m run or change in direction or gradient			

TRADE : 4.2 SEWERAGE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION/TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Backfilling of trench	Backfilling in 150 mm layers of approved materials on both sides compacted with rammer up to 300 mm on top of pipe. Then, backfill in 300 mm layer to slightly higher than the top of trench compacted by mechanical vibrating tamper. - Compaction	- SSBW 2014 Section F : Cl. 14.0 - MSIG Volume III: Section 3	- Construction Drawing - Survey equipment/ pegs/markers/ TBM/ measurement equipment	1 in every 20m run or change in direction or gradient	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Sistem Pembetulan, SPAN's approval certificate/ document, Manufacturer's Certificate, SIRIM Certificate	ITP shall be read in conjunction with SSBW 2014 : Section F - Sewerage Works, BQ descriptions, Construction Drawings, Manufacturer's Instruction and relevant approving authorities' guidelines/ documents
5	Manhole, Inspection Chamber	- Check manhole type, internal lining, concrete surround, manhole size, manhole cover and frame	- SSBW 2014 Section F : Cl. 10 - MSIG Volume III: Section 3	- Construction Drawing	- Each Manhole			
6	Septic Tank, Small Sewage Treatment System (SSTS) and Sewage Treatment Plant (STP)	- Construction and Installation	- SSBW 2014 Section F : Cl. 11 - System Provider specification on construction and installation of the System	- System Provider specification on construction and installation of the System	- During Construction and Installation			

TRADE : 4.2 SEWERAGE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION/TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
7	Connection to Public Sewerage Line	- Letter of approval from relevant authority - SO Approval	- SSBW 2014 Section F : Cl. 12 - MSIG Volume III: Section 4	- Construction Drawing	- During Construction	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Sistem Pembetulan, SPAN's approval certificate/ document, Manufacturer's Certificate, SIRIM Certificate	ITP shall be read in conjunction with SSBW 2014 : Section F - Sewerage Works, BQ descriptions, Construction Drawings, Manufacturer's Instruction and relevant approving authorities' guidelines/ documents
8	Testing & Commissioning	a) Gravity Sewer i. Exfiltration test (low pressure air or water test) ii. Check for straightness, obstruction and grade iii. Infiltration test (when required) iv. CCTV test (when required) b) Force Main i. Exfiltration test (when required) ii. High pressure leakage test iii. High pressure leakage test (following high pressure water test) iv. Check for straightness, obstruction and grade v. CCTV test (when required) c) Manhole and others i. Visual inspection ii. Water tightness test (when required)	- SSBW 2014 Section F : Cl. 13 MSIG Volume III: Section 4	Refer to MSIG Volume III: Section 4	- before backfilling			

TRADE : 4.3 EXTERNAL WATER RETICULATION

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	General	Employment of Permitted Personnel	SSBW 2014 Section L : Cl. 1.0/SPAN Guidelines	Visual Inspection	-Before Construction	Kontraktor/ Perunding/PP/WPP/ PTB	Borang Pemeriksaan Sistem Retikulasi Air ; Valid Permits issued by Suruhanjaya Perkhidmatan Air Negara (SPAN)	Borang Pemeriksaan Sistem Retikulasi Air & <i>Manufacturer's Certificate</i>
2	Selection of Product and Material	Before delivery to site, check: - registration of supplier - approval / compliance of product and material	SSBW 2014 Section L : Cl. 2.2 & 4.4.2/SPAN Guidelines/State Water Authority	-Visual Inspection	-Before Construction		Certificate of Registration issued by SPAN / SIRIM	
3	Product and materials: (i): Pipe, Fitting, Valve and Pipe Special (ii): Storage Tank	On delivery to site, check : - dimension and defects - Stacking arrangement On delivery to site, check : - dimension and defects	- Construction drawing - SSBW 2014 Section L : Cl. 4.1 /SPAN Guidelines - SSBW 2014 Section L : Cl. 4.4.2 /SPAN Guidelines	- Visual inspection; manufacturer's Certificate - Visual inspection, survey record - Visual inspection	- Every delivery - Every 10 m intervals - Every delivery			ITP shall be read in conjunction with BQ, Construction Drawing, manufacturer's Instruction and relevant approving authorities' guidelines/ documents Note : Pumping System & Cold Water Plumbing works are covered under Mechanical Scope of Works

TRADE : 4.3 EXTERNAL WATER RETICULATION

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Trench excavation and pipe laying	- Check lines, grades and dimensions of the pipe alignment - Check pipe bedding and foundation - Backfilling in 150 mm layers of approved materials on both sides compacted with rammer up to 300 mm on top of pipe. Then, backfill in 300 mm layer to slightly higher than the top of trench compacted by mechanical vibrating tamper - Density test for compaction	- SSBW 2014 Section L : Cl. 4.1 /SPAN Guidelines - Construction drawing - SSBW 2014 Section L : Cl. 4.2.7 /SPAN Guidelines/SPAN Guidelines - Not less than 95% of dry density	- Survey equipment/pegs/markers/TBM - "ditto" - "ditto" - BS 1377	- 1 in every 20m run or change in direction or gradient - Every pipe laying - Excavation to required level - Average thickness over any 100 metre length not less than the required thickness		Borang Pemeriksaan Sistem Retikulasi Air and Manufacturer's Certificate	ITP shall be read in conjunction with BQ, Construction Drawing, Manufacturer's Instruction and relevant approving authorities guideline/ documents. Note: * Pumping system and cold water plumbing works are covered under mechanical scope of works
5	Road Reinstatement	- Backfilling with approved sand in 225 - Density test for compaction - Check reinstatement works	- SSBW 2014 Section L : Cl. 4.2.9 /SPAN Guidelines	Construction Drawings	Refer to JKR Specification for Water Reticulation, Internal Plumbing System and Sanitary Fittings/SPAN Guidelines		Borang Pemeriksaan Sistem Retikulasi Air and Manufacturer's Certificate	

TRADE : 4.3 EXTERNAL WATER RETICULATION

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
6	Valve Chamber	Check: - Thickness and size - Concrete grade for foundation - Brickwork and finishing works - Manhole / chamber cover - Wrought iron steps	SSBW 2014 Section L : Cl. 4.3.4 & 4.3.5 /SPAN Guidelines	Construction Drawing	-Where ever applicable		Borang Pemeriksaan Sistem Retikulasi Air and Manufacturer's Certificate	Borang Pemeriksaan Sistem Retikulasi Air and Manufacturer's Certificate
7	Scour Valve Chamber Location	- Chamber location: - Enable outlet pipe to discharge to drain / water courses	- S.O Instruction	survey and construction drawing and site inspection	-Where ever applicable		Borang Pemeriksaan Sistem Retikulasi Air and Manufacturer's Certificate	Borang Pemeriksaan Sistem Retikulasi Air and Manufacturer's Certificate
8	Hot Tapping	- Hot tapping equipment: - Tapping machine to be cleaned and disinfected before attaching to tapping valve and saddle	- SSBW 2014 Section L : Cl. 4.3.9, SPAN Guidelines , State Water Authority	Approved method statement and equipment (semak BS standard)	-Where ever applicable		Borang Pemeriksaan Sistem Retikulasi Air and manufacturer's Certificate	ITP shall be read in conjunction with BQ, Construction Drawing, manufacturer's Instruction and relevant approving authorities' guidelines/ documents Note: * Pumping system and cold water plumbing works are covered under mechanical scope of works

TRADE : 4.3 EXTERNAL WATER RETICULATION

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
9	Pipe Jacking	Check: - Placement of pipe - pipe jacking equipment and operation	- SSBW 2014 Section L : Cl. 4.3.8, SPAN Guidelines , State Water Authority	Approved method statement	- Where ever applicable		Borang Pemeriksaan Sistem Retikulasi Air and manufacturer's Certificate	ITP shall be read in conjunction with BQ, Construction Drawing, manufacturer's Instruction and relevant approving authorities' guidelines/ documents Note: * Pumping system and cold water plumbing works are covered under mechanical scope of works
10	Tank Installation	Check: - installation by approved installer - Watertightness test - Disinfection	-SSBW 2014 Section L : Cl. 4.2.9 /SPAN Guidelines	Construction Drawings	-Where ever applicable		Borang Pemeriksaan Sistem Retikulasi Air and manufacturer's Certificate	
11	Testing & Commissioning	- Pressure test - Leakage test (minimum one test for every 1000m of pipeline); - Joints shall be exposed to detect leakages Flushing and Disinfection	- Water Authority's Approval - manufacturer's Method statement and SSBW 2014 Section L : Cl. 4.3.2 /SPAN Guidelines SSBW 2014 Section L : Cl. 4.3.3 /SPAN Guidelines/SPAN Guidelines	Approved method statement and equipment	-After completion of construction / installation of pipelines and tanks -Before commisioning		Borang Pemeriksaan Sistem Retikulasi Air and manufacturer's Certificate, Testing Record	

TRADE : 4.4 INTERNAL ROAD AND HARDSTANDING

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Subgrade Earthfill / Cut Area	- In-Situ Density Test (Top 300mm)	Standard Specification For Building Works 2014 (SSBW 2014) Section P : Cl. 2.1.2 (CBR not less than 5% when compacted to 95% maximum dry density)	BS 1377 : Part 9 : 1990	- Minimum one test per 500 sq metre of each layer compacted	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja Pavemen, Trial Mix Record, Calibration Equipment Certificate	
2	Subgrade Surface Finishes	- Shape, super elevation, level , grade	SSBW 2014 Section P : Cl. 2.1.6 (Shall be within +10mm and -30mm of the required level)	- Survey record/pegs/markers/T BM	- Immediately after completion of the works	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja Pavemen, Trial Mix Record, Calibration Equipment Certificate	
3	Sub Base Material	Material Suitability : - Gradation Limits	SSBW 2014 Section P : Cl. 2.3.2, Table P2	BS 1377 : Part 2 : 1990	1 Initial stage 2 One test per 750 cu metre stockpile or laid	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja Pavemen, Trial Mix Record, Calibration Equipment Certificate	
4	Sub Base Construction	- Thickness - Surface finishes - shapes, super elevation, level, grade	SSBW 2014 Section P : Cl. 2.3.8 with tolerances as Table P5 SSBW 2014 Section P : Cl. 2.3.8 with tolerances as Table P5	- Relevant construction drawing - Relevant construction drawing	- Over any 100 metre length - One test per 500 sq metre	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja Pavemen, Trial Mix Record, Calibration Equipment Certificate	

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5	Crushed Aggregate Base Course	Physical & Mechanical Properties :	SSBW 2014 Section P : Cl. 2.4.2		1) Initial stage			
		- Plastic Index	- Not more than 6		2) One test per 750 cu metre stockpile or laid			
		- Aggregate crushing value	- Not more than 25%	- BS 1377:Part2:1990				
		- Flakiness Index	- Not more than 25%	- MS 30 : Part 8				
		- Soaked CBR Test	- Not less than 80% when compacted to 95% max dry density	- MS 30 : Part 5				
		- Gradation Limits	- Table P3	- BS 1377:Part 4: 1990 (4.5 kg rammer)				
		- Thickness	SSBW 2014 Section P : Cl. 2.4.4 - 2.4.6	- BS 1377:Part 2:1990	Average thickness over any 100 metre length not less than the required thickness	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja Pavemen, Trial Mix Record, Calibration Equipment Certificate	
	Base Course Construction	- In-situ compaction test	SSBW 2014 Section P : Cl. 2.4.7	- Dipping method				
			- Not less than 95% max dry density	- BS 1377 : Compaction Test	- One per test 500 sq metre of each layer laid			
		- Surface finishes - shape, super elevation, level, grade	SSBW 2014 Section P : Cl. 2.4.12, with tolerances asTable P5	- Relevant construction drawing				
6	Binder and Wearing Course	- Aggregate, bitumen and method of construction	- Refer to Standard Specification for Asphaltic Concrete for Road Pavement for Building Works (JKR 20401-0029-97 & JKR 20401-0030-97)	- Relevant construction drawing	- Immediately laying after the application of tack coat	Kontraktor/ Perunding/ PP/WPP/ PTB	Borang Pemeriksaan Kerja Pavemen, Trial Mix Record, Calibration Equipment Certificate	

Nota : For high volume road (more than 1 million ESA) - refer to ITP for Road Project and JKR Standard Specification for Roadworks

5.0 KERJA STRUKTUR



TRADE

- 5.1 Concrete Works
- 5.2 Precast Concrete Works (*New Trade*)
- 5.3 Roof Structure
 - 5.3.1 Pre-Fabricated Cold Formed Steel Roof Truss
 - 5.3.2 Pre-Fabricated Timber Roof Truss
- 5.4 Steel Structure

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TRADE : 5.1 CONCRETE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	CONCRETE MATERIALS	Manufacturers certificate of test.(types & composition of cement)	SIRIM approved cement; Table D1, MS EN 197-1.	SPB Tools JKR.PK(O).04-SKC.ST.1A	Before mixing concrete and at change of producer/supplier	Contractors producer/ supplier	certificate	
	Cement	Storage	Protected against water					
	Aggregates (Fine and Course)	Approved Source., Aggregate test results	Preferably Granite, No marine aggregates.	SPB Tools , JKR/QC/A02/04	Before mixing concrete and at change of source/ producer/ supplier	Contractors producer/ supplier	JKR/QC/A02/04	
		Aggregates test results	Elongation,flakiness, clay slit content, soundness etc. Table D2 , MS EN 12620, MS 30					
		Grading or Sieve Analysis test results.	Within Grading envelope.; Table D3, D3A, MS EN 12620, MS 30					
	Water	Source of water.	Approved source -clean, free chloride and sulphate		Before mixing concrete and at change of sourced/ producer/ supplier	Contractors producer/ supplier	Sampling test	
		Sampling test results	MS EN 1008					
	Admixture	Admixtures specifications/catalog	Free chloride, suitability and compatibility data (for usage of 2 or more admixture)	SPB Tools	Before mixing concrete and at change of admixtures.		Manufacturers catalog and specification	
			Table D4, MS EN 934/BS EN 934-2					
2	STEEL REINFORCEMENT	Steel characteristic strength fy N/mm2	As design for use in the construction drawings	SPB Tools , JKR/QC/A03/04	Before delivery to site / Initial, Random testing	Contractor	Mill certificates, tensile test results	
			MS 146, BS 4461, MS 144, MS 145					
		Storage	In clean and dry conditions		Initial stage/ throughout.	Contractor		
		Condition of steel reinforcement	Clean , free from rust, scalling, oil, grease, paint, dirt etc	SPB Tools	Before fixing and concreting.	Contractor		
		Cutting and bending of steel reinforcement	As per construction drawings. and BS 4449	SPB Tools	Before fixing and concreting.	Contractor		
		Fixing of steel reinforcement to formwork	As per drawing, JKR/QC/B04/04.	SPB Tools	Before concreting	Contractor		
			Comply design concrete cover					
			BS 1052					
		Welding of reinforcement	Welding carried out by certified welder	SPB Tools		Contractor		
			BS EN 1011 and BS EN 60974					

TRADE : 5.1 CONCRETE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	APPROVAL AND PRODUCTION OF CONCRETE MIXTURE (Prescribed or designed concrete)	Concrete grade /strength or mixture	As required in construction drawing or Approved by SO .MS 523-1, MS 523-2	SPB Tools JKR/QC/A06/04, JKR/QC/C01/04PM (7) , JKR/QC/C01/04PM (28)	Initial stage or Regularly on production	Contractors supplier	Concrete testing from Initial test results or conformity test or identity test, and /or Delivery order	
		Cement content	JKR Building Specs 2014 (Table D5,D5A or D6, D6A)					
		Consistency / watercement ratio	Slump test, compacting test, Vebe test, flow test					
			Table D7, D7A,, D7B, D7C, D7D					
		Admixtures	Prescribed concrete : CEM 1 only . No admixture					
			Designed concrete : All cement type + Admixture (Table D6,D6A)					
		Total chloride content	Measurement of % chloride ion in mix.					
			BS 1881:Part 124, Table D7E					
		Max sulphate content	Measurement of sulphate content in mix					
			Not exceed 4 %, BS 1881:Part 124					
4	APPROVAL OF SITE MIXED.	Quantities of material	Cement, Aggregates, water, admixtures aremeasured by weight or volume	SPB tools	Initial Stage	S.O.		
		Calibration of equipment	Site calibrated with certificate from accredited lab.					
		Mixing of concrete	JKR Building Specs 2014.					
5	APPROVAL OF READY MIXED.	Supplier Information / Manufacturer certificate	Supplier name, Plant location, transportation duration, Plant's capacity production.		Initial Stage	S.O.	Manufacturers certificates and licencing.	
		Plant's setup	Proper material storage,QA/QC plan, ISO certified test lab with calibrated equipment		Initial Stage	S.O.		
		Mixing	All concrete materials mixed at plant (NO extra water/ admixtures added after leaving the plant)	SPB tools JKR/QC/A06/04	Regularly on production	Contractors supplier		
		Delivery	Delivery ticket and manufacturer's batching record					
			Check for grade, slump, temperature, Time < 2 hrs.					

TRADE : 5.1 CONCRETE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
6	CONCRETE TESTING (Compressive Strength : CUBES OR CYLINDER)	Initial test results	Samples: At least 3 specimens from each of 3 batches. (Average strength is used)	SPB Tools JKR/QC/B05/04	Initial stage /change in material or specified requirement	Contractor	JKR/QC/B05/04	1. EN 12390-2 (Curing) 2. Test result - average of 2 or more specimens made from 1 sample tested at same age. 3. Cube strength at 7 days- for prescribed mix : Specs (Table D12) ,for designed mix :2/3 of 28-days compressive strength. 4. concrete under production control certification (Specs (Table D13) 5. concrete NOT under production control certification (Specs (Table D11)
			Average Compressive strength > fck of Table D8, D9 by adequate margin (2x SD) : (At least 6 – 12 N/mm2)					
			Historical data of batching plant can be used (exceed target mean strength at 28 days)					
		Conformity test results	Rate of sampling for accessing conformity : (Table D10), 35 test results for initial reduction or 35 test results (within 12 months) for continuous production.	SPB Tools JKR/QC/B05/04	Initial stage /change in material or specified requirement	Contractor	JKR/QC/B05/04	
			Test result from individual specimen or; average of 2 or more specimens made from 1 sample tested at 28 days.					
			Criteria Acceptance : Table D11					
		Identity test	Rate of sampling and testing to EN 12350-1	SPB Tools JKR/QC/B05/04	Random on production.	Contractor	JKR/QC/B05/04	
			· <u>critical structure</u> : 1 sample per 10m ³ or 10 batches					
			· <u>slab/beam</u> :1sample per 20m ³ or 20 batches					
			· <u>raft foundation/ mass concrete</u> :1 sample per 50m ³ or 50 batches					
			· minimum 2 samples each concreting day per grade/structure					
			· for designed mix : 4 samples (12 cubes) on first concreting day per grade and subsequently minimum 1 sample per source per day per grade					
		Identity test for Slump and Flow test	Sampling and testing plan to comply with MS 26-1-1 (sampling),MS 26-1-2 (slump measurement),MS 26-1-5 (flow measurement)	SPB Tools JKR/QC/B05/04	Initial stage / random on production.	Contractor	JKR/QC/B05/04	
			Slump measurement – Table D14, D15 , and MS 523:Part 1					
			Flow measurement – Annex B of MS 523-2					

TRADE : 5.1 CONCRETE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
7	PLACEMENT OF CONCRETE	Site condition	Dry condition. No concreting in flowing water and underwater.	JKR/QC/A06/04	Throughout	Contractor	JKR/QC/A06/04	
		Placement and compaction	Time mixing and placement within 2 hrs., Temperature not exceed 36C					
			Concrete dropped no exceed 1.5m high.					
			Compacting in layer 300 mm to 450 mm.only.					
8	CURING AND PROTECTION	Curing method and duration.	Water curing (surface of concrete wetted by ponding with water)		Immediately after concrete set.	Contractor		
			Waterproofed curing paper or plastic sheeting					
			Duration Not less than :					
			· 5 days for F1 to F4 surfaces · 3 days for F11 to F15 surfaces					
9	FORMWORK AND SCALFOLDING	Design Drawings and method statement	Certified by Professional Engineer. If scaffolding is necessary, appoint competent scaffolder (refer to Factories and Machinery Act with Regulations	Design /shop drawings	Before installation.	Contractor	Drawings, calculation certificate	
		Construction stage	Formwork and scaffolding in correct position, shape, profile and dimension (verticality, alignment and level), rigid and tight, clean.	visual	Before and during concreting	Contractor		
			Finishes: Formed and unformed surface finish to various classes.					
		Removal of formworks	Table D18 – minimum period between concreting and the removal of forms (for OPC)	SPB Tools JKR.PK(O).04-SKC.ST.1C,	After min strength achieved.	Contractor	JKR.PK(O).04-SKC.ST.1C	

TRADE : 5.1 CONCRETE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
10	SUPPORTING AND SPACER BLOCKS	size	NOT more than 50mm x50mm	SPB Tools	Throughout	Contractor		
		strength	At least the same strength and material source's as the concrete to be poured (with nominal aggregates size = 10 mm)	SPB Tools	Throughout	Contractor		
11	CONSTRUCTION JOINTS	Location	As per drawings; or if not indicated in the drawings, Contractor may proposed with SO approval	SPB Tools	Throughout	Contractor		
			NOT allowed at toilet/wet area	SPB Tools	Throughout	Contractor		
		Horizontal constructions joint	Placed 25mm gauge strip inside the forms along all exposed surface to ensure straight joint	SPB Tools	Throughout	Contractor		
		Constructions joint for wall/column	Construct 75mm height of kicker (starter stub) monolithically with the base concrete	SPB Tools	Throughout	Contractor		

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	SUBMISSION OF DOCUMENTS AND DRAWINGS	Method Statement	To specify on method of manufacture, handling, transportation and installation of all components. <i>Refer to Specification For Precast Concrete Component JKR 2061-0183-09 Cl. 8.1</i>	Submitted method statement	Initial Stage	Contractor	Approved Method Statement by S.O	
		Drawing i. M&E ii. Structure	To specify location and position of equipment/conduit as stated on JKR IBS Catalogue Version 2:2016 <i>Refer to Dwg No. JKR/CKAS/P-IBS/PEL 15/NA 02</i> As per assembly drawing: i) Layout drawing ii) Section drawing iii) Connection details iv) Element types v) General drawing To specify lifting point, positioning and assembly of precast component	Certified shop drawing by P.E Certified assembly drawing by P.E	Before manufacturing	Contractor	Approved Shop/Assembly Drawing by S.O	
2	CONCRETE MATERIALS	As per ITP 3rd Edition 2015 : Version 2						
3	STEEL REINFORCEMENT	As per ITP 3rd Edition 2015 : Version 2						
		Fixing of reinforcement cages	Rebars, cast in-items, corrugated sleeve pipes, recesses, spacer blocks, lifting hooks and inserts must be correctly positioned and properly secured. <i>Refer to Construction Quality Assessment (Conquas 21 : Precast Concrete Elements - Good Industry Practices) >Fabrication Process</i>	Approved Shop Drawing	Before Concreting	Contractor	Contractor Inspection Form	* Applicable on site casting
		Welding of rebars	The reinforcement cages shall be free of dirt and other debris.	N/A	Initial stage / throughout	Contractor	N/A	

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	FORMWORK AND SCALFOLDING	As per ITP 3rd Edition 2015 : Version 2						
		Mould Design	The dimensional accuracy of the mould/formwork, shall be determined by the precast manufacturer and the standard tolerances are in accordance with BS 5606:1990	N/A	Initial Stage if necessary	Contractor	Certified calculations and drawings	* Applicable on site casting
			CIDB Assessment of IBS Status Manufacturer (AIS)	Certified manufacturer			AIS certificate	
		Mould preparation	Brushing or spraying mould oil (release agent) depend on the surface nature of the mould, according to BS EN 13670:2009	N/A	Before Casting	Contractor	Contractor Inspection Form	* Applicable on site casting
			Refer to Specification For Precast Concrete Works JKR 20601-0251-18 Cl.5.1					
5	APPROVAL AND PRODUCTION OF CONCRETE MIXTURE (Designed concrete)	As per ITP 3rd Edition 2015 : Version 2						
6	APPROVAL OF GROUTING MIXTURE (SITE MIXED)	Grouting grade /strength or mixture	As required in production drawing or Approved by SO. BS EN 447	SPB Tools JKR/QC/A06/04, JKR/QC/C01/04PM (7) JKR/QC/C01/04PM (28)	Initial stage or Regularly on production	Contractors	Grout test result	
		Cement content	Cement shall comply with MS EN 197-1 type CEM 1 or any other type of cement permitted. Refer to Latest JKR Building Specs Section D: Concrete Works :Clause 2.1					
		Consistency / watercement ratio	Grouting : workability is classed as very high with no slump.	SPB Tools JKR/QC/A06/04, JKR/QC/C01/04PM (7) JKR/QC/C01/04PM (28)	Initial stage or Regularly on production	Contractors	Grout test result	
			Refer to Latest JKR Building Specs Section D: Concrete Works					
			Water cement ratio between 0.4 to 0.6					
			Refer to Latest JKR Building Specs Section D: Concrete Works					
		Admixtures	Designed grouting : All cement type + Admixture (non-shrink / expansion agent) Refer to 1) Latest JKR Building Specs Section D: Concrete Works					
		Total chloride content	Chloride ≤ 0.10 % by weight of cement Refer to 1) Latest JKR Building Specs Section D: Concrete Works 2) BS EN 447					

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
6	APPROVAL OF GROUTING MIXTURE (SITE MIXED)	Max sulphate content	Sulphate ≤ 4.5 % by weight of cement Refer to BS EN 447	SPB Tools JKR/QC/A06/04, JKR/QC/C01/04PM (7) JKR/QC/C01/04PM (28)	Initial stage or Regularly on production	Contractors	Grout test result	
		Quantities of material	Cement, Aggregates, water, admixtures are measured by weight or volume Refer to Latest JKR Building Specs Section D: Concrete Works, Clause 4.4	SPB Tools	Initial stage or Regularly on production	Contractors	JKR/QC/B05/04	
		Calibration of equipment	Site calibrated with certificate from accredited lab. JKR Building Specs 2014 Section D: Concrete Works, Clause 4.4	SPB Tools	Initial stage or Regularly on production	Contractors	JKR/QC/B05/04	
		Mixing of grouting	Designed mixes shall be submitted to the S.O for approval Refer to Latest JKR Building Specs Section D: Concrete Works, Clause 4.4					
7	APPROVAL OF SITE MIXED (CONCRETE)	As per ITP 3rd Edition 2015 : Version 2						
8	APPROVAL OF READY MIXED	As per ITP 3rd Edition 2015 : Version 2						
9	CONCRETE TESTING (Compressive Strength : CUBES OR CYLINDER)	As per ITP 3rd Edition 2015 : Version 2						
10	GROUTING TESTING	Compressive Strength	Crushing test on prismatic specimen 40x40mm in cross section and 160mm in length	SPB Tools JKR/QC/B05/04	Initial stage/random on production.	Contractor	JKR/QC/B05/04 & Grout Test Result	
			3 Sample shall be taken from 3 separate batches. 2 cubes shall be cast from each sample for testing at 7 and 28 days.					
			Average strength must greater than the specified characteristic strength.					
			Refer to Specification For Precast Concrete Works JKR 20601-0251-18 Cl.8.1					

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
10 (cont.)	GROUTING TESTING (cont.)	Fluidity Test	Cone method and Grout Spread method shall be performed in accordance with the test method given in BS EN 445 Clause 4.3	N/A	Initial stage/random on production.	Contractor	Grout Test Result	
			Fluidity test requirement as per BS EN 447 Clause 6.3, Table 1					
		Flowability Test	Testing for the flow of grout (Flow Cone Method) shall be performed in accordance with the test method given in ASTM C939		Initial stage/random on production.	Contractor	Grout Test Result	
			Refer to Specification For Precast Concrete Works JKR 20601-0251-18 Cl.8.1					
11	PLACEMENT OF CONCRETE	As per ITP 3rd Edition 2015 : Version 2						
		Position	Casting yard shall not be exposed to rain or direct sun rays. Refer to Specification For The Design, Manufacture & Construction Of Precast Concrete Structures,CREAM, CIDB >4.5 Placement	N/A	Throughout	Contractor	Approved Method Statement	Site Casting
12	PLACEMENT OF GROUTING	Placement	The placement of grouting can be done vertically and horizontally: i) Vertical placement (pressure grouting) - minimum pressure 100kN/m2 ii) Vertical placement (gravity flow) iii) Horizontal flow (gravity flow grouting)	JKR/QC/A06/04	Throughout	Contractor	JKR/QC/A06/04	
13	CURING AND PROTECTION	As per ITP 3rd Edition 2015 : Version 2						
14	HANDLING	Demoulding	Achieve minimum concrete compressive strength of lifting & handling for demoulding as stated in the drawing and approved by the S.O	JKR.PK(O).04-SKC.ST.1C & Visual	After Casting	Contractor	Contractor Inspection Form/Approved method statement & shop drawing	
			Mark the element as per shop drawing					
			Refer to Specification For The Design, Manufacture & Construction Of Precast Concrete Structures,CREAM, CIDB >4.8.2 Demoulding					

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
14 (cont.)	HANDLING (cont.)	Inspection	Inspection for cracking and other defects or damage is satisfactory	JKR.PK(O).04-SKC.ST.1C & Visual	After Casting	Contractor	Contractor Inspection Form/Approved method statement & shop drawing	
			Measurement for opening, recesses, cast in items, starter&dowel bar,lifting hook, length, breadth and depth for each element is satisfactory					
			Surface finish is satisfactory					
			Refer to Specification For The Design, Manufacture & Construction Of Precast Concrete Structures,CREAM, CIDB > 4.8.4 Inspection					
		Storage	The elements shall be stacked, cross braced, and supported according to the detail given by manufacturer and approved by the SO	Visual	After Casting	Contractor	Approved Method Statement by S.O	
			No accumulation of trapped water and deleterious matter in the components.	Visual			Approved Method Statement by S.O	
The safety of elements shall be checked at all times.								
Refer to Latest JKR Building Specs >Section D: Concrete Works; 11.2 Storage								
15	LIFTING	Method	Specification for Precast Concrete Works, Clause 6.7.1 A lifting method statement shall be prepared by the Contractor and submitted for approval.	- Lifting chain	Every precast components	Contractor	Approved Method Statement by S.O and test result	
			The element shall be lifted from the mould according to the locations of lifting devices and instructions on the production drawings, in a manner to avoid cracking and other damage.					
			Lifting devices, chain and slings shall be tested by a certified testing house and be used according to manufacturer's specification. Refer to Specification for Precast Concrete Works, Clause 6.7.2	N/A	Before Installation	Contractor		

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
15 (cont.)	LIFTING (cont.)	Machinery	Validity of certificate Permit Mesin Angkutan (PMA)	N/A	Before installation	Contractor	Certificate from Department of Occupational Safety and Health (DOSH)	
			Right capacity of lifting equipment (crane, belt and sling, etc)					
		Location of Equipment	Suitable site platform for machine to be placed	N/A	Before installation	Contractor	Approved method statement by S.O	
		Access route for equipment	Easy to access			Contractor		
			Safe					
		Machine Operator	Validity of operating license	N/A	Before installation	Contractor	Certificate from Department of Occupational Safety and Health (DOSH)	
16	TRANSPORTATION	Position tolerances	Piles - 150mm Flooring units - 150mm Beams - Along the length 300mm & On the end 25mm Wall panels - Face 25mm in any direction & Edge 5mm across the thickness and/or 25mm longitudinally Refer to CIS 9:2008 1.6.3	Measuring device	Before installation	Contractor	Contractor Inspection Form	
16	TRANSPORTATION	Accessibility and capacity of the transport	The method of lifting, the type of equipment and transport to be used, and the minimum strength of the components to be handled shall be to the approval of the S.O./P.D.	N/A	Before installation	Contractor	Approved letter from authority (for abnormal vehicle)	
			Clearances for the transportation of the precast elements and movement is necessary.					
			Ensure the suitability of particular capacity and size of the transporter					
			Refer to Specification for Precast Concrete Works, Clause 6.6					

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
17	STORAGE							
	AREA	Adequate area	Easy access and handling	N/A	Before installation	Contractor	Approved Method Statement by S.O	
		Storage	They shall be firmly supported only at the points as specified in the Drawings. <i>Refer to Specifications for Precast Concrete Works, Clause 7</i>					
		Ground condition	Hard, firm, level, clean, well drained to avoid any differential ground settlements					
		Onsite Storage	Appropriate stacking method to prevent any undue stresses and damages	N/A	Before installation	Contractor	Approved Method Statement by S.O	
	STACKING METHOD (ON VEHICLES & AT SITE)	Protection of Precast Component	Use boards or plywood or plastic sheets	N/A	Before installation	Contractor	Approved Method Statement by S.O	
		Stacking Condition	Different storage and stacking requirements for different precast components:	N/A	before installation	Contractor	Approved Method Statement by S.O	
			i) Vertical position; - Precast walls - Facade panels					
			ii) Horizontal Position: - Precast Slabs - Precast Planks - Precast Beams - Precast Columns - Hollowcore Panels					
			No ground contact during stacking to prevent damage on components					
		Locations of support points	Designated bearing point	N/A	before installation	Contractor	Approved Method Statement by S.O	
			Supports must be arranged to avoid twisting or distorting of the precast components					
			Platform should be supported adequately					
		Effective arrangement of components	To minimise handling, the components should also be stored based on erection sequence					
		Support material	Non-staining to prevent discolouration					

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
18	INSPECTION OF PRECAST UNIT	Precast component type and sizing	The dimensional properties of the components shall be checked in accordance in the drawings. <i>Refer to Specification for Precast Concrete Works</i>	measuring tape	Before transportation and installation	Contractor	Delivery order (DO), QAQC form manufacturing	
		Assessment to precast component: - Precast concrete beam - Precast concrete column - Precast concrete half slab - Hollow core slab	- Crack with limitations. Limiting crack width = 0.3 mm - No damage - Permitted deviations of cross sections according to BS EN 13369:2004 Refer to 1) Specification for Precast Concrete Works Clause 6.2, Clause 6.3, Clause 6.4, Clause 6.5 2) MS EN 1992-1-1:2010, Table NA4 & BS EN 1992-1-1, Clause 7.3 Table 7.1N	visual Crack comparator & measuring tape	Before transportation and installation	Contractor	Contractor Inspection form	
19	METHOD STATEMENT OF ASSEMBLY AND ERECTION	- Site marking - Ground Preparation - Propping and temporary support - Lifting and pitching - Erection sequence	The method of assembly and erection shall be submitted. <i>Refer to 1) JKR Building Specs 2014 : Section D Concrete Works , Clause 11.4</i> <i>2) Specification For Precast Concrete Works JKR 20601-0251-18 Cl.8.1, Clause 6</i>	temporary props/spirit level/SPB tools	Before installation	Contractor	- Approved Shop/Assembly drawing - Approved Method statement by S.O	
		Health and safety.	Comply with Guidelines on Occupational Safety and Health in Construction Industry (Management) 2017	Sistem Pengurusan Keselamatan & Kesihatan Pekerjaan OHSAS ISO 18001:2007	Before installation	Contractor	N/A	
		Alignment and levelling.	As per Shop/Assembly Drawing	Survey equipment/spirit level	Before installation	Contractor	Approved Shop/Assembly drawing	
		Position and assembly precast element	Position Tolerance Refer to Specification For Precast Concrete Works JKR 20601-0251-18 Cl.8.1, Clause 6, Table 6.1	Licences surveyor and competent installer	Throughout	Contractor	Contractor Inspection Form & Accredited Certificate	

TRADE : 5.2 PRECAST CONCRETE WORKS (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
20	Bearing Pad	Specification	Neoprene bearing pads : - Shore A hardness of 60± 5 at 27.5°C - Minimum rupture strength of 105kg/cm ² - Minimum rupture elongation of 300% <i>Refer to Latest JKR Building Specs Section D: Concrete Works Clause 5.4.9</i>	N/A	Initial Stage	Contractor	Product Certificate	
			Rubber Bearing Pad - Functionality, position, specification, working temperature range,application and deviation should be stated in submission document <i>Refer to Specification For Precast Concrete Works JKR 20601-0251-18 Cl.8.1, Clause 9.1</i>	N/A	Initial Stage	Contractor	Material approval by S.O	
		Position.	As per Shop/Assembly Drawing	N/A	N/A	N/A	N/A	
21	WATERPROOFING	Internal & External Joints	Application of waterproofing and sealant material of adjoining precast component shall be in accordance with manufacturer's recommendations. <i>Refer to Latest JKR Building Specs Section D: Concrete Works Clause 5.4</i>	N/A	Before installation	Contractor	Approved Method Statement and Material Approval by S.O	

TRADE : 5.3 ROOF STRUCTURE			SUB-TRADE : 5.3.1 PRE-FABRICATED COLD FORMED STEEL ROOF TRUSS					
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	a) Project Condition	Selection of Approved System Provider (S.P)	Web : http://www.jkr.gov.my :- Registered with JKR Malaysia	PENGUMUMAN: Lampiran A (Senarai Pembekal Sistem Kekuda Bumbung)	Initial Stage	Contractor	Appendix 1: Rev:CKASJ/SKB/1 / 2010 Application Form (Lampiran C)	
	b) Identified project Location	Selection of Approved System Provider (S.P)	Coating Material i) AZ 150 - within 400meter from the sea with Fasterner Class 3 ii) Z200 - beyond 400meter from the sea with Fasterner Class 2	Lampiran A (Senarai Pembekal Sistem Kekuda Bumbung)	Initial Stage	contractor	(23)JKR.CKSGJ/02.500/030/LN/16 JLD4 bertarikh 7 Jun 2008	Truss system uses screws with corrosion protection class 3 in accordance with AS 3566 is only allowed its use in environments within the 400m of the ocean or other aggressive environmental influences
		Application Form	Specification:- JKR-20601-0186-11	Lampiran C	Initial Stage	Contractor	Appendix 1: Rev:CKASJ/SKB/1 / 2010	
		Approved Appointed System Provider (S.P)	Specification:- JKR-20601-0186-11	Lampiran C	Initial Stage	S.O	Appendix 1: Rev:CKASJ/SKB/1 / 2010	Issued approval letter to main contractor
2	Document Submission	Fabricator and installation works	All trusses shall be assembled by licensed fabricator by the S.P registered with CIDB and installation works shall be executed and supervised by qualified personnel with valid certificated issued by CIDB clause 2 .3, 2.4 specification JKR-20601-0186-11	Verify the identification and qualification of the Installer prior to the installation with valid certificate issued by CIDB	Installation Stage	S.O	Appendix 1: Rev:CKASJ/SKB/1 / 2010 Application Form (Lampiran C)	
		Technical Specification	Specification:- JKR-20601-0186-11	—	Installation Stage	Sistem Provider	Catalog	
		Method Statement	Specification:- JKR-20601-0186-11	Manufacturing SOP	Installation Stage	Sistem Provider	Manufacturer brochure	
		Quality Assurance	Specification:- JKR-20601-0186-11	Manufacturing SOP	Installation Stage	Sistem Provider	Inspection Checklist	

TRADE : 5.3 ROOF STRUCTURE			SUB-TRADE : 5.3.1 PRE-FABRICATED COLD FORMED STEEL ROOF TRUSS					
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Cold-Formed steel roof truss with span more than 13m but not exceeding 20m	Special Provisions (to be submitted to Pengarah Kanan, Cawangan Kejuruteraan Awam Dan Struktur	Appendix 5 (JKR-20601-0186-11)	Inspection checklist for trusses pre-installation process	Before installation	Contractor, S.O & CKAS	Prior to Approval by CKAS	Analysis, design and drawing duly endorsed by PE
			Appendix 5 (JKR-20601-0186-11)	Inspection checklist for trusses post installation process	After installation	Contractor, S.O & CKAS		
4	Material Testing Requirements		Appendix 2 Specification:- JKR-20601-0186-11			System Provider/S.O	Testing Certificate from Accredited Laboratory	Testing are compulsory for Trusses members and and others Selection of Base Steel.
	i) Trusses Members (Base Steel)	i) Tensile Test	MS 1196: 2004	Approved Lab Test Result (SIRIM OR CREAM)	Initial Stage			
		ii) Adhesion Test	MS 1196: 2004, AS 1397					
		iii) Bend Test	AS 1397					
		iv) Chemical Composition of Base Metal	AS/NZS 1050/ ISO 9223					
		v) Point Bending Test	Verification of Section Properties					
	ii) Batten or Purlin (Base Steel)	i) Tensile Test	MS 1196: 2004	Approved Lab Test Result (SIRIM OR CREAM)	Initial Stage			
		ii) Adhesion Test	MS 1196: 2004, AS 1397					
		iii) Bend Test	AS 1397					
		iv) Chemical Composition of Base Metal	AS/NZS 1050/ ISO 9223					
		v) Point Bending Test	Verification of Section Properties					
	iii) Wall Plate (Base Steel)	i) Tensile Test	MS 1196: 2004	Approved Lab Test Result (SIRIM OR CREAM)	Initial Stage			
		ii) Adhesion Test	MS 1196: 2004, AS 1397					
		iii) Bend Test	AS 1397					
		iv) Chemical Composition of Base Metal	AS/NZS 1050/ ISO 9223					
		v) Point Bending Test	Verification of Section Properties					

TRADE : 5.3 ROOF STRUCTURE				SUB-TRADE : 5.3.1 PRE-FABRICATED COLD FORMED STEEL ROOF TRUSS				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4 (cont'd)	vii) Fasterner Class 2	i) Tensile Test	AS 3566.1-2002	Approved Lab Test Result (SIRIM OR CREAM)	Initial Stage	System Provider/S.O	Testing Certificate from Accredited Laboratory	A proof that the fasteners and anchor bolt were purchased from the above mention as manufacturer/ supplier/agent
		ii) Torsional Test	AS 3566.1-2002					
		iii) Surface Hardness	AS 3566.1-2002					
		iv) Shear Test	AS/NZS 4600: 2005					
		v) Salt Spray	AS 3566.2-2002					
		vi) Coating material analysis	AS 3566.2-2002					
		vii) Coating Thickness	AS 3566.2-2002					
	viii) Fasterner Class 3	i) Tensile Test	AS 3566.1-2002	Approved Lab Test Result (SIRIM OR CREAM)	Initial Stage			
		ii) Torsional Test	AS 3566.1-2002					
		iii) Surface Hardness	AS 3566.1-2002					
		iv) Shear Test	AS/NZS 4600: 2005					
		v) Salt Spray	AS 3566.2-2002					
		vi) Coating material analysis	AS 3566.2-2002					
		vii) Coating Thickness	AS 3566.2-2002					
	viii) Anchor Bolt	i) Pull Out Test	BS 5080: Part 1 : 1986	Approved Lab Test Result (SIRIM OR CREAM)	Initial Stage			
		ii) Coating Composition	AS 3566.2-2002					
		iii) Coating Thickness	AS 3566.2-2002					

TRADE : 5.3 ROOF STRUCTURE			SUB-TRADE : 5.3.1 PRE-FABRICATED COLD FORMED STEEL ROOF TRUSS					
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5	Approval of material and types for Section Properties	i) Trusses Members	Min. thickness 1.0mm (unsymmetrical section)	Measuring Tape, Venear Caliper, Digital Gauge	During installation	System Provider/S.O	Mill certification by manufacturer, Invoice & measurement	
			Min. thickness 0.6mm symmetrical machine-manufactured box or closed cross member section					
			Minimum Height : 75mm					
			Minimum Width : 35mm					
			Lipped : 7mm					
		ii) Batten or purlin	Min. thickness 0.5mm					
		iii) Wall Plate	Min. thickness 1.2mm					
			Minimum Height : 75mm (Span ≤ 10meter)					
			Minimum Height : 100mm (Span > 10meter)					
		iv) Bracing	Min. thickness 1.0mm					
		v) Bracket	As per design					
		vi) Apec	As per design					
		vii) Triple-Grip	As per design					
		vii) Fasterner Class 2	Min. Coating 12 micron	Accredited lab test result material				
		viii) Fasterner Class 3	Min. Coating 25 micron (mechanically plated zinc-tin)	Accredited lab test result material				
		viii) Anchor Bolt	Hot Dipped Galvanized (minimum thickness 42 micron)	Accredited lab test result material				

TRADE : 5.3 ROOF STRUCTURE		SUB-TRADE : 5.3.1 PRE-FABRICATED COLD FORMED STEEL ROOF TRUSS						
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
6	Storage & handling	Correct lifting equipment	Specification:- JKR-20601-0186-11 Clause 10.0 & Method Statement	Visual	Throughout	System Provider	Quality Assurance and Control Plan	Prior to inspection, Contactor must submit Request for Inspection (RFI) form. Inspection shall be carried out only after obtaining S.O. approval of RFI.
		Storage method	Specification:- JKR-20601-0186-11 Clause 8.2 & Method Statement	Visual	Throughout	System Provider	Quality Assurance and Control Plan	
7	Installation	i) Truss configuration	Specification:- JKR-20601-0186-11 Clause 10.3	Visual & Inspection checklist	Throughout	System Provider / S.O	Endorsed by P.E Approved System Provider (S.P)	
		ii) Truss Spacing	Maximum truss spacing of 1.2 metres with permitted deviation of ± 0.05 metres	Measuring Tape & Inspection checklist	Throughout	System Provider / S.O	Endorsed by P.E Approved System Provider (S.P)	
		iii) Splicing / Box-up provided in design	Location and numbers of screws Specification:- JKR-20601-0186-11 Clause 9.6	Measuring Tape, visual & Inspection checklist	Throughout	System Provider / S.O	Endorsed by P.E Approved System Provider (S.P)	
		iv Bracing						
		a) Top Chord Bracing	Specification:- JKR-20601-0186-11	Visual & Inspection checklist	Throughout	System Provider / S.O	Endorsed by P.E Approved System Provider (S.P)	
		b) Bottom Chord Bracing	Bracing connections anchoring to structures members	Visual & Inspection checklist	Throughout	System Provider / S.O	Endorsed by P.E Approved System Provider (S.P)	
		c) Diagonal bracing	Bracing connections anchoring to structures members	Visual & Inspection checklist	Throughout	System Provider / S.O	Endorsed by P.E Approved System Provider (S.P)	
		v) Wall Plate	Specification:- JKR-20601-0186-11 Clause 10.5	Visual & Inspection checklist	Throughout	System Provider / S.O	Endorsed by P.E Approved System Provider (S.P)	

TRADE : 5.3 ROOF STRUCTURE			SUB-TRADE : 5.3.1 PRE-FABRICATED COLD FORMED STEEL ROOF TRUSS					
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
7 (cont'd)		vi) Anchor Bolt	Spacing of anchor bolt not exceeding 1.0 metres spacing centre to centre. (Effective Setting Depth according to manufacture requirement)	Measuring Tape, visual & Inspection checklist	Throughout	System Provider / S.O	Endorsed by P.E Approved System Provider (S.P)	
		vii) Any apparent gaps or space between the wall plate and supporting structure	To be packs and evented out by using approved non-shrink cement grout.	Visual & Inspection checklist	Throughout	System Provider / S.O		
		viii) Corrosion	Specification:- JKR-20601-0186-11	Visual & Inspection checklist	Throughout	System Provider / S.O		
		ix) No. of Screws	Roof truss members shall be connected with minimum of three (3) nos. of fasteners.	Visual & Inspection checklist	Throughout	System Provider / S.O	Specification:- JKR-20601-0186-11	
		x) Deflected members	Change to new members	Visual & Inspection checklist	Throughout	System Provider / S.O	Rectification works base on the recommendation made by the P.E. and to the approval of the S.O.	
		xii) Defects in truss members, wall plates etc	Exceeding the limits or permitted tolerances are detected. Specification:- JKR-20601-0186-11 Clause 11.0	Measuring Tape, Visual & Inspection checklist	Throughout	System Provider / S.O	Rectification works base on the recommendation made by the P.E. and to the approval of the S.O.	
8	M & E Services	The S.P. indicated on the drawing shall be installed using strap	i) Fixed on bottom chord member. Specification:- JKR-20601-0186-11 Clause 5.4.4	Visual & Inspection checklist	Throughout	System Provider, Contractor , S.O	Design Consideration by S.P.	
			ii) Installation on purlins is not allowed.	Visual & Inspection checklist	Throughout	System Provider, Contractor , S.O	Specification:- JKR-20601-0186-11	
			iii) Drilling is strictly prohibited on all truss members	Visual & Inspection checklist	Throughout	System Provider, Contractor , S.O	Specification:- JKR-20601-0186-11	

TRADE : 5.3 ROOF STRUCTURE			SUB-TRADE : 5.3.1 PRE-FABRICATED COLD FORMED STEEL ROOF TRUSS					
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
9	Water Tank	Shall not be placed on roof trusses	Supported independently Specification:- JKR-20601-0186-11 Clause 5.4.5	Visual & Inspection checklist	Visual & Inspection checklist	System Provider, Contractor , S.O	Specification:- JKR- 20601-0186-11	
10	Installation of Roof Covering	i) Roof Tile	A palette only allowed to seat on the roof trusses provided not more than 40 tiles or 150 kg in weight	Visual & Inspection checklist	Visual & Inspection checklist	System Provider, Contractor , S.O	Specification:- JKR- 20601-0186-11 Clause 10.9	
		ii) Lightweight Covering	Shall not be stacked on the roof trusses directly during laying out stage.	Visual & Inspection checklist	Visual & Inspection checklist	System Provider, Contractor , S.O	Specification:- JKR- 20601-0186-11	
		iii) Time Frame Roof Covering	S.P. Method Statement	Visual	After installation	System Provider, Contractor , S.O	S.P. Method Statement	
11	Post Installation Document Submission	i) As-Build Drawing	Two (2) sets of drawing by System Provider and to be endorsed by P.E	Specification:- JKR- 20601-0186-11	After installation	System Provider, Contractor , S.O	Endorsed by P.E Approved System Provider (S.P)	
		ii) System Provider Warranty	Statement the period of warranty shall not less than ten (10) year from date the of Certificate of Practical Completion (CPC) and expiry date of warranty shall be clearly written in the warranty certificated	Specification:- JKR- 20601-0186-11 Appendix 4	After installation	System Provider, Contractor , S.O	Issued by Approved System Provider (S.P)	

TRADE : 5.3 ROOF STRUCTURE				SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Sistem Provider	Selection of Approved System Provider (S.P)	Web : http://www.jkr.gov.my :- Registered with JKR Malaysia	PENGUMUMAN: Lampiran A (Senarai Pembekal Sistem Kekuda Bumbung)	Initial Stage	Contractor	Appendix 1: Rev:CKASJ/SKB/1 / 2010 Application Form (Lampiran C)	
		Application Form	Specification:- JKR-20601-0190-12	Lampiran C	Initial Stage	Contractor	Appendix 1: Rev:CKASJ/SKB/1 / 2010	
		Approved Appointed System Provider (S.P)	Specification:- JKR-20601-0190-12	Lampiran C	Initial Stage	S.O	Appendix 1: Rev:CKASJ/SKB/1 / 2010	Issued approval letter to main contractor
2	Document Submission	Fabricator *	All trusses shall only be assembled by licensed fabricators by the S.P and registered with CIDB. A copy of CIDB registered certificated shall be submitted to the S.O for verification, Specification JKR-20601-0190-12 clause 2.3	Verify the identification and qualification with valid certificate issued by CIDB	Installation Stage	S.O	Appendix 1: Rev:CKASJ/SKB/1 / 2010 Application Form (Lampiran C)	
		Installer *	Installation works shall be executed and supervised by qualified personel with valid certificated issued by CIDB, Specification JKR-20601-0190-12 clause 2.4	Verify the identification and qualification with valid certificate issued by CIDB	Installation Stage	S.O	Appendix 1: Rev:CKASJ/SKB/1 / 2010 Application Form (Lampiran C)	

TRADE : 5.3 ROOF STRUCTURE				SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Details Profile Timber (Dimension) & Section Properties :	Hip Rafter	proposed roof truss system specification JKR-20601-0190-12 clause 7.0	Measuring Tape	Installation Stage	S.O	FRIM Test Report	
		Rafter	proposed roof truss system specification JKR-20601-0190-12 clause 7.0	Measuring Tape	Installation Stage	S.O	FRIM Test Report	
		Batten	proposed roof truss system specification JKR-20601-0190-12 clause 7.0	Measuring Tape	Installation Stage	S.O	FRIM Test Report	
		Wall Plate (min. size 50mm x 100mm)	Standard required roof truss system specification JKR-20601-0190-12 clause 6.8.1	Measuring Tape (Min. grade of SG2)	Installation Stage	S.O	FRIM Test Report	
		Bracing	proposed roof truss system specification JKR-20601-0190-12 clause 7.0	Measuring Tape	Installation Stage	S.O	FRIM Test Report	
4	Details Design profile drawing to be endorsed by P.E	Members, Bracing, Connection, Wall Plate and Truss Accessories	MS 544 - Part 1, Part 2 and Part 5	Appendix 3 - Checklist on the Contractor Submission	Installation Stage	SO	Checklist	
		Technical Spesification	Specification:- JKR-20601-0190-12	—	Installation Stage	System Provider	Catalog	
		Method Statement	Specification:- JKR-20601-0190-12	Manufacturing SOP	Installation Stage	System Provider	Manufacturer brochure	
		Quality Assurance	Specification:- JKR-20601-0190-12	Manufacturing SOP	Installation Stage	System Provider	Inspection Checklist	
5	Timber roof truss with span more than 12m but not exceeding 16m	Special Provisions (to be submitted to Pengarah Kanan, Cawangan Kejuruteraan Awam Dan Struktur	Specification:- JKR-20601-0190-12	Inspection checklist for trusses pre-installation process	Before installation	Contractor, S.O & CKAS	Prior to Approval by CKAS	Analysis, design and drawing duly endorsed by PE
			Specification:- JKR-20601-0190-12	Inspection checklist for trusses post installation process	After installation	Contractor, S.O & CKAS		

TRADE : 5.3 ROOF STRUCTURE

SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
6	Material Testing Requirements for plate fasterner		Specification:- JKR-20601-0190-12 Appendix 2					C3 (medium corrosivity) Z450 or AZ150 for base metal plate fasterner
	Ai) Base Steel for AZ150 is only allowed its use in environments within the 400m of the ocean or other aggressive environmental influences or	i) Tensile Test	MS 1196	Approved Lab Test Result (Sirim or Cream)	Initial Stage	S.O	Testing Certificate from Accredited Laboratory	A proof that the fasteners and anchor bolt were purchased from the above mention as manufacturer/ supplier/agent
		ii) Adhesion of Aluminium-Zinc base coating (Bend Test)	MS 1196					
		iii) Mass of Aluminium-Zinc base coating	AS 1397					
		iv) Chemical Composition of Base Metal	AS/NZS 1050 / ISO 9223					
	Aii) Base Steel for Z200 is not allowed its use in environments within the 400m of the ocean or other aggressive environmental influences	i) Tensile Test	MS 1196					
		ii) Adhesion of Zinc base coating (Bend Test)	AS 1397					
		iii) Mass of zinc base coating	AS 1397					
		iv) Chemical Composition of Base Metal	AS/NZS 1050 / ISO 9223					
	B) Anchor Bolt	i) Pull Out Test	BS 5080: Part 1 : 1986	Approved Lab Test Result (Sirim or Cream)	Initial Stage			
		ii) Coating Composition	AS 3566.2-2002 (Hot Dipped Galvanized (minimum thickness 42micron)					
		iii) Coating Thickness						
	C) Nails	iv) Coated protectively by hot-dip galvanizing	AS 2334					

TRADE : 5.3 ROOF STRUCTURE				SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
7	D) Material Testing Requirments for Timber.	i) Identification of species & visual grading	MS 1714	Approved Lab Test Result (Sirim or Cream)	Initial Stage	S.O	Appendix 2, Testing Certificate from Accredited Laboratory	As Per Project
		ii) Moisture content	BS373 & MS 837					
		iii) Density	BS373 & MS 837					
		iv) Specific gravity	BS373 & MS 837					
		v) Dry salt retention	MS 360, MS 821 & MS 544					
		vi) Depth of penetration	MS 360 & MS 544					
		vii)Static bending	BS 373					
		viii)Compression parallel to grain (Optional : where testing required for verification, the principal standard shall be selected, for S.O.'s approval.)	BS 373					
8	Drawing Inspection on material	i) Truss Spacing	Maximum truss spacing of 1.2metres with permitted deviation of ± 0.05 metres Specification:- JKR-20601-0190-12 Clause 2.2	Measuring Tape & Inspection checklist	Throughout	System Provider, Contractor , S.O	Endorsed by P.E Approved System Provider (S.P)	
9	Inspection on material	i) Metal Plate Fasteners (Connector)	As per design Specification:- JKR-20601-0190-12 Clause 7.2	Visual defects / Vernier Caliper (size & thickness)	Throughtout	System Provider & SO	manufacturer Certificate	
		ii) Nail Plate	As per design Specification:- JKR-20601-0190-12 Clause 7.2	Visual defects / Vernier Caliper (size & thickness)	Throughtout	System Provider & SO	manufacturer Certificate	
		iii) Nails (7.2.2, 7.3)	As per design Specification:- JKR-20601-0190-12 Clause 7.2	Vernier Caliper	Throughtout	System Provider & SO	manufacturer Certificate	

TRADE : 5.3 ROOF STRUCTURE			SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS					
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
10	Truss Fabrication	i) Factory Fabrications				System Provider & SO	Quality Assurance and Control Plan	Prior to inspection, Contactor must submit Request for Inspection (RFI) form. Inspection shall be carried out only after obtaining S.O. approval of RFI.
		a) Method Statement for Fabrications	Specification:- JKR-20601-0190-12 Clause 8.1	Factory inspection	Initial Stage	System Provider & SO		
		b) Method of transporting and handling of roof trusses to site.		Visual	Initial Stage	System Provider & SO		
		c) Quality Assurance document		Visual	Initial Stage	System Provider & SO		
		ii) On-Site Fabrication				System Provider & SO	Quality Assurance and Control Plan	
		a) Covered fabrication and storage facility	Specification:- JKR-20601-0190-12 Clause 8.2	Visual	Initial Stage	System Provider & SO		
		b) Fabrication equipment		Table Press, Jig- G Press	Initial Stage	System Provider & SO		
		c) Truss fabrication drawings		Visual	Initial Stage	System Provider & SO		
		d) Quality Assurance document		Visual	Initial Stage	System Provider & SO		
		e) Qualified S.P site fabrication team		Visual	Initial Stage	System Provider & SO		

TRADE : 5.3 ROOF STRUCTURE				SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
11	Installation							
12	Trusses and Rafters (Timber - defects with permissible limits)	Knots (<i>Penyambung tidak rapat</i>)	Specification:- JKR-20601-0190-12 Clause 9.0	Visual Measuring Tape (Overall Length, Angle Length, width and Thickness)	Throughout	System Provider & SO	checklist for truss installation	
		Wane (Size semakin kurang)				System Provider & SO	checklist for truss installation	
		Checks and shakes (splits)				System Provider & SO	checklist for truss installation	
		Fractures				System Provider & SO	checklist for truss installation	
		Top Chord (members)				System Provider & SO	checklist for truss installation	
		Bottom Chord (members)				System Provider & SO	checklist for truss installation	
		Bracing				System Provider & SO	checklist for truss installation	
		Member Slicing				System Provider & SO	checklist for truss installation	

TRADE : 5.3 ROOF STRUCTURE				SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
13	Truss joint	Damage to connector	Specification:- JKR-20601-0190-12	Visual	Throughout	System Provider & SO	checklist for truss installation	
		Missing connector				System Provider & SO	checklist for truss installation	
14	Workmanship - All trusses visually checked for obvious misalignment and incorrect spacing	Spacing of trusses	Specification:- JKR-20601-0190-12 Clause 2.2	Visual	Throughout	System Provider & SO	checklist for truss installation	
		Vertical alighment (misalignment)	Specification:- JKR-20601-0190-12 Clause 9.2	Plum bob and Visual		System Provider & SO	checklist for truss installation	
		Horizontal alighment (misalignment)				System Provider & SO	checklist for truss installation	
15	Wall Plate	Specified Size (min. size 50mm x 100mm)	Standard required roof truss system Specification JKR-20601-0190-12 clause 6.8.1	Measuring Tape	Throughout	System Provider & SO	checklist for truss installation	
		Grade Specified (min.grade of SG2)		FRIM Test Report		System Provider & SO	checklist for truss installation	
		No non permissible timber defect between anchor and truss.	Specification:- JKR-20601-0190-12	Visual		System Provider & SO	checklist for truss installation	
		Size of anchor matches specification		Measuring Tape		System Provider & SO	checklist for truss installation	

TRADE : 5.3 ROOF STRUCTURE				SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
16	Workmanship	Gap between wall plate and beam at truss / rafters position packed	Specification:- JKR-20601-0190-12	Visual	Throughout	System Provider & SO	checklist for truss installation	
		No knots at anchor bolt position		Visual		System Provider & SO	checklist for truss installation	
		If applicable, washers provided for anchor bolts		Visual		System Provider & SO	checklist for truss installation	
		If applicable, anchor bolts tightened		Visual		System Provider & SO	checklist for truss installation	
17	Truss Joint	Damage to connectors	Specification:- JKR-20601-0190-12	Visual	Throughout	System Provider & SO	checklist for truss installation	
		Missing connectors		Visual		System Provider & SO	checklist for truss installation	
18	M & E Services	The S.P. indicated on the drawing shall be installed using strap	i) Fixed on bottom chord member. Specification:- JKR-20601-0190-12 Clause 5.5.4	Visual & Inspection checklist	Throughout	System Provider, Contractor , S.O	Design Consideration by S.P.	
			ii) Installation on purlins is not allowed.	Visual & Inspection checklist		System Provider, Contractor , S.O	Specification:- JKR-20601-0190-12	
			iii) Drilling is strictly prohibited on all truss members	Visual & Inspection checklist		System Provider, Contractor , S.O	Specification:- JKR-20601-0190-12	
19	Water Tank	Shall not be placed on roof trusses	Supported independently Specification:- JKR-20601-0190-12 Clause 5.5.5	Visual & Inspection checklist	Visual & Inspection checklist	System Provider, Contractor , S.O	Specification:- JKR-20601-0190-12	

TRADE : 5.3 ROOF STRUCTURE				SUB-TRADE : 5.3.2 PRE FABRICATED TIMBER ROOF TRUSS				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
20	Installation of Roof Covering	i) Roof Tile	A palette only allowed to seat on the roof trusses provided not more than 40 tiles or 150 kg in weight Specification:- JKR-20601-0190-12 Clause 9.8	Visual & Inspection checklist	Visual & Inspection checklist	System Provider, Contractor , S.O	Specification:- JKR-20601-0190-12	
		ii) Lightweight Covering	Shall not be stacked on the roof trusses directly during laying out stage.	Visual & Inspection checklist	Visual & Inspection checklist	System Provider, Contractor , S.O	Specification:- JKR-20601-0190-12	
21	Post Installation Document Submission	i) As-Build Drawing	Two (2) sets of drawing by System Provider and to be endorsed by P.E	Specification:- JKR-20601-0190-12	After installation	System Provider, Contractor , S.O	Endorsed by P.E Approved System Provider (S.P)	
		ii) System Provider Warranty	Statement the period of warranty shall not less than ten (10) year from date the of Certificate of Practical Completion (CPC) and expiry date of warranty shall be clearly written in the warranty certificated	Specification:- JKR-20601-0190-12 Appendix 4	After installation	System Provider, Contractor , S.O	Issued by System Provider (S.P)	

TRADE : 5.4 STEEL STRUCTURE

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION/TEST	STANDARD/ REQUIREMENT	TOOLS/EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material	Qualities of Steel Material Testing Surface condition - Steel Surface (Check against pitted and rust) - Surface Defect - Other defect Structural fastener Shear stud Protective treatment materials	JKR NO.20601-0191-12 Table A & B JKR NO.20601-0191-12 Table A BS EN ISO 8501-1 BS EN 10163 BS EN 10210-1 JKR NO.20601-0191-12 Section 4 Clause 4.8 JKR NO.20601-0191-12 Section 4 Clause 4.9 JKR NO.20601-0191-12 Section 4 Clause 4.10	N.A. Laboratory Test Laboratory Test	Initial stage Laboratory Test	Manufacturer/ supplier	JKR.PK(O).04- SKC.ST.2A Test Certificate JKR.PK(O).04- SKC.ST.2A JKR.PK(O).04- SKC.ST.2A Test Certificate JKR.PK(O).04- SKC.ST.2A	
2	Drawings	Design, fabrication and erection drawings General arrangement drawings Foundation plan drawings Fabrication drawings Erection drawings Submission of approval drawings As-Built Drawings	BS 1192-1 and BS 1192-2 BS 499-2 (Welding symbols) JKR NO.20601-0191-12 Section 5 Clause 5.2 JKR NO.20601-0191-12 Section 5 Clause 5.3 JKR NO.20601-0191-12 Section 5 Clause 5.4 JKR NO.20601-0191-12 Section 5 Clause 5.5 JKR NO.20601-0191-12 Section 5 Clause 5.6 JKR NO.20601-0191-12 Section 5 Clause 5.7	N.A.	According to related stage Initial stage Initial stage Prior fabrication Prior erection According to related stage Completion	Contractor Contractor Structural steelwork fabricator Contractor S.O Contractor	Drawings Drawing submission Drawing submission Drawing submission & Drawing Register Drawing submission Letter of approval Drawing submission	
3	Workmanship-Welding	Welder qualification	BS EN 287-1/BS EN 4872-1	N.A.	Before welding	S.O.	Certificate	
		Welding Inspector qualification	SIRIM/CIDB/other	N.A.	Before welding	S.O.	Certificate	
		Welding procedure - Approval of procedure - Testing of procedure	BS EN1011 BS EN ISO 15614-1	Welding procedure Welding procedure	Before welding	Independent Inspection Authority Contractor	Welding procedure	

TRADE : 5.4 STEEL STRUCTURE

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION/TEST	STANDARD/ REQUIREMENT	TOOLS/EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS	
3 (cont'd)		Assembly	JKR NO.20601-0191-12 Section 7 Clause 7.4	Welding procedure	Throughout	Contractor	JKR.PK(O).04- SKC.ST.2A		
		- Fit-up	JKR NO.20601-0191-12 Table D						
		- Jigs							
		- Tacks Welds							
		- Weld Quality Acceptance Criteria R							
		- Corrective Actions							
		- Extension pieces							
		- Production test plates							
		Non-destructive testing of welds	BS EN ISO 17637 JKR NO.20601-0191-12 Table C&D JKR NO.20601-0191-12 Table C	Inspection procedure Magnetic Particle Inspection/Dye Penetrant Inspection Magnetic particle inspection (MPI)/Dye penetrant inspection (DPI)	Post welding	Inspecting authority	Inspection procedure and scope		
		- Visual Inspection				A suitably qualify person			
		-Surface flaw detection				A suitably qualify person	JKR.PK(O).04- SKC.ST.2C		
		(i) Determine if closer examination of weld surface is required							
(ii) Timing	JKR NO.20601-0191-12 Section 7 Clause 7.5	JKR NO.20601-0191-12 Table C&D	Post welding	Inspecting authority	JKR.PK(O).04- SKC.ST.2C Certificate				
Ultrasonic examination									
- Examiner qualification	JKR NO.20600-0019-99 Section 7 Clause 7.5.4								
- Determine if ultrasonic examination is required	JKR NO.20601-0191-12 Table C&D								
- Procedure and timing	JKR NO.20600-0019-99 Section 7 Clause 7.5.4	Ultrasonic device							
Shear stud welding		Manufacturer recommendation	N.A.	Before welding	Contractor	JKR.PK(O).04- SKC.ST.2C			
- Method following manufacturer recommendation									
- Trial									
- Testing									
- Removal of defective studs	JKR NO.20601-0191-12 Section 7 Clause 7.6	JKR NO.20601-0191-12 Section 7 Clause 7.7	Welding pocedure Bend Test by 6kg hammer	Before welding	Contractor				
			JKR NO.20601-0191-12 Section 7 Clause 7.7	Post welding	Contractor				
				After testing	Contractor				

TRADE : 5.4 STEEL STRUCTURE

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION/TEST	STANDARD/ REQUIREMENT	TOOLS/EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Workmanship-Bolting	Ordinary bolted assemblies - Bolt/Nut combination - Bolt grades - Bolt length - Washers - Galvanized nuts - Bolt tightening - Fitted bolts - Fit-up High Strength Friction Grip assemblies - Bolt/Nut/Washer combination - Tightening - Calibration of torque equipment - Fit-up	JKR NO.20601-0191-12 Section 8	JKR NO.20601-0191-12 Section 8	Throughout assembly	Contractor	JKR.PK(O).04- SKC.ST.2A	
5	Workmanship-Accuracy of fabrication	Permitted deviations	JKR NO.20601-0191-12 Section 9	Measuring tools	After fabrication	Contractor	JKR.PK(O).04- SKC.ST.2C	
6	Workmanship-Erection	Method statement submission	JKR NO.20601-0191-12 Section 10 Clause 10.1.1	N.A.	Latest by 2 weeks before erection	Contractor	Proof of submission	
		Certification of completion submission	JKR NO.20601-0191-12 Section 10 Clause 10.9	N.A.	After erection	Contractor	Certificate	
7	Workmanship-Accuracy of erected steelwork	Permitted deviations	JKR NO.20601-0191-12 Section 11.0	Measuring tools	After erection	Contractor	JKR.PK(O).04- SKC.ST.2C	
8	Protective treatment	Method statement submission	JKR NO.20601-0191-12 Section 12.0	Measuring tools	After receiving specification from S.O.	Contractor	JKR.PK(O).04- SKC.ST.2C	
9	Fire Protection	Materials	JKR NO.20601-0191-12 Section 13.0	JKR NO.20601-0191-12 Section 13.1	Prior erection	Contractor	Manufacturere's Data Sheet	
		- Minimum spray thickness according to hours of fire protection rating	JKR NO.20601-0191-12 Table F	JKR NO.20601-0191-12 Table F			JKR NO.20601-0191-12 Appendix 1	

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6.0 KERJA ARKITEK



TRADE

- 6.1 Flooring
- 6.2 Water Proofing
- 6.3 Tiling Works (Floor/Wall Tiles)
- 6.4 Plastering Work
- 6.5 Door, Window And Ironmongery
- 6.6 Ceiling Works
- 6.7 Roof Covering
- 6.8 Painting Works
- 6.9 Sanitary Ware & Fittings
- 6.10 Interior, Signage & Graphic
- 6.11 Softscape Works
- 6.12 Hardscape Works

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TRADE : 6.1 FLOORING

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material delivered to the site	- Ensure the specification as specified in contract and approved by the HODT / S.O - Ensure type of material, sizes, thickness / oz, approved colour/ pattern and skirting if necessary	- As specified in contract document, drawings, manufacturer's catalogue, certification and as per approved proposal - Refer Standard Specification for Building Works 2014 (clause 4.0 - K/8-14) - Refer Architectural Works Briefs User Manual Ver. 1:2012 (clause 5.13 - floors) - Refer SPP Bil. 7 Tahun 2002 - Penggunaan bahan / barangan / perkhidmatan tempatan dalam perolehan kerajaan	Sample, relevant certificates & catalogue	Before installation/ Upon material delivery	HODT, Contractor & SO	JKR.PK(0).04-SKA.4 & JKR.PK(0).04-SRA.1	- Inform SO if any discrepancy occurs - Refer to approved material document - Material must be same as proposed material and stored properly at site
2	Surface preparation	- Surface evenness and cleanliness - All the necessary works must be done before flooring works start (eg : water proofing, gradient etc.)	- As specified in contract document, drawings, manufacturer's catalogue, certification and as per approved proposal - Refer Standard Specification for Building Works 2014 (clause 4.0 - K/8-14) - Refer Architectural Works Briefs User Manual Ver. 1:2012 (clause 5.13 - floors) - Refer SPP Bil. 7 Tahun 2002 - Penggunaan bahan / barangan / perkhidmatan tempatan dalam perolehan kerajaan	Visual, measuring	Before installation	Contractor, Installer, SO & PTB (penyelia tapak bina)	JKR.PK(0).04-Surface preparation must be checked and certified for approval by specialist	Refer to method statement from product manufacturer & approved material document
3	Installation of materials	- Pattern and arrangement of - Prepare mock-up area 3meter x 3meter (minimum) and determine by HODT/ SO / PTB (penyelia tapak bina) - Floor finish level upon completion	- As specified in contract document, drawings, manufacturer catalogue, certification and as per approved proposal - Refer Standard Specification for Building Works 2014 (clause 4.0 - K/8-14) - Refer Architectural Works Briefs User Manual Ver. 1:2012 (clause 5.13 - floors) - Refer SPP Bil. 7 Tahun 2002 - Penggunaan bahan / barangan / perkhidmatan tempatan dalam perolehan kerajaan	Visual, measuring	During / Before	Contractor, Installer, SO & PTB (penyelia tapak bina)	Refer to JKR.PK(0).04-SKA.4 & JKR.PK(0).04-SRA.3 Installation must be done by specialist	Inform SO if delivery of installation is not satisfactory Refer to method statement from product manufacturer

TRADE : 6.1 FLOORING

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Inspection	- To make sure any defect / unwanted marks on the surface to be rectified - To make sure all the specification must be followed as per contract & approval	- As specified in contract document, drawings, manufacturer catalogue, certification and as per approved proposal - Refer Standard Specification for Building Works 2014 (clause 4.0 - K/8-14) - Refer Architectural Works Briefs User Manual Ver. 1:2012 (clause 5.13 - floors)	Visual, measuring tools & water flow / pounding test	After installation	Contractor, Installer, SO & PTB (penyelia tapak bina)	Check according to requested specialist's standards Request specialist's undertaking letter to certify that the waterproofing system is workable	Inform SO if delivery of installation is not satisfactory

TRADE : 6.2 WATERPROOFING

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Check the material delivered before installation.	Ensure the specification as specified in contract and approved by the HODT / S.O	- As specified in contract document, drawings, manufacturer's catalogue, certification and as per approved proposal - Refer Standard Specification for Building Works 2014 (clause 5.4 - D/18) - Refer Architectural Works Briefs User Manual Ver. 1:2012 (clause 5.14 - waterproofing) - Refer SPP Bil. 7 Tahun 2002 - Penggunaan bahan / barangan / perkhidmatan tempatan dalam perolehan kerajaan	Sample, relevant certificates & catalogue	Before installation/ Upon material delivery	HODT, Contractor, SO	JKR.PK(0).04-SKA.4 & JKR.PK(0).04-SRA.1 Material must be same as proposed material and stored properly at site	Inform HODT /SO if any discrepancy occurs Refer to approved material document
2	Surface preparation	Surfaces to be waterproofed must be structurally safe, clean, dry and free of all surface contamination including form release agents, curing compounds, concrete finishing aids and all other forms of surface contamination.	- As specified in contract document, drawings, manufacturer's catalogue, certification and as per approved proposal - Refer Standard Specification for Building Works 2014 (clause 5.4 - D/18) - Refer Architectural Works Briefs User Manual Ver. 1:2012 (clause 5.14 - waterproofing)	Visual & spirit level (gradient)	Before installation	Contractor, SO & PTB (penyelia tapak bina)	JKR.PK(0).04-SKA.4 & JKR.PK(0).04-SRA.2	Refer to approved material document & gradient

TRADE : 6.2 WATERPROOFING

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Installation of materials	Surface coverage meets the required number of layers / method statements preferred product	- As specified in contract document, drawings, manufacturer method statement - Refer Standard Specification for Building Works 2014 (clause 5.4 - D/18) - Refer Architectural Works Briefs User Manual Ver. 1:2012 (clause 5.14 - waterproofing)	Visual,	During installation	Contractor, SO & PTB (penyelia tapak bina)	Refer to manufacturer's installation requirements and approved drawings JKR.PK(0).04-SKA.4 & JKR.PK(0).04-SRA.3 Installation must be done by specialist	Inform SO if delivery of installation is not satisfactory Refer to method statement from product manufacturer
4	Inspection	Upon completion of the waterproofing system installation, where possible, a water test should be carried out for a certain period of products to test the completeness of the application for the whole affected area.	- As specified in contract document, drawings, manufacturer method statement - Refer Standard Specification for Building Works 2014 (clause 5.4 - D/18) - Refer Architectural Works Briefs User Manual Ver. 1:2012 (clause 5.14 - waterproofing)	Visual, measuring tools	After installation	Contractor, SO & PTB (penyelia tapak bina)	Check according to requested specialist's standards Request specialist's undertaking letter to certify that the waterproofing system is workable	Inform SO if delivery of installation is unsatisfactory

TRADE : 6.3 TILING WORKS (FLOOR / WALL TILES)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Submit sample / catalogue / colour scheme proposal	catalog / shop drawing / SIRIM cert. / sample material	• Submit at least one month from commencement of building works with client's approval • As specified in contracts document • To ensure only specified or equivalent paint are submitted for approval	mock-up / sample/certified material	Earlier construction works or after superstructure works finish At least one month before installation	Consultant, Contractor, SO Client	JKR.PK (0).04-SKA.3 (wall finishes) and JKR.PK (0).04-SKA.4 (floor finishes) Sample size must be same as propose material and stored properly in site office	Inform SO if any discrepancy occurs Obtain client's approval
2.	Check quality of tiles upon delivery	Random check	• As specified in contract document and as per approved proposal, and tile installation guideline • Check on tonality, crack, chip, wasp and surface unevenness	visual	Once material delivered on site	Consultant, Contractor, SO	Material must be same as proposed material and stored properly at site	Refer to approved material document
3.	Confirm tiles dimension	Sample / Mock-up	• As specified in contract document and drawing specification • Width and length tolerance to be +/- 1%, thickness +/- 10%	measurement tools / spirit level		Consultant, Contractor, SO	Material must be same as proposed material and stored properly at site Refer to construction drawing	Refer to approved material document
4.	Wall / surface preparation	Random check	• Make sure all surfaces are clear from dirt, ready to accept tiles and completely dry	visual		Consultant, Contractor, SO	Surface preparation must be checked and certified for approval by specialist	Refer to method statement from product manufacturer

TRADE : 6.3 TILING WORKS (FLOOR / WALL TILES)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5	Floor surface preparation	Random check	• Make sure all surfaces are clear from dirt, ready to accept tiles and completely dry	visual		Consultant, Contractor, SO	Surface preparation must be checked and certified for approval by specialist	Refer to method statement from product manufacturer
6	Tiles installation	Random check and Test	• Check mortar/glue thickness as stated in tiles installation guideline • As specified in contract document	visual		Consultant, Contractor, SO	Refer to manufacturer's installation requirements, method statement and approved drawings Installation must be done by specialist	Inform SO if delivery of installation is not satisfactory Refer to method statement from product manufacturer
7	Site inspection	Audit check list construction	• As specified in contract document and tiles installation guideline • As specified in Sistem Pengurusan Bersepadu (SPB) form	visual		Consultant, Contractor, SO	Check according to requested specialist's standards	Inform SO if delivery of installation is unsatisfactory

TRADE : 6.4 PLASTERING WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Preparation for Plastering	check mock-up preparation / Random check	at least 3 days after the completion of brickwall as specified in the construction drawing.	visual / laser equipment	once	Consultant, Contractor, SO	JKR.PK (0).04-SKA.3 (Mock Up) Refer to construction drawing	Inform SO if any discrepancy occurs
2.	Clean Surface	random check	- The surface shall be cleaned and wetted before plastering. - As specified in the contract document and Sistem Pengurusan Bersepadu (SPB) form	visual	ALL	Consultant, Contractor, SO	Mock Up/sample of minimum 9m2 (3m width x 3m height) done by contractor shall be supplied to SO for approval	Subjected to judgment of SO whether mock up/sample is of acceptable quality or not
3.	Plaster Mix	preparation / external test	1 part of cement to 6 parts of sand by volume. - All mixing of mortar for plaster shall be done by machine. Hand mixing shall only be allowed for small quantities and with the approval of the SO - As specified in the contract document.	visual / sample	ALL	Consultant, Contractor, SO	Sample done by contractor shall be supplied to SO for approval	Subjected to judgment of SO whether mock up/sample is of acceptable quality or not
4.	Aligment	Random Check.	Set out aligments on brickwall surface before commencement of plastering works.	Measurement tools	ALL	Consultant, Contractor, SO	Mock Up/sample of minimum 9m2 (3m width x 3m height) done by contractor shall be supplied to SO for approval	Subjected to judgment of SO whether mock up/sample is of acceptable quality or not
5.	Apply the first coat	Random Check.	- Averaging 10 mm thick applied to the area having greater deviation from the intended finish surface. - As specified in the contract document.	Measurement tools	ALL	Consultant, Contractor, SO	Mock Up/sample of minimum 9m2 (3m width x 3m height) done by contractor shall be supplied to SO for approval	Subjected to judgment of SO whether mock up/sample is of acceptable quality or not

TRADE : 6.5 DOOR, WINDOW AND IRONMONGERY

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Submit sample / catalogue / shop drawing / method statement for approval and prepared mock up at site.	catalog / shop drawing / SIRIM cert. / sample material	• Submit at least one month from commencement of building works • As specified in contracts document • To ensure only specified item submitted for approval	shop drawing / certified material.	once before delivery	Consultant, Contractor, SO	JKR.PK (0).04-SKA.5 (Door & window) and JKR.PK (0).04-SKA.8 (Ironmongery)	Inform SO if any discrepancy occurs
2.	Material delivered to site	lab material test	• As specified in contract document and as per approved proposal		ALL	Consultant, Contractor, SO	The tested result must achieve the specification requirements	Inform SO in case of system failure
3.	Contractor to measure opening provided at site for windows and doors.	random check	• Prior to fabrication, check of any deviation to the specified size and report to the SO	measuring tape/laser measure.	ALL	Consultant, Contractor, SO	Refer to construction drawing	Subjected to judgment of SO whether opening is acceptable or not
4.	Fix Sub frame in position	Random Check.	• As specified in contract document and method statement. • To fix sub frame before plastering and check the alignment with level before fixing in position.	Spirit level / laser measure	ALL	Consultant, Contractor, SO	Refer to manufacturer's installation requirements and approved drawings Installation must be done by specialist	Inform SO if delivery of installation is not satisfactory
5.	Fix frame in position	Random Check.	• Check defect on the frame if any, rectify or reject.	visual	ALL	Consultant, Contractor, SO	Refer to manufacturer's installation requirements and approved drawings Installation must be done by specialist	Inform SO if delivery of installation is not satisfactory
6.	Install door window panel / Install Ironmongery	Random Check.	• As specified in contract document and method statement. • As specified in Sistem Pengurusan Bersepadu (SPB) form	visual	ALL	Consultant, Contractor, SO	Installation must be done by specialist	Refer to method statement from product manufacturer

TRADE : 6.6 CEILING WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Receive and check shop drawings from supplier. Ceiling type : - plaster ceiling - suspended ceiling Fixed ceiling	catalog / drawings / sample	Check as per contract document and take into account factors such as: <u>Plaster & suspended ceiling</u> board pattern. - Other components such as -'main T & cross T', 'wall angle', 'soffit cleat', 'hanging C channel' and 'cornice' <u>Fixed ceiling</u> board pattern. - Other component such as- 'cornice' Other requirement– SIRIM Certificate and warranty, fire rated and sound insulation (acoustic ceiling).	Contract Dokumen / SPK Tools / Shop Dwg.	Earlier / months before the ceiling installation works or after roof structure works done.	Consultant, Contractor, SO	JKR.PK (0).04-SKA.2 (Mock Up)	Inform SO if any discrepancy occurs
2.	Receive and check sample for approval	Sample material	Check as per contract document and shop drawings.	Visual	Earlier construction works or after superstructure works finish	Consultant, Contractor, SO	Sample size must be same as propose material and stored properly in site office	Inform SO if any discrepancy occurs
3.	Ceiling mock-up at site.	Set Mock-up	Check the mock-up as per construction drawings & shop drawings together with the sample that have been approved and verified.	Mock up / sample Material	3 months before ceiling work.	Consultant, Contractor, SO	JKR.PK (0).04-5 (Mock Up) and weight testing (50kg/point)	Inform SO in case of ceiling system failure
4.	Check material that is sent to site.	Random check by batch / lab test.	Check material whether it is the same as per approved sample. Store in an enclosed area that is free of dirt and moisture.	Measuring Tape / laser measure	All Stages.	Consultant, Contractor, SO	The tested result must achieve the specification requirements	Inform SO in case of ceiling system testing failure

TRADE : 6.6 CEILING WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5.	Ceiling Installation	Random check installation / similar to mock-up.	Check the ceiling installation as per construction drawings and for each space: - Installation technique as per approved mock-up. - Design and pattern of the ceiling shall be aligned with the roof fall. '- Floor to ceiling height must be enough to cater the ceiling space for mechanical and electrical wirings. 'ceiling manhole' for fix ceiling as required.	Visual	All Stages.	Consultant, Contractor, SO	Check according to approved specification and approved drawing	Inform SO if any discrepancy occurs
6.	After the installation	Check room by room / Audit before handing over	Final inspection for: - Electrical & mechanical fixtures such as air-cond diffusers, lightings, ceiling fans and fire requirements are not directly fix to the ceiling boards. - Finishes of the ceilings must be in good condition after the work is completed.	Visual	All Stages.	Consultant, Contractor, SO	Ensure workmanship is of acceptable quality and visually clean	Inform SO if delivery of workmanship is unsatisfactory

TRADE : 6.7 ROOF COVERING								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Sample	catalog / shop drawings / sample	• Submission of shop drawing and sample for approval prior to mock-up fabrication on site 2 months before commencement on site • As specified in contract document	shop drawing / certified material.	Once (before delivery)	Consultant, Contractor, SO	JKR.PK (0).04-SKA.1 (Mock Up)	Inform SO if any discrepancy occurs
2	Material Delivery	check material at random	• Ensure only approved items are delivered at site as specified in the contract document. • Items should be kept unexposed for long before installation process commences. • Reject all damage items and items that does not confirm to specifications. • Handling & storage of roofing sheets / tiles / related items shall comply to the approved Method Statement	visual	delivery stages	Consultant, Contractor, SO	Sample size must be same as propose material and stored properly in site office	Inform SO if any discrepancy occurs
3	Installation	Approved installer and Certified by roof Supplier	• Finishing - No stain marks shall be visible - Finishing shall be in good paint works • Falls - Roof fall shall look smooth with no tool marks - Even and level especially no potential in stripping - Falls in right direction • Physical Damage - No visible damage / defects eg. cracks, chip, etc - Joint / Sealant / Alignment shall be consistent, neat and aligned - Inspect exterior for continuity of roof covering, deterioration of fascias, gutters and soffits; and performance of flashings - Inspect interior finishes (ceilings and walls) for signs of water penetration, and structural distress • Chockage / Ponding - No sign of chockage or ponding • Construction - No sign of leaking - Proper dressing for protrusion if any - Neat and secured installation of fixtures	visual	ALL	Consultant, Contractor, SO	Acquire calculation endorsement for roof system from structural engineer . The result of installation must be in accordance with the supplier's standard requirements	Inform SO if any discrepancy occurs Refer back to the manufacturer's requirements
4.	Flat / Membrane Roof / water proofing installation.	Ponding test as per audit check list.	• No leaks or damp patches show on soffit • No blisters shall be on the roof (either broken or not), which may allow water to enter the roof • Look for depressions around vent pipes where water can collect and begin leaking through cracks in the surface. • No gap / separations of flashing by the parapet that rings the flat roof • Surface to level to avoid tripping • Proper dressing for any protrusion • Openings to be sealed to prevent pest invasion • Clean and no stain marks • No bubbles shall appear on the membrane surface • To ensure overlapping of membrane as per supplier's requirement • Ponding on flat roof shall be not more than 3mm high	visual & spirit level (to determine roof fall)	ALL	Consultant, Contractor, SO	The result of installation must be in accordance with the supplier's standard requirements.	Inform SO if any discrepancy occurs Refer back to the manufacturer's requirement

TRADE : 6.7 ROOF COVERING

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5.	Sloped Roof Installation	audit check list	• All purlins are in the right level and none is out of line (structure tolerance shall meet roofing manufacturer recommendation) • Final coating of paint has been applied to roof structural members • Layers of insulation shall as specified in contract document, approved construction/shop drawings or other relevant documents. • Thickness (BST) of metal roofing sheet shall as specified in contract document, approved construction/shop drawings or other relevant documents. • Roof tiles in alignment • Roof tiles shall be nailed or screwed as recommended by manufacturer • Openings to be sealed to prevent pest invasion • Consistent colour tone • Proper dressing for any protrusion	visual	ALL	Consultant, Contractor, SO	JKR.PK (0).04-5 (Mock Up) Refer to manufacturer's requirements Refer to construction drawings	Inform SO if any discrepancy occurs
6	Roof Features - Fascia - Soffit - Flashing - Gutters / Drains / RWDP - Skylights - Vents - Others	Audit check list.	• No ponding and chokage • No cracks, chips and any other visible damage • RWDP inlet shall be lower than the surrounding gutter invert level • Gutter and RWDP inlet to be covered to prevent chokage where practical • Clean and no cement stains • No physical damage of all roof flashing and the flashing around vent stacks, roof edges, dormers, and skylights. • To ensure flashing has been installed as specified in contract documents, approved construction/ shop drawings or other relevant documents.	visual	ALL	Consultant, Contractor, SO	• JKR.PK (0).04-5 (Mock Up) • Refer to manufacturer's requirements • Refer to construction drawings	Inform SO if any discrepancy occurs

TRADE : 6.8 PAINTING WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Submit sample / catalogue / colour scheme proposal	catalog / shop drawing / sirim cert. / sample material	• Submit at least one month from commencement of building works with client's approval • As specified in contracts document • To ensure only specified or equivalent paint are submitted for approval	Colour scheme	once before delivery At least one month before installation	Consultant, Contractor, SO Client	JKR.PK (0).04-SKA.6 (Mock Up) Sample size must be same as propose material and stored properly in site office	Inform SO if any discrepancy occurs Obtain client's approval
2.	Material delivered to site	Random check	• As specified in contract document and as per approved proposal	visual	ALL	Consultant, Contractor, SO	Material must be same as proposed material and stored properly at site	Refer to approved material document
3.	Wall / surface preparation	Random check	• Make sure all surfaces are clear from dirt, smoothly plastered and completely dry	visual	ALL	Consultant, Contractor, SO	Surface preparation must be checked and certified for approval by specialist	Refer to method statement from product manufacturer
4.	Site readiness	Random check	• Other construction works overlapped are well planned on site to avoid conflict • No other site activity to take place near painting area to disrupt painting quality	visual	ALL	Consultant, Contractor, SO	Refer to CPM for wall area that is ready for painting works	Subjected to judgment of SO whether site is ready or not

TRADE : 6.8 PAINTING WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5.	Apply base coat	Random check	- To make sure wall surface is free from unevenness - Make sure base coat applied is as specified in contract document	visual	ALL	Consultant, Contractor, SO	Mock Up/sample of minimum 9m2 (3m width x 3m height) done by contractor shall be supplied to SO for approval	Subjected to judgment of SO whether mock up/sample is of acceptable quality or not
6.	Applying paint	Approved applicator and Certified by Paint Supplier	- To make sure walls are coated with 2 layers of emulsion acrylic paint for internal, and weather resistance acrylic paint with anti fungus for external - Paint must be in good condition, maintenance free with good aesthetics, APEO free (alkylphnol ethoxylate) and low VOC (volatile organic compound) with green label by SIRIM - Minimum 5 years warranty	visual / certification	ALL	Consultant, Contractor, SO	Mock Up/sample of minimum 9m2 (3m width x 3m height) done by contractor shall be supplied to SO for approval Painting job must be done by specialist if necessary	Subjected to judgment of SO whether mock up/sample is of acceptable quality or not

TRADE : 6.9 SANITARY WARE & FITTINGS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submit sample / catalogue / shop drawing / method statement for approval and prepared mock up at site.	catalog / shop drawing / sirim cert. / sample material	• Submit at least one month from commencement of building works • As specified in contracts document • To ensure only specified item submitted for approval	shop drawing / certified material.	ONCE BEFORE DELIVERY	Consultant, Contractor, SO	JKR.PK (0).04-SKA.9 (Mock Up)	Inform SO if any discrepancy occurs
2	Site Readiness / Storage material	Random check	• Other construction works overlapped are well planned on site to avoid conflict • No other site activity to take place near painting area to disrupt painting quality	visual	ALL	Consultant, Contractor, SO	Refer to CPM for areas that are ready for sanitary ware and fittings installation	Subjected to judgment of SO whether site is ready or not
3	Check material that is sent to site.	Random check	• To check prior to fabrication of any deviation to the specified size and report to the SO • As stated in the specification	visual	ALL	Consultant, Contractor, SO		
4	Sanitary ware & Fittings installation	Random check	Check the sanitary installation as per construction drawings and for each space: - Installation technique as per approved mock-up.	visual	ALL	Consultant, Contractor, SO	Check according to approved specification and approved drawing	Inform SO if any discrepancy occurs
5	Sanitary after the installation	Audit check list before hand over	• As specified in contract document and method statement.	visual	ALL	Consultant, Contractor, SO	Check according to requested specialist's standards	Inform SO if delivery of installation is unsatisfactory

TRADE : 6.10 INTERIOR, SIGNAGE AND GRAPHIC

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submit sample / catalogue / colour scheme proposal	catalog / shop drawing / sirim cert. / sample material	• Submit within '6' month before installation of works. • As specified in contracts document • To ensure only specified or equivalent materials are submitted for approval	mock-up / sample	6 months before the completion work	Consultant, Contractor, SO	JKR.PK (0).04-SKA.10 (Signage & Graphic) and JKR.PK (0).04-SKA.11 (Interior)	Inform SO if any discrepancy occurs
2.	Factory visit / Fabricate material in factory / in situ / Mock – up for Furniture and signage.	Random Check / material	• Inspection the materials used and fabricate at factory • As specified in contract document and as per approved proposal • Mock – up for Furniture, signage and others related.	visual	3 months before the completion work	Consultant, Contractor, SO		
3	Site readiness	Random check	• To make sure all materials delivered in good condition/inspect the materials on site. • Make sure the site is ready / clear for major work • Measured the site area to be constructed.	visual	All Stages	Consultant, Contractor, SO	Refer to CPM for areas that are ready for interior signages and graphic installation	Subjected to judgment of SO whether site is ready or not
4.	Material delivered to site / site preparation / confirms I.D works dimension.	Random check / Lab test	• To make sure all material approved delivered as specified and approve contract document. • Provide protection and secured storage.	lab cert / visual	All Stages	Consultant, Contractor, SO		
5.	Site Preparation	Random check	• Make sure the site is ready / clear for major work. • Measured the site area to be constructed.	visual	All Stages	Consultant, Contractor, SO		
6.	Installation materials	Random check	• To make sure all materials in good condition / inspect the material on site. • Check mortar / glue / carcass thickness in ID works and related works. • As specified in contract document	visual	All Stages	Consultant, Contractor, SO	Check according to approved specification and approved drawing	Inform SO if any discrepancy occurs
7.	Site Inspection	Audit check list construction	• As specified in contract document and installations guideline.		All Stages	Consultant, Contractor, SO	Check according to requested specialist's standards	Inform SO if delivery of installation is unsatisfactory

TRADE : 6.11 SOFTSCAPE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Nursery visit	Approval of selected plant	• Check the specifications • Visit nursery and mark all selected plants with paint • Only select good quality plants	visual	Once before delivery	Consultant, Contractor, SO	JKR.PK (0).04-SKA.13 (Mock Up)	Inform SO if any discrepancy occurs
2.	Material Delivery	Randomly check the type, size and height of plants	• Ensure only approved and marked plants are delivered at site as specified in the contract document • Plants should be stored at shed or temporarily covered nursery • Plants should not be left under the sun on site more than 2 days. • Reject all damaged or unhealthy plants	visual / measurement tools	Delivery stages	Consultant, Contractor, SO		
3.	Planting preparation	Random check	• Ensure all holes are excavated as per specified in the drawing and left for one week to eliminate fungus and parasites. • Ensure soil mixture is from ratio of 3 topsoil : 1 organic compound.	visual	All	Consultant, Contractor, SO		
4.	Planting process	Random check	• For palms, make sure all fronds are tied to avoid moisture loss. • Water immediately after planting • Ensure mulching and stakes are provided as per detail drawing provided.	visual	All	Consultant, Contractor, SO		
5.	Maintenance	Audit Check List	• Ensure all plants are watered twice a day and fertilize fortnightly for first six months. • Check and ensure all dead and unhealthy plants are replaced.	visual visual	All All	Consultant, Contractor, SO Consultant, Contractor, SO		

TRADE : 6.12 HARDSCAPE WORKS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Submit sample / catalogue / colour scheme proposal	catalogue/sample/color scheme/certificate	• Check the specifications as per detail drawing. • Inspect site to check any underground utility to be relocated • Check soil condition suitable to cater the design load • Prepare tools and material to execute work	Visual	Once before delivery	Consultant, Contractor, SO	JKR.PK (0).04-SKA.12 (Mock Up)	Inform SO if any discrepancy occurs
2.	Material Delivery	Random check	• Ensure only approved hardscape items are delivered at site as specified in the contract document. • Items should be kept unexposed for long before installation process commences. • Reject all damage items and items that does not conform to specifications.	Visual	All	Consultant, Contractor, SO		
3.	Excavation/Base preparation	Random check	• Ensure all surfaces are flexible, withstanding loads from traffic,wear & weather. • 100mm to 300mm of soil is first removed for the area. • Proper treatment of the underlaying soil & base as per detail drawing. • Ensure subsoil is compacted using a vibrating plate compactor. • Crushed rock aggregate is added & compacted thoroughly. • Additional aggregate is added & compacted to the required level. Installation of a bed of sand & screeded level.	Visual / measurement tools	All	Consultant, Contractor, SO		
4.	Installation	Random check	• Install approved hardscape paver pattern & sand swept in the joints. • Joints between pavers are filled with sand. • Ensure the plate compactor is used over the surface & additional sand is brushed in until all joints are completely filled • Ensure a sealant is applied to the surface after cleaning.	Visual	All	Consultant, Contractor, SO		
5.	Maintenance	Audit Check List	• Clean and treat hardscape if necessary	Maintenance checklist	All	Consultant, Contractor, SO		

7.0 KERJA LAPANGAN TERBANG

TRADE

- 7.1 Site Investigation (*New Trade*)
- 7.2 Rigid Pavement (*Revised 1/2020*)
- 7.3 Flexible Pavement (*Revised 1/2020*)



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TRADE : 7.1 SITE INVESTIGATIONS

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOL/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	SOIL BORING							
	a. Runway & Taxiway	i) Spacing Random along pavement at min 60 m intervals	Federal Aviation Administration (FAA) AC 150/5320 -6E CI 202	Visual, testing and measurement	Once per project/source	Project Manager/ Contractor	Inspection Form/SI Report	
	b. Other Areas Of Pavement	i) Spacing 1 boring per 930 sq m of area	Federal Aviation Administration (FAA) AC 150/5320 -6E CI 202	Visual, testing and measurement	Once per project/source	Project Manager/ Contractor	Inspection Form/SI Report	
	c. Borrow Areas	i) Spacing Sufficient tests to clearly define the borrow material ii) Depth To depth of borrow excavation	Federal Aviation Administration (FAA) AC 150/5320 -6E CI 202	Visual, testing and measurement	Once per project/source	Project Manager/ Contractor	Inspection Form/SI Report	
2	SOIL STRENGTH TESTS							
	a. CBR test	Sufficient Test to clearly to defined soil strength	Federal Aviation Administration (FAA) AC 150/5320 -6E CI 205	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form	
	b. Plate Bearing test	Sufficient Test to clearly to defined soil strength	Federal Aviation Administration (FAA) AC 150/5320 -6E CI 205 ICAO A. Manual Part 2	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form	

TRADE : 7.2 RIGID PAVEMENT WORKS (Revised 1/2020)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOL/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material							
	a. Concrete	Concrete Properties : i) Strength (cube test)	At least grade 40 As per drawing/BQ	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form/Certificate	
	b. Reinforcement bar	Reinforcement bar	Y type As Per drawing	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form/certificate	
	c. BMC	BMC	At least R6 As per drawing					
	d. Concrete Testing	Flexural Strength Test	BS 1881: 1952 One group of 6 test beams is to be made for every 450 cubic metres of concrete produced 2 nos for 7 days and 4 nos for 28 days	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form/certificate	
	e. Sealant Joint	Physical Requirements for Preformed Elastic Joint Sealer	BS 2752 ASTM D-2628	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form/certificate	
	f. Finishing Surface Accuracy	PQC Surface	At 3m straight-edge placed anywhere in any direction on the surface, there is not to be a gap greater than 3mm between the bottom of the straight-edge and the surface of the pavement anywhere along the straight-edge.	Visual, testing and measurement	As per requirement	Project Manager	Inspection Form	
2	Surface regularity	Airfield Pavement Roughness	Survey area 3.05 m to 5.22m from runway centre line Boeing Bump Index (BBI) value below 1.0 AC 150/5380-9	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form	
3	Compliance to International Civil Aviation Organization (ICAO) Standards	Markings on pavement is the exact dimension and location as stated in the Layout and Details of Markings drawings	Layout and Details of Markings drawings approved by Airport Standard Division, Civil Aviation Authority Malaysia (CAAM)	Visual, measurement	Completion of pavement markings works	Project Manager	Inspection Form	

TRADE : 7.3 FLEXIBLE PAVEMENT WORKS (Revised 1/2020)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOL/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Material		M.S 30					
	a. Course Aggregate	Course Aggregate Properties: i) Abrasion Loss Los Angeles	Not more than 30%	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form/test result	
		ii) Water Absorption	Not more than 2%					
		iii) Flakiness Index	Not more than 30%					
		iv) 5 cycles Sodium Sulphate Soundness test,wt loss	Not more than 12% AASHTO T 104					
	b. Fine Aggregate	Fine Aggregate Properties: i) 5 cycles Sodium Sulphate Soundness test,wt loss	Not more than 12% AASHTO T 104	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form/test result	
		ii) Water Absorption	Not more than 2%					
	c. Filler	Fine Aggregate Properties: i) Aggregate fraction passing the No.200. B.S sieve	Not less than 60% passing	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form/test result	

TRADE : 7.3 FLEXIBLE PAVEMENT WORKS (Revised 1/2020)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOL/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1 (Con't)	d. Bitumen	Bitumen Properties:						
		i) Penetration at 25°	Min 80 and max 100 ASTM D5	Visual, testing and measurement	As per requirement	Project Manager/ Contractor	Inspection Form	* Carbon disulphide may be used in place of the trichloroethylene
		ii) Softening Point °C	Min 45 and max 52 ASTM 36					
		iii) Solubility in Trichloroethylene % wt.*	Min 90 ASTM D2042					** The choice shall be subjected to agreement between the purchaser and the vendor
		iv) Ductility at 25 °C 5 cm per min. (cm)	Min 100 ASTM D113					
		v) Flash point Cleveland open cup °C	Min 225 ASTM D92					
		vi) Retained penetration after thin-film oven test % ** or	Min 47 ASTM D1754					
		vii) Loss on heating % **	Max 0.5 ASTM D6					
		viii) Drop in penetration after heating %	Max 20 ASTM D6/D5					
	e. Tack Coat Grade RS-1K or RS-2K	Spraying rate	Spray at a rate of 1.85 to 2.75 m2 per litre	Visual, testing and measurement	As per requirement	Project Manager	Inspection Form	
	f. Prime coat SS-1K	Spraying rate	Spray at a rate of 0.5 to 1.0 litre per m2	Visual, testing and measurement	As per requirement	Project Manager	Inspection Form	
	g. Finishing Surface Accuracy	Wearing Course	At 3m straight-edge placed anywhere in any direction on the surface, there is not to be a gap greater than 3mm between the bottom of the straight-edge and the surface of the pavement anywhere along the straight-edge.	Visual, testing and measurement	As per requirement	Project Manager	Inspection Form	

TRADE : 7.3 FLEXIBLE PAVEMENT WORKS (*Revised 1/2020*)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOL/ EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2	Compliance to International Civil Aviation Organization (ICAO) Standards	Markings on pavement is the exact dimension and location as stated in the Layout and Details of Markings drawings	Layout and Details of Markings drawings approved by Airport Standard Division, Civil Aviation Authority Malaysia (CAAM)	Visual, measurement	Completion of pavement markings works	Project Manager	Inspection Form	

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8.0 *KERJA MARIN*



TRADE

- 8.1 Fender (*Revised 1/2020*)
- 8.2 Bollard (*Revised 1/2020*)
- 8.3 Cathodic Protection
- 8.4 Revetment (*Revised 1/2020*)
- 8.5 Steel Pontoon

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TRADE : 8.1 FENDER (Revised 1/2020)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Approval of material and types	Visual inspection and manufacturer records (inclusive of testing reports, technical data sheet, product catalogue and certificate)	Section 8 (fender) - JKR Marine Specs - Characteristics performance shall meet requirements indicated in the drawing - Deflection curve - Fender Performance Testing : Compression Test at the speed of 2 - 8 cm/min. The result from 2nd & 3rd compression cycle shall be less than the permitted maximum reaction and more than the permitted minimum energy absorption. - Sampling shall be 1 for each 10 Fenders.	Construction Drawing	Factory visit	COW/ Site Engineer / Designer	Certification by manufacturer & measurement	
2	On site visual inspection and handling	Prior commencement of work	Section 8 (fender) -JKR Marine Specs - Visual inspection and manufacturer records (inclusive of testing reports, technical data sheet, product catalogue and certificate) - Tolerance of Fender's Dimension : Length, Width & Height +4%,-2%. - Tolerance of Bolt Holes : Diameter & Pitch $\pm$ 3mm. Borang Pemeriksaan Fender dan Bollard - Borang JKR.PK(O).04-SKC.MT.6A (Peringkat Penerimaan)	camera, tape, Construction Drawing	upon delivery at site	COW/ Site Engineer	Delivery Order, Photographs & measurement	
3	Installation of fender	Prior commencement of work	Section 8 (fender) -JKR Marine Specs & Construction drawing (fender type, model and rubber grade, accessories type, sizes, lengths) Borang Pemeriksaan Fender dan Bollard - Borang JKR.PK(O).04-SKC.MT.6B (Semasa Pembinaan) & 6C (Produk siap)	Camera, tape, Construction Drawing	During installation	COW/ Site Engineer	Photographs, measurement	
4	Guarantee certification		Section 8 (fender) -JKR Marine Specs	-	After Installation	COW/ Site Engineer	As-built drawings & Guarantee certification by manufacturer	

TRADE : 8.2 BOLLARD (Revised 1/2020)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Approval of material and types	Visual inspection and manufacturer records (inclusive of testing reports, technical data sheet, product catalogue and certificate)	Section 28 (bollard) - JKR Marine Specs Section 28.2a - Cast steel BS3100:1991 grade "A1" - anchor bolt, nut and washer are stainless steel grade 304	Construction drawing	Factory visit	COW/ Site Engineer	Certification by manufacturer, measurement & construction drawing	
2	On site visual inspection and handling	Prior commencement of work	Section 28 (bollard) -JKR Marine Specs - Visual inspection and manufacturer records (inclusive of testing reports, technical data sheet, product catalogue and certificate) - Allowable tolerance: Dimension $\pm 2\%$ - Allowable diameter of holes for bolt $\pm 2\%$ - Allowable pitch of holes $\pm 4\%$ Borang Pemeriksaan Fender dan Bollard - Borang JKR.PK(O).04-SKC.MT.6A (Peringkat Penerimaan)	Camera, tape, construction drawing	Upon delivery at site	COW/ Site Engineer	Delivery Order, Photographs & measurement	
3	Installation of bollard	Position of bolt & bollard	Section 28 (bollard) -JKR Marine Specs/ Construction drawing - bolt must clear threads protruding above the nuts - nut and washer seated into the recess in the bollard - bollard body with grade 40/20 concrete Borang Pemeriksaan Fender dan Bollard - Borang JKR.PK(O).04-SKC.MT.6B (Semasa Pembinaan)	Camera, tape, construction drawing	Before, during and after installation	Site Engineer	Photographs, measurement & construction drawing	
4	Completion of bollard installation	Position of bollard	Section 28 (bollard) -JKR Marine Specs/ Construction drawing Borang Pemeriksaan Fender dan Bollard (Produk siap) - Borang JKR.PK(O).04-SKC.MT.6C	Camera, tape	After Installation	Site Engineer	As-built drawings	

TRADE : 8.3 CATHODIC PROTECTION

	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Approval of material	Visual inspection and manufacturer records (inclusive of testing reports, technical data sheet, product catalogue and certificate)	Section 7 (Cathodic Protection) -JKR Marine Specs Section 7.2 NACE RP-01-76, AS 2239, BS7361 Part 1:1991, RP B401	-	Factory visit	COW/ Site Engineer / Designer	Certification by manufacturer	
2	On site visual inspection and handling	Prior commencement of work	Section 7 (Cathodic Protection) -JKR Marine Specs - Visual inspection and manufacturer records (inclusive of testing reports, technical data sheet, product catalogue and certificate) Borang Pemeriksaan Lapisan Pelindungan Keluloi dan Katodik -Borang JKR.PK(O).04-SKC.MT. 10A (Peringkat Penerimaan)	camera, tape	Progressively	COW/ Site Engineer	Delivery Order, Photographs & measurement	
3	Installation of Anodes	Prior commencement of work	Section 7 (Cathodic Protection) -JKR Marine Specs - Number of anodes, anode sizes, weight - Coated steel surface located above mudline shall be 20mA/sq.m - Coated steel surface located above mudline and below HWL shall be 65mA/sq.m Borang Pemeriksaan Lapisan Pelindungan Keluloi dan Katodik -Borang JKR.PK(O).04-SKC.MT. 10B (semasa Pembinaan)	Camera	During installation	COW/ Site Engineer	Photographs	
4	Testing and Commissioning		Section 7 (Cathodic Protection) -JKR Marine Specs - results testing Borang Pemeriksaan Lapisan Pelindungan Keluloi dan Katodik -Borang JKR.PK(O).04-SKC.MT. 10C (Peringkat Siap)	-	After Installation	COW/ Site Engineer	As-built drawings & Certification and report by manufacturer	

TRADE : 8.4 REVTMENT (Revised 1/2020)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Approval of material							
	a) Geotextile	Visual inspection and manufacturer records (inclusive of testing reports, technical data sheet, product catalogue and certificate)	Section 5 (Revetment) -JKR Marine Specs Section 5.4.1 - ENISO 10319, ENISO 12236, ENISO 12956, EDIN 60500/4, EDIN 60500/7, ISO 9001 certified	-	Factory visit	COW/ Site Engineer	Certificate of compliance by supplier	
	b) Stone (Armour rock)	Visual inspection and manufacturer records (inclusive of testing reports, technical data sheet, product catalogue and certificate)	Section 5 (Revetment) -JKR Marine Specs - weight according to drawing Section 5.7.1 - AASHTO Method T-104	-	Quarry visit	COW/ Site Engineer	Certificate of compliance by supplier	
2	On site visual inspection and handling							
	a) Geotextile	Prior commencement of work	Section 5 (Revetment) -JKR Marine Specs Section 5.4.1 - ENISO 10319, ENISO 12236, ENISO 12956, EDIN 60500/4, EDIN 60500/7, ISO 9001 certified Borang Pemeriksaan Perlindungan Pantai - Borang JKR.PK(O).04-SKC.MT. 9A (Peringkat Penerimaan)	camera, tape	Progressively	COW/ Site Engineer	Delivery Order, Photographs & measurement	
	b) Stone (Armour rock)	Prior commencement of work	Section 5 (Revetment) -JKR Marine Specs Section 5.7- granite Borang Pemeriksaan Perlindungan Pantai - Borang JKR.PK(O).04-SKC.MT. 9A (Peringkat Penerimaan)	camera, tape	Progressively	COW/ Site Engineer	Delivery Order, Photographs & measurement	

TRADE : 8.4 REVTMENT (Revised 1/2020)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Installation							
	a) Geotextile	Prior commencement of work	Section 5 (Revetment) -JKR Marine Specs Section 5.6 - min overlap 0.5m (both directions) Borang Pemeriksaan Perlindungan Pantai - Borang JKR.PK(O).04-SKC.MT. 12B (Semasa Pembinaan)	camera, tape Setting Out Plan @ Survey Plan	Progressively	COW/ Site Engineer	Photographs, measurement	
	b) Stone (Armour rock)	Prior commencement of work	Section 5 (Revetment) -JKR Marine Specs Section 5.7- granite - rock weight Borang Pemeriksaan Perlindungan Pantai - Borang JKR.PK(O).04-SKC.MT. 12B (Semasa Pembinaan)	camera, tape Setting Out Plan @ Survey Plan	Progressively	COW/ Site Engineer	Photographs, measurement Check Existing level, platform level and crest level	
4	Completion of installation							
	a) Geotextile	-	Section 5 (Revetment) -JKR Marine Specs Borang Pemeriksaan Perlindungan Pantai - Borang JKR.PK(O).04-SKC.MT. 12C (Peringkat Siap)	-	After Installation	COW/ Site Engineer	As-built drawings & Certification and report by manufacturer	
	b) Stone (Armour rock)	-	Section 5 (Revetment) -JKR Marine Specs Section 5.7- granite - rock gradient, level, revetment dimension,, survey works - Thickness of layer - Arrangement of rock - tolerance layer shall be within 20% of layer thickness Borang Pemeriksaan Perlindungan Pantai - Borang JKR.PK(O).04-SKC.MT. 12C (Peringkat Siap)	camera, tape, diver	After Installation	COW/ Site Engineer	Photographs, measurement, As-built drawings & report by manufacturer	

TRADE : 8.5 STEEL PONTOON

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Approval of plates and sections material	Manufacturer records - testing reports, technical data sheet, and mill certificate)	Section 13 - JKR Marine Specifications	-	Before delivery on site/fabrication yard	Site Engineer	Certification from manufacturer	
2	On site inspection and measurement for verification	Steel plates and sections	Section 13 - JKR Marine Specifications	Calipers	Upon delivery at site/fabrication yard	Technician	Delivery order	
3	Welding consumable, welders certificates and welding procedure specifications (WPS)	Fabricator record and submission	Section 13 - JKR Marine Specifications	-	Before welding works	Site Engineer	Document submitted by fabricators/ contractor	
4	Non destructive test (NDT) on welds	Welding quality	Section 12 - JKR Marine Specifications	Radiographic (x-ray) equipment	After welding works	Fabricator/Site Engineer	QA/QC report by 3rd party inspector/ laboratory	
5	Air pressure leaking test	Each compartment on every welding joint and mainhole	Section 13 - JKR Marine Specifications	Pressure gauge equipment, soap liquid and torch light	After coating work	Fabricator/Site Engineer	Test report	

9.0 KERJA MEKANIKAL



TRADE

- 9.1 Air-conditioning System
- 9.2 Fire Fighting System
- 9.3 Cold Water System
- 9.4 Sanitary Plumbing System
- 9.5 Lift System
- 9.6 Building Automation System
- 9.7 Kitchen Equipment & Ancillary System
- 9.8 LPG System
- 9.9 Escalator (*New Trade*)
- 9.10 Generic Mechanical Services (*New Trade*)

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TRADE : 9.1 AIR-CONDITIONING SYSTEM								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Piping	Material Acceptance	Specification / Contract	Vernier Caliper / Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04-5 JKR. PK (O). 04-SKM.1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
		Installation (above ground and underground)	Malaysia Standard / British Standard / Specification i.e Flange, welding , screw subject to pipe size	-	Section by section	Contractor	JKR. PK (O). 04 JKR. PK (O). 04-SKM.1-4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
		Testing	Pressure test 1.5 working pressure for 48 hrs and pressure drop shall not below 10% from the pressure test	Dial Pressure gauge	Every section	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal.
2.	Pump	Material Acceptance	Specification / Contract	Delivery order/ Catalogue	Upon receiving material	S.O Rep	JKR. PK (O). 04-5 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal.
		Installation	Approved JKR working drawing	-		Contractor	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahan kerja mekanikal
		Testing	Capacity test - Total head against zero flowrate	Pressure gauge/Pump performance curve	Upon completion installation	JKR and Contractor	JKR. PK (O). 04-SKM 4 dan T&C Form	JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal
3.	Ductwork c/w insulation	Material Acceptance	Specification / Contract	Vernier Caliper / template gauge / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	
	note : Pre-fabricated duct inspection is FAT	Installation	SMACNA, Specification, approved JKR working drawing	Measuring tape,Vernier caliper,knife, torch light, thickness gauge	All various duct sizes	Contractor	JKR. PK (O). 04 JKR. PK (O). 04 - SKM 1-4	
		Testing	Leakage test (ASHRAE), static pressure test (Specification) , condensation test (48 hrs)	Barometer	Upon completion installation	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	

TRADE : 9.1 AIR-CONDITIONING SYSTEM								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4.	Switch Board/Wiring L-S1 - (Specification for Low Voltage Internal Electrical Installation)	Material Acceptance	Specification / Contract	Delivery order / Visual	Delivery on site	S.O Rep	JKR. PK (O). 04 JKR. PK (O). 04 - SKM 1-4	(Cont')
		Installation	Specification (L-S1)	Visual	as per work progress	Contractor	JKR. PK (O). 04 JKR. PK (O). 04 - SKM 1-4	
		Testing	Specification (L-S1)	Clamp, Multi meter , Test pen	Upon completion	JKR and Contractor	JKR. PK (O). 04- SKM.4 dan T&C Form	
5.	Chiller/Compressor	Material Acceptance	Specificaton / Contract	FAT	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	
		Installation	Manufacturer spesification / Approved JKR Working drawing		Upon plant room completion	Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	MS / specification / Performance testing	Chiller Control panel, Thermometer, pressure gauge, Visual for condensation	Upon completion of system	JKR and Contractor	JKR. PK (O). 04- SKM.4 dan T&C Form	
6.	AHU Room	Material Acceptance	Specificaton / Contract	Visual	Delivery on site	S.O Rep	JKR. PK (O). 04 SKM 1-4	
		Installation	Specificaton / Contract / electrical and cold water requirement, Approved JKR Working Drawing	Visual, measuring tape, Vernier caliper for wall insulation thickness	50% Progress	Contractor	JKR. PK (O). 04 SKM 1-4	

TRADE : 9.1 AIR-CONDITIONING SYSTEM								
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
7.	AHU / FCU	Material Acceptance	Specificaton / Contract	Delivery order / Visual		S.O Rep	JKR. PK (O). 04 SKM 1-4	(Cont')
		Installation	Manufacturer recommendation / Standard JKR Mechanical drawing / actual size against space provided, Approved JKR working drawing	Visual & Measuring tape	Upon 75% completion room without front wall / Before ceiling T is constructed	Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	MS / specification / Performance testing	Anamometer, Tachometer, ammeter/clamp meter	Upon completion installation	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
8.	Cooling Tower	Material Acceptance	Specificaton / Contract	Delivery order / Visual	Before T&C	S.O Rep	JKR. PK (O). 04 SKM 1-4	
		Installation	Manufacturer recommendation / Approved JKR working drawing / actual size against space provided	-		Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Specification / Performance testing	Tachometer, ammeter/clamp meter	Upon completion installation	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	

TRADE : 9.2 FIRE FIGHTING SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Automatic Sprinkler System							
	1.1 Pump/jockey pump	Material Acceptance	Specification / Contract	Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
		Installation	Manufacturer specification / Approved JKR Working drawing			Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Capacity test - Total head against zero flowrate	Dial Pressure gauge	Upon completion installation	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
	1.2 Electric motor	Material Acceptance	Specification / Contract	Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal.
		Installation	Manufacturer specification / Standard JKR Mechanical drawing	-		Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Specification ; ampere, voltage	Clamp meter, volt meter/ multi meter	Upon completion installation and power ready	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal.
	1.3 Valves , Fittings and switches	Material Acceptance	Specification / Contract	Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahan kerja mekanikal
	(pressure gauge, breeching inlet, sprinkler heads, isolation valves, pressure switch etc)	Installation	Manufacturer specification / Approved working drawing	Visual	as per work progress	Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Leak test for valves and fittings.	N/A (Tested once the system has completed)	Upon completion piping installation	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal
			Functional test for switches					

TRADE : 9.2 FIRE FIGHTING SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2.	<u>Hose Reel System</u>	Installation	Specification (L-S1)	Visual	as per work progress	S.O Rep	JKR. PK (O). 04 SKM 1-4	(Cont')
		Installation	Approved working drawing	-	when space and pipe ready	Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Functional ; open and close	-	Upon installation completed	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
	2.1 Pump	Material Acceptance	Specification / Contract	Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	
		Installation	Manufacturer specification / Approved working drawing			Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Capacity test - Total head against zero flowrate	Dial Pressure gauge	Upon completion installation	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
	2.2 Hose	Material Acceptance	Specification / Contract	Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	
		Installation	Manufacturer specification / Approved working drawing			Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Specification / Contract	Visual	Upon completion installation	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
	2.3 Water Tank	Material Acceptance	Specification / Contract	Visual / Delivery Order		S.O Rep	JKR. PK (O). 04 SKM 1-4	
		Installation	Manufacturer specification / Approved working drawing	Vernier Caliper	Upon completion installation	Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Specification / Contract- Visual Leak test	-		JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	

TRADE : 9.2 FIRE FIGHTING SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3.	<u>Wet Riser/Dry Riser System</u> 3.1 Pump	Material Acceptance	Specification / Contract	Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	(Cont')
		Installation	Manufacturer specification / Approved working drawing			Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Capacity test - Total head against zero flowrate	Dial Pressure gauge	Upon completion installation	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
	3.2 Valves , Fittings and switches (pressure gauge, breeching inlet, landing valve, isolation valves, pressure switch , Alarm gong)	Material Acceptance	Specification / Contract	Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	
		Installation	Manufacturer specification / Approved working drawing	Visual		Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Leak test for pipe , fittings and functional	N/A		JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
4.	Fire Suppression System (Gas cylinder , Discharge nozzle, detector)	Material Acceptance	Specification / Contract	Visual / Delivery Order	Upon receiving material	S.O Rep	JKR. PK (O). 04 SKM 1-4	
		Installation	Manufacturer specification / Approved working drawing	Measuring tape for nozzle distance	as per work progress	Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing	Specification / Contract- Test until intermittent alarm and fire curtain drop down	Dummy test	Once	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	

TRADE : 9.2 FIRE FIGHTING SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5.	Fire Alarm System Fire Alarm Panel , detector, alarm bell, sounder, manual call point and all accessories	Material Acceptance Installation Testing	Specificaton / Contract Manufacturer specification / Approved working drawing MS / specification / Performance testing	Visual / Delivery Order Visual Multimeter, Test pen	Upon receiving material Upon plant room completion	S.O Rep Contractor JKR and Contractor	JKR. PK (O). 04 SKM 1-4 JKR. PK (O). 04 SKM 1-4 JKR. PK (O). 04-SKM.4 dan T&C Form	(Cont')
6.	Pipeworks And Fittings	Material Acceptance Installation Testing	Specificaton / Contract Specificaton / Contract / Approved working drawing Specification- pressure test 1.5 from working pressure	Visual / Delivery Order Vernier caliper Pressure gauge	Upon receiving material as per work progress Every section	S.O Rep Contractor JKR and Contractor	JKR. PK (O). 04 SKM 1-4 JKR. PK (O). 04 SKM 1-4 JKR. PK (O). 04-SKM.4 dan T&C Form	
7.	Electrical Works (Control panel / switchboard, wiring)	Material Acceptance Installation Testing	Specificaton / Contract Specification, L-S1 L-S1	Visual / Delivery Order Visual Clamp meter, multi meter, Test pen	Upon receiving material Upon space ready Upon completion installation	S.O Rep Contractor JKR and Contractor	JKR. PK (O). 04 SKM 1-4 JKR. PK (O). 04 SKM 1-4 JKR. PK (O). 04-SKM.4 dan T&C Form	

TRADE : 9.3 COLD WATER SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Pipeworks And Fittings	Material Acceptance	Specifcaton / Contract	Proof of document	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
	(Valves, Joints, Pipe Supports & Sleeves)	Installation	Specifcaton / Contract / Approved Working Drawing	Proof of document / Manufacturer Recommendation / Method Statement	During Installation / Section by section	Contractor	JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
		TESTING: Pressure test	Specification - pressure test 1.5 from working pressure	Dial pressure gauge	Upon completion of pipeworks / Every section	JKR and Contractor	JKR. PK (O). 04-SKM 4 dan T&C Form	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal.
2	Domestic & Suction Tank	Material Acceptance	Specifcaton / Contract	Proof of document	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal.
	(Water Tank Material, Tank Components & Accessories i.e: overflow & warning pipe, access manhole, level indicator and etc. & Water Tank Foundation)	Installation	Specifcaton / Contract / Approved Working Drawing	Proof of document / Manufacturer Recommendation / Method Statement	Upon plinth / support ready	Contractor	JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahan kerja mekanikal
		TESTING: Leak test	Specification / Contract	Visual, Leak detector	Upon completion of pipeworks	JKR and Contractor	JKR. PK (O). 04-SKM 4 dan T&C Form	JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal

TRADE : 9.3 COLD WATER SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Booster Pumps System & Hydropneumatic System	Material Acceptance	Specifcation / Contract: 1. <i>Single / multi stage centrifugal type</i>	Proof of document / Manufacturer Recommendation / Method Statement	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-SKM 1-4	
	(Pumps, Controller & Devices, Electrical Works, Pipes, Fittings & Valves, Support Base & Pneumatic Tank)	Installation	Specifcation / Contract / Approved Working Drawing: 1. <i>The plinth shall raise the pumps to at least 6 inch</i>	Manufacturer Recommendation / Approved Working Drawing	During Installation	Contractor	JKR. PK (O). 04-SKM 1-4	
		TESTING: Capacity test - Total head against zero flowrate	Specification / Contract	Dial pressure gauge	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM 4 dan T&C Form	

TRADE : 9.4 SANITARY PLUMBING SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Pipeworks And Fittings	Material Acceptance	Specificaton / Contract	Proof of document	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
	(PVC-U Soil, Waste Pipe, Vent Pipe, Pipe Supports & Expansion Joints)	Installation	Specificaton / Contract / Approved Working Drawing	Proof of document / Manufacturer Recommendation / Method Statement	During Installation / Section by section	Contractor	JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
		TESTING: Air Test, Water Test, Performance Test	Specification / Relevant British Standard	Relevant meter and gauge	Upon completion of pipeworks / Every section	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal.
2	Grease Interceptors / Waste Drain Trap	Material Acceptance:	Specificaton / Contract: 1. <i>The body of the interceptor & baffles shall be made of stainless steel material grade 316</i>	Proof of document	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal.
		Installation	Specificaton / Contract / Approved Working Drawing	Proof of document / Manufacturer Recommendation / Method Statement	Upon completion of pipeworks	Contractor	JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahan kerja mekanikal
		TESTING: Visual Leak test / Flow Test	Specification / Relevant British Standard	Visual	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal

TRADE : 9.5 LIFT SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Lift machine (motor, sheave, brake)	Material acceptance Installation	Specification / Contract Specification by manufacturer / Contractor Approved working drawing	Visual / Proof of document Visual	Upon storage facility provided Upon Lift Motor Room ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-5 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
2	Speed governor (steel rope, safety gear)	Material acceptance Installation	Specification / Contract Specification by manufacturer / Contractor Approved working drawing	Visual / Proof of document / Digital Vernier caliper Visual	Upon storage facility provided Upon Lift Motor Room ready	S.O Rep / C.O.W Contractor	1) JKR. PK (O). 04-SKM 1 - 4 2) certificate of origin JKR. PK (O). 04-SKM 1 - 4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
3	Lift car (ventilation fan, lighting, COP, load weighing device, automatic self levelling device, finishes & flooring)	Material acceptance Installation	Specification / Contract: 1. <i>Highest button < 1.4m.</i> Specification / Approved working drawing:	Visual / Proof of document Visual / measuring tape	Upon storage facility provided Upon lift shaft ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 - 4 JKR. PK (O). 04-SKM 1 - 4	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal. JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal.
4	Car door/Landing door (fire rating) (hall lantern, indicator, door sill, effective locking device, beam detector sensor/safety edge)	Material acceptance Installation	Specification / Contract: 1. <i>Architraves colour to be selected by SO</i> Specification / Approved working drawing: 1. Lobby floor to slope away from lift well at gradient 1:10	Visual / Proof of document Visual / spirit level / digital vernier caliper	Upon storage facility provided Upon lift shaft ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 - 4 JKR. PK (O). 04-SKM 1 - 4	JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahan kerja mekanikal

TRADE : 9.5 LIFT SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5	Guide rail (Fastening, guide shoes)	Material acceptance Installation	Specification / Contract: 1. <i>Solid steel rails of "T" section</i> Specification / Approved working drawing: 1. Minimum distance between fishplate & guide rail bracket = 200mm	Visual / Proof of document / measuring tape Visual / measuring tape / plumb line	Upon storage facility provided Upon lift shaft ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal (Cont')
6	Wire ropes (Suspension ropes, compensating ropes)	Material acceptance Installation	Specification / Contract: 1. <i>Suspension ropes: comply BS329</i> Manufacturer recommendation / Specification / Approved working drawing: 1. For suspension ropes, not less than 3 ropes per lift car. Diameter not less than 10mm.	Visual / Proof of document / Vernier caliper Visual / Proof of document / Vernier Caliper	Upon storage facility provided During installation of lift machine	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	
7	Counterweight	Material acceptance Installation	Specification / Contract: 1. <i>Cast steel and lead free metal</i> Specification / Approved working drawing: 1. <i>Clamp by tie rod with lock nut secured by cotter pins at both end</i>	Visual / Proof of document Visual	Upon storage facility provided Upon lift pit ready & before installation of lift car	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	
8	Buffer	Material acceptance Installation	Specification / Contract Specification / Approved working drawing: 1. <i>Located symmetrically with reference to the vertical centre line of car</i>	Visual / Proof of document Visual / measuring tape	Upon storage facility provided Upon lift pit ready & before installation of lift car	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	
9	Lift controller (Earthing, surge protection, limit switch)	Material acceptance Installation	Specification / Contract: 1. <i>Microprocessor type</i> Specification / Approved Working Drawing	Visual / Proof of document Visual	Upon storage facility provided Upon lift car & lift machine ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	

TRADE : 9.5 LIFT SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
10	Automatic rescue device (wiring, battery & battery charger)	Material acceptance Installation	Specification/Contract Specification / Approved Working Drawing: 1. <i>Assembled in an independent box</i>	Visual / Proof of document Visual	Upon storage facility provided Upon lift car & lift machine ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	(Cont')
11	Electrical switchboard (Isolator, cable, wiring, lighting & surge protector) L-S1 - (Specification for low voltage internal electrical installation)	Material acceptance Installation	Specification / Contract: 1. <i>Switchboard shall be self contained cubicle type, metal clad, flush fronted</i> Specification / Electrical regulation & standard, L-S1	Visual / Proof of document Visual	Upon storage facility provided Upon lift car & lift machine ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	
12	Central supervisory panel (intercom, buzzer, wiring)	Material acceptance Installation	Specification / Contract Specification / Approved working drawing	Visual / Proof of document Visual	Upon storage facility provided Upon lift car & lift machine ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	
13	Ventilation Fan /Air Conditioning for Lift Motor Room	Material acceptance Installation	Specification / Contract Specification / Approved working drawing	Visual / Proof of document Visual	Upon storage facility provided Upon Lift Motor Room ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	
14	Emergency Battery Operated Power Supply (EBOPS)	Material acceptance Installation	Specification / Contract Specification / Approved working drawing	Visual / Proof of document Visual	Upon storage facility provided Upon lift car & lift machine ready	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	
15	Complete system	TESTING : Power failure test / Fire mode test / Drop test / Functional test / Overload test / Noise Pressure level / Vibration test / Balance test / Insulation test TESTING : Safety contact	specification / All relevant BS standards Factories & Machinery Act (FMA) 1967	Visual/ Walkie talkie/Sound level meter / accelerometer / lux meter/ Stop watch/ Dead weight / Insulation resistance tester Visual / Walkie talkie	Upon completion the whole system Upon completion the whole system	JKR and Contractor JKKP (DOSH)	1) NSC - T&C Form; or 2) Contractor (Direct contract) - T & C Form 1) PMA Certificate	

TRADE : 9.6 BUILDING AUTOMATION SYSTEM (BAS)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Workstation - Computer, Printer, UPS, Dongle	Material Acceptance	Specification / Contract	Visual / Proof of document	Upon control room provided	S.O Rep	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
		Installation	Approved Construction Drawing	Proof of document / Manufacturer Recommendation / Method Statement	During installation / Section by section	Contractor	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	
		Testing	Specification / Contract	Visual / Program	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
2	Software - System Architecture, Antivirus	Installation	Approved Construction Drawing / IO point & Program	Proof of document / Manufacturer Recommendation / Method Statement	During installation / Section by section	Contractor	JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal.
		Testing : Program Interlocking / Interfacing	Specification / Contract / IO point No error / question mark / exclamation mark display	Visual / Program	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
3	Network Controller (NC) / Stand Alone Controller (SAC)	Material Acceptance	Specification / Contract	Visual Proof of document / Manufacture Certificate	Upon storage facility provided	S.O Rep	JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal. JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahan kerja mekanikal
		Installation	Approved Construction Drawing / IO point & Program	Proof of document / Manufacturer Recommendation / Method Statement	During installation / Section by section	Contractor	JKR. PK (O). 04 SKM 1-4	
		Testing : Program Interlocking / Interfacing	Specification / Contract / IO point No error / question mark / exclamation mark display	Visual / Program	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	

TRADE : 9.6 BUILDING AUTOMATION SYSTEM (BAS)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4	Direct Digital Controller	Material Acceptance	Specification / Contract	Visual Proof of document / Manufacture Certificate	Upon storage facility provided	S.O Rep	JKR. PK (O). 04 JKR. PK (O). 04SKM 1-4	JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal
		Installation	Approved Construction Drawing / IO point & Program	Proof of document / Manufacturer Recommendation / Method Statement	During installation / Section by section	Contractor	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	
		Testing : Program Interlocking / Interfacing	Specification / Contract / IO point No error / question mark / exclamation mark display	Visual / Program	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
5	Control Device - Sensor & Signaling, Transducer, Switches, Actuator, Relay, Etc.	Material Acceptance	Specification / Contract	Visual Proof of document / Manufacture Certificate	Upon storage facility provided	S.O Rep	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	
		Installation	Approved Construction Drawing / IO point & Program	Proof of document / Manufacturer Recommendation / Method Statement	During installation / Section by section	Contractor	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	
		Testing : Program Interlocking / Interfacing	Specification / Contract / IO point No error / question mark / exclamation mark display	Visual / Program Functional	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
6	Cabling And Wiring C/W Conduit, Trunking	Material Acceptance	Specification / Contract	Visual / Caliper Proof of document / Manufacture Certificate	Upon storage facility provided. For Fibre Optic - Special Storage Requirement needed	S.O Rep	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	
		Installation	Approved Construction Drawing Separate conduit / trunking for power and signal cable Identification code / tagging for each cable	Proof of document / Manufacturer Recommendation / Method Statement	During installation / Section by section	Contractor	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	
		Testing : i.e Continuity test	Specification / Contract	Visual / Network Cable Tester	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	

TRADE : 9.6 BUILDING AUTOMATION SYSTEM (BAS)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
7	High Level Interfacing	Material Acceptance	Specification / Contract	Visual Proof of document / Manufacture Certificate	Upon storage facility provided	S.O Rep	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	(Cont')
		Installation	Approved Construction Drawing	Proof of document / Manufacturer Recommendation / Method Statement	During installation / Section by section	Contractor	JKR. PK (O). 04 JKR. PK (O). 04SKM 1-4	
		Testing	Specification / Contract	Visual / Program	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	
8	Control Panel	Material Acceptance	Specification / Contract	Visual Proof of document / Manufacture Certificate	Upon storage facility provided	S.O Rep	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	(Cont')
		Installation	Approved Construction Drawing	Proof of document / Manufacturer Recommendation / Method Statement	During installation / Section by section	Contractor	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	
		Testing	Specification / Contract	Visual / Program	Upon completion the whole system	JKR and Contractor	JKR. PK (O). 04-SKM.4 dan T&C Form	

TRADE : 9.7 KITCHEN EQUIPMENT AND ANCILLARY SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Kitchen Equipment e.g. kwali range, deep fryer, frying pan, baine marie, dish washer, water boiler	Material Acceptance	Specification / Contract (Type, Material & Thickness)	Proof of document e.g. Borang Kelulusan Bahan, Delivery Order, Vernier Caliper	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-5 JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
		Installation	Specification / Contract / Approved Working Drawing	Manufacturer Installation Manual / Method Statement	• First Stage: Upon Completion of Infrastructure • Second Stage: Once Installation Completed	S.O Rep / C.O.W	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
		Testing : Functional Test	Specification	Visual	Upon completion of works	S.O Rep / C.O.W	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal.
2	Cold Storage System e.g. cold room, freezer, chiller, refrigerator	Material Acceptance	Specification / Contract	Proof of document e.g. Borang Kelulusan Bahan, Delivery Order	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-5 JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal.
		Installation	Specification / Contract / Approved Working Drawing	Manufacturer Installation Manual / Method Statement	• First Stage: Upon Completion of Infrastructure • Second Stage: Once Installation Completed	S.O Rep / C.O.W	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahah kerja mekanikal
		Testing : Functional Test	Specification	Thermometer	Upon completion of works	S.O Rep / C.O.W	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal

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TRADE : 9.8 LPG SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Storage Tank (Bulk Tank & Cylinder)	Material Acceptance	Specification / Contract / MS 830 & MS 930 / Pendaftaran Mesin Tekanan (PMT)	Proof of document e.g. Borang Kelulusan Bahan, Delivery Order	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-5 JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
		Installation	Specification /Contract/Approved Working Drawing / Approval To Install (ATI)	Proof of Document / Manufacturer Recommendation / Method Statement	• First Stage: Upon Completion of Infrastructure • Second Stage: Once Installation Completed	SO Rep / Gas Competent Person	JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
		Testing	Pressure at tank as per pressure supply design.	Testing certificate from DOSH	Upon delivery to site.	Contractor (competent)	JKR. PK (O). 04-SKM 4	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal.
2	Pipeworks and Fittings	Material Acceptance	Specification / Contract	Proof of document e.g. Borang Kelulusan Bahan, Delivery Order	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-5 JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal.
		Installation	Specification /Contract/Approved Working Drawing / Approval To Install (ATI)	Manufacturer Installation Manual / Method Statement	Upon completion of pipe works / Section by section	SO Rep / Gas Competent Person	JKR. PK (O). 04 SKM 1-4	JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahan kerja mekanikal
		Testing : Leak test	Specification – pressure test 1.5 from working pressure	Dial pressure gauge	Upon completion of pipe works / Section by section	SO Rep / Gas Competent Person	JKR. PK (O). 04-SKM 4 dan T&C Form	JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal

TRADE : 9.8 LPG SYSTEM

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Regulator (1ST & 2ND Stage), Manifold, Valve, Emergency Shut Off Valve, Pressure Gauge, Gas Meter, Gas Detector, Vaporiser, Terminal Outlet	Material Acceptance Installation Testing	Specification / Contract Specification / Contract / Approved Working Drawing / Approval To Install (ATI) No leakage is allowed at any time.	Proof of document e.g. Borang Kelulusan Bahan, Delivery Order Manufacturer Installation Manual / Method Statement Pressure gauges/ Gas Leak detector	Upon storage facility provided Upon completion of pipe works / Section by section Upon completion of the system.	S.O Rep / C.O.W SO Rep / Gas Competent Person SO Rep / Gas Competent Person	JKR. PK (O). 04-5 JKR. PK (O). 04 SKM 1-4 JKR. PK (O). 04 SKM 1-4 4 dan T&C Form	
4	System Level	Testing : • Pressure Drop Test (<10% From Supply Pressure) • Emergency Shut Off Test • Gas Leak Test	Specification / Contract / MS 830 & MS 930 / Approval To Operate (ATO)	Dial pressure gauge	Upon completion of System Installation	SO Rep / Gas Competent Person	JKR. PK (O). 04 SKM 1-4	

TRADE : 9.9 ESCALATOR SYSTEM (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Driving Machine (main drive chain, motor, brake)	Material acceptance Installation	Specification / Contract Specification by manufacturer / Contractor Approved working drawing	Visual / Proof of document Visual	Upon storage facility provided Upon escalator installation	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-5 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
2	Hand Rails	Material acceptance Installation	Specification / Contract Specification by manufacturer / Contractor Approved working drawing	Visual / Proof of document Visual Height	Upon storage facility provided Upon hand rails installation	S.O Rep / C.O.W Contractor	1) JKR. PK (O). 04-SKM 1 -4 2) certificate of origin JKR. PK (O). 04-SKM 1 - 4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
3	Balustrades	Material acceptance Installation	Specification / Contract Specification by manufacturer / Contractor Approved working drawing	Visual / Proof of document Visual (glass/stainless steel/ mild steel/etc)	Upon storage facility provided Upon balustrades installation	S.O Rep / C.O.W Contractor	1) JKR. PK (O). 04-SKM 1 -4 2) certificate of origin JKR. PK (O). 04-SKM 1 - 4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
4	Steps (Dimension, material, gap, demarcation line)	Material acceptance Installation	Specification / Contract Specification by manufacturer / Contractor Approved working drawing	Visual / Proof of document Taper/filler gauge	Upon storage facility provided Upon escalator installation	S.O Rep / C.O.W Contractor	1) JKR. PK (O). 04-SKM 1 -4 2) certificate of origin JKR. PK (O). 04-SKM 1 - 4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
5	Truss cover	Material acceptance Installation	Specification / Contract Specification by manufacturer / Contractor Approved working drawing	Visual / Proof of document Taper/filler gauge	Upon storage facility provided Upon truss cover installation	S.O Rep / C.O.W Contractor	1) JKR. PK (O). 04-SKM 1 -4 2) certificate of origin JKR. PK (O). 04-SKM 1 - 4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
6	Controller (Earthing, surge protection, limit switch)	Material acceptance Installation	Specification / Contract: 1. Microprocessor type Specification / Approved Working Drawing	Visual / Proof of document Visual	Upon storage facility provided Upon escalator installation	S.O Rep / C.O.W Contractor	JKR. PK (O). 04-SKM 1 -4 JKR. PK (O). 04-SKM 1 -4	

TRADE : 9.9 ESCALATOR SYSTEM (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
7	Electrical switchboard (Isolator, cable, wiring, lighting & surge protector) L-S1 - (Specification for low voltage internal electrical installation)	Material acceptance	Specification / Contract: 1. <i>Switchboard shall be self contained cubicle type, metal clad, flush fronted</i>	Visual / Proof of document	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-SKM 1 -4	
		Installation	Specification / Electrical regulation & standard, L-S1	Visual	Upon escalator installation	Contractor	JKR. PK (O). 04-SKM 1 -4	
8	Safety signage	Material acceptance	Specification / Contract: a)"KANAK-KANAK PERLU DIPIMPIN" "(Small children shall be held firmly)". b)"HAIWAN PELIHARAAN PERLU DIDUKUNG" "(Pets shall be carried)". c)"PEGANG SUSUR TANGAN" "(Use the handrail)". d)"KERETA SORONG KANAK-KANAK DAN TROLI TIDAK DIBENARKAN" "(Strollers and trolleys not permitted)". e)"BERDIRI DI DALAM PETAK KUNING" "(Please stand within the yellow lines)". f)"BUTANG KECEMASAN" "(Emergency Stop Button)".	Visual / Proof of document	Upon safety signage facility provided	S.O Rep / C.O.W	1) JKR. PK (O). 04-SKM 1 -4 2) certificate of origin	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
		Installation	Specification by manufacturer / Contractor Approved working drawing	Visual Height	Upon safety signage installation	Contractor	JKR. PK (O). 04-SKM 1 - 4	
9	Building gaps	Material acceptance	Specification / Contract	Visual / Proof of document	Upon safety signage facility provided	S.O Rep / C.O.W	1) JKR. PK (O). 04-SKM 1 -4 2) certificate of origin	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
		Installation	Specification by manufacturer / Contractor Approved working drawing	Visual Height	Upon safety signage installation	Contractor	JKR. PK (O). 04-SKM 1 - 4	

TRADE : 9.9 ESCALATOR SYSTEM (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
10	Complete system	TESTING : All safety devices as stated but not limited to the following should be tested below for correct operation: i. Braking Device (Electro-mechanical brake and auxiliary brake) ii. Broken Step Chain Device iii. Broken Drive Chain/ Belt Device iv. Handrail Entry/Inlet Device v. Handrail Speed Monitoring Device vi. Broken Handrail Device vii. Loose Handrail Device viii. Comb plate obstruction safety device. ix. Step plate safety Device x. Step Chain safety Device xi. Step missing safety device xii. Step Sagging Device xiii. Step Roller Device xiv. Over-speed Device xv. Non-reversal Device xvi. Key operation (direction and indicator) & Maintenance operation/controller xvii. Skirt Guard/Panel Switch xviii.Landing Plate safety switch xix.Emergency Stop Switches xx.Early Fire Detection Device xxi.Safety Signage xxii.Yellow Demarcation Line xxiii.Skirt Defector Brush/Rubber xxiv. Aesthetics n hazards (sharp edges, slippery platform etc)	specification / All relevant BS standards	Visual/ Walkie talkie/ accelerometer / lux meter/ Stop watch/Insulation resistance tester	Upon completion the whole system	JKR and Contractor	1) NSC - T&C Form; or 2) Contractor (Direct contract) - T & C Form	
			Factories & Machinery Act (FMA) 1967	Visual / Walkie talkie	Upon completion the whole system	JKKP (DOSH)	1) PMA Certificate	

TRADE : 9.10 GENERIC MECHANICAL SERVICES (New Trade)

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Generic Mechanical Services	Material Acceptance	Specification / Contract	Proof of document e.g Borang Kelulusan Bahan, Delivery Order, Inspection / Measurement Tools	Upon storage facility provided	S.O Rep / C.O.W	JKR. PK (O). 04-5 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04: Prosedur Pembinaan Dan Penyeliaan Tapak Bina
		Installation	Specification / Contract / Approved Working Drawing	Manufacturer Installation Manual / Method Statement	- First Stage: Upon Completion of Infrastructure (if applicable) - Second Stage: Once Installation Completed	S.O Rep / C.O.W	JKR. PK (O). 04 JKR. PK (O). 04-SKM 1-4	JKR. PK (O). 04-5: Prosedur Borang Kelulusan Bahan/ Pemeriksaan Mock-Up
		Testing : - Component Level Testing - System Level Testing	Specification	- Visual - Relevant Inspection / Measurement Tools	Upon completion of works	S.O Rep / C.O.W	JKR. PK (O). 04-SKM.4 dan T&C Form	JKR. PK (O). 04-SKM.1: Borang Semakan Penyeliaan Kerja Mekanikal. JKR. PK (O). 04-SKM 2: Borang Pemasangan Kerja Mekanikal. JKR. PK (O). 04-SKM 3: Borang Semakan Pengujian dan pentauliahan kerja mekanikal JKR. PK (O). 04-SKM 4: Borang Pemeriksaan Uji Saksi Pemasangan Kerja Mekanikal

10.0 KERJA ELEKTRIK



TRADE

10.1 Low Voltage

- 10.1.1 Electrical Boards (*Revised 1/2020*)
- 10.1.2 Wiring System & Underground Cable
- 10.1.3 Lightning Protection System
- 10.1.4 Standby Generator Set (*Revised 1/2020*)
- 10.1.5 Road Lighting System (*Revised 1/2020*)
- 10.1.6 Traffic Signal Light (*New Trade*)

10.2 Extra Low Voltage

- 10.2.1 PA System (*Revised 1/2020*)

10.3 ICT & Telephone

- 10.3.1 External Installation For ICT & Telephone
- 10.3.2 Internal Installation For ICT : Active Equipment
- 10.3.3 Internal Installation For Passive Equipment And ICT Room
- 10.3.4 Internal Installation For Telephone

10.4 Medical Equipment

- 10.4.1 General Radiography
- 10.4.2 Examination Light
- 10.4.3 Surgical Light
- 10.4.4 Surgical Table

10.5 Medium Voltage System (New Trade)

- 10.5.1 11kV Dry-Type Distribution Transformers (*New Trade*)
- 10.5.2 11kV Metal-Enclosed Switchgear (*New Trade*)
- 10.5.3 11kV Medium Voltage Underground Cable (*New Trade*)

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TRADE : 10.1 LOW VOLTAGE				SUB-TRADE : 12.1.1 ELECTRICAL BOARDS (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	MSB / SSB / DB / AMF Board / PFCB / FP	1. Submission for material approval 2. Factory Acceptance Test (Routine Test) : a) Visual Inspection b) Functional test c) Pressure Test / Injection Test 2500 VAC (*excluding DB) d) Insulation Resistance Test 1000 VDC (*excluding DB) 3. Material on site inspection	1. Shop Drawing 2. Technical Submittal (i.e: Catalogue, Brand & Model). 3. Contract Document 4. Specifications (L-S1, L-S2, L-S5, etc) 5. J-MAL 1. Approved Shop Drawing 2. Technical Submittal (i.e: Catalogue, Brand & Model) 3. Contract Document 4. Specifications (L-S1, L-S2, L-S5, etc) 5. J-MAL 1. Approved Shop Drawing 2. Technical Submittal (i.e: Catalogue, Brand & Model) 3. Contract Document 4. Specifications (L-S1, L-S2, L-S5, etc) 5. J-MAL 1. Approved Shop Drawing 2. Technical Submittal (i.e: Catalogue, Brand & Model) 3. Contract Document 4. Specifications (L-S1, L-S2, L-S5, etc) 5. J-MAL 1. Design Requirement 2. Specification (L-S1, L-S2, L-S5, etc) 3. J-MAL	N/A Measuring Devices (Caliper, Measuring Tape, etc.) N/A LV Pressure Test Set 1kV Insulation Resistance Test Set. N/A	Before manufacturing of the boards Prior of delivery to the site Prior of delivery to the site Once for each board Prior of delivery to the site Once for each board Prior of delivery to the site Once for each board Prior of delivery to the site Once for each delivery	Contractor Contractor/ S.O Rep Contractor Contractor Contractor Contractor/ S.O Rep	JKR.PK(O).04-5 (Borang kelulusan Bahan / Peralatan / Pemeriksaan Mock-up) JKR.PK(O).04-SKE.2B (Borang Pemeriksaan / Ujian Peralatan / Mesin di Kilang) Approved Shop Drawing CKE.ITP.01.35.(00).2011 (FACTORY ACCEPTANCE TEST - Checklist For Visual Inspection of Low Voltage Electrical Boards) TEST REPORT (Functional Test) TEST REPORT (Pressure Test) JKR.PK(O).04-4 (Borang Kalibrasi Peralatan) c/w Calibration Cert.) TEST REPORT (Insulation Resistance Test) JKR.PK(O).04-4 (Borang Kalibrasi Peralatan) c/w Calibration Cert.) JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan) DRAWING (Approved Shop Drawing) REPAIRED DEFECT LIST (from FAT - if applicable)	

TRADE : 10.1 LOW VOLTAGE				SUB-TRADE : 12.1.1 ELECTRICAL BOARDS (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	MSB / SSB / DB / AMF Board / PFCB / FP (Con't)	4. Installation of MSB / SSB / DB / AMF Board / PFCB / FP	1. Approved Shop Drawing 2. Approved Method Statement 3. Specification (L-S1, L-S2, L-S5, etc)	N/A	In-progress and upon completion of installation Once for each board	Contractor	JKR.PK(0).04-SKE.4C (Borang Pemeriksaan Pemasangan PSU/PSK/Feeder Pillar) JKR.PK(0).04-SKE.4D (Borang Pemeriksaan Pemasangan Papan Agihan)	
		5. Installation of Earthing System for LV Board.	1. Approved Shop Drawing 2. Specification (L-S1, L-S2, L-S5, etc) 3. R < 3 Ohm	Earth Tester Set	In-progress and upon completion of installation Once for each installation	Contractor	JKR.PK(0).04-SKE.3B (Borang Pemeriksaan Pemasangan Sistem Pembumian (Earthing System). CKE.ITP.01.31.(00).2012 (Record of Earth Electrode Resistance Test) JKR.PK(0).04-4 (Borang Kalibrasi Peralatan) c/w Calibration Cert.)	
		6. Inspection of Switch Room (*excluding FP)	1. Approved Shop Drawing 2. Specification (L-S1, L-S2, L-S5, etc)	Measuring Devices (Caliper, Measuring Tape, etc.).	In-progress and upon completion of installation Once for each room	Contractor	JKR.PK(0).04-SKE.4B (Borang Pemeriksaan Bilik Suis / Mesin Elektrik / Bilik ICT).	
		7. Setting of Protection Relay (*excluding FP)	Setting value from designer	Secondary Relay Test Set	Upon completion of installation for all works at the board Once for each relay	Contractor / Competent Person	TEST REPORT (Borang H(JPE) from ST) JKR.PK(0).04-4 (Borang Kalibrasi Peralatan) c/w Calibration Cert.)	
		8. Functional test during Testing & Commissioning Session	1. Design Requirement 2. Specification (L-S1, L-S2, L-S5, etc) 3. Functioning	N/A	Upon completion of other test above Once for each board	Contractor	JKR.PK(0).04-SKE.5B (Borang Pemeriksaan Kefungsian Komponen Elektrik) JKR.PK(0).04-SKE.6A (Borang Pemeriksaan Pengesahan Pentauliahan Kerja-Kerja Elektrik)	
		9. RCD Test	1. Design Requirement 2. Specification (L-S1, L-S2, L-S5, etc) 3. Functioning	RCD Tester Set	Upon completion of DB, wiring and earthing installation Once for each board	Contractor	JKR.PK(0).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrik / ICT / ELV). CKE.ITP.10.34.(00).2012 (Record of RCCB Test)	

MSB
SSB
DB

= Main Switchboard
= Sub Switchboard
= Distribution Board

AMF
PFCB
FP

= Automatic Main Failure
= Power Factor Correction Board
= Feeder Pillar

TRADE : 10.1 LOW VOLTAGE

SUB-TRADE : 10.1.2 WIRING SYSTEM & UNDERGROUND CABLE

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Light Fittings/Fan	1. Submission of material for approval	1. Contract. 2. J-MAL. 3. Specifications (L-S1).	Measuring devices.	Before material delivery at site. Once for each material.	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material on site inspection.	1. To conform as per approved material.	Measuring devices.	Upon delivery at site. Once for each delivery.	Contractor / S.O Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Installation of conduit, trunking and accessories.	1. Specification (L-S1).	Measuring devices.	In-progress and upon completion of installation. Once for each zone / section / floor.	Contractor	JKR.PK(O).04-SKE.4A (Borang Pemeriksaan Pemasangan)	
		4. Installation of final circuit wiring.	1. Specification (L-S1).	N/A	In-progress and upon completion of installation. Once for each zone / section / floor.	Contractor	JKR.PK(O).04-SKE.4A (Borang Pemeriksaan Pemasangan)	
		5. Continuity test.	1. $R < 1$ Ohms.	Insulation & Continuity Tester.	Upon completion of wiring work. Once for each circuit.	Contractor	JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.C&I (Record of Continuity and Insulation Resistance Test)	
		6. Insulation resistance test @ 500Vdc insulation test voltage.	1. $R > 2$ Mohms.	1. Insulation & Continuity Tester. 2. Insulation Tester.	Upon completion of continuity test. Once for each circuit.	Contractor	JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.C&I (Record of Continuity and Insulation Resistance Test)	
		7. Polarity test.	1. Load connected correctly.	1. Insulation & Continuity Tester.	Upon completion of wiring work. Once for each circuit.	Contractor	JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.POL (Record of Polarity Tset)	

TRADE : 10.1 LOW VOLTAGE

SUB-TRADE : 10.1.2 WIRING SYSTEM & UNDERGROUND CABLE

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	Light Fittings/Fan (Con't)	8. Installation of fittings.	1. Panduan Kaedah Penggantungan Lampu. 2. Approved method Statement 3. Specifications (L-S1)	Measuring devices.	Upon completion of fitting installations. Once for each zone / section / floor.	Contractor	JKR.PK(O).04-SKE.4E (Borang Pemeriksaan Kelengkapan Elektrik)	
		9. Functional test.	1. Functional.	Measuring devices.	Upon completion of other test above. Once for each zone / section / floor.	Contractor	JKR.PK(O).04-SKE.5C (Borang Pemeriksaan Ujian Fungsi Pemasangan Elektrik)	
2	Switch Socket Outlet (SSO)	1. Submission of material for approval	1. Contract. 2. J-MAL. 3. Specifications (L-S1).	Measuring devices.	Before material delivery at site. Once for each material.	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material on site inspection	1. To conform as per approved material	Measuring devices.	Upon delivery at site. Once for each delivery.	Contractor / S.O Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Installation of conduit, trunking and accessories.	1. Specification (L-S1).	Measuring devices.	In-progress and upon completion of installation. Once for each zone / section / floor.	Contractor	JKR.PK(O).04-SKE.4A (Borang Pemeriksaan Pemasangan)	
		4. Installation of final circuit wiring.	1. Specification (L-S1).	N/A	In-progress and upon completion of installation. Once for each zone / section / floor.	Contractor	JKR.PK(O).04-SKE.4A (Borang Pemeriksaan Pemasangan)	
		5. Continuity test.	1. R < 1 Ohms.	Insulation & Continuity Tester.	Upon completion of wiring work. Once for each circuit.	Contractor	JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.C&I (Record of Continuity and Insulation Resistance Test)	
		6. Insulation resistance test @ 500Vdc insulation test voltage.	1. R > 2 Mohms.	1. Insulation & Continuity Tester. 2. Insulation Tester.	Upon completion of continuity test. Once for each circuit.	Contractor	JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.C&I (Record of Continuity and Insulation Resistance Test)	

TRADE : 10.1 LOW VOLTAGE

SUB-TRADE : 10.1.2 WIRING SYSTEM & UNDERGROUND CABLE

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2. (Con't)	Switch Socket Outlet (SSO) (Con't)	7. Polarity test. 8. Installation of fittings. 9. Functional test.	1. Load connected correctly. 1. Panduan Kaedah Penggantungan Lampu. 2. Approved method Statement 3. Specifications (L-S1) 1. Functional.	1. Insulation & Continuity Tester. Measuring devices. Measuring devices.	Upon completion of wiring work. Once for each circuit. Upon completion of fitting installations. Once for each zone / section / floor. Upon completion of other test above. Once for each zone / section / floor.	Contractor Contractor Contractor	JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.POL (Record of Polarity Tset) JKR.PK(O).04-SKE.4E (Borang Pemeriksaan Kelengkapan Elektrik) JKR.PK(O).04-SKE.5C (Borang Pemeriksaan Ujian Fungsi Pemasangan Elektrik)	
3	Three Phase Point / Submain Cables	1. Submission of material for approval 2. Material on site inspection. 3. Installation of conduit, trunking and accessories. 4. Installation of cables. 5. Continuity test. 6. Insulation resistance test @ 500Vdc insulation test voltage.	1. Contract. 2. J-MAL. 3. Specifications (L-S1). 1. To conform as per approved material. 2. Specification (L-S1). 1. Specification (L-S1). 2. Approved method statement. 1. CPC is continuous 1. R > 2 Mohms.	Measuring devices. Measuring devices. Measuring devices. N/A Insulation & Continuity Tester. 1. Insulation & Continuity Tester. 2. Insulation Tester.	Before material delivery at site. Once for each material. Upon delivery at site. Once for each delivery. In-progress and upon completion of installation. Once for each zone / section / floor. In-progress and upon completion of installation. Once for each zone / section / floor. Upon completion of wiring work. Once for each circuit. Upon completion of continuity test. Once for each circuit.	Contractor Contractor / S.O Rep Contractor Contractor Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up) JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan) JKR.PK(O).04-SKE.4A (Borang Pemeriksaan Pemasangan) JKR.PK(O).04-SKE.4A (Borang Pemeriksaan Pemasangan) JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.C&I (Record of Continuity and Insulation Resistance Test) JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.C&I (Record of Continuity and Insulation Resistance Test)	

TRADE : 10.1 LOW VOLTAGE

SUB-TRADE : 10.1.2 WIRING SYSTEM & UNDERGROUND CABLE

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3. (Con't)	Three Phase Point / Submain Cables (Con't)	7. Phase sequence test.	1. Phase sequence terminated correctly.	Phase sequence tester.	Upon completion of cable insulation test. Once for each circuit.	Contractor	JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) Borang Phase Sequence Continuity	
4	Underground Cable	1. Submission of material for approval 2. Material on site inspection. 3. Installation of cables. 4. Continuity test. 5. Insulation resistance test @ d.c voltage not less than twice (2x) the nominal voltage of the circuit concerned. 6. Phase sequence test.	1. Contract. 2. J-MAL. 3. Specifications (L-S1). 1. To conform as per approved material. 1. Specification (L-S3). 2. Approved method statement. 1. CPC is continuous and reasonable ($R = \text{length} \times \text{cable internal resistance}$) 1. $R > 2 \text{ Mohms}$ 1. Phase sequence terminated correctly.	Measuring devices. Measuring devices. Measuring devices. Insulation & Continuity Tester. 1. Insulation & Continuity Tester. 2. Insulation tester. Phase sequence tester.	Before material delivery at site. Once for each material. Upon delivery at site. Once for each delivery. In-progress and upon completion of installation. Once for each zone / section. Upon completion of cable installation. Once for each cable. Upon completion of cable continuity test. Once for each cable Upon completion of continuity test. Once for each circuit.	Contractor Contractor / S.O Rep Contractor Contractor Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up) JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan) JKR.PK(O).04-SKE.4A (Borang Pemeriksaan Pemasangan) JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.IR&C (Insulation and Continuity test) JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) JKR.IR&C (Insulation and Continuity test) JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-ujian Elektrikal) Borang Phase Sequence Continuity	

TRADE : 10.1 LOW VOLTAGE				SUB-TRADE : 10.1.3 LIGHTNING PROTECTION SYSTEM				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Lightning Protection System	1. Submission of material approval	1. Contract Document 2. Construction Dwg 3. J-MAL 4. Specification L-S9	N/A	Before material delivery at site / Once for each material	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material on site inspection	As per material approval	N/A	Upon delivery at site / Once for each delivery	Contractor / S.O Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Inspection on air termination system installation	1. Air terminals or vertical finials of annealed copper tape 25mm x 3mm or other approved material. 2. Fixing bracket intervals < 500mm (metallic / non-metallic roof). 3. Air termination rods min. 300mm (L), 16mm dia. with lock nut.	Measuring Equipment	In-progress and upon completion of installation / Once for each block	Contractor / S.O Rep	JKR.PK(O).04-SKE.4F (Borang Pemeriksaan Pemasangan Sistem Perlindungan Kilat)	
		4. Inspection on down conductor system installation	A. Conventional (Exposed) 1. Annealed copper tape 25mm x 3mm or other approved material. 2. Conductive fixtures at interval < 500mm. 3. Bending radii > 200mm and > 45°. B. Structural Bonding (Encased in Concrete) 1. Annealed copper tape 25mm x 3mm or other approved material. 2. Properly clamped down conductor to structural reinforcing bar at 1m intervals. C. Structural Using Natural Component (e.g. Steel Structure) 1. Vertical and horizontal bars welded over a length > 30mm.	Measuring Equipment	In-progress and upon completion of installation / Once for each down conductor	Contractor / S.O Rep	JKR.PK(O).04-SKE.4F (Borang Pemeriksaan Pemasangan Sistem Perlindungan Kilat)	
		5. Inspection on test joint installation	1. Joints and bonds by copper clamps or exothermic welding or brazing. 2. Height at 2.5m from finished floor level. 3. Copper clamp overlapping >20mm. 4. PVC casing for exposed down conductor between test joint and ground. 5. Flash counter height at 2.0m from floor finished level.	Measuring Equipment	In-progress and upon completion of installation / Once for each test joint	Contractor / S.O Rep	JKR.PK(O).04-SKE.4F (Borang Pemeriksaan Pemasangan Sistem Perlindungan Kilat)	

TRADE : 10.1 LOW VOLTAGE				SUB-TRADE : 10.1.3 LIGHTNING PROTECTION SYSTEM				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	Lightning Protection System (Con't)	6. Inspection on earth termination and bonding installation	1. Annealed copper tape 25mm x 3mm between earth electrode interconnection, burried > 500mm(D) and distance about 1m around external walls. 2. Exothermic weld or brazing between down conductor and earth electrode. 3. Bonding conductor of annealed copper tape 25mm x 3mm for connection between earth termination and MEB. 4. Copper jacketed earth electrode with 16mm dia. 2 nos. 1.5(L). 5. Heavy duty type earth chamber 300mm (L) x 300mm (W) x 180mm (H) with removable cover (strength $\geq 6\text{N/mm}^2$). 6. Permanent label "Lightning Protection Earth-Do Not Remove" fixed at every connection of down conductor to earth termination and at every earth electrodes.	Measuring Equipment	In-progress and upon completion of installation / Once for each termination and bonding	Contractor / S.O Rep	JKR.PK(O).04-SKE.4F (Borang Pemeriksaan Pemasangan Sistem Perlindungan Kilat)	
		7. Continuity test : 1. Air termination system 2. Air termination and down conductor system 3. Down conductor system and earth termination 4. Earth termination 5. Earth termination and Main Earthing Bar (MEB)	1. All conductors are continuously connected (Resistance < 1 Ω). 2. If natural component being used as down conductor system, overall electrical resistance between uppermost part and ground level < 0.2 Ω .	Continuity Tester	Upon completion of works / Once for each block	Contractor	JKR.PK(O).04-SKE.4F (Borang Pemeriksaan Pemasangan Sistem Perlindungan Kilat)	
		8. Resistance test : 1. Earth electrode 2. Earth termination	Entire system combine resistance < 10 Ω .	Earth Tester	Upon completion of installation / Once for each block	Contractor	JKR.PK(O).04-SKE.4F (Borang Pemeriksaan Pemasangan Sistem Perlindungan Kilat) ITP.01.31.(00).2012 (Borang 'Record of Earth Electrode Resistance Test')	

TRADE : 10.1 LOW VOLTAGE		SUB-TRADE : 10.1.4 STANDBY GENERATOR SET (Revised 1/2020)						
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Standby Generator Set.	1. Submission for material approval	1. Contract Document & Technical Submittal (i.e: Catalogue, Brand & Model) 2. EMAL. 3. Specification (L-S5). 4. Approved shop drawing for genset room. 5. Certificate of origin	N/A	Before Factory Acceptance Test (FAT) / Once for each material	Contractor	JKR.PK(O).04-5 Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock Up)	
		2. Factory Acceptance Test (FAT)	1. Manufacturers Specification. 2. Design requirement. 3. Specification (L-S5) 4. Approved shop drawing for generator set. 5. To confirm as per material approved.	1. Load bank (0.8 lagging P.F) 2. Testing Equipment.	Before material delivery at site/ Once for each material or delivery	Contractor	JKR.PK(O).04-SKE.2B (Borang Pemeriksaan / Ujian Peralatan / Mesin Dikilang) SPECIFICATION (L-S5 :APPENDIX B, Generator Set Test Results)	
		a) Visual Inspection						
		b) Generator Set Test	1. Manufactures specification 2. Specification (L-S5)		Before material delivery at site/ Once for each material or delivery			
		c) Cranking Test (Batteries)	1. Manufactures specification 2. Specification (L-S5) a. Minimum 6 successive abortive start		Before material delivery at site/ Once for each material or delivery			
		3. Material On Site Inspection	To conform as per approved during material approval and FAT.	N/A	Upon delivery at site. Each delivery	Contractor / S.O Rep	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		4. Generator set room requirement	1. Specification (L-S5)	N/A	By the end of construction or after generator set have been energized	Contractor	JKR.PK(O).04-SKE.4B (Borang Pemeriksaan Bilik Suis / Mesin Elektrik / Bilik ICT)	
		5. Inspection on installation works	1. Manufacturers specification manual. 2. Approved Shop drawing. 3. Specification (L-S5).	N/A	During installation and completion of installation. Throughout the installation	Contractor / S.O Rep	JKR.PK(O).04-SKE.5C (Borang Pemeriksaan Ujian Fungsi Pemasangan Elektrik)	
		6. Fuel system test	1. Jabatan BOMBA & Penyelamat Malaysia. 2. Jabatan Alam Sekitar (JAS). 3. Specification (L-S5)		Upon completion of installation. During testing and commissioning	Contractor	SPECIFICATION (L-S5 : Section 11, Engine Protective Devices)	
		7. Noise level measurement	1. Jabatan Alam Sekitar (JAS). 2. Specification (L-S6) 3. Noise Level not exceeding <65 dBA Measured at 1 metre distance away from the generator room.	Sound Pressure Level (SPL) Meter	Upon completion of acoustic treatment. During testing and commissioning	Contractor	SPECIFICATION (L-S6 : Design Criteria)	
		8. AMF board	1. Manufacturers specification. 2. Design requirement. 3. Specification (L-S5).	Insulation Tester	Upon completion of installation. During testing and commissioning	Contractor	SPECIFICATION (L-S5 : Section 16, Generator Set Switchboard)	

TRADE : 10.1 LOW VOLTAGE				SUB-TRADE : 10.1.4 STANDBY GENERATOR SET (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
2	Cabling Work	1. Insulation resistance test	Mohms	1. Insulation & Continuity Tester 2. Insulation Tester	Upon completion of continuity test. Once for each circuit.	Contractor	JKR.PK(O).04-SKE 5A (Borang Pemeriksaan Ujian-ujian Elektrik/ ICT / ELV) JKR.-IRC (CKE.ITP.01.32.(00).2012) (Record of Insulation Resistance and Continuity Test)	

TRADE : 10.1 LOW VOLTAGE			SUB-TRADE : 10.1.5 ROAD LIGHTING SYSTEM (Revised 1/2020)					
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Feeder Pillar	Refer Trade 10.1.1 Low Voltage: Electrical Boards	1. Contract Document 2. Specifications (L-S1, L-S20) 3. Drawing 4. Shop Drawing 5. J-MAL.	N/A	During FAT / Once for each material	Contractor	Refer Trade 12.1.1 Low Voltage: Electrical Boards	
2	Underground Cable	1. Submission of material for approval 2. Material On Site Inspection 3. Installation of cables 4. Continuity test 5. Insulation resistance test @ d.c voltage not less than twice (2x) the nominal voltage of the circuit concerned 6. Phase sequence test	1. Contract Document 2. Specification (L-S3). 3. J-MAL To conform as per approved material 1. Specification (L-S3). 2. Approved method statement. CPC is continuous (R= reasonable value) R > 2 MOhms Phase sequence terminated correctly	N/A Measuring equipment N/A Insulation & Continuity Tester 1. Insulation & Continuity Tester 2. Insulation tester Phase sequence tester	Before material delivery at site / Once for each material or delivery Once for each delivery During installation/ Once for each zone / section / floor Upon completion of cable installation/ Once for each cable Upon completion of continuity test / Once for each cable Upon completion of insulation test / Once for each circuit	Contractor Contractor / SO rep Contractor Contractor Contractor Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up) JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan) JKR.PK(O).04-SKE.3A (Borang Pemeriksaan Kabel Bawah Tanah) JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian Elektrik / ICT / ELV) CKE.ITP.01.32.(00).2012 (Record of Insulation Resistance and Continuity Test) JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian Elektrik / ICT / ELV) CKE.ITP.01.32.(00).2012 (Record of Insulation Resistance and Continuity Test) JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian Elektrik / ICT / ELV) CKE.ITP.01.32.(00).2012 (Record of Insulation Resistance and Continuity Test)	

TRADE : 10.1 LOW VOLTAGE				SUB-TRADE : 10.1.5 ROAD LIGHTING SYSTEM (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
3	Column (c/w concrete footing)	1. Submission of material for approval	1. Contract Document 2. Specification (L-S20) 3. Drawing 4. J-MAL.	N/A	Before material delivery at site/ Once for each material	Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
		2. Factory Acceptance Test (For Non-Standard Column)	1. Contract Document 2. Specification (L-S20) 3. Drawing 4. J-MAL.	Measuring Devices (Caliper, Measuring Tape, etc.)	Approved of Fabrication / Shop Drawing / Once for each Sample	Contractor	JKR.PK(O).04-SKE.2B (Borang Pemeriksaan / Ujian Peralatan / Mesin)	
		3. Material on site inspection	To conform as per approved sample	N/A	Upon delivery at site/ Once for each delivery	Contractor / SO rep	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		4. Mock-up Inspection	1. Specification (L-S20) 2. Drawing	N/A	Prior to Installation./ Once for each type of installation.	Contractor / SO rep	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
		5. Inspection of Installation	1. Specification (L-S20) 2. Drawing	N/A	In progress and upon completion of installation./ Periodically, Once upon completion.	Contractor / SO rep	JKR.PK(O).04-SKE.5C (Borang Pemeriksaan Ujian Fungsi Pemasangan Elektrik)	
4	Road Lighting Luminaire	1. Submission of material for approval	1. Contract Document 2. Specification (L-S20) 3. Drawing 4. J-MAL.	N/A	Before material delivery at site/ Once for each material	Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
		2. Material on site inspection	To conform as per approved sample	N/A	Upon delivery at site/ Once for each delivery	Contractor / SO rep	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		3. Mock-up Inspection	1. Specification (L-S20) 2. Drawing	N/A	Prior to Installation / Once for each type of installation.	Contractor / SO rep	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
		4. Inspection of Installation	1. Specification (L-S20) 2. Drawing	N/A	In progress and upon completion of installation / Periodically, Once upon completion.	Contractor / SO rep	JKR.PK(O).04-SKE.5C (Borang Pemeriksaan Ujian Fungsi Pemasangan Elektrik)	
		5. Performance Test (Luminance & Illuminance)	1. Specification (L-S20) 2. Standard MS 825 3. Standard BS EN 13201-3	1. Luminance meter 2. Illuminance meter	Upon completion of installation (T&C)	Contractor	L-S20 1. Luminance Measurement Grid 2. Illuminance Measurement Grid 3. Longitudinal Uniformity of Each Lane	

TRADE : 10.1 LOW VOLTAGE					SUB-TRADE : 10.1.5 ROAD LIGHTING SYSTEM (Revised 1/2020)			
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD/REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
5	Modular Termination Box / Loop-In Loop-Out Terminal Block	1. Submission of material for approval	1. Contract Document. 2. Specification (L-S20) 3. Drawing 4. J-MAL	N/A	Before material delivery at site / Once for each material	Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
		2. Material on site inspection	To conform as per approved sample	N/A	Upon delivery at site / Once for each delivery	Contractor / SO rep	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		3. Mock-up Inspection	1. Specification (L-S20) 2. Drawing	N/A	Prior to Installation/ Once for each type of installation	Contractor / SO rep	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
		4. Inspection of Installation	1. Specification (L-S20) 2. Drawing	N/A	In progress and upon completion of installation./ Periodically, Once upon completion	Contractor / SO rep	JKR.PK(O).04-SKE.5C (Borang Pemeriksaan Ujian Fungsi Pemasangan Elektrik)	
6	Pit / Lurang (Manhole)	1. Inspection of Installation	To conform as per approved drawing & specification	Measuring Tape	Pre-concreting / Once for each Pre-cabing / Once for each	Contractor / SO rep	JKR.PK(O).04-SKE.3A (Borang Pemeriksaan Kabel Bawah Tanah)	
7	Ducting - Pipe Jacking/HDD/ Open Cut (road crossing / elevated structure)	1. Inspection of Installation	To conform as per approved drawing & specification	Measuring / Roller Tape	Pre-concreting / Once for each	Contractor / SO rep	JKR.PK(O).04-SKE.3A (Borang Pemeriksaan Kabel Bawah Tanah)	
8	New Jersey Barrier (NJB) Cover	1. Inspection of Installation	To conform as per approved sample	N/A	Prior to Installation / Once for each type of installation	Contractor / SO rep	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
9	Labelling	1. Submission of material for approval	1. Contract Document. 2. Specification (L-S20) 3. Drawing	N/A	Before material delivery at site/ Once for each material	Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	
		2. Inspection of Installation	To conform as per approved drawing	N/A	Prior to Installation / Once for each type of installation	Contractor / SO rep	JKR.PK(O).04-5 (Borang Kelulusan Bahan / Peralatan / Pemeriksaan Mock-Up)	

TRADE : 10.1 LOW VOLTAGE				SUB-TRADE : 10.1.6 TRAFFIC SIGNAL LIGHT (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1	Traffic Signal Controller	Submission of material list / brands for approval	1. Contract Document. 2. Specifications (JKR/SPJ/2008-S8). 3. Approved shop drawing		Before fabrication at factory	Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan/Peralatan/Pemeriksaan Mock-up)	
		Factory Acceptance Test 1. Visual Inspection. 2. Functional test. 3. Routine test.	1. Approved shop drawing. 2. Technical Submittal (Catalogue, Brand & Model) 3. Contract Document. 4. Specifications (JKR/SPJ/2008-S8).	Measuring devices.	Approved of Fabrication/Shop Drawing	Contractor	1. JKR.PK(O).04-SKE.2B (Borang Pemeriksaan/Ujian Peralatan/Mesin di Kilang) 2. Senarai Semak Pemeriksaan Lampu Isyarat 3. Test report	
		Material on site inspection.	To conform as per approved material / FAT.		Upon delivery at site. Once for each delivery.	Contractor/ SO Rep	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		Inspection of Installation 1. Installation / Safety Aspect 2. Electrical Testing 3. Functional Safety Testing 4. Labelling / Circuit Tagging	1. Approved shop drawing. 2. Specifications (JKR/SPJ/2008-S8). 3. NTJ dan ATJ 13/87	Measuring devices.	In-progress and upon completion of installation. Once upon completion.	Contractor/ SO Rep	1. JKR.PK(O).04-SKE.4A (Borang Pemeriksaan Pemasangan) 2. Senarai Semak Pemeriksaan Lampu Isyarat	
2	Underground Cable Refer Trade 10.1.2						JKR.PK(O).04-SKE.3A (Borang Pemeriksaan Kabel Bawah Tanah)	
3	Column (c/w concrete footing) Refer Trade 10.1.5							
4	Signal Head	Submission of material list / brands for approval	1. Contract Document. 2. Specifications (JKR/SPJ/2008-S8). 3. Approved shop drawing	N/A	Before material delivery at site.	Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan/Peralatan/Pemeriksaan Mock-up)	
		Factory Acceptance Test 1. Visual Inspection. 2. Functional test.	1. Approved shop drawing. 2. Technical Submittal (Catalogue, Brand & Model) 3. Contract Document. 4. Specifications (JKR/SPJ/2008-S8).	Measuring devices.	Approved of Fabrication/Shop Drawing	Contractor/ SO Rep	1. JKR.PK(O).04-SKE.2B (Borang Pemeriksaan/Ujian Peralatan/Mesin di Kilang) 2. Senarai Semak Pemeriksaan Lampu Isyarat 3. Test report	
		Material on site inspection.	To conform as per approved material.	N/A	Upon delivery at site. Once for each delivery.	Contractor/ SO Rep	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	

TRADE : 10.1 LOW VOLTAGE				SUB-TRADE : 10.1.6 TRAFFIC SIGNAL LIGHT (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
4. (Con't)	Signal Head (Con't)	Inspection of Installation 1. Visual Inspection.	1. Approved shop drawing. 2. Technical Submittal (Catalogue, Brand & Model) 3. Contract Document. 4. Specifications (JKR/SPJ/2008-S8). 5. NTJ & ATJ 13/87	Measuring devices.	In-progress and upon completion of installation. Once upon completion.	Contractor/ SO Rep	1. JKR.PK(O).04-SKE.5C (Borang Pemeriksaan Ujian Fungsi Pemasangan Elektrik) 2.Senarai Semak Pemeriksaan Lampu Isyarat	
5	Cable Termination	Inspection of Installation.	1. Approved Shop Drawing. 2. Specification (LS-3 & JKR/SPJ/2008-S8).	N/A	In-progress of installation.	Contractor/ SO Rep	N/A	
6	Vehicle Detector (Type 1 : Induction Loop Cable Type 2 : IRF (Infrared) Type 3 : Camera Type 4 : Wireless etc)	Submission of material list / brands / sample for approval	1. Contract. 2. Drawings. 3.Specifications (JKR/SPJ/2008-S8).	Measuring devices.	Before material delivery at site. Once for each material.	Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan/Peralatan/Pemeriksaan Mock-up)	
		Material on site inspection.	To conform as per approved material.	Measuring devices.	Upon delivery at site. Once for each delivery.	Contractor/ SO Rep	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		Inspection of Installation.	1. Approved Shop Drawing. 2. Specification (JKR/SPJ/2008-S8).	N/A	In-progress and upon completion of installation. Once for each zone / section.	Contractor/ SO Rep	Senarai Semak Pemeriksaan Lampu Isyarat.	
7	Cable & Detector Pit Refer Trade 10.1.5	Inspection of Installation.	To conform as per approved drawing and specification.	Measuring devices.	Pre-cast concreting	Contractor/ SO Rep	1. JKR.PK(O).04-SKE.5C Borang Pemeriksaan Ujian Fungsi Pemasangan Elektrik 2.Senarai Semak Pemeriksaan Lampu Isyarat	
8	Earthing system	Submission of material list / brands for approval	1. Contract. 2. J-MAL. 3. Specification (L-S1).	Measuring devices.	Before material delivery at site. Once for each material.	Contractor	JKR.PK(O).04-5 (Borang Kelulusan Bahan/Peralatan/Pemeriksaan Mock-up)	
		Material on site inspection.	To conform as per approved material.	Measuring devices.	Upon delivery at site. Once for each delivery.	Contractor/ SO Rep	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		Installation of earthing system.	1. Approved Shop Drawing. 2. Specification (L-S1).	Earth Tester.	In-progress and upon completion of installation. Once for each zone / section.	Contractor	JKR.PK(O).04-SKE.3B (Borang Pemasangan Elektrod Bumi)	

		SENARAI SEMAK PEMERIKSAAN LAMPU ISYARAT		
BIL	PERKARA	Lampu Isyarat		Tindakan / Catatan
		YA	TIDAK	
1	VISUAL INSPECTION : -			
1.1	Traffic Light Controller			
1.1.1	Microprocessor-based	☐	☐	
1.1.2	Class IP 55 (MS IEC 60529)	☐	☐	
1.1.3	Coated with epoxy dry-powder and oven baked semi-gloss enamel grey (except for stainless steel)	☐	☐	
1.1.4	Log Book	☐	☐	
1.1.5	Lock & 2 Sets of Key (each controller)	☐	☐	
1.1.6	Anti Vandalism Features (2 set of steel bar, handle with lock etc)	☐	☐	
1.1.7	Ventilation louvre c/w wire mesh and protection	☐	☐	
1.1.8	Anti Sticker Paint	☐	☐	
1.1.9	Color Code :			
	a. Golden Yellow Stripe (No. 356 BS 381C)	☐	☐	
	b. Black (BS 873)	☐	☐	
1.1.10	Labelling sticker as per approved shop drawing	☐	☐	
1.2	Signal Head			
1.2.1	Nominal diameter 300mm	☐	☐	
1.2.2	Three optical arranged vertically	☐	☐	
1.2.3	Arrangement (upper = red, middle = amber, lower = green)	☐	☐	
1.2.4	Type A visor	☐	☐	
1.2.5	Height :			
	a. Post-Mounted = Centre of green optical shall be 2.5m above the carriageway	☐	☐	
	b. Overhead = lowest point of signal shall be not less than 5.5m or more than 6.5m above the carriageway	☐	☐	
1.3	Column			
1.3.1	Nominal diameter 100mm	☐	☐	
1.3.2	Twin service door	☐	☐	
1.3.3	Information Board "Aduan Kerosakan" as per approved shop drawing	☐	☐	
1.3.4	Alternate orange and black band	☐	☐	
1.3.5	Anti-vandalism locking device	☐	☐	
1.3.6	Double slot hinged service door	☐	☐	
1.4	Vehicle Detector			
1.4.1	Type of vehicle detector as approved shop drawing	☐	☐	
1.5	Cable and Detector Pit			
1.5.1	Heavy duty pre-cast concrete pit	☐	☐	
1.5.2	Cable pit size = 450mm (L) X 450mm (W) X 450mm (H)	☐	☐	
1.5.3	Detector pit size = 300mm (L) X 300mm (W)	☐	☐	
1.6	Others			
1.6.1	Plinth dimension	☐	☐	
1.6.2	Facility Switch	☐	☐	
1.6.3	Fittings (Lamp, Switch Socket Outlet, Heater etc)	☐	☐	
1.6.4	Meter TNB	☐	☐	
1.6.5	Maintenance Tool (If Any)	☐	☐	

 SENARAI SEMAK PEMERIKSAAN LAMPU ISYARAT				
BIL	PERKARA	Lampu Isyarat		Tindakan / Catatan
		YA	TIDAK	
2	<u>FUNCTIONAL INSPECTION :-</u>			
2.1	Green Conflict	☐	☐	
2.2	Double lamp conflict	☐	☐	
2.3	Sequence of phasing	☐	☐	
2.4	Time settings	☐	☐	
2.5	Pedestrian Facilities Test	☐	☐	
2.6	Buzzer	☐	☐	
2.7	Push Button	☐	☐	
2.8	Flashing Rate	☐	☐	
2.9	Vehicle Detector Test	☐	☐	
2.10	Green Wave (Integration of traffic light controller between two or more junction)	☐	☐	
2.11	Auto Reclosure RCCB	☐	☐	
2.12	Earthing Test	☐	☐	
ULASAN :				
TERIMA / TIDAK TERIMA				
DISEMAK OLEH : (Kontraktor)		DISAHKAN OLEH : (Pengurus Projek)		
Tandatangan :		Tandatangan :		
Nama Pegawai :		Nama Pegawai :		
Tarikh:		Tarikh:		

TRADE : 10.2 EXTRA LOW VOLTAGE				SUB-TRADE : 10.2.1 PA SYSTEM (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Public Address System	1. Material submission approval	1. Contract Document 2. PA Syste, General Specification 3. Schedule of Technical Data	N/A	Before material deliver at project site. Once for each type of material.	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Incoming material inspection	1. To conform with material submission approval	N/A	Upon material delivered at project site. Once for each material delivery	Contractor / SO Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Conduiting/Trunking & Cabling work	1. Specification(L-S1) 2. PA System General Specification	Measuring equipment	In-progress and upon completion of installation. Once for each zone / floor.	Contractor	JKR.PK(O).04-SKE.4A (Borang Pengesahan Pemeriksaan Pemasangan)	
		4. Continuity test	1. Resistance < 5 Ohms [Given the cable use is min. 18AWG twisted pair speaker cable with max. length of 100M]	Insulation & Continuity Tester	Upon completion of cabling work. Once for each zone/floor	Contractor	CKE.ITP.06.01(01).2019 Line Continuity and Insulation Test for Loudspeaker Wiring	
		5. Insulation test	1. Resistance > 1M Ohms	Insulation & Continuity Tester.	Upon completion of cabling work. Once for each zone/floor	Contractor	CKE.ITP.06.01(01).2019 Line Continuity and Insulation Test for Loudspeaker Wiring	
		6. Tapping wattage inspection	1. To confirm that the speaker tapping wattage conforms to shop drawing and schematic	N/A	Upon completion of speaker installation. Randomly chosen speakers installed.[Based in project size and/or as per WPP(E) consent]	Contractor / SO Rep	JKR.PK(O).04-SKE.4E (Borang Pemeriksaan Kelengkapan Elektrik/ICT/ELV)	

TRADE : 10.2 EXTRA LOW VOLTAGE				SUB-TRADE : 10.2.1 PA SYSTEM (Revised 1/2020)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	Public Address System (Con't)	7. Speaker installation inspection	1. PA General Specification 2. e-PSMG	N/A	Upon completion of speaker installation. Randomly chosen speakers installed.[Based on project size and/or as per WPP(E) consent].	Contractor / SO Rep	JKR.PK(O).04-SKE.4E (Borang Pemeriksaan Kelengkapan Elektrik/ICT/ELV)	
		8. Functional test of all equipments	1. All equipments shall operate as specify in the contract and manufacturer specifications.	N/A	Upon completion of PA System Installation. Once for each equipment installed	Contractor	CKE.ITP.06.01(02).2019 Zoning,Functional and Sound Pressure Level Test For Loudspeaker	
		9. Zoning test	1. To confirm that the zoning for each speaker installed conforms to shop drawing and schematic	N/A	Upon completion of PA System installation. Once for each speakers installed	Contractor	CKE.ITP.06.01(02).2019 Zoning,Functional and Sound Pressure Level Test For Loudspeaker	
		10. Sound pressure level test	1. To conform with PA System General Specification	Sound Pressure Level Meter	Upon completion of PA System installation. Once for each speaker installed	Contractor	CKE.ITP.06.01(02).2019 Zoning,Functional and Sound Pressure Level Test For Loudspeaker	

TRADE : 10.3 ICT & TELEPHONE

SUB-TRADE : 10.3.1 EXTERNAL INSTALLATION FOR ICT & TELEPHONE

ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	External Installation for ICT & Telephone	1. Submission of Material for approval.	1. Contract. 2. Specifications. Catalogue must be submit	N/A	Before material delivery at site. Once for each material.	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material on site inspection.	1. As per approved material. Free from defect. Evidence/ photos. Catalouge	N/A	Upon delivery at site. Once for each delivery.	Contractor / SO Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Inspection of Manhole/ Telephone Pit Installation	1. Contract. 2. LS-3 Specifications.	Measuring tape.	In-progress and upon completion of installation. Once for each zone / section / floor.	Contractor / SO Rep	JKR.PK(O).04-SKE.3A (Borang Pengesahan Pemeriksaan Kabel Bawah Tanah) CKE.ITP.03.05.(00).2012 (Senarai Semak Pemeriksaan Pemasangan Manhole & Pit)	
		4. Inspection of uPVC pipe & G.I pipe Installation	1. Contract. 2. LS-3 Specifications.	N/A	In-progress and upon completion of installation. Once for each zone /routing	Contractor / SO Rep	JKR.PK(O).04-SKE.3A (Borang Pengesahan Pemeriksaan Kabel Bawah Tanah) CKE.ITP.03.06.(00).2012 (Senarai Semak Pemeriksaan Pemasangan uPVC Pipe & G.I Pipe)	
		5. Testing & Commissioning; Clearence of ducting	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard	N/A	Upon completion of installation.. All pipe	Contractor	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.07.(00).2012 (Senarai Semak Pengujian & Pentauliahan Kelegaan G.I Pipe & uPVC Pipe)	

TRADE : 10.3 ICT & TELEPHONE				SUB-TRADE : 10.3.1 EXTERNAL INSTALLATION FOR ICT & TELEPHONE				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	External Installation for ICT & Telephone. (Con't)	6. Inspection of Fiber Optic & Jelly Filled Cable Installation	1. Specification - General Practices for ICT Installation & LS - 16 2. Approved Shop Drawing	N/A	In-progress and upon completion of installation. Once for each zone /routing	Contractor	JKR.PK(O).04-SKE.3A (Borang Pengesahan Pemeriksaan Kabel Bawah Tanah) CKE.ITP.03.08.(00).2012 (Senarai Semak Pemeriksaan Pemasangan Interbuilding Cabling – Fiber & Jelly Filled)	
		7. Testing & Commissioning; Fiber Optic cable	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard	Cable Analyzer	Upon completion of cabling work. All cable	Contractor	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.09.(00).2012 (Senarai Semak Pengujian & Pentauliahan Fibre Optic cable)	
		8. Testing & Commissioning; Jelly Filled cable	1. LS - 16 Specification	Continuity Tester	Upon completion of cabling work. All cable	Contractor	JKR.PK(O).04-SKE.5A (Borang Pemeriksaan Ujian-Ujian Elektrikal) CKE.ITP.03.10.(00).2012 (Senarai Semak Pengujian & Pentauliahan Interbuilding Jelly Filled cable)	

TRADE : 10.3 ICT & TELEPHONE				SUB-TRADE : 10.3.2 INTERNAL INSTALLATION FOR ICT - ACTIVE EQUIPMENT				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Internal Installation for ICT -Active Equipment	1. Submission of material for approval	1. Contract. 2. Specifications. Catalogue must be submit	N/A	Before material delivery at site.Once for each material.	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material on site inspection.	1. As per approved material.	N/A	Upon material are delivered at project site.Once for each material / delivery.	Contractor / SO Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Inspection & Testing of Access Switch	1. Contract. 2. Specifications.	N/A	Upon completion of installation.Once for each zone / section / floor.	Contractor / SO Rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.11.(00).2012 (Senarai Semak Pemeriksaan, Pengujian & Pentauliahan Access Switch)	
		4. Inspection & Testing of Distribution Switch	1. Contract. 2. Specifications.	N/A	Upon completion of installation.. All equipment	Contractor / SO Rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.12.(00).2012 (Senarai Semak Pemeriksaan, Pengujian & Pentauliahan Distribution Switch)	
		5. Inspection & Testing of Core Switch	1. Contract. 2. Specifications.	N/A	Upon completion of installation.. All equipment	Contractor / SO Rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.13.(00).2012 (Senarai Semak Pemeriksaan, Pengujian & Pentauliahan Core Switch)	
		6. Inspection & Testing of Wireless AP	1. Contract. 2. Specifications.	N/A	Upon completion of installation.. All equipment	Contractor / SO Rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.14.(00).2012 (Senarai Semak Pemeriksaan, Pengujian & Pentauliahan Wireless Access Point)	
		7. Inspection & Testing of Wireless Controller	1. Contract. 2. Specifications.	N/A	Upon completion of installation.. All equipment	Contractor / SO Rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.15.(00).2012 (Senarai Semak Pemeriksaan, Pengujian & Pentauliahan Wireless Controller)	

TRADE : 10.3 ICT & TELEPHONE				SUB-TRADE : 10.3.2 INTERNAL INSTALLATION FOR ICT - ACTIVE EQUIPMENT				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE/ FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	Internal Installation for ICT -Active Equipment. (Con't)	8. Inspection & Testing of UPS	1. Contract. 2. Specifications.	N/A	Upon completion of installation.. All equipment	Contractor / SO Rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.16.(00).2012 (Senarai Semak Pemeriksaan, Pengujian Dan Pentauliahan Un-Interruptible Power Supply (UPS))	
		9. Inspection & Testing of Server	1. Contract. 2. Specifications.	N/A	Upon completion of installation.. All equipment	Contractor / SO Rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.17.(00).2012 (Senarai Semak Pemeriksaan, Pengujian & Pentauliahan Server)	
		10. Inspection & Testing of Firewall	1. Contract. 2. Specifications.	N/A	Upon completion of installation.. All equipment	Contractor / SO Rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.18.(00).2012 (Senarai Semak Pemeriksaan, Pengujian & Pentauliahan Firewall)	

TRADE : 10.3 ICT & TELEPHONE					TRADE : 10.3.3 INTERNAL INSTALLATION FOR PASSIVE EQUIPMENT & ICT ROOM			
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Internal Installation for ICT ; Passive Equipment & ICT Room	1. Submission of Material for approval.	1. Specifications. Catalogue must be submit	N/A	Before material delivery at site. Once for each material.	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	N/A
		2. Material on site inspection.	As per approved material. Free from defect. Evidence/ photos. Catalogue	N/A	Upon delivery at site. Once for each delivery.	Contractor/ SO rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	N/A
		3. Inspection of Trunking, Cable Tray & Conduit ICT	1. LS-1 Specifications.	Measuring Equipment.	As work progress and upon completion of installation. For each zone/section/floor.	Contractor/ SO rep	CKE. ITP.03.19.(00).2012 (Senarai Semak Pemeriksaan Pemasangan Trunking, Cable Tray & Conduit ICT)	N/A
		4. Inspection of Indoor Fibre Optic Cable Installation	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard	N/A	In-progress and upon completion of installation. Once for each zone /routing	Certified Installer Cable/ Contractor/SO rep	CKE. ITP.03.20.(00).2012 (Senarai Semak Pemeriksaan Pemasangan Indoor Fibre Optic Cable)	N/A
		5. Testing & Commissioning; Internal fibre optic cable	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard	Cable Analyzer	Upon completion of installation. All cable	Certified Tester/ Contractor	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE. ITP.03.09.(00).2012 (Senarai Semak Pengujian & Pentauliahan Fibre Optic cable)	N/A
		6. Inspection of Unshielded Twisted Pair (UTP) cable Installation	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard	N/A	In-progress and upon completion of installation. Once for each zone /routing	Certified Installer Cable/ Contractor/SO rep	CKE. ITP.03.21.(00).2012 (Senarai Semak Pemeriksaan Pemasangan Unshielded Twisted Pair (UTP) cable)	N/A
		7. Testing & Commissioning; UTP cable	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard 3. Without Marginal Pass	Cable Analyzer	Upon completion of cabling work. All cable	Certified Installer Cable/ Contractor/SO rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE. ITP.03.22.(00).2012 (Senarai Semak Pengujian & Pentauliahan UTP cable)	N/A
		8. Inspection of Equipment Rack & Accessories	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard	N/A	Upon completion of cabling work. All rack	Contractor/ SO rep	CKE. ITP.03.23.(00).2012 (Senarai Semak Pemeriksaan Pemasangan Equipment Rack & Accessories)	N/A
		9. Inspection of Telecommunication Closet Room (TCR)	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard	N/A	Upon completion of work. All TCR.	Contractor/ SO rep	CKE. ITP.03.24.(00).2012 (Senarai Semak Pemeriksaan Telecommunication Closet Room (TCR))	N/A
		10. Inspection of Server Room	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard	N/A	Upon completion of work.	Contractor/ SO rep	CKE. ITP.03.25.(00).2012 (Senarai Semak Pemeriksaan Server Room)	N/A
		11. Inspection of Data Center	1. Specification - General Practices for ICT Installation 2. TIA/ EIA standard - TIA 942	N/A	Upon completion of work.	Contractor/ SO rep	CKE. ITP.03.26.(00).2012 (Senarai Semak Pemeriksaan Data Center)	N/A

TRADE : 10.3 ICT & TELEPHONE					SUB-TRADE : 10.3.4 INTERNAL INSTALLATION FOR TELEPHONE			
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Internal Installation for Telephone	1. Submission of Material for approval.	1. Specifications. Catalogue must be submit	N/A	Before material delivery at site. Once for each material.	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	N/A
		2. Material on site inspection.	As per approved material. Free from defect. Evidence/ photos. Catalogue	N/A	Upon delivery at site. Once for each delivery.	Contractor/ SO rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	N/A
		3. Inspection of Trunking, Cable Tray & Conduit Telephone	1. LS-1 Specifications.	Measuring Equipment.	As work progress and upon completion of installation. For each zone/section/floor.	Contractor/ SO rep	CKE.ITP.03.27.(00).2012 (Senarai Semak Pemeriksaan Pemasangan Trunking, Cable Tray & Conduit Telephone)	N/A
		4. Inspection of Indoor backbone Telephone Cable, 2 pair/ 0.63mm cable, Distribution Point (DP) Box, Sub/ Main Distribution Frame (SDF/ MDF)	1. LS16 Specification For Telephone Installation)	N/A	In-progress and upon completion of installation. Once for each zone /routing	Contractor/ SO rep	CKE.ITP.03.28.(00).2012 (Senarai Semak Pemeriksaan Pemasangan Indoor backbone Telephone Cable/ 2pair 0.63mm cable/ DP/ MDF)	N/A
		5. Testing & Commissioning; Indoor backbone Telephone Cable and 2 pair/ 0.63mm cable	1. LS16 Specification For Telephone Installation)	Cable Analyzer	Upon completion of installation.. All cable	Certified Tester/ Contractor	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.29.(00).2012 (Senarai Semak Pengujian & Pentauliahan Indoor backbone Telephone Cable and 2 pair/ 0.63mm cable)	N/A
		6. Inspection of SDF, PABX & MDF Room	1. LS16 Specification For Telephone Installation)	N/A	In-progress and upon completion of work.	Contractor/ SO rep	CKE.ITP.03.30.(00).2012 (Senarai Semak Pemeriksaan SDF, PABX & MDF Room)	N/A
		7. Inspection of Private Automatic Branch Exchange (PABX) equipment	1. LS16 Specification For Telephone Installation)	N/A	In-progress and upon completion of work.	Certified Pabx Installer/ Contractor/SO rep	CKE.ITP.03.31.(00).2012 (Senarai Semak Pemeriksaan Pemasangan (PABX) equipment)	N/A
		8. Testing & Commissioning; PABX	1. LS16 Specification For Telephone Installation)	N/A	Upon completion of work.	Certified Pabx Installer/ Contractor/SO rep	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.32.(00).2012 (Senarai Semak Pengujian & Pentauliahan PABX)	N/A
		9. Testing & Commissioning; Direct line, Fax Line & Extension Line Functionality	1. LS16 Specification For Telephone Installation)	N/A	Upon completion of work.	Contractor	JKR.PK(O).04-9 (Senarai Semak Pengujian & Pentauliahan) CKE.ITP.03.33.(00).2012 (Senarai Semak Pengujian & Pentauliahan Direct line, Fax Line & Extension Line Functionality)	N/A

TRADE : 10.4 MEDICAL EQUIPMENT				SUB-TRADE : 10.4.1 GENERAL RADIOGRAPHY				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	General Radiography System	1. Material approval submission	1. Contract Document 2. General Radiography Specification 3. Schedule of Technical Data Compliance 4. Approval Letter by MOH	N/A	Before materials deliver at project site Once for each system	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material Inspection	1. To conform with material submission approval	N/A	Upon equipment delivery at project site Once for each system	Contractor/ SO Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Pre-installation work	1. Specification (LS-1) 2. General Radiography Specification	N/A	Before equipment installation at project site	Contractor	JKR.PK(O).04-SKER.4A (Borang Pengesahan Pemeriksaan Pemasangan)	
		4. Functionality Test of the system	1. General Radiography specification 2. Ministry Of Health requirement	N/A	After the complete installation of the equipment	Contractor	JKR.PK(O).04-SKER.4A (Borang Pengesahan Pemeriksaan Pemasangan)	

TRADE : 10.4 MEDICAL EQUIPMENT				SUB-TRADE : 10.4.2 EXAMINATION LIGHT				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Examination Light	1. Material approval submission	1. Contract Document 2. Examination Light Specification 3. Schedule of Technical Data Compliance	N/A	Before materials deliver at project site Once for each system	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material Inspection	1. To conform with material submission approval	N/A	Upon equipment delivery at project site Once for each system	Contractor/ SO Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Pre-installation work	1. Specification (LS-1) 2. Examination Light Specification	N/A	Before equipment installation at project site	Contractor	JKR.PK(O).04-SKER.4A (Borang Pengesahan Pemeriksaan Pemasangan)	
		4. Functionality Test of the system	1. Examination Light Specification 2. Ministry Of Health requirement	Lux meter	After the complete installation of the equipment	Contractor	JKR.PK(O).04-SKER.4A (Borang Pengesahan Pemeriksaan Pemasangan)	

TRADE : 10.4 MEDICAL EQUIPMENT				SUB-TRADE : 10.4.3 SURGICAL LIGHT				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Surgical Light	1. Material approval submission	1. Contract Document 2. Surgical Light Specification 3. Schedule of Technical Data Compliance	N/A	Before materials deliver at project site Once for each system	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material Inspection	1. To conform with material submission approval	N/A	Upon equipment delivery at project site Once for each system	Contractor/ SO Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Pre-installation work	1. Specification (LS-1) 2. Surgical Light Specification	N/A	Before equipment installation at project site	Contractor	JKR.PK(O).04-SKER.4A (Borang Pengesahan Pemeriksaan Pemasangan)	
		4. Functionality Test of the system	1. Surgical Light Specification 2. Ministry Of Health requirement	Lux meter	After the complete installation of the equipment	Contractor	JKR.PK(O).04-SKER.4A (Borang Pengesahan Pemeriksaan Pemasangan)	

TRADE: 10.4 MEDICAL EQUIPMENT				SUB-TRADE: 10.4.4 SURGICAL TABLE				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	Surgical Table	1. Material approval submission	1. Contract Document 2. Surgical Table Specification 3. Schedule of Technical Data Compliance	N/A	Before materials deliver at project site Once for each system	Contractor	JKR.PK(O).04-5 (Borang Pemeriksaan Mock-up)	
		2. Material Inspection	1. To conform with material submission approval	N/A	Upon equipment delivery at project site Once for each system	Contractor/ SO Rep	JKR.PK(O).04-SKE.2A (Borang Pengesahan Penerimaan Bahan)	
		3. Pre-installation work	1. Specification (LS-1) 2. Surgical Table Specification	N/A	Before equipment installation at project site	Contractor	JKR.PK(O).04-SKER.4A (Borang Pengesahan Pemeriksaan Pemasangan)	
		4. Functionality Test of the system	1. Surgical Table Specification 2. Ministry Of Health requirement	Lux meter	After the complete installation of the equipment	Contractor	JKR.PK(O).04-SKER.4A (Borang Pengesahan Pemeriksaan Pemasangan)	

TRADE : 10.5 MEDIUM VOLTAGE SYSTEM (New Trade)				TRADE : 10.5.1 11 kV DRY-TYPE DISTRIBUTION TRANSFORMERS (New Trade)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	11 kV Dry-type Distribution Transformers	1. Submission of documents for approval	1. Contract Document 2. Technical Submittal (i.e. Catalogue, Test Report) 3. Specification (L-S17) 4. Shop Drawings 5. J-MAL	N/A	Before Factory Acceptance Test (FAT). Each item.	Contractor. Manufacturer	JKR.PK(O).04-5 (Borang Kelulusan Bahan)	
		2. Factory Acceptance Test (FAT)	1. Checklist by manufacturer 2. Testing procedure by manufacturer		Before delivery to site / Each Item	Contractor. Manufacturer	JKR.PK(O).04-SKE.2B (Borang Pemeriksaan /Ujian Peralatan/Mesin Di Kilang)	
		a) Visual Inspection	1. Approved Shop Drawing 2. Specification (L-S17).	Measuring tape, caliper etc	During FAT. Each item.	Contractor. Manufacturer. S.O./S.O.'s Rep. HODT (if any) Consultant (if any)	CKE.USPMA(P).003-2-8 (Visual Inspection Report 11 kV Dry-Type Distribution Transformer)	
		b) Routine Tests	1. Specification (L-S17) 2. Bill of Quantity (BQ)	To be provided by manufacturer	During FAT. Each item.	Contractor. Manufacturer. S.O./S.O.'s Rep. HODT (if any) Consultant (if any)	Manufacturer test sheet	
		3. On-site Testing	1. Method statement on on-site test procedure by Service Engineer		Before commissioning / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		a) 24 kV a.c. Separate-source AC withstand voltage test	1. Specification (L-S17)	Hipot Tester	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		b) Measurement of winding resistance	1. Specification (L-S17) 2. FAT Test Report	Winding Resistance Meter	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		c) Measurement of voltage ratio	1. Specification (L-S17) 2. FAT Test Report	Transformer Turns Ratio Meter	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	

TRADE : 10.5 MEDIUM VOLTAGE SYSTEM (New Trade)				TRADE : 10.5.1 11 kV DRY-TYPE DISTRIBUTION TRANSFORMERS (New Trade)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	11 kV Dry-type Distribution Transformers (Con't)	d) Measurement of insulation resistance	1. Specification (L-S17) 2. FAT Test Report 3. The insulation resistance results shall not lower than 70% of FAT results	Insulation Tester	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		e) Testing and setting of winding temperature alarm and trip as per manufacturer requirements.	1. Specification (L-S17) 2. FAT Test Report	To be provided by Contractor/Service Engineer	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		4. Commissioning	1. Specification (L-S17)	To be provided by Contractor/Service Engineer	On successful testing of the complete transformer installation	Contractor. Service Engineer. S.O./S.O.'s Rep.	JKR.PK(O).04-SKE.6A (Borang Pemeriksaan Pengesahan Pentauliahan Kerja-Kerja Elektrik)	
		a) Set the tap changer to the nominal supply voltage	1. Specification (L-S17) 2. Voltage within the tolerance 230/400V, +10%, -6%	Multimeter	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.O)	Service Engineer test sheet	

TRADE : 10.5 MEDIUM VOLTAGE SYSTEM (New Trade)				SUB-TRADE : 10.5.2 11 kV METAL- ENCLOSED SWITCHGEAR (New Trade)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	11 kV Metal-Enclosed Switchgear	1. Submission of documents for approval	1. Contract Document 2. Technical Submittal (i.e. Catalogue, Test Report) 3. Specification (L-S15) 4. Shop Drawings 5. J-MAL	N/A	Before Factory Acceptance Test (FAT) / Each Item	Contractor. Manufacturer	JKR.PK(O).04-5 (Borang Kelulusan Bahan)	
		2. Factory Acceptance Test (FAT)	1. Checklist by manufacturer 2. Testing procedure by manufacturer		Before delivery to site / Each Item	Contractor. Manufacturer	JKR.PK(O).04-SKE.2B (Borang Pemeriksaan /Ujian Peralatan/Mesin Di Kilang	
		a) Visual Inspection	1. Approved Shop Drawings 2. Specification (L-S15)	Measuring tape, caliper etc.	During FAT / Each Item	Contractor. Manufacturer. S.O./S.O.'s Rep. HODT (if any) Consultant (if any)	Specification (L-S15)	
		b) Routine Tests	1. Specification (L-S15).	To be provided by manufacturer	During FAT / Each Item	Contractor. Manufacturer. S.O./S.O.'s Rep. HODT (if any) Consultant (if any)	Manufacturer test sheet	
		3. On-site Testing	1. Method statement on on-site test procedure by Service Engineer		Before commissioning / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		a) CT Magnetization Curve Test	1. Specification (L-S15)	Current Transformer Test Set	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		b) CT Ratio Test	1. Specification (L-S15) 2. CT ratio transformation is within the tolerance of no more than 10% of the current ratio error	Current Transformer Test Set	During on-site testing / Each Item.	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		c) CT Polarity Test	1. Specification (L-S15) 2. Polarity: In-phase	Current Transformer Test Set	During on-site testing / Each Item..	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		d) VT (PT) Ratio Test	1. Specification (L-S15)	To be provided by manufacturer	During on-site testing / Each Item..	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		e) Relay Secondary Injection Test	1. Specification (L-S15) 2. Inject 130% (3.25A), 200% (5A) and 300% (7.5A) of the Plug Setting Multiplier (PSM) setting. 3. To compare the results with the manufacturer's data sheet.	Relay Test Set	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Borang Suruhanjaya Tenaga (ST), Borang H(JPE)Pin.2011 (Inverse Time Overcurrent and Earth Fault Relay Calibration Certificate)	

TRADE : 10.5 MEDIUM VOLTAGE SYSTEM (New Trade)				SUB-TRADE : 10.5.2 11 kV METAL- ENCLOSED SWITCHGEAR (New Trade)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	11 kV Metal-Enclosed Switchgear. (Con't)	f) Primary Injection Test (Stability Test)	1. Specification (L-S15)	1. Current Supply Unit or 2. Relay Test Set	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Borang Suruhanjaya Tenaga (ST), Borang H(JPE)Pin.2011 (Inverse Time Overcurrent and Earth Fault Relay Calibration Certificate)	
		g) Measurement of the resistance of the main circuit (contact resistance)	1. Specification (L-S15) 2. FAT Test Report	1. Micro-Ohmmeter	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		h) Functional Test of Vacuum Circuit Breaker (VCB)	1. Specification (L-S15)	To be provided by Contractor/Service Engineer	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		i) Heaters Operation Test	1. Specification (L-S15)	1. Multimeter	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		4. Commissioning	1. Specification (L-S15)	To be provided by Contractor/Service Engineer	On successful testing of the complete 11 kV Metal-Enclosed Switchgear installation	Contractor. Service Engineer. S.O./S.O.'s Rep.	JKR.PK(O).04-SKE.6A (Borang Pemeriksaan Pengesahan Pentauliahan Kerja-Kerja Elektrik)	
		a) Measure the nominal supply voltage	1. Specification (L-S17) 2. Voltage within the tolerance 11000, +5%, -5%	Multimeter or by visual inspection at digital power meter	During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	

TRADE : 10.5 MEDIUM VOLTAGE SYSTEM (New Trade)					TRADE : 10.5.3 11 kV MEDIUM VOLTAGE UNDERGROUND CABLE (New Trade)			
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1.	11 kV Medium Voltage Underground Cable	1. Submission of documents for approval	1. Contract Document 2. Technical Submittal (i.e. Catalogue, Test Report) 3. Specification (L-S13) 4. Shop Drawings 5. J-MAL	N/A	Before Factory Acceptance Test (FAT) / Each Item	Contractor. Manufacturer	JKR.PK(O).04-5 (Borang Kelulusan Bahan)	
		2. Factory Acceptance Test (FAT)	1. Checklist by manufacturer 2. Testing procedure by manufacturer		Before delivery to site / Each Item	Contractor. Manufacturer	JKR.PK(O).04-SKE.2B (Borang Pemeriksaan /Ujian Peralatan/Mesin Di Kilang	
		a) Visual Inspection	1. Approved Shop Drawings 2. Specification (L-S13) 3. Standard (IEC 60228 and IEC 60502-2)	Caliper etc.	During FAT / Each Item	Contractor. Manufacturer. S.O./S.O.'s Rep. HODT (if any) Consultant (if any)	Manufacturer test sheet	
		b) Routine Tests	1. Specification (L-S13) 2. Standard (IEC 60228 and IEC 60502-2)	To be provided by manufacturer	During FAT / Each Item	Contractor. Manufacturer. S.O./S.O.'s Rep. HODT (if any) Consultant (if any)	Manufacturer test sheet	
		3. Cable Installation	1. Approved Method Statement 2. Specification (L-S13)	N/A	In-progress and upon completion of installation. / Once for each installation	Contractor. S.O./S.O.'s Rep.	JKR.PK(O).04-SKE.3A (Borang Pemeriksaan Kabel Bawah Tanah)	
		4. On-site Testing	1. Method statement on on-site test procedure by Service Engineer	Insulation Tester	Before commissioning / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	JKR.PK(O).04-SKE.2A (Borang Pemeriksaan Pengesahan Penerimaan Bahan)	
		a) Insulation Resistance Test	1. Specification (L-S13) 2. Test at 5 kVdc		During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	
		b) Sheath Integrity Test	1. Specification (L-S13) 2. Test at 5 kVdc		During on-site testing / Each Item	Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet	

TRADE : 10.5 MEDIUM VOLTAGE SYSTEM (New Trade)				TRADE : 10.5.3 11 kV MEDIUM VOLTAGE UNDERGROUND CABLE (New Trade)				
ITEM	DESCRIPTION OF WORKS	POINT OF INSPECTION / TEST	STANDARD / REQUIREMENT	TOOLS / EQUIPMENT	STAGE / FREQUENCY	RESPONSIBILITY	EVIDENCE	REMARKS
1. (Con't)	11 kV Medium Voltage Underground Cable. (Con't)	c) Soaking Test 5. Commissioning	1. Specification (L-S13) 2. To perform for 48 hours simulating a typical working condition voltage stress (without load). 1. Specification (L-S13)	N/A N/A	During on-site testing / Each Item On successful testing of the complete 11 kV Medium Voltage Underground installation	Contractor. Service Engineer. S.O./S.O.'s Rep. Contractor. Service Engineer. S.O./S.O.'s Rep.	Service Engineer test sheet JKR.PK(O).04-SKE.6A (Borang Pemeriksaan Pengesahan Pentauliahan Kerja-Kerja Elektrik)	

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JABATAN KERJA RAYA MALAYSIA