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LABORATORY LOCATION:
(PERMANENT LABORATORY)**BUILDTEST LABORATORY SDN. BHD.**
NO. 12, JALAN PS 8/1
TAMAN PRIMA SELAYANG
68100 BATU CAVES
SELANGOR
MALAYSIA**FIELDS OF TESTING:****MECHANICAL, CHEMICAL &**
NON-DESTRUCTIVE TEST**FIELDS OF CALIBRATION:****MASS & FORCE**

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017).

This laboratory's fulfillment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF TESTING: MECHANICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Hardened Concrete	Compressive Strength Test (Cubes, Cores & Cylinders)	BS EN 12390-3: 2019 (Test at ambient conditions)
	Water Absorption of Concrete Specimens	BS 1881-122: 2011 + A1: 2020 (Test at ambient conditions)
	Density of Hardened Concrete	BS EN 12390-7: 2019 (Volume by Water Displacement Method)
	Secant Modulus of Elasticity in Compression (Method A)	BS EN 12390-13: 2021
	Water Penetration in Hardened Concrete	BS EN 12390-8: 2019
	Loss of Ignition	BS 1881-124: 2015 Clause 6.6
	Initial Surface Absorption Test	BS 1881-208: 1996
	Drying Shrinkage	ISO 1920-8:2009
Rapid Chloride Penetration Test	ASTM C 1202-19	

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Aggregates	Flakiness Index of Coarse Aggregates	BS 812: Part 105: Sect 105.1: 1989
	Elongation Index of Coarse Aggregates	BS 812: Part 105: Sect 105.2: 1990
	Aggregate Crushing Value (ACV)	BS 812: Part 110: 1990 (Test at Dry Conditions)
	Aggregate Impact Value (AIV)	BS 812: Part 112: 1990 Clause 7.1 (Test at Dry Conditions)
	Ten Percent Fines Value (TFV)	BS 812: Part 111: 1990 (Test at Dry Conditions)
	Shape Index	BS EN 933-4: 2008
	Clay Lumps and Friable Particles in Aggregates	ASTM C 142 / C 142 M-17
	pH Value	BS 1377-3: 2018 + A1: 2021 Clause 12
	Los Angeles Abrasion (LA) of Small-Size Coarse Aggregates	ASTM C131/C131M-20
	Los Angeles Abrasion (LA) of Large-Size Coarse Aggregates	ASTM C535-16
	Particle Size Distribution by Sieving Method	BS EN 933-1: 2012
	Determination of Materials Finer than 75 µm by Washing	ASTM C 117-17 (Procedure A - Washing with Plain Water)
	Particle Density and Water Absorption of Coarse Aggregates	BS 812: Part 2: 1995 Clause 5.3 - Wire Basket Method (Test at Ambient Conditions)
	Particle Density and Water Absorption of Fine Aggregates	BS 812: Part 2: 1995 Clause 5.5 - Glass Jar Method (Test at Ambient Conditions)
	Particle Density and Water Absorption	BS EN 1097-6: 2022 Clause 8 and Clause 9
Organic Impurities in Fine Aggregates for Concrete	ASTM C40/C40M-20	
Shell Content	BS EN 933-7: 1998	
Loss of Ignition	BS EN 1744-1: 2009 + A1: 2012 Clause 17	

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Aggregates	Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)	ASTM C 1260 - 21
	Soundness by Use of Sodium Sulfate or Magnesium Sulfate	ASTM C88/C88M-18
	Drying Shrinkage	MS EN 1367-4: 2012
	Sand Equivalent Value	ASTM D 2419 - 22
	Fine Aggregate Angularity Value	ASTM C 1252 - 17
	Bulk Density and Voids in Aggregate	ASTM C 29 / C29 M – 17a
	Bulk Density, Voids and Bulking of Aggregates	BS 812 : Part 2 : 1995 Clause 6
Rocks	Point Load Strength Index	ASTM D 5731-16
	Uniaxial Compressive Strength of Intact Rock Core Specimens	ASTM D 7012-14 ¹ (Method C)
Soil	Particle Size Distribution on Soil by Wet Sieving and Hydrometer Method	BS 1377 – 2: 2022 Clause 10 BS EN ISO 17892 - 4: 2016 Clauses 5.2 & 5.3
	Moisture Content	BS 1377-1: 2016 BS 1377: Part 2: 1990 Clause 3.2 (Oven-drying Method)
	Dry Density / Moisture Content Relationship of Soils by 2.5kg Rammer Method	BS 1377: Part 4: 1990 Clause 3.3
	Dry Density / Moisture Content Relationship of Soils by 4.5kg Rammer Method	BS 1377: Part 4: 1990 Clause 3.5
	Dry Density / Moisture Content Relationship of Granular Soils by Vibrating Hammer Method	BS 1377: Part 4: 1990 Clause 3.7
	Liquid Limit	BS 1377: Part 2: 2022 Clause 5.0
Plastic Limit and Plasticity Index	BS 1377: Part 2: 2022 Clause 6	

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Soil	Laboratory California Bearing Ratio (CBR) pH Value Loss of Ignition	BS 1377: Part 4: 1990 Clause 7 BS 1377 – 3 : 2018 + A1: 2021 Clause 12 BS 1377 – 3 : 2018 + A1: 2021 Clause 6

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SCOPE OF TESTING: MECHANICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Steel Reinforcing Bar	Tensile Tests for determination of: <ul style="list-style-type: none"> - Yield strength - Tensile strength - Mass per meter - Percentage elongation after fracture - Percentage total extension at maximum force Force range: up to 1500kN Bend Test Rebend Test	BS EN ISO 15630-1: 2019 Clause 5 ISO 6892-1: 2019 MS 146:2014 BS EN ISO 15630-1 : 2019 Clause 6 ASTM E 290 – 14 MS 146 : 2014 ISO 7438 : 2020 BS EN ISO 15630-1 : 2019 Clause 7 MS 146 : 2014 Clause 7.3.5 MS 145 : 2014 Clause 7.2.5
Steel Wire	Tensile Tests for determination of: <ul style="list-style-type: none"> - Mass per metre - Yield strength (determined from 0.2% proof strength) - Tensile strength - Tensile/yield strength ratio - Percentage total elongation at maximum force Bend Test Rebend Test	BS EN ISO 15630-1 : 2019 Clause 5 ISO 6892-1 : 2019 MS 144:2014 BS EN ISO 15630-1 : 2019 Clause 6 ASTM E 290 – 14 MS 146 : 2014 ISO 7438 : 2020 BS EN ISO 15630-1 : 2019 Clause 7 MS 146 : 2014 Clause 7.3.5 MS 145 : 2014 Clause 7.2.5

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SCOPE OF TESTING: MECHANICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Steel Fabric	<p>Tensile Tests for determination of:</p> <ul style="list-style-type: none"> - Yield strength (determined from 0.2% proof strength) - Tensile strength - Tensile/yield strength ratio - Percentage total elongation at maximum force <p>Bend Test</p> <p>Rebend Test</p> <p>Weld Shear Force</p> <p>Measurement of The Geometrical Characteristics – Welded Fabric (Bar Spacing)</p>	<p>ISO 15630-2 : 2019 Clause 5</p> <p>ISO 6892-1 : 2019</p> <p>MS 145:2014</p> <p>BS EN ISO 15630-1 : 2019 Clause 6</p> <p>ASTM E 290 – 14</p> <p>MS 146 : 2014</p> <p>ISO 7438 : 2020</p> <p>BS EN ISO 15630-1 : 2019 Clause 7</p> <p>MS 146 : 2014 Clause 7.3.5</p> <p>MS 145 : 2014 Clause 7.2.5</p> <p>ISO 15630-2 : 2019 Clause 7.1</p> <p>MS 145 : 2014 Clause 9</p> <p>ISO 15630-2 : 2019 Clause 10.1</p>
Reinforcement Couplers for Mechanical Splices of Bars	<p>Tensile Strength</p> <p>Tensile and Slip Test</p>	<p>ISO 6892 – 1: 2019</p> <p>ISO 6892 – 1: 2019</p> <p>ISO 15835 – 2 : 2018 Clause 5.3 and 5.4</p>
Multi-Wire Steel Prestressing Strand	Tensile Test	<p>BS EN ISO 15630 – 3 : 2019 Clause 5</p> <p>MS 1138 Part 4 : 2020</p>
Masonry Units	<p>Compressive Strength Test (Clay, Calcium Silicate and Aggregate Concrete Masonry Units)</p> <p>Water Absorption</p>	<p>BS EN 772-1 : 2011 + A1 : 2015</p> <p>BS EN 772 – 7: 1998</p>

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SCOPE OF TESTING: MECHANICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Bitumen	Sampling Compacted Asphalt Mixtures for Laboratory Testing	ASTM D 5361 / D 5361 M-16
	Thickness or Height of Compacted Bituminous Paving Mixture Specimens	ASTM D 3549 / D 3549 M-18 (Method A)
	Bulk Specific Gravity and Density of Non-Absorptive Compacted Asphalt Mixtures	ASTM D 2726 / D 2726 M-21
	Marshall Stability and Flow of Asphalt Mixtures	ASTM D 6927 - 22
Water	pH Value	BS 1377-3 : 2018 Clause 12
Cement	Flexural Strength	BS EN 196 – 1: 2016 Clause 9.1
	Compressive Strength	BS EN 196 – 1: 2016 Clause 9.2
	Compressive Strength (50 mm Cube Specimens)	ASTM C 109 / C 109 M – 20a
	Loss of Ignition	BS EN 196 – 2: 2013 Clause 4.4.1

Signatories:

1. Ip Kwok Khuen
2. Tang Wei Luen
3. Ip Kar Mun
4. Nor Hasyira Binti Hashim

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Method/ Equipment/Technique
Aggregates	Water - Soluble Chloride	BS EN 1744 – 1: 2009 + A1: 2012 Clause 7
	Water – Soluble Sulfate	BS EN 1744 – 1: 2009 + A1: 2012 Clause 10.1
	Acid – Soluble Sulfate	BS EN 1744 – 1: 2009 + A1: 2012 Clause 12
Soil	Water – Soluble Chloride	BS 1377-3: 2018 + A1: 2021: Clause 9.2 & 9.2.7 (Volhard's Method)
	Water – Soluble Sulfate	BS 1377-3: 2018 + A1: 2021: Clause 7.3 & 7.6 (Gravimetric)
	Organic Matter	BS 1377-3: 2018 + A1: 2021: Clause 4

Signatory:

1. **Wan Faraizati Binti Wan Ismail** **M/6109/9791/22**

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SCOPE OF TESTING: MECHANICAL**SITE: CATEGORY I**

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Soil	In-Situ Vertical Deformation and Strength Test: Plate Load Test	BS 1377 – 9: 1990 Clause 4.1
	In-situ California Bearing Ratio (CBR)	BS 1377 : Part 9 : 1990 Clause 4.3
	In-situ Density Test by Small Pouring Cylinder Method	BS 1377 : Part 9 :1990 Clause 2.1 – Small Pouring Cylinder Method
	In-situ Density Test by Large Pouring Cylinder Method	BS 1377 : Part 9 :1990 Clause 2.2 – Large Pouring Cylinder Method
	Mackintosh Probe Test	MS 2038 : 2006 Clause 5.3.2.2
	JKR Probe Test	MS 2038 : 2006 Clause 5.3.2.2
Hardened Concrete	Ultrasonic Pulse Velocity Test	BS EN 12504 – 4 : 2021

Signatories:

- | | |
|-----------------------------|------------------------------|
| 1. Ip Kwok Khuen | (All except Plate Load Test) |
| 2. Tang Wei Luen | (All except Plate Load Test) |
| 3. Ip Kar Mun | (All) |
| 4. Nor Hasyira Binti Hashim | (Plate Load Test Only) |

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SCOPE OF TESTING: NON-DESTRUCTIVE TEST**SITE TESTING: CATEGORY I**

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Method/ Equipment/Technique
Hardened Concrete	Surface Hardness Testing by Rebound Hammer in the range of 20 to 55 rebound number, R	BS EN 12504 – 2 : 2021
	Estimating the Bar Location, Bar Spacing, Concrete Cover and Bar Diameter Embedded in Concrete	BS 1881: Part 204: 1988

Signatories:

1. Ip Kwok Khuen
2. Tang Wei Luen
3. Nor Hasyira Binti Hashim

* The expanded uncertainties are based on an estimated confidence probability of not less than 95% and have a coverage factor of k=2 unless stated otherwise

SCOPE OF CALIBRATION: MASS**SITE CALIBRATION: CATEGORY I**

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Balance	Up to 30 kg	0.1 g	ASTM E 898 – 20 (Calibrated Using Standard Weights)

Signatories:

1. Ip Kwok Khuen
2. Ip Kar Mun

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SCOPE OF CALIBRATION: CALIBRATION (FORCE)**SITE CALIBRATION: CATEGORY I**

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Compression / Tensile Testing Machine	Up to 800 kN	3.0 kN	Calibrated by using load cell with reference to ISO 7500 - 1: 2018
	801 kN to 2000 kN	5.2 kN	

Signatory:

1. Ip Kar Mun