o. Anchors and Fasteners

i. The Contractor shall submit the details of the proposed proprietary anchor to the S.O. for approval

ii. Notwithstanding the above, the alternative anchor proposed shall be made of carbon steel galvanized to a minimum thickness of 5 um or stainless steel in accordance to European Technical Approval Guideline ETAG 001 Metal Anchors for use in Concrete.

iii. The size of the anchor fixing shall not be less than 6mm diameter (M6) with an effective anchorage depth of not less than 30mm measured from the soffit of the floor slab. The hole for the anchor shall be drilled using a drill bit of the corresponding size to the proprietary anchor. The design resistance in all load directions shall not be less than 1.10kN.

iv. Shot-fired alternative anchors shall not be allowed. Shot—fired (hybrid— pin) alternative anchors shall not be used to install the suspended ceiling hangers to the concrete soffit. Screws with nylon wing plugs shall not be used as ceiling anchors to install the suspended ceilings.

v. Fasteners shall have a corrosion-resistant finish and be appropriate for intended use, in accordance with BS EN 14566. The heads of fasteners shall be shaped so that they can be driven below the surface of the plasterboard without punching through the paper liner.

p. Acoustical Cellulose Insulation

i. Spray Applied Acoustical Cellulose Insulation on ceding and/or soffit of slab shall be:

a) Thickness — minimum 30mm

b) Thermal conductivity (k—value) = 0.0029 W/mK tested to ASTM C- 177.

c) Fire retardant Class 'O' complying with BS476 Part 6 & 7 and endorsed by Jabatan Bomba Dan Penyelamat Malaysia.

d) Average moisture absorption of not more than 15% as per ASTM C739.

e) Tested Noise Reduction Coefficient of NRC 0.75 at 30mm thickness.

f) Tested to non—toxic and asbestos-free, contain no carcinogenic materials and shall not cause any skin irritation to humans.

g) Where required, appropriate surface preparation and treatment should be done on the surface of the substrate according to the manufacturer's recommendation.

h) The application of cellulose insulation shall be applied strictly to manufacturer's method statement and to S.O approval

q. Ceiling Suspension System

i. General

a) Batten system (furring channels) as vertical ceiling hangers shall not be allowed for the installation of a proprietary ceiling system.

b) Where grid ceiling suspension system are installed exposed to wind condition (outside building), all lay-in ceiling panels/boards shall be sewed to the suspension system with minimum two proprietary 'hold—down clip' for each tile as recommended by the manufacturer and approved by the S.O.

c) Only proprietary adjustable butterfly type locking clips (rod joiner) shall be used with a minimum thickness of 0.48mm and galvanize mass of minimum 80g/sq.m. The locking clips shall be of minimum steel grade SK-5 or equivalent with a minimum pal off strength of 110kgs.

ii. Fixed Ceiling System

a) Timber framing or metal framing system shall be designed and installed to support the fixed ceiling panels/boards on the external or outside space of the building as shown on the Drawings.

b) All timber materials used shall be treated. Unless otherwise ceiling boards fixed to the timber frames shall be with butt 'V'joint using screws as recommended by the ceiling manufacturer and to S.O.'s approval.

c) Where conceal ceiling are used, all ceiling panels/boards fixed to the metal frames shall be screwed permanently to the metal framing system as recommended by the ceiling manufacturer and to S.O approval.

d) All screw fixing of the ceiling panelboards to the framing system shall be completely sealed to match with the ceiling surface. All external ceiling shall be painted with weather-resistant paint as specified under : PAINTING WORKS.

iii. Grid Ceiling Suspension System

a) Vertical suspension members

1. Ceiling hangers shall be galvanized mild steel machine straightened hanger rods of minimum 4mm diameter consisting of 2 pieces length with a galvanization thickness of minimum 80q/sq.m and tensile strength of minimum 350MPa., held together by a galvanized rod joiner (adjustable galvanized locking clips). Only proprietary adjustable locking clips (butterfly type) shall be used as a rod joiner.
2. Proprietary anchor fixing shall not be less than 6mm diameter (M6) with an effective anchorage depth of not less than 30mm measured from the soffit of the floor slab. The hole for the anchor shall be drilled using a drill bit of corresponding size to the anchor. The proprietary anchor is fixed to the structural soffit at a distance 200mm away from the wall and then spaced equal to or not more than 1200mm center to center (c/c) to form the grid of the ceiling hanger
3. One end of the hanger shall be attached to a pre-drilled galvanized mild steel L-shaped soffit cleat 25mm x 25mm X 50mm (width) and minimum base metal thickness of 2mm with a galvanization thickness of a minimum 80q/sq.m for suspending the pre-straightened hanger rod. The other end of the hanger shall be secured using proprietary locking clips to the primary T-section. The T-sections shall be fixed according to the required ceiling level by adjusting the length of the ceiling hanger through the joiner.
4. One end of the pre-straightened hanger rod shall be hooked to the pre-drilled soffit cleat and the other end of the hanger shall be secured to the primary T-section using proprietary locking clips. The T-sections shall be fixed according to the required ceiling level by adjusting the length of the ceiling hanger through the joiner
5. The proprietary adjustable locking clips (butterfly type rod joiner) shall be 0.5mm minimum thickness with a galvanized coating mass of a minimum 80g/sq.m. The locking clips shall be of minimum steel grade SK-5 and with a minimum pull-off strength of 110 kgs.

b) Horizontal suspension members

1. The T-grid system Shal manufactured to a minimum 24mrn width x 30mm height T-section rigidized (rotary stitching) on all T-sections and with a load carrying capacity of minimum 20kgs/m2 per ASTM C635. All T-sections shall be in powder-coated white color. Installation shall refer to the manufacturer's method statement.
2. Perimeter wall angles shall be securely fixed to the adjacent perimeter walk using appropriate fixings forming part of the grid ceiling system as recommended by the manufacturer and approved by the S.O.

iv. Concealed Ceiling Suspension System (Soffit-ceiling distance & height : 1800mm)

a) Unless otherwise shown on the Drawings and when the distance between the concrete soffit and the suspended ceiling board is less than 1800mm in vertical height. the concealed ceiling suspension system shall be as follows :

b) Vertical suspension members

1. Ceiling hangers shall be rigidized galvanized mild steel 25mm x 25mm angle section With 0.5mm base metal thickness OR galvanized mild steel machine straightened hanger rods of minimum 4 mm diameter with a galvanization thickness of minimum 80g/sq.m and tensile strength of minimum 350MPa. The rod shall be in 2 pieces and should be used in conjunction with the (butterfly type) clip/rod joiner. Leveling of the ceiling shall be executed in accordance with the manufacturer's method statement.
2. Proprietary anchor fixing shall not be less than 6mm diameter (M6 or with an effective anchorage depth of not less than 30mm measured from the soffit of the floor slab. The hole for the anchor shall be drilled using a drill bit of the size of the anchor. The proprietary anchor shall be fixed to the structural soffit at a distance 200mm away from the wall and then spaced equal to or not more than 1000mm centre to centre (c/c) to form the grid of the ceiling hanger.
3. Where hanger rods are used, one end of the hanger rod shall be attached to a galvanized mild steel L-shaped soffit cleat 25mm x 25 mm x 50mm (width) with a minimum base metal thickness of 2mm. The other end of the hanger Shal be secured using proprietary locking clips to the primary channel (main runners).
4. Where mild steel angle sections are used as ceiling hangers, one end of the ceiling hanger shall be connected to the pre-drilled proprietary anchor fastener to the soffit slab. The other end of the hanger shall be secured using proprietary locking clips or suspension brackets to the primary channel (main runners).

c) Horizontal members

1. Primary rigidized galvanized steel channel (main runners) shall be 34mm x 12mm x 0.4mm minimum BMT at a distance of 100mm away from the wall and spaced equal to or not more than 1000mm c/c (the minimum thickness may varies according to the profile with larger cross-section values with appropriate justification from manufacturer). Installation shall refer to the manufacturer's method statement.
2. Secondary rigidized galvanize steel channel 34mm x 12mm x 0.4mm minimum BMT shall be secured using proprietary locking clips or suspension brackets to the primary channel.
3. The primary and secondary channels shall be connected using galvanized proprietary locking clips or suspension brackets with a minimum thickness of 0.5mm (the minimum thickness may varies according to the profile with larger cross-section values with appropriate justification from the manufacturer) and screwed as recommended by the manufacturer. And no tilting movements are allowed on Primary channel once secured with locking clips.
4. Unless otherwise specified, a single layer 9mm thick gypsum plasterboard ceiling shall be screwed using galvanized wafer head drywall screw Ø 4mm x 25mm length fixed at a maximum distance of 200mm c/c to the secondary channel as recommended by the manufacturer.

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UNIVERSITI TEKNOLOGI MARA

NO. RUJUKAN PROJEK: 200-PPII(BP.5/3/158)-ARC

TARIKH: 20 24 | 31 DIS.

TAJUK LUKISAN: **METHOD OF STATEMENT FOR CEILING**

SKALA: **N.T.S**

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v. Concealed Ceiling Suspension System (Floor-ceiling distance > 1800mm)

a) Unless otherwise shown on the Drawings or when the distance between the concrete soffit and the suspended ceiling board exceeds 1800mm in vertical height, the concealed ceiling suspension system shall be as follows :

1. Vertical suspension members

i. Ceiling hanger system shall be galvanized mild steel threaded rods of not less than 6mm diameter.

ii. Fixing of vertical suspension hangers to soffit slab shall be by using threaded rod and proprietary anchor (drop-in anchor or equivalent). Identify the actual location of suspended point on site, mark the position for drilling, the position should no more than 100mm away from the perimeter wall, drilling at least 28mm depth. Insert corresponding diameter drop-in anchor or equivalent, for best result hammer the "pin" slightly inside the drop-in-anchor. Cut threaded rod to require suspension length and screw fix the threaded rod into the corresponding diameter drop-in-anchor or equivalent. Slightly pull the threaded rod to check the fixing.

iii. One end of the threaded ceiling hanger rod shall be connected to the pre-drilled anchor fastener (drop-in anchors or equivalent) and the other end of the threaded rod shall be secured to the proprietary locking clips or suspension brackets with two M6 nuts and locked to the primary channel (main runners).

2. Horizontal members

i. Primary channel shall be galvanized steel 38mm x 12mm x Imm thick minimum placed at a distance of 100mm away from the wall and spaced equal to or not more than 1000mm c/c.

The primary channel shall have the characteristic strength of at least 250N/mm2. Installation shall refer to the manufacturer's method statement.

ii. The dimension of the secondary channel shall be at not less than 50mm x 20mm x 0.5mm thick minimum placed at 450mm c/c minimum for 9mm thickness board and 600mm c/c minimum for 12mm thickness board. The secondary channel shall have the characteristic strength of at least 250N/mm2.

iii. The primary and secondary channels shall be connected using a galvanized proprietary locking clip with a minimum thickness of 0.5mm (thethickness may vary according to the profile with larger cross-section values with appropriate justification from the manufacturer) and screw as recommended by the manufacturer.

iv. Unless otherwise specified, a single layer 9mm thick minimum plasterboard ceiling shall be screwed using galvanized drywall screw Ø4mm x 25mm length at a maximum of 200mm c/c to the secondary channel as recommended by the manufacturer.

3. Performance and Installation Requirements

i. Suspended ceiling systems are not designed for and shall not be regarded as structural elements. Electrical wiring systems, including cable trays, conduits, junction boxes, lighting fixtures, air-conditioning ducts, air diffusers, and other appurtenances shall not be placed directly on the ceiling and shall be independently supported and independently braced from the structure.

ii. Suspended ceilings shall be designed to ensure that detrimental levels of water and condensation are not formed within or on the surfaces of the ceiling and related components and the ceilings shall be designed according to Class C conditions of BS EN 13964.

iii. Other steel components of the substructure such as supporting member, perimeter trim, et cetera shall have a characteristic strength of at least 250N/mm2, and their tolerances shall comply with BS EN 13964. No bends or notches or drilling or other alterations from its original state are allowed on steel components unless allowed by the manufacturer.

iv. Where not specified, tolerances for the ceiling shall comply with BS EN 13964. The maximum deflection between two suspension points shall not exceed 1.1500 where L is the suspension distance between the two points.

v. The top fixing of all suspension components Shall be made to the primary structural framing element unless specifically designed otherwise. The contractor shall ensure the fixings are of a corrosion-resistant material suitable for the intended application, and fixings shall be compatible with the material of the structure to which they are to be fitted.

4. Structural steel fixing

i. Self-drilling screws are not allowed for structural steel unless specifically designed otherwise. These screws shall not be placed in tension unless specifically designed for that purpose.

ii. Penetrations made into the structural steel by drilling shall be duly approved by the S.O

iii. Clips shall be installed strictly in accordance with the manufacturer's recommendations.

5. Cold-formed truss/timber truss fixing

i. Suspended ceiling system fixings to cold-formed trusses shall only be allowed by using steel plate straps. In the case of proprietary truss systems, the Contractor shall obtain written approval from the Truss System Provider and the S.O.

ii. Fixings to timber joists shall be made into the side of the timber, with five times the diameter of the fastener clear edge distances.

6. Glued laminated timber fixing

   i. Top fixing to glued laminated timber members shall only be allowed with the approval of an S.O. The glued laminated timber shall be fabricated as specified under SECTION H: TIMBER, JOINERY AND IRONMONGERY.

7. Concrete fixing

   i. Shot-fired fasteners are not allowed to be installed directly on a concrete flat roof slab. Separate structural framing elements for ceiling fixing shall be specifically designed if required, and it shall be approved by the S.O.

   ii. Fixing to aerated/lightweight concrete shall only be made by the manufacturer's recommendations.

8. Purlin fixing

   i. Fixings shall be made of steel plate straps. No connections requiring drillings to the web/lip of the purlins are allowed unless specifically designed otherwise.

   ii. Where flange connections are necessary, they should be made as close as possible to the web of the purlin, and design calculations shall be provided to ensure the structural capacity of the purlin is not compromised.

   iii. Fixings shall be selected and installed in accordance with the manufacturer's specifications and approved by the S.O.

9. All concrete expansion bolts shall be installed in accordance with the manufacturer's recommendations taking due care to maintain minimum edge distances, spacing, and embedment depth.

10. Ceiling hangers shall be installed in accordance with the ceiling system manufacturer's recommendation. Bends as means of leveling the ceiling or to avoid plenum services, shall not be made in the ceiling hangers. Where ceiling hangers cannot be secured at the specified spacing, secondary members shall be installed to the manufacturer's recommendation.

11. In areas where the suspended ceiling is adjacent to rooms or areas with twenty-four (24) hours of air-conditioning and the concrete soffits are applied With PU foam, the ceiling suspension hanger shall be secured to the concrete soffit using M6 x 30mm A4 stainless steel (DINI 7440) anchor bolts as specified or shown on the Drawings.

12. Unless otherwise shown on the Drawings, plasterboard partitions shall be fixed to the primary framing members of the ceiling suspension system in accordance with of BS 8212.

13. Suspended Ceiling Exposed to Wind (Outside Building).

   i. Wind Load

      1. The minimum basic wind speed shall be 35 m/s. However, the minimum basic wind speed shall be increased to 41m/s for lightweight covering.

      2. The requirement of wind load shall be as stated in the MS 1553 — Code of Practice on Wind Loading for Building Structures. The minimum basic Wind speed shall be as specified above or as per the value stated in MS 1553 whichever is higher.

      3. Load combinations shall be identified (as per MS EN 1993 Part I to Part 3 or other equivalent standards internationally) and itemized to enable the design checking to be carried out upon the most adverse conditions or the effect (e.g., the effect of uplift) under consideration.

      4. Where grid ceiling system is installed in areas exposed to wind conditions (outside buildings), all lay-in ceiling panels/boards shall be secured to the suspension system with a minimum two proprietary 'hold-down clips' for each tile as recommended by the manufacturer and approved by the S.O. Installation shall refer to manufacturers method statement.

14. Testing and Inspection

   i. The Contractor shall carry out an in-situ Pull-Out Test for the complete ceiling suspension (hanger) system inclusive of the rod joiner and the anchors. The sampling rate shall be 5 samples for every 200 number of hangers installed and the points Of testing shall be carried out subject to S.O's approval.

   ii. The minimum load for the pull-out test shall be 0.5 kN applied to each complete ceiling suspension sample inclusive of rod joiner where applicable. The test sample shall be left for 8 hours, and the observation shall be recorded and submitted to the S.O for approval.

   iii. The Contractor Shall inform the S.O. in writing to request for inspection and approval prior to closing up of the ceiling suspension system with ceiling panels.

15. Warranty

i. When a proprietary ceiling system is used, the Contractor shall submit to the S.O. a warranty from the manufacturer with the following provisions:

1. The products used are genuine and free from manufacturing defects.
2. The complete ceiling suspension (hanger) system is installed in accordance with the manufacturer's method statement, recommendation, guidance, and specifications that will deliver the specified level of performance.
3. The warranty certificate shall cover a period of ten (10) years from the date of Certificate of Practical Completion against any defect or failure due to the installation and workmanship by the manufacturer's registered panel installer.

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UNIVERSITI TEKNOLOGI MARA

NO. RUJUKAN PROJEK:
200-PPII(BP.5/3/158)-ARC

TAJUK LUKISAN:
**METHOD OF STATEMENT FOR CEILING**

TARIKH: **20 24 | 31 DIS.**

SKALA: **N.T.S**

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# METHOD OF STATEMENT FOR WATER PROOFING

1. GENERAL INSTRUCTIONS

a. The method statement should be read in conjunction with the specifications stated in the architectural drawings.
b. This method statement outlines the procedure for the preparation, application, and curing of backing screed and waterproofing works approved products, including S R Mortar, Prime-N-Bond, and Hydro Barrier Waterproofing Membrane. The work will be carried out as per the manufacturer's guidelines, local building codes, and industry standards to ensure the long-term performance and durability of the waterproofing system.
c. The product shall be installed by experience professional registered and approved applicator by manufacturer's.

2. SUMMARY

a. Scope of work - Provide ceramic tile, tile installation materials, and accessories as indicated on drawings, as specified herein, and as needed for complete and proper installation.
b. Related Documents – The Drawings & Specification

3. WORK INCLUDES

a. This method statement includes the following :
   i. Surface preparation of the substrate.
   ii. Application of Prime-N-Bond bonding agent.
   iii. Installation of S R Mortar backing screed.
   iv. Application of Hydro Barrier Waterproofing Membrane.
   v. Quality control and inspections during each phase.
   vi. Cleaning and preparation for the next phase of construction (e.g., tiling).

4. SUBMITTALS

a. Before commencing the work, the following documents shall be submitted for approval :
   i. Manufacturer's product data sheets for S R Mortar, Prime-N-Bond, and Hydro Barrier Waterproofing Membrane.
   ii. Certificates of compliance with relevant standards (e.g., ISO, ASTM).
   iii. Warranty information for Laticrete products.
   iv. Detailed drawings of the waterproofing system, including joint and corner treatments.

5. DELIVERY, HANDLING AND STORAGE PROTECTION

a. Delivery : Ensure that all waterproofing materials are delivered to the site in their original, unopened packaging, clearly labeled with the manufacturer's name and product type.
b. Handling : Handle materials with care to prevent damage. Avoid exposure to extreme temperatures or moisture before use.
c. Storage : Store materials in a dry, cool, and well-ventilated area. Keep waterproofing membranes off the ground and protected from contamination.

6. ENVIRONMENTAL CONDITIONS

a. Temperature : The temperature during the application and curing process should be between 5°C (41°F) and 35°C (95°F). Avoid applying waterproofing during rain, high humidity, or extreme temperature conditions.
b. Surface Condition : The substrate should be free from dust, debris, grease, oil, and any contaminants that may affect adhesion.
c. Protection : If necessary, provide temporary covers to shield the waterproofing system from moisture or direct sunlight during curing.

7. MATERIALS

a. The following materials will be used for the waterproofing works :
   i. S R Mortar for backing screed application.
   ii. Prime-N-Bond bonding agent.

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iii. Hydro Barrier Waterproofing Membrane.
iv. Clean, potable water for mixing.
v. Tiling tools, mixers, trowels, rollers, and brushes.
vi. Measuring tape, straight edges, and levels.

8. MIXING

a. Prime-N-Bond : Mix the bonding agent as per the manufacturer's data sheet to achieve a smooth and even consistency.
b. S R Mortar : Mix S R Mortar with clean water in the correct proportion according to the manufacturer's instructions. Mix until the mortar achieves a uniform consistency with no lumps.
c. Hydro Barrier Membrane : Mix the Hydro Barrier Waterproofing Membrane according to the manufacturer's guidelines to ensure uniform consistency.

9. PREPARATION

a. Surface Preparation : Ensure that the substrate is clean, dry, and free from any contaminants (e.g., dust, grease, or loose debris). Any cracks or irregularities should berepaired before proceeding.
b. Dampen the Surface : Slightly dampen the surface to improve bonding, but avoid excessive moisture accumulation.
c. Bonding Agent Application : Apply Prime-N-Bond using a roller or brush to the substrate in a thin, even coat. Allow it to dry for 15–60 minutes before proceeding to the next step.

10. APPLICATION

a. Backing Screed:
   i. Mix S R Mortar as per the manufacturer's guidelines.
   ii. Apply the screed at a thickness of 15mm to 45mm for floor areas and 10mm to 15mm thick upturns to walls up to 1500mm in height at shower walls.
   iii. Ensure the surface is level and smooth using a straight edge or level. Allow the screed to cure for 3 days before proceeding.
b. Waterproofing Membrane :
   i. First Coat : Apply Hydro Barrier Waterproofing Membrane to the entire surface at 1.2kg/m², ensuring complete coverage. Use a roller or brush for an even application.
   ii. Second Coat : After the first coat has dried (approximately 24 hours), apply a second full coat of the waterproofing membrane, ensuring consistent coverage.
   iii. Curing : Allow the waterproofing to cure for 48 hours before proceeding with anyfurther works, such as tiling.

11. FIELD QUALITY CONTROL

a. Substrate Inspection : Inspect the substrate before applying bonding agents to ensure it is free from contaminants and ready for application.
b. Bonding Agent : Verify that Prime-N-Bond is applied evenly and that the proper drying time is observed.
c. Screed Thickness : Ensure that the screed thickness meets the specifications as per the design.
d. Waterproofing Coverage : Check that the waterproofing membrane is applied without gaps, ensuring complete coverage at all junctions, corners, and pipe penetrations.
e. Water Ponding Test : If required, conduct a water ponding test after curing to verify that the waterproofing is watertight.

12. WARRANTY

a. A warranty for the waterproofing system, including materials and workmanship, will be provided as per the manufacturer's guidelines. The warranty period will commence from the date of the final inspection and handover. A certificate of warranty will be issued upon completion.

13. CLEANING

a. Post-Application Cleaning : Immediately remove any excess waterproofing material from the surface before it sets. Use clean water and a cloth to clean the tools and surrounding areas.
b. Site Cleaning : Ensure the work area is cleaned thoroughly after the completion of waterproofing works, and all waste materials are properly disposed of in accordance with local regulations.

14. MOCK-UPS
a. Provide a mock-up of each type/style/finish/size/color of approved tile, along with respective installation adhesives, mortars, grouts, and other installation materials as directed by the architect officer.

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