Critique of Architectural Details

Summary: We were asked for help with these architectural details publicly.

Process. The set of details presented below was only subjected to the first step of a process. The process involves analysis and critique or clarification of what was shown on the drawings, typically leading to research of associated conditions, review of available alternatives, and choice of solution, resulting in a new, better set of details.

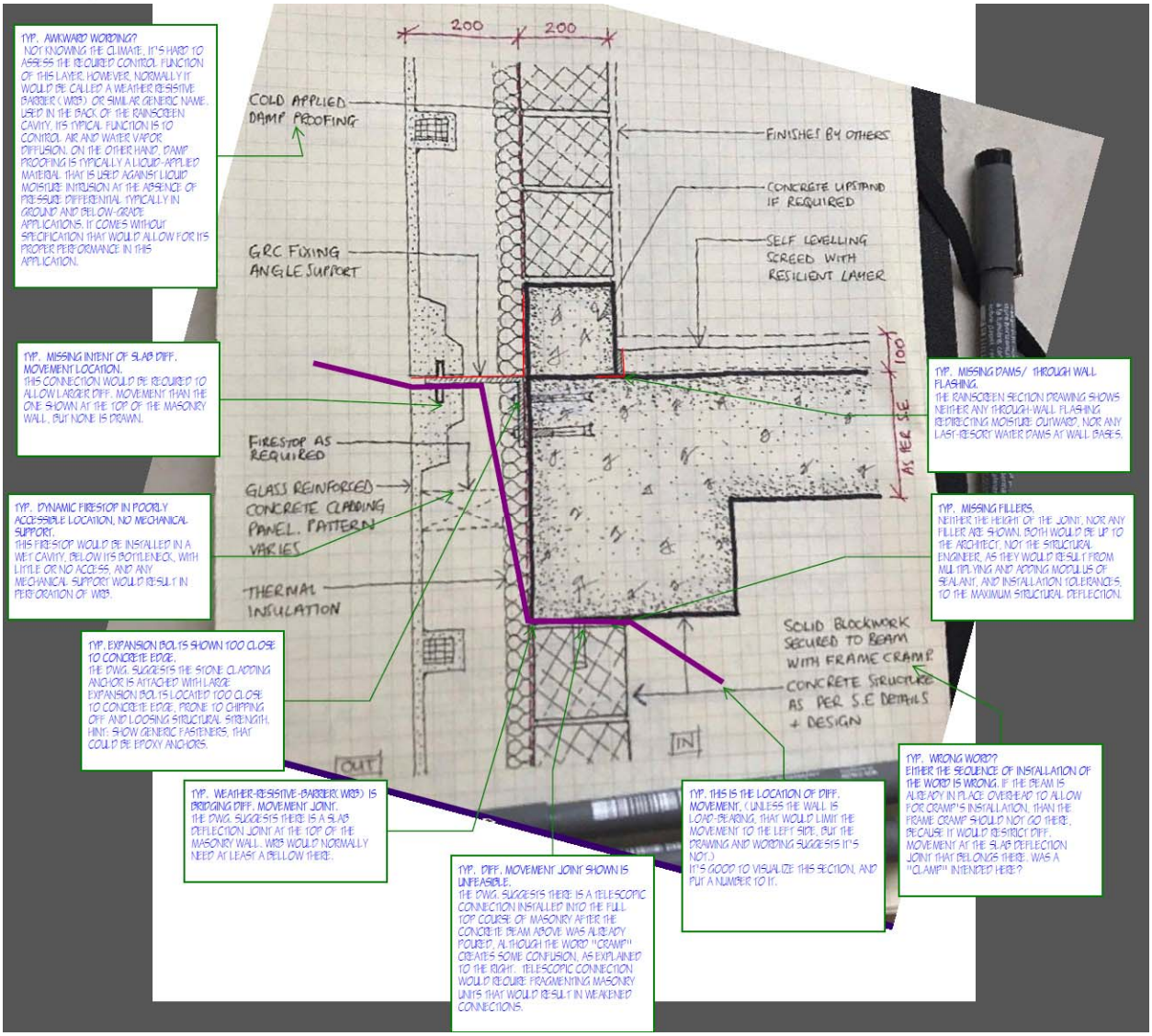
General Comments:

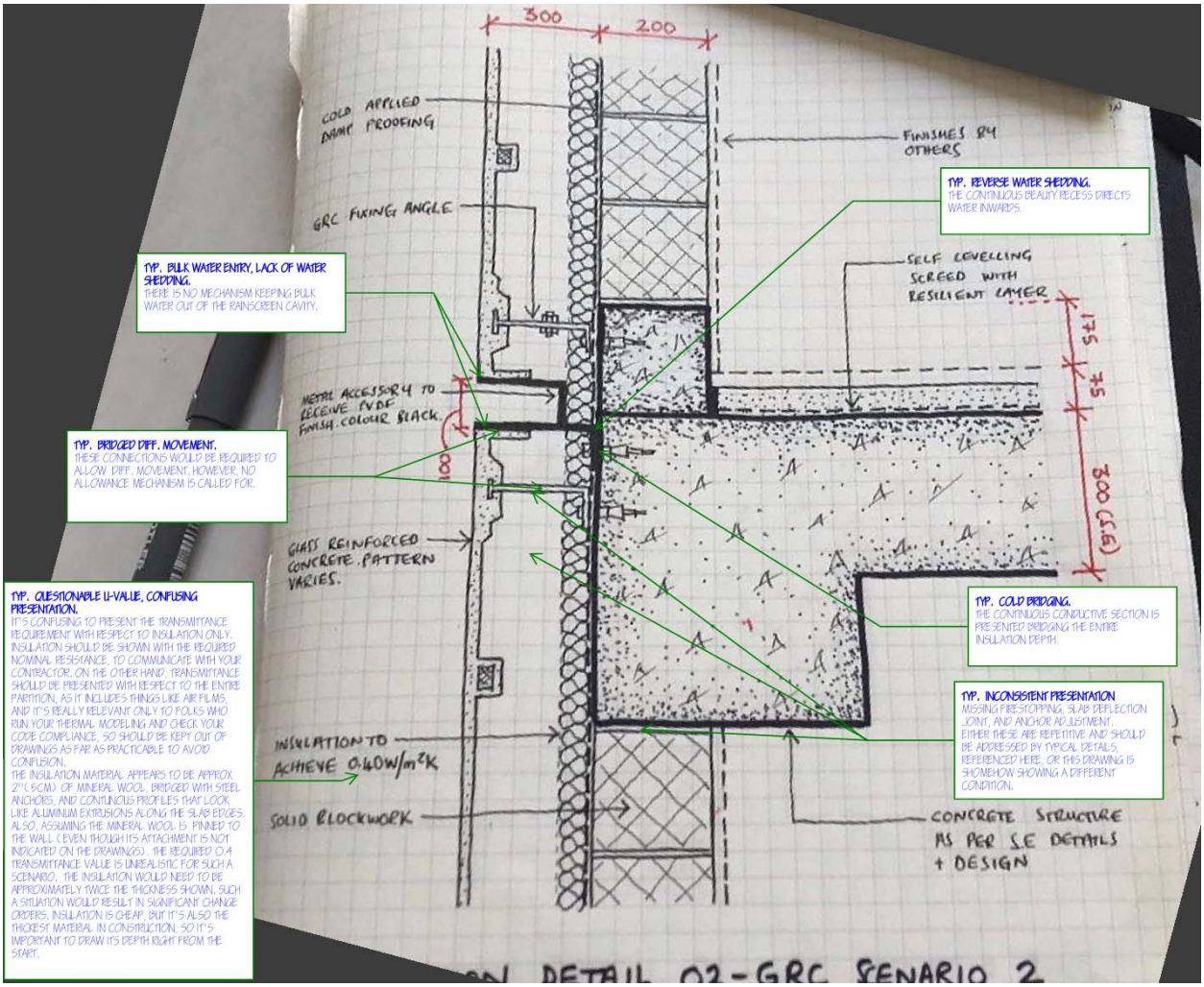
Good: These details are drawn by hand with by a very skillful drafter, so they are very pleasant for reader's eyes and easy to read. The sides of an assembly "out" and "in" are clearly marked. Sections through different materials are very well differentiated.

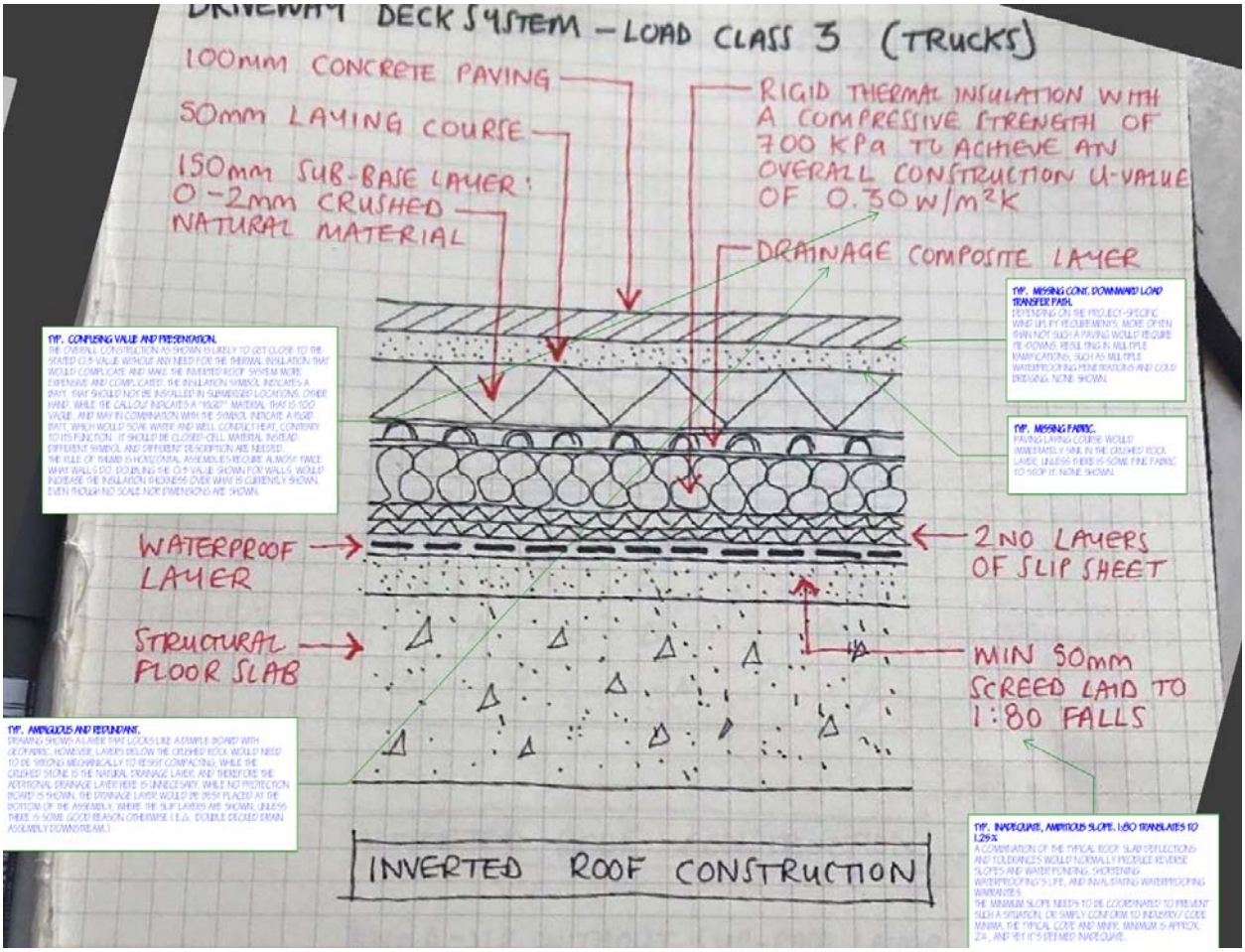
Bad: There are also some aspects commonly overlooked by architects, e.g. differential movements are not addressed, water drainage and ventilation paths are not marked (and an inward drainage is pictured), thermal insulation thickness do not appear to meet the stated resistance, and slope appears to be uncoordinated with either perimeter details and typical structural deflections.

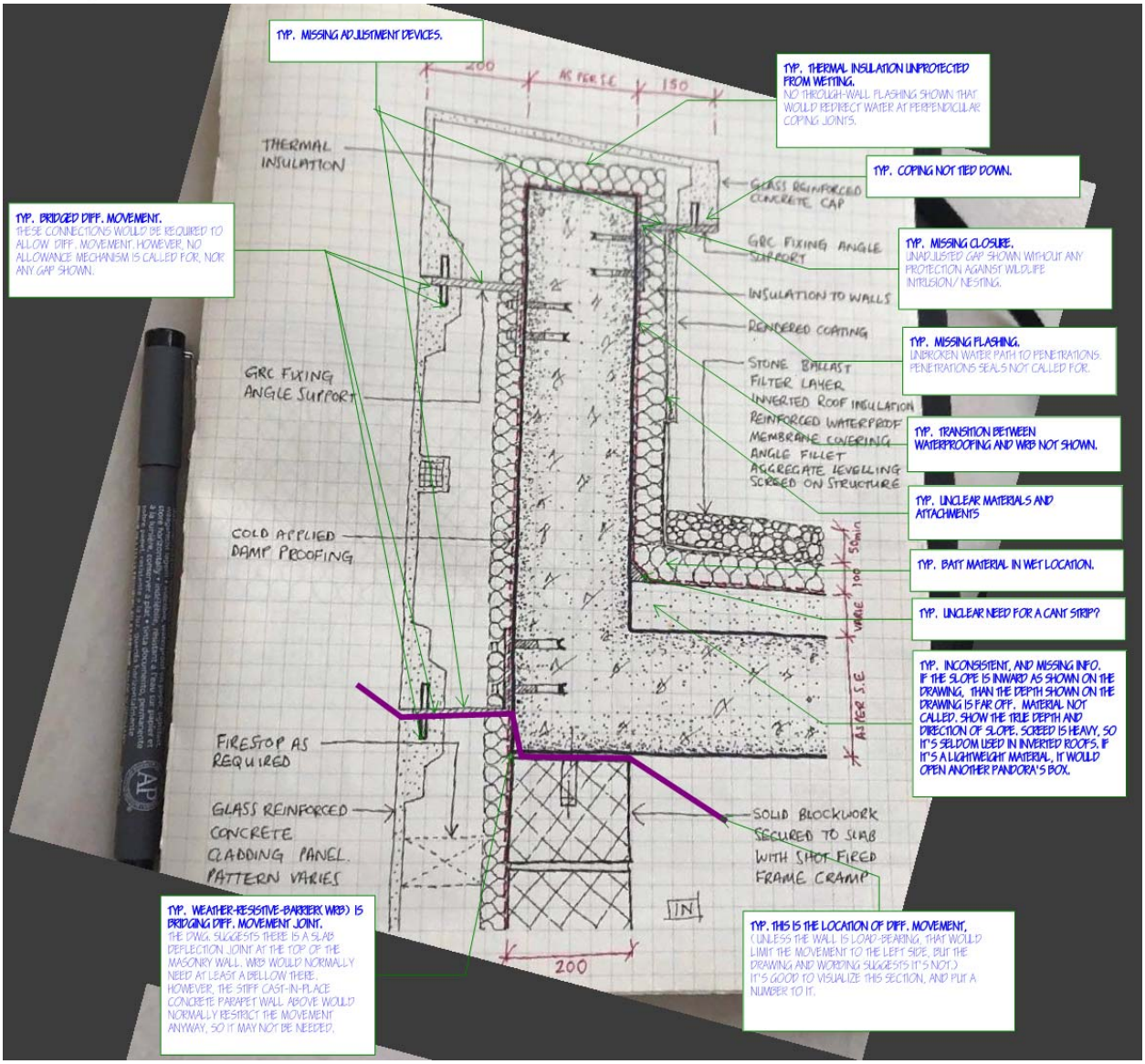
Less important is that some dimensions don't match proportions, so the intentions are sometimes hard to decipher: where e.g. thicknesses of layers need to match the declared slope time distance, but it may be the necessary cost of the artisanal character of these sketches.

Next Step: We never heard back, which is typical. Typically, designers would either pretend they didn't get them or protest such comments, and therefore we would have to explain them, showing slideshows explaining basic principles of building physics, elementary behavior of common construction materials, photographs of associated deficiencies taken on buildings that we investigated in the past, etc. In most of these cases, it would be revealed that architects did not understand these comments. That's how the educational seminars were born: they were intended to address deficiencies in the typical architectural curriculum.


TYP. AWKWARD WORDING?
NOT KNOWING THE CLIMATE, IT'S HARD TO ASSESS THE REQUIRED CONTROL FUNCTION OF THIS LAYER. HOWEVER, NORMALLY IT WOULD BE CALLED A WEATHER RESISTIVE BARRIER (WRB) OR SIMILAR GENERIC NAME, USED IN THE BACK OF THE RAINSCREEN CAVITY. ITS TYPICAL FUNCTION IS TO CONTROL AIR AND WATER VAPOR DIFFUSION. ON THE OTHER HAND, DAMP PROOFING IS TYPICALLY A LIQUID-APPLIED MATERIAL THAT IS USED AGAINST LIQUID MOISTURE INTRUSION AT THE ABSENCE OF PRESSURE DIFFERENTIAL, TYPICALLY IN GROUND AND BELOW-GRADE APPLICATIONS. IT COMES WITHOUT SPECIFICATION THAT WOULD ALLOW FOR ITS PROPER PERFORMANCE IN THIS APPLICATION.
200
200
COLD APPLIED DAMP PROOFING
FINISHES BY OTHERS
CONCRETE UPSTAND IF REQUIRED
GRC FIXING ANGLE SUPPORT
SELF LEVELLING SCREED WITH RESILIENT LAYER
100
AS PER S.E
TYP. MISSING INTENT OF SLAB DIFF. MOVEMENT LOCATION.
THIS CONNECTION WOULD BE REQUIRED TO ALLOW LARGER DIFF. MOVEMENT THAN THE ONE SHOWN AT THE TOP OF THE MASONRY WALL, BUT NONE IS DRAWN.
TYP. MISSING DAMS/ THROUGH WALL FLASHING.
THE RAINSCREEN SECTION DRAWING SHOWS NEITHER ANY THROUGH-WALL FLASHING REDIRECTING MOISTURE OUTWARD, NOR ANY LAST-RESORT WATER DAMS AT WALL BASES.
FIRESTOP AS REQUIRED
GLASS REINFORCED CONCRETE CLADDING PANEL. PATTERN VARIES
TYP. DYNAMIC FIRESTOP IN POORLY ACCESSIBLE LOCATION, NO MECHANICAL SUPPORT.
THIS FIRESTOP WOULD BE INSTALLED IN A WET CAVITY, BELOW ITS BOTTLENECK, WITH LITTLE OR NO ACCESS, AND ANY MECHANICAL SUPPORT WOULD RESULT IN PERFORATION OF WRB.
TYP. MISSING FILLERS.
NEITHER THE HEIGHT OF THE JOINT, NOR ANY FILLER ARE SHOWN, BOTH WOULD BE UP TO THE ARCHITECT, NOT THE STRUCTURAL ENGINEER, AS THEY WOULD RESULT FROM MULTIPLYING AND ADDING MODULUS OF SEALANT, AND INSTALLATION TOLERANCES, TO THE MAXIMUM STRUCTURAL DEFLECTION.
THERMAL INSULATION
SOLID BLOCKWORK SECURED TO BEAM WITH FRAME CRAMP
CONCRETE STRUCTURE AS PER S.E DETAILS + DESIGN
TYP. EXPANSION BOLTS SHOWN TOO CLOSE TO CONCRETE EDGE.
THE DWG. SUGGESTS THE STONE CLADDING ANCHOR IS ATTACHED WITH LARGE EXPANSION BOLTS LOCATED TOO CLOSE TO CONCRETE EDGE, PRONE TO CHIPPING OFF AND LOOSING STRUCTURAL STRENGTH. HINT: SHOW GENERIC FASTENERS, THAT COULD BE EPOXY ANCHORS.
OUT
IN
TYP. WRONG WORD?
EITHER THE SEQUENCE OF INSTALLATION OF THE WORD IS WRONG. IF THE BEAM IS ALREADY IN PLACE OVERHEAD TO ALLOW FOR CRAMP'S INSTALLATION, THAN THE FRAME CRAMP SHOULD NOT GO THERE, BECAUSE IT WOULD RESTRICT DIFF. MOVEMENT AT THE SLAB DEFLECTION JOINT THAT BELONGS THERE. WAS A "CLAMP" INTENDED HERE?
TYP. WEATHER-RESISTIVE-BARRIER(WRB) IS BRIDGING DIFF. MOVEMENT JOINT.
THE DWG. SUGGESTS THERE IS A SLAB DEFLECTION JOINT AT THE TOP OF THE MASONRY WALL. WRB WOULD NORMALLY NEED AT LEAST A BELLOW THERE.
TYP. THIS IS THE LOCATION OF DIFF. MOVEMENT, UNLESS THE WALL IS LOAD-BEARING, THAT WOULD LIMIT THE MOVEMENT TO THE LEFT SIDE, BUT THE DRAWING AND WORDING SUGGESTS IT'S NOT.)
IT'S GOOD TO VISUALIZE THIS SECTION, AND PUT A NUMBER TO IT.
TYP. DIFF. MOVEMENT JOINT SHOWN IS UNFEASIBLE.
THE DWG. SUGGESTS THERE IS A TELESCOPIC CONNECTION INSTALLED INTO THE FULL TOP COURSE OF MASONRY AFTER THE CONCRETE BEAM ABOVE WAS ALREADY POURED. ALTHOUGH THE WORD "CRAMP" CREATES SOME CONFUSION, AS EXPLAINED TO THE RIGHT. TELESCOPIC CONNECTION WOULD REQUIRE FRAGMENTING MASONRY UNITS THAT WOULD RESULT IN WEAKENED CONNECTIONS.


300
200
COLD APPLIED DAMP PROOFING
GRC FIXING ANGLE
METAL ACCESSORY TO RECEIVE EVDF FINISH. COLOUR BLACK.
100
GLASS REINFORCED CONCRETE. PATTERN VARIES.
INSULATION TO ACHIEVE 0.40W/m²K
SOLID BLOCKWORK
FINISHES & OTHERS
SELF LEVELLING SCREED WITH RESILIENT LAYER
57±1
55
800 (S.B)
CONCRETE STRUCTURE AS PER S.E DETAILS + DESIGN
TYP. REVERSE WATER SHEDDING.
THE CONTINUOUS DEADLY RECESS DIRECTS WATER INWARDS.
TYP. BULK WATER ENTRY, LACK OF WATER SHEDDING.
THERE IS NO MECHANISM KEEPING BULK WATER OUT OF THE RAINSCREEN CAVITY.
TYP. BRIDGED DIFF. MOVEMENT.
THESE CONNECTIONS WOULD BE REQUIRED TO ALLOW DIFF. MOVEMENT. HOWEVER, NO ALLOWANCE MECHANISM IS CALLED FOR.
TYP. QUESTIONABLE U-VALUE, CONFUSING PRESENTATION.
IT'S CONFUSING TO PRESENT THE TRANSMITTANCE REQUIREMENT WITH RESPECT TO INSULATION ONLY. INSULATION SHOULD BE SHOWN WITH THE REQUIRED NOMINAL RESISTANCE, TO COMMUNICATE WITH YOUR CONTRACTOR. ON THE OTHER HAND, TRANSMITTANCE SHOULD BE PRESENTED WITH RESPECT TO THE ENTIRE PARTITION, AS IT INCLUDES THINGS LIKE AIR FILMS, AND IT'S REALLY RELEVANT ONLY TO FOLKS WHO RUN YOUR THERMAL MODELING AND CHECK YOUR CODE COMPLIANCE, SO SHOULD BE KEPT OUT OF DRAWINGS AS FAR AS PRACTICABLE TO AVOID CONFUSION.
THE INSULATION MATERIAL APPEARS TO BE APPROX. 2" (50MM) OF MINERAL WOOL, BRIDGED WITH STEEL ANCHORS, AND CONTINUOUS PROFILES THAT LOOK LIKE ALUMINUM EXTRUSIONS ALONG THE SLAB EDGES. ALSO, ASSUMING THE MINERAL WOOL IS PINNED TO THE WALL (EVEN THOUGH ITS ATTACHMENT IS NOT INDICATED ON THE DRAWINGS), THE REQUIRED 0.4 TRANSMITTANCE VALUE IS UNREALISTIC FOR SUCH A SCENARIO. THE INSULATION WOULD NEED TO BE APPROXIMATELY TWICE THE THICKNESS SHOWN. SUCH A SITUATION WOULD RESULT IN SIGNIFICANT CHANGE ORDERS. INSULATION IS CHEAP, BUT IT'S ALSO THE THICKEST MATERIAL IN CONSTRUCTION, SO IT'S IMPORTANT TO DRAW ITS DEPTH RIGHT FROM THE START.
TYP. COLD BRIDGING.
THE CONTINUOUS CONDUCTIVE SECTION IS PRESENTED BRIDGING THE ENTIRE INSULATION DEPTH.
TYP. INCONSISTENT PRESENTATION
MISSING FIRESTOPPING, SLAB DEFLECTION JOINT, AND ANCHOR ADJUSTMENT. EITHER THESE ARE REPETITIVE AND SHOULD BE ADDRESSED BY TYPICAL DETAILS, REFERENCED HERE, OR THIS DRAWING IS SHOWING A DIFFERENT CONDITION.
DETAIL 02 - GRC SENARIO 2


DRIVEWAY DECK SYSTEM – LOAD CLASS 3 (TRUCKS)
100mm CONCRETE PAVING
50mm LAYING COURSE
150mm SUB-BASE LAYER: 0-2mm CRUSHED NATURAL MATERIAL
RIGID THERMAL INSULATION WITH A COMPRESSIVE STRENGTH OF 700 KPa TO ACHIEVE AN OVERALL CONSTRUCTION U-VALUE OF 0.30 W/m²K
DRAINAGE COMPOSITE LAYER
TYP. CONFLICING VALUE AND PRESENTATION.
TYP. MISSING CONT. DOWNWARD LOAD TRANSFER PATH.
TYP. MISSING FABRIC.
WATERPROOF LAYER
2NO LAYERS OF SLIP SHEET
STRUCTURAL FLOOR SLAB
MIN 50mm SCREED LAID TO 1:80 FALLS
TYP. AMBIGUOUS AND REDUNDANT.
TYP. INADEQUATE, AMBITIOUS SLOPE. 1:80 TRANSLATES TO 1.25%
INVERTED ROOF CONSTRUCTION


TYP. MISSING ADJUSTMENT DEVICES.
200
AS PER S.E
150
THERMAL INSULATION
TYP. THERMAL INSULATION UNPROTECTED FROM WETTING.
NO THROUGH-WALL FLASHING SHOWN THAT WOULD REDIRECT WATER AT PERPENDICULAR COPING JOINTS.
TYP. COPING NOT TIED DOWN.
GLASS REINFORCED CONCRETE CAP
TYP. BRIDGED DIFF. MOVEMENT.
THESE CONNECTIONS WOULD BE REQUIRED TO ALLOW DIFF. MOVEMENT. HOWEVER, NO ALLOWANCE MECHANISM IS CALLED FOR, NOR ANY GAP SHOWN.
GRC FIXING ANGLE SUPPORT
TYP. MISSING CLOSURE.
UNADJUSTED GAP SHOWN WITHOUT ANY PROTECTION AGAINST WILDLIFE INTRUSION/ NESTING.
INSULATION TO WALLS
RENDERED COATING
TYP. MISSING FLASHING.
UNBROKEN WATER PATH TO PENETRATIONS. PENETRATIONS SEALS NOT CALLED FOR.
GRC FIXING ANGLE SUPPORT
STONE BALLAST
FILTER LAYER
INVERTED ROOF INSULATION
REINFORCED WATERPROOF MEMBRANE COVERING ANGLE FILLET
AGGREGATE LEVELLING SCREED ON STRUCTURE
TYP. TRANSITION BETWEEN WATERPROOFING AND WRB NOT SHOWN.
TYP. UNCLEAR MATERIALS AND ATTACHMENTS
COLD APPLIED DAMP PROOFING
50min
100
VARIES
AS PER S.E
TYP. BATT MATERIAL IN WET LOCATION.
TYP. UNCLEAR NEED FOR A CANT STRIP?
TYP. INCONSISTENT, AND MISSING INFO. IF THE SLOPE IS INWARD AS SHOWN ON THE DRAWING, THAN THE DEPTH SHOWN ON THE DRAWING IS FAR OFF. MATERIAL NOT CALLED. SHOW THE TRUE DEPTH AND DIRECTION OF SLOPE. SCREED IS HEAVY, SO IT'S SELDOM USED IN INVERTED ROOFS. IF IT'S A LIGHTWEIGHT MATERIAL, IT WOULD OPEN ANOTHER PANDORA'S BOX.
FIRESTOP AS REQUIRED
GLASS REINFORCED CONCRETE CLADDING PANEL. PATTERN VARIES
SOLID BLOCKWORK SECURED TO SLAB WITH SHOT FIRED FRAME CRAMP
TYP. WEATHER-RESISTIVE-BARRIER (WRB) IS BRIDGING DIFF. MOVEMENT JOINT.
THE DWG. SUGGESTS THERE IS A SLAB DEFLECTION JOINT AT THE TOP OF THE MASONRY WALL. WRB WOULD NORMALLY NEED AT LEAST A BELLOW THERE. HOWEVER, THE STIFF CAST-IN-PLACE CONCRETE PARAPET WALL ABOVE WOULD NORMALLY RESTRICT THE MOVEMENT ANYWAY, SO IT MAY NOT BE NEEDED.
TYP. THIS IS THE LOCATION OF DIFF. MOVEMENT.
(UNLESS THE WALL IS LOAD-BEARING, THAT WOULD LIMIT THE MOVEMENT TO THE LEFT SIDE, BUT THE DRAWING AND WORDING SUGGESTS IT'S NOT.)
IT'S GOOD TO VISUALIZE THIS SECTION, AND PUT A NUMBER TO IT.
IN
200