

**Structural Design Review
AVIPA Plus Package House
drawings not dated
WO-A-0042**

Comment #	Reviewer	Reference	Comment	Response Code	Response	Back-Check
STRUCTURAL COMMENTS - AVIPA Plus Package House Construction						
S1	FRS	General	Drawings for the 20x12.7m Package House Construction were provided. There are no drawings for the Guard House, Bathrooms, Perimeter Wall or 2.51x10m structure.			
S2	FRS	Calculations	Reference International Building Code 2006 for design and construction requirements.			
S3	FRS	Specifications (not provided)	Construction quality standards, testing are therefore undefined. Need to submit materials tests and provide certificates from manufacturers for items, indicating conformance with appropriate standards. The work should be inspected by a qualified individual for all critical work items.			
S4	FRS	Structural System	System is a concrete moment resisting frame with infill masonry walls. Form and place concrete columns before infill wall placement. Need truss bearing plates embedded into the top of the beams with threaded anchors (or drilled in and grouted with epoxy grout. Place additional confinement reinforcement bars or stirrups into the concrete below the bearing plate. Suggest reinforced concrete infill wall strip footing foundation.			
S5	FRS	Structural System	Provide hooked reinforcement to develop and transfer forces between the columns and perimeter beams.			
S6	FRS	Geotechnical	Field verify the presence of groundwater and foundation soils prior to construction. Without test data, a conservative estimate of allowable, vertical bearing pressure of 1500psf (0.70 Mpa) might be assumed. Groundwater presence below a meter of the foundation base is not expected to significantly influence the footing width.			
S7	FRS	Foundation	Remove unsuitable materials (organics, clays, cobbles, debris) at the base of foundation excavations. Provide a competent, firm, dry subbase to place concrete foundations.			
S8	FRS	Foundation	Lap hooked vertical bars in footing a minimum of 250mm.			
S9	FRS	Foundation	Suggest damp proofing material is applied to the exterior infill walls to minimize moisture entry through the wall below grade.			
S10	FRS	Foundation	Reviewer does not have information on required frost depth for these regions. Provide required foundation depth below generally accepted frost depth.			
S11	FRS	Foundation	If area within package house is intended to be dry, a full coverage, concrete slab-on-grade with vapor barrier between gravel and underside of building slabs-on-grade is suggested. Not sure if damp conditions are a problem for curing the fruit.			

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S12	FRS	Foundation	Elevations show masonry unit infill walls between columns on stone foundation. Stone foundation not recommended for seismic zone construction. Instead suggest nominally reinforced concrete masonry unit wall to cast-in-place reinforced concrete wall footing below frost line. Attach masonry wall top to underside of concrete perimeter beam at roof line.			
S13	FRS	Column Section	A shelf is indicated at the top of the column detail, not shown on the plans. Suggest eliminating shelf and casting the perimeter beams integral with the top of the column. Design and detail these connections as a moment-resisting frame.			
S14	FRS	Column Section	Reinforcement protruding through the top of column appear much longer than the connecting concrete beam depth. Provide hooked end to maintain minimum concrete cover. Suggest 50mm clear concrete cover to all main reinforcement.			
S15	FRS	Column Section	Show minimum clearance to stirrups as 40mm and verify with design calculations for adequate reinforcement in the moment resisting frame.			
S16	FRS	Beam Details	Show bending details on the drawing. Suggest 4bar diameters for the minimum bending radius with minimum 12 diameters extension beyond bend. Provide 4 diameters extension on 135 degree seismic hooks for stirrups in beams and columns.			
S17	FRS	Beam Details	Continue beam stirrup through joint between beam and column.			
S18	FRS	Beam Details	Indicate appropriate units for concrete strength in notes. Appears to be kPA not Mpa. Insert decimal separator?			
S19	FRS	Beam Details	Beam stirrups to have 135 degree hooks due to seismic zone.			
S20	FRS	Masonry Wall	Anchor exterior walls into roof perimeter beams.			
S21	FRS	Masonry Wall	Provide lintels, could be cast-in-place reinforced concrete, over openings. Grout solid and reinforce jambs in wall alongside door openings.			
S22	FRS	Masonry Wall	Provide horizontal wire reinforcement or reinforced concrete bond beams in hall height and at bottom course. Show a typical detail			
S23	FRS	Site Plan Package House	Is the perimeter of the package house paved with concrete slab-on-grade? If yes, indicate on the plan and call out a maximum spacing for control joints to minimize cracking (approx. 2m). Control joints can be formed by tooling the curing concrete. Place a slight slope away from building for drainage.			

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S24	FRS	Side Elevation	Shows masonry unit infill wall along exposed side face. Will a veneer wall layer be placed over the infill walls and concrete columns? Provide veneer wall anchors in that case, or show the face of the concrete column in the elevation.			
S25	FRS	Long Cross Section AA	Shows left side wall foundation founded above lower floor level. Extend columns and concrete footings down below lower floor level for stability.			
S26	FRS	Long Cross Section AA	Elevation 0.00 is called out for finished grade of apron around building. Suggest calling it elevation 10.0 so that no "negative" elevations can cause confusion during construction.			
S27	FRS	Cross Section BB	Reinforced concrete beam indicated at bottom and top of wall. Provide connection to columns.			
S28	FRS	Truss Plan Dimensions	Show all intended dimension lines to clarify. Some dimensions shown as "0.00" and "0.06".			
S29	FRS	Truss Plan Materials	18GA corrugated iron sheet is indicated in notes. Steel corrugated panels intended for use as roof decking are appropriate. The roofing should be coated with paint on both sides or use galvanized finish for corrosion resistance.			
S30	FRS	Truss Details	Show a steel bearing plate detail with grout on supports anchored into the concrete support (top of column).			
S31	FRS	Truss Plan	Note says "good quality" L iron shall be used. Recommend using steel Grade A36 (min yield stress 248 Mpa).			
S32	FRS	Truss Plan	Show construction details for Secondary roof framing. Cross Section AA shows them as trusses.			
S33	FRS	Truss Details	Combination bolted and welded joints shown on the truss need to be detailed. The welds need to follow a quality standard such as AWS and the mating surfaces need to be prepared adequately. The ends of the angle steel prepared for welding should not be flame cut - which could weaken the strength of the connection.			
S34	FRS	Truss Details	Show typical and special connection details for Truss.			
S35	FRS	Truss Details	Are the 2.5in x 3mm truss members adequate for the applied loadings? Give special consideration to the connection requirements for the truss chords at the centerline.			
S36	FRS	Roof Details Fastening	Fasten at least every 150 mm (6 in.) o.c. at supports and 305 mm (12 in.) at intermediate supports. Place fasteners nominally 9.5 mm (3/8 in.) from ends and edges of boards. Screw fasteners may be used.			

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S37	FRS	Roof Details Overhangs	There are no eaves gable end overhangs shown on the roof details. Eaves are a good detail that prevents rainwater from running down the exterior of the building, staining the masonry surfaces and possibly allowing water to penetrate the framing around windows and door frames. They also aid in bring water out beyond building foundation.			
S38	FRS	Roof Details Ventilation	Roof ventilation details should be incorporated to exchange air and minimize moisture that can damage the roof components. Passive roof vents, ridge vents, eave vents.			
S39	FRS	Roof Details Flashing	Flashing detail should be shown to prevent moisture entry at limits of roofing. Use a minimum dimension of 100 mm (4 in.) up vertical surfaces and 100 mm (4 in.) out onto the roof deck.			
S40	FRS	Roof Details Underlayment	No underlayment details are indicated between the plywood and corrugated roof. It is important to provide a felt or other breathing layer between plywood sheathing and the corrugated metal roof at points of contact to prevent moisture buildup on the plywood and subsequent damage.			
S41	FRS	Stair Detail	A 10cm layer of PCC is called out under stair RCC. It would be more economical to place the stairway concrete full depth with 25 Mpa concrete and reinforcement off the bottom of compacted gravel by a minimum of 75mm. This would be considered placing permanently against earth and stair concrete could be held to the minimum design depth, adding in the 75mm clearance.			
S42	FRS	Stair Detail	Chamfer the stair nosing's to help prevent spalling. Providing an additional rebar within the nosing gives added resistance to spalling.			
S43	FRS	Stair Detail	Notes indicate stainless steel reinforcement for concrete. While acceptable, corrosion resistance can be achieved by providing adequate concrete cover, mix control and concrete placement to achieve same durability, if not exposed to detrimental chemicals.			
S44	FRS	Stair Detail	Suggest a concrete beam is set at bottom of stairwell instead of anchoring into the stone floor, extended down about 450mm from bottom level for bear bearing contact area and settlement.			
S45	FRS	Stair Detail	There is a note for plain concrete, where will it be used?			

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S46	FRS	Ramp Details Retaining Wall	Retaining wall is indicated as a cantilever wall constructed entirely of masonry units. Suggested to provide a reinforced concrete strip footing to give flexural continuity along it's length - resists settlement and cracks in the wall. Construct wall in a running bond pattern with reinforcement in a grouted core every 800mm on center. Provide vertical reinforcement hooks set into the concrete footing and extend into the grouted masonry cores.			
S47	FRS	Ramp Details Retaining Wall	Wall footing is very shallow. It is suggested to be located below assumed frost line.			
S48	FRS	Ramp Details Retaining Wall	Provide draining stone behind foundation wall and install several weep holes to avoid frost damage in winter.			
S49	FRS	Ramp Details Retaining Wall	Water resistant masonry blocks or blocks coated with a water resistant finish will help to keep the blocks from weathering.			
S50	FRS	Site Plan Bathrooms	Is there a septic tank or composting toilet below? No foundation is indicated.			
S51	FRS	Site Plan Bathrooms	Is bathroom set up on an elevated slab spanning over a septic tank? Steps are shown, clarify on drawings.			
S52	FRS	Light Pole Bases	Light pole bases need to be set deep enough and with adequate reinforcement to resist sliding and overturning from wind loadings. Provide details.			
S53	FRS	Greenhouse	No details are provided for a slab or structure.			
S54	FRS	Other Structure	No details are provided for a slab or structure indicated on the site plan between Greenhouse and package house.			
S55	FRS	Perimeter Wall	No information was provided for the perimeter wall and base.			