ANNEXURE A

NATIONAL HOME BUILDERS REGISTRATION COUNCIL REPORT:

TEMPORARY RESIDENTIAL UNITS IN DUNCAN VILLAGE, EAST LONDON

NATIONAL HOME BUILDERS
NHBRC
REGISTRATION COUNCIL

Report : TRU Duncan Village
East London
Province :Eastern Cape
Locality :Coordinates
-32°57'18.7"S, 27°46'44.7"E

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NHBRC ASSESSMENT REPORT

DUNCAN VILLAGE TRU, EAST LONDON, EASTERN CAPE

Report Ref: Duncan Village/01/2020-09

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DATE	30 October 2020
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DATE	02 November 2020

For National Home Builders Regulation Council

www.nhbrc.org.za

RECORD OF REVISIONS

DATE	REV. NO.	DESCRIPTION
06 October 2020	Draft 0.1	Circulated internally for input.
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DEFINITIONS

Clay soil	a fine-grained natural soil material that combines one or more clay minerals with traces of metal oxides and organic matter. Clays are plastic due to their water content and become hard, brittle and non–plastic upon drying.
Differential settlement	Relative settling of material; the gradual downward movement of foundations due to compression of soil which can lead to damage if settlement is uneven.
DPC	damp-proof course (DPC) is a barrier through the structure by capillary action such as through a phenomenon known as rising damp. Rising damp is the effect of water rising from the ground into property.
Ground heave	the upward movement of the ground usually associated with the expansion of clay soils which swell when wet.
Masonry wall	is the building of structures from individual units, which are often laid in and bound together by mortar.
Platform	A raised level surface on which people or things can stand.
Ponding	the (typically) unwanted accumulation of groundwater, typically on a flat ground or roadway.
Shop Drawing	A shop drawing is a drawing or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, consultants, or fabricator. Shop drawings are typically required for prefabricated components and assist the manufacturer to cut/manufacture the elements in required size and detail.
Stormwater	Water that originates during precipitation events and snow/ice melt. Stormwater can soak into the soil (infiltrate), be held on the surface and evaporate, or runoff and end up in nearby streams, rivers, or other water bodies (surface water).
Subsidence	The gradual caving in or sinking of an area of land.
Superstructure	A structure built on top of something else (the part of a building above its foundations).
Visual Inspection	Inspection of equipment and structures using either or all of raw human senses such as vision, hearing, touch and smell and/or any non-specialised inspection equipment.
Weathering	Wearing away or change the appearance or texture of (something) by long exposure to the atmosphere.

EXECUTIVE SUMMARY

The National Department of Human Settlements has requested the NHBRC to investigate temporary residential units (TRU) in Duncan Village, East London, Eastern Cape Province.

The size of the housing units are approximately 30m² in floor area. The units are constructed as timber-framed structures. These units, however, do not follow the prescripts of National Building Regulations and the applicable SABS standards in terms of deemed-to-satisfy rules.

No rational design or engineering specifications of the housing units have been presented to the NHBRC.

The defects found on these housing units are composed of structural and non-structural defects which range from minor to major structural defects. The defects are mainly due to design deficiencies, poor construction practice and inadequate assembly.

It is noted that a competent person has certified the completed housing units. However, it is with concern that the competent person has not included his name, details or ECSA professional registration number. It is advisable that in terms of the Engineering Professions Act (Act 46 of 2000), the first opportunity of response to be offered to the Competent Person. Hence NHBRC recommends that clarity to be sought from Housing Development Agency in terms of the identity and professional status of the competent person who has signed the completion certificate.

1. INTRODUCTION

Department of Human Settlement requested that NHBRC to undertake a technical verification of quality and compliance with standards in the Duncan Village, East London. The site is located next to Mdantsane in East London and will be used to house residents currently living in informal houses in Duncan Village while their houses are being constructed.

The National Department of Human Settlements requested NHBRC to assist with a technical verification of the following:

- Quality and compliance with the norms and standards as well as requirements as set out in the National Housing Code (2009) regarding the Temporary Residential Units (TRU)
- The accreditation status of the building system
- The application of the system on site and compliance with the accredited record
- The adherence and compliance with the specifications and approved technical drawings
- The quality of the workmanship and finishing
- Any matter of relevant technical significance
- Remedial measures to be implemented (if any)

Subsequent to the receipt of request from Department of Human Settlement, a site inspection and visual assessment of the units was conducted on 29 September 2020 by the author in company of the other stakeholders.

This report summarises the views and observations of the author on behalf of NHBRC.

2. PROJECT DETAILS

The project details are as follows:

- Location : Duncan Village TRU, East London, Eastern Cape
- Coordinates : -32°57'18.7" S, 27°46'44.7" E
- Home Builder : NJR Projects
- Engineers : M. Kona Consulting Engineers

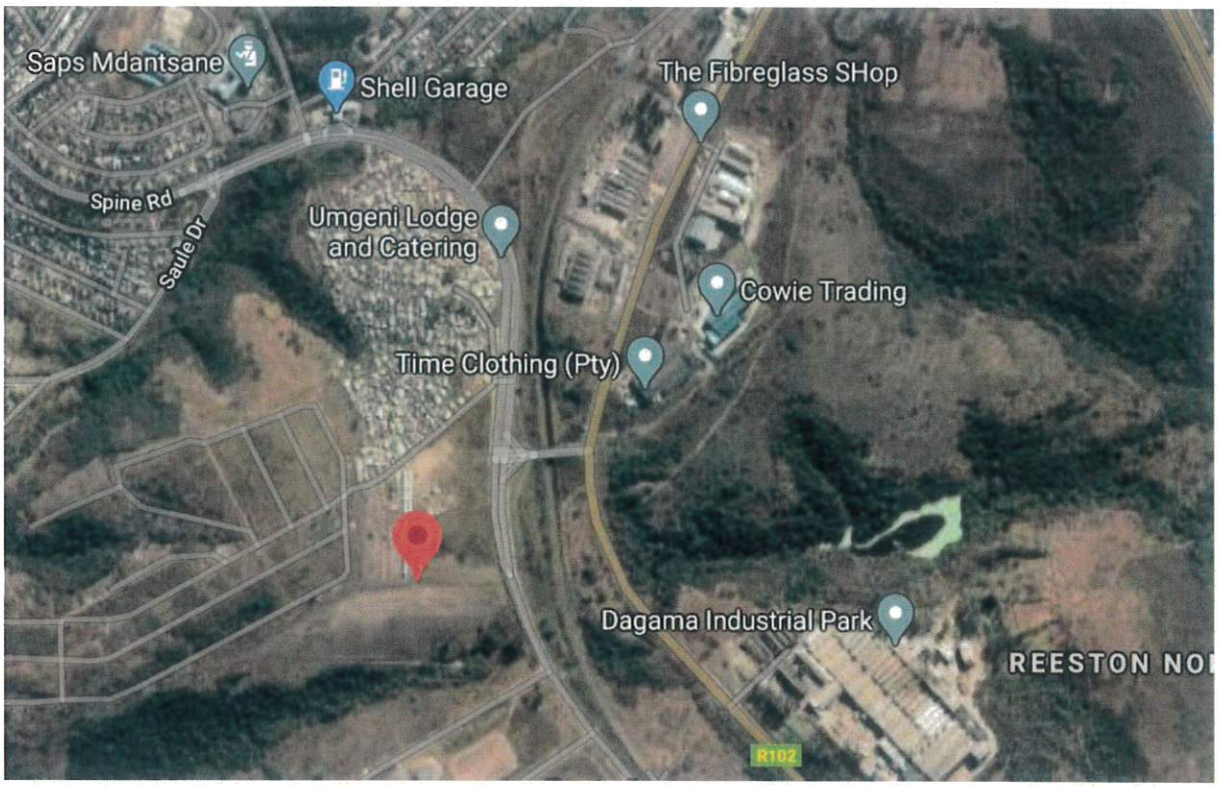

Figure 1: Locality map ((Google map, 2020))

3. SCOPE OF WORKS

This report is prepared as per request received from Department of Human Settlement. The report responds to the queries raised by the department. The queries raised by the Department of Human Settlement define the scope of works and the objectives that the report seeks to achieve. It is noted that in terms of the Housing Consumer Protection Measures Act (Act 95 of 1998 as amended) temporary shelters are excluded from the mandate of NHBRC.

The report scope may be summarised as follows:

- Quality and compliance with the norms and standards as well as requirements as set out in the National Housing Code (2009) regarding the Temporary Residential Units (TRU)
- The accreditation status of the building system
- The application of the system on site and compliance with the accredited record
- The adherence and compliance with the specifications and approved technical drawings
- The quality of the workmanship and finishing
- Any matter of relevant technical significance
- Remedial measures to be implemented (if any)

4. LIMITATIONS AND EXCLUSIONS

In preparation of this report reference directly or indirectly is made to the following standards or codes of practice:

- Housing Consumer Protection Measures Act (Act 95 of 1998, As amended) empowers NHBRC to act in the best interest of Housing Consumer and General Public Safety.
- This report records the quality of the construction based on the observations by the author.
- The author did not assess the detailed adequacy of the structural design.
- The assessments are based on the requirements of National Building Regulations, National Housing Code of 20009, SANS 10400 and Building Standards Act (Act 103 of 1977).
- The following standards are specifically referenced in the report, since the compliance to National Building regulations may be achieved through application of following:

- ✓ SANS 10400 Part A: General principles and requirements.
- ✓ SANS 10400Part B: Structural design.
- ✓ SANS 10400 Part C: Dimensions.
- ✓ SANS 10400 Part D: Public safety.
- ✓ SANS 10400 Part F: Site operations.
- ✓ SANS 10400 Part G: Excavations.
- ✓ SANS 10400Part H: Foundations.
- ✓ SANS 10400 Part J: Floors.
- ✓ SANS 10400 Part K: Walls.
- ✓ SANS 10400 Part L: Roofs.
- ✓ SANS 10400 Part M: Stairways.
- ✓ SANS 10400 Parts N: Glazing.
- ✓ SANS 10400 Part O: Lighting and ventilation.
- ✓ SANS 10400 Part P: Drainage.
- ✓ SANS 10400 Part Q: Non-water-borne means of sanitary disposal.
- ✓ SANS 10400 Part R: Stormwater disposal.
- ✓ SANS 10400 Part S: Facilities for disabled persons.
- ✓ SANS 10400 Part T: Fire protection.
- ✓ SANS 10400 Part V: Space heating.
- ✓ SANS 10400 Part W: Fire installation.
- ✓ SANS 10400 Part XA: Energy usage

- In addition to above, SANS 10082 is referenced since it indicates the deemed-to-satisfy specifications for timber frame construction.
- All defects are identified and reported through visual inspection of the site. No investigation of the other parts of the structure where there is no visible defect is undertaken.
- NHBRC did not undertake a full forensic investigation of the housing unit.
- No testing was done on material and or deflection measurements of structural elements.
- The report covers non-structural items as they are referenced in SANS 10400. However, some items may have been excluded at this stage because other standards govern these elements of the shelter i.e. quality of finishes, evenness, plumbing, electrical, Energy efficiency and etc.

- Visual inspection: Visual assessments carried out were in line with the guidelines of NHBRC Home Building manuals and general Good Building Practice, and the author's own experience in assessing the innovative building technologies.
- The competent person indicated that design drawings and shop drawings would be provided as it was not available on the day of site inspection. Hence a conclusion is made that the Rational Designs for the temporary units were not available during investigation and reporting. Therefore, no assessment of the rational design is undertaken at this stage. (A shop drawing is a drawing or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, consultants, or fabricator. Shop drawings are typically required for prefabricated components and assist the manufacturer to cut/manufacture the elements in required size and detail.)

5. NATIONAL BUILDING REGULATIONS

National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977 as amended) defines that a building" includes (amongst others) the following:

"(a) any other structure, whether of a temporary or permanent nature and irrespective of the materials used in the erection thereof, erected or used for or .in connection with

(i) the accommodation or convenience of human beings or animals;

As such, it is deduced that temporary structures shall comply with the required standards and conditions as permanent structures. However, the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977 as amended) further in Clause 18 stipulates that deviations and exemptions are permitted subject to the following:

"18. (1) A local authority may, .at the request in writing of the owner of any building or any person having an interest. Therein; respect of the erection of such building or the land on which it is being or is to be erected, in writing permit a deviation or grant an exemption from any applicable national building regulation. Except a national building regulation regarding the strength and. Stability of buildings.

(2) The council may, at the request in writing of the owner of any building or any person having an interest therein and after consultation with the local authority in question, in respect of the erection, of such building or the land on which it is being or is to be erected, in writing permit a deviation or grant an exemption from, any applicable national building regulation relating to the strength and stability of buildings. "

Concerning Duncan Village TRU project, there is no evidence presented to the NHBRC that the local authority or any person may have exempted the buildings from complying with the National Building Regulations. Hence it is deduced that the regulations and all the relevant standards and codes of practice apply.

6. SANS 10400

SANS 10400 is developed and approved by National Committee SABS TC 59, Construction standards, by procedures of the SABS Standards Division, in compliance with Annexure 3 of the WTO/TBT agreement. (SANS 10400, 2010)

The current SANS 10400 document was published in November 2010.

This document supersedes the corresponding parts of SABS 0400:1990 (first revision).

It is stipulated that compliance with the requirements of this document will be deemed to be compliance with the requirements of part A of the National Building Regulations, issued in terms of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977).

While Duncan Village Temporary Residential Units do not fall under the category of deemed-to-satisfy however to compare the performance areas that are stipulated under SANS 10400, we make reference to the chapters that are published under SANS 10400. (SANS 10400, 2010)

- ✓ SANS 10400 Part A: General principles and requirements.
- ✓ SANS 10400Part B: Structural design.
- ✓ SANS 10400 Part C: Dimensions.
- ✓ SANS 10400 Part D: Public safety.
- ✓ SANS 10400 Part F: Site operations.
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- ✓ SANS 10400 Part T: Fire protection.
- ✓ SANS 10400 Part V: Space heating.
- ✓ SANS 10400 Part W: Fire installation.
- ✓ SANS 10400 Part XA: Energy usage

The design working life of a building other than a category 1 building shall be not less than 30 years in respect of the structural system and non-accessible components, and 15 years for repairable or replaceable components and materials, such as claddings, roofing materials, exterior trims, and integrated components, such as windows and doors. Category 1 buildings may have a design life of not less than 10 years in respect of repairable or replaceable components, provided that provision for upgrading is made at the design stage and such upgrading does not require the removal or dismantling of the existing structure and does not require highly specialised skills to be applied. (SANS 10400-B, 2012)

The representative permanent, imposed and seismic loads and impact sources applied to the structure and structural elements shall be in accordance with the requirements of the relevant part of SANS 10160.

In terms of the units that do not meet the deemed-to-satisfy requirements and need to be the certified by Agrément SA SANS 10400 recommends the following tests to be undertaken: (SANS 10400-B, 2012)

"Testing in accordance with the requirements of annex B shall be used to demonstrate that specific requirements are complied with in relation to tables 1 to 3, as appropriate.

NOTE 1 Suitable tests are described in Agrément South Africa's *Performance criteria: Building and walling systems – Structural strength and stability*, for example,

Test 1: Transverse flexure of walls

Test 2: Horizontal load resistance/vertical spanning

Test 3: Racking

Test 4: Horizontal load on doors, windows and their immediate surround

Test 5: Strength of L-connections between walls

Test 6: Strength of T-connections between walls

Test 7: Anchorage of roof trusses to walls

Test 8: Ability of the walls to resist vertical loads

Test 9: Ability of gable walls to resist wind loading.

NOTE 2 Suitable tests, complete with acceptance criteria, are described in Agrément South Africa's *Performance criteria: Building and walling systems – Structural assessment of dry-stack masonry building systems*, for example,

Test 1: Vertical load-bearing capacity of walls

Test 2: Transverse flexure of walls

Test 3: Horizontal load resistance/vertical spanning

Test 4: Horizontal line load resistance

Test 5: Racking load resistance

Test 6: Response of buildings to simulated wind loading

Test 7: Horizontal load on doors and windows and their immediate surround

Test 8: Transverse flexure of gable walls

Test 9: Soft body impact test

Test 10: Steel tool impact test (hard body impact test)."

In conclusion, none of the above tests are undertaken neither the rational design relevant to these elements has been presented to the author at the time of the writing of the report.

7. NATIONAL HOUSING CODE

Through the National Housing Code, the Government is empowered to provide temporary housing relief to households in stress following natural or manmade disasters. The Emergency Housing Assistance Programme may then be used for temporary housing for disaster victims until such time as they can be provided with permanent houses.

The technical norms and standards of the National Housing Code, Part 3 apply that any specification or definition of norms and standards for affordable housing should ideally be performance based. This encourages innovation by allowing a variety of building systems, materials or techniques to be combined to meet the set performance requirements.

7.1. COMPLIANCE TO NBR

National Housing Code stipulates that the proof of compliance with National Building Regulation may be achieved thorough the following: (DoHS, 2009)

a) A design that conforms in all respects with the Deemed-to-satisfy rules set out in SANS 10400;

b) A certificate issued by the Board of Agrément SA, that is,

- an Agrément Certificate, or

- a MANTAG Certificate; and

c) A rational design prepared by a competent person. Unconventional building methods, systems or components, are covered by an Agrément Certificate.

The aim of this approach is to provide an assurance of fitness for purpose of non-standardised building and construction products and systems, by evaluating these against prescribed performance criteria.

7.2. RATIONAL DESIGN

The Housing Code prescribes following a rational design process, where the product/construction system does not follow the deemed-to-satisfy rules. The purpose of a rational design is to ensure fitness for the purpose the National Department of Human Settlement through the National Housing Code insists that the competent person must: (DoHS, 2009)

a) Clearly identify those aspects of the building that are the subject of the rational design;

b) Inspect for compliance with the rational design; and

c) Assume full professional responsibility for the subsequent performance of the subjects covered by the rational design.

All aspects of the work that are not the subject of the rational design, must comply with the Deemed-to-satisfy rules of SABS 0400 or be covered by a Certificate issued by the Board of Agrément SA. (DoHS, 2009)

8. NHBRC METHOD OF ASSESSMENT

The assessment is based on the visual inspections of the structural elements of the Temporary Residential Units located at Duncan Village TRU project, East London.

The assessment of structure is limited to the elements that are visually within reach.

NHBRC Technical followed the following process to assess the works:

- Desktop study (i.e. evaluation of available project specification and drawings)
- Examination of applicable standards and contractual documents. The following guidelines and standards are referred to for the purpose of assessment:
  - SANS 10400 – The application of the National Building Regulations and Standards;
  - SANS 10082 – Timber Frame Building
  - Agrément SA guidelines
  - Applicable SABS standards,
- Visual assessment of the Temporary Residential Units

8.1. Available Information

The following information is available:

- Rock Hard® Prefabricated Housing information brochure.
- Geotechnical Investigation report
- Completion certificate for 148 TRU units on erf 81 and 87.

8.2. Geotechnical Conditions

A geotechnical report compiled by Kimopax and dated June 2020 was provided. The geotechnical report provides an indication of the site soil conditions. The report does not specifically evaluate the use of pole foundation or comment on the feasibility thereof but indicate favourable soil conditions.

The soil is classified in accordance with Unified Soil Classification System (USCS). The material is classified as GC, SC, CL, ML, and CL-ML classes. This is clayey gravely sand and silt with a low plasticity and should not have a negative impact on the TRU project.

The geotechnical report has classified the soil in accordance to AASHTO soil classification system which is inconsistent with the prescribed site soil classification in terms of the SANS 10400 and National Building Regulations.

8.3. Building Structure

The floor area of housing unit is ±30m^2. NHBRC is informed by Housing Development Agency that the housing units are temporary shelters to accommodate the occupants while their permanent subsidy house is being constructed. The house plans were not available at the time of

assessment and reporting. It appears that no architectural or council approved drawings were submitted prior to construction.

The characteristics of the houses are the following:

a) The housing units are rectangular in shape.
b) The houses are timber frame structures. The units are made up of prefabricated panels that are manufactured in a factory off site. The panels are then assembled on site.
c) The units are externally cladded with magnesium oxide board and internally with gypsum boards.
d) The units are supported on poles that are planted into the ground.
e) The roof consist of three roof trusses with purlin beams between them that support the galvanised corrugated sheets.
f) There are no water and sewer connections but electrical fittings are installed (surface mounted) in the units.

8.4. Method of Assessment

The assessment is based on visual inspection of the structure, which were guided by home builder, supplier and representatives of HDA.

The following equipment is used during the assessment:

- Cell phone Camera
- Steel measuring tape

9. FINDINGS AGAINST SANS 10082

No shop drawings or design report was provided by the contractor. As the structures are timber frame structures the building should be compliant to SANS 10082. As such below follows a summary of points of deviation from SANS 10082, Timber frame buildings.

Refer to Table 1 for a brief summary of deviations from SANS 10082.

The list is not exhaustive and does not cover all the items of deviation.

Figure 2: General view

Ref.	ITEM	SANS 10082:2007 Reference	Deviation
9.1	Foundations	Clause 6.2.	• No Bearing surface provided under pole foundations.
9.2	Suspended timber floors	Clause 6.3	• Insufficient crawling space provided. • No design provided for sub-frame beams. • Joist span exceeds maximum span.
9.3	Wall Construction	Clause 6.4	• Insufficient stud size. • Insufficient anchorage to substructure. • No wall bracing provided. • No noggins provided as fire stops. • No wall insulation provided.
9.4	Timber roof framing	Clause 6.5	• No design provided for roof structure without bracing. • Incorrect corrugated roof sheet thickness and coating detail. • Insufficient anchoring.
9.5	Poor workmanship		Various items of poor workmanship

Table 1: Summary of findings against SANS 10082

9.1. Foundations

- SANS 10082 covers materials and practices used in the design and construction of single-storey and double-storey timber frame buildings and portions of such buildings.

  Sans 10082 indicate the requirement for bearing surfaces under planted pole foundations.

Deviation

The foundations consist of poles planted into the ground. These poles range from 100mm Ø to 150mm Ø. The foundation poles do not have footings with minimum bearing areas as per Table 4 and Figure 4. For the pole size used a footing with bearing area of at least 45000 mm² should be provided.

The holes for the poles are made with an auger drill of ± 250mm Ø. The poles are directly placed in the hole and material compacted around the pole.

Figure 3: View of auger drilled holes for foundation poles

9.2. Suspended Timber Floors

- SANS 10082 indicates that crawling space of at least 450mm should be allowed below the suspended timber floor.

Deviation

The suspended timber floor is not a minimum of 450mm above the ground in some of the units.

Figure 4: View of height of subfloor above ground level

- The sub-frame consists of beams that are fixed to the foundation poles. These beams are spaced and spans ± 1 150mm. The sub-frame beams should be the product of a design in accordance with SANS 10163.

Deviation

This design was not confirmed in documentation provide.

- SANS 10082 indicate the maximum span of 600mm for 38mm x 76mm joists, spaced between 400mm and 600mm apart.

Deviation

The floor panels which consists of the floor joist with the floor boards nailed to it is then connected to this sub-frame. The joists are 38mm x 76mm and are spaced ±420mm apart. They span between the sub-frame beams which is ± 1150mm apart.

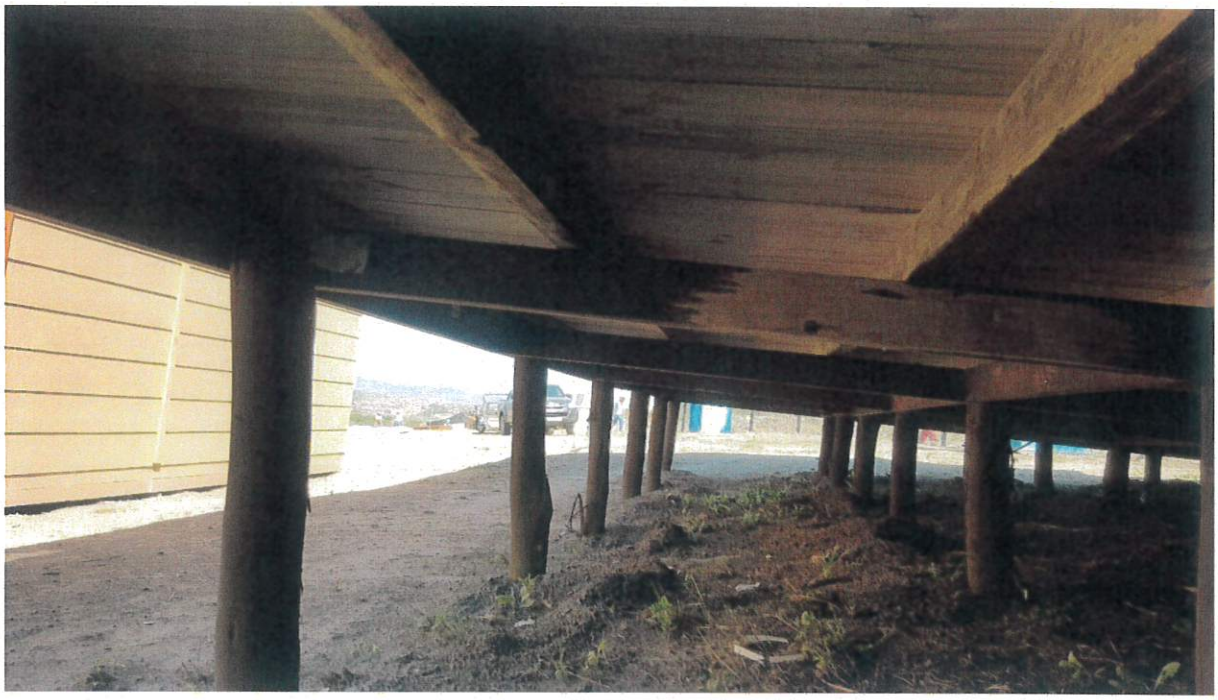

Figure 5: View of joist spanning over sub-frame beams

9.3. Wall Construction

- SANS 10082 clause 6.4 Table 12 indicate the permissible dimensions of timber framed walls. The minimum indicated stud size is 50mm x 76mm at a stud spacing of 450mm.

Deviation

The wall panels are constructed with 50mm x 50mm studs at spacing of ± 580mm.

Figure 6: View of wall panel

- SANS 100082 indicates that the studs of the wall panel should be tied to the bottom plate by means of metal connector plates in instances of light roofs.

Deviation

The wall panels are screwed to the floor panels with 70mm screws at mid span of studs. No metal connector plates are used.

- SANS 10082 indicate that walls should be stiffened by means of permanent bracing.

Deviation

No permanent bracing is provided in wall panels.

- SANS 10082 indicate the requirement for noggins between the studs of wall panels to act as firestops.

Deviation

No noggins areas provided in wall panels.

- SANS 10082 indicate the requirement for wall and roof insulation to prevent thermal transmittance through these elements.

Deviation

No insulation is provided in wall panels.

AluBubble ® sheets is provided under the roof sheets. This product is not indicated in the deemed-to-satisfy specifications and design calculations should be provided to confirm compliance.

9.4. Timber roof framing

- SANS 10082 indicate that the supporting structure used in the basic roof construction shall be trusses which shall be designed, manufactured and erected in accordance with the relevant parts of SANS 10163 and SANS 10243.

Deviation

No design was provided for the roof trusses and purlin beams used in the roof construction. The trusses are manufactured using 76mm x 38mm timber screwed together and covered with the magnesium oxide board on both sides. The double 76mm x 38mm purlin beams are connected to the trusses with a metal angle bracket with two screws into the purlin beam and two screws into the truss side.

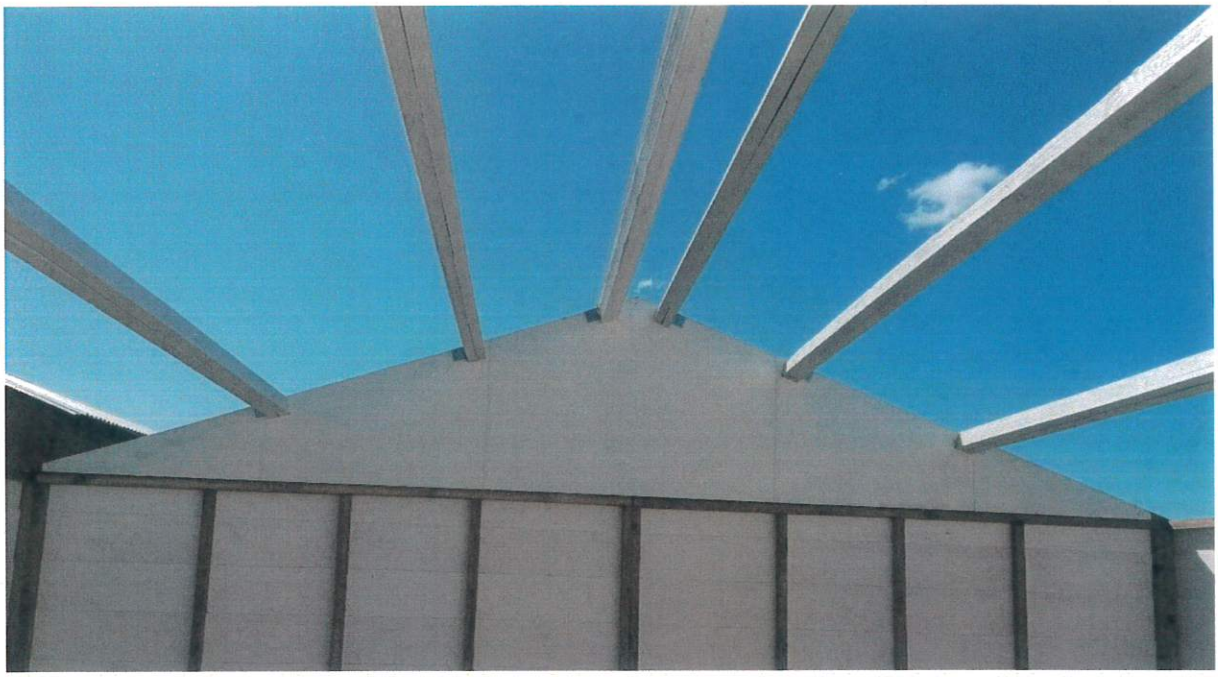

Figure 7: View roof structure

- SANS 10400 Part L indicate that roof sheets should be made of steel with a minimum thickness of 0.5mm. The minimum galvanised coating specification is also indicated as Z200 for all areas other than coastal areas.

Deviation

The roof sheets used is 0.3mm thick sheets with a galvanised coating of Z100.

- SANS 10082 indicate anchorage of roof structure to walls. With the requirement of 30mm x1.2mm steel strap or 2 x 4 diameter wires.

Deviation

The trusses are screwed into the wall panels and no steel straps are used for the anchorage. The middle truss is also not bearing sufficiently on the wall for effective anchorage.

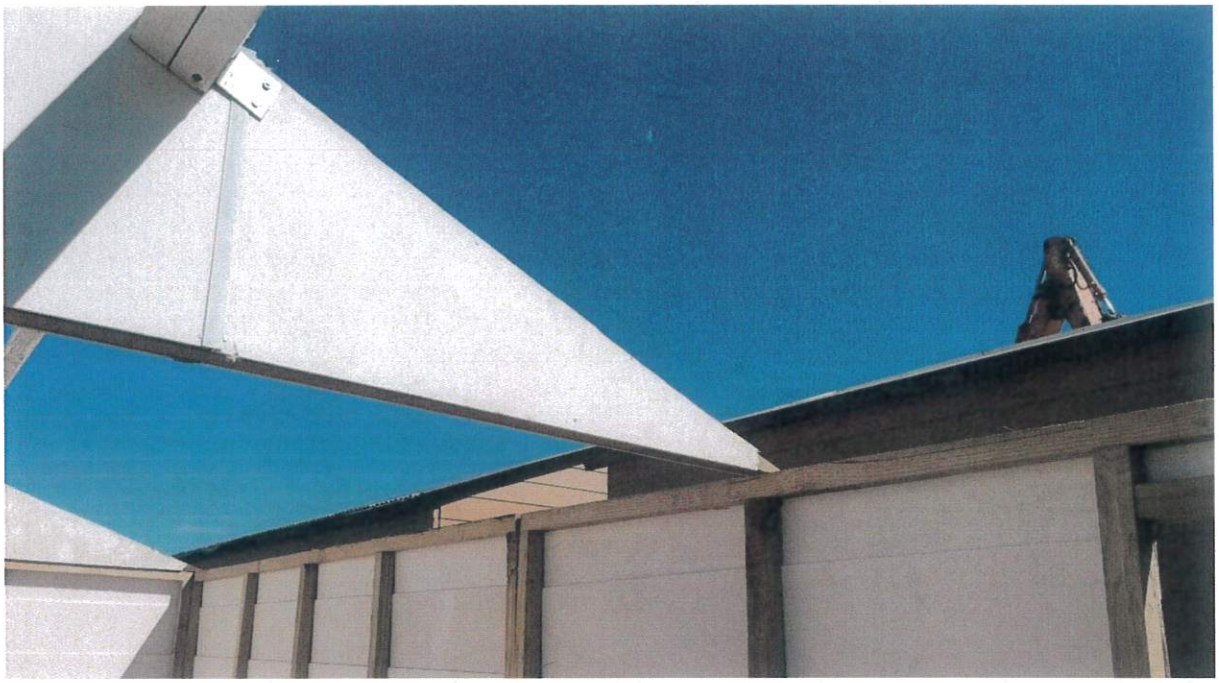

Figure 8: Middle truss bearing unto external wall

9.5. General poor workmanship

- Roof sheets damaged – could lead to water ingress.

Figure 9: Roof sheets damaged

- Foundation poles not installed straight.

Figure 10: Foundation poles not straight

- Ineffective fixing screws.

Figure 4: Ineffective fixing screws

- Unscrewed fixing brackets

Figure 5: Fixing brackets

- Internal gypsum board not fitting, gaps opening.

Figure 6: Gaps in internal cladding

- Timber splitting at screw positions.

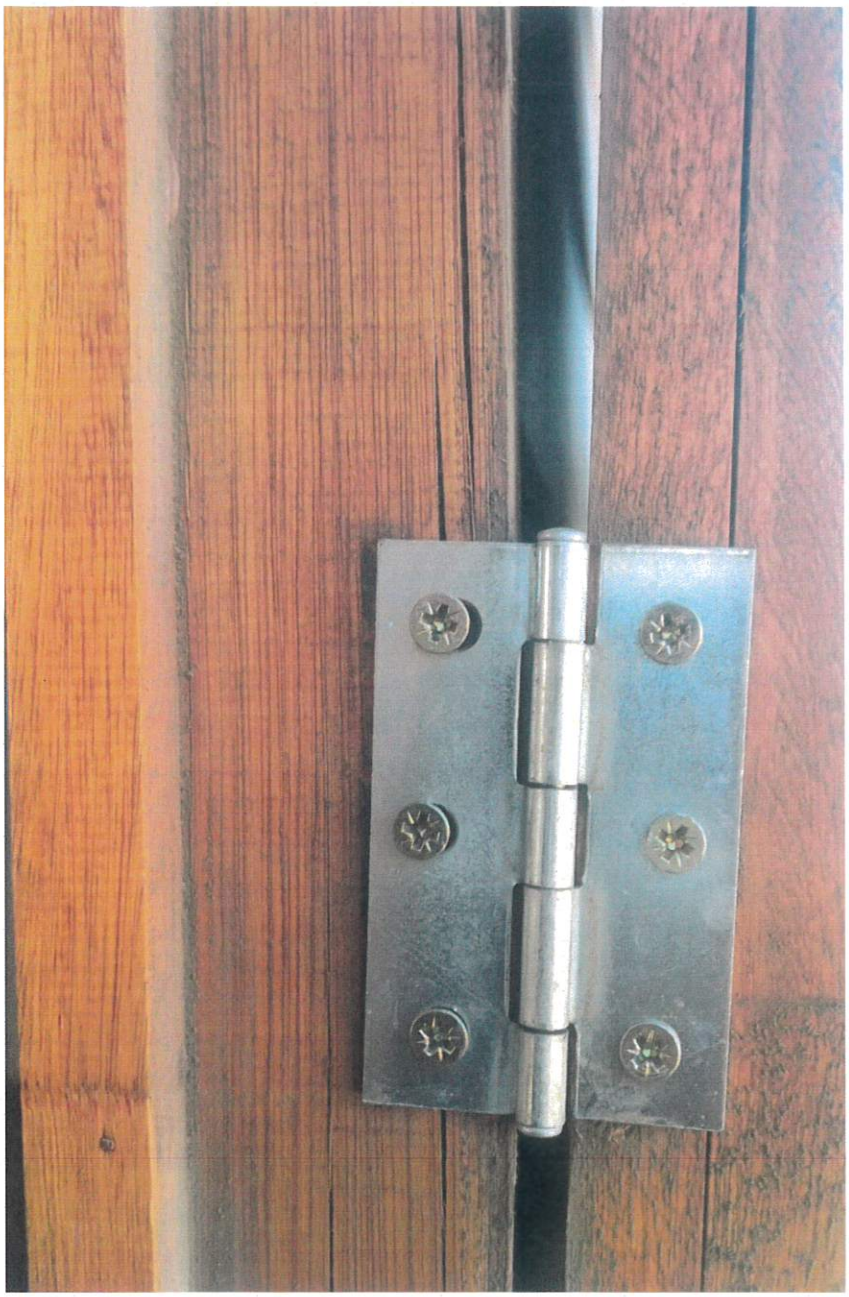

Figure14: Timber splitting

10. CONCLUSION & RECOMMENDATION

Most of the deviations observed are of serious nature and compromise the safety of the structure. These deficiencies result in an unsafe structure which becomes a hazard to the inhabitants of the units and the persons living in the vicinity of the structure.

The competent person has certified the housing units and, it is advisable that in terms of the Engineering Professions Act (Act 46 of 2000), first opportunity of response to be offered to the Competent Person.

NHBRC has identified a number of deviations from National Building Regulations and relevant SABS standards which is discussed in detail under chapter 11.

Follows a summary of the discussions for consideration and further action.

Ref	ITEM	DEFECT DESCRIPTION	PROPOSED SOLUTION
10.1	**Structural Stability**	NHBRC is raising concern. Further no rational designs submitted to NHBRC.	✓ In line with the requirements of Engineering professions Act (Act 46 of 2000), the competent person for the project to be engaged to provide a rational design and remedial solution.
10.2	**Compliance to SANS 10082**	TRUs are non-compliant to SANS 10082 (See Table 1 for the summary list of items)	✓ NHBRC recommends that the competent person provide a rational design report in terms of SANS 10163 to confirm compliance with design specifications. ✓ In line with the requirements of Engineering Professions Act (Act 46 of 2000), the competent person

			for the project to be engaged to provide remedial solution.
10.3	**Workmanship**	Some items of poor workmanship visible.	✓ DoHS to engage the home builder and request a remedial report.
10.4	**Fire Protection**	Safety distances in terms of SANS 10400 Part T cannot be confirmed.	✓ DoHS to engage home builder and request confirmation of material compliance to SANS 10177

Table 3: Summary of recommendations

10.1. Structural Stability

The overall structural stability is of concern. The necessary bracing of the wall and roof structure is not installed.

No rational design has been submitted to NHBRC. The engineers indicated that they will complete a design report and submit shop drawings to NHBRC. Shop drawings are typically drawings that are prepared by the manufacturer of the steel structures to cut the steel elements to the required size.

In terms of roof truss to wall connection details, no drawings or calculations have been submitted.

NHBRC received a completion certificate for the housing units. It is with concern that details of the competent person such as name, surname and professional registration details do not appear on the completion certificate.

NHBRC recommends that the identity of the competent person to be queried as NHBRC was not provided the information and in line with the requirements of Engineering Professions Act (Act 46 of 2000), the competent person for the project to be engaged to provide a rational design and remedial solution.

10.2. Compliance to SANS 10082

It is our considered opinion that the structure is not in compliance with SANS 10082. The construction material is timber and as such the construction should comply with SANS 10082 or be the subject of a rational design in accordance to SANS 10163.

NHBRC has observed a number of deviations from SANS 10082 as listed under chapter 10 and hence recommends that in line with the requirements of Engineering Professions Act (Act 46 of 2000), the competent person for the project to be engaged to provide remedial solution.

10.3. Workmanship

The workmanship is generally acceptable but various items of poor workmanship occurs and needs to be addressed.

NHBRC recommends that the Department of Human Settlement to formally request a remedial report from the home builder.

10.4. Fire Protection

SANS 10400-T stipulates building element or building component shall comply with the requirements for stability, integrity and insulation when tested in accordance with the relevant provisions of SANS 10177-2: Fire testing of materials, components and elements used in buildings – Part 2: Fire resistance test for building elements.

No confirmation of this compliance has been provided and the fire rating of the elements can therefore not be confirmed. The units are spaced at 1m apart and are non-compliant to SANS 10400-T.

11. REFERENCES

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