

CONTENTS



Preface	2
1. Double-storey semi-detached home	3
1.1 Design Description	3
1.1.2 Land-use	3
1.1.3 Architectural Design	3
1.1.3 Energy efficiency and sustainability	3
2. Single-storey semi-detached homes	4
2.1 Design description	4
2.2.2 Land-use	4
2.2.3 Architectural Design	4
2.2.4 Energy efficiency	4
3. General Guidelines	4
3.1 Reduce chances of water penetration	5
3.2 Improve social acceptability	5
3.3 Improve technical cohesion of the house	5
3.4 Interventions that improve energy efficiency and have no cost implications	5
3.5 Energy efficiency interventions that will lead to additional upfront costs	5
3.6 Other sustainable measures to consider	5
4. Double-storey semi-detached homes' working drawings and perspectives	6
5. Single-storey detached homes' working drawings and perspectives	11

Preface

The NHBRC has worked on various Corporate Social Projects, utilising funds collected from charity events or through Public Private Partnerships (PPPs), for purposes of constructing homes. These projects were comprised of affordable homes, which were built for deserving beneficiaries, residing in different provinces. Through the construction of these homes the NHBRC could promote and expose Innovative Building Technologies (IBTs) to communities; monitor the process and performance of IBTs; advise on relevant technical improvements; and enhance the architectural designs.

While IBTs can, amongst other benefits, assist with improving construction time and reduce labour costs, the overall quality of a home can simultaneously also be enhanced by these systems. The intention was to make a meaningful change in the lives of less fortunate people, through the provision of a home that becomes a haven for safety, pride and dignity. This portfolio serves as a guideline, on some architecturally designed homes between 50m² and 70m², using IBTs. These affordable homes, completed by the NHBRC, are examples of what is possible, but will have to be adapted to relevant sites and IBTs. These guidelines can be followed by government, IBT system owners and home owners, on how to improve the overall quality of the house and hence the market value.

“General design guidelines applicable to all IBT housing typologies, related to some key functional, social and energy efficiency issues, which should be considered to improve the quality of the design, are included.”

This portfolio provides guidelines on two types of homes: double-storey semi-detached units and single-storey detached houses. It does not provide step-by-step guidelines on how to do an architectural and energy efficiency design, but provides examples of general factors to consider when designing homes using IBT. It also excludes variations on the two typologies, walk-ups and high-rise residential. To provide for many variables, such as size and orientation of sites, context of the project, and climatic zones, these plans will have to be adapted accordingly.

Guidelines are provided that are unique to the design of double-storey and single-storey homes, relating in particular to land-use, improved architectural designs and energy efficiency. General design guidelines applicable to all IBT housing typologies, related to some key functional,

social and energy efficiency issues, which should be considered to improve the quality of the design, are also included. These guidelines for ensuring a good quality IBT home, are provided over and above the mandatory requirements of the National Building Regulations, Agrément Certification, SANS 10400, the NHBRC Home Building Manual and other related standards.

In view of focussing on the architectural designs, the portfolio includes the design description, municipal working drawings and related 3D images. The design examples indicate that simple, attractive and affordable homes can be built using innovative building systems. They are showing much potential for becoming an interesting solution to many construction issues in government subsidised housing delivery. The architectural designs play a major role in increasing the cohesion of technical components in addition to improving the living standards of less fortunate South Africans.



Figure 1: Example of a 3D representation of a double-storey design

1 Double-storey semi-detached homes

1.1 Design Description

This portfolio provides an illustration of a medium-density housing solution using IBTs, which showcases South Africa's potential, regarding sustainable human settlements. The sites on which the homes are located represent a typical scenario for the lower-middle income group. For this type of project, the site should preferably be part of an integrated development, which includes being close to amenities such as transport hubs, educational and health care facilities, industrial nodes and a developed public service infrastructure (e.g. police station, clinic and magistrates court). The design considerations in this portfolio that should be focussed on relate to land-use, architectural design considerations and energy efficiency interventions.

1.1.2 Land-use

An example is given of a double-storey design where the land-use is maximised within an existing township establishment. Various design configurations can be considered depending on the context of the project and the type of land registration. This is an example of a semi-detached double-storey unit on full-title sub-divided stands. Each full-title house has its own garden. Other possible design solutions can include double-storey semi-detached units or row houses on an open piece of land in relevant linear or clustered configurations. Homes on these sites can be full-title developments on individual stands or can be sectional-title clusters or townhouses on one large property.

This portfolio demonstrates, to good effect, the scenario of designing on many full-title erven, adjacent to each other. A total of eight double-storey units of 75m² each can be built on four sub-divided stands (eight stands in total). This showcases optimal use of land, especially relevant in cases where land is limited. The semi-detached homes each have a 40m² footprint including the covered patios. Municipal drawings were provided in this document for only two of the units.

1.1.3 Architectural design

The units are South African post-modern, represented by a simple shape of which two units are joined by a central core. The central core element reflects South Africa's appreciation of nature by its abstract application of natural materials, warm colours and texture. The joining of two units signifies South Africa's unity in diversity. The needs of the beneficiaries were also considered by incorporating bedrooms and services on the ground floor; with easy access to the unit for the differently abled and elderly persons.

An IBT system was used for each home to illustrate that the specific simple shape of the designs can be adapted to incorporate many different technologies. Differences will occur in the connections of components which are purpose made for rational designs. The type of IBT system must be suitable for a specific climate zone and should include factors such as accessibility of materials and products, maintenance of a home, distance from suppliers, economies of scale, local labour forces and lead time flexibility. The dimensions of the building components are influenced by requirements for strength and stability as well as energy efficiency. IBTs demonstrate significant value-adding attributes to construction products and could according to studies reduce construction costs and time, even improving the construction quality for relevant IBT systems. Time can be saved, for instance, by being able to cast the foundation beams and the ground slab in a single operation, using less mortar, less setting time, reducing drying times and allowing faster erection of panel systems.

1.1.4 Energy efficiency and sustainability

Environmental sustainability is achieved through Agrément Certificate requirements, energy efficiency standards and other creative solutions that will enhance sustainability. Two semi-detached units improve energy efficiency and are predominantly north orientated. The shared wall between two units, reduces the number of external walls for each home and improves heat gain or heat loss.

Other sustainable measures were incorporated in this design such as water tanks for grey water usage and a small garden to grow vegetables. Training will need to be provided on how to treat water and for growing plants.



2 Single-storey semi-detached homes

2.1 Design Description

A few examples of designs are provided for single-storey detached homes. These affordable IBT designed homes are probably best suited for lower-middle income groups, where land is available for full-title single units, on their own stand. These homes should be built where land has been promulgated with all infrastructure and amenities provided. Effective land-use, improved architectural designs and energy efficiency are to be the focal point of the design considerations for this document.

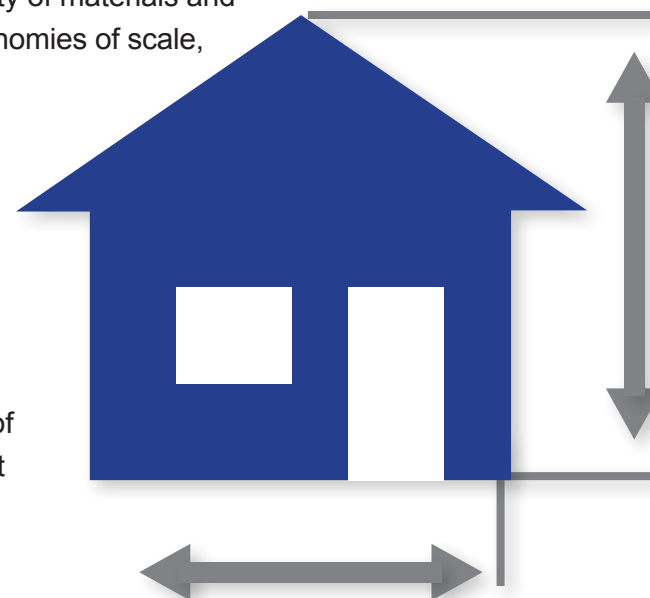
2.1.2 Land-use

Full-title detached homes should preferably be north orientated on a site. In cases where sites are east-west orientated more consideration has to be given to optimal energy efficiency measures

2.1.3 Architectural design

A simple post-modern design style was chosen for houses 1, 2 and 4 that would be familiar to most building contractors and hence fast-track the construction process. With the aim of ensuring stability, the hipped roof became the principle element for two of the homes, tying the walls together more securely, over and above the approved Agrément certified system designs. A covered patio on the north side provided additional shading on two elevations of the building to reduce solar heat gain. The type of IBT system must be suitable for a specific climate zone and should include factors such as accessibility of materials and products, home maintenance, distance from suppliers, economies of scale, local labour forces and lead time flexibility.

For house 3, the IBT design was based on a simple contemporary modern style home familiar to most contractors. The narrow east-west orientated site determined the shape of the building and hence the best suited roof design that would work for the IBT system. A mono-pitched insulated roof was chosen that was cost effective with well-designed connections between the roof and walls tailored specifically for IBTs to ensure sufficient stability.

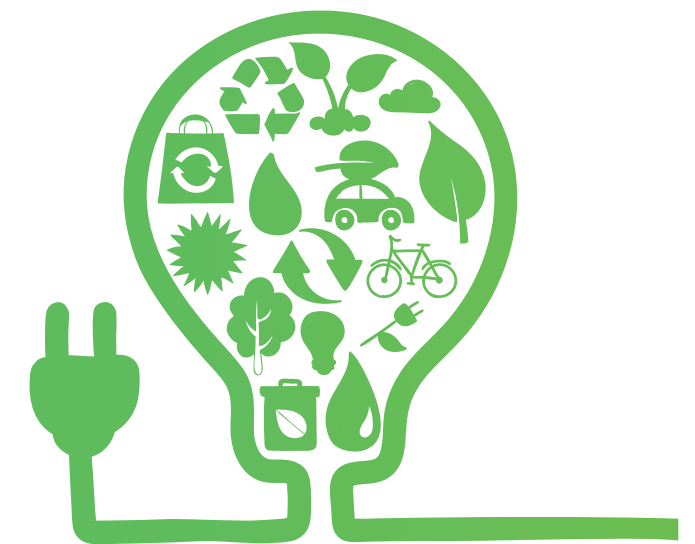


The simplicity of the designs will provide flexibility for different IBT systems to be used. There are different innovations that can fast-track the construction process. For example, structurally insulated panels allow for the component to be erected at a faster rate and interlocking type blocks using specialised bonding cement slurry allow for less mortar to be used and, therefore, save time. Assembling all parts in a factory such as doors, windows and services can reduce labour time.

2.1.4 Energy efficiency and sustainability

In cases where sites are east-west orientated, the design can be improved through more mindful energy efficiency interventions and passive design solutions for the placing of living; roof overhangs; shading; roof insulation; renewable energy solutions for hot water and considering the size and position of windows and/or glazing type.

The narrowness of the length of house 3, in accordance with the site shape required more specific energy efficiency measures and passive design solutions such as providing more shading on the east and west elevations, which was achieved with the covered walkway along the east and roof overhang on the west. Windows were strategically placed to consider conductance and solar heat gain. Although these designs were



based on energy efficiency standards that came into operation in 2011, it would be preferable to complete a rational design using certified energy efficiency software.

“The simplicity of the designs will provide the flexibility for different IBT systems to be used. There are different innovations that can fast-track the construction process.”

3 General Guidelines

As a result of technical complexities brought about by the use of innovative (non-standardised) building technologies, greater scrutiny of basic design aspects is required, when compared to standard brick and mortar, to ensure health, safety and environment are not compromised. It is, therefore, crucial to look at some common functional design problems and provide some guidelines on how problems can be prevented. These guidelines are common to all IBT housing typologies and are as follows:

3.1 Reduce chances of water penetration

- It is best practice to include design solutions that will prohibit water penetration through the provision of adequate roof overhangs or other overhead covering which can protect external doors and walls.
- Weather bars should be included for external doors, along with small steps (between internal floor and external apron) to prevent wind from blowing water under the external door. External doors must be finished off with weatherproof finishes and properly applied to manufacturer's specifications.
- Simple roof designs with less turns and valleys will reduce chances of water penetration. Careful attention must be paid to the workmanship of fasciae.
- In addition to gutters and downpipes for water to be drained away from the foundations of the house, an apron around the house is also recommended.

3.2 Improve social acceptability

- To improve the quality of lifestyle, a small covered external patio should be included.
- Accessibility to front doors should be carefully designed to allow access for differently abled people.
- Durability of the components of a house is critical; with minimum maintenance or easy solutions to maintenance preferred.
- Where possible, improve architectural design proportions.
- Use open plan designing to increase perception of space.
- Provide private entrances to the bathroom and to at least one bedroom.
- Provide two external doors.

3.3 Improve technical cohesion of the house

- Ensure compatibility of materials
- Ensure the design connections are suitable for the design.
- Ensure the technical solutions are in context with the design concept and location.

3.4 Interventions that improve energy efficiency and have no cost implications

- Two semi-detached units improve energy efficiency and are predominantly north orientated.
- Correct placing, size and type of windows and glazing (most windows on the north elevation, then south, and least windows on the east and west).
- Designs with roof overhangs must be in accordance with the movement of the sun. Know where to protect walls and openings from the sun and when to warm the walls.
- The solar reflectance of roof materials is critical and use should be made of light coloured roof coverings or finishes.
- The use of energy labelled appliances will reduce energy consumption.
- It is preferred that IBT systems are chosen or designed that are better suited to a specific climate zone. This will include factors such as accessibility to materials and travelling distances to a construction site.
- The embodied energy of an IBT material should be considered.

3.5 Energy efficiency interventions that will lead to additional upfront costs

- Insulation in the walls and roof improve the thermal resistance.
- Renewable hot water heating systems such as solar water heaters must be used. Good quality high-pressure or low-pressure systems should be chosen for durability purposes with purchase guarantees in place.
- Compact fluorescent lights or light-emitting diodes must be used.
- Passive solar building design should be promoted e.g. trombe wall.
- Thermal bridging should be considered in the energy efficiency design of an IBT in terms of insulation.
- By calculating the life-cycle costs, there will be cost savings in the long-term.

3.6 Other sustainable measures to consider

- Water tanks – for grey water and drinking water.
- A small garden to grow vegetables accompanied by training.

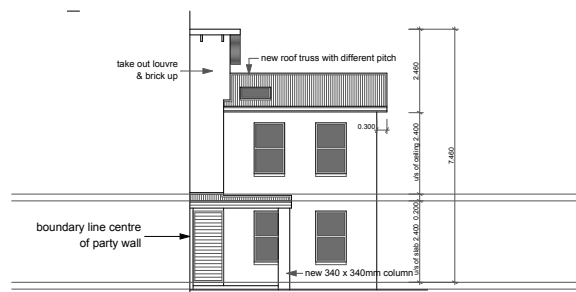




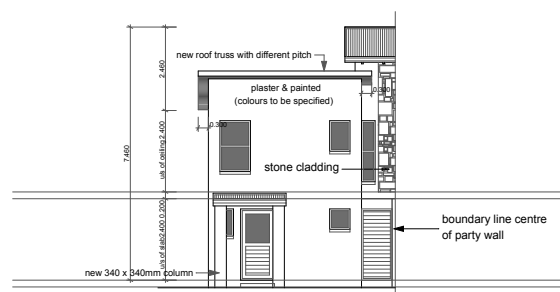
4

Double-storey semi-detached homes' working drawings and perspectives

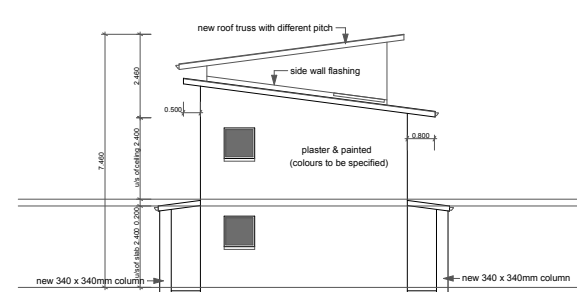
4.1 Work drawings



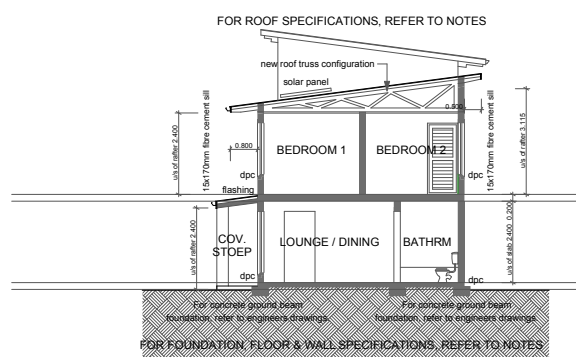
NORTH ELEVATION 1:100



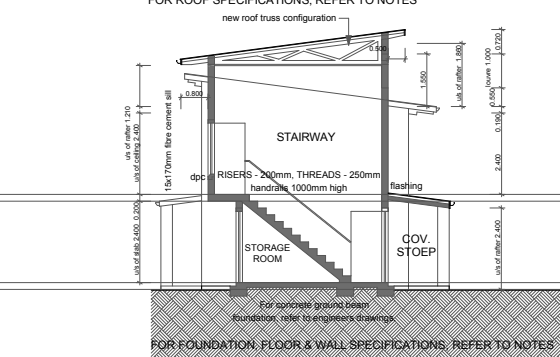
SOUTH ELEVATION 1:100



WEST ELEVATION 1:100



SECTION A-A 1:100



SECTION B-B 1:100

FENESTRATION SCHEDULE

FENESTRATION CALCULATION:

North: $W_n = 900 \times 1500(4) = 5.4m^2$
South: $W_s = 400 \times 800 = 0.32m^2$
 $W_n = 600 \times 600 = 0.36m^2$
 $W_n = 400 \times 1800 = 0.72m^2$
 $W_n = 600 \times 900 = 0.54m^2$
 $W_n = 900 \times 1500 = 1.35m^2$
West: $W_w = 900 \times 900(2) = 1.62m^2$
Total fenestration area = **10.58m²**

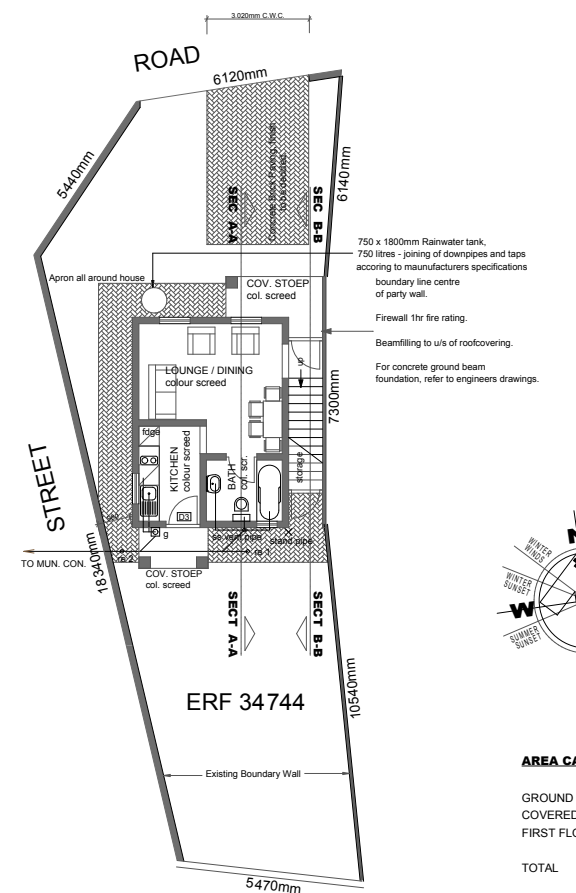
Unit area = 71.13m² (excl. courtyard)
Net area = 62m² (excl. courtyard)

The total floor area is checked in the calculation below:
15% of the net floor area of 62m² = 9.3m²
Total fenestration = 10.58m²
10.58m² > 9.3m² which does not comply
Requires rational design - see energy table

ENERGY EFFICIENCY SCHEDULE PER HOUSE

DESCRIPTION	SOLUTION
HOT WATER	Collector panels of 4.2m ² is required for 250 litres resorting to a 1 x 300 litre solar geyser
FENESTRATION	Rational design for fenestration requires 10.58m ² to be Single Low E Glazing (e.g. Solar E Smart Glass, low-emissivity glass). For solar heat gain sufficient shading is provided
ROOF ASSEMBLY	Climate zone 4: R-value = 3.7 + 145mm Isotherm
EXTERNAL WALLS	To manufacturers specifications, R-value: See table

ENERGY EFFICIENCY SCHEDULE



SITE & GROUND FLOOR 1:100

SHOWING SEWERAGE LAYOUT

AREA CALCULATIONS:

GROUND FLOOR COVERED STOEPS	33.57m ²
FIRST FLOOR	6.64m ²
TOTAL	74.67m ²
SITE AREA	158.43m ²
COVERAGE	40.21m ² - 25.38%

GROUND FLOOR 1:100

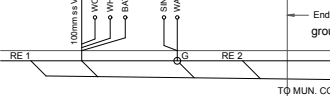
W1	W2	W3	W4	W5	W6
400x800	400x800	600x600	600x600	900x900	900x1500
2.100	2.100	2.100	2.100	2.100	2.100
2.100	2.100	2.100	2.100	2.100	2.100
2.100	2.100	2.100	2.100	2.100	2.100
2.100	2.100	2.100	2.100	2.100	2.100

* Rehau uPVC Windows or White Powder Coated Aluminium, 60 Micron thick.

WINDOW SCHEDULE

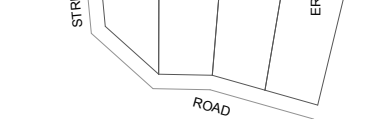
SEWERAGE SECTION

RE	RE 1	RE 2
COVER LEVEL	10 000	10 000
INVERT LEVEL	9 490	9 490
DEPTH	450	510
DISTANCE	3 700	3 700
FALL	1:60	1:60



SEWERAGE SECTION

LOCALITY PLAN 1:350



DOOR SCHEDULE

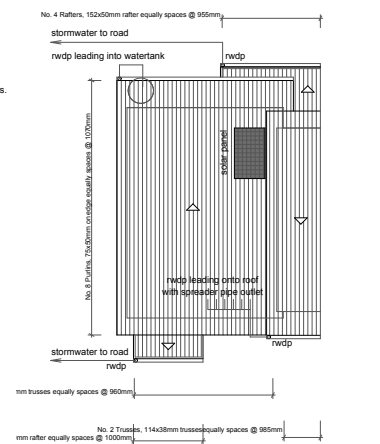
D1	D2	D3
813x2032	1000x2032	1000x2032
2.032	2.032	2.032
2.032	2.032	2.032
2.032	2.032	2.032
2.032	2.032	2.032

FRAME	FRAME	FRAME
* Painted Galvanized Mild Steel Door Frame	* Painted Galvanized Mild Steel Door Frame	* Painted Galvanized Mild Steel Door Frame
DOOR	DOOR	DOOR
* Painted Semi-solid meranti Timber door, complete with 2 lever lock set	* Varnished Solid meranti Timber door, complete with 3 lever lock set	* Varnished Clear half glass solid timber door with 3 lever lock set

R-VALUES FOR WALLS

NO.	THICKNESS (mm)	MATERIAL	CONDUCTIVITY (W/m.K)	R-VALUE (m ² .K/W)
R ₁		MOVING AIR FILM		0.03
R ₂	10	EXT. PLASTER	0.5	0.02
R ₃	100	CONC. BLOCKS	0.38	0.23
R ₄	10	INT. PLASTER	0.5	0.02
R ₅		STELLAR FILM		0.11
TOTAL R-VALUE				0.41

6.41 > 6.23 (SANS 10400-PA FOR CLIMATE ZONE 1) AND THEREFORE COMPLIES



ROOF PLAN 1:100

SPECIFICATION & NOTES:

FOUNDATIONS:
* 750x250mm CONCRETE STRIP FOR 100mm BRICK WALLS.
* 750x250mm CONCRETE FLOOR SLAB THICKENING FOR 90mm INTERNAL WALLS.
* 750x250mm CONCRETE STRIP FOR 100mm YARD AND BOUNDARY WALLS.
* STRUCTURAL FOUNDATIONS TO ENGINEER'S DETAILS.

FLOORS:
* 3mm LAYER OF SELF-LEVELLING LATEX AND CEMENT BASED FINISH APPLIED ON TOP OF THE 50mm CEMENT SCREED ON 100mm CONCRETE SURFACE BED FOR INTERIOR FLOORS. GROUT LINES RESEMBLING TILES ARE CUT INTO SURFACES. THE SURFACE IS POLISHED TO ENSURE A SMOOTH SURFACE. 350 MICRON DAMP PROOF MEMBRANE.
* DAMP PROOF MEMBRANE TO BE WELL LAPPED TO BRICKWALL DPC.
* FIRST FLOOR: FINISH AS PER SPECIFICATIONS ON 200mm R.C. SLAB TO ENGINEER'S DETAIL.

CONCRETE APRON:
DIG UP & REMOVING RUBBISH, DEBRIS, VEGETATIONS, HEDGES, SHRUBS, BUSHES ETC NOT EXCEEDING 200mm DIRTY INCLUDING FORMING A COMPACTED SUB-BASE UNDER CONCRETE APRON AREA COMPACTED 93% MODASH TO DENSITY TO A TOTAL THICKNESS OF NOT EXCEEDING 150mm INCLUDING A 100mm CONCRETE SURFACE BED OF 80mm THICKNESS WITH A SMOOTH SURFACE FINISH.

WALLS:
* EXTERNAL WALLS 150mm BRICKS.
* INTERNAL WALLS 90mm BRICKS.
* GALVANIZED LADDER-TYPE BRICKWORK EVERY 2nd COURSE WITH NO 2 COURSES ADDITIONALLY BELOW WINDOW CILLS AND ABOVE ALL OPENINGS.
* PRECAST LINTOLS OVER ALL OPENINGS AND LAD IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
* STEPPED BRICKWORK DPC TO BE A MINIMUM OF 150mm ABOVE GROUND LEVEL WITH WEEP HOLES EVERY SECOND PERPEND.
* MAIN EXTERIOR & INTERIOR WALL FINISHES - MIDAS COLOUR RANGE EXTERIOR FINISH - MIDAS ENVIRO WEATHERMASTER (A HEAVY TEXTURE (CEMENT ENHANCED ACRYLIC) INTERIOR FINISH - MIDAS ENVIRO MASSHOMES ANTI-MICROBIAL INTERIOR.

ROOF, BATHWATER GOODS AND CEILING:
* REFER TO ROOFPAN.
* ALL ROOF TIMBERS TO SPECIALIST ENGINEER'S SPECIFICATIONS AND MANUFACTURER'S INSTRUCTIONS.
* MAIN ROOF @ 7°.
* GALVANIZED COATED CUPLOCK ZINCALUME STEEL SHEETING WITH A GEMSBOK SAND FINISH.
* 38x14mm TIMBER TRUSSES, FOR SPACINGS REFER TO ROOF PLAN.
* COVERED STOEP @ 7°.
* 38x14mm & 50x150mm TIMBER RAFTER @ COVERED STOEPS, FOR SPACINGS REFER TO ROOF PLAN.
* FOR FACIA BOARD REFER TO ROOF DETAIL.
* UPVC STREAMLINED 110mm SQUARE PROFILE STANDARD GUTTER AND DOWNPIPES, DOWNPIPES TO CONNECT TO WATER TANKS ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
* FOR RAFTERS, PURLINS & BATTEN SIZES REFER TO ROOF PLANS.
* CEILING - 140mm THICK BOTHERM INSULATION BETWEEN BATTENS AND 10mm GYPSUM PLASTER BOARD FIXED TO BATTENS.

MUNICIPAL NOTES:
* ALL WORK TO BE IN ACCORDANCE WITH THE NATIONAL BUILDING REGULATIONS AND BUILDING STANDARDS ACT NO 103 OF 1977.
* DIMENSIONS AND LEVELS TO BE VERIFIED ON SITE.
* OVERALL DIMENSIONS TO TAKE PRECEDENCE (EXT).
* WORK TO FIGURED DIMENSIONS ONLY.
* DPC TO ALL VERTICAL AND HORIZONTAL OPENINGS.
* FOUNDATIONS TO BE A MINIMUM OF 300mm BELOW VIRGIN SOIL.
* HOUSE FFL 200mm ABOVE B.O.F. AT BOUNDARY L.C.
* WINDOWS AND DOORS EXCEEDING 1m² OR LESS THAN 500mm FROM FFL TO BE SAFETY GLAZED.
* ALL GLAZING TO COMPLY WITH SABS 0137.
* DRAINS 110mm PVC - MINIMUM FALL OF 1:60.
* RES OR LIES AT ALL BENDS AND JUNCTIONS WITH MARKED COVERS AT GROUND LEVEL.
* CLOSED SYSTEM ENTER AT 45° JUNCTIONS.
* 600mm BENDS TO DRAINAGE RUN.
* MINIMUM DEPTH OF 450mm BELOW COVER LEVEL.
* COVER LEVEL 100mm ABOVE BOUNDARY L.C.
* BETWEEN WALLS & ROOF SHEETING TO BE BEAMFILLED.
* ALL MANHOLES AND RES UNDER DRIVEWAYS OR CONCRETE SLABS TO BE SEALED WITH HEAVY DUTY COVERS.
* CONTRACTOR TO ENSURE THAT A BALANCED WATER PRESSURE SYSTEM IS INSTALLED WITH ALL VALVES ETC. HOUSED IN ROOF SPACE.
* ANY SEWERAGE & STORMWATER LINES UNDERNEATH BUILDING OR PAVED DRIVEWAY TO BE ENCASED IN 150mm CONCRETE.

* IN ASSOCIATION WITH THE NHBRC AND SKALK STEYN ARCHITECTURE

NATIONAL HOME BUILDERS
NHBRC
REGISTRATION COUNCIL

National Home Builders
Registration Council and Skalk
Steyn Architecture

Phase 4, Medscheme Office Park
10 Muswell Road South
Bryanston
2021

&
22 Waratah Street
PO Box 61
Melkbosstrand
7437

LEGACY PROJECT

Erff 34744
c/o Sphinx and Sussex Road
Blue Downs
Cape Town

Drawing Name
**GROUND FLOOR, FIRST FLOOR,
SITE PLAN, ELEVATIONS,
SECTIONS AND SCHEDULES**

Drawing Status
MUNICIPAL DRAWINGS

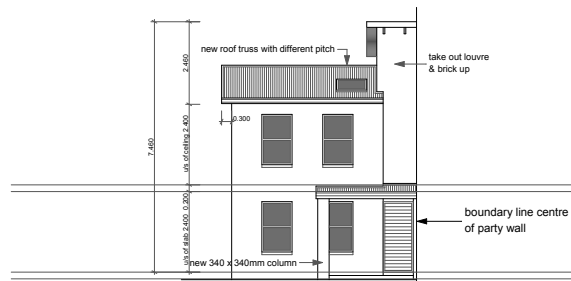
Drawn by
Date

Checked by
Date

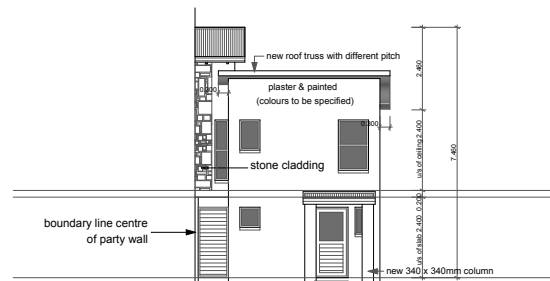
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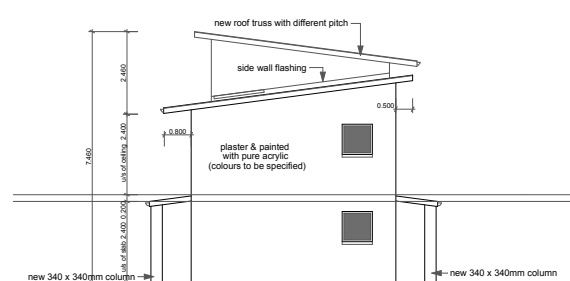
Status
Revision



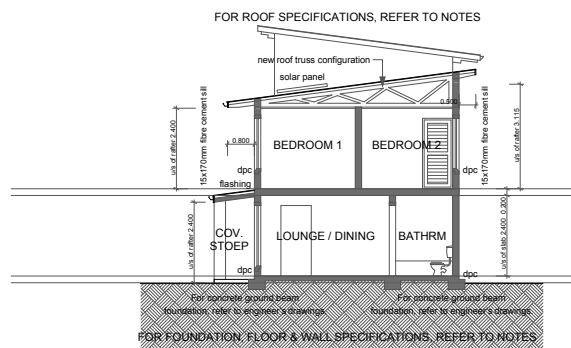
NORTH ELEVATION 1:100



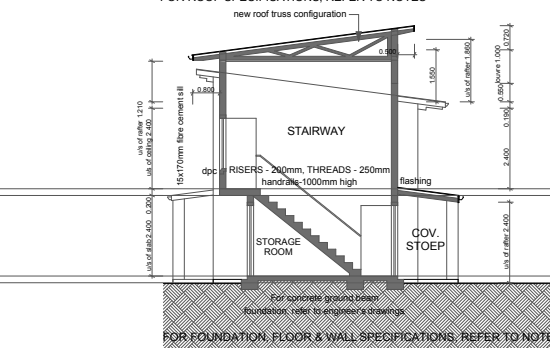
SOUTH ELEVATION 1:100



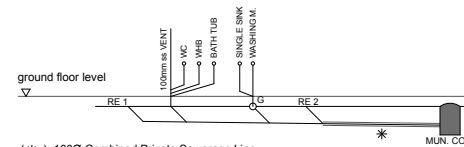
EAST ELEVATION 1:00



SECTION A-A 1:100



SECTION B-B 1:100

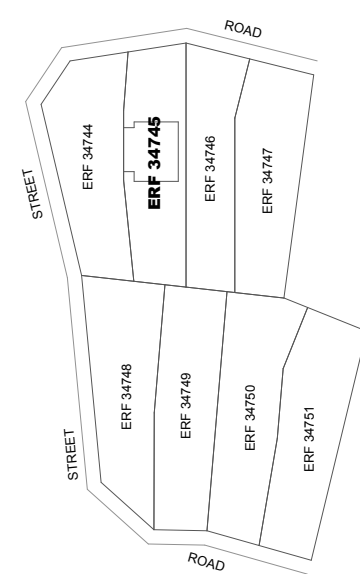


SEWERAGE SECTION

WINDOW SCHEDULE

W1	W2	W3	W4	W5	W6	W7	W8
400x800	400x1800	600x600	600x600	600x900	600x900	600x900	600x900

*uPVC Windows or White Powder Coated Aluminium, 60 Micron thick.



LOCALITY PLAN 1:350

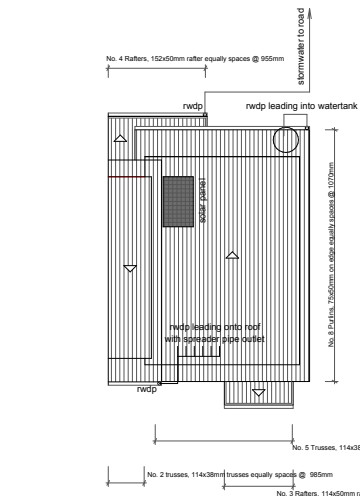
DOOR SCHEDULE

D1	D2	D3
813x2032	1000x2032	1000x2032

R-VALUES FOR WALLS

NO.	THICKNESS (mm)	MATERIAL	CONDUCTIVITY (W/mK)	R-VALUE (m²K/W)
R ₁	10	MOVING AIR FILM	0.03	0.03
R ₂	10	EXT. PLASTER	0.03	0.03
R ₃	150	CONC. BLOCKS	0.38	0.23
R ₄	10	INT. PLASTER	0.03	0.03
R ₅		STILL AIR FILM	0.11	0.11
TOTAL R-VALUE				0.41

0.41 > 0.35 (RANS 14400XA FOR CLIMATE ZONE 1) AND THEREFORE COMPLIES



ROOF PLAN 1:100

FENESTRATION SCHEDULE

FENESTRATION CALCULATION:

North: $W_n = 900 \times 1500(4) = 5.4m^2$
 South: $W_s = 400 \times 800 = 0.32m^2$
 $W_n = 600 \times 600 = 0.36m^2$
 $W_n = 400 \times 1800 = 0.72m^2$
 $W_n = 600 \times 900 = 0.54m^2$
 $W_n = 900 \times 1500 = 1.62m^2$

Unit area = 71.13m² (excl. courtyard)
 Net area = 62m² (excl. courtyard)

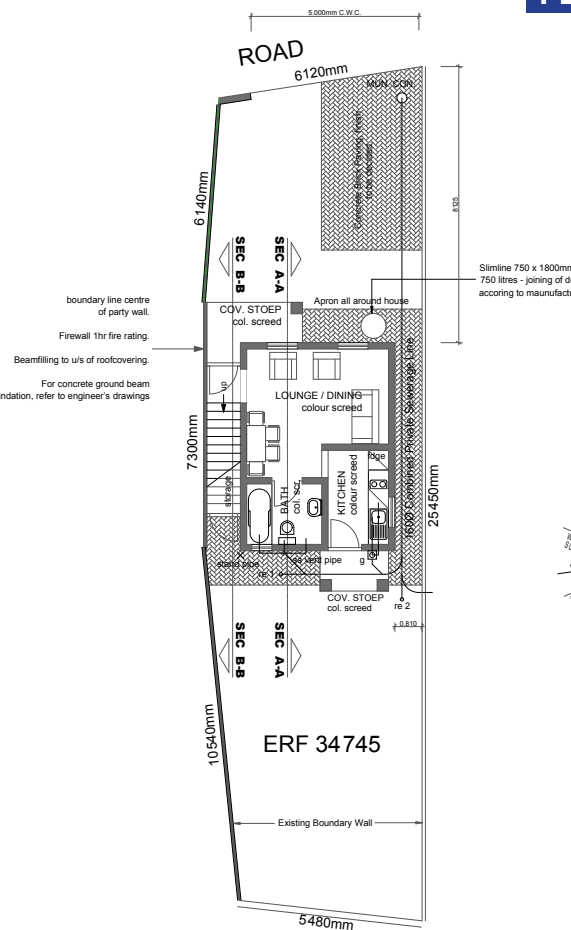
The total floor area is checked in the calculation below:
 15% of the net floor area of 62m² = 9.3m²
 Total fenestration = 10.58m²

10.58m² > 9.8m² which does not comply.
 Requires rational design - see energy table

ENERGY EFFICIENCY SCHEDULE PER HOUSE

DESCRIPTION	SOLUTION
HOT WATER	COULDS panels of 4.50m² is required for 250 litres per day
FENESTRATION	Rational design for fenestration requires W_n on GP to be Single Low E Glazing (e.g. Solar E Smart Glass Low Emissivity Glass) For solar heat gain sufficient shading is provided
ROOF ASSEMBLY	Climate zone 4 R-value = 3.7 = 145mm Isotherm
EXTERNAL WALLS	Manufacturers specifications. R-value: See table

ENERGY EFFICIENCY SCHEDULE



SITE & GROUND FLOOR 1:100

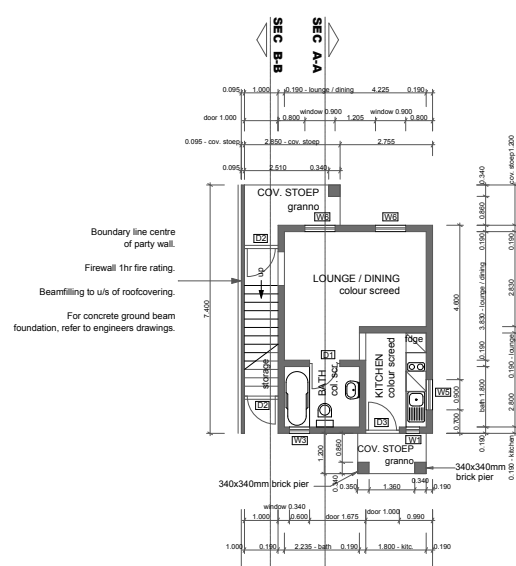
SHOWING SEWERAGE LAYOUT



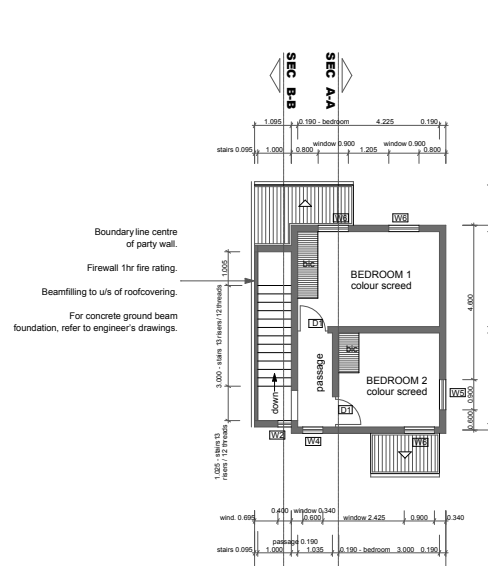
AREA CALCULATIONS:

GROUND FLOOR	COVERED STOEPS	FIRST FLOOR	TOTAL
33.57m²	6.64m²	34.47m²	74.67m²

SITE AREA = 153.13m²
 COVERAGE = 40.21m² = 26.26%



GROUND FLOOR 1:100



FIRST FLOOR 1:100

SPECIFICATION & NOTES:

FOUNDATIONS:

- * 750x250MM CONCRETE STRIP FOR 100MM BRICK WALLS.
- * 750x250MM CONCRETE FLOOR SLAB THICKENING FOR 80mm INTERNAL WALLS.
- * 750x250MM CONCRETE STRIP FOR 100MM YARD AND BOUNDARY WALLS.
- * STRUCTURAL FOUNDATIONS TO ENGINEER'S DETAILS.

FLOORS:

- * 3MM LAYER OF SELF-LEVELLING LATEX AND CEMENT-BASED FINISH APPLIED ON TOP OF THE 50MM CEMENT SCREED ON 100MM CONCRETE SURFACE BED FOR INTERIOR FLOORS. GROUT LINES RESEMBLING TILES ARE CUT INTO SURFACES. THE SURFACE IS POLISHED TO ENSURE A SMOOTH SURFACE. 250 MICRON DAMP PROOF MEMBRANE.
- * DAMP PROOF MEMBRANE TO BE WELL LAPPED TO BRICKWALL DPC.
- * FIRST FLOOR - FINISH AS PER SPECIFICATIONS ON 200mm R.C. SLAB TO ENGINEER'S DETAIL.

CONCRETE APRON:

- * DPC UP & REMOVING RUBBISH, DEBRIS, VEGETATIONS, HEDGES, SHRUBS, BUSHES ETC NOT EXCEEDING 200MM GIRTH INCLUDING FORMING A COMPACTED SUB-BASE UNDER CONCRETE APRON AREA COMPACTED 95% MOD ASHTO DENSITY TO A TOTAL THICKNESS OF NOT EXCEEDING 150MM INCLUDING A DAMP CONCRETE SURFACE BED OF 80MM THICKNESS WITH A SMOOTH SURFACE FINISH.

WALLS:

- * EXTERNAL WALLS 180MM BRICKS.
- * INTERNAL WALLS 90MM BRICKS.
- * GALVANIZED LADDER TYPE BRICKWORK EVERY 2ND COURSE WITH NO. 2 COURSES ADDITIONALLY BELOW WINDOW CELLS AND ABOVE ALL OPENINGS.
- * PRECAST LINTOLS OVER ALL OPENINGS AND LAID IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- * STEPPED BRICKWORK DPC TO BE A MINIMUM OF 150MM ABOVE GROUND LEVEL WITH WEIR HOLES EVERY SECOND PERIOD.
- * MAIN EXTERIOR & INTERIOR WALL FINISHES - MODAS COLOUR RANGE EXTERIOR FINISH - MODAS ENVIRO WEATHERMASTER GEA HEAVY TEXTURE (CEMENT ENHANCED ACRYLIC) INTERIOR FINISH - MODAS ENVIRO MASSHOMES ANTI-MICROBIAL INTERIOR.

ROOF, RAINWATER GOODS AND CEILINGS:

- * REFER TO ROOPLAN.
- * ALL ROOF TIMBERS TO SPECIALIST ENGINEER'S SPECIFICATIONS AND MANUFACTURER'S INSTRUCTIONS.
- * MAIN ROOFS @ 7°
- * GALVANIZED COATED CLIP LOCK ZINCALUME STEEL SHEETING WITH A GEMSBOK SAND FINISH.
- * 38x14MM TIMBER TRUSSES, FOR SPACINGS REFER TO ROOF PLAN.
- * COVERED STOEP @ 7°
- * 38x14MM & 50x125MM TIMBER RAFTER @ COVERED STOEPS, FOR SPACINGS REFER TO ROOF PLAN.
- * FOR FACIABOARD REFER TO ROOF DETAIL.
- * UPVC STREAMLINED 10MM SQUARE PROFILE STANDARD GUTTER AND DOWNPIPES, DOWNPIPES TO CONNECT TO WATER TAPS ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
- * FOR RAFTERS, PURLINS & BATTEN SIZES REFER TO ROOF PLANS.
- * CEILINGS - 145MM THICK ISO THERM INSULATION BETWEEN BATTENS AND 10MM CRYSTAL PLASTER BOARD FIXED TO BATTENS.

MUNICIPAL NOTES:

- * ALL WORK TO BE IN ACCORDANCE WITH THE NATIONAL BUILDING REGULATIONS AND BUILDING STANDARDS ACT NO. 103 OF 1977.
- * DIMENSIONS AND LEVELS TO BE VERIFIED ON SITE.
- * OVERALL DIMENSIONS TO TAKE PRECEDENCE (EXT).
- * WORK TO FIGURED DIMENSIONS ONLY.
- * DPC TO ALL VERTICAL AND HORIZONTAL OPENINGS.
- * FOUNDATIONS TO BE A MINIMUM OF 300mm BELOW VIRGIN SOIL.
- * HOUSE FFL 200MM ABOVE D.O.T. AT BOUNDARY I.C.
- * WINDOWS AND DOORS EXCEEDING 1m² OR LESS THAN 500MM FROM FFL TO BE SAFETY GLAZED.
- * ALL GLAZING TO COMPLY WITH SABS 0137.
- * DRAINS 100MM & PVC - MINIMUM FALL OF 1:50.
- * RES OR RES ALL BENDS AND JUNCTIONS WITH MARKED COVERS AT GROUND LEVEL.
- * CLOSED SYSTEM ENTER AT 45° JUNCTIONS.
- * 600MM BENDS TO DRAINAGE RUN.
- * MINIMUM DEPTH OF 450MM BELOW COVER LEVEL.
- * COVER LEVEL 7MM ABOVE BOUNDARY I.C.
- * BETWEEN WALLS & ROOF SHEETING TO BE BEAMFILLED.
- * ALL MANHOLES AND RES UNDER DRIVEWAYS OR CONCRETE SLABS TO BE SEALED WITH HEAVY DUTY COVERS.
- * CONTRACTOR TO ENSURE THAT A BALANCED WATER PRESSURE SYSTEM IS INSTALLED WITH ALL VALVES ETC. HOUSED IN ROOF SPACE.
- * ANY SEWERAGE & STORMWATER LINES UNDERNEATH BUILDING OR PAVED DRIVEWAY TO BE ENCASED IN 150MM CONCRETE.



National Home Builders Registration Council and Skalk Steyn Architecture

Phase 4, Medscheme Office Park
 10 Muswell Road South
 Bryanston
 2021

&
 22 Waratah Street
 PO Box 61
 Melkbosstrand
 7437

LEGACY PROJECT

Erf 34745
 c/o Sphinx and Sussex Road
 Blue Downs
 Cape Town

Drawing Name
GROUND FLOOR, FIRST FLOOR, SITE PLAN, ELEVATIONS, SECTIONS AND SCHEDULES

Drawing Status
MUNICIPAL DRAWINGS

Drawn by Date

Checked by Date

Drawing Scale **1:100**

Layout ID **A.01** Status Revision



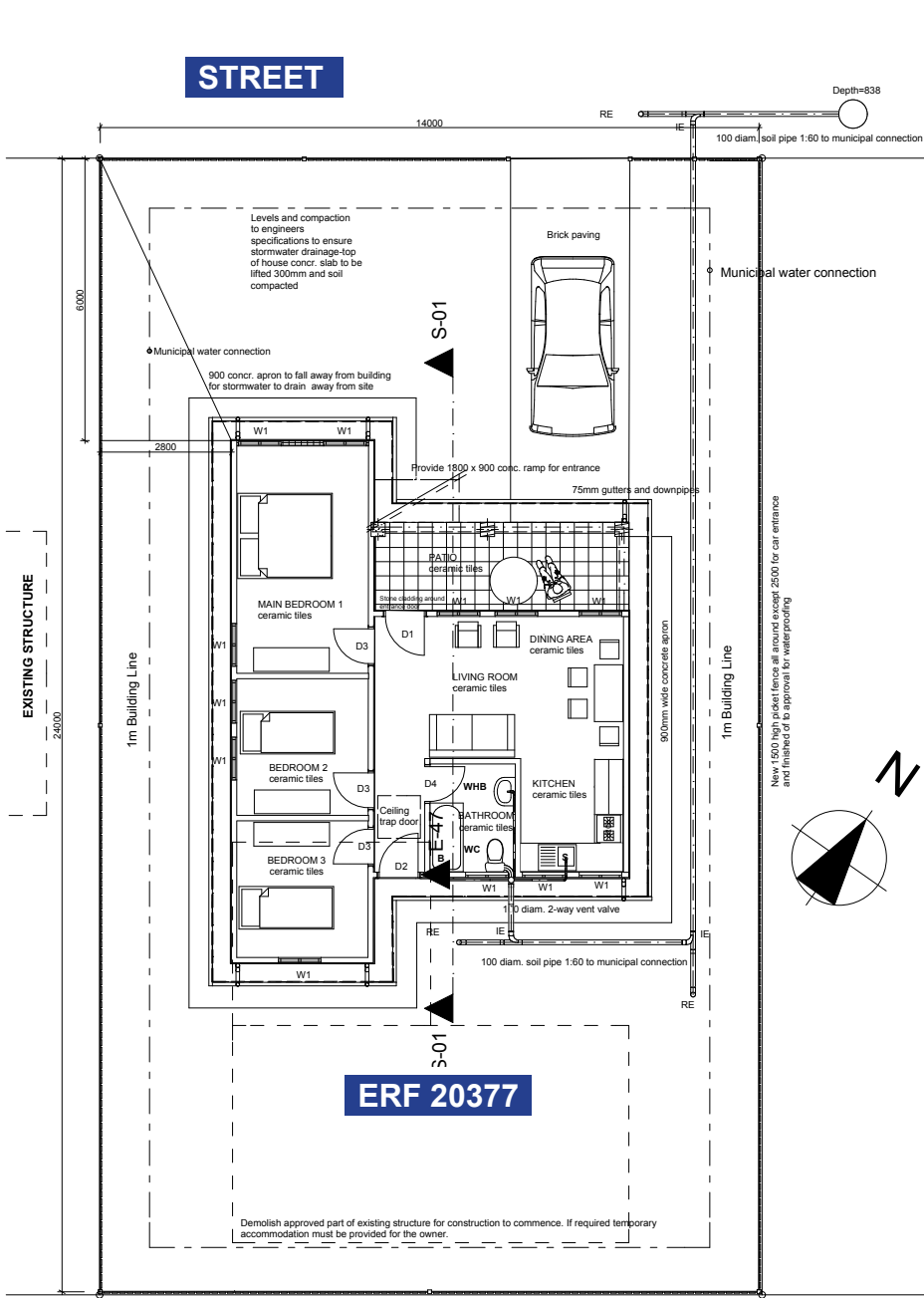




5 ■■■

Single-storey detached homes' working drawings and perspectives

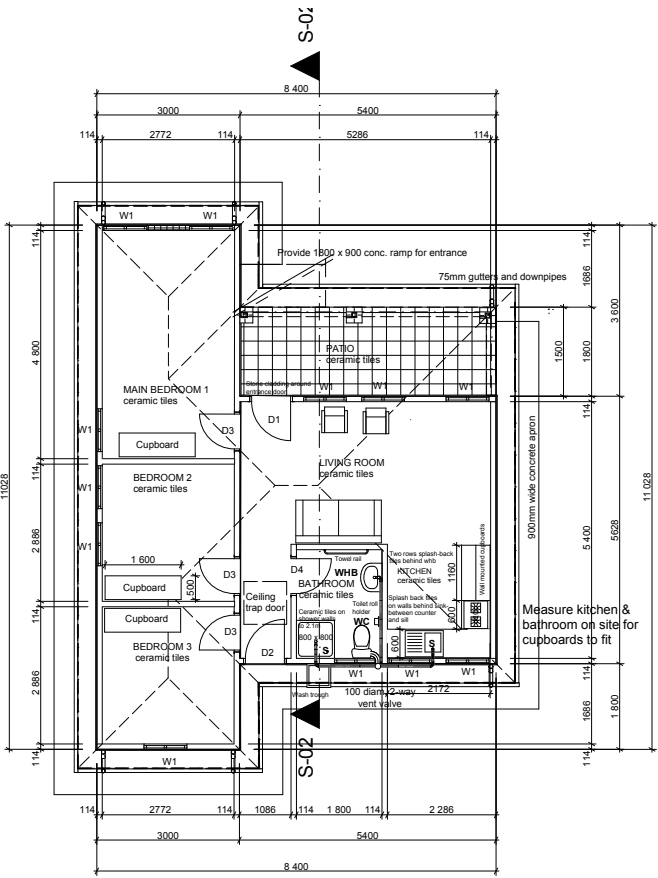
5.1 House 1 - Work drawings



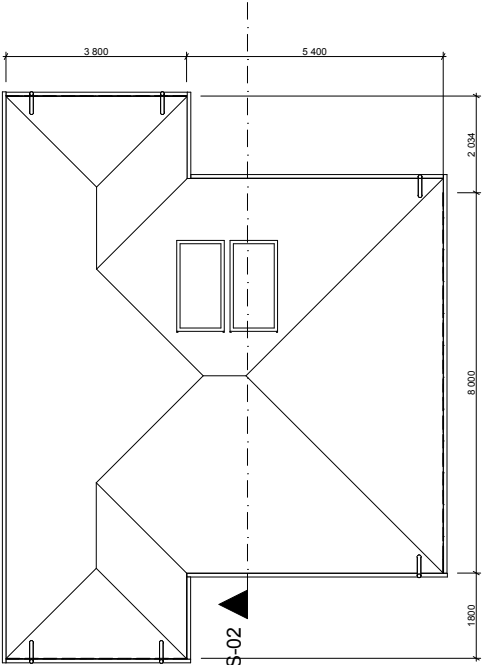
SITE PLAN

TOTAL AREA SCHEDULE		
DESCRIPTION	OUTSIDE OF EXT. WALL	INSIDE OF EXT. WALL
Without Patio	63m ²	58m ²
With Patio	73m ²	67m ²
Site Area	336m ²	
Site Coverage	18%-21%	

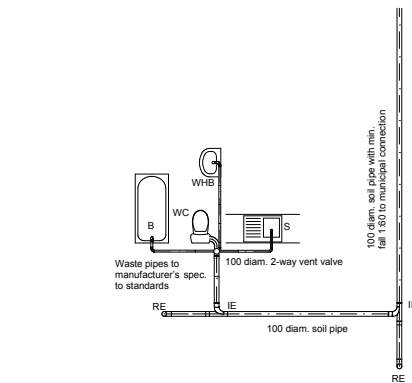
AREA SCHEDULE



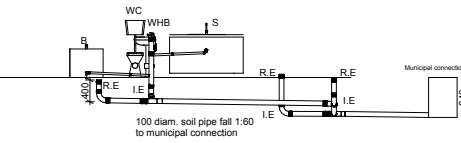
GROUND FLOOR PLAN



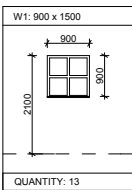
HIPPED ROOF PLAN



DRAINAGE LAYOUT



DRAINAGE ELEVATION



D1: 900 x 2032	D2: 813 x 2032	D3: 813 x 2032	D4: 813 x 2032
QUANTITY: 1	QUANTITY: 1	QUANTITY: 3	QUANTITY: 1
FRAME Energy efficient frame, other enclosed, painted or finished to manufacturer's specifications	FRAME Energy efficient frame, other enclosed, painted or finished to manufacturer's specifications	FRAME Energy efficient frame, other enclosed, painted or finished to manufacturer's specifications	FRAME Energy efficient frame, other enclosed, painted or finished to manufacturer's specifications
DOOR: 1xRH Varnished solid timber door with 3 lever lockset. Provide weather bar	DOOR: 1xLH Varnished solid timber door with 3 lever lockset. Provide weather bar	DOOR: 2xLH & 1xRH Painted semi-solid timber door with 2 lever lockset	DOOR: 1xRH Painted semi-solid timber door with 2 lever lockset

WINDOW AND DOOR SCHEDULE

STANDARD CONSTRUCTION NOTES:

- ALL CONSTRUCTION AND MATERIALS TO COMPLY WITH THE REQUIREMENTS OF NHBRC'S HOME BUILDERS' MANUAL AND SANS 10400, UNLESS OTHERWISE AGREED THROUGH AN AGREEMENT CERTIFICATE OR RATIONAL DESIGN
- PROVISION TO BE MADE FOR STORMWATER RUNOFFS. ALL APRONS, EXTERNAL PAVING TO SLOPE AWAY FROM BUILDING
- WHERE ELECTRICAL INSTALLATION IS REQUIRED SPECIFICATIONS WILL BE PROVIDED AND A REGISTERED ELECTRICIAN APPOINTED
- A REGISTERED PLUMBER IS TO BE APPOINTED FOR DRAINAGE, WATER RETICULATION & FITTINGS
- THIS DRAWING IS NOT TO BE SCALED
- ALL SITE DIMENSIONS AND LEVELS TO BE CHECKED AND VERIFIED BEFORE ANY WORK COMMENCES ON SITE
- DISCREPANCIES TO BE REPORTED TO PROJECT MANAGER

SPECIFICATIONS:

1. GENERAL NOTES:

1.1 ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE BEFORE ANY WORK COMMENCES. THE LAND SURVEYOR'S DIMENSIONS ARE TO BE FOLLOWED FOR THE SITE. DIMENSIONAL DISCREPANCIES WILL BE TO THE COST OF THE CONTRACTOR

2. FOUNDATIONS:

2.1 ALL FOUNDATIONS, FOUNDATION WALLS, STRUCTURAL CONCRETE WORK AND SUBSOIL STORMWATER DRAINAGE TO GEOTECHNICAL REPORT AND ENGINEER'S SPECIFICATIONS

3. FLOORS:

3.1 CONCRETE SURFACE BED WITH 25MM SCREED OR TO RATIONAL DESIGN

3.2 350 X 350MM UNGLAZED CERAMIC TILES FOR ALL FLOORS BEDDED IN 3:1 CEMENT MORTAR AND 6MM JOINTS WITH NATURAL CEMENT GROUTING. CHECK WITH NHBRC FOR TYPE AND COLOUR

3.3 DAMP PROOF MEMBRANES TO BE WELL LAPPED AT WALLS TO IBT SYSTEM SPECIFICATIONS

4. WALLS:

4.1 SEE RATIONAL DESIGN FOR WALL DIMENSIONS AND DETAILS AND ITS RELATED 375 MICRON DPC

4.2 114MM EXTERNAL WALLS WILL COMPRISE 9MM NUTEC, 90MM LWSF AND 15 GYPSUM BOARD. 108MM INTERNAL WALLS WILL COMPRISE 9MM NUTEC, 90MM LWSF AND 9MM NUTEC

4.3 LINTOLS ABOVE WINDOWS, DOORS AND OPENINGS TO SYSTEMS' RATIONAL DESIGN

4.4 10MM PLASTER ON INTERNAL AND EXTERNAL WALLS. THE BASE PLASTER OF EXT. WALLS TO BE 20MM THICK AND 650MM HIGH

4.5 WALLS ARE FINISHED OFF WITH PAINT ACCORDING TO IBT SYSTEM DESIGNER'S SPECIFICATIONS

5. ROOFS:

5.1 USE A HIPPED ROOF DESIGN OF WHICH THE ROOF ASSEMBLY IS TO RATIONAL DESIGN OF THE SYSTEM DESIGN

5.2 FOR ROOF COVERING USE STONE COATED METAL TILES ACCORDING TO MANUFACTURER'S SPECIFICATIONS

5.3 ROOF OVERHANGS TO BE 400MM

5.4 108MM X 150MM FIBRE CEMENT FASCIA ALL AROUND OVERHANGS

5.5 PROVIDE 75MM WIDE SEAMLESS CHROMADEK METAL GUTTERS AND DOWNPIPES TO BE APPROVED BY NHBRC

5.6 140MM ISOTHERM INSULATION ON TOP OF CEILING

5.6 55MM FIBRE CEMENT CORNICE GLUED WITH NC ADHESIVE

6. WINDOW AND DOORS:

6.1 THE GLASS TYPE MUST BE LOW-E GLASS AND FRAMES MUST BE ENERGY EFFICIENT

6.2 WINDOW FRAMES BUILT IN ACCORDING TO THE IBT BUILDING SYSTEM WITH RELEVANT DPC BELOW WINDOW SILLS

7. WATER HEATING:

7.1 HIGH PRESSURE SOLAR WATER HEATER WITH ANTI-FREEZE TO BE INSTALLED TO SANS STANDARDS

NATIONAL HOME BUILDERS
NHBRC
REGISTRATION COUNCIL

National Home Builders Registration Council

JOE SLOVO HOUSE
5 Leeuwkop Road
Sunninghill
2191

60m² IBT House

Drawing Name
**GROUND FLOOR, SITE PLAN,
DRAINAGE LAYOUT AND
SCHEDULES**

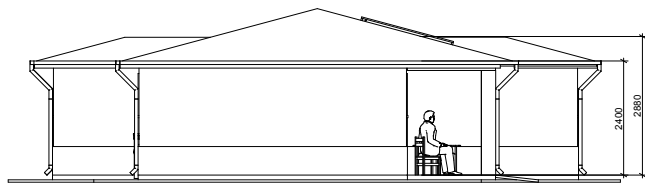
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Drawn by _____ Date _____

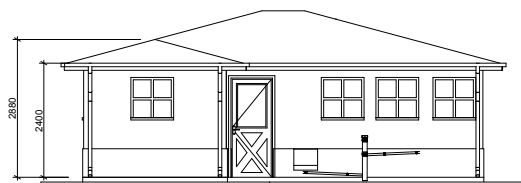
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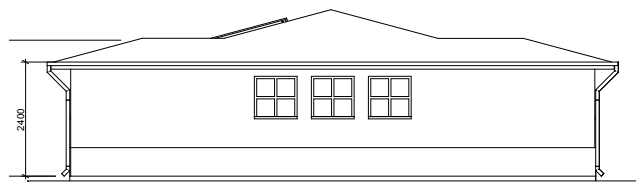
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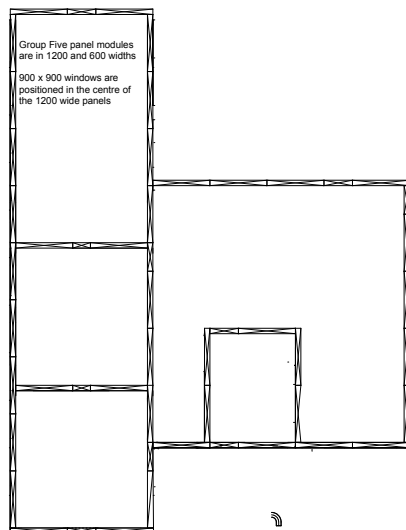
EAST ELEVATION



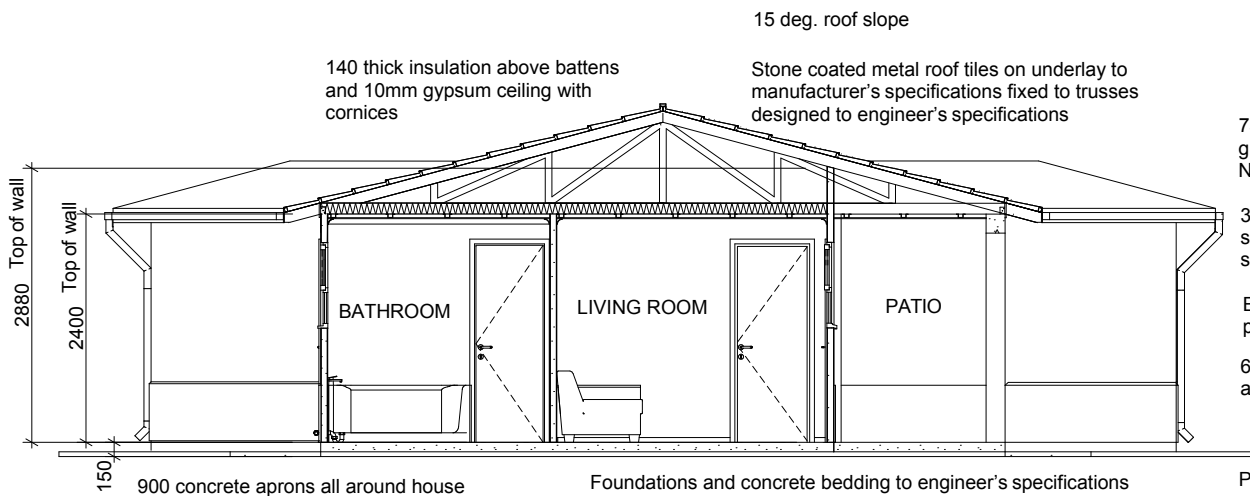
SOUTH ELEVATION



WEST ELEVATION



EXAMPLE PANEL LAYOUT PLAN



SECTION S-02
Scale 1:50



NORTH ELEVATION
Scale 1:50

FENESTRATION CALCULATION:

North: $W_1 = 900 \times 900(5) = 4.05m^2$
South: $W_2 = 900 \times 900(4) = 3.24m^2$
West: $W_3 = 900 \times 900 = 0.81m^2$
Total fenestration area = $8.11m^2$

Unit area = $61m^2$ (excl. courtyard)
Net area = $58m^2$ (excl. courtyard)

The total floor area is checked in the calculation below:

15% of the net floor area of $58m^2$ = $8.7m^2$
Total fenestration = $8.11m^2$
 $8.11m^2 > 8.7m^2$ which does not comply

FENESTRATION CALCULATION

ENERGY EFFICIENCY SCHEDULE	
DESCRIPTION	SOLUTION
HOT WATER	Collector panels of $4.2m^2$ is required for 252 litres resorting to a 1 x 300 litre solar geyser
FENESTRATION	Single-Low E Glazing (e.g. Solar E Smart Glass: low-emissivity glass) or to Group Five
ROOF ASSEMBLY	Climate zone 2: R-value = $3.2 \pm 130mm$ Isotherm
EXTERNAL WALLS	To manufacturers specifications. R-value: See table

ENERGY EFFICIENCY SCHEDULE

NO.	THICKNESS (MM)	MATERIAL	CONDUCTIVITY $W/(m.K)$	R-VALUE $(m^2.K/W)$
R_1		MOVING AIR FILM		0.03
R_2	9	NUTEC BOARD	0.19	0.047
R_3	90	POLYSTYRENE	0.035	2.57
R_4	15	GYPSUM BOARD	0.17	0.088
R_5		STILL AIR FILM		0.11
TOTAL R-VALUE				2.8
2.8 > 2.2 (SANS 10400XA FOR CLIMATE ZONE 1) AND THEREFORE COMPLIES				

R-VALUES FOR WALLS

STANDARD CONSTRUCTION NOTES:

- ALL CONSTRUCTION AND MATERIALS TO COMPLY WITH THE REQUIREMENTS OF NHBRC'S HOME BUILDERS' MANUAL AND SANS 10400, UNLESS OTHERWISE AGREED THROUGH AN AGREEMENT CERTIFICATE OR RATIONAL DESIGN
- PROVISION TO BE MADE FOR STORMWATER RUNOFFS. ALL APRONS, EXTERNAL PAVING TO SLOPE AWAY FROM BUILDING
- WHERE ELECTRICAL INSTALLATION IS REQUIRED SPECIFICATIONS WILL BE PROVIDED AND A REGISTERED ELECTRICIAN APPOINTED
- A REGISTERED PLUMBER IS TO BE APPOINTED FOR DRAINAGE, WATER RETICULATION & FITTINGS
- THIS DRAWING IS NOT TO BE SCALED
- ALL SITE DIMENSIONS AND LEVELS TO BE CHECKED AND VERIFIED BEFORE ANY WORK COMMENCES ON SITE
- DISCREPANCIES TO BE REPORTED TO PROJECT MANAGER

SPECIFICATIONS:

1. GENERAL NOTES:

1.1 ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE BEFORE ANY WORK COMMENCES. THE LAND SURVEYOR'S DIMENSIONS ARE TO BE FOLLOWED FOR THE SITE. DIMENSIONAL DISCREPANCIES WILL BE TO THE COST OF THE CONTRACTOR/SPONSORS

2. FOUNDATIONS:

2.1 ALL FOUNDATIONS, FOUNDATION WALLS, STRUCTURAL CONCRETE WORK AND SUBSOIL, STORMWATER DRAINAGE TO GEOTECHNICAL REPORT AND ENGINEER'S SPECIFICATIONS

3. FLOORS:

3.1 CONCRETE SURFACE BED WITH 25MM SCREED OR TO RATIONAL DESIGN

3.2 350 X 350MM UNGLAZED CERAMIC TILES FOR ALL FLOORS BEDDED IN 3:1 CEMENT MORTAR AND 8MM JOINTS WITH NATURAL CEMENT GROUTING. CHECK WITH NHBRC FOR TYPE AND COLOUR

3.3 DAMP PROOF MEMBRANES TO BE WELL LAPPED AT WALLS TO SYSTEM SPECIFICATIONS

4. WALLS:

4.1 SEE RATIONAL DESIGN FOR WALL DIMENSIONS AND DETAILS AND ITS RELATED 375 MICRON DPC

4.2 140MM EXTERNAL WALLS WILL COMPRISE 9MM NUTEC, 90MM LWSF AND 15 GYPSUM BOARD, 108MM INTERNAL WALLS WILL COMPRISE 9MM NUTEC, 90MM LWSF AND 9MM NUTEC

4.3 UNITS ABOVE WINDOWS, DOORS AND OPENINGS TO SYSTEMS' RATIONAL DESIGN

4.4 10MM PLASTER ON INTERNAL AND EXTERNAL WALLS. THE BASE PLASTER OF EXT. WALLS TO BE 20MM THICK AND 60MM HIGH

4.5 WALLS ARE FINISHED OFF WITH PAINT ACCORDING TO IBT SYSTEM DESIGNER'S SPECIFICATIONS

5. ROOFS:

5.1 USE A HIPPED ROOF DESIGN OF WHICH THE ROOF ASSEMBLY IS TO RATIONAL DESIGN OF THE SYSTEM DESIGN

5.2 FOR ROOF COVERING USE STONE COATED METAL TILES ACCORDING TO MANUFACTURERS SPECIFICATIONS

5.3 ROOF OVERHANGS TO BE 400MM

5.4 10MM X 150MM FIBRE CEMENT FASCIA ALL AROUND OVERHANGS

5.5 PROVIDE 75MM WIDE SEAMLESS METAL GUTTERS AND DOWNPIPES TO BE APPROVED BY NHBRC

5.6 140MM ISOTHERM INSULATION ON TOP OF CEILING

5.7 55MM FIBRE CEMENT CORNICE GLUED WITH NC ADHESIVE

6. WINDOW AND DOORS:

6.1 THE GLASS TYPE MUST BE LOW-E GLASS AND FRAMES MUST BE ENERGY EFFICIENT

6.2 WINDOW FRAMES BUILT IN ACCORDING TO THE IBT BUILDING SYSTEM WITH RELEVANT DPC BELOW WINDOW SILLS

7. WATER HEATING:

7.1 HIGH PRESSURE SOLAR WATER HEATER WITH ANTI-FREEZE TO BE INSTALLED TO SANS STANDARDS

NATIONAL HOME BUILDERS
NHBRC
REGISTRATION COUNCIL

National Home Builders Registration Council

JOE SLOVO HOUSE
5 Leeukop Road
Sunninghill
2191

60m² IBT House

Drawing Name
**NORTH-, SOUTH-, EAST-, WEST
ELEVATIONS, SECTION S-02 AND
PANEL LAYOUT**

Drawing Status
MUNICIPAL DRAWINGS

Drawn by _____ Date _____

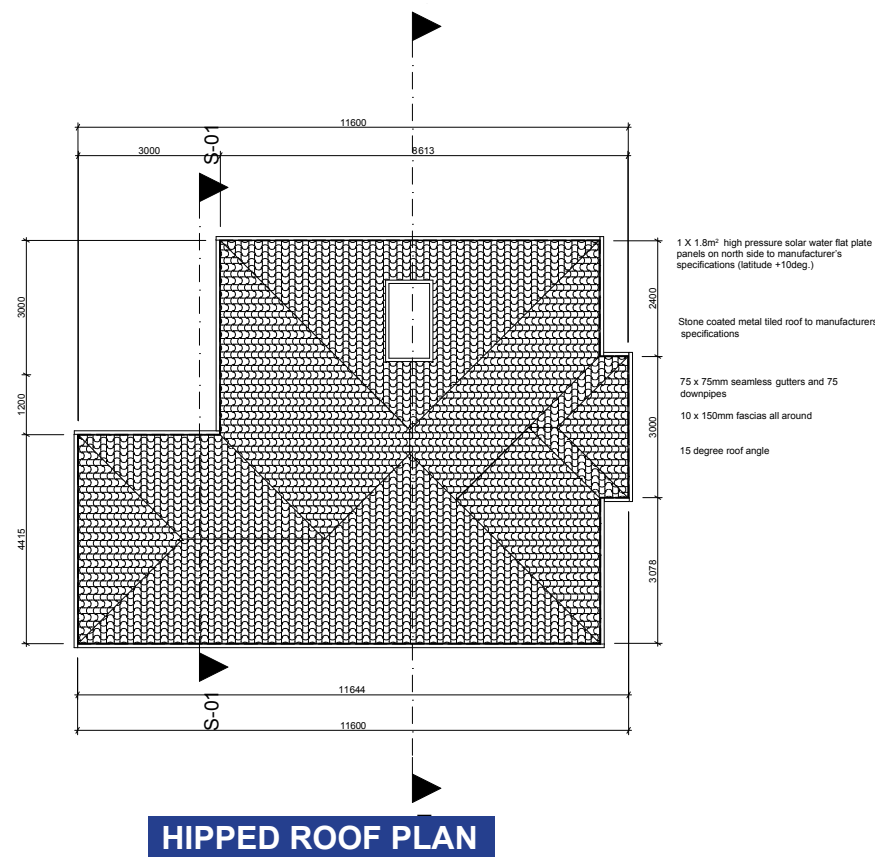
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A.02

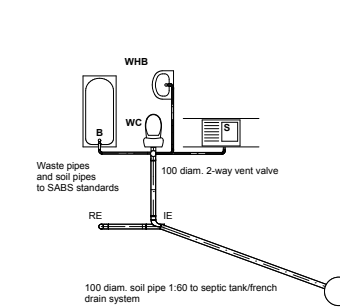
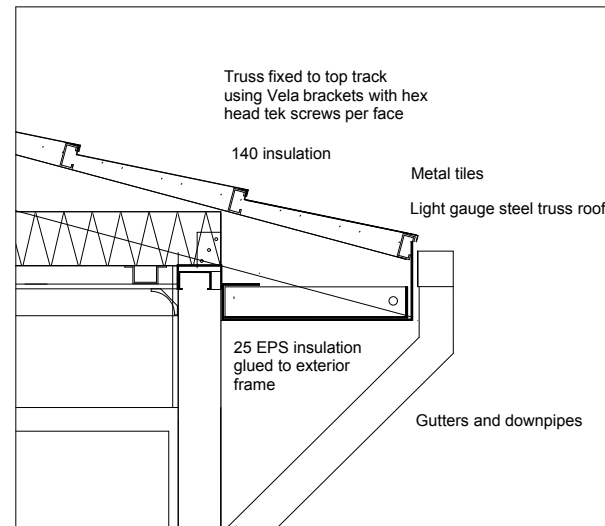
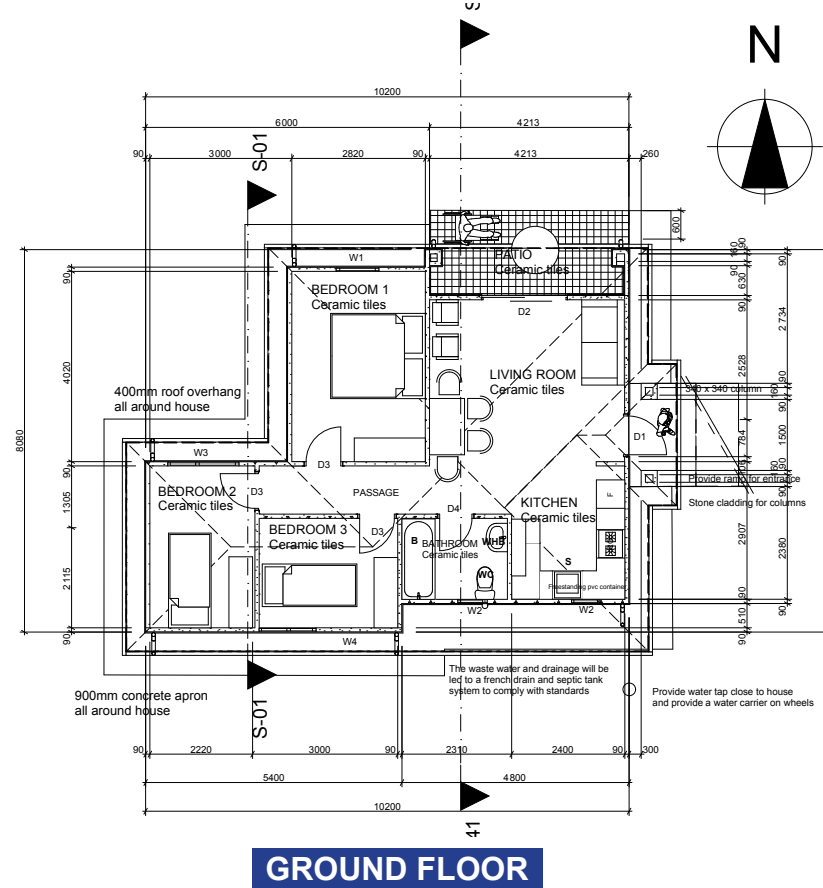


5.2 House 2 - Working Drawings

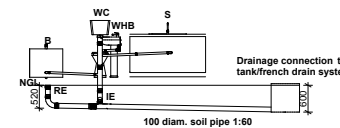


TOTAL AREA SCHEDULE OPTION 1		
DESCRIPTION	OUTSIDE OF EXT. WALL	INSIDE OF EXT. WALL
Without Patio	63m ²	60m ²
With Patio & Entrance	69m ²	
Site Area		
Site Coverage		

AREA SCHEDULE



DRAINAGE LAYOUT



DRAINAGE ELEVATION

OPTION 1

W1: 900 x 1500	W2: 600 x 900	W3: 1500 x 1500	W4: 1200 x 1200
QUANTITY: 2	QUANTITY: 2	QUANTITY: 1	QUANTITY: 1

D1: 900 x 2032	D2: 813 x 2032	D3: 813 x 2032	D4: 813 x 2032
QUANTITY: 1	QUANTITY: 1	QUANTITY: 3	QUANTITY: 1
FRAME Energy efficient frames, either avoided, painted or finished off to manufacturer's specifications	FRAME Energy efficient frames, either avoided, painted or finished off to manufacturer's specifications	FRAME Energy efficient frames, either avoided, painted or finished off to manufacturer's specifications	FRAME Energy efficient frames, either avoided, painted or finished off to manufacturer's specifications
DOOR: 1xRH Varnished solid timber door with 3 lever lockset Provide weather bar	DOOR: 1xLH SLIDING Varnish solid timber door with 3 lever lockset Provide weather bar	DOOR: 1xLH & 1xRH Painted semi-solid timber door with 2 lever lockset	DOOR: 1xLH Painted semi-solid timber door with 2 lever lockset

WINDOW AND DOOR SCHEDULE

STANDARD CONSTRUCTION NOTES:

-ALL CONSTRUCTION AND MATERIALS TO COMPLY WITH THE REQUIREMENTS OF THE NATIONAL BUILDING REGULATIONS, SANS 10400 AND THE NHBRC'S HOME BUILDER'S MANUAL, WHICH CAN INCLUDE AN AGREEMENT CERTIFICATE OR RATIONAL DESIGN PROVISION TO BE MADE FOR STORMWATER RUNOFFS. ALL APRONS, EXTERNAL PAVING TO SLOPE AWAY FROM BUILDING -WHERE ELECTRICAL INSTALLATION IS REQUIRED SPECIFICATIONS WILL BE PROVIDED AND A REGISTERED ELECTRICIAN APPOINTED -A REGISTERED PLUMBER IS TO BE APPOINTED FOR DRAINAGE, WATER RETICULATION & FITTINGS -THIS DRAWING IS NOT TO BE SCALED -ALL SITE DIMENSIONS AND LEVELS TO BE CHECKED AND VERIFIED BEFORE ANY WORK COMMENCES ON SITE -DISCREPANCIES TO BE REPORTED TO PROJECT MANAGER

SPECIFICATIONS:

1.1 ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE BEFORE ANY WORK COMMENCES ON SITE. THE LAND SURVEYOR'S DIMENSIONS ARE TO BE FOLLOWED FOR THE SITE. DIMENSIONAL DISCREPANCIES WILL BE TO THE COST OF THE CONTRACTOR/SPONSORS

2. FOUNDATIONS:

2.1 ALL FOUNDATIONS, FOUNDATION WALLS, STRUCTURAL CONCRETE WORK AND SUBSOIL STORMWATER DRAINAGE TO GEOTECHNICAL REPORT AND ENGINEER'S SPECIFICATIONS

3. FLOORS:

3.1 CONCRETE SURFACE BED WITH 25MM SCREED TO RATIONAL DESIGN
3.2 350 X 350MM UNGLAZED CERAMIC TILES FOR ALL FLOORS BEDDED IN 3:1 CEMENT MORTAR AND 8MM JOINTS WITH NATURAL CEMENT GROUTING. CHECK WITH NHBRC FOR TYPE AND COLOUR
3.3 DAMP PROOF MEMBRANES TO BE WELL LAPPED AT WALLS TO AGREEMENT SPECIFICATIONS

4. WALLS:

4.1 SEE AGREEMENT CERTIFICATE FOR WALL DIMENSIONS AND DETAILS AND IT'S RELATED 375 MICRON DPCS
4.2 LINTOLS ABOVE WINDOWS, DOORS AND OPENINGS TO SYSTEMS' RATIONAL DESIGN
4.4 10MM PLASTER ON INTERNAL AND EXTERNAL WALLS. BASE OF EXTERNAL WALL 20MM THICK PLASTER AT 600MM HEIGHT
4.5 WALLS ARE FINISHED WITH TWO COATS OF EXTERIOR ACRYLIC PAINTS WITH SABS OR AGREEMENT SOUTH AFRICA ACCREDITATION AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS

5. ROOFS:

5.1 USE A HIPPED ROOF DESIGN OF WHICH THE ROOF ASSEMBLY IS TO RATIONAL DESIGN OF THE SYSTEM DESIGN. DIMENSIONS MUST BE CHECKED ON SITE FOR CERTIFIED ROOF TRUSSES
5.2 FOR ROOF COVERING USE STONE COATED METAL TILES ACCORDING TO MANUFACTURER'S SPECIFICATIONS
5.3 ROOF OVERHANGS TO BE 400MM
5.4 10MM X 150MM FIBRE CEMENT FASCIA ALL AROUND OVERHANGS
5.5 PROVIDE 75MM WIDE SEAMLESS METAL GUTTERS AND DOWNPIPES TO BE APPROVED BY NHBRC
5.6 140MM ISOTHERM INSULATION ON TOP OF CEILING
5.6 55MM FIBRE CEMENT CORNICE GLUED WITH NC ADHESIVE

6. WINDOW AND DOORS:

6.1 THE GLASS TYPE MUST BE LOW-E GLASS AND FRAMES MUST BE ENERGY EFFICIENT
6.2 WINDOW FRAMES BUILT IN ACCORDING TO THE TOWER TECH. BUILDING SYSTEM WITH RELEVANT DPC BELOW WINDOW SILLS

7. WATER HEATING:

7.1 HIGH PRESSURE SOLAR WATER HEATER WITH ANTI-FREEZE TO BE INSTALLED TO SABS STANDARDS

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NHBRC
REGISTRATION COUNCIL

National Home Builders Registration Council

JOE SLOVO HOUSE
5 Leeuwkop Road
Sunninghill
2191

60m² IBT House

Drawing Name

**GROUND FLOOR, ROOF PLAN
AND DRAINAGE LAYOUT**

Drawing Status

CONSTRUCTION DRAWINGS

Drawn by

Date

Checked by

Date

Drawing Scale

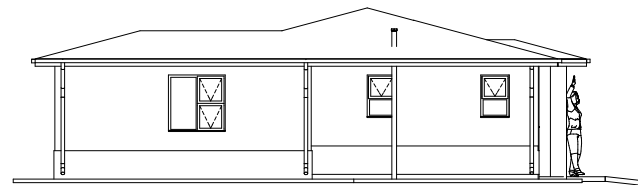
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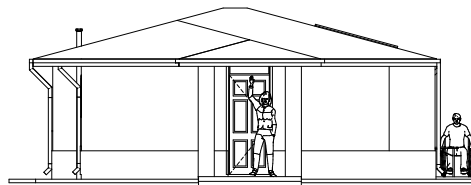
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Revision

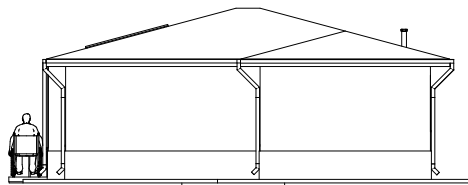
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SOUTH ELEVATION

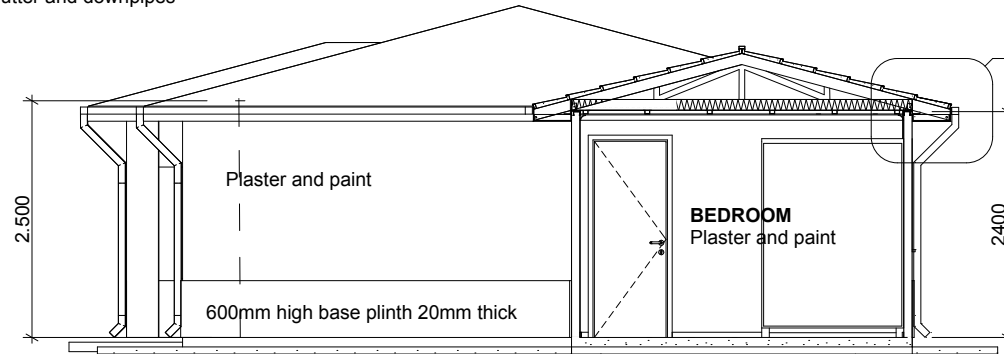


EAST ELEVATION



WEST ELEVATION

See specifications for gutter and downpipes



150mm min. between ufl and ngl

Concrete slab and foundations to engineer's specifications

SECTION A

Stone coated metal roof tiles on underlay to manufacturer's specifications fixed to trusses designed to engineer's specifications

Detail 1

140 thick insulation above battens and 10mm gypsum ceiling with cornices

Stone coated metal roof tiles on underlay to manufacturer's specifications fixed to engineers specifications

400mm roof overhang all around

Fascias, gutter and downpipes

Plaster and paint

600mm high base plinth 20mm thick

900mm concrete apron

SOUTH ELEVATION

FENESTRATION CALCULATION:

North: $W_1 = 1500 \times 900 = 1.35m^2$
 $W_2 = 1500 \times 1500 = 2.25m^2$
 $D_1 = 1810 \times 2032 = 3.67m^2$
South: $W_3 = 900 \times 600(2) = 1.08m^2$
 $W_4 = 1200 \times 1200 = 1.44m^2$
Total fenestration area = 8.79m²

Unit area = 61m² (excl. courtyard)
Net area = 58m² (excl. courtyard)

The total floor area is checked in the calculation below:

15% of the net floor area of 58m² = 8.7m²
Total fenestration = 8.79m²

8.79m² > 8.7m² which does not comply

For solar heat gain adequate roof cover must be provided for the sliding door.

FENESTRATION CALCULATION

ENERGY EFFICIENCY SCHEDULE	
DESCRIPTION	SOLUTION
HOT WATER	Collector panels of 4.2m ² is required for 252 litres resorting to a 1 x 300 litre solar geyser
FENESTRATION	Conductance: Single-Low E Glazing (e.g. Solar E Smart Glass: low-emissivity glass)
ROOF ASSEMBLY	Climate zone 2: R-value = 3.2 = 130mm Isotherm
EXTERNAL WALLS	To Tower Technologies Agreement Certificate

ENERGY EFFICIENCY SCHEDULE

STANDARD CONSTRUCTION NOTES:

-ALL CONSTRUCTION AND MATERIALS TO COMPLY WITH THE REQUIREMENTS OF NATIONAL BUILDING REGULATIONS, SANS 10400 AND NHBRC'S HOME BUILDERS MANUAL, WHICH CAN INCLUDE AN AGREEMENT CERTIFICATE OR RATIONAL DESIGN

-PROVISION TO BE MADE FOR STORMWATER RUNOFFS: ALL APRONS, EXTERNAL PAVING TO SLOPE AWAY FROM BUILDING

-WHERE ELECTRICAL INSTALLATION IS REQUIRED SPECIFICATIONS WILL BE PROVIDED AND A REGISTERED ELECTRICIAN APPOINTED

-A REGISTERED PLUMBER IS TO BE APPOINTED FOR DRAINAGE, WATER RETICULATION & FITTINGS

-THIS DRAWING IS NOT TO BE SCALED

-ALL SITE DIMENSIONS AND LEVELS TO BE CHECKED AND VERIFIED BEFORE ANY WORK COMMENCES ON SITE

-DISCREPANCIES TO BE REPORTED TO PROJECT MANAGER

SPECIFICATIONS:

1. GENERAL NOTES:

1.1 ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE BEFORE ANY WORK COMMENCES ON SITE. THE LAND SURVEYORS DIMENSIONS ARE TO BE FOLLOWED FOR THE SITE. DIMENSIONAL DISCREPANCIES WILL BE TO THE COST OF THE CONTRACTOR/SPONSORS

2. FOUNDATIONS:

2.1 ALL FOUNDATIONS, FOUNDATION WALLS, STRUCTURAL CONCRETE WORK AND SUBSOIL STORMWATER DRAINAGE TO 'GEOTECHNICAL REPORT AND ENGINEER'S SPECIFICATIONS'

3. FLOORS:

3.1 CONCRETE SURFACE BED WITH 25MM SCALED TO RATIONAL DESIGN

3.2 380 X 350MM UNGLAZED CERAMIC TILES FOR ALL FLOORS BEDDED IN 3:1 CEMENT MORTAR AND 8MM JOINTS WITH NATURAL CEMENT GROUTING. CHECK WITH NHBRC FOR TYPE AND COLOUR

3.3 DAMP PROOF MEMBRANES TO BE WELL LAPPED AT WALLS TO AGREEMENT SPECIFICATIONS

4. WALLS:

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4.5 WALLS ARE FINISHED WITH TWO COATS OF EXTERIOR ACRYLIC PAINTS WITH SABS OR AGREEMENT SOUTH AFRICA ACCREDITATION AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS

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5.6 140MM ISOOTHERM INSULATION ON TOP OF CEILING

5.8 55MM FIBRE CEMENT CORNICE. GLUED WITH NC ADHESIVE

6. WINDOW AND DOORS:

6.1 THE GLASS TYPE MUST BE LOW-E GLASS AND FRAMES MUST BE ENERGY EFFICIENT

6.2 WINDOW FRAMES BUILT IN ACCORDING TO THE TOWER TECH. BUILDING SYSTEM WITH RELEVANT DPC. BELOW WINDOW SILLS

7. WATER HEATING:

7.1 HIGH PRESSURE SOLAR WATER HEATER WITH ANTI-FREEZE TO BE INSTALLED. TO SANS STANDARDS

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National Home Builders Registration Council

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5 Leeuwkop Road
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2191

60m² IBT House

Drawing Name

ELEVATIONS, SECTIONS AND SCHEDULES

Drawing Status

CONSTRUCTION DRAWINGS

Drawn by Date

Checked by Date

Drawing Scale

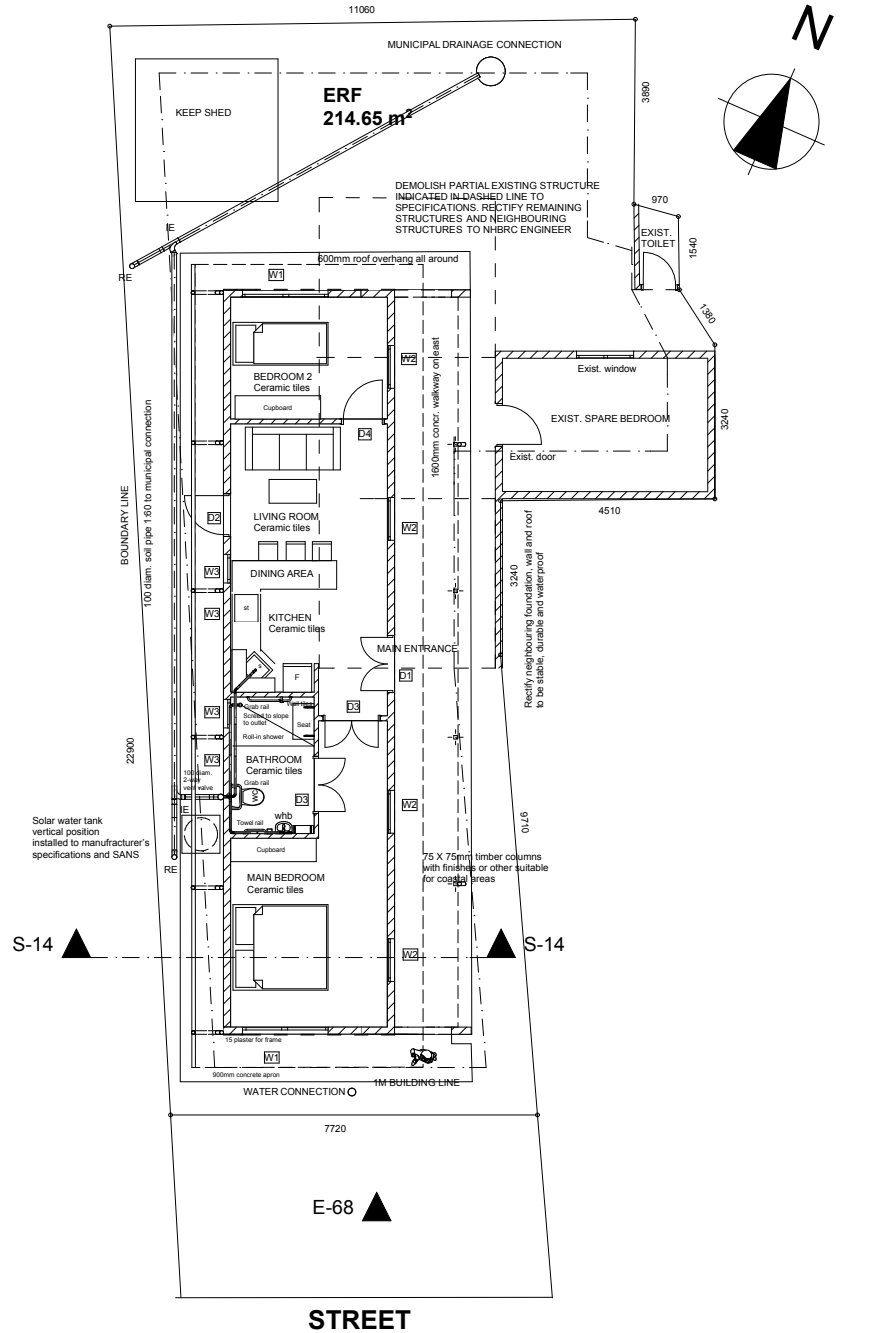
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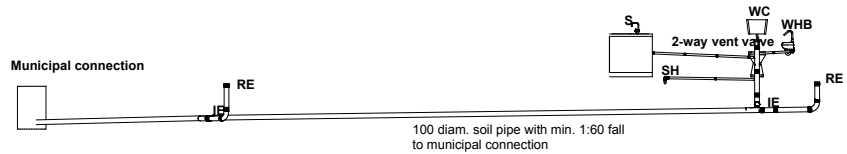
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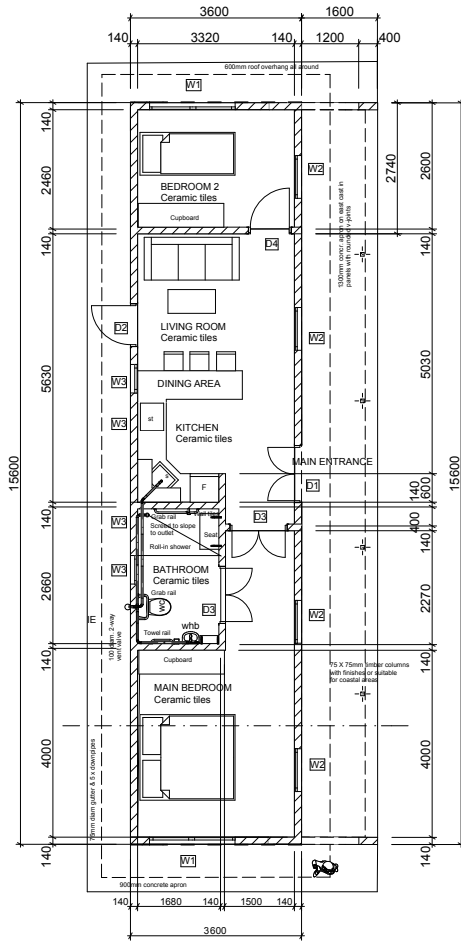
5.3 House 3 - Work drawings



SITE PLAN



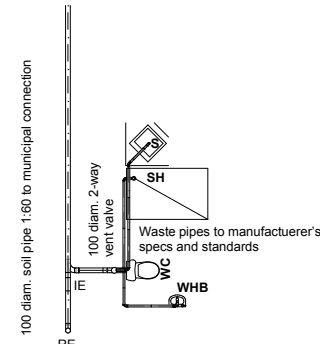
DRAINAGE ELEVATION



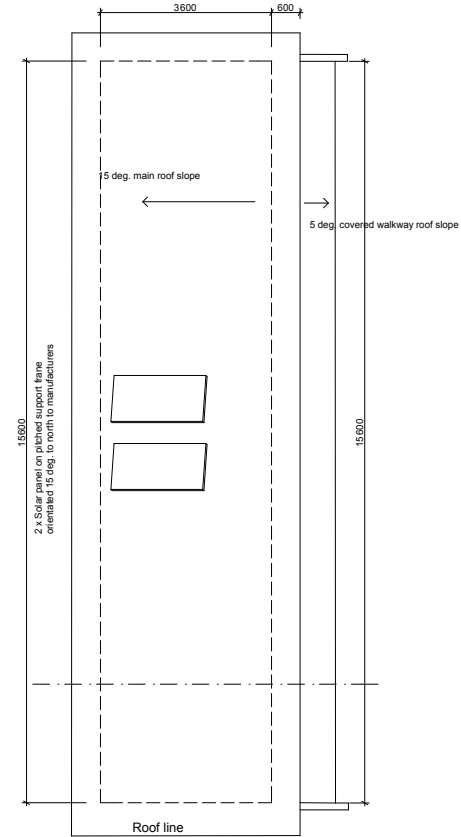
GROUND FLOOR PLAN

TOTAL AREA SCHEDULE		
DESCRIPTION	OUTSIDE OF EXT. WALL	INSIDE OF EXT. WALL
Without Patio	57m2	48m2
With Covered Walkway	76m2	71.6m2
Existing Structures	23.3m2	20.26m2
Total Structures Area	80m2-100m2	
Site Area	214.65m2	
Site Coverage	37%-47%	

AREA SCHEDULE



DRAINAGE PLAN



ROOF PLAN

W1: 1800 x 1200	W2: 900 x 900	W3: 600 x 800
QUANTITY: 2	QUANTITY: 4	QUANTITY: 2
Monolithic glass to Table 1 of SANS 10400 Part N	Monolithic glass to Table 1 of SANS 10400 Part N	Safety glass to Table 1 of SANS 10400 Part N

D1: 900 x 2100	D3: 900 x 2100	D2: 900 x 2100	D4: 813 x 2100
QUANTITY: 1	QUANTITY: 2	QUANTITY: 1	QUANTITY: 1
FRAME Energy efficient frames either anodised, painted or finished off to manufacturer's specifications for coastal areas	FRAME Energy efficient frames either anodised, painted or finished off to manufacturer's specifications for coastal areas	FRAME Energy efficient frames either anodised, painted or finished off to manufacturer's specifications for coastal areas	FRAME Energy efficient frames either anodised, painted or finished off to manufacturer's specifications for coastal areas
DOOR Varnished solid double doors with 3 lever lockset	DOOR Painted double semi-solid timber door with 2 lever lockset	DOOR Varnished solid timber door with 3 lever lockset	DOOR Painted semi-solid timber door with 2 lever lockset

WINDOW AND DOOR SCHEDULE

- STANDARD CONSTRUCTION NOTES:**
- ALL CONSTRUCTION AND MATERIALS TO COMPLY WITH THE REQUIREMENTS OF NHBRC'S HOME BUILDERS MANUAL AND SANS 10400, UNLESS OTHERWISE AGREED THROUGH AN AGREEMENT CERTIFICATE OR RATIONAL DESIGN
 - PROVISION TO BE MADE FOR STORMWATER RUNOFFS. ALL APRONS, EXTERNAL PAVING TO SLOPE AWAY FROM BUILDING
 - WHERE ELECTRICAL INSTALLATION IS REQUIRED SPECIFICATIONS WILL BE PROVIDED AND A REGISTERED ELECTRICIAN APPOINTED
 - A REGISTERED PLUMBER IS TO BE APPOINTED FOR DRAINAGE, WATER RETICULATION & FITTINGS
 - THIS DRAWING IS NOT TO BE SCALED
 - ALL SITE DIMENSIONS AND LEVELS TO BE CHECKED AND VERIFIED BEFORE ANY WORK COMMENCES ON SITE
 - DISCREPANCIES TO BE REPORTED TO PROJECT MANAGER
 - DIFFERENT CONTRACTORS/PROFESSIONALS FOR ONE PROJECT TO CO-ORDINATE WITH EACH OTHER FOR DIFFERENT BUILDING SYSTEMS TO FIT TOGETHER ESPECIALLY FOR RATIONAL DESIGNS
- SPECIFICATIONS:**
- 1. GENERAL NOTES:**
- 1.1 ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE BEFORE ANY WORK COMMENCES. THE LAND SURVEYORS DIMENSIONS ARE TO BE FOLLOWED FOR THE SITE. DIMENSIONAL DISCREPANCIES WILL BE TO THE COST OF THE CONTRACTOR/SPONSORS
- 2. FOUNDATIONS:**
- 2.1 ALL FOUNDATIONS, SLABS, FOUNDATION WALLS, STRUCTURAL CONCRETE WORK AND SUBSOIL STORMWATER DRAINAGE TO GEOTECHNICAL REPORT AND ENGINEER'S SPECIFICATIONS/AGREEMENT CERTIFICATE
- 3. FLOORS:**
- 3.1 CONCRETE SURFACE BED WITH 25MM SCREED OR TO RATIONAL DESIGN
- 3.2 350 X 350MM UNGLAZED CERAMIC TILES FOR ALL FLOORS BEDED IN 3:1 CEMENT MORTAR AND 8MM JOINTS WITH NATURAL CEMENT GROUTING. CHECK WITH NHBRC FOR TYPE AND COLOUR
- 3.3 DAMP PROOF MEMBRANES TO BE WELL LAPPED AT WALLS TO SYSTEM SPECIFICATIONS
- 4. WALLS:**
- 4.1 SEE KAVANGO RATIONAL DESIGN FOR WALL DIMENSIONS AND DETAILS AND ITS RELATED DPC
- 4.2 140MM EXTERNAL AND 140MM INTERNAL CONCRETE WALLS AND REINFORCEMENT TO KAVANGO RATIONAL DESIGN
- 4.3 LINTOLS ABOVE WINDOWS, DOORS AND OPENINGS TO SYSTEMS' RATIONAL DESIGN
- 4.5 WALLS ARE FINISHED OFF WITH PAINT ACCORDING TO IBT SYSTEM DESIGNER'S SPECIFICATIONS
- 5. ROOFS:**
- 5.1 USE A 15 DEG. MONO-PITCHED MAIN ROOF DESIGN OF WHICH THE ROOF ASSEMBLY IS TO SANS 10400 OR RATIONAL DESIGN OF THE SYSTEM DESIGN
- 5.2 FOR MAIN ROOF COVERING USE STONE COATED METAL TILES OR OTHER SUITABLE ROOF MATERIAL FOR COASTAL AREAS ACCORDING TO MANUFACTURER'S SPECIFICATIONS
- 5.3 USE A 5 DEG. MONO-PITCH ROOF FOR COVERED WALKWAY WITH SUITABLE LIGHT ROOF FOR COASTAL AREAS
- 5.4 ROOF OVERHANGS TO BE 600MM FOR MAIN ROOF
- 5.5 10MM x 150MM FIBRE CEMENT FASCIA ALL AROUND OVERHANGS
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- 5.7 55MM FIBRE CEMENT CORNICE GLUED WITH NC ADHESIVE
- 6. WINDOW AND DOORS:**
- 6.1 THE GLASS TYPE TO BE CLEAR GLASS AND FRAMES MUST BE ENERGY EFFICIENT
- 6.2 WINDOW FRAMES BUILT IN ACCORDING TO THE KAVANGO BUILDING SYSTEM WITH RELEVANT DPC BELOW WINDOW SILLS
- 7. WATER HEATING:**
- 7.1 HIGH PRESSURE SOLAR WATER HEATER WITH ANTI-FREEZE TO BE INSTALLED TO SANS STANDARDS

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60m² IBT House

Drawing Name
**GROUND FLOOR, SITE PLAN,
DRAINAGE LAYOUT AND AREA
SCHEDULE**

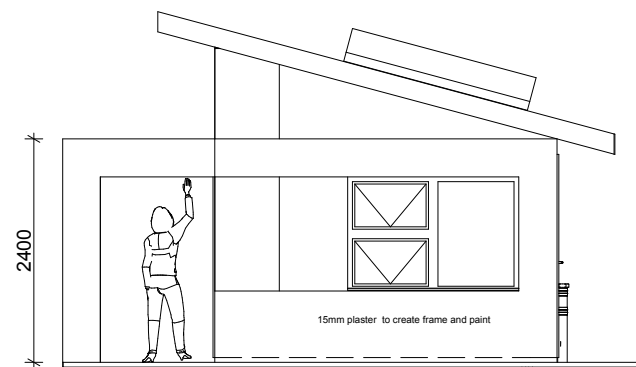
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MUNICIPAL DRAWINGS

Drawn by _____ Date _____

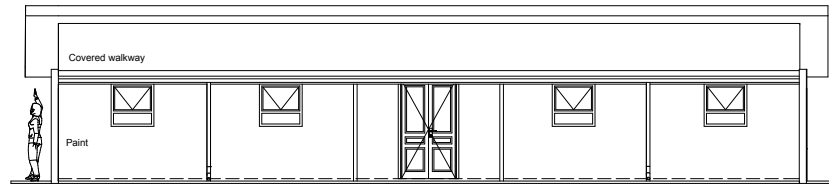
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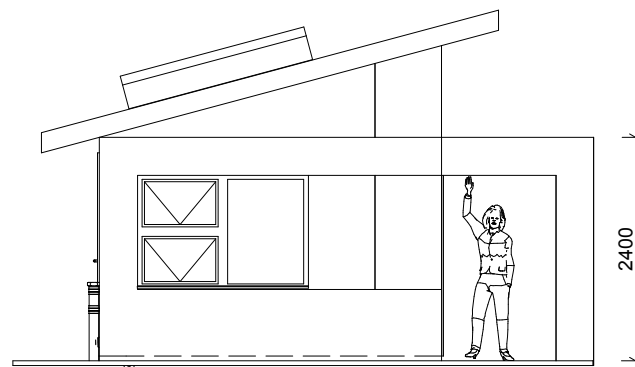
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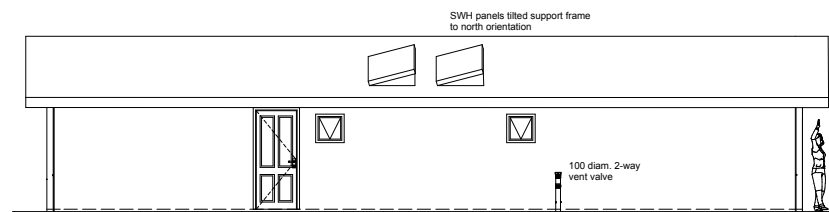
Sill detail to NHBRC
NORTH ELEVATION



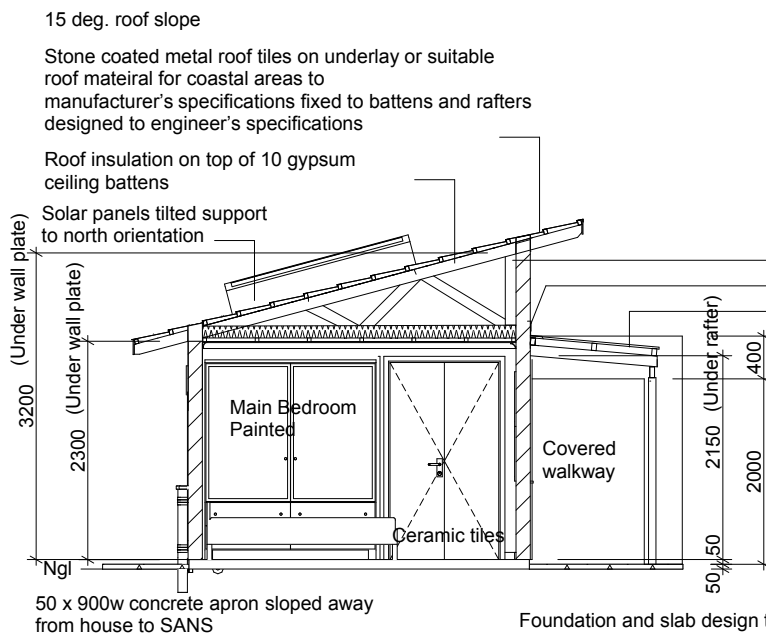
EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION



SECTION 1

Fixing of roof structure to walls to engineer's specifications

600 roof overhangs for main roof leaving no gaps between walls and roof finish to prevent water ingress. Roof overhangs of main roof to be provided with fascias

Internal and ext. walls painted

Cornices for ceilings

Roof flashing for Kavango walls

5 deg. covered walkway roof slope

Galvanised roof sheeting on 76 x 50 SA pine purlins at 1200 spacing on 38 x 114 SA pine rafters on 38 x 114 SA pine beam supported by galvanised and painted 75 x 75 columns at 3120 centres

75 X 75 seamless gutters and downpipes to NHBRC approval

50 x 1600w concrete apron sloped away from house to SANS

Foundation and slab design to engineer's details and fitting of top structure coordinated with engineer

ENERGY EFFICIENCY SCHEDULE	
DESCRIPTION	SOLUTION
HOT WATER	Collector panels of 4,2m ² is required for 252 litres resorting to a 1 x 300 litre solar geyser
FENESTRATION	Monolithic- and safety glass to SANS 10400 Part N
ROOF ASSEMBLY	Climate zone 4: R-value = 3.7= 110mm Isotherm
EXTERNAL WALLS	To manufacturers specifications. R-value: See table

ENERGY EFFICIENCY SCHEDULE

FENESTRATION CALCULATION TO SANS 10400XA 4.4.4

North:	W ₁ =	1200 x 1800	=2.16m ²
South:	W ₁ =	1200 x 1800	=2.16m ²
West:	W ₂ =	600 x 600 (2)	=0.36m ²
East:	W ₂ =	900 x 900 (4)	=3.24m ²
Total fenestration area = 9m²			

Unit area =57m² (excl. covered walkway)

Net area =57m² (excl. covered walkway)

The total floor area is checked in the calculation below:

15% of the net floor area of 57m² =8.55m²

Total fenestration =8.14m²

8.14m² < 8.55m² which does comply

FENESTRATION CALCULATION

NO.	THICKNESS (MM)	MATERIAL	CONDUCTIVITY W/(m.K)	R-VALUE (m ² .K/W)
R ₆		MOVING AIR FILM		0.03
R ₁	5	PLASTER	0.5	0.1
R ₂	140	CONC. BRICK	1.63	0.086
R ₃	5	PLASTER	0.5	0.1
R ₅		STILL AIR FILM		0.11
TOTAL R-VALUE				0.43

According to 4.4.3.2 of SANS XA a masonry wall may be used that is a double skin masonry wall with no cavity, plastered internally, and face masonry that is either plastered or not plastered externally, or a single leaf masonry wall with a nominal wall thickness greater than or equal to 140mm, plastered internally and externally will comply.

Hollow concrete block with 10mm plaster both sides is equivalent to R-Value of 0.31- 0.35.

Therefore, the 140mm wall with R-value 0.43 > 0.35 and complies

R-VALUES FOR WALLS

STANDARD CONSTRUCTION NOTES:	
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4. WALLS:	
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4.2 150MM EXTERNAL AND 100MM INTERNAL CONCRETE WALLS AND REINFORCEMENT TO RATIONAL DESIGN	
4.3 UNITS ABOVE WINDOWS, DOORS AND OPENINGS TO SYSTEMS' RATIONAL DESIGN	
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7. WATER HEATING:	
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60m² IBT House

Drawing Name
**ELEVATIONS AND SECTION,
WINDOW & DOOR SCHEDULE &
ENERGY EFFICIENCY SCHEDULE**

Drawing Status
MUNICIPAL DRAWINGS

Drawn by _____ Date _____

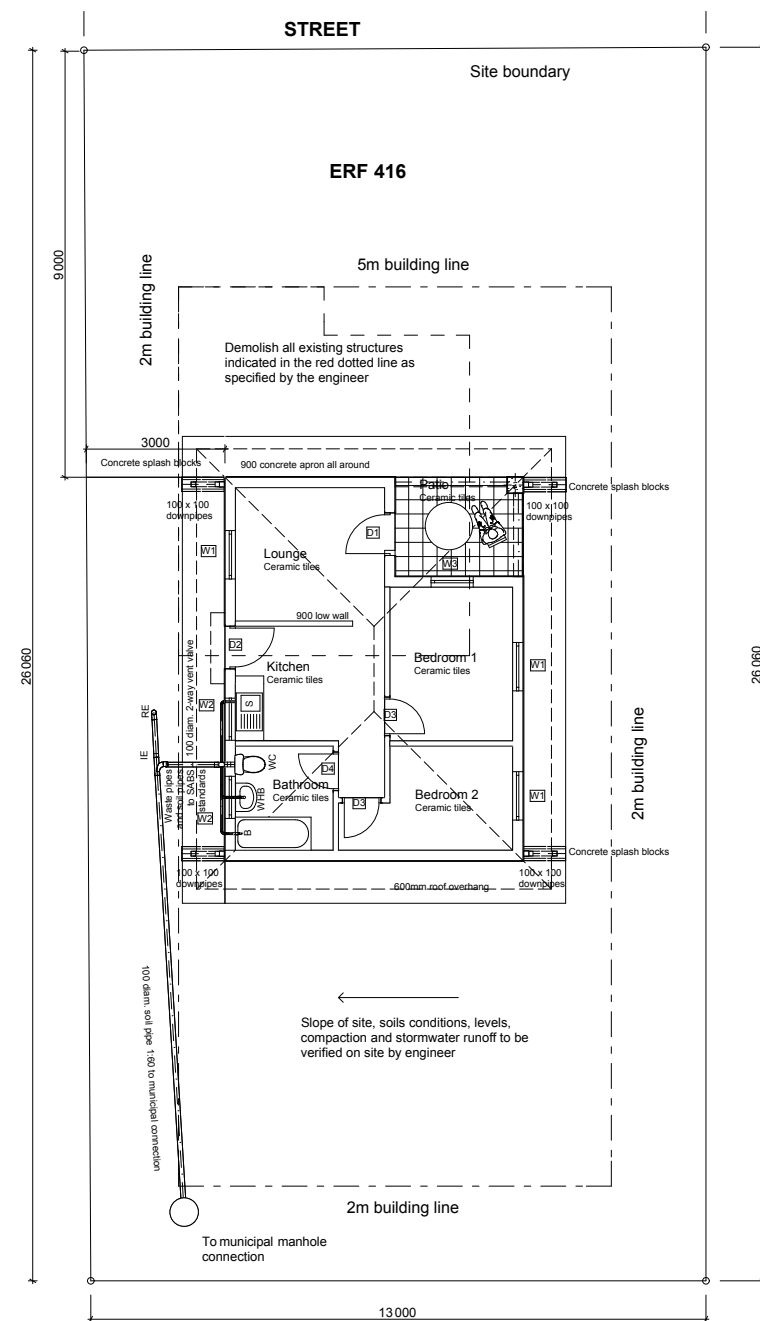
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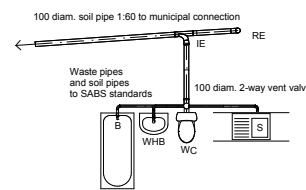
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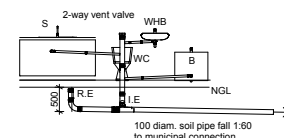
5.4 House 4 - Working Drawings



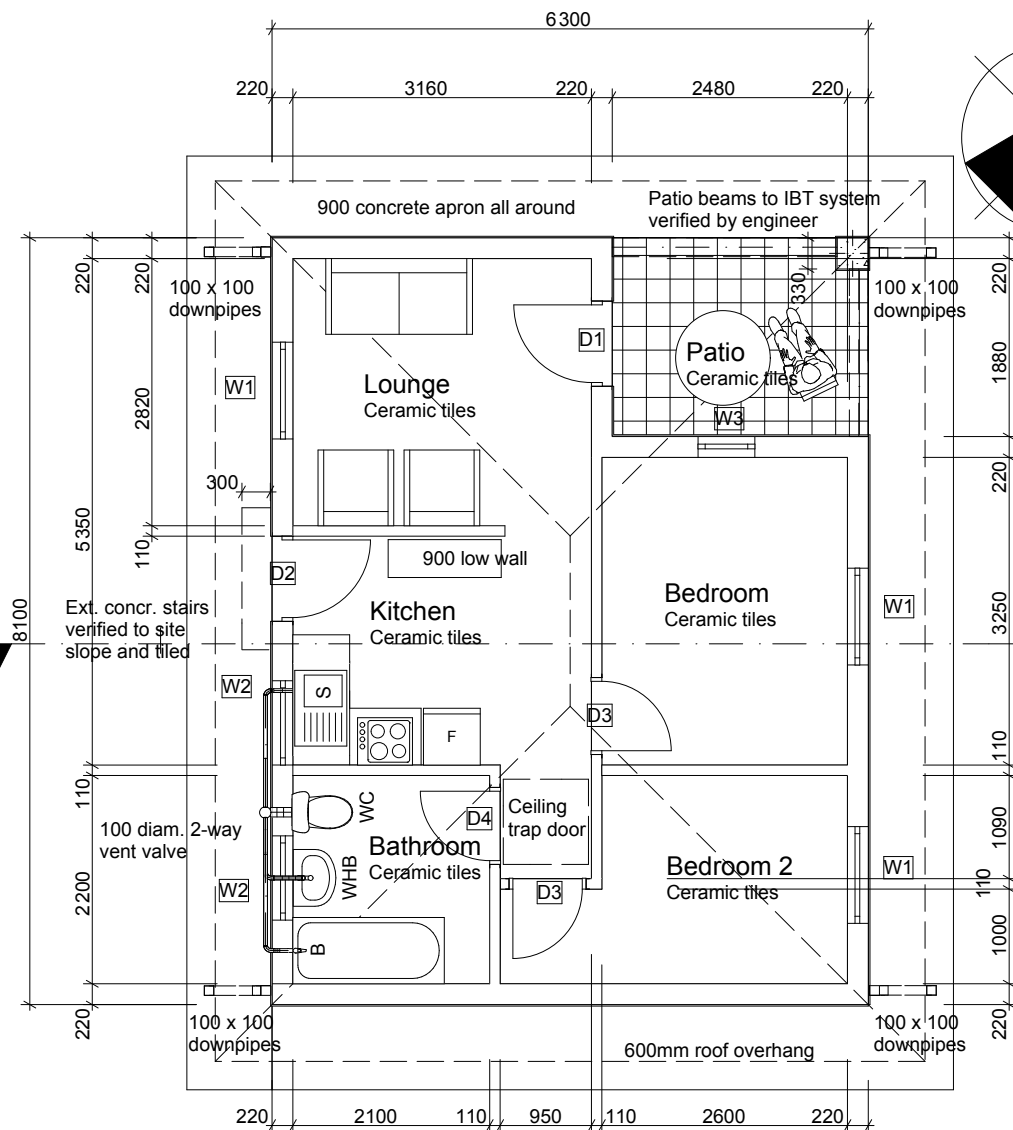
SITE PLAN



DRAINAGE LAYOUT



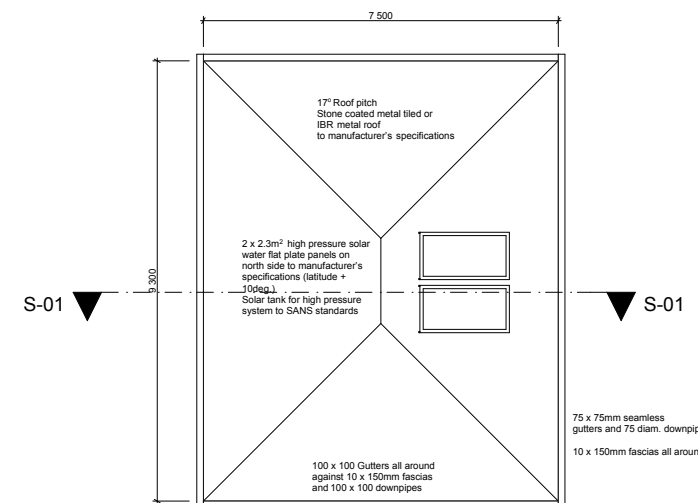
DRAINAGE ELEVATION



GROUND FLOOR PLAN

TOTAL AREA SCHEDULE		
DESCRIPTION	OUTSIDE OF EXT. WALL	INSIDE OF EXT. WALL
Without Patio	45m ²	39m ²
With Patio	51m ²	45m ²
Site Area	338.78m ²	
Site Coverage	18%-21%	

AREA SCHEDULE



HIPPED ROOF PLAN

- STANDARD CONSTRUCTION NOTES:**
- ALL CONSTRUCTION AND MATERIALS TO COMPLY WITH THE REQUIREMENTS OF THE NATIONAL BUILDING REGULATIONS, SANS 10400 AND THE NHBRC'S HOME BUILDER'S MANUAL, WHICH MUST INCLUDE AN AGREEMENT CERTIFICATE OR RATIONAL DESIGN PROVISION TO BE MADE FOR STORMWATER RUNOFFS. ALL APRONS, EXTERNAL PAVING TO SLOPE AWAY FROM BUILDING.
 - WHERE ELECTRICAL INSTALLATION IS REQUIRED SPECIFICATIONS WILL BE PROVIDED AND A REGISTERED ELECTRICIAN APPOINTED.
 - A REGISTERED PLUMBER IS TO BE APPOINTED FOR DRAINAGE, WATER RETICULATION & FITTINGS.
 - THIS DRAWING IS NOT TO BE SCALED.
 - ALL SITE DIMENSIONS AND LEVELS TO BE CHECKED AND VERIFIED BEFORE ANY WORK COMMENCES ON SITE.
 - DISCREPANCIES TO BE REPORTED TO PROJECT MANAGER.
- SPECIFICATIONS:**
- 1. GENERAL NOTES:**
- 1.1 ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE BEFORE ANY WORK COMMENCES ON SITE. THE LAND SURVEYOR'S DIMENSIONS ARE TO BE FOLLOWED FOR THE SITE. DIMENSIONAL DISCREPANCIES WILL BE TO THE COST OF THE CONTRACTOR/SPONSORS.
- 2. FOUNDATIONS:**
- 2.1 ALL FOUNDATIONS, FOUNDATION WALLS, STRUCTURAL CONCRETE WORK AND SUBSOIL STORMWATER DRAINAGE TO GEOTECHNICAL REPORT AND ENGINEER'S SPECIFICATIONS.
- 3. FLOORS:**
- 3.1 CONCRETE SURFACE BED WITH 25MM SCREED TO RATIONAL DESIGN.
- 3.2 350 X 350MM UNGLAZED CERAMIC TILES FOR ALL FLOORS BEDDED IN 3:1 CEMENT MORTAR AND 8MM JOINTS WITH NATURAL CEMENT GROUTING. CHECK WITH NHBRC FOR TYPE AND COLOUR.
- 3.3 DAMP PROOF MEMBRANES TO BE WELL LAPPED AT WALLS TO AGREEMENT SPECIFICATIONS.
- 4. WALLS:**
- 4.1 SEE AGREEMENT CERTIFICATE FOR WALL DIMENSIONS AND DETAILS AND ITS RELATED 375 MICRON DPC'S.
- 4.2 LINTOLS ABOVE WINDOWS, DOORS AND OPENINGS TO SYSTEMS' RATIONAL DESIGN.
- 4.4 15MM PLASTER ON INTERNAL AND EXTERNAL WALLS. BASE OF EXTERNAL WALL 25MM THICK PLASTER AT 600MM HEIGHT.
- 4.5 WALLS ARE FINISHED WITH TWO COATS OF EXTERIOR ACRYLIC PAINTS WITH SABS OR AGREEMENT SOUTH AFRICA ACCREDITATION AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- 5. ROOFS:**
- 5.1 USE A HIPPED ROOF DESIGN OF WHICH THE ROOF ASSEMBLY IS TO RATIONAL DESIGN OF THE SYSTEM DESIGN. DIMENSIONS MUST BE CHECKED ON SITE FOR CERTIFIED ROOF TRUSSES.
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- 5.6 110MM GLASSWOOL INSULATION OR SIMILAR ON TOP OF CEILING.
- 5.6 55MM FIBRE CEMENT CORNICE GLUED WITH NC ADHESIVE.
- 6. WINDOW AND DOORS:**
- 6.1 THE GLASS TYPE MUST BE STANDARD AND FRAMES MUST BE ENERGY EFFICIENT.
- 6.2 WINDOW FRAMES BUILT IN ACCORDANCE TO THE IBT BUILDING SYSTEM WITH RELEVANT DPC BELOW WINDOW SILLS.
- 7. WATER HEATING:**
- 7.1 HIGH PRESSURE SOLAR WATER HEATER WITH ANTI-FREEZE TO BE INSTALLED TO SABS STANDARDS.



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Sunninghill
Johannesburg
2191

50m² IBT House

Drawing Name
**GROUND FLOOR, ROOF PLAN
AND DRAINAGE LAYOUT**

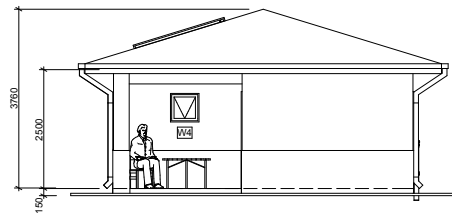
Drawing Status
MUNICIPAL DRAWINGS

Drawn by _____ Date _____

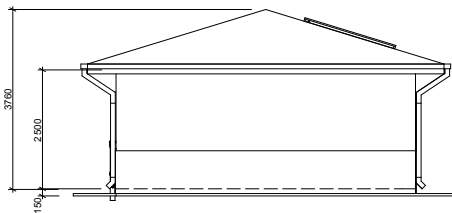
Checked by _____ Date _____

Drawing Scale
1:100; 1:50

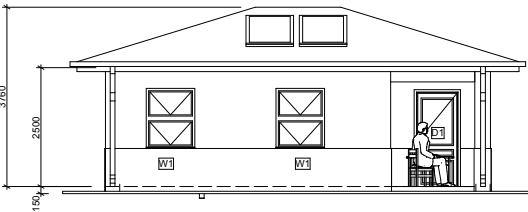
Layout ID **A.01** Status _____ Revision _____



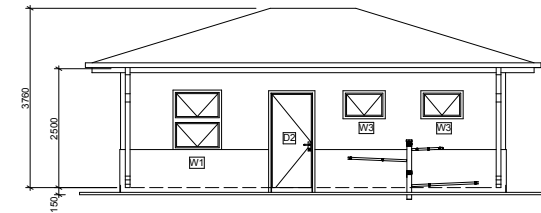
NW ELEVATION



SE ELEVATION



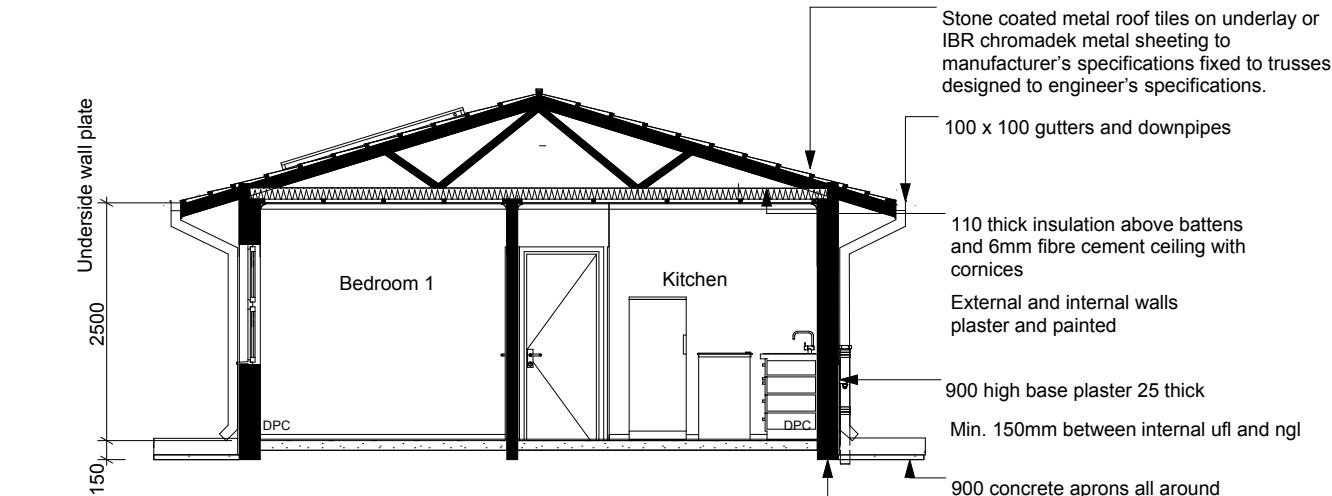
NE ELEVATION



SW ELEVATION

ENERGY EFFICIENCY SCHEDULE	
DESCRIPTION	SOLUTION
HOT WATER	Collector panels of 4,2m² is required for 252 litres resorting to a 1 x 300 litre solar geyser
FENESTRATION	Monolithic- and safety glass to SANS 10400 Part N
ROOF ASSEMBLY	Climate zone 1: R-value = 3.7 = 110mm Glasswool
EXTERNAL WALLS	To IBT sponsor specifications. R-value: See table

ENERGY EFFICIENCY SCHEDULE



SECTION 01
SCALE 1:100

W1: 1022 x 1264	W2: 890 x 590	W3: 890 x 890
QUANTITY: 3	QUANTITY: 2	QUANTITY: 1

WINDOW SCHEDULE

D1: 900 x 2032	D2: 813 x 2032	D3: 813 x 2032	D3: 813 x 2032
QUANTITY: 1	QUANTITY: 1	QUANTITY: 2	QUANTITY: 1
FRAME Energy efficient frames either avoided, painted or treated off to manufacturer's specifications	FRAME Energy efficient frames either avoided, painted or treated off to manufacturer's specifications	FRAME Energy efficient frames either avoided, painted or treated off to manufacturer's specifications	FRAME Energy efficient frames either avoided, painted or treated off to manufacturer's specifications
DOOR: 1xRH Varnished solid timber door with 3 lever lockset Provide weather bar	DOOR: 1xLH Varnish solid timber door with 3 lever lockset Provide weather bar	DOOR: 1xLH & 1xRH Painted semi-solid timber door with 2 lever lockset	DOOR: 1xLH Painted semi-solid timber door with 2 lever lockset

DOOR SCHEDULE

WALLS CALCULATION TO SANS 10400XA 4.4.3.2

NO.	THICKNESS (MM)	MATERIAL	CONDUCTIVITY W/(m.K)	R-VALUE (m².K/W)
R _a		MOVING AIR FILM		0.03
R ₁	15	EXT. PLASTER	0.5	0.03
R ₂	220	HYDRAFORM BRICK	0.9 - 0.22	0.24
R ₃	15	INT. PLASTER	0.05	0.3
R ₄		STILL AIR FILM		0.11
TOTAL R-VALUE				0.71
THE R-VALUE OF 0.71 > 3.5 (VALUE FOR 220 MASONRY WALL PLASTERED INT. & RENDERED EXT.), WHICH COMPLIES				

R-VALUE FOR WALLS

Stone coated metal roof tiles on underlay or IBR chromadek metal sheeting to manufacturer's specifications fixed to trusses designed to engineer's specifications.

100 x 100 gutters and downpipes

110 thick insulation above battens and 6mm fibre cement ceiling with cornices

External and internal walls plaster and painted

900 high base plaster 25 thick

Min. 150mm between internal ufl and ngl

900 concrete aprons all around

Foundation and concrete bedding to engineer's specifications

Levels and compaction to engineer's specification

FENESTRATION CALCULATION TO SANS 10400XA 4.4.4

North:	W ₁ = 1022 x 1264(2) = 2.58m²
South:	W ₁ = 1022 x 1264 = 1.29m²
South:	W ₂ = 890 x 590(2) = 0.52m²
West:	W ₃ = 890 x 890 (2) = 0.79m²
Total fenestration area = 5.18m²	
Unit area = 45m² (excl. patio)	
Net area = 45m² (excl. patio)	

The total floor area is checked in the calculation below:

15% of the net floor area of 45m²	= 6.75m²
Total fenestration	= 5.18m²
5.18m² < 6.75m² which complies	

FENESTRATION CALCULATION

ORIENTATION AND SHADING TO SANS 204

The house does not fall within the optimal orientation in Jhb of +- 15 deg. true north Requirement of roof overhang:

$$P = \tan \theta (\text{sun angle}) \times H$$

$$= 0.49 \times 1.617 = 790\text{mm (not feasible, use 600mm)}$$

Therefore, test conductance for insulation in glazing (glazing type)

Conductance Calculations:

Table 7- Panels versus shading descriptions (test)

Panel	Facing direction	Area m²	Shading description
W ₃	N	0.36m²	Shaded by a 600mm roof overhang
W ₁	E	1.29m²	Shaded by a 600mm roof overhang
W ₁	E	1.29m²	Shaded by a 600mm roof overhang
W ₁	W	1.29m²	Shaded by a 600mm roof overhang
W ₂	W	0.52m²	Shaded by a 600mm roof overhang
W ₂	W	0.52m²	Shaded by a 600mm roof overhang

Use the formula in SANS 204 to check whether the aggregate Conductance is smaller than the net floor area multiplied by the constant C_g as follows:

$$(A_1 \times U_1) + (A_2 \times U_2) + (A_3 \times U_3) + \dots \text{etc.} < A_T \times C$$

$$(0.36 \times 7.9) + (1.29 \times 7.9) + (1.29 \times 7.9) + (1.29 \times 7.9) + (0.52 \times 7.9) + (0.52 \times 7.9) < 38 \times 1.2$$

$$1.7 + 10.19 + 10.19 + 10.19 + 4.18 + 4.18 < 45.6$$

$$40.63 < 45.6$$

40.63 is smaller than 45.6 therefore does comply (glazing can remain as clear glass)

SHADING CALCULATION

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50m² IBT House

Drawing Name

ELEVATIONS, SECTIONS &
ENERGY EFFICIENCY SCHEDULES

Drawing Status

MUNICIPAL DRAWINGS

Drawn by

Date

Checked by

Date

Drawing Scale

1:100; 1:50

Layout ID

Status

Revision

A.01



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