

22/1/2024

RE: STRUCTURAL ENGINEERING CERTIFICATE

1. Structure

Ezzy Fit FRP composite sleeper for retaining wall. Class 10b structure under the Building Code of Australia.

1.6m, 2.0m and 2.4m long, respectively; 60mm wide and 165mm deep hole section; 2.7mm wall thickness.

2. Description of aspect/s certified

1.6m long sleeper: maximum working horizontal pressure resistance 1.5kPa; can be used for up to 5m high retaining wall with or without soil reinforcement.

2.0m long sleeper: maximum working horizontal pressure resistance 1.8kPa; can be used for up to 3m high retaining wall with or without soil reinforcement.

2.4m long sleeper: maximum working horizontal pressure resistance 2.3kPa; can be used for up to 1.0m high retaining wall with or without soil reinforcement.

The sleepers can be used under 5kPa vertical design live load (subject to the site condition as below).

The site condition below must be taken into account when to design retaining wall with the sleepers:

- Soil property;
- Wind load;
- Earthquake load;
- Top surcharge load;
- Retained earth pressure;
- Ground water pressure;
- The distance of building to the retaining wall;
- The distance of construction zone to the retaining wall.

3. Basis of certification

AS1170.0-2002 (R2016) Structural Design Actions-General Principles;
AS1170.1-2002 (R2016) Permanent Imposed & Other Actions;

AS1170.2-2002 Wind loads;
AS1170.4-2007 Earthquake Actions;
AS4678-2002 Earth Retaining Structures.

4. Reference documentation

Ezzy Fit Sleep Drawings;

This certificate must work with the relevant Building Regulation form (e.g. Form 15 in QLD) for a given site location.

The certificate supersedes the ones issued on 15/11/2023 and 1/12/2023.

Bin Wang



MIEAust | CPEng | NER (2915503)

26/02/2024

RE: STRUCTURAL ENGINEERING CERTIFICATE

1. Structure

Ezzy Fit FRP composite post for retaining wall. Class 10b structure under the Building Code of Australia.

Post dimension and shape:

- 100x100x6 H
- 100x100x6 U
- 100x100x10 H
- 100x100x10 U

2. Description of aspect/s certified

- 100x100x6 H and 100x100x6 U shaped posts:
 - ✓ 1m high above the ground. The maximum spacing of the posts is 2.0m subject up to 5kPa surcharge live load.
 - ✓ 1m high above the ground. The maximum spacing of the posts is 2.4m subject up to 3kPa surcharge live load.
- 100x100x10 H and 100x100x10 U shaped posts:
 - ✓ 2m high above the ground. The maximum spacing of the posts is 1.6m subject up to 5kPa surcharge live load.
 - ✓ 2m high above the ground. The maximum spacing of the posts is 2.0m subject up to 3kPa surcharge live load.
 - ✓ 1m high above the ground. The maximum spacing of the posts is 2.4m subject up to 5kPa surcharge live load.

The posts are recommended to have an angle which is a 1 in 10 slop.

The site condition below must be taken into account when to design the post of retaining wall:

- Soil property;
- Wind load;
- Earthquake load;
- Top surcharge load;
- Retained earth pressure;

- Ground water pressure;
- The post footing design with the embedment requirement;
- The distance of building to the retaining wall;
- The distance of construction zone to the retaining wall.

3. Basis of certification

AS1170.0-2002 (R2016) Structural Design Actions-General Principles;
AS1170.1-2002 (R2016) Permanent Imposed & Other Actions;
AS1170.2-2002 Wind loads;
AS1170.4-2007 Earthquake Actions;
AS4678-2002 Earth Retaining Structures;
AS2870-2011 Residential slabs and footings.

4. Reference documentation

Ezzy Fit Post Drawings;

This certificate must work with the relevant Building Regulation form (e.g. Form 15 in QLD) for a given site location.

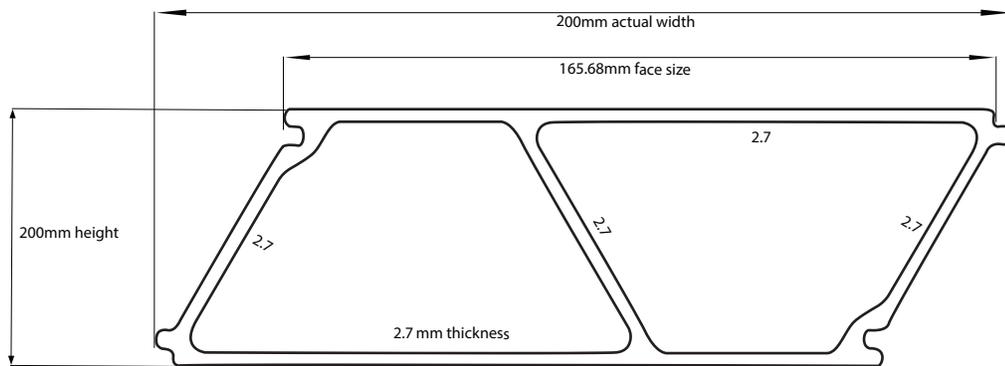
Bin Wang



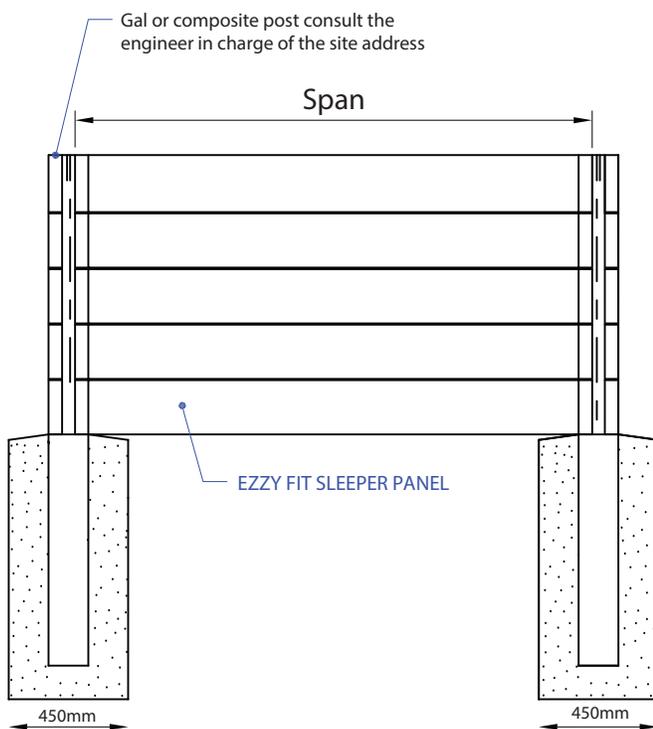
MIEAust | CPEng | NER (2915503)

| Ezzy Fit Sleepers Dimensions (mm) | | | Max Retaining Wall Height (mm) |
|-----------------------------------|--------------|-----------|--------------------------------|
| Length | Width | Thickness | |
| 1600 | 200x165 face | 60mm | 5000 |
| 2000 | 200x165 face | 60mm | 3000 |
| 2400 | 200x165 face | 60mm | 1000 |

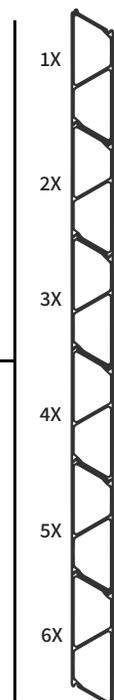
Consult with the engineer in charge of the job address.



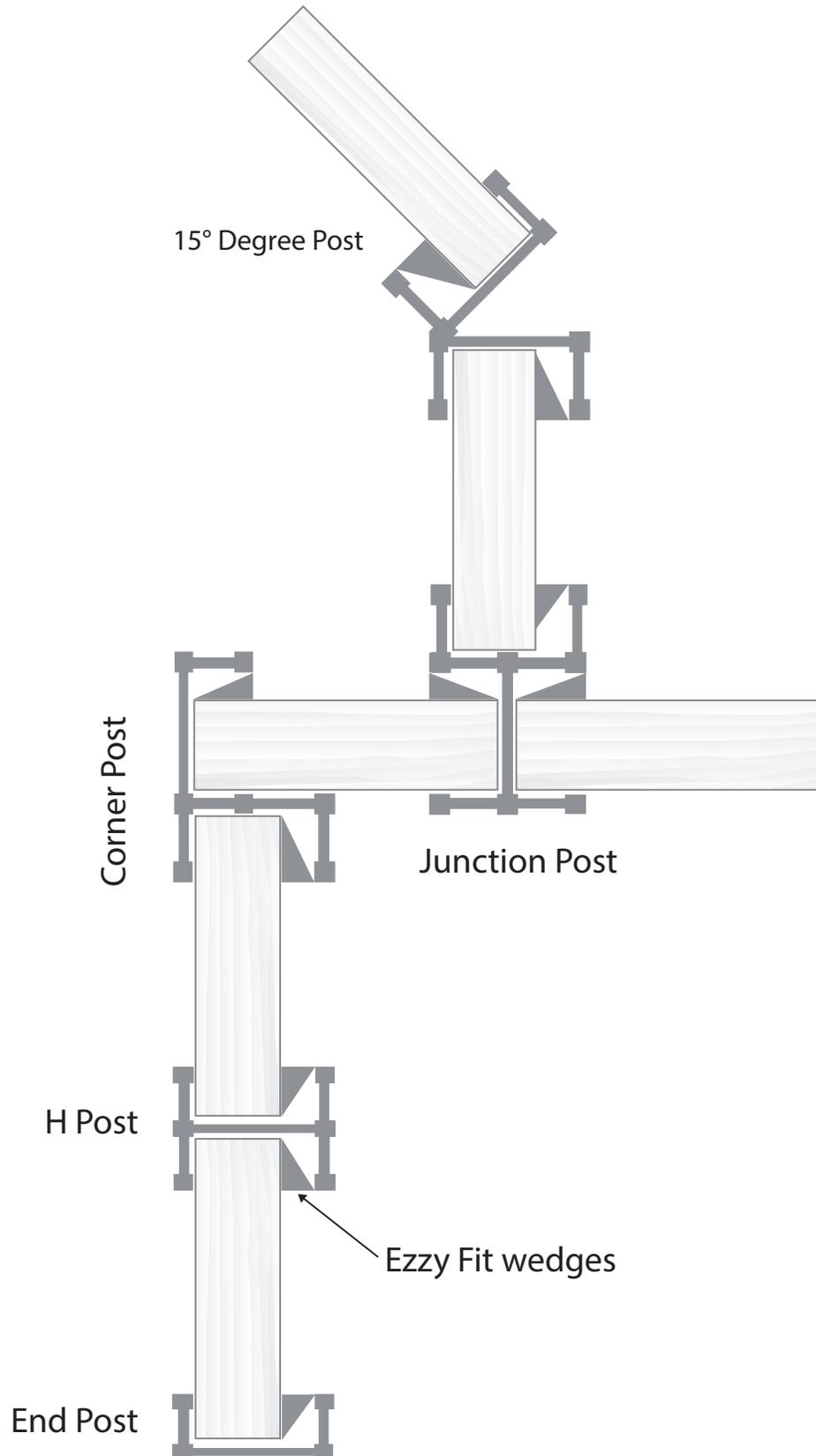
SLEEPER PANEL CROSS-SECTION



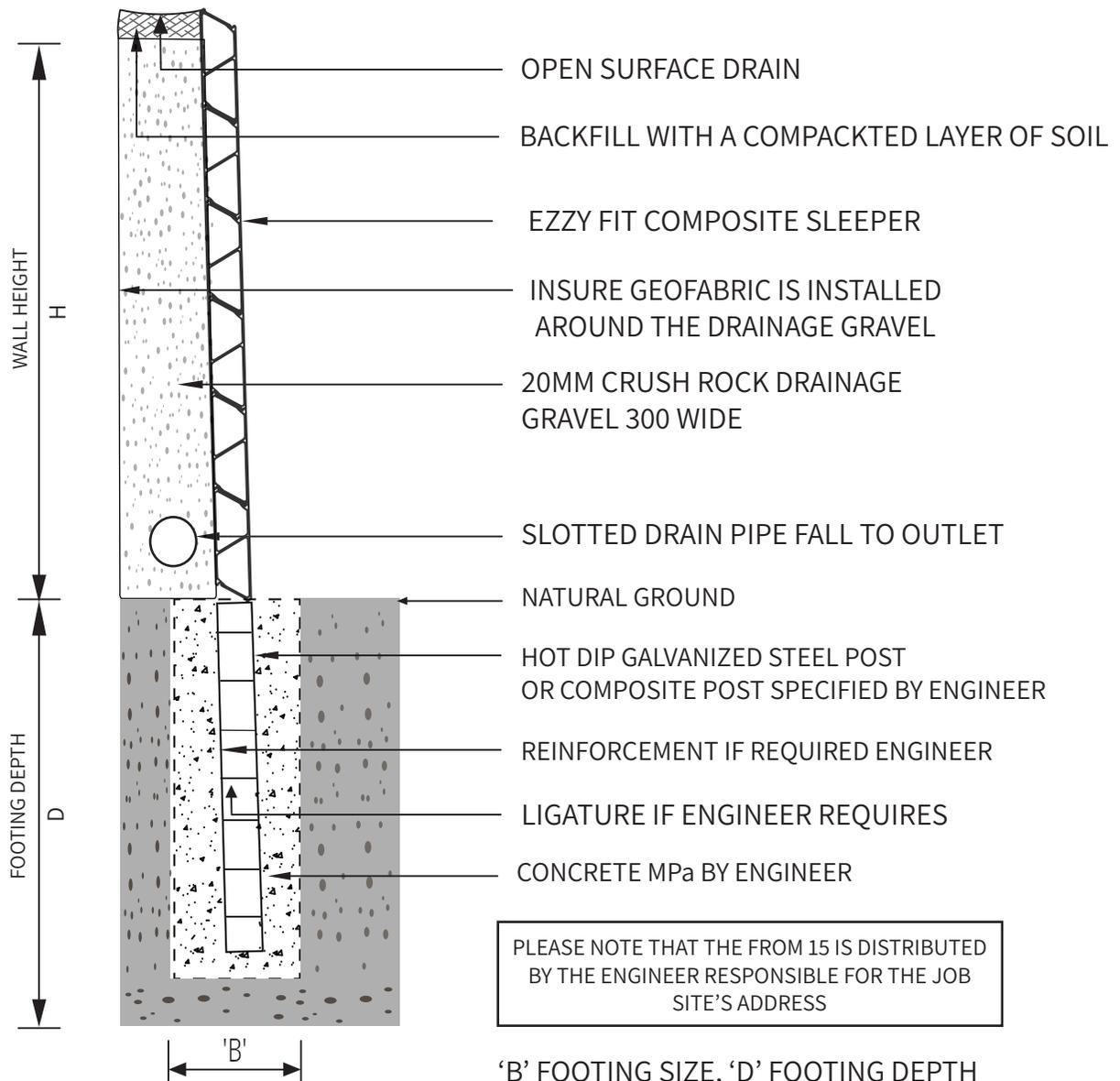
THE EZZY FIT SLEEPERS DIFFER FROM CONVENTIONAL SLEEPERS IN THAT SIX UNITS ARE REQUIRED TO ACHIEVE A HEIGHT OF ONE MTR. THIS IS DUE TO THE OUTSTANDING STRUCTURAL STRENGTH INCORPORATED INTO THE EZZY FIT DESIGN, ALLOWING IT TO REACH IMPRESSIVE HEIGHTS OF UP TO FIVE MTR.



DIFFERENT POST POSITIONS EXAMPLES



Wall heights exceeding 1 mtr must be designed by the responsible engineer overseeing the project. The diagram provided below is intended for reference purposes only.



'B' FOOTING SIZE, 'D' FOOTING DEPTH
'H' WALL HEIGHT

Technical Data Sheet

Ecoleader EL-4040N

Chemical/Physical Nature

EL-4040N is an unsaturated polyester resin derived from maleic acid, phthalic acid and standard glycols, dissolved in styrene. EL-4040N is of low viscosity and medium reactivity.

Major Applications/Principal Properties

EL-4040N is intended for Pultrusion, Hand lay-up, RTM process, etc. High light transmission of FRP, good infiltration of glass fibre.

Product Specifications

| Property | Range | Unit | Test Method |
|---------------------------|---------|-------|-------------|
| Appearance | Clear | - | TM-017 |
| Viscosity _{23°C} | 350-550 | mPa.s | TM-006 |
| Solid Content | 60-66 | % | TM-011 |
| Gel time _{82°C} | 3-6 | min | TM-016 |
| Gel time _{25°C} | 15-22 | min | TM-018 |

TM-016: 100g resins with 2g CH50 (Akzo-nobel).

TM-018: 100g resins with 1.5g M50 (Akzo-nobel), 1g COB1 (Akzo-nobel).

Properties of liquid resin (typical values)

| Property | Value | Unit | Test Method |
|----------------------------------|-------|-------|-------------|
| Stability, no init., dark, 25° C | 6 | Month | - |
| Flash point | 33 | °C | - |

Properties of cast resin (typical values)

| Property | Value | Unit | TM |
|-----------------------|-------|-------------------|------------|
| Tensile strength | 65 | Mpa | GB/T2567 |
| Tensile E-modulus | 3000 | Mpa | GB/T2567 |
| Elongation at break | 5 | % | GB/T2567 |
| Flexural strength | 105 | Mpa | GB/T2567 |
| Flexural E-modulus | 2800 | MPa | GB/T2567 |
| Impact res.-unnotched | 18 | KJ/m ² | GB/T1043.1 |
| HDT | 65 | °C | GB/T1634.1 |

Curing conditions: cure for 24 hours at R.T., Post cure for 24 hours at 80°C;

Testing conditions: temperature: 23±2 °C,
relative moisture: 50±6 %

Processing

1. No accelerator in resin, when using resin, the curing system should be chosen according to the specific equipment, product, temperature and Pultrusion speed
2. Before using the resin, please mind the water content of glass fibre, Calcium carbonate, etc

Technical Data Sheet

Storage guidelines

The resin should be stored indoors in the original, unopened and undamaged packaging, in a dry place at temperatures between 5° C and 30° C. Shelf life is reduced at higher temperatures. Exposure to sunshine should be avoided. Store in dark and in 100% light tight containers only.

Material Safety /Test methods

A material safety data sheet and test methods referred for the product are available on request.



Although the facts and suggestions in this publication are based on our own research and are believed reliable, we cannot assume any responsibility for performance or results obtained through the use of our products herein described, nor do we accept any liability for loss or damages directly or indirectly caused by our products. The user is held to check the quality, safety and all other properties of our product prior to use. Nothing herein is to be taken as permission, inducement or recommendation to practise any patented invention without a license.



Description of Zhongsheng FRP Reinforced Retaining Wall

Fiberglass reinforced plastics(FRP) are a composite material consisting of a matrix, usually a thermoset resin, and a reinforcement of fibers.

The reinforcing fiber adds strength and elasticity to the tough but weak matrix, creating a tough, long lasting material with the ability to produce sturdy, complex shapes in a variety of sizes.

Pultrusion is a cost-effective processing technique of forming and manufacturing a continuous length of fiber-reinforced polymer (FRP) by pulling a mix of reinforced fibers and liquid resin through a heated die.

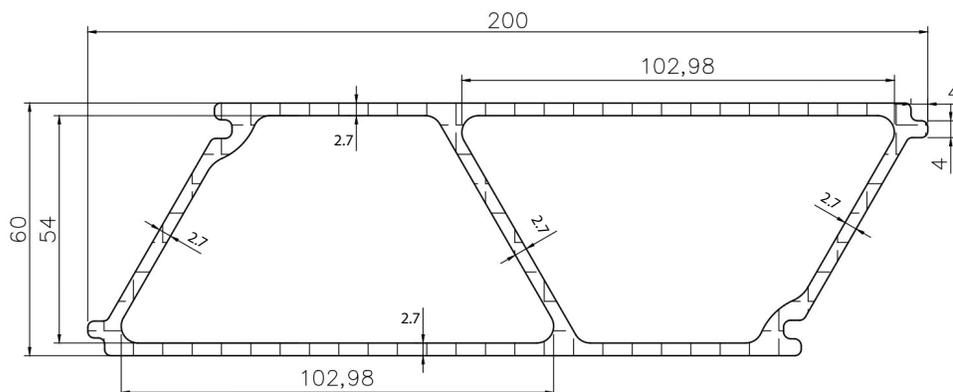
Cross Section Size of FRP Reinforced Retaining Wall

Width: 200 mm

Thickness: 60 mm

Wall thickness: 2.7mm

The Drawing of Cross Section:



Material Composite of FRP Reinforced Retaining Wall:

- * E glass fiber-176 Assembled Roving (Brand: JUSHI)
- * Unsaturated polyester resin- EL-4040N (Brand: Leader)
- * UV inhibitor(UV-329(5411)) {Chemical Name: 2- (2'-Hydroxy-5'-tert-octylphenyl) benzotriazole} & antioxidant B900 (0.5% in the resin totally)
- * Surface Veil: Composite Polyester Mat
- * Filler

Features:

- | | |
|--------------------------------------|----------------------------------|
| Lightweight&high strength | Cost efficient |
| Rust resistant & corrosion resistant | Easy to transport |
| Advanced UV resistance | Environmentally friendly |
| Low maintenance | Relatively easy on-site assembly |



Long service life
Electrically Non-Conductive
Resists Insect Damage

Low Water Absorption
Strong weather resistance

Applications:

- *Marine and construction industries
- *Chemical industry, petroleum industry
- *Utility and Telecommunications
- *Tool Manufacturing
- *Sporting, Recreational and Outdoor Equipment

FRP Seawall



FRP Retaining Wall



FRP Handrails and steps in Chemical Factory



FRP Support Beams for PV Power

