



Construction Manual



Engineered Wood Products Association of Australasia

PNGFP are certified by the Engineered Wood Products Association of Australasia (EWPAA) and carry the EWPAA JAS-ANZ branding. This means any product branded with the EWPAA JAS-ANZ brand has been manufactured under an accredited third party audited, process based quality control program, that ensures the product meets the intended designed criteria. PNGFP are also PEFC Chain of Custody Certified (Programme for the Endorsement of Forest Certification) the worlds leading forest certification organisation. An international non-profit, non-Government organisation dedicated to promoting sustainable forest management.



Performance Testing

PNGFP NiuBridge has undergone comprehensive structural testing of full scale specimens at the University of Technology Sydney. The test results confirm that NiuBridge meets and exceeds the ULS requirements of both T44 and S1600 loading conditions.



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What is the NiuBridge System?

The NiuBridge System is a comprehensive Engineered Wood Product bridge building system that is a cost-effective solution for refurbishment of existing structures as well as new bridge construction.

The system exploits the structural advantages of sustainable plantation resource manufactured under the controls of a Type 5 ISO 17065 JAS-ANZ product certification scheme.

The NiuBridge system comprises: -

- **NiuDeck:** Heavy Duty Plywood Decking System
- **ECO Modular System:** Cost effective single and dual lane modular system ideally suited to temporary installations with single spans up to 10m
- **HPF Modular System:** Lightweight high performing modular system for single spans up to 15m
- **SHPF Modular System:** Readily transportable high performing system for longer spans up to 24m
- **NiuKerb:** Prefinished Plywood Kerbing system



The NiuBridge modular bridge system is a light weight system for all spans up to 24m. NiuBridge is suitable for installation on a variety of existing substructures, including timber, heritage masonry, steel and concrete. NiuBridge is also ideally suitable for installation on precast spread footing abutment systems as well as the conventional piles and abutments.

Whether installed onto existing or new substructures NiuBridge Modular is the ideal cost-effective solution with fast and simple installation:

NiuBridge is a flexible system that can incorporate site specific requirements without compromising the systems integrity.

Fully protected from rotting and termites NiuBridge has a design life of 50 years.

Advantages:

- Light weight
- Minimal crane size required.
- Option of a pre-applied bituminous deck wearing surface on modules
- Significantly reduced installation time
- Compliant to Austroads T44 and AS5100 S1600 loading
- Flexible design options and custom design service
- Reliable engineering properties
- Sustainable plantation resource (PEFC Chain of Custody)
- Alkaline Copper Quaternary (ACQ) H4 "Veneer Treatment" preservation.



Purpose & Standards

Purpose

The purpose of this construction manual is to provide guidance on specifications and construction requirements for installation of all elements of the NiuBridge system.

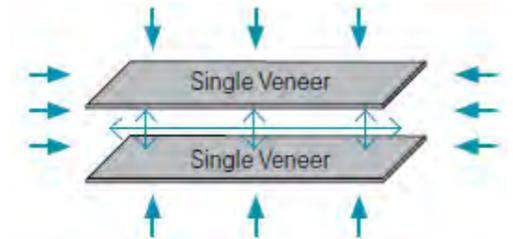
This document is of a general nature and should be read in conjunction with the detailed "project specific" documents including, but not limited to, Drawings, Contracts, Project Specifications and Safe Work Method Statements.

Typical installation arrangements that are contained in the NiuBridge standard drawings do not constitute site specific site layout drawings; these drawings need to be provided by the consulting engineer for the project. Any differences between the site specific documentation and this guide need to be referred by the relevant authorised personnel to a PNGFP representative.

Preservation Treatment

NiuBridge utilizes the veneer preservation treatment method to ensure complete protection from termites and fungal decay (rotting). Veneer treatment is the only way to ensure complete penetration and that any unsealed cut panels will not decay.

Veneer treatment method is where the individual sheets of veneer are preservative treated before being fabricated into plywood to ensure 100% penetration. The treated veneers are then bonded with a permanent phenolic resin which is often referred to as "A" bond or Marine "A" or Structural bond.



Structural "A" bonds require rigorous testing after submersion in boiling water for 72 hours or 6 hours under high pressure steam to ensure a high quality bond.

Manufacturing Standards

- AS/NZS 2269:2012; Plywood – Structural
- AS/NZS 4357:2005 – Structural Laminated Veneer Lumber
- AS/NZS 1604.1:2012; Specification for preservative treatment Part 1: Sawn and Round Timber
- AS/NZS 1604.3:2012; Specification for preservative treatment Part 3: Plywood
- AS/NZS 1604.4:2012; Specification for preservative treatment Part 4: Laminated veneer lumber (LVL).

Design Standards

- AS 1720.1 Timber structures – Part 1: Design Methods, Section 5 Plywood
- AS 5100:2004; Bridge Design
- 92 Austroads Bridge Design Code.

What is NiuDeck?

NiuDeck is a purpose designed and engineered heavy plywood decking system which is primarily used for re-decking traditional timber road bridges but can also be used with a variety of supporting structures. NiuDeck can also be used in wharf and rail deck applications.



Manufactured using a proven durable glue system together with 100% “veneer” preservation treatment method the product is well designed for adverse climatic conditions of bridge applications ensuring a long design life.

Developed as a renewable alternative to traditional hardwood sawn timber, NiuDeck is manufactured from sustainable plantation pine using hydro-electric power to the highest quality standards.

Available in a range of thicknesses NiuDeck offers the engineer a cost-effective solution for a wide variety of applications which comply with either, Austroads Bridge Design Code or Australian standard AS5100 Bridge Design. In addition, a custom design service is available to handle the most challenging applications.

Dimensions:

- Variable length up to 11.9m
- Standard lengths of 5.4m, 7.0m, 8.7m
- Standard width 1200mm
- Non-standard widths from 900 to 3600mm
- Standards thicknesses from 56mm to 198mm (thicker on request).

Manufacturing Specification:

- “A” Bond (AS/NZS2269)
- Veneer grade “C” and “D” (AS/NZS2269)
- Preservation treatment to Hazard Class H4 (AS/NZS 1604.3) by veneer treatment method
- Density of approximately 600 Kg/m³ when shipped
- Moisture content between 8 to 15% when shipped.



Characteristic Properties Bending:

- Stress Grade (parallel/perpendicular) : F14/F14
- Bending strength (f_b) (parallel/perpendicular) : 36MPa/36MPa
- Moisture factor (AS1720.1) k_{19} : 0.8
- Assembly factor (AS1720.1) g_{19} : 1.0

Characteristic Properties Shear:

- Stress Grade (parallel/perpendicular) : F14/F14
- Bending strength (f_s) (parallel/perpendicular) : 4.8MPa/4.8MPa

What is NiuDeck?

Deflection:

- Reduction factor k_e is adopted to allow for significant shear deflections due to a low shear modulus and span to depth ratios of less than 10:1.
- k_e : 0.75

Standard Thickness Section Properties¹:

| Thickness (mm) | I longit x10 ⁶ mm ⁴ | Z longit x10 ³ mm ⁴ | I trans x 10 ⁶ mm ⁴ | Z trans x 10 ³ mm ⁴ |
|----------------|---|---|---|---|
| 56 | 8.6 | 303 | 6.3 | 216 |
| 84 | 28.4 | 663 | 22 | 505 |
| 112 | 66.8 | 1168 | 52.8 | 908 |
| 140 | 129.9 | 1816 | 103.6 | 1427 |
| 150 | 166.9 | 2143 | 134.6 | 1703 |
| 155 | 188.05 | 2319 | 151.8 | 1847 |
| 167 | 223.4 | 2609 | 179.6 | 2062 |
| 195 | 355.1 | 3546 | 285.6 | 2811 |

¹For one meter wide

Typical Thicknesses Required:

| Parameter | 1300mm Maximum Girder Spacing | 1600mm Maximum Girder Spacing |
|---|-------------------------------|-------------------------------|
| Clear Span (mm) | 1150mm | 1450mm |
| Thickness for 80 kN wheel load to AS 5100 Bridge Design | 150mm | 155mm |
| Maximum Cantilever for 80kN wheel load | 450mm | 500mm |
| Thickness for 70kN wheel load to 92 Austroads Bridge Design Code | 140mm | 150mm |
| Maximum Cantilever for 70kN wheel load to 92 Austroads Bridge Code (mm) | 450mm | 500mm |

Assumptions:

- Maximum cantilever is measured from the inside of the kerb to the girder centreline.
- Panels are laid perpendicular to girder (zero degrees skew).
- For AS5100 designs the critical live load is assumed to be W80 wheel load.
- Wheel load patch size is 200x500mm.
- Deck is assumed to have at least 3 continuous spans.

Limitations:

- The above design values are indicative only. Specific bridge decks must be designed and certified by an appropriately qualified and registered engineer to suit the applicable loads and conditions.

NiuDeck Installation

Skew Decks

The above section properties are applicable when the NiuDeck panels are laid perpendicular to the girders. Skew decks are where the panels are laid at an angle other than perpendicular.



Installation

To ensure correct installation of the product we recommend the following instructions be strictly adhered to:

- Supporting structure needs to be sound prior to installation of NiuDeck.
- Changing the thickness or width of the NiuDeck product from the approved design during the installation process is not allowed unless a variation to the design is obtained and signed off by the design engineer.
- Docking to length of both NiuDeck during the installation process is allowed however any saw cut done by hand, chain saw or circular saw needs to be a minimum distance of 25mm from any visible screws. If screws cannot be located, then it is recommended to cut the NiuDeck with a concrete saw.
- NiuDeck needs to be fixed at each girder with a minimum of 2 bolts (one per side). M24 is recommended for extra longevity with a minimum 100x100x16mm washer.
- Alternative fixing of panels to girder can be done by prefabricated steel straps
- Panels with widths of between 900mm and 1200mm are to be located in the centre of the deck with at least 3 x 1200mm panel widths away from the abutments.
- Ensure deck panels are evenly supported by the girders.
- Coat the tops of the girders with a bituminous seal as protection from moisture that may seep through between the deck panels.
- Load distributors are recommended to be attached between and parallel to the girders to control differential deflection of adjacent panels.



Fasteners:

- The minimum corrosion protection for fasteners shall be a heavy hot dipped galvanised coating. However, in coastal or in environments where there will be prolonged periods of elevated moisture content (> 18%) it is recommended 316 stainless steel fasteners be used.
- It is also recommended that all fasteners be coated in grease before installation.

Camber:

- Camber (approximately 1%) can be built into the NiuDeck panels at installation time via differing height girders or packing corbels. Additional camber can also be obtained by shaping the bitumen deck wearing surface.

What is Eco Modular?

The NiuBridge ECO modular bridge system is a robust cost-effective system for all single spans up to 10m. NiuBridge ECO is suitable for installation on almost all substructures, including temporary installations direct on the ground.

Key features:

- Single span length up to 10m
- Compliant to T44 loading
- Standard single lane width 4200mm
- Standard double lane width 8400mm
- Non-standard lengths and widths available on request.

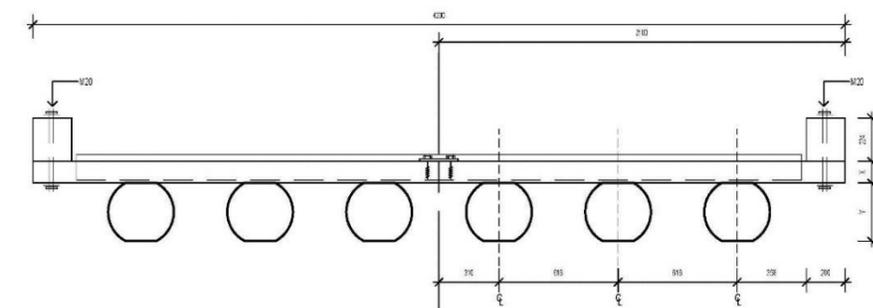


Figure 1: Typical single lane deck and girder cross section

Delivery



As part of the NiuBridge ECO Module design optional lifting eyes can be installed to facilitate the unloading and installation process.

If a pre-applied deck wearing surface has been specified, the lifting eye points and module jointing plates will be masked with sacrificial plywood that is to be removed at time of installation (Figure 2).

It is the responsibility of the contractor installing NiuBridge to ensure that all lifting is undertaken in accordance with a Safe Work Method Statement that complies with all relevant laws, safety regulations and codes of practices.

Figure 2 – Bolt and Deck Joint masking

Installation

NiuBridge system is either installed on an existing timber or concrete substructure, or on a new substructure. The typical installation process is as follows: -

- Ensure substructure is sound and suitable to accommodate the NiuBridge modules.
- Place elastomeric pads (if specified) on headstocks, corbels or abutments.
- Place and secure NiuBridge modules to the headstocks and abutments.
- Complete longitudinal deck jointing.
- Install additional barriers if required.
- Install (or patch if pre-applied) deck wearing surface.

To ensure correct installation of the product we recommend the following instructions be strictly adhered to:

Design:

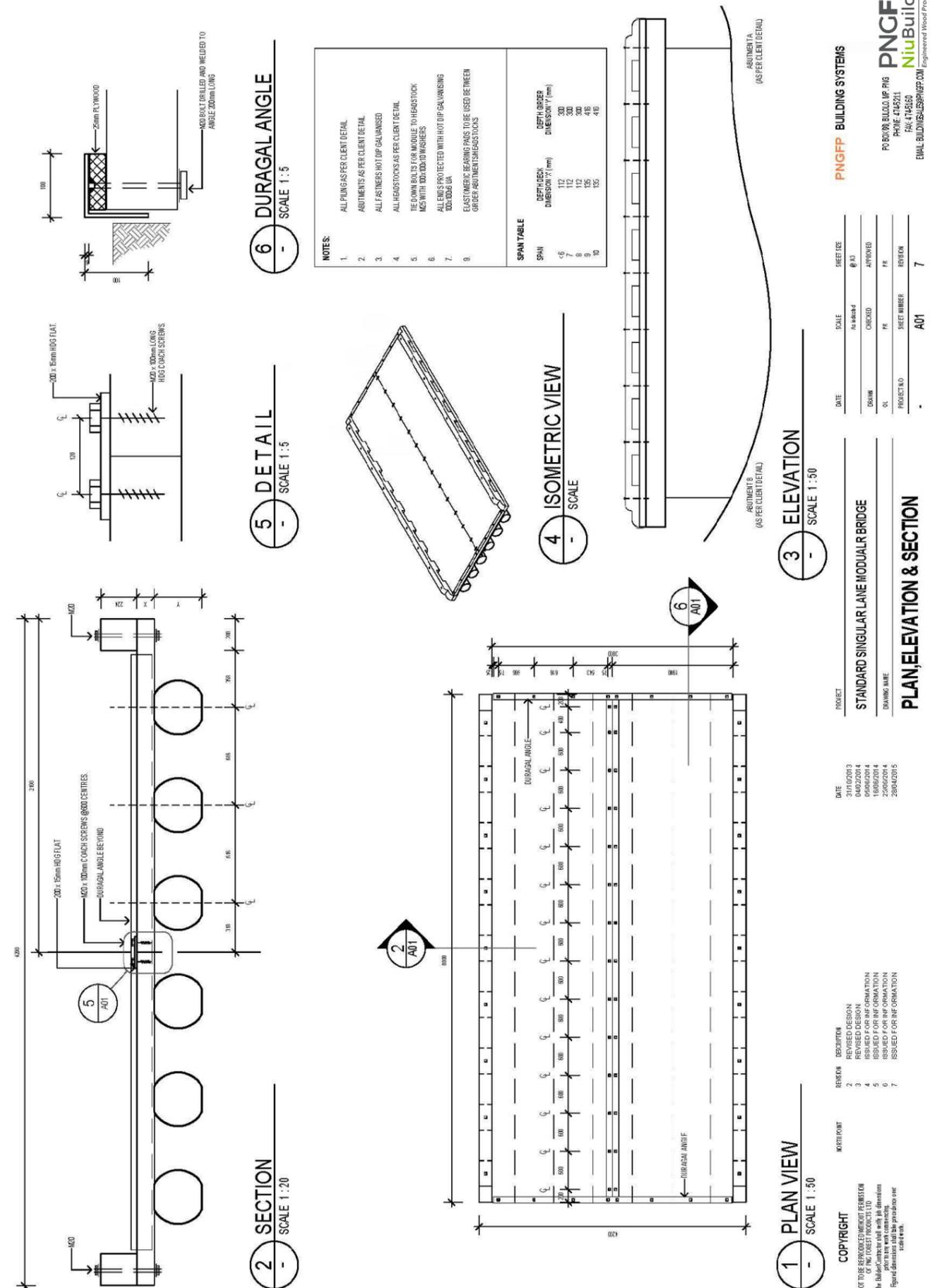
- Supporting structure needs to be sound prior to installation of NiuBridge
- NiuBridge needs to be fixed at each girder with a minimum of 1 bolts per end per girder, however, site specific requirements need to be considered. The minimum bolt size is M20 with M24 recommended for extra longevity with a 100x100x16mm washer.
- Ensure NiuBridge modules are evenly supported by the sub-structure.

Corrosion:

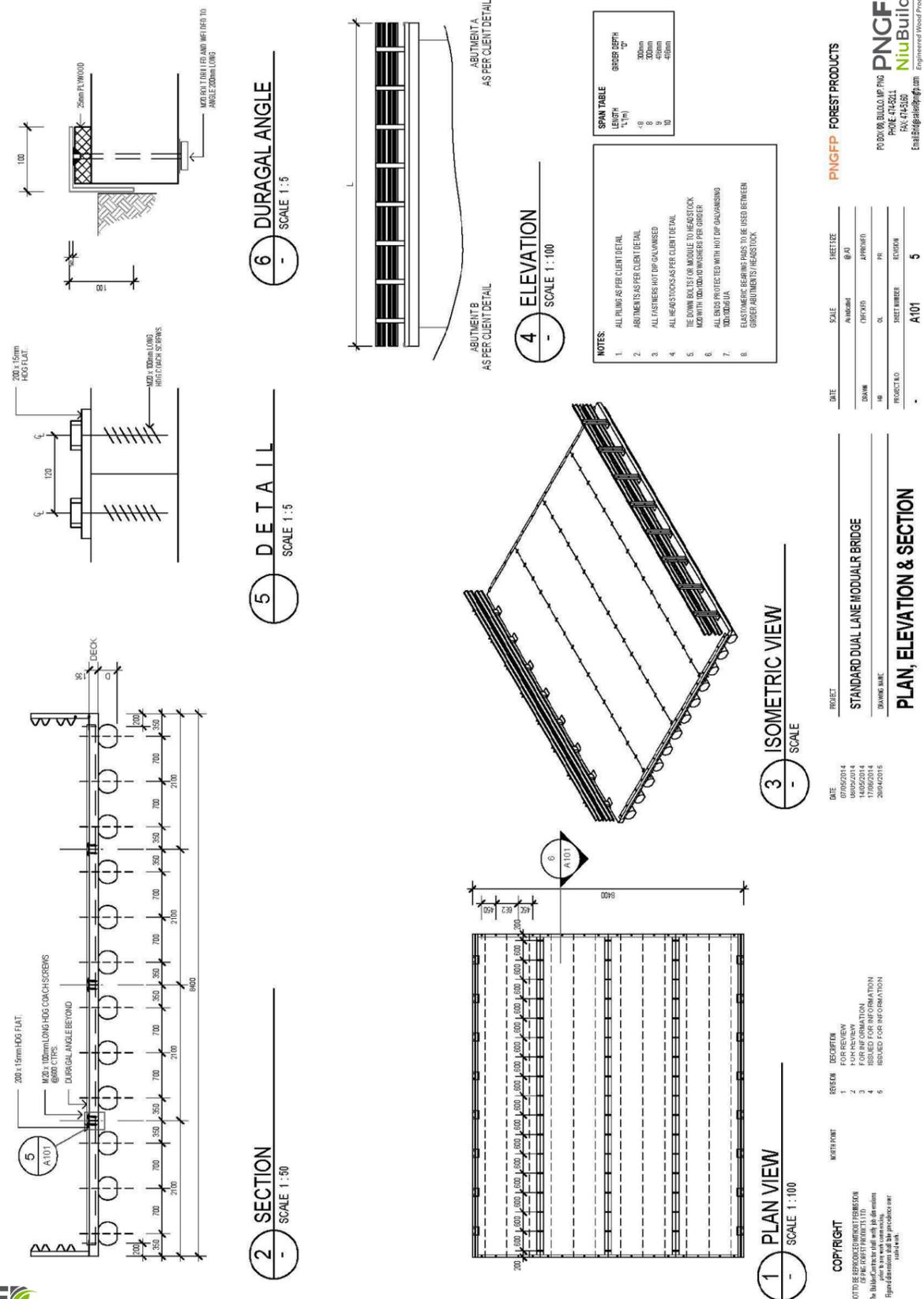
- The minimum corrosion protection for fasteners shall be a heavy hot dipped galvanised coating. However, in coastal or in environments where there will be prolonged periods of elevated moisture content (> 18%) it is recommended 316 stainless steel fasteners be used.
- It is also recommended that all fasteners be coated in grease before installation.

Camber:

- Camber can be built into the supporting structure. Additional camber can also be obtained by shaping the bitumen deck wearing surface.



Typical Drawings



What is HPF Modular?

The NiuBridge HPF modular bridge system is a high performing engineered wood product system suitable for all single spans applications up to 15m. NiuBridge HPF is suitable for installation on a variety of existing substructures, including timber, heritage masonry, steel and concrete. NiuBridge HPF is also ideally suitable for installation on precast spread footing abutment systems as well as the conventional piles and abutments.

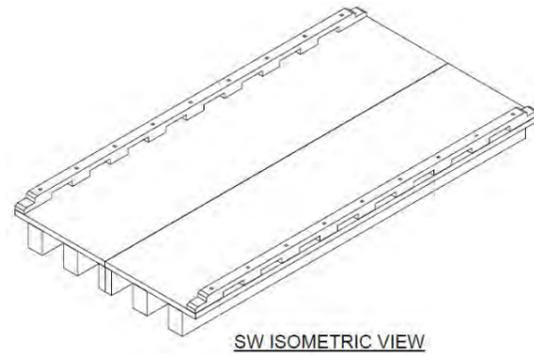


Key features:

- Single span length up to 15m
- Compliant to T44 and AS5100 S1600 loading
- Standard single lane width 4600mm
- Standard double lane width 8800mm
- Non-standard lengths and widths available on request.



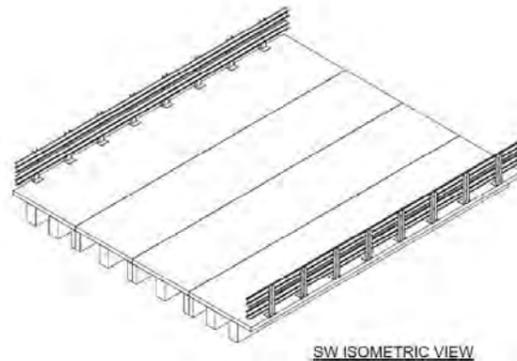
HPF Modular



| Span (m) | Overall Lane Width Inside Kerbs (m) | Overall Lane Width Outside Kerbs (m) | Module Width (m) | Deck Thickness (mm) | Girder Depth (mm) | Kerb Width (mm) | Kerb Depth (mm) | Approximate Module Weight ² (tonne) |
|----------|-------------------------------------|--------------------------------------|------------------|---------------------|-------------------|-----------------|-----------------|--|
| 8 | 4.2 | 4.6 | 2.3 | 108 | 342 | 200 | 216 | 4.6 |
| 10 | 4.2 | 4.6 | 2.3 | 108 | 445 | 200 | 216 | 6.4 |
| 12 | 4.2 | 4.6 | 2.3 | 135 | 555 | 200 | 216 | 9.0 |
| 15 | 4.2 | 4.6 | 2.3 | 135 | 780 | 200 | 216 | 13.2 |

Note 2: Includes 2 coat bitumen chip seal

Table 1: Single Lane Attributes Table



| Span (m) | Overall Lane Width Inside Kerbs (m) | Overall Lane Width Outside Kerbs (m) | Outer Module Width (m) | Inner Module Width (m) | Deck Thickness (mm) | Girder Depth (mm) | Approximate Outer Module Weight ² (tonne) | Approximate Inner Module Weight ² (tonne) |
|----------|-------------------------------------|--------------------------------------|------------------------|------------------------|---------------------|-------------------|--|--|
| 8 | 8.4 | 8.8 | 2.3 | 2.1 | 108 | 342 | 4.6 | 4.2 |
| 10 | 8.4 | 8.8 | 2.3 | 2.1 | 108 | 445 | 6.4 | 5.8 |
| 12 | 8.4 | 8.8 | 2.3 | 2.1 | 135 | 555 | 9.0 | 8.2 |
| 15 | 8.4 | 8.8 | 2.3 | 2.1 | 135 | 780 | 13.2 | 12.1 |

Note 2: Includes 2 coat bitumen chip seal

Table 2: Double Lane Attributes Table

Installation

Delivery and Lifting



The sequencing and timing of delivery needs to be coordinated by the main contractor in consultation with PNGFP. Issues that need to be considered are: -

- Site access and timing
- Traffic control
- Transportation requirements
- Crane size and reach

As part of the NiuBridge HPF Module design there are M30 holes in the deck for attaching suitably approved M30 lifting eyes to facilitate the unloading and installation process. Alternatively, suitably approved slings and/or chain can be used around the module.

If a pre-applied deck wearing surface has been specified, these lifting holes will be masked with plywood discs (Figure 3).

Figure 3 – Bolt and Deck Joint masking

It is the responsibility of the contractor installing NiuBridge to ensure that all lifting is undertaken in accordance with a Safe Work Method Statement that complies with all relevant laws, safety regulations and codes of practices.

Installation

NiuBridge system is either installed on an existing timber or concrete substructure, or on a new substructure. The typical installation process is as follows: -

- Ensure substructure is sound and suitable to accommodate the NiuBridge modules.
- Place elastomeric pads (if specified) on headstocks, corbels or abutments.
- Place and secure NiuBridge modules to the headstocks and abutments.
- Complete longitudinal deck jointing.
- Install and tighten tie down bolts
- Install additional barriers if required.
- Install (or patch if pre-applied) deck wearing surface.

To ensure correct installation of the product we recommend the following instructions be strictly adhered to:

Design:

- Supporting structure needs to be sound prior to installation of NiuBridge.
- NiuBridge needs to be fixed at each girder with a minimum of 1 bolts per end per girder, however site-specific details need to be considered. M24 bolts are recommended with a 100x100x16mm washer.
- It is recommended that the tie down bolts be located adjacent to each girder on the downstream side.
- Ensure NiuBridge modules are evenly supported by the sub-structure.



Typical Drawings (contd)

ELEVATION
SCALE 1:50

SW ISOMETRIC VIEW
SCALE 1:10

SIDE VIEW
SCALE 1:20

PLAN VIEW
SCALE 1:50

NOTES:

1. ALL PILING AS PER COUNCIL DETAIL.
2. ABUTMENTS AS PER COUNCIL DETAIL.
3. ALL FASTENERS HOT DIP GALVANISED.
4. ALL HEADSTOCKS AS PER COUNCIL DETAIL.
5. TIE DOWN BOLTS FOR MODULE TO HEADSTOCK M24 WITH 100x100x10 WASHERS.
6. ALL ENDS PROTECTED WITH HOT DIP GALVANISING 100x100x6 UA.
7. ALL GIRDERS FITTED WITH GIRDER BEARING PLATES CAPS.
8. ELASTOMERIC BEARING PADS TO BE USED ON ALL GIRDER BEARING PLATES CAPS AND CONCRETE ABUTMENTS.

| LENGTH "L" (m) | GIRDER DEPTH "H" (mm) | DECK THICKNESS "D" (mm) | BOLT POSITION "h ₁ " (mm) | BOLT POSITION "h ₂ " (mm) |
|----------------|-----------------------|-------------------------|--------------------------------------|--------------------------------------|
| 8 | 342 | 135 | 170 | 405 |
| 10 | 445 | 135 | 220 | 405 |
| 12 | 565 | 135 | 150 | 405 |
| 15 | 780 | 135 | 200 | 580 |

REVISIONS

| NO | DATE | BY | CHKD | APP'D | REASON |
|----|----------|----------|------|-------|--------|
| 1 | 24/09/15 | 02/11/15 | | | |
| 2 | | | | | |

PROJECT INFORMATION

PROJECT NO: 150161
 SHEET NO: A105
 OF: 2

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SHPF Modular

The NiuBridge SHPF modular bridge system is a high performing engineered wood product system suitable for all single spans applications up to 24m. NiuBridge SHPF unique design allows the bridge to be shipped in easily transportable sections which are then readily assembled on site. SHPF NiuBridge is suitable for installation on a variety of existing substructures both pile and spread footings, including timber, heritage masonry, steel and concrete.



Key features:

- Single span lengths from 15 to 24m
- Compliant to T44 loading
- Standard single lane width 4600mm
- Segmented design allows for easy transportation and rapid assembly when on site.
- Light weight .



SHPF Modular

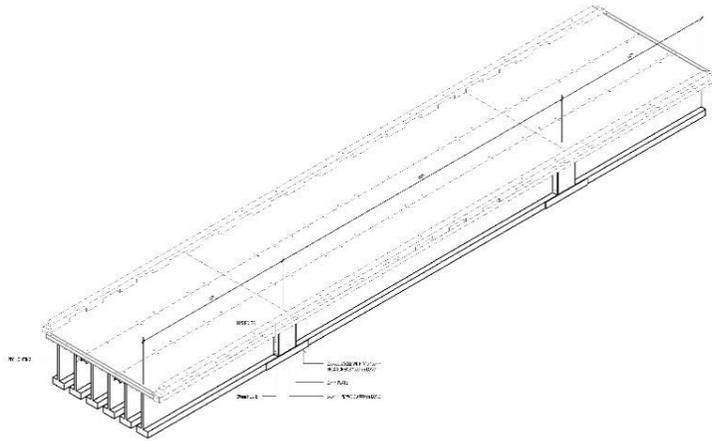


Table 3: Single lane attributes table

| Total Span (m) | Approach Section Span (m) | Centre Section Span (m) | Overall Lane Width Outside Kerbs (m) | Overall Lane Width Inside Kerbs (m) | Deck Thickness (mm) | Module Depth (mm) | Girder Depth (mm) | Kerb Width (mm) | Kerb Depth (mm) | Approximate Total Weight ² (tonne) |
|----------------|---------------------------|-------------------------|--------------------------------------|-------------------------------------|---------------------|-------------------|-------------------|-----------------|-----------------|---|
| 20 | 5 | 10 | 4.2 | 3.8 | 135 | 1389 | 342 | 200 | 216 | 30.0 |
| 22 | 5.5 | 11 | 4.2 | 3.8 | 135 | 1389 | 445 | 200 | 216 | 33.0 |
| 24 | 6 | 12 | 4.2 | 3.8 | 135 | 1389 | 445 | 200 | 216 | 36.0 |

Table 4: Component Module Attributes Table

| Span (m) | Section | Location | Module Length (m) | Module Width (m) | Module Depth (mm) | Deck Thickness (mm) | Approximate Module Weight ³ (tonne) |
|----------|----------|----------|-------------------|------------------|-------------------|---------------------|--|
| 20 | Approach | Outside | 5 | 1.5 | 1389 | 135 | 2.6 |
| 20 | Approach | Inside | 5 | 1.2 | 1389 | 108 | 2.4 |
| 20 | Centre | Outside | 10 | 1.5 | 1389 | 135 | 5.2 |
| 20 | Centre | Outside | 10 | 1.2 | 1389 | 135 | 4.8 |
| 22 | Approach | Outside | 5.5 | 1.5 | 1389 | 135 | 2.9 |
| 22 | Approach | Inside | 5.5 | 1.2 | 1389 | 108 | 2.6 |
| 22 | Centre | Outside | 11 | 1.5 | 1389 | 135 | 5.7 |
| 22 | Centre | Outside | 11 | 1.2 | 1389 | 135 | 5.3 |
| 24 | Approach | Outside | 6 | 1.5 | 1389 | 135 | 3.1 |
| 24 | Approach | Inside | 6 | 1.2 | 1389 | 108 | 2.9 |
| 24 | Centre | Outside | 12 | 1.5 | 1389 | 135 | 6.2 |
| 24 | Centre | Outside | 12 | 1.2 | 1389 | 135 | 5.8 |

Note 3: Excludes bitumen chip seal

Typical Drawings

NOTES

- ALL BRIMS AS PER CLIENT DETAIL
- ASSEMBLY AS PER CLIENT DETAIL
- ALL PARTNERS NOT OF GALVANISED
- ALL BRIMS AS PER CLIENT DETAIL
- BEFORE BRIMS FOR BRIMS TO BE STOCK
- BEFORE BRIMS FOR BRIMS TO BE STOCK
- ALL ENDS PROTECTED WITH HOT DIP GALVANISING TREATMENT
- 20mm THICK ELASTOMERIC BEARING AIDS TO BE USED BETWEEN GIRDERS AND INTERSECTIONS
- ALL ENDS PROTECTED WITH HOT DIP GALVANISING TREATMENT
- ALL ENDS PROTECTED WITH HOT DIP GALVANISING TREATMENT
- BEAMS TO BE PAINTED WITH 2 COATS OF QUALITY OIL-BASED PAINT (COATS OF OIL-BASED PAINT)
- 20mm THICK ELASTOMERIC BEARING AIDS TO BE USED BETWEEN GIRDERS AND INTERSECTIONS

PROJECT: STANDARD SINGULAR LANE MODULAR BRIDGE
DATE: 20/08/2024
SCALE: AS SHOWN
PROJECT NO.: A01
REVISION: 2

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Pre-Ordering

In order to ensure a smooth and efficient installation of any of the NiuBridge systems it is essential to undertake sufficient site planning. It is recommended a site meeting be conducted with representatives from the consulting engineer, installation contractor and PNGFP to discuss constraints, delegate responsibilities and schedule. Table 2 below outlines key tasks to be discussed together with suggested responsibility.

| Stage | Task | Responsibility |
|--------------------------|--|----------------|
| Order Detail | Confirm details of the NiuBridge product and any options e.g. pre-installed deck wearing surface | Customer |
| Project Schedule | Project schedule to be agreed on allowing sufficient time for manufacture and shipping. | Customer/PNGFP |
| Site Preparation | Ensure site is accessible for cranes and delivery vehicles | Customer |
| Lifting Equipment | Organise suitable lifting equipment to unload delivery vehicles and for installation. | Customer |
| Delivery | Coordinate delivery sequence with site requirements | Customer/PNGFP |
| Delivery | Site traffic control | Customer |
| Installation | Installation process | Customer |

Table 5 Key Planning Tasks and Responsibility

Safety

- Requirements and regulations must be observed at all times, including transportation, lifting, handling, storage and installation.
- Responsibility of contractor to provide Safe Work Method Statements that comply with all relevant laws and regulations.
- Must use nominated PPE as detailed in the MSDS statement.
- All lifting must be done by qualified operators and strictly in accordance with all relevant health and safety standards.
- Care must be taken during any lifting operation to prevent any damage e.g. spearing due to forklift tyres or edge damage due to lifting chains/straps.

Deck Wearing Surface

NiuBridge requires a durable deck wearing surface to be installed to ensure that the designed service life is achieved. In order to maximise the life of the deck wearing surface the entire bridge structure must be tight to minimise movement under load.

The recommended deck wearing surfaces are either a multi-layered aggregate system or asphaltic concrete and the weight of this surface needs to be considered in the design load of the bridge.

Multi-layered aggregate system:

- Spray deck, ends and edges with a Cationic Rapid Set Emulsion (CRS) in accordance with the manufacturer's instructions.
- Apply and roll with a non-vibrating roller 14mm chip layer to the surface.
- Spray a second coat of emulsion.
- Apply and roll with a non-vibrating roller a 7mm chip layer to the surface
- Repeat layers for the desired thickness and durability.
- Remove excess loose chip from the final layer.



Asphaltic Concrete:

- Spray deck, ends and edges with a Cationic Rapid Set Emulsion (CRS) in accordance with the manufacturer's instructions.
- Apply and roll with a non-vibrating roller a 7mm chip layer to the surface.
- Apply a minimum 30mm thick layer of asphaltic concrete.
- Roll with a non-vibrating roller and allow to cure.



NiuKerb

NiuKerb is a prefinished Engineered Wood kerbing system that is ready to be bolted directly to a bridge deck saving significant on site installation time and cost.

The product is available as either a 6m long x 200mm wide x 216mm deep solid section or with 600mm long x 100mm deep drainage sections pre-cut into the kerb (scuppers). Both products are available with either tapered approach as detailed in Figure 5 or a square end.

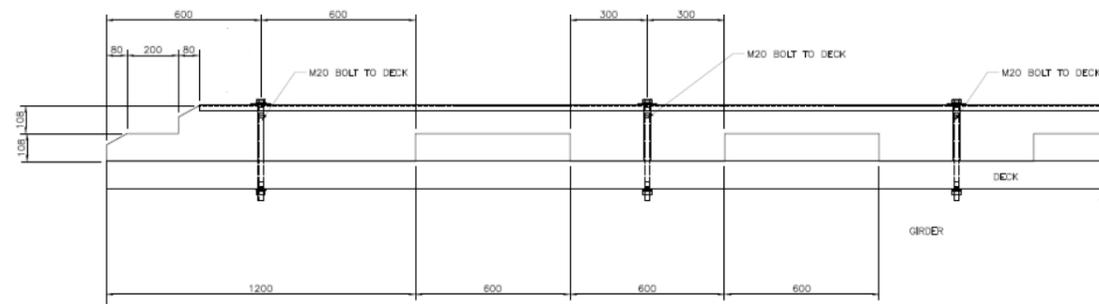


Figure 4: Kerbing scupper details

The Engineered Wood Products Association of Australasia Ltd. certifies that

PNG Forest Products Ltd.
PO Box 88, BULOLO 423, Papua New Guinea

operates a Chain of Custody Management system that meets the requirements of the

PEFC ST 2002:2013 Chain of Custody of Forest Based Products
(as amended www.pefc.org)

Mill Number: 916 Expiry Date: 22 Dec 2023
Chain of Custody Approach: Volume Credit

The currency of certification should be verified on the EWPAA or PEFC online certification registers.

Scope of Certification

| | |
|-----------------------------------|--------------------------|
| Wooden Furniture | Treated Plywood |
| Treated and Untreated Pine Timber | Timber Bridge Components |
| Rough Sawn Hardwood | Poles |
| Plywood Noise Barriers | Plywood Cladding |
| Plywood | Overlaid Plywood |
| Dressed Hardwood | |

Sites covered by this Certificate

PNGFP - Bulolo : Huxley St, Bulolo, Papua New Guinea

Dave Gover, CEO EWPAA

Issued Date: 19 Dec 2018
Last Recertification Date: 22 Dec 2018
Initial Certification Date: 22 Dec 2015

The contents of this certificate are valid as of the date of issue. This certificate must not be reproduced except in full. To verify the current list of certifications held by this organisation, visit the web pages linked below.
<https://pefc.org/find-certified/certified-certificates/> <https://ewp.asn.au/members>

The Engineered Wood Products Association of Australasia Ltd. certifies that

PNG Forest Products Ltd.
PO Box 88, BULOLO 423, Papua New Guinea

operates a quality control system that meets the requirements of the

EWPA Product Certification Scheme

EWPA certification involves regular inspections of the manufacturing process, independent testing of product compliance and periodic assessment of product performance in the marketplace.

Details of the certifications scheme are available at www.ewp.asn.au

Mill Number: 916 Issued: 08 Jan 2019

Certified Products

| | |
|---------------------------------------|---------------------------------|
| AS/NZS 2269 Plywood Structural | AS 6669 Plywood Formwork |
| Grade F14 | Grade F17 |
| Bond A Bond | Bond A Bond |
| Emission Class Super E0 | Emission Class Super E0 |
| AS/NZS 2270 Plywood Interior | Special Products |
| Bond C Bond | Product NuiDeck |
| Emission Class E0 | NuiBridge |
| AS/NZS 2271 Plywood Exterior | |
| Bond A Bond | |
| Emission Class Super E0 | |
| AS/NZS 2272 Plywood Marine | |
| Grade Standard | |
| Bond A Bond | |
| Emission Class Super E0 | |

Dave Gover, CEO EWPAA

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www.jas-anz.org/our-directory/certified-organisations <https://ewp.asn.au/members>

Before NiuDeck

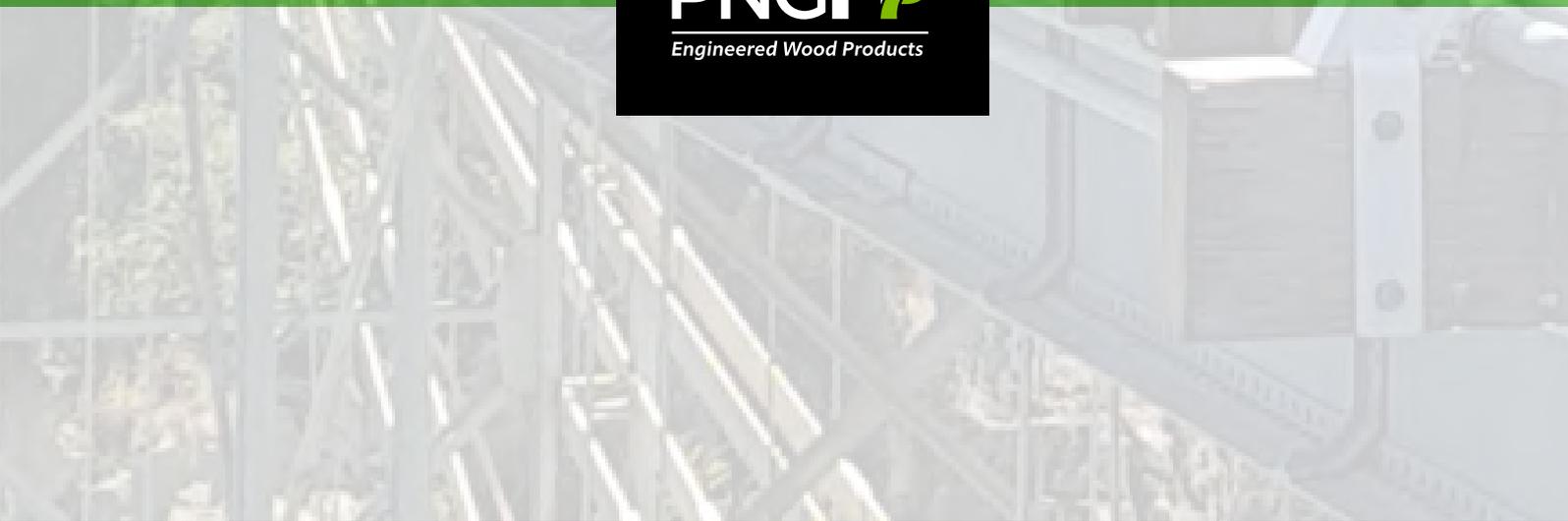


After NiuDeck



OK Tedi Mining Bridge Papua New Guinea





PNGFF
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