BigRiver

2017

Bridgeply Design and Installation Manual

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The Big River Group

With more than 110 years in the timber industry, the Big River Group is one of the largest private timber manufacturing and marketing businesses in Australia, servicing all states and many international projects.

Manufacturing operations are located at Grafton and Wagga Wagga in NSW, where a range of hardwood and pine resources are processed into timber products, including plywood for formwork, Structural and decorative applications.

The Big River Group has sales and distribution outlets in Townsville, the Sunshine Coast, Brisbane, Grafton, Sydney, the Illawarra, Wagga Wagga, Melbourne, Adelaide and Perth, servicing the construction and building industry as well as the manufacturing sector with diverse range of timber products and other associated construction materials.

As both manufacturing and distributor of building products, the Big River group provides the security of a complete support network, backed by technical expertise and more than a century of experience.

Contents

Introduction

It is well known, the natural hardwood resource that was once in plentiful supply has now become scarce.

The supply requirement for large-end-section hardwood members has necessitated the requirements for alternatives. Hardwood members that once appeared as bridge decks, on wharf platforms, under rail line, footbridges & environmental walkways have become extremely difficult to source and costly to replace.

With these requirements in mind, Evolution Forest Products and Big River have developed Bridgeply for these specific applications.

Developed from a renewable resource, Bridgeply is an alternative to large-end-sections hardwood members. Manufactured from Structural plywood in accordance with the stringent Australian & New Zealand Standard AS/NZS 2269. Cross laminated from 100% Australian plantation timbers, the panels range in thickness, length and width that offers flexibility in design. Bridgeply is preservative treated to hazard level H4 to allow for decks to come into direct contact with soil and to ensure preservation from environmental elements, and termite attack.

Overall Bridgeply is an economically priced timber panel that has predictable engineered properties to meet your performance requirements. Bridgeply is manufactured from 100% Australian grown plantation resource, verified as legal and sustainable by Chain of Custody program through Australian Forestry Standard (AFS) Program Endorsement Forestry Certification (PEFC) certification number 224.

Advantages of Using Bridgeply

- Predictable Engineering Properties from an engineered wood panel.
- MANFACTURED IN AUSTRALIA
- Reduces number of gaps between deck units (directs water away from superstructure)
- Rapid deck installation times
- Reduced labour costs
- Reduced time of road closures
- Allows cantilevering to widen bridges and accommodate guard rail and footbridge applications
- Uses traditional equipment and skills and is readily available allowing for easy installation and in site modification
- Sustainable and legal plantation resource authorised by PEFC
- Enveloped preservative treated to protect against rot and termite attack
- Low maintenance
- Low cost alternative to complete refurbishment

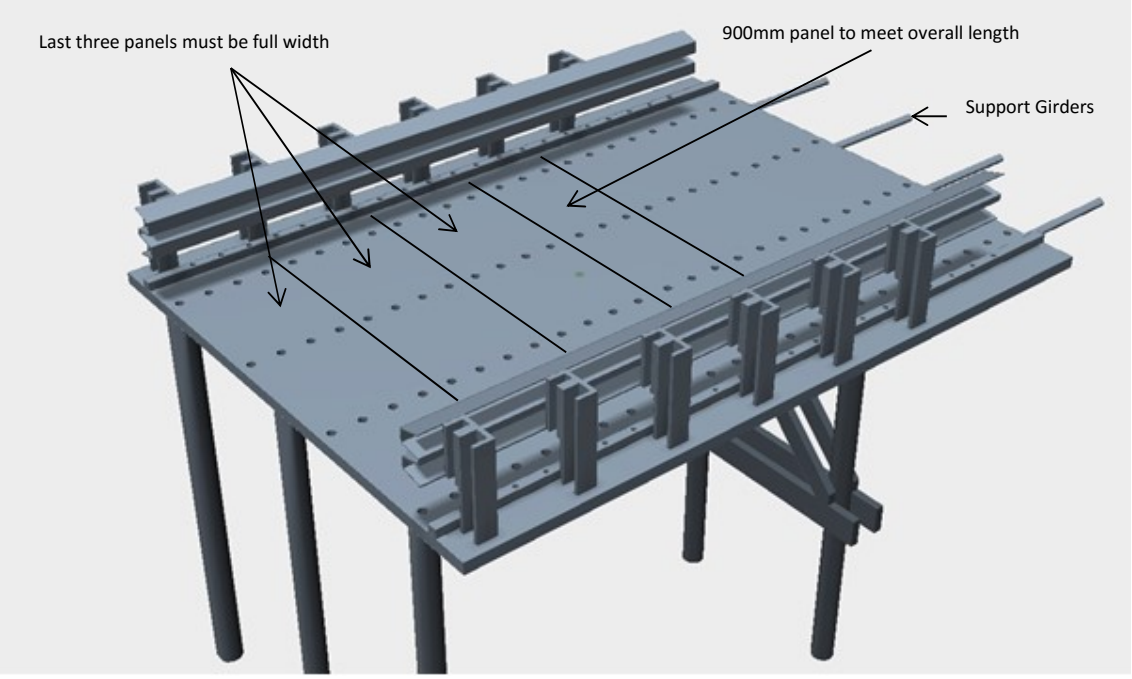


Fig. 1 Typical bridge deck design

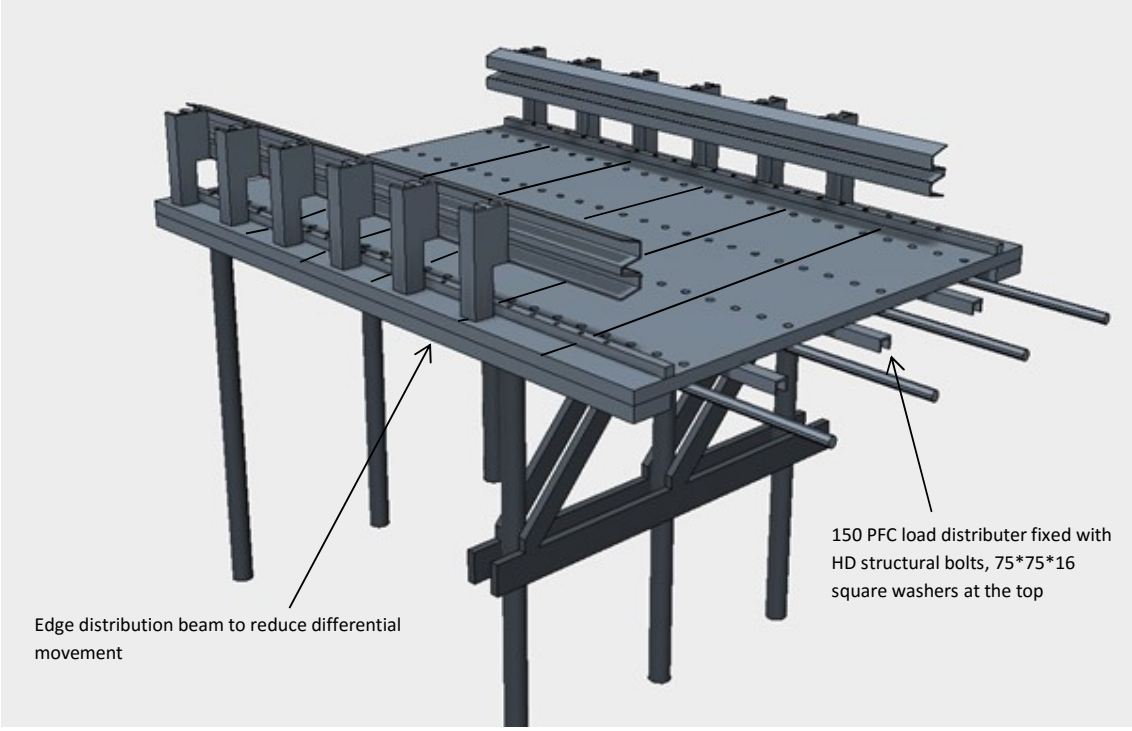


Fig. 2 Typical cantilever design with load distributers

Design Loads

For a Bridgeply deck on a road bridge the typical live load would be the W80 wheel load in AS5100-2004 – Bridge Design. The A160 axle load or the M1600 moving traffic load would be typical for the girders.

Note: A load limit on a bridge may not reduce the need to consider the W80 wheel load requirement.

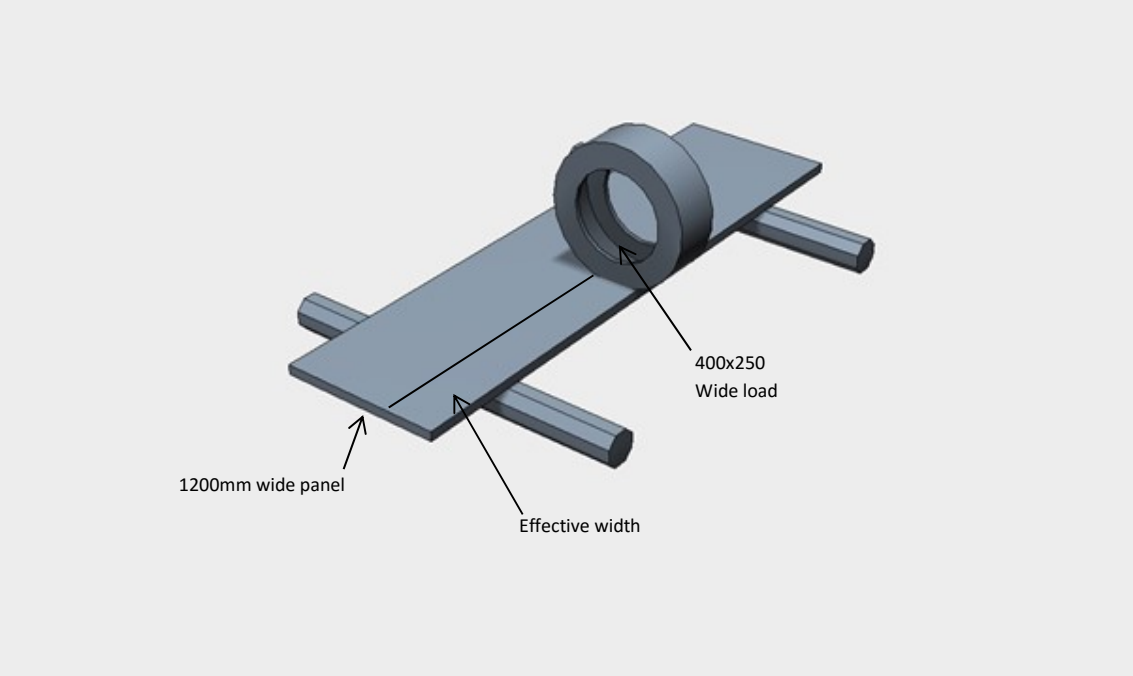


Fig. 3 Effective design width for wheel load

Design Details

Manufacturing Standard: AS/NZS2269-2012 and AS/4707-2006

Standard Plan Dimensions: 1200mm wide sheet up to 14m in length. Non-standard sheets supplied between 595mm and 1200mm wide.
Length and Skew angle as required

Other Properties

Standard Preservative Treatment: Hazard Level 4 (ground contact), meeting the requirements of: AS/NZS1604.3-2012

Thickness Increase over Nominal: 10% when wet from treatment impregnation
5% over nominal, after drying in situ
Finished thickness = +2% -4% of nominal thickness 168mm-179mm

Density:
Air Dry: 650kg/m^3 of nominal volume (before treatment)
Transported Wet: 1250kg/m^3 of nominal volume
Final on Bridge: 750kg/m^3 of nominal volume

Limit State Checks

Bridgeply has a stress grade of F11 as defined in AS1720. The following values are recommended when bridgeply structures are checked for compliance with AS1720.1 Timber Structures-Design Methods, Section 5 Plywood.

Bending Strength – Cl5.4.2 of AS1720.1	
Characteristic Bending Strength, f'_b	31 MPa
Moisture Factor, k_{19}	0.8
Assembly Factor, g_{19}	1.0

Shear Strength – Cl5.4.2 of AS1720.1	
Characteristic Bending Strength, f'_b	5.0 MPa
Moisture Factor, k_{19}	0.8
Assembly Factor, g_{19}	0.4

Deflection
A reduction factor Ke is adopted to allow for significant shear deflections due to low shear modulus and a span depth : ratio of less than 10:1 **Ke = 0.75** **'The short term Modulus of Elasticity is 10500MPa x 0.75 = 7875MPa'**

Standard Section Properties

Bridgeply consists of 5 layers of 32-30-13 plywood. The following section properties have been determined based on the process described in AS/NZS2269.0-Appendix B.

Note: Z values based on parallel plies only
I values include both ply directions (a factor of 0.03 is applied to perpendicular plies)

Section Properties

Thickness	Face Grain Parallel to Span		Face Grain Perpendicular to Span	
	I (mm^4 per mm width)	Z (mm^3 per mm width)	I (mm^4 per mm width)	Z (mm^3 per mm width)
100	46000	907	37291	726
155	176000	2196	150000	1860
170	210600	2491	174972	2046

Cantilever Decks

Bridgeply Decks can be cantilevered to:

-extend the width of the bridge for highway traffic (see Fig. 4)

-add a footbridge (see Fig. 5)

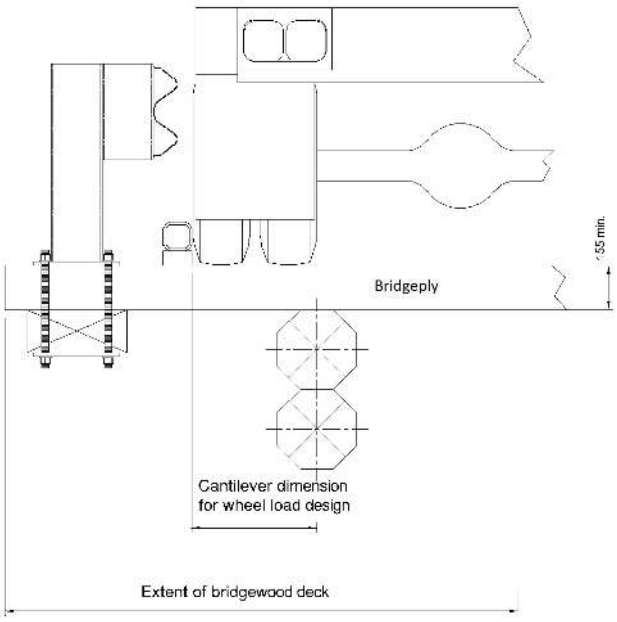


Fig. 4 Typical cantilever deck on a road bridge

Note:
1. Integrity and adequacy of the outer girders should be confirmed before adding cantilevers
2. An additional 550 to 600mm is required for a guard rail, post clearance block, post and foot plate
3. The cantilever can be continued for a foot bridge/cycle way

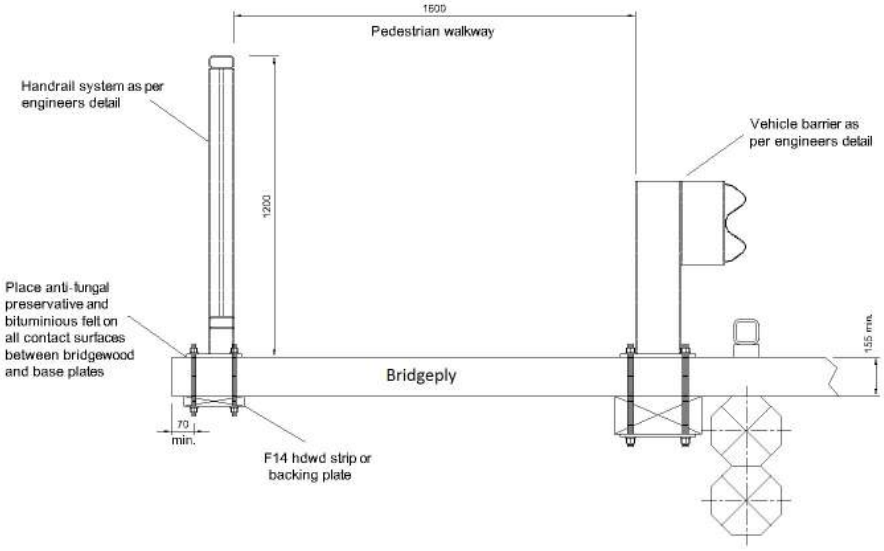


Fig. 5 Typical cantilever footpath (showing bar fixing detail)

Skew Bridges

The section properties presented in this manual are applicable to plywood spanning perpendicular to the girders. Skew bridge analysis requires alternation of section properties towards those of the cross grain direction and/or increasing the effective girder spacing. The pattern of wheel placement can also alter, resulting in one wheel of an A160 axle falling on the adjacent panel.

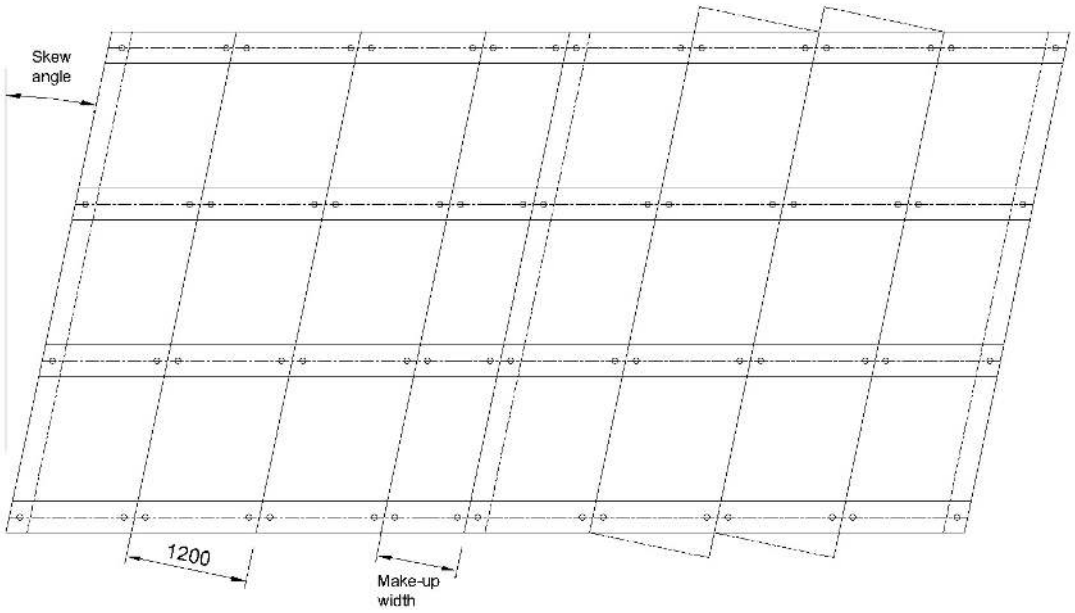
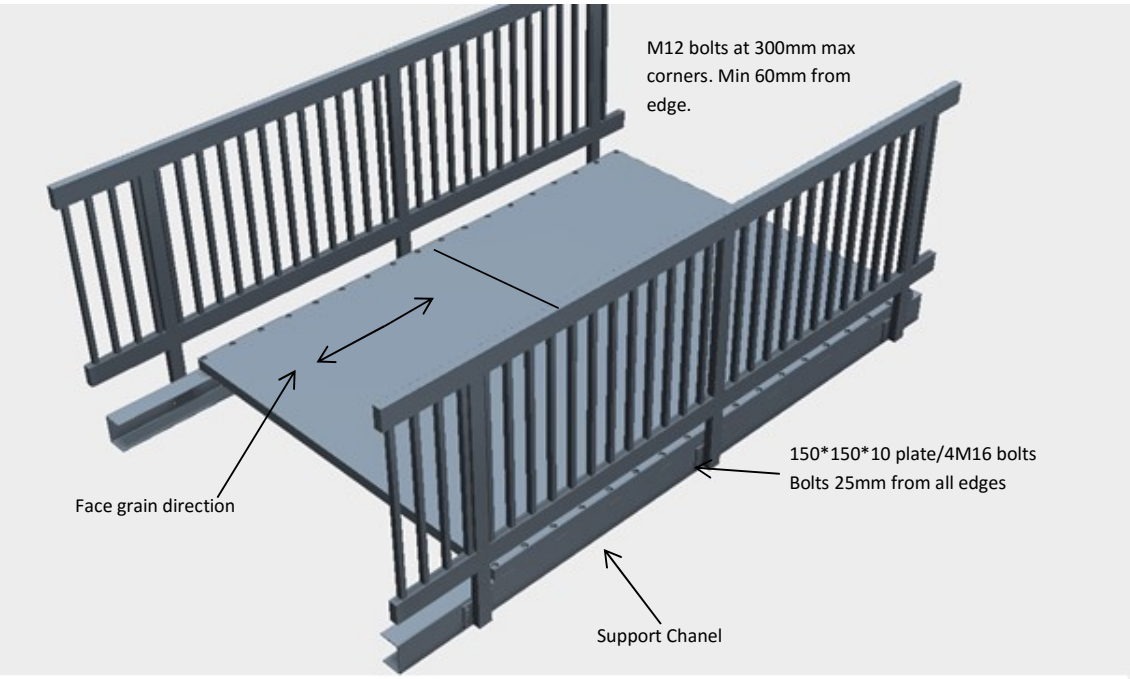
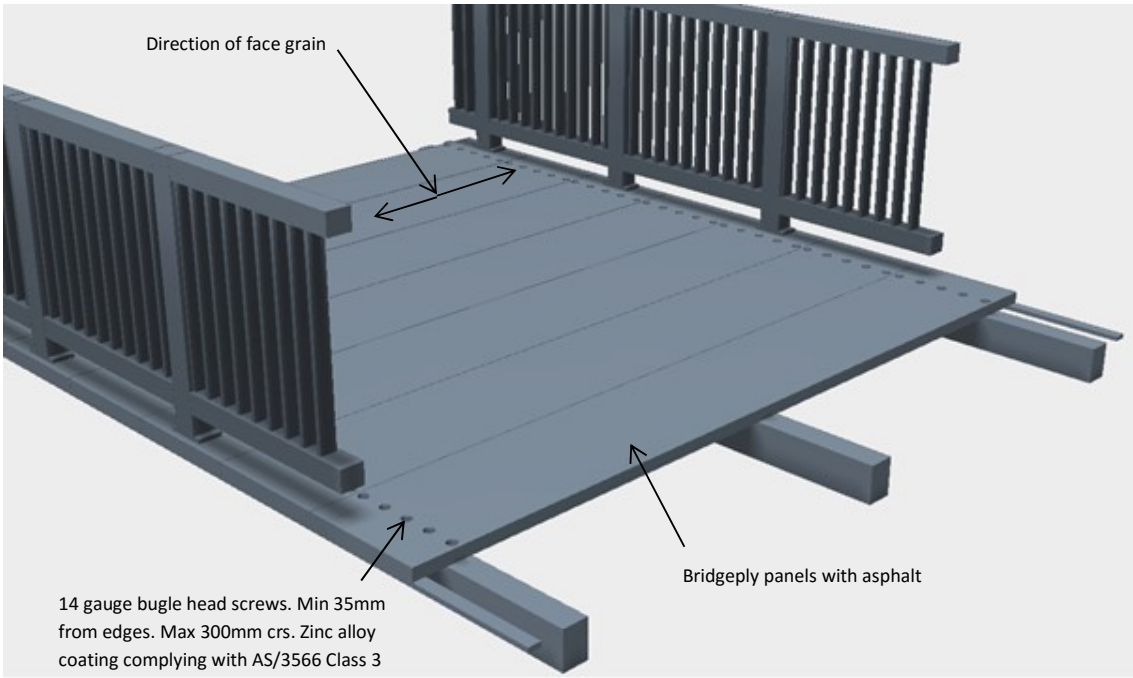


Fig. 6 Bridge with skewed panels, plan view

Typical footbridge arrangement



Typical Footbridge Design



Fixing the Deck

Refer to Fig. 1 and Fig.2 for deck arrangements.

To ensure serviceability with reasonable maintenance requirements, the fixing detail should be appropriate to the speed, frequency and weight class of vehicles.

Points to Consider

- The presence of degrading features in the superstructure such as radial checks, pipes, longitudinal shear failures and general fungal or insect attack
- Ensure that close mating between supporting girder and deck panels is achieved
- Fix to edge and intermediate girders as necessary to ensure and minimise parting and hammering under load passage and girder deflection, Bolt-ended straps may be used to avoid drilling girders
- Camber transverse deck panels at about 0.005 times the distance between outer girders (1% cross fall). This can be done by packing under the corbels or intermediate girders
- Corbel rock is discussed in cited papers. This action can cause direct lifting of Bridgeply panels by the ends of girders. Joint integrity at corbels is also important to achieve some continuity or girder spans and consequent span stiffening.
- Girder ends are best cut to allow contact between abutting girders only at the top. This tapered end detail avoids girder shunt and consequent joint loads.
- Coat girders with a bituminous seal or similar ingredient that may migrate through panel joints
- Hot dip galvanising is the minimum requirement for corrosion resistance of steel components in contact with CCA treated timber such as Bridgeply
- Coat any edges, ends or holes which have been cut or drilled on site with a brush on timber preservative such as Koppers CN emulsion, this is crucial in order to maintain the treatment envelope.
- Load distributors or bolting beams are recommended between and parallel to girders. This is to control deflections between panels under medium to heavy traffic conditions. The specified washer size is important to maintain tight action of these and other joints
- No panel to be less than 900mm wide
- Panels less that 1200mm wide to be placed at least 3 panels from abutments
- The recommendation for steel girders and supports is that there needs to be a prophylactic between the H4 treated Bridgeply and the steel, Typically a bituminous DPC or bituminous epoxy type system.

Placement of holes

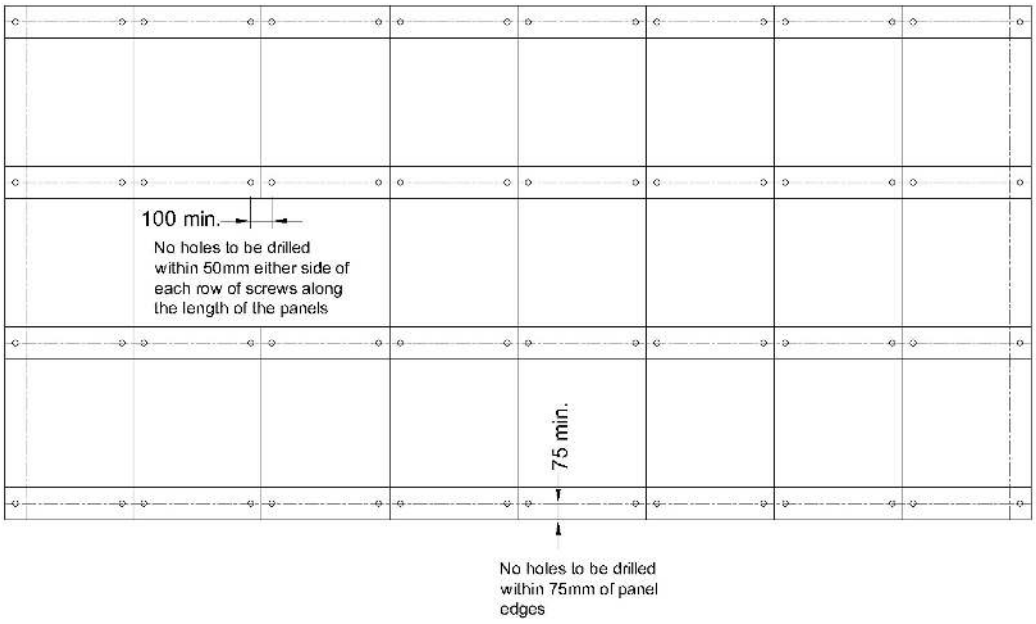


Fig. 9 Placement of holes

Deck Surfacing

Purpose

To provide a durable deck wearing surface for Bridgeply this will accommodate wheel loads meeting the design of the deck.

Deck Preparation

- Check that close mating occurs between girders and the plywood deck
- Load distributors must be attached to the underside of the deck, parallel to, and between the girders
- The deck surface must be dry
- The deck must be free from loose dust salts or deposits which will affect the adhesion of the binder to the wood surface
- The deck fixings must be tight to minimise excess deck movement under load

Bitumen/Aggregate System

Materials

- Cationic Rapid Set Emulsion (CRS)-avoid surfacing at temperatures below 10°C
- Chipseal (14mm and 7mm aggregate) to Austroads spray seal design guide

Method

1. Spray the Bridgeply ends and edges adjacent to abutments with emulsion, using a hand spray, to protect the deck ends from weathering
2. Spray the deck surface with emulsion
3. Apply a 14mm chipseal layer over emulsion
4. Roll the chip using a non-vibrating roller to ensure compaction and adequate coating of chip
5. Spray a second coat of emulsion over the chipseal, ensuring total coverage
6. Apply a 7mm chipseal layer
7. Roll the chip using a non-vibrating roller to ensure compaction and adequate coating of chip
8. Broom the finished surface to remove any loose chip. Further emulsion and chipseal layers may be applied as desired, but there must be a minimum of 2 layers to provide the necessary surface durability

Asphaltic Concrete

Materials

- CRS as per previous system
- Asphaltic Concrete (AC10)

Method

1. Apply the CRS on the ends and surface of the deck as per previous method
2. Apply a 7mm chipseal layer to CRS
3. Apply the asphaltic concrete (minimum 30mm thick but its weight must be considered in the design load of the bridge)
4. Roll the asphaltic concrete with a non-vibrating roller
5. Allow the asphaltic concrete to cure for a minimum of 2 hours before allowing traffic use.

Bridge Curbing

- Length: 2.4m to 6.0m
- Cross section: 200mm x 200mm
- Chamfer edges available at a surcharge
- Treated to H4
- A-bond
- Not structurally rated
- Radiata pine

Bridgeply Life Expectancy

Bridgeply is thick plywood, manufactured using a glue system which will not break down under adverse climatic conditions. The product is preservative treated to withstand insect attack, including termites, and rot. If the deck is installed in line with this manual; it remains fully supported by all girders; a protective deck wearing surface is maintained; and its design load is not exceeded, a Bridgeply deck has a life expectancy of up to 40 years.

Further Reading

To establish effect of degradation on structural action see:

P J Yttrup, P W Law, H Audova, 'The Mechanics of Timber Beam Bridges' AUSTROADS Bridge Conference, Brisbane, November 1991

For simple quantitative analysis of beam bridges see:

P J Yttrup, P W, Law, H Subramaniam, 'Analysis and Determination of Safe Working Load Limits for Timber Beam Bridges'

D R Strohfeldt, 'Transverse Plywood Bridge Decks on Girders Selected for a Trapezoidal Lane Load Model' Timber Bridges Conference, University of Melbourne, November 1992

Load Span Tables

The following tables show the approximate load capacity of Bridgeply panels, including both point loads and uniformly distributed loads. Tables 1 and 2 represent the maximum design loads based on the bending and shear strengths of the panel. Tables 3 and 4 represent the maximum design loads based on a deflection limit of span/300.

NOTE: The following values are provided as estimates only. Bridge decks must be designed by appropriately qualified engineers to suit the loading and conditions relevant to that specific bridge.

Load Span Tables for 155mm F11 Bridgeply

Table 1: Maximum loads for a bridgeply panel continuous over two or more spans based on a strength limit state

Girder Spacing (mm)	Maximum Concentrated Load (kN/m width)	Maximum Uniformly Distributed Load (kPa)
1000	120.2	192.4
1200	120.2	160.3
1400	120.2	137.4
1600	120.2	120.2
1800	107.6	97.2
2000	96.9	78.7
2200	88.1	65.0
2400	80.7	54.6
2600	74.5	46.6
2800	69.2	40.2
3000	64.6	35.0
3200	60.5	30.7
3400	57.0	27.2
3600	53.8	24.3
3800	51.0	21.8
4000	48.4	19.7

Table 2: Maximum loads for a bridgeply panel over a single span based on a strength limit state

Girder Spacing (mm)	Maximum Concentrated Load (kN/m width)	Maximum Uniformly Distributed Load (kPa)
1000	120.2	240.4
1200	120.2	200.4
1400	112.4	160.6
1600	98.4	123.0
1800	87.4	97.2
2000	78.7	78.7
2200	71.5	65.0
2400	65.6	54.6
2600	60.5	46.6
2800	56.2	40.2
3000	52.5	35.0
3200	49.2	30.7
3400	46.3	27.2
3600	43.7	24.3
3800	41.4	21.8
4000	39.3	19.7

Table 3: Maximum loads for a bridgeply panel continuous over two or more spans based on a deflection limit of span/300. Calculations are based on short term loading.

Girder Spacing (mm)	Maximum Concentrated Load (kN/m width)	Maximum Uniformly Distributed Load (kPa)
1000	309.0	332.0
1200	214.6	192.1
1400	157.6	121.0
1600	160.9	108.1
1800	127.1	75.9
2000	103.0	55.3
2200	85.1	41.6
2400	71.5	32.0
2600	60.9	25.2
2800	52.5	20.2
3000	45.8	16.4
3200	40.2	13.5
3400	35.6	11.3
3600	31.8	9.5
3800	28.5	8.1
4000	25.7	6.9

Table 4: Maximum loads for a bridgeply panel over a single span based on a deflection limit of span/300. Calculations are based on short term loading.

Girder Spacing (mm)	Maximum Concentrated Load (kN/m width)	Maximum Uniformly Distributed Load (kPa)
1000	221.3	354.2
1200	153.7	204.9
1400	112.9	129.1
1600	115.3	115.3
1800	91.1	81.0
2000	73.8	59.0
2200	61.0	44.3
2400	51.2	34.2
2600	43.7	26.9
2800	37.6	21.5
3000	32.8	17.5
3200	28.8	14.4
3400	25.5	12.0
3600	22.8	10.1
3800	20.4	8.6
4000	18.4	7.4

Load Span Tables for 155mm, F11 Bridgeply Cantilevers

Table 5: Maximum Concentrated Loads (kN per m width) for a bridgeply panel with an overhang based on a strength limit state.

Girder Spacing (mm)	Overhang (mm)									
	100	200	300	400	500	600	700	800	900	1000
1000	120.2	120.2	120.2	98.4	78.7	65.6	56.2	49.2	43.7	39.3
1200	120.2	120.2	120.2	98.4	78.7	65.6	56.2	49.2	43.7	39.3
1400	112.4	112.4	112.4	98.4	78.7	65.6	56.2	49.2	43.7	39.3
1600	98.4	98.4	98.4	98.4	78.7	65.6	56.2	49.2	43.7	39.3
1800	87.4	87.4	87.4	87.4	78.7	65.6	56.2	49.2	43.7	39.3
2000	78.7	78.7	78.7	78.7	78.7	65.6	56.2	49.2	43.7	39.3
2200	71.5	71.5	71.5	71.5	71.5	65.6	56.2	49.2	43.7	39.3
2400	65.6	65.6	65.6	65.6	65.6	65.6	56.2	49.2	43.7	39.3
2600	60.5	60.5	60.5	60.5	60.5	60.5	56.2	49.2	43.7	39.3
2800	56.2	56.2	56.2	56.2	56.2	56.2	56.2	49.2	43.7	39.3
3000	52.5	52.5	52.5	52.5	52.5	52.5	52.5	49.2	43.7	39.3
3200	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	43.7	39.3
3400	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	43.7	39.3
3600	43.7	43.7	43.7	43.7	43.7	43.7	43.7	43.7	43.7	39.3
3800	41.4	41.4	41.4	41.4	41.4	41.4	41.4	41.4	41.4	39.3
4000	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3

Table 6: Maximum Distributed Loads (kPa) for a bridgeply panel with an overhang based on a strength limit state.

Girder Spacing (mm)	Overhang (mm)									
	100	200	300	400	500	600	700	800	900	1000
1000	238.1	231.2	220.6	207.3	192.4	176.8	160.6	123.0	97.2	78.7
1200	199.0	195.0	188.6	180.3	170.7	160.3	149.5	123.0	97.2	78.7
1400	162.3	167.4	164.2	158.8	152.3	145.1	137.4	123.0	97.2	78.7
1600	123.9	126.9	132.1	139.9	136.9	131.8	126.1	120.2	97.2	78.7
1800	97.8	99.6	102.8	107.5	112.6	112.6	112.6	111.5	97.2	78.7
2000	79.1	80.3	82.4	85.4	89.5	91.2	91.2	91.2	91.2	78.7
2200	65.3	66.1	67.5	69.6	72.3	75.3	75.3	75.3	75.3	75.3
2400	54.8	55.4	56.4	57.8	59.7	62.2	63.3	63.3	63.3	63.3
2600	46.7	47.1	47.8	48.9	50.2	52.0	53.9	53.9	53.9	53.9
2800	40.3	40.6	41.1	41.8	42.8	44.1	45.7	46.5	46.5	46.5
3000	35.1	35.3	35.7	36.3	37.0	38.0	39.1	40.5	40.5	40.5
3200	30.8	31.0	31.3	31.7	32.3	33.0	33.9	35.0	35.6	35.6
3400	27.3	27.4	27.7	28.0	28.4	29.0	29.7	30.5	31.5	31.5
3600	24.3	24.4	24.6	24.9	25.3	25.7	26.2	26.9	27.6	28.1
3800	21.8	21.9	22.1	22.3	22.6	22.9	23.4	23.9	24.5	25.2
4000	19.7	19.8	19.9	20.1	20.3	20.6	20.9	21.3	21.8	22.4

Table 7: Allowable Point Load (kN per metre width), on a Bridgeply Panel with a Cantilever Overhang based on a deflection limit of Overhang/300

Span (mm)	Overhang (mm)									
	100	200	300	400	500	600	700	800	900	1000
1000	73.8	57.6	35.5	24.7	18.4	14.4	11.6	9.6	8.1	6.9
1200	51.2	49.4	30.7	21.6	16.3	12.8	10.4	8.6	7.3	6.3
1400	37.6	37.6	27.1	19.2	14.6	11.5	9.4	7.9	6.7	5.8
1600	38.4	38.4	32.4	23.1	17.6	14.0	11.5	9.6	8.2	7.1
1800	30.4	30.4	29.3	21.0	16.0	12.8	10.5	8.9	7.6	6.6
2000	24.6	24.6	24.6	19.2	14.8	11.8	9.8	8.2	7.1	6.1
2200	20.3	20.3	20.3	17.7	13.7	11.0	9.1	7.7	6.6	5.8
2400	17.1	17.1	17.1	16.5	12.7	10.2	8.5	7.2	6.2	5.4
2600	14.6	14.6	14.6	14.6	11.9	9.6	8.0	6.8	5.9	5.1
2800	12.5	12.5	12.5	12.5	11.2	9.0	7.5	6.4	5.5	4.9
3000	10.9	10.9	10.9	10.9	10.5	8.5	7.1	6.1	5.3	4.6
3200	9.6	9.6	9.6	9.6	9.6	8.1	6.8	5.8	5.0	4.4
3400	8.5	8.5	8.5	8.5	8.5	7.7	6.4	5.5	4.8	4.2
3600	7.6	7.6	7.6	7.6	7.6	7.3	6.1	5.2	4.6	4.0
3800	6.8	6.8	6.8	6.8	6.8	6.8	5.9	5.0	4.4	3.8
4000	6.1	6.1	6.1	6.1	6.1	6.1	5.6	4.8	4.2	3.7

Table 8: Allowable distributed Load (kPa), on a Bridgeply Panel with a Cantilever Overhang based on a deflection limit of Overhang/300

Span (mm)	Overhang (mm)									
	100	200	300	400	500	600	700	800	900	1000
1000	110.7	110.7	110.7	110.7	80.5	53.0	37.0	27.0	20.4	15.8
1200	64.0	64.0	64.0	64.0	64.0	46.6	32.7	24.0	18.2	14.2
1400	40.3	40.3	40.3	40.3	40.3	40.3	29.3	21.6	16.5	12.9
1600	36.0	36.0	36.0	36.0	36.0	36.0	35.4	26.2	20.0	15.7
1800	25.3	25.3	25.3	25.3	25.3	25.3	25.3	24.0	18.4	14.5
2000	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	17.0	13.4
2200	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	12.5
2400	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
2600	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
2800	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
3000	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
3200	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
3400	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
3600	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
3800	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
4000	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3

Load Span Tables for 175mm, F11 Bridgeply

Table 9: Maximum loads for a bridgeply panel continuous over two or more spans based on a strength limit state

Span (mm)	Maximum Concentrated Load (kN/m width)	Maximum Uniformly Distributed Load (kPa)
1000	218.1	207.2
1200	183.1	172.6
1400	157.0	148.0
1600	137.3	129.5
1800	122.1	110.2
2000	109.9	89.3
2200	99.9	73.8
2400	91.6	62.0
2600	84.5	52.8
2800	78.5	45.5
3000	73.2	39.7
3200	68.7	34.9
3400	64.6	30.9
3600	61.0	27.6
3800	57.8	24.7
4000	54.9	22.3

Table 10: Maximum loads for a bridgeply panel over a single span based on a strength limit state

Span (mm)	Maximum Concentrated Load (kN/m width)	Maximum Uniformly Distributed Load (kPa)
1000	129.5	258.9
1200	129.5	215.8
1400	127.5	182.2
1600	111.6	139.5
1800	99.2	110.2
2000	89.3	89.3
2200	81.2	73.8
2400	74.4	62.0
2600	68.7	52.8
2800	63.8	45.5
3000	59.5	39.7
3200	55.8	34.9
3400	52.5	30.9
3600	49.6	27.6
3800	47.0	24.7
4000	44.6	22.3

Table 11: Maximum loads for a bridgeply panel continuous over two or more spans based on a deflection limit of span/300. Calculations are based on short term loading.

Span (mm)	Maximum Concentrated Load (kN/m width)	Maximum Uniformly Distributed Load (kPa)
1000	370.4	398.0
1200	257.2	230.3
1400	189.0	145.1
1600	192.9	129.6
1800	152.4	91.0
2000	123.5	66.3
2200	102.0	49.8
2400	85.7	38.4
2600	73.1	30.2
2800	63.0	24.2
3000	54.9	19.7
3200	48.2	16.2
3400	42.7	13.5
3600	38.1	11.4
3800	34.2	9.7
4000	30.9	8.3

Table 12: Maximum loads for a bridgeply panel over a single span based on a deflection limit of span/300. Calculations are based on short term loading.

Span (mm)	Maximum Concentrated Load (kN/m width)	Maximum Uniformly Distributed Load (kPa)
1000	265.4	424.6
1200	184.3	245.7
1400	135.4	154.7
1600	138.2	138.2
1800	109.2	97.1
2000	88.5	70.8
2200	73.1	53.2
2400	61.4	41.0
2600	52.3	32.2
2800	45.1	25.8
3000	39.3	21.0
3200	34.6	17.3
3400	30.6	14.4
3600	27.3	12.1
3800	24.5	10.3
4000	22.1	8.8

**AS5100 uses both span/300 and span/600 deflection limits. As load and deflection are related linearly, the loads given in tables 3 and 4 can be halved to apply to a deflection limit of 1/600.*

Load Span Tables for 175mm, F11 Bridgeply Cantilevers

Table 13: Maximum Concentrated Loads (kN per m width) for a bridgeply panel with an overhang

Girder Spacing (mm)	Overhang (mm)									
	100	200	300	400	500	600	700	800	900	1000
1000	129.5	129.5	129.5	111.6	89.3	74.4	63.8	55.8	49.6	44.6
1200	129.5	129.5	129.5	111.6	89.3	74.4	63.8	55.8	49.6	44.6
1400	127.5	127.5	127.5	111.6	89.3	74.4	63.8	55.8	49.6	44.6
1600	111.6	111.6	111.6	111.6	89.3	74.4	63.8	55.8	49.6	44.6
1800	99.2	99.2	99.2	99.2	89.3	74.4	63.8	55.8	49.6	44.6
2000	89.3	89.3	89.3	89.3	89.3	74.4	63.8	55.8	49.6	44.6
2200	81.2	81.2	81.2	81.2	81.2	74.4	63.8	55.8	49.6	44.6
2400	74.4	74.4	74.4	74.4	74.4	74.4	63.8	55.8	49.6	44.6
2600	68.7	68.7	68.7	68.7	68.7	68.7	63.8	55.8	49.6	44.6
2800	63.8	63.8	63.8	63.8	63.8	63.8	63.8	55.8	49.6	44.6
3000	59.5	59.5	59.5	59.5	59.5	59.5	59.5	55.8	49.6	44.6
3200	55.8	55.8	55.8	55.8	55.8	55.8	55.8	55.8	49.6	44.6
3400	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	49.6	44.6
3600	49.6	49.6	49.6	49.6	49.6	49.6	49.6	49.6	49.6	44.6
3800	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	44.6
4000	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6

Table 14: Maximum Distributed Loads (kPa) for a bridgeply panel with an overhang

Girder Spacing (mm)	Overhang (mm)									
	100	200	300	400	500	600	700	800	900	1000
1000	238.1	231.2	220.6	207.3	192.4	176.8	161.4	139.5	110.2	89.3
1200	199.0	195.0	188.6	180.3	170.7	160.3	149.5	138.7	110.2	89.3
1400	170.9	168.3	164.2	158.8	152.3	145.1	137.4	129.5	110.2	89.3
1600	140.6	142.4	142.4	141.4	136.9	131.8	126.1	120.2	110.2	89.3
1800	110.9	112.6	112.6	112.6	112.6	112.6	112.6	111.5	106.9	89.3
2000	89.7	91.1	91.2	91.2	91.2	91.2	91.2	91.2	91.2	89.3
2200	74.1	75.0	75.3	75.3	75.3	75.3	75.3	75.3	75.3	75.3
2400	62.2	62.9	63.3	63.3	63.3	63.3	63.3	63.3	63.3	63.3
2600	53.0	53.5	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9
2800	45.7	46.0	46.5	46.5	46.5	46.5	46.5	46.5	46.5	46.5
3000	39.8	40.0	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5
3200	34.9	35.1	35.5	35.6	35.6	35.6	35.6	35.6	35.6	35.6
3400	30.9	31.1	31.4	31.5	31.5	31.5	31.5	31.5	31.5	31.5
3600	27.6	27.7	27.9	28.1	28.1	28.1	28.1	28.1	28.1	28.1
3800	24.8	24.9	25.0	25.3	25.3	25.3	25.3	25.3	25.3	25.3
4000	22.3	22.4	22.6	22.8	22.8	22.8	22.8	22.8	22.8	22.8

Note: Tables 5 and 6 are based on a strength limit state

Table 15: Allowable Point Load (kN per metre width), on a Bridgeply Panel with a Cantilever Overhang based on a deflection limit of Overhang/300

Girder Spacing (mm)	Overhang (mm)									
	100	200	300	400	500	600	700	800	900	1000
1000	88.5	69.1	42.5	29.6	22.1	17.3	13.9	11.5	9.7	8.3
1200	61.4	59.2	36.9	25.9	19.5	15.4	12.5	10.4	8.8	7.5
1400	45.1	45.1	32.5	23.0	17.5	13.8	11.3	9.4	8.0	6.9
1600	34.6	34.6	29.1	20.7	15.8	12.6	10.3	8.6	7.4	6.4
1800	36.4	36.4	35.1	25.1	19.2	15.4	12.6	10.6	9.1	7.9
2000	29.5	29.5	29.5	23.0	17.7	14.2	11.7	9.9	8.5	7.4
2200	24.4	24.4	24.4	21.3	16.4	13.2	10.9	9.2	7.9	6.9
2400	20.5	20.5	20.5	19.7	15.3	12.3	10.2	8.6	7.4	6.5
2600	17.4	17.4	17.4	17.4	14.3	11.5	9.6	8.1	7.0	6.1
2800	15.0	15.0	15.0	15.0	13.4	10.8	9.0	7.7	6.6	5.8
3000	13.1	13.1	13.1	13.1	12.6	10.2	8.5	7.3	6.3	5.5
3200	11.5	11.5	11.5	11.5	11.5	9.7	8.1	6.9	6.0	5.3
3400	10.2	10.2	10.2	10.2	10.2	9.2	7.7	6.6	5.7	5.0
3600	9.1	9.1	9.1	9.1	9.1	8.8	7.3	6.3	5.5	4.8
3800	8.2	8.2	8.2	8.2	8.2	8.2	7.0	6.0	5.2	4.6
4000	7.4	7.4	7.4	7.4	7.4	7.4	6.7	5.8	5.0	4.4

Table 16: Allowable distributed Load (kPa), on a Bridgeply Panel with a Cantilever Overhang based on a deflection limit of Overhang/300

Girder Spacing (mm)	Overhang (mm)									
	100	200	300	400	500	600	700	800	900	1000
1000	132.7	132.7	132.7	132.7	96.5	63.5	44.4	32.4	24.4	19.0
1200	76.8	76.8	76.8	76.8	76.8	55.8	39.2	28.8	21.8	17.0
1400	48.4	48.4	48.4	48.4	48.4	48.4	35.2	25.9	19.7	15.4
1600	32.4	32.4	32.4	32.4	32.4	32.4	32.4	31.4	24.0	18.8
1800	30.3	30.3	30.3	30.3	30.3	30.3	30.3	28.8	22.1	17.3
2000	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	20.4	16.1
2200	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	15.0
2400	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
2600	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
2800	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
3000	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
3200	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
3400	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
3600	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
3800	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
4000	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8

Load Span Tables for Plywood Footbridges

Table 17: Allowable Concentrated Loads (kN) for F11 Plywood with a deflection limit of span/300

Construction Code	Span (mm)					
	300	400	450	600	800	900
19-30-7	5.3	3.0	2.3	1.3	0.7	0.6
21-30-7	7.4	4.2	3.3	1.9	1.1	0.8
25-30-9	11.4	7.9	6.3	3.5	2.0	1.6
27-30-9	13.2	9.8	7.7	4.3	2.4	1.9
33-30-11	18.7	14.0	12.5	7.6	4.3	3.4

Table 18: Allowable Distributed Loads (kPa) for F11 Plywood with a deflection limit of span/200

Construction Code	Span (mm)					
	300	400	450	600	800	900
19-30-7	58.1	32.6	25.8	14.5	8.1	6.0
21-30-7	65.6	36.9	29.1	16.3	9.1	7.2
25-30-9	80.5	49.5	39.1	22.0	12.3	9.7
27-30-9	87.0	56.9	44.9	25.2	14.2	11.2
33-30-11	106.3	79.7	64.0	36.0	20.2	15.9

Bridgeply Footbridges

The following load span tables are for 100mm Plywood made up of 3 layers of 33-30-11 Plywood.

Table 19: Properties of the Plywood

Variables	Value
I	44915mm^4 per mm width
Z	907mm^3 per mm width
Stress Grade	F11
MOE	10500MPa
Short Term MOE (0.75 x MOE)	7875MPa
F'b	31MPa
F's	5MPa

Table 20: Maximum Allowable Loads based on a strength limit state

Span	Maximum Concentrated Load (kN)	Maximum Distributed Load (kPa)
300	129.8	411.0
400	129.8	308.3
500	129.8	246.6
600	129.8	205.5
700	114.3	176.2
800	100.0	154.1
900	88.9	137.0
1000	80.0	123.3
1100	72.7	107.4
1200	66.7	90.3

Table 21: Maximum Allowable Loads based on a deflection limit of span/300

Span	Maximum Concentrated Load (kN)	Maximum Distributed Load (kPa)
300	877.7	3144.1
400	493.7	1326.4
500	316.0	679.1
600	219.4	524.0
700	161.2	330.0
800	123.4	221.1
900	97.5	155.3
1000	105.3	113.2
1100	87.0	85.0
1200	73.1	65.5

An economical alternative to complete bridge replacement.