A Modern Strategy for Municipal Infrastructure Projects

Utilizing New Structural Fiber Composites In A Harsh Florida Environment

Jon Hansen
Business Development Manager

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

What do you think of when you hear the word Fiberglass?

ITCHY!

How about the word Fiberglass Composites?

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Cool, But So 1900's

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

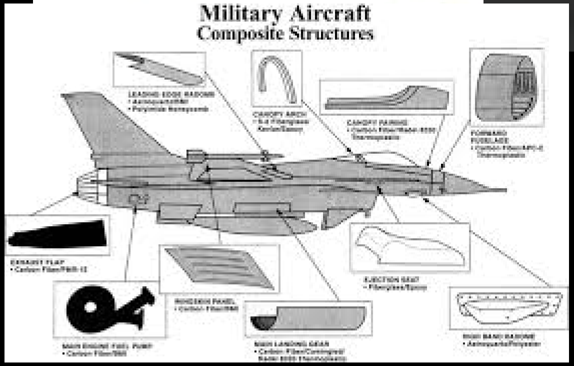
www.wagnerscft.com

Composites Today

Intertwining Science, Chemistry, and Engineering

- **Polymer Matrix Resins**
  - Polyester Resin
  - Vinylester Resin
  - Epoxy Resin
- **Fiber Components**
  - Glass Fiber (Many Variations)
  - Carbon Fiber
  - Basalt Fiber

Composites Today



BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

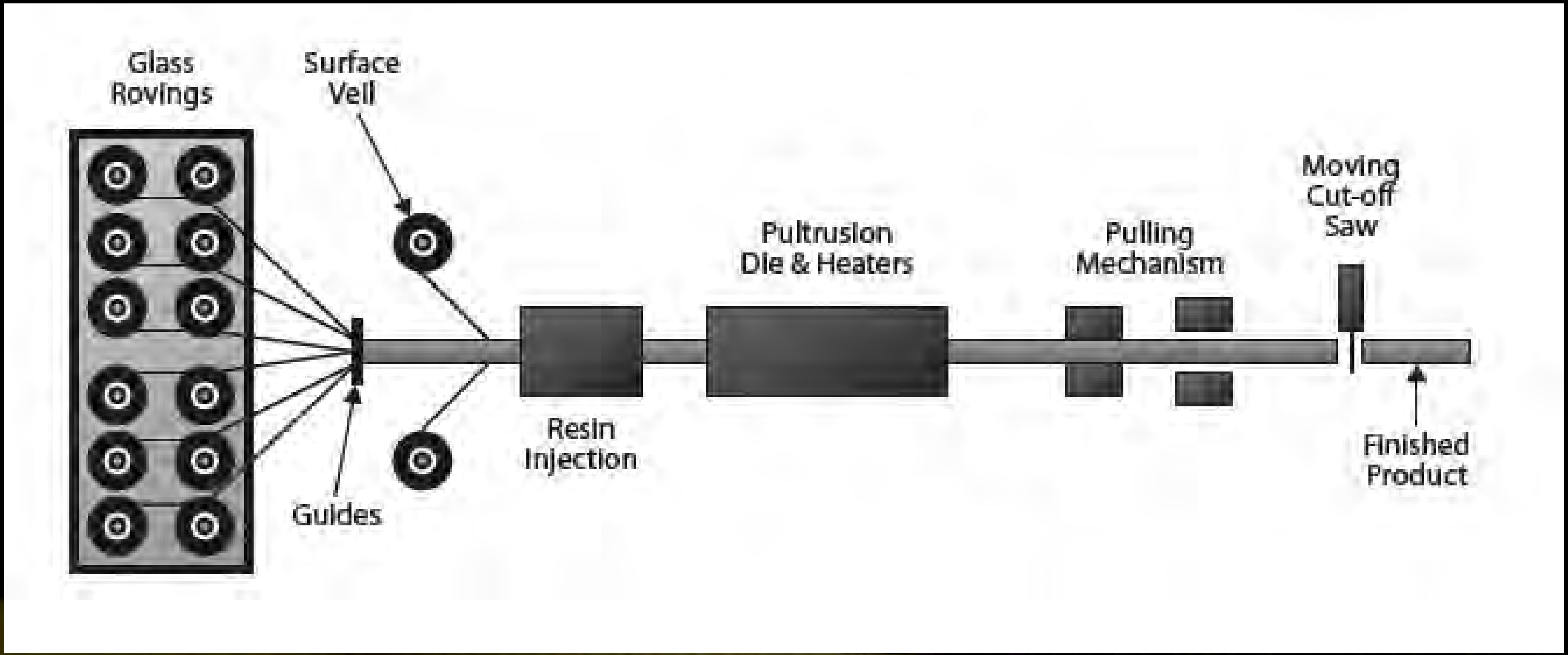
Composites Today

- **Today it has become the material of choice in Corrosive Locations and in applications Where Mass Matters.**
  - Desalinisation Plants (pipes / tanks)
  - Mineral Extraction
  - Aeronautical – originally NASA and now Airbus (A380) and the Boeing Dreamliner
  - Formula 1 (and now Audi / BMW etc)
  - Sporting Equipment

Pultruded Fiberglass
What is it?

Pultruded Sections

Pultrusion Process



Pultruded Sections

Wagners produces modular building components from which engineered solutions can be manufactured.

- 100x75x5 SHS (4” x 3” nom)
- 100x100x5 SHS (4” x 4” nom)
- 125x125x6.5 SHS (5” x 5” nom)
- 300x6 Flat (12” x ¼” nom)
- 300x24 Flat (12” x 1” nom)

Certified System ISO 9001

Bonded Sections

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Section Properties
Comparison with Steel and timber

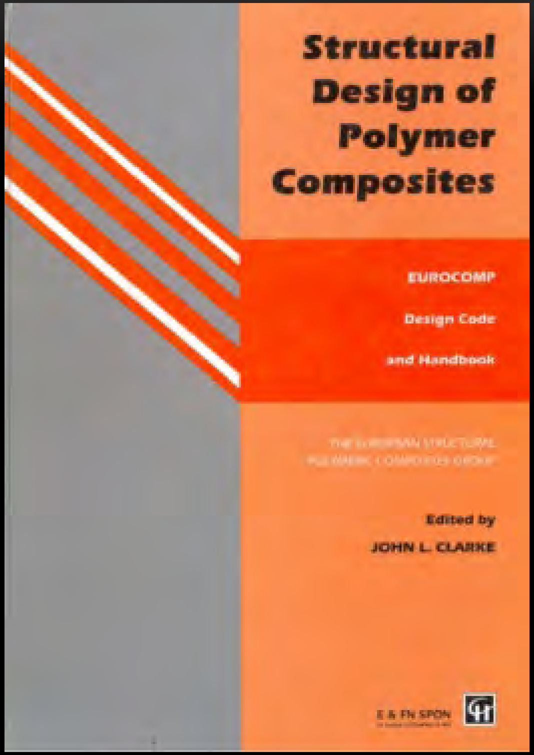
	CFT	Steel Gr250	Timber
Section	4” x 4” x 5.2 SHS	4” x 4” x 5 SHS	4” x 4” x F17
Mass (PSF)	0.82	2.9	1.8
Tensile strength Long (PSI)	88,473	59,465	4,351
Compressive strength Long (PSI)	70,343	50,763	7,252
Youngs Modulus E (KSI)	5,221	29,008	1,595

Lighter than timber – Stronger than steel !!

Material Properties and Testing

Design Standards

- Euro-Comp Code
  - European Polymeric Structural Composites Group
- factors evaluated based on process
- ASCE Pre-standard
  - for LRFD of pultruded fiber reinforced polymer structures – November 2010



Certified System ISO 9001

Testing Standards

All product from the pultrusion process is batch controlled, with batch testing undertaken. Batch testing results must be greater than allowable design values set from prototype testing.

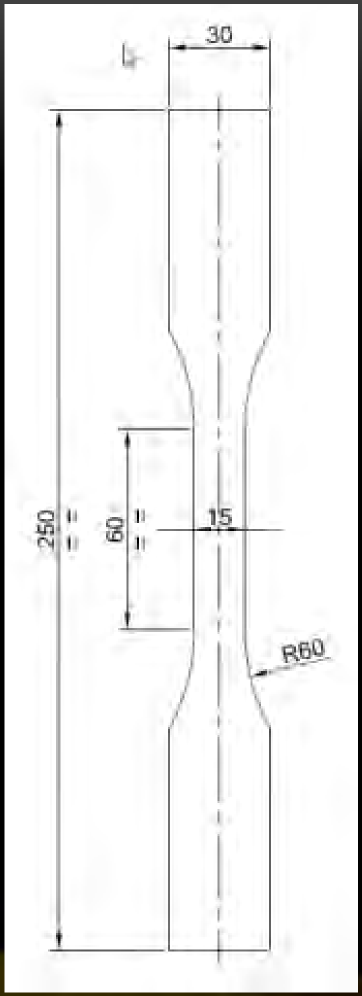
Tests include:

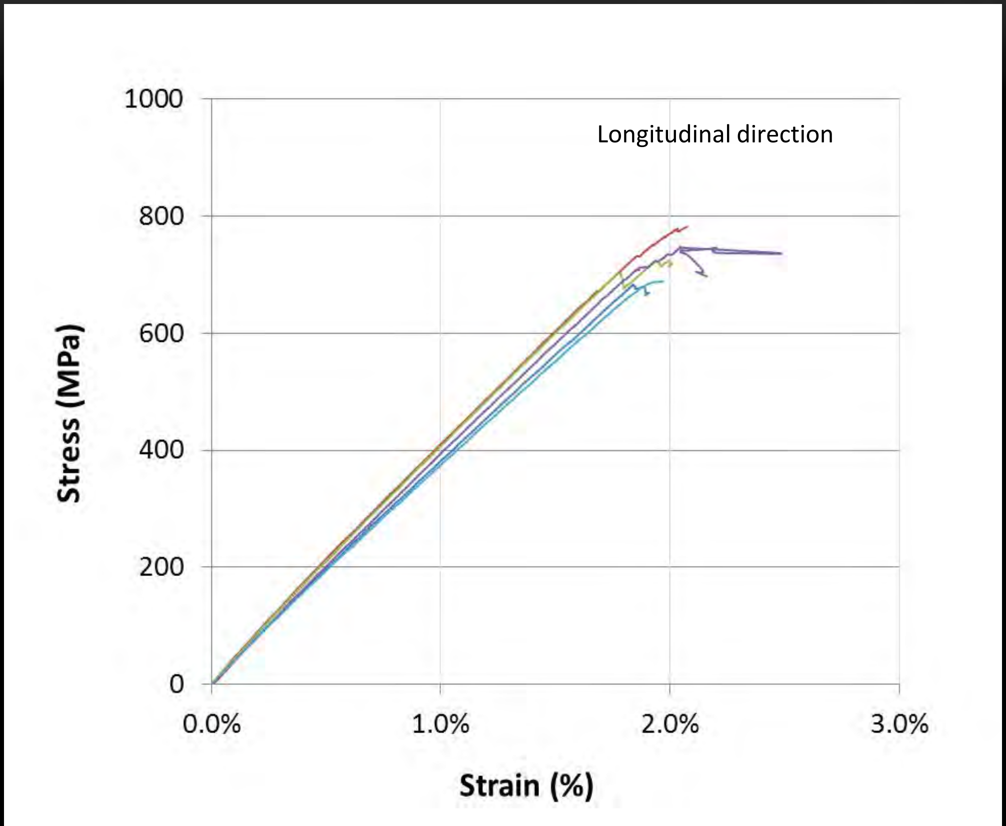
- Shear strength and modulus testing
- Tensile strength and modulus testing
- Compression strength and modulus testing
- Completeness of cure

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

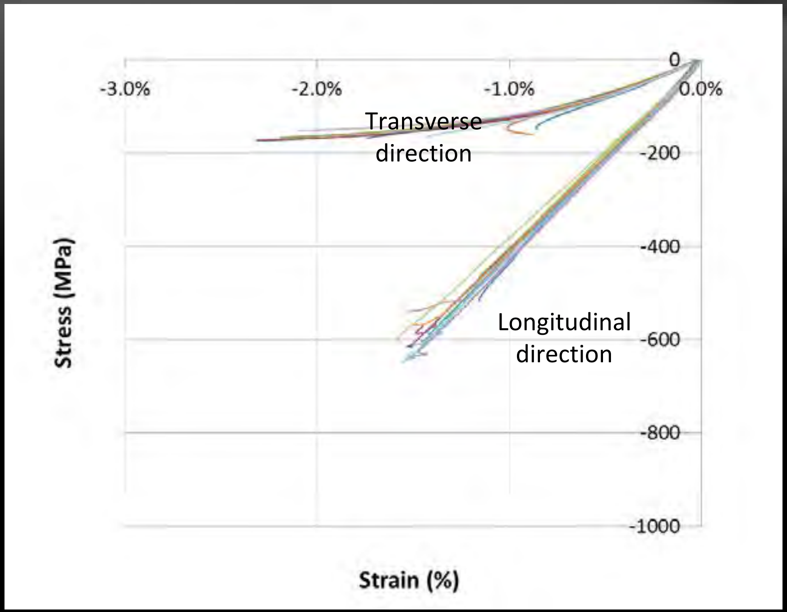
Tension

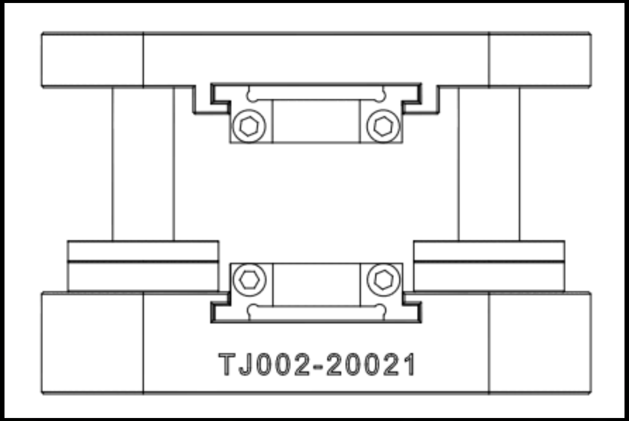




Certified ISO 9001

Compression





Wagners Pultruded Sections

WAGNERS

WAGNERS PULTRUDED FRP STRUCTURAL SECTIONS

PRODUCT SPECIFICATIONS

75x100x5, 100x100x5, 125x125x6.5 SHS

SECTION PROPERTIES

Designation			Radii		Gross Section Area	About x-, y- and n- axis					
Depth d	Width b	Thickness t	Internal r_i	External r_e	A_g	Moment of Inertia about the x axis I_x	Moment of Inertia about the y axis I_y	Elastic Section Modulus for bending about the x axis Z_x	Elastic Section Modulus for bending about the y axis Z_y	Elastic Section Modulus for bending about the n axis Z_n	Torsion Constant J
(mm)	(mm)	(mm)	(mm)	(mm)	(mm²)	(10^6mm⁴)	(10^6mm⁴)	(10^3mm³)	(10^3mm³)	(10^3mm³)	(10^6mm⁴)
100	75	5.25	4.75	10	1604.98	3.26	1.431	45.20	38.16		2.89
100	100	5.25	4.75	10	1851.88	2.86	2.86	57.20	57.20	42.83	4.65
125	125	6.5	4.75	10	3014.51	6.98	6.98	111.7	111.7	82.52	11.07

MECHANICAL PROPERTIES

Designation	Mass m	Density ρ	Ultimate Tensile Strength σ_t		Ultimate Compressive Strength σ_c		Shear Strength	Modulus Of Elasticity E		Moment Capacity M	
			Longitudinal	Transverse	Longitudinal	Transverse		Longitudinal	Transverse	X axis	Y axis
	(kg/m)	(kg/m³)	(Mpa)	(Mpa)	(Mpa)	(Mpa)	(Mpa)	(N/mm²)	(N/mm²)	(kN.m)	(kN.m)
100x75x5 SHS	5.28	1970	650	41	550	104	84	35400	12900	13.17	9.44
100x100x5 SHS	[illegible]	1970	650	41	550	104	84	35400	12900	17.74	17.74
125x125x6.5 SHS	5.94	1970	650	41	550	104	84	35000	12900	33.85	33.85

MATERIAL REDUCTION FACTORS

Material Partial Safety Factor	Short Term Loading	Long Term Loading
Load Multiplier	1.3	3.16
Material Reduction Factor	0.79	0.32

EUROCOMP Design Code and Handbook, Edited by John L. Clarke, 1st edition, 1996, Published by E & FN Spon, London SE1 8 HN, UK

REV A

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Characteristic Values

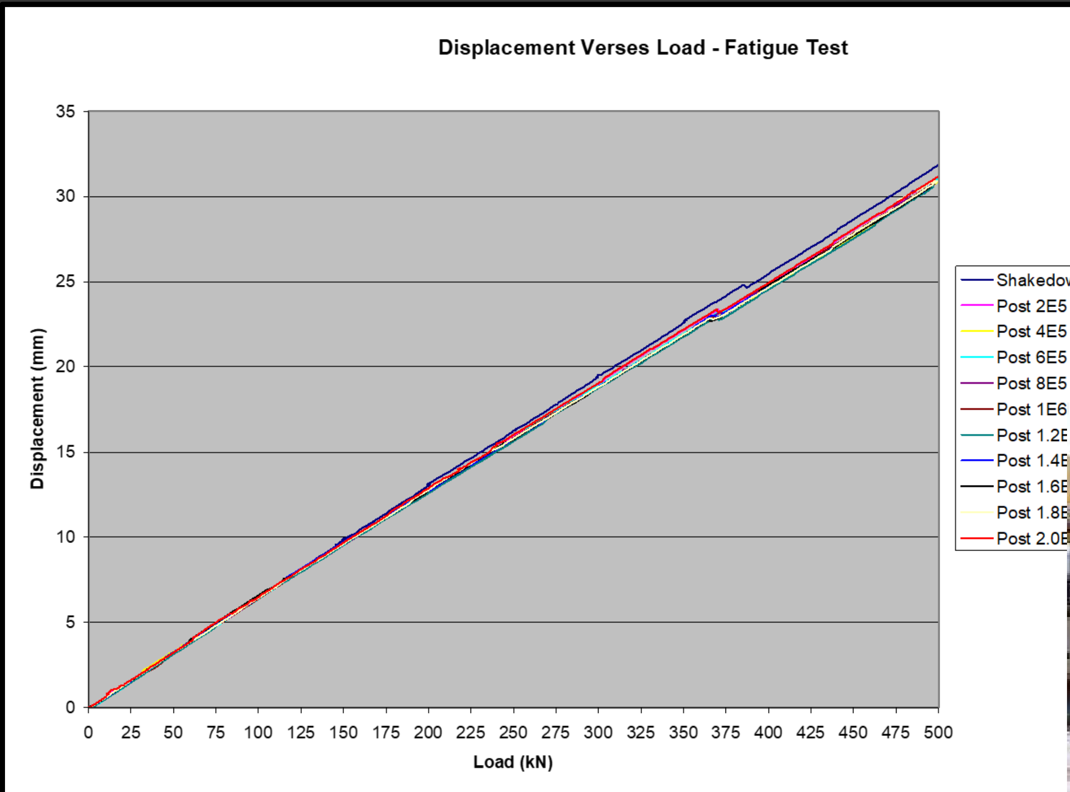
Property	Notation	Value	Unit	Test Method	PSI
Tensile Strength – Longitudinal	f_{Lt}	610	MPa	ISO 527-4	88,473
Tensile Modulus of Elasticity – Longitudinal	E_{Lt}	36300	MPa		5,264,870
Poisson's Ratio – Longitudinal	ν_L	0.28			
Tensile Strength – Transverse	f_{Tt}	55.0	MPa	ISO 527-4	7,977
Tensile Modulus of Elasticity – Transverse	E_{Tt}	10800	MPa		1,566,408
Poisson's Ratio – Transverse	ν_T	0.09			
Compressive Strength – Longitudinal	f_{Lc}	485	MPa	ASTM D6641	70,343
Compressive Modulus of Elasticity – Longitudinal	E_{Lc}	33300	MPa		4,829,757
Compressive Strength – Transverse	f_{Tc}	120	MPa	ASTM D6641	17,405
Compressive Modulus of Elasticity – Transverse	E_{Tc}	11600	MPa		1,682,438
In-Plane Shear Strength – Longitudinal	f_{Lv}	84.0	MPa	ASTM D7078	12,183
In-Plane Shear Modulus of Elasticity – Longitudinal	G_L	4280	MPa		620,762
Interlaminar Shear Strength	f_{lv}	44.0	MPa	ASTM D2344	6,382

NOTE: The values in the table are the characteristic values to be used for design in normal ambient conditions. It does not include adjustment factors to account for temperature, humidity, and chemical environments.

Composite Beams

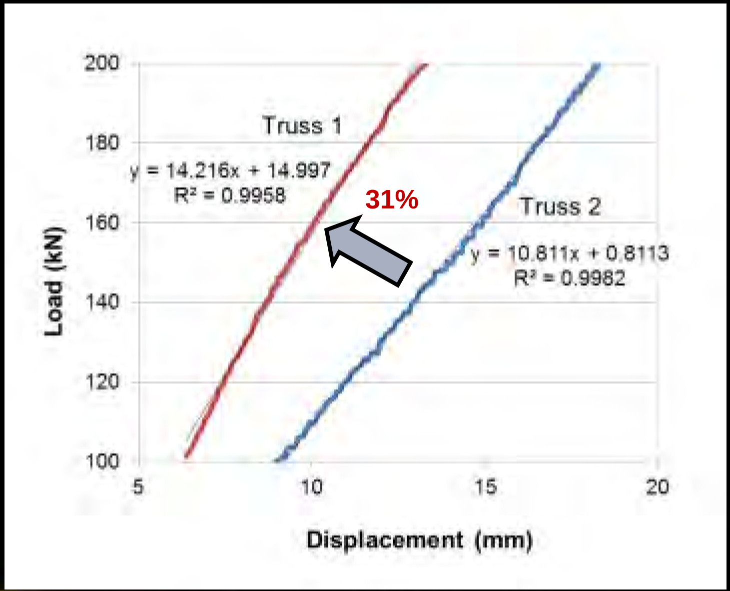
BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Testing Analysis - Fatigue



- 2 Million Cycles
- 4-Point Bending
- 2x 56,000 lb Point Loads (250kN)
- Average 1 ¼" Deflection (32mm)
- No loss of stiffness across test

Grout-filled truss (Comparative study)



ISO 9001

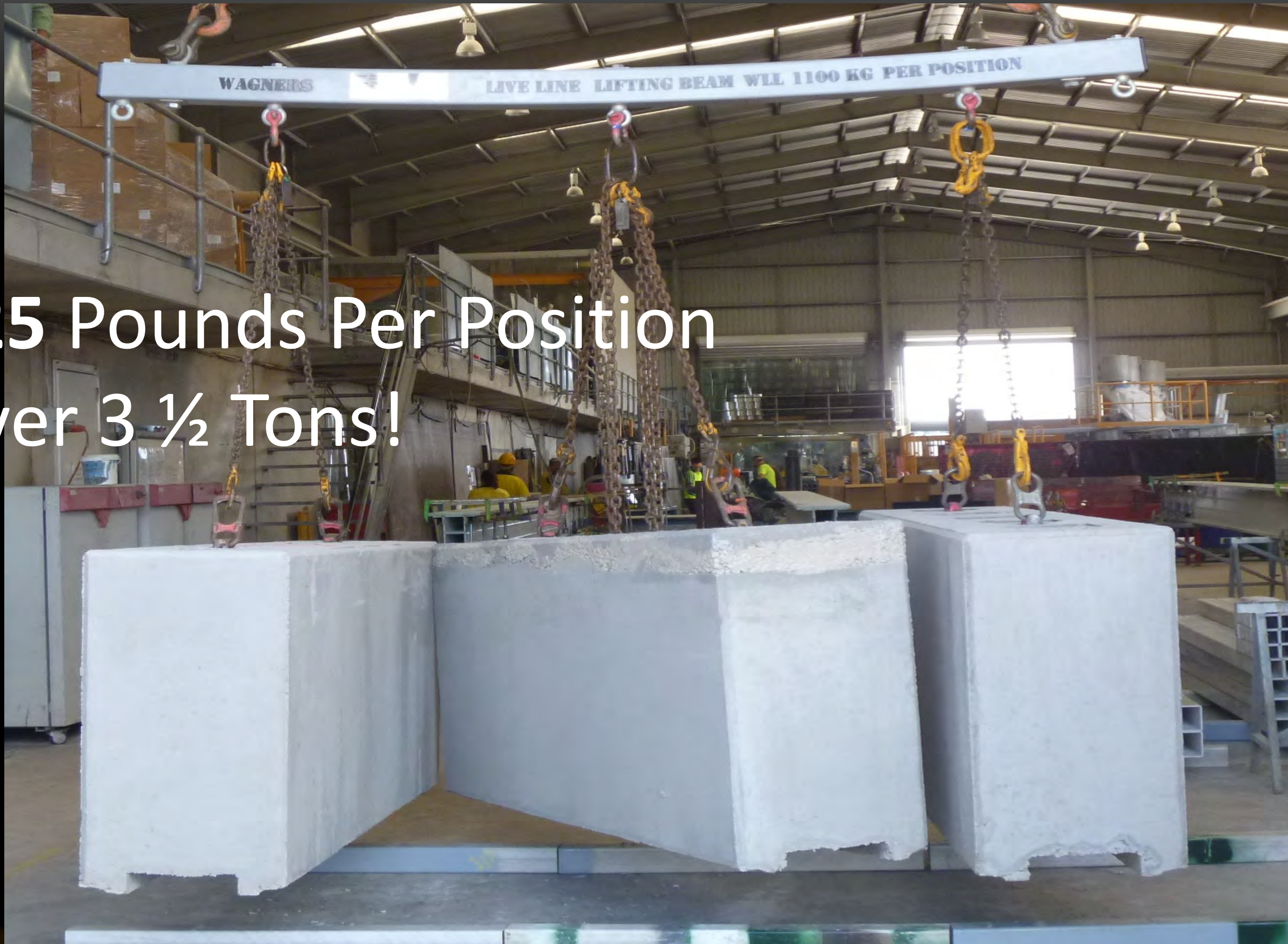
BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

	Section / Joint			
Chord	Top	Bottom	Brace	Vertical
Truss 1	250x125 BRB / Grout-filled	250x125 BRB / Glued insert		
Truss 2	250x125 BRB / Glued insert			

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Cross Arms – How Strong ?



2,425 Pounds Per Position

= Over 3 ½ Tons!

Certified System ISO 9001

Product Longevity

- 75 Years before any sign of Degradation – Unpainted
- Painted 100 Years Plus

- University of New South Wales Independent Testing

Paint and Finish

- Paint is Vitreflon V700

Manufacturers Warranty

- 25 Years Design Life to First Maintenance
  40 Years Expected Life
- Can Be Produced in Nearly Any Color
- Suggested Programmed Maintenance:
  - Every 2 years
  - Touch up where required
  - Zero on major for minimum 25 years

Certified System ISO 9001

Making Your Dollars Go Further

- **Longevity - Zero Maintenance:**

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Wagners Composite Fiber Technology

Ocala Aquafer Recharge Park Boardwalk (Under Construction)
Ocala, Florida

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Projects

Designing For Extreme Environments

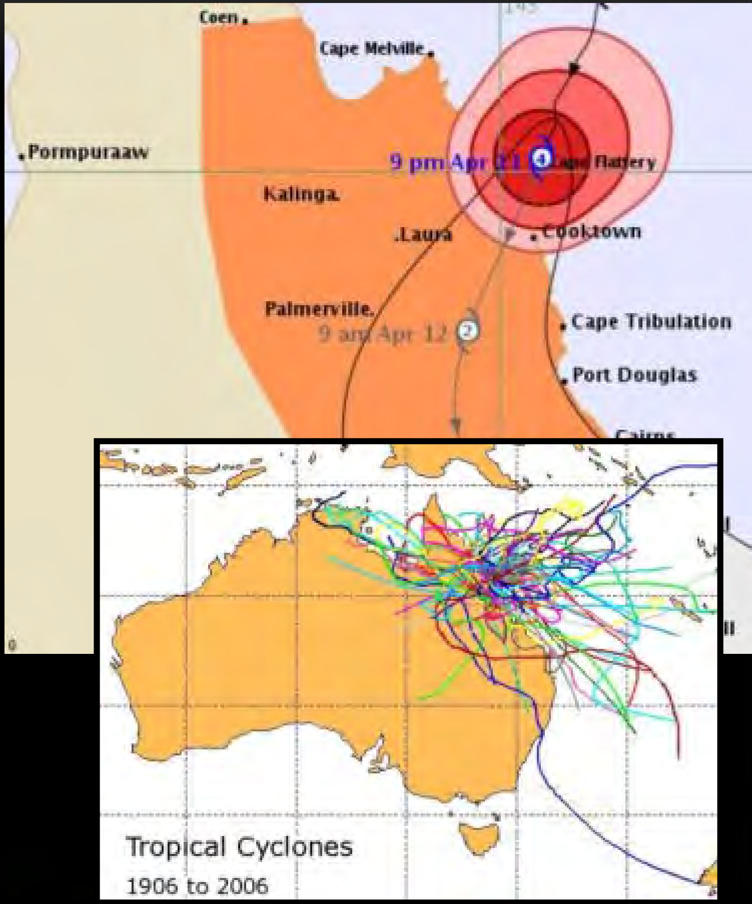
DfMA – Design for Manufacture and Assembly

Rehab of Cooktown Wharf, Australia

Designing For Extreme Environments

Design Considerations

Rehab of Cooktown Wharf, Australia



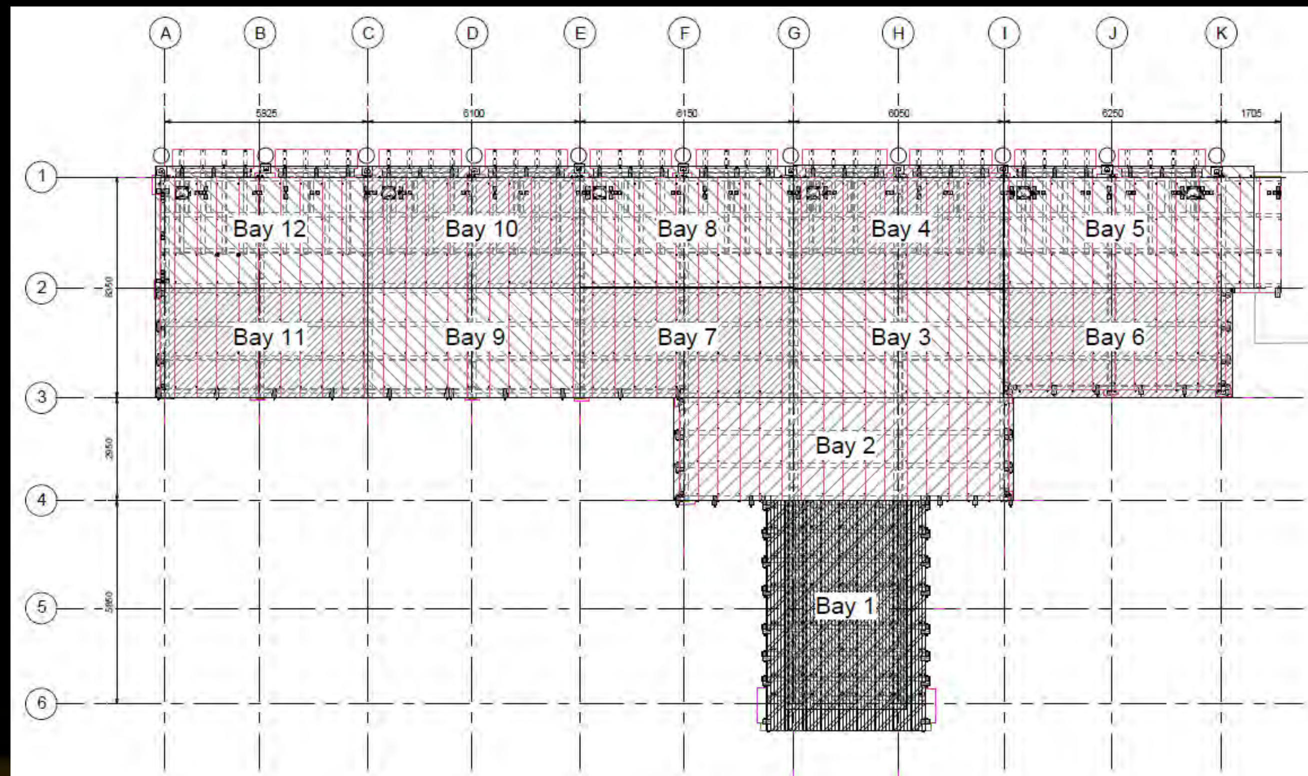
- Designed IAW AS4997 – Maritime Structures
- Environmental – Highly Corrosive exposed position
- Close proximity to Important Natural Habitats
- Use by Commercial operators and general Public
- Live Load – 24 ton Hino Truck (20kN on 150x150mm) and 5kPa
- Dead Load on existing piles – not to be increased
- Cyclone Rated – Wind Load and Wave uplift + Storm Surge
    - Wave Crest approx. ~20" above deck surface
    - Uplift Pressure across deck in storm surge ~150 PSF

Designing For Extreme Environments

DfMA – Design for Manufacture and Assembly

- Design allowed for ‘bays’ to be made in adjacent carpark, and lifted in with Cook Shire Councils Telehandler
- No requirement for Barge or Water Based Crane

Rehab of Cooktown Wharf, Australia



Road Bridges on a Single Trailer to Remote Locations

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Designing For Extreme Environments

DfMA – Design for Manufacture and Assembly

Rehab of Cooktown Wharf, Australia

Demolition of Wharf

Construction Sequence

1. Timber superstructure hold down bolts removed
2. Timber superstructure cut, lifted and removed

Designing For Extreme Environments

DfMA – Design for Manufacture and Assembly

Assembly of Bays

Rehab of Cooktown Wharf, Australia

Construction Sequence

1. Composite superstructure assembled on site

Designing For Extreme Environments

DfMA – Design for Manufacture and Assembly

Installation of Bay 1

Rehab of Cooktown Wharf, Australia

Construction Sequence

1. Composite superstructure lifted in

ISO 9001 Certified System

Designing For Extreme Environments

DfMA – Design for Manufacture and Assembly

Rehab of Cooktown Wharf, Australia

Installation of Bay 2

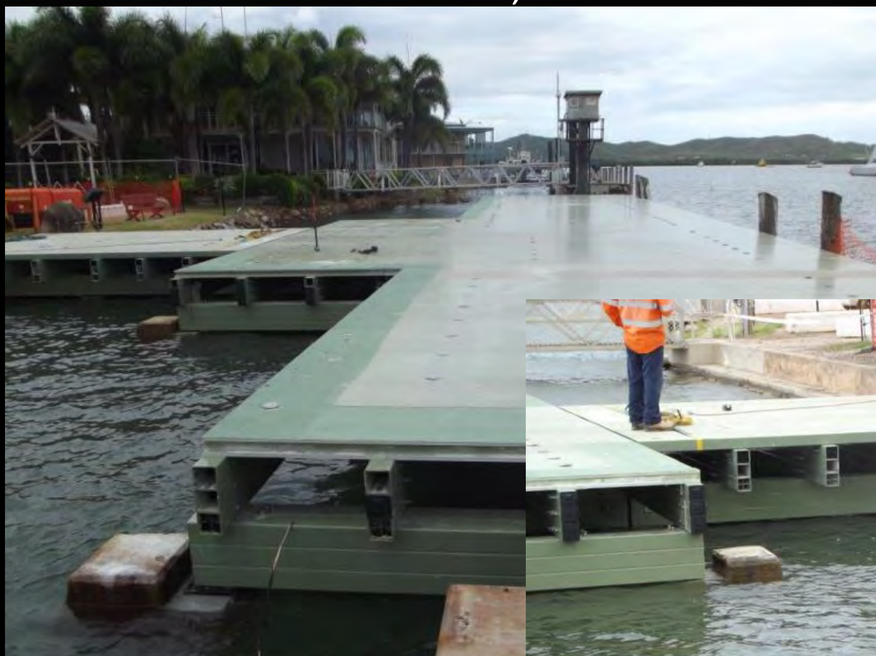
Construction Sequence

1. Composite superstructure lifted in
2. Install Deck
3. Drive on Composite Superstructure to remove next Timber Bay

Designing For Extreme Environments

DfMA – Design for Manufacture and Assembly

Rehab of Cooktown Wharf, Australia



Decking Completion

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Designing For Extreme Environments

DfMA – Design for Manufacture and Assembly

Rehab of Cooktown Wharf, Australia

Fender Installation (Piles By FenderTec)

Handrails and Light Post Installation

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Designing For Extreme Environments

Rehab of Cooktown Wharf, Australia

Completed Warf

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Boardwalk Project - Before

- Brisbane City Council – Freshwater Apartments Boardwalk

Boardwalk Project - During

- Brisbane City Council – Freshwater Apartments Boardwalk

Boardwalk Project - After

- Brisbane City Council – Freshwater Apartments Boardwalk

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Certified System ISO 9001

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

WAGNERS

www.wagnerscft.com

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Certified System ISO 9001

Anzac Walk – The Build

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

WAGNERS

www.wagnerscft.com

Arundel Wetlands Raised Boardwalks

ISO 9001 Certified System

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

BOARDWALKS | PEDESTRIAN BRIDGES| ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

Certified System
ISO 9001

WAGNERS
www.wagnerscft.com

ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

WAGNERS

www.wagnerscft.com

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

WAGNERS

www.wagnerscft.com

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

WAGNERS

www.wagnerscft.com

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

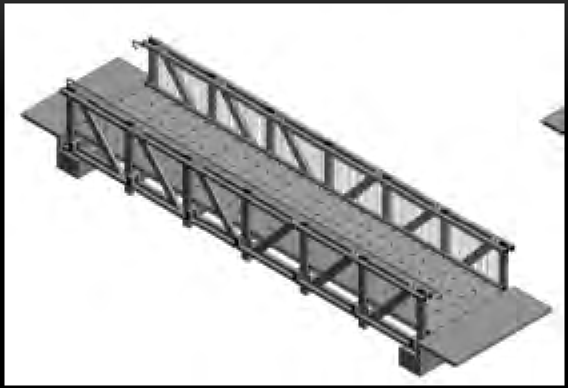
WAGNERS

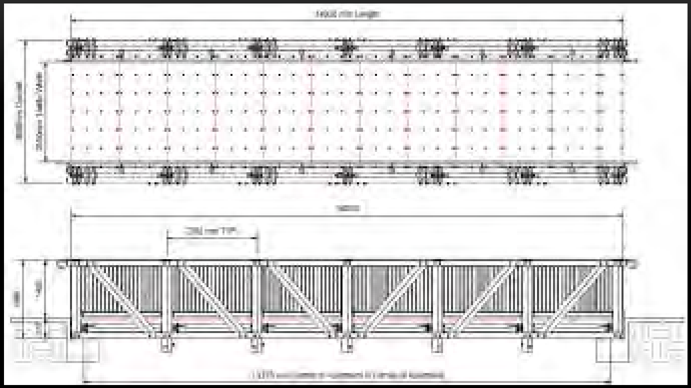
COMPOSITE FIBER TECHNOLOGIES

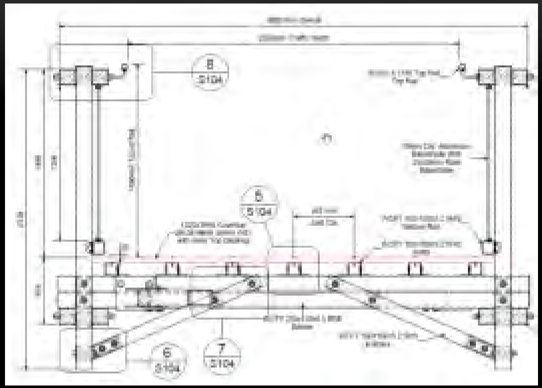
WAGNERS

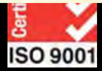
www.wagnerscft.com

Clewley Park Footbridge









BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

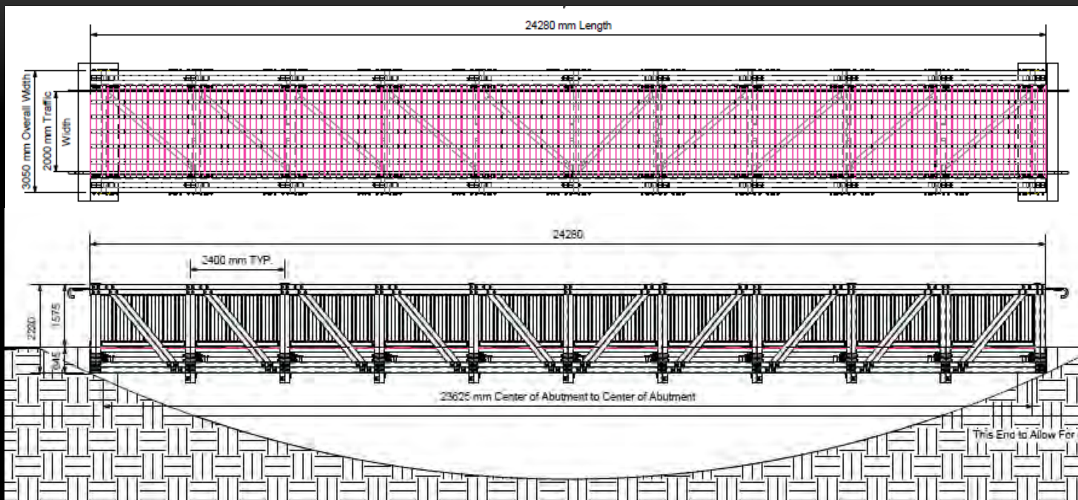
www.wagnerscft.com

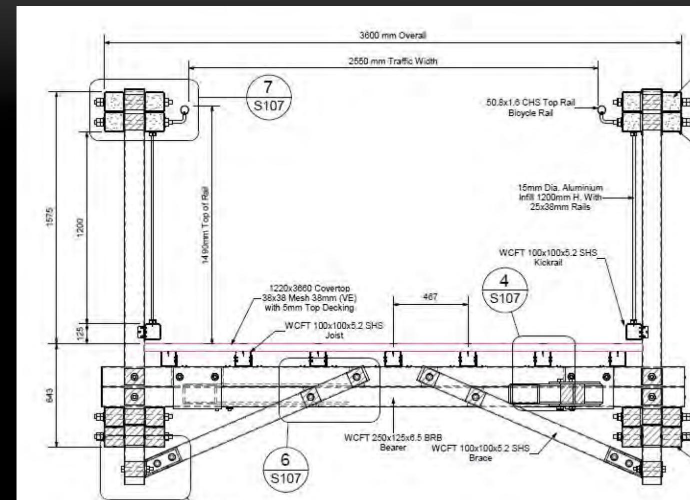
WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Stage 2 - Mercy Footbridge replacement





BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Certified System ISO 9001

Dunlin Road – Burleigh Waters

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Suggested
Programmed Maintenance on Pedestrian Structures

Zero for 25 Years

Certified System ISO 9001

Shelters

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Certified System ISO 9001

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com


Cattana Wetlands

Rottnest Island

BOA ONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

Certified System ISO 9001

www.wagnerscft.com

Stairs – Shelly Beach

BO S

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

9001

www.wagnerscft.com

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

Certified System ISO 9001

www.wagnerscft.com

Boardwalk with a Difference

BOARDWALKS | PEDESTRIAN BRIDGES| ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

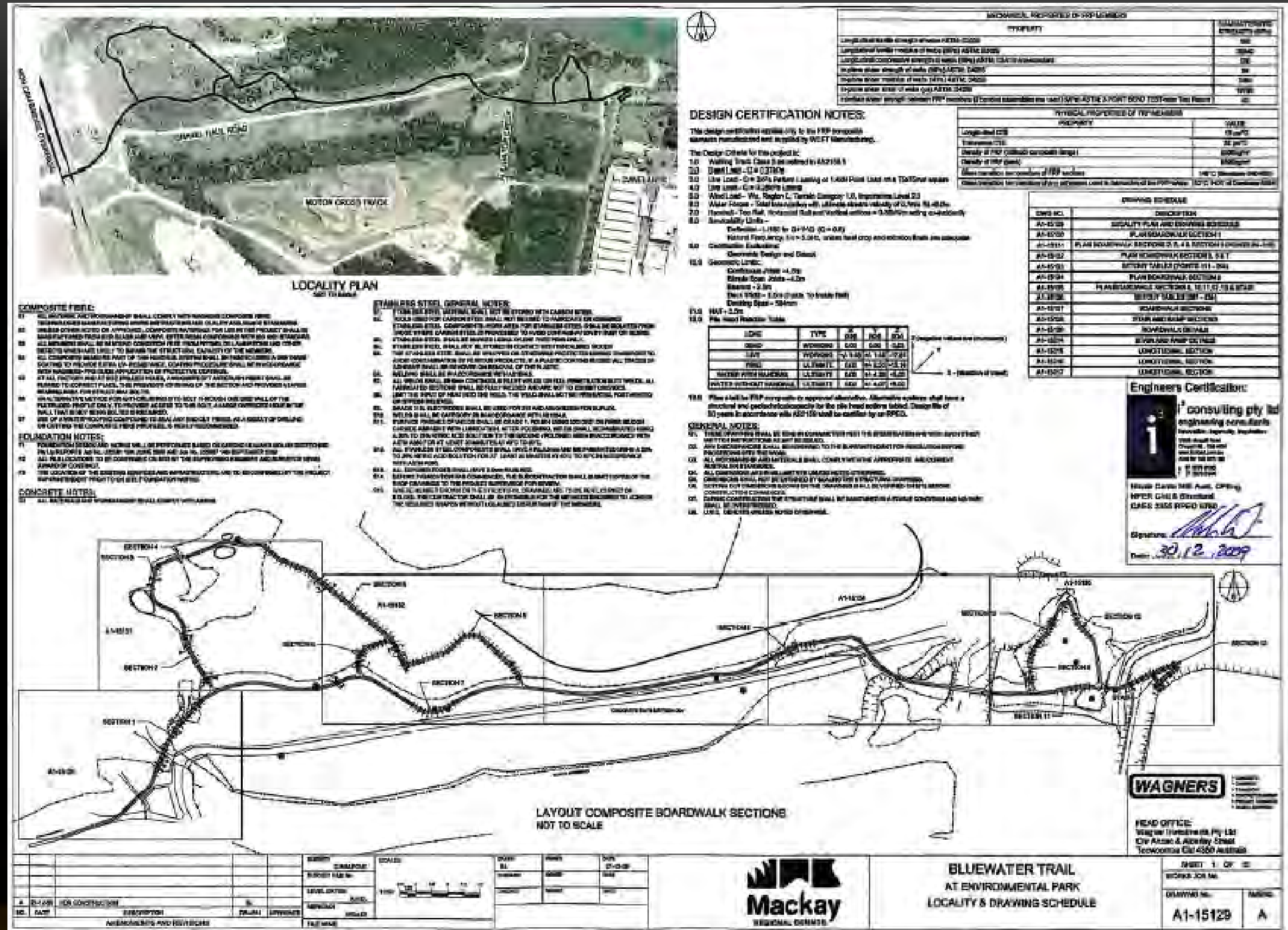
WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Trail Project – Forest Walk

Bluewater Trail Environmental Park



BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Trail Project – Forest Walk

- Bluewater Trail Environmental Park

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Trail Project – Forest Walk

- Bluewater Trail Environmental Park

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Trail Project – Forest Walk

- Bluewater Trail Environmental Park

Certified System ISO 9001

Trail Project – Forest Walk

- Bluewater Trail Environmental Park

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Pedestrian Bridges Over Difficult Locations

ISO 9001 Certified System

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Pedestrian Bridges over difficult locations

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Certified System ISO 9001

Pile Driving Techniques

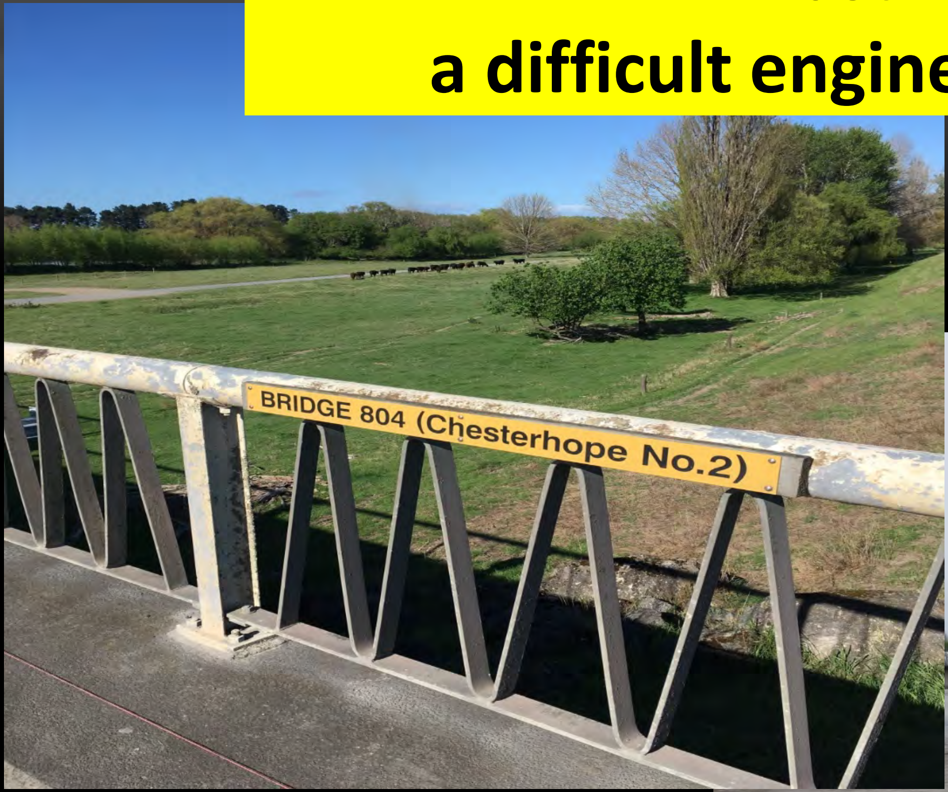
Larger Equipment

Small Equipment

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Hastings NZ
a difficult engineering challenge



The Requirement
1500 LF of Clip on Pedestrian Cycleway

ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Shipped to NZ, Pre Cut – Pre Drilled ready for assembly by local contractor RED STEEL – Napier NZ

Certified System ISO 9001

Assembled by RED STEEL – Napier NZ

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Hastings - New Zealand
Chesterhope Bridge Cycleway Upgrade

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Certified System
ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

ISO 9001 Certified System

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Certified System ISO 9001

BOARDWALKS | PEDESTRI

RVES, JETTIES & PONTOONS

Certified System ISO 9001

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

BOA ONS

BO... ...NS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

ISO 9001

Road Bridges

Road Bridge Replacement

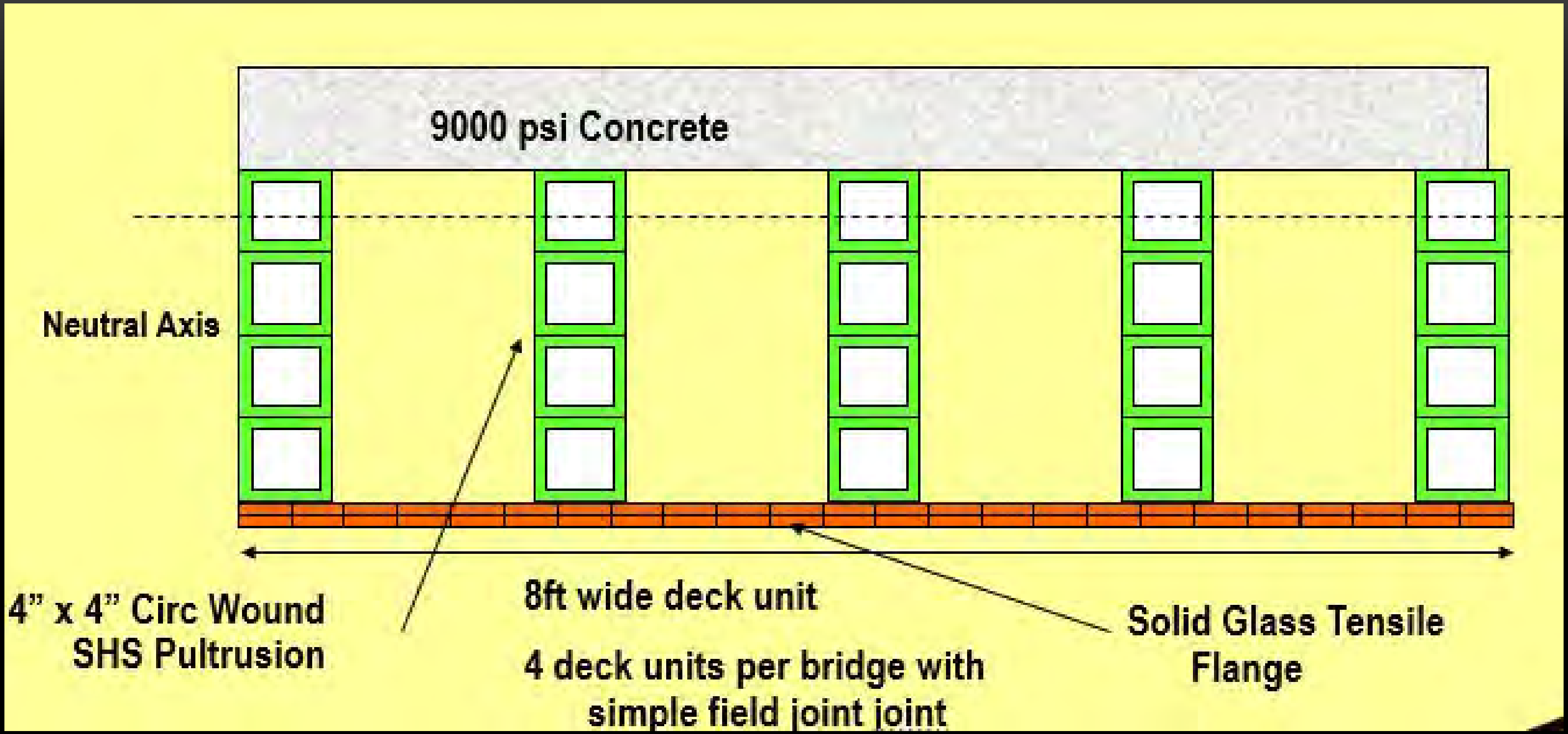
- Wagners through R+D and IBRC Funding Supplied 5 Bridge Decks between 2004 and 2008.
- Each Bridge had its own challenges
  - New Oregon Road, Erie County, NY
  - Collins St, City of Hornell, NY
  - Bemus-Ellery Road Bridge, Chatauqua County, NY
  - English Run Road, Lycoming County, PA
  - PR-139 Bridge over Ausobo Creek, Ponce, Puerto Rico
- Each Bridge also went through the same Design / Validation Process
  - Proposed Section
  - Grillage Analysis
  - FEA Modelling
  - Prototype Manufacture and Testing
  - Manufacturing

New Oregon Road – Erie County

- Erie County Department of Public Works oversees 1200 lane mile of road, upon which 24 feet of snow falls every year. The county dumps 96,000 tons of de-icing salts on their roads each year.

Certified System ISO 9001

Proposed Section



- AASHTO HS25 Design Vehicle
- L/500 allowable deflection under Live Load

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Today in NY

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Results of Observations

After 13 years of service the following observations are made:

- No deck surface deterioration
- No Corrosion of FRP materials
- No Structural failures
- No damage from debris (underside)

Conclusion –

FRP Materials are living up to the reputation!

Certified System ISO 9001

Bridge Replacement

Manly Road Bridge

- Bridge Sections Shipped To Site And Set Into Place

Bridge Replacement

Manly Road Bridge

- Completed

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS

COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Bridge Replacement

Built In Place

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Bridge Replacement

Built In Place

Certified System ISO 9001

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Bridge Replacement

Built In Place

ISO 9001 Certified System

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

WAGNERS
COMPOSITE FIBER TECHNOLOGIES

www.wagnerscft.com

Bridge Replacement

Built In Place

BOARDWALKS | PEDESTRIAN BRIDGES | ROAD BRIDGES | VIEWING PLATFORMS | WHARVES, JETTIES & PONTOONS

Key Takeaways

100 year Design Life

+ 25-40 Years of low/ no maintenance

= Substantial ROI in about 10 years.

- Lightweight Materials Mean Lower Structure Cost And Lower Construction Costs
- Inert Materials = Zero Environmental Effects

Key Takeaways

Fiscally Responsible:

- 1:5 Ratio for replacement
  - Over a 100 year period, conservatively you will replace a wood boardwalk 5 times or every 1 boardwalk built with Fiberglass.
- Manpower:
  - Skilled crew and/or budget required for ongoing maintainance and replacement of deckboards, railings, pilings, etc.

Key Takeaways

Bottom Line:

Change your mindset and the mindset of your team.

Material longevity and lifecycle cost savings need to be considered when the opportunity for replacement arises.