sustainable infrastructure systems

Featured Case Studies

Pedestrian Structures

V2 / Release Date 1/7/2017

Introduction

SIS is a unique organisation focused on manufacturing and distributing sustainable and recycled products for diversified clients around the world. From recycled plastic, recycled wood plastic composites (WPC), fibreglass reinforced plastic composites (FRP) and recycled rubber through to co-extruded multi-composites and OEM manufacturing, SIS are market leaders in delivering sustainable products to customers in Civil Infrastructure, Building & Construction, Oil & Gas, Mining, Aviation, Aquaculture, Marine & Ports, Transport & Logistics and Agriculture.

Drawing on a strategic distribution capability with offices in Adelaide, Melbourne, Sydney, Brisbane, Shanghai, Shenzhen, Hong Kong and Los Angeles, SIS has manufacturing facilities in Australia, the People's Republic of China and North America. Our company is financially strong, total quality oriented, technically advanced, and customer focused. We specialise in the development and manufacture of high quality sustainable products. We utilise a holistic project management approach to ensure the best results and measured success of each project. We understand the importance of product and project planning, consultation, analysis, management, communication and support.

We have an agile business environment and utilise a global team of highly experienced developers, manufacturing facilities, builders and support crew who can best meet our client's requirements under any given circumstances. Our strategy is founded on diversification – by product, geography and market. To succeed, we have in place a workforce that reflects our values and the communities in which we operate. We recruit from our host communities, to attract high calibre people who are committed to the success of our organisation and thrive on working in high performing teams. We are committed to developing the skills and capability of our people and believe this, underpinned by our tier one resource base, is what differentiates us from our competitors.

Sustainable infrastructure is not just about new infrastructure; it is about rehabilitation, reuse or the optimisation of existing infrastructure, which is consistent with the principles of sustainability and sustainable product development, whether it be from civil infrastructure to mining sectors. This encompasses infrastructure renewal, long-term economic analysis of infrastructure, energy use and reduced infrastructure costs, the protection of existing infrastructure from environmental degradation, material selection for sustainability, quality, durability and energy conservation, minimising waste and materials, the redesign of infrastructure in light of climate change and the remediation of environmentally damaged areas of our world. Clearly, sustainable infrastructure will lead to improvements to mankind through better socio-economics. Responsible design needs to balance social, economic and environmental issues.

SIS aims to set a responsible standard of sustainable product design and manufacture for our diverse client base in both the short and the long term. We all have a significant impact on the world around us and each of us should play a part in protecting future generations. Designers, engineers and planners have a big responsibility to set standards of product design that benefit the environment and the people who live in it. SIS's aspiration is that ultimately, talking about sustainability will become superfluous, because it will be the expected.

Materials

CORESpan™ represents the latest in pultrusion and extrusion technology. SIS pioneered this revolutionary product for Australian clients who demanded the look of timber through the use of WPC (Wood Plastic Composite) but required far greater strength than just WPC alone. SIS's **CORESpan™** fabrication technology allows a WPC member to be extruded with a FRP (Fibre Reinforced Plastic) inner core making it a multi-composite extrusion. The use of FRP increases strength to hollow WPC sections from 122% to 600% depending on the wall thickness of the hollow FRP internal member used. Member strength requirements are ultimately determined by our client's needs, and the end use of the member. **CORESpan™** has the look and feel of WPC but with the hidden added benefit of strength. This state-of-the-art manufacturing process has been mastered by SIS to deliver zero delamination of the external surface, nor will it rot, split, crack, rust, attract vermin and is non-permeable.

StructuralComp™ FRP (Fibre Reinforced Plastic) is manufactured using only the very best materials guaranteeing stakeholders superior corrosion resistance, product quality, permeated colour and long term overall performance. In most cases, **StructuralComp™** represents the best material to handle any given service environment given our ability to manufacture using specific resin components. It's corrosion resistance combined with strength and extended design life, compared to more traditional materials, makes it the most economical and acceptable solution available today for the construction of pedestrian structures. With a choice of colours and the ability to manufacture to specific fire ratings & codes, **StructuralComp™** FRP is the material of choice for designers, specifiers and installers and is available in three different resin series, each with their own associated benefits. Another distinct advantage of **StructuralComp™** FRP is its low weight-to-strength ratio. Depending on lay-up structure, **StructuralComp™** FRP can weigh approximately 20% of that of steel, and half as much as aluminium. **StructuralComp™** FRP is also non-permeable nor will it conduct electricity making it one of the best materials to specify for the construction of bridges, boardwalks and viewing platforms.

SISCo-FC™ - Construction Systems for Composite are a component driven, out of the box system which is pre-designed and certified using SIS materials including FRP, WPC and Multi-Composite extrusions and pultrusions. Designed and developed using over 15 years of resin based construction expertise, this unique customised system eliminates the need for costly cutting and drilling of components on-site and dramatically reduces waste from these actions. Lightweight component properties allows for better manual handling, reduces the risk of WH&S incidents and prevents the need for large, costly lifting equipment to be used at installation. **SISCo-FC™** construction systems take cost effective material, use clever design to deliver stakeholders superior pedestrian structures with a superior design life compared to structures built from more traditional materials.

Manufacturing



Products designed, manufactured and supplied by SIS embody state of the art technology and are engineered by our teams to deliver enhanced performance and sustainably effective operation for customers worldwide. All our products are manufactured to the highest industry standards, following strict quality assurance guidelines. With many employees dedicated to production, quality product and technical expertise is ensured at all times. Excellent long term relationships with our key suppliers of raw materials and components provide confidence in material quality as well as sustainable and efficient manufacturing and supply chain processes.

The close relationship with our research and development division ensures that SIS manufacturing teams can react quickly and professionally to customer needs. SIS has built a reputation based on excellent customer service, high quality manufacturing and on providing the right solution in sustainable product design and manufacturing. Continuous improvement of equipment design, materials and manufacturing technology ensures SIS maintains its capability of offering clients the latest and most commercially viable sustainable products available. SIS also works with clients to develop specific solutions to meet their unique needs through the application of research and development efforts in a partnering relationship.

We manufacture and supply products from materials that include:

- Recycled Plastic
- Recycled Plastic Panel
- Fibreglass Reinforced Plastic
- Recycled Wood Plastic Composite
- Recycled Rubber
- Aluminium / Recycled Plastic Composite

With a global network of offices and manufacturing facilities, along with projects in Africa, the Middle East, Asia, Australia and the Pacific Rim, SIS can be trusted to provide easy, efficient and seamless supply to almost all places on earth.

ISO 9001:2008
BUREAU VERITAS
Certification

Design, Engineering & Project Management

You may choose SIS for just material manufacture and supply, or project management as well. Either way, you can be guaranteed of superior customer service and on-site support throughout any project. Our structures team were responsible for the design and construction of the first wholly composite boardwalk and wholly composite bridge installed in Australia and can construct pedestrian structures from ground up or can complete a simple retrofit to an existing sub-structure.

Our project management team is well established, reputable and award-winning and have acquired significant experience undertaking a wide range of design and construction projects including those in rural and remote locations. We provide a professional, quality service in commercial construction with all works completed with integrity and professionalism. Having consistently demonstrated a strong work ethic, quality and commitment to all works we undertake, SIS is trusted on a National level to carry out an ever growing variety of works requiring innovation and a sustainable outlook. We understand the importance of meeting milestones and completion dates, and strive to achieve all agreed requirements. We are committed to building relationships with our clients, which has ensured our growth and an award-winning reputation as a quality civil installation company.

Our experience and broad skill-set give us the expertise required to complete challenges such as restricted time-frames and remote locations.

We stand by to assist both the public and private sectors deliver pedestrian structure projects on time, on budget and with minimal disruption the people and places around them. Contact us on 1300 261 074 to discuss your project.

Project Showcase

Pedestrian Structures

Recent Projects












SISCo-FC construction systems for composite
BRIDGES | BOARDWALKS | VIEWING PLATFORMS

StructuralComp
FIBRE REINFORCED PLASTIC COMPOSITE

Project Showcase

Pedestrian Structures

Recent Projects












SISCo-FC construction systems for composite
BRIDGES | BOARDWALKS | VIEWING PLATFORMS

StructuralComp
FIBRE REINFORCED PLASTIC COMPOSITE

Project Showcase

Pedestrian Structures

Recent Projects












Case Study, Cantilevered Deck Design & Construct

PROJECT:	Prince Alfred College Rowing Deck
PROJECT TYPE:	Cantilevered Deck Design & Construct
CLIENT:	Adelaide City Council
STATE:	South Australia

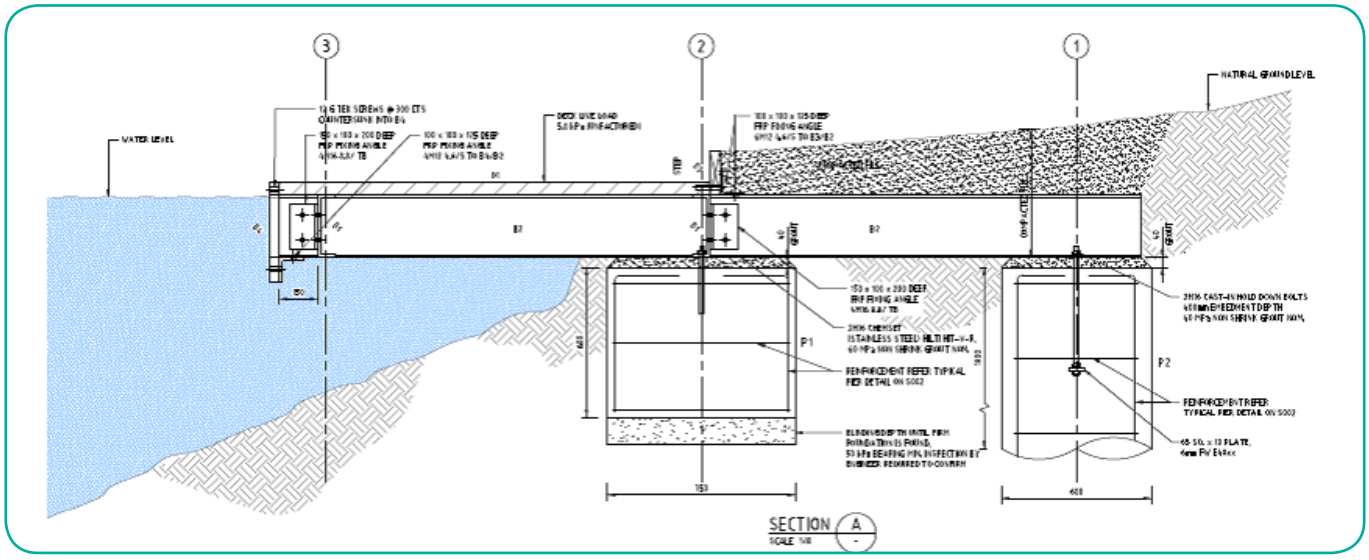
The structures team at SIS have been constructing boat decks along Adelaide's River Torrens for the Adelaide City Council for many years. When Prince Alfred College, who's deck is located adjacent the Adelaide University Footbridge, required a new boat landing to be constructed, SIS were chosen as head contractor after an open tender process was completed by Council. This project was a full design & construct which included the removal of the existing timber and steel deck.

Case Study, Cantilevered Deck Design & Construct

A project team was assembled and key control areas identified and allocated after in depth consultation with Council. A geotechnical investigation was undertaken and comprised of service locating and subsequently drilling a single borehole to 12m. SPT testing was carried out at 1.5m centres beginning at 2m below existing surface with the borehole being terminated at 10m. Soil samples were logged by Visual-Tactile method as described I AS1726 Site Investigation Code. The subsurface profile encountered meant that original plans to pile drive were aborted and SIS engineers worked to provide a pier footing design to reduce costs and lengthy time delays in manufacturing extended piles. The end result was a cantilevered deck design with subsurface superstructure.

After close consultation with SIS designers, Council selected a combination of our StructuralComp™ Fibre Reinforced Plastic and Recycled Wood Plastic Composite components based on product integrity, quality and value for money and the materials ability to withstand harsh environments over a 70-80 year design life. Stakeholder requirements presented to SIS included a finished deck height of 60mm above normal river level, a non-slip surface, a front fascia board which would not mark or damage rowing boats and a project delivery timeline which meant rowing could continue between seasons.

The structures team were excited to take on the design and construct of the new deck given the complexities of the river bank. Challenges such as underwater concrete pouring and sub surface construction meant that our installation team were required to have all componentry drilled and cut to exact specifications for under water assembly.



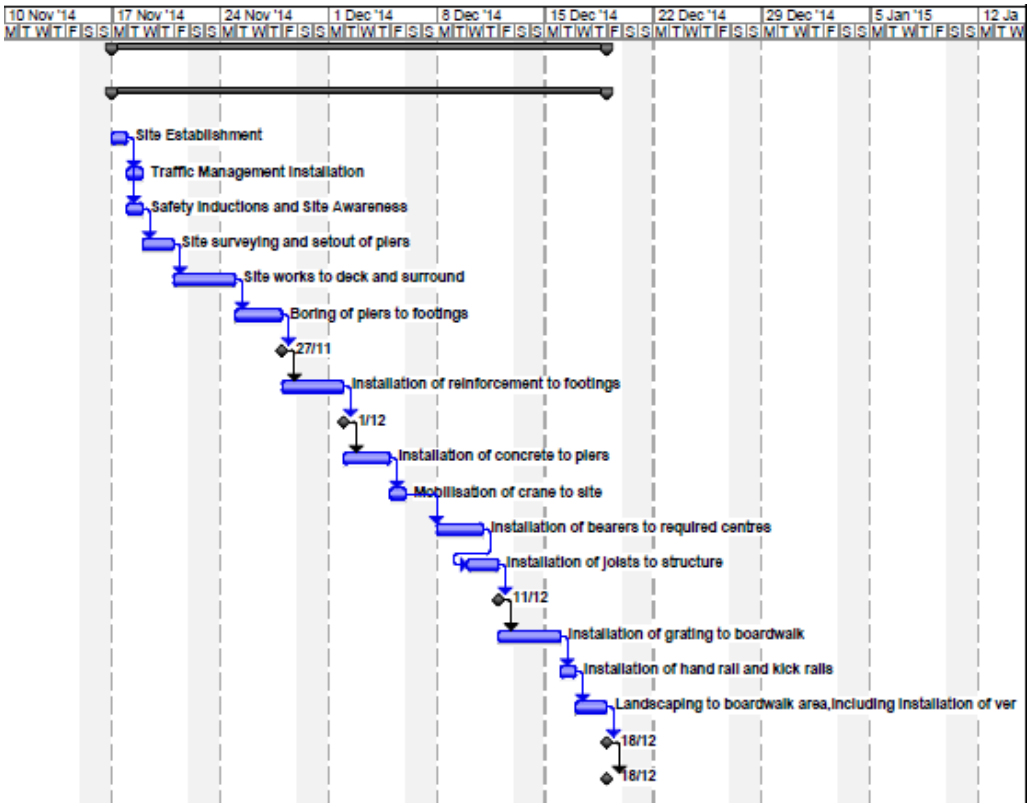
Case Study, Cantilevered Deck Design & Construct

Testimonials

I have worked with the structure's team for many years on composite bridges in our parklands and boat landings and decks along the River Torrens, so when it was time to remove an existing structure followed by the design and construct of another, SIS were a clear choice. Council have chosen composites now for many years given their advantages over more traditional materials, such as performance, aesthetics and green credentials. SIS were head contractor on this project which involved full design and engineering, which was challenging to say the least. Full credit goes to SIS for coming up with an innovative cantilevered design which required precision engineering and sub surface (water) installation.

Steve Stefanopoulos
Project Manager – Capital Works
Adelaide City Council

Project Construction Program



Case Study, Cantilevered Deck Design & Construct

Project Progress Photos












Case Study, Footbridge Retrofit Design & Supply

PROJECT:	Evan Walker Footbridge, Southbank
PROJECT TYPE:	Footbridge Retrofit Design & Supply
CLIENT:	City of Melbourne
STATE:	Victoria

The City of Melbourne approached SIS to assist in finding a solution to the on-going issues associated with the deck surface on the Evan Walker Footbridge, which accommodates up to 10,000 pedestrians per day. Originally constructed in 1992, the bridge is located on Southbank, Melbourne and carries people from Flinders Street Station across to the popular Southbank precinct. The structure consists of 3 spans, is 130m in length and had been retrofitted in 2006 with a prefabricated 70mm x 45mm dressed Merbau timber with a 50mm slip resistant rebated infill in the top trafficable surface. By 2015, the 700m^2 deck had shown significant wear and was no longer delivering the level of slip resistance required. Council had also decided to

Case Study, Footbridge Retrofit Design & Supply

replace the original timber joists given the deck was to come off the structure during the upgrade.

New age materials such as our StructuralComp™ FRP and better testing methods meant that the City of Melbourne were given a large scope of SIS materials to choose from when reviewing deck and superstructure refurbishment and replacement. Traditional materials such as timber, concrete and steel are competing against recycled plastics, wood plastic composites and fibre reinforced plastics and multi composites such as our CoreSpan™, a co-extruded WPC and FRP composite.

SIS worked closely with Council and conducted a whole cost of life assessment on the structure, which are critical when looking at the construction of new infrastructure or the retrofitting of new materials to existing structures. SIS now designs for an expected design life of between 75 and 100 years. There are always two very distinctive costs that need to be considered – one being the initial upfront cost of materials and the other is the ongoing cost of maintaining the structure / material. Council's requirement was that this structure was to be virtually maintenance free for up to 30 years.

This project had a number of limitations. There was a requirement to maintain current deck height given the steel super structure and the abutment of deck boards to each side of the top deck. Deck and joist weights needed to be considered against that of the existing and the deck also needed to accommodate high heel footwear, have very few fixings, allow substantial water egress in winter months and have no butt joins across the structure. In an area as beautiful as the Yarra River, the surface of this structure also needed to look as good as it performed. Another concern that Council had with the existing structure was the protruding fixings. These caused a major hazard to users and created a cost to Council in the constant monitoring and replacement of

Case Study, Footbridge Retrofit Design & Supply

these fixings. Any new deck needed to have as fewer top down fixings as possible to reduce any maintenance issues.

Given there was to be a 35% reduction in the decking and joist mass corresponding to an overall reduction on the structures mass of approximately 4%, SIS conducted a Dynamic Analysis on the structure to investigate the impact this was to have on the overall structural performance. Pedestrian bridge design is currently performed to AS5100-2004 Bridge Design where the original structure was designed prior to this code and also its predecessor HB77.1-1996. The steel superstructure was modelled in Microstran to determine the natural frequencies and mode shapes with the frequency shift due to the retro-fitting of StructuralComp™ FRP materials deemed to be very minor.

SIS also engaged Cardno to complete a feature and level survey to ensure accuracy of the layout given original drawings were aging and not to be relied on. Pitt & Sherry were engaged also by SIS to provide independent third party certification to Council using various design manuals and publications including Guide Specifications for Design of FRP Pedestrian Bridges (AASHTO, 2008).

At the time of consultation with Council, existing profile sizes available of 254.0mm x 69.9mm x 12.7mm PFC and decking at 304.8mm x 53.84mm gave an overall height of 307.84mm compared to an existing overall (deck & joist) height of 295mm. The width of the deck board (307.84mm) also exceeded councils desire to keep the board width under 250mm. These two factors combined meant that SIS would commission a new tool (size) to reduce the height and width. It would also be determined at this stage whether the deck would be redesigned to be heavier or lighter depending on controlling factors. The deck also has the capacity to span 1200mm at 5kPa therefore reduced substantially the quantity required. This was compensated by the larger and thicker (12.7mm) joist members being used.

The coefficient of friction was a key consideration on this project. Australian Standard AS/NZS 4586:1999 dictates that this project classifies as "External Ramping" and therefore required a classification of V (or P5 under the new classification). The most important factor here is that the material was tested in both the direction of travel and perpendicular to it. Some products and materials are marketed with the testing only carried out in the direction of travel which gives misleading result.



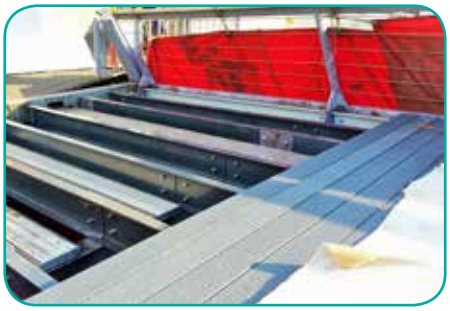

Case Study, Footbridge Retrofit Design & Supply

sustainable infrastructure systems

Project Progress Photos











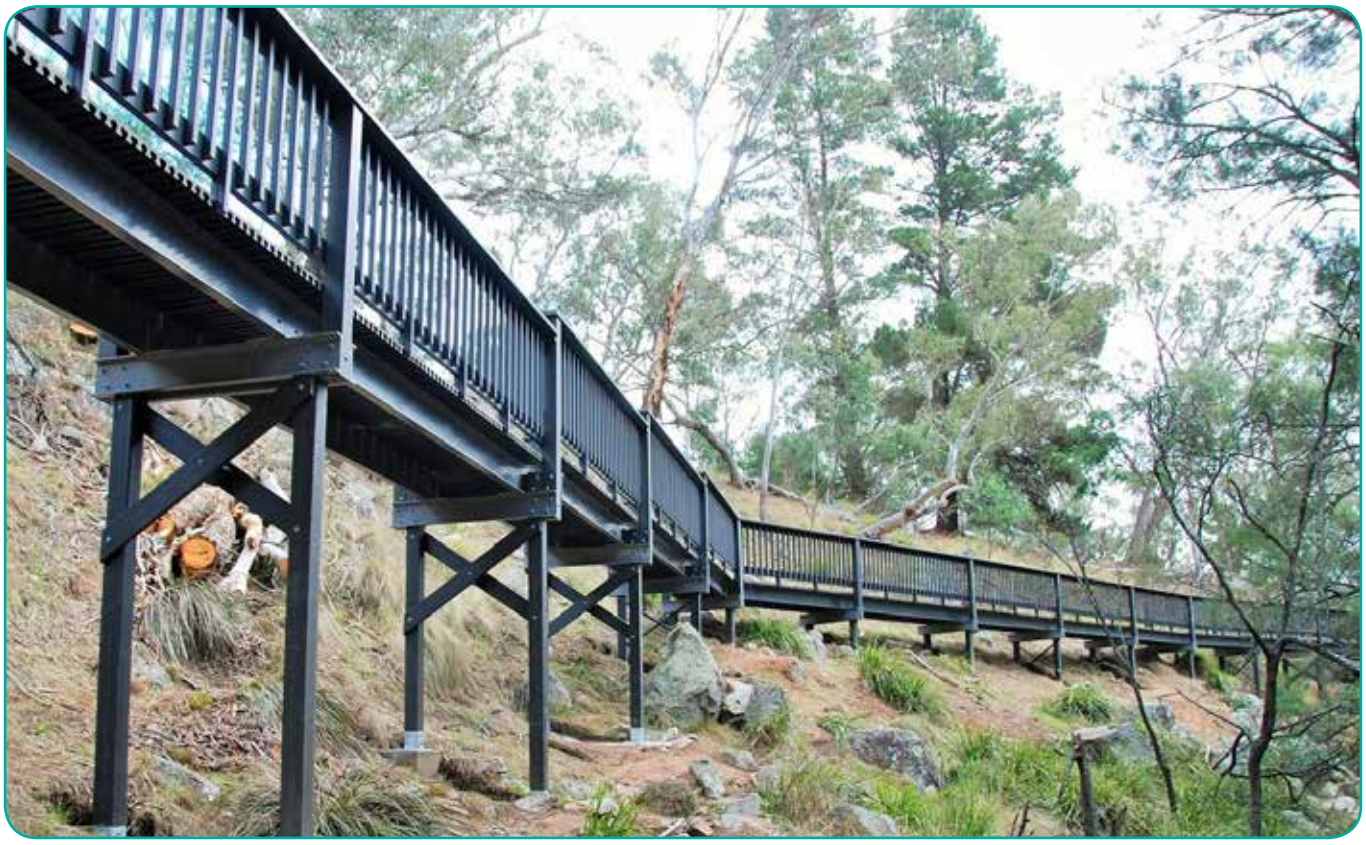

SISCo-FC construction systems for composite
BRIDGES | BOARDWALKS | VIEWING PLATFORMS

StructuralComp
FIBRE REINFORCED PLASTIC COMPOSITE

Case Study, Boardwalk Design & Construct

PROJECT:	Hartley River Walk Boardwalk
PROJECT TYPE:	Boardwalk Design & Construct
CLIENT:	NSW National Parks & Wildlife
STATE:	New South Wales

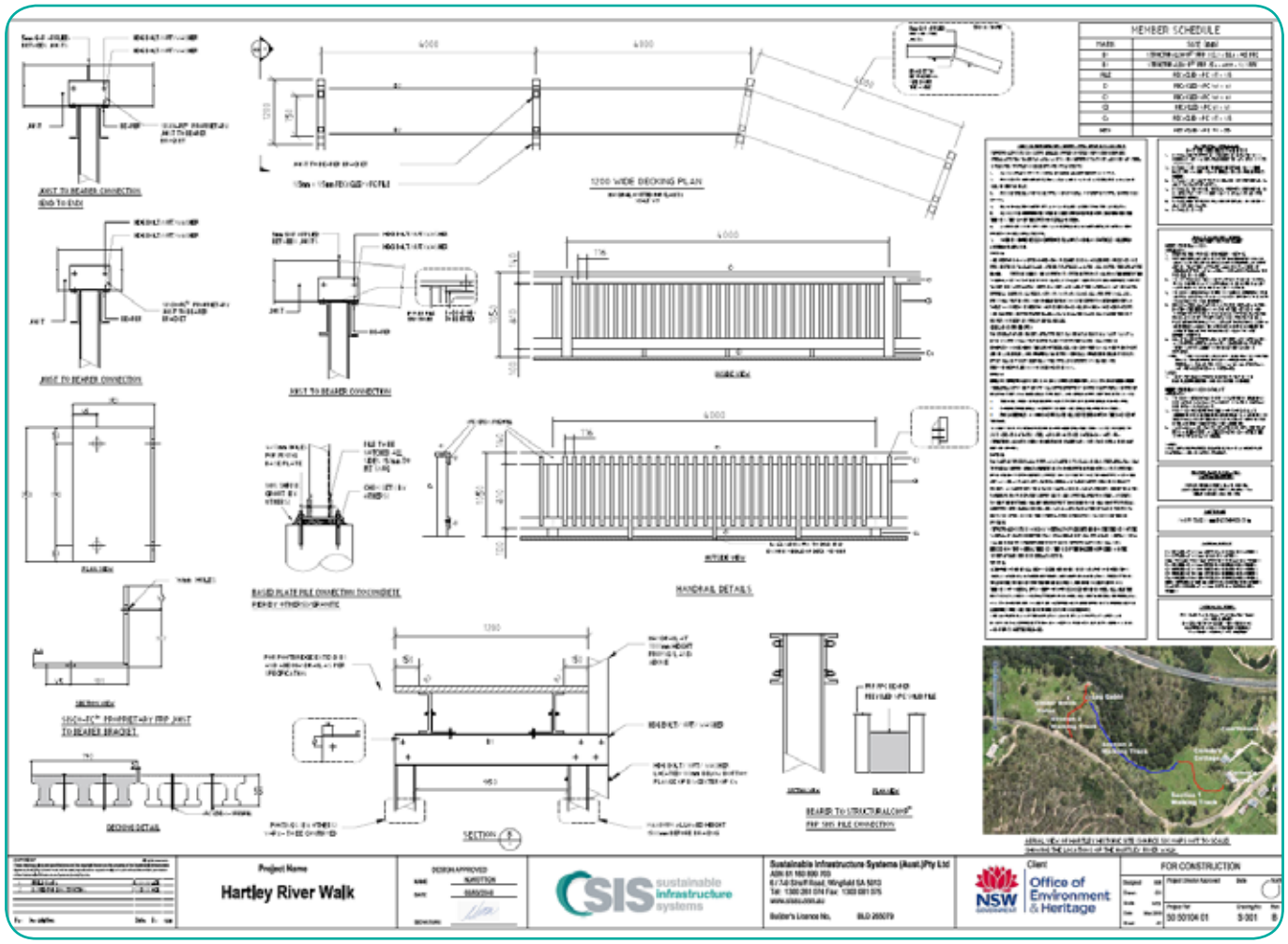
The River Walk Boardwalk is 200 meters in length and is located in the historic township of Hartley in the Blue Mountains, NSW and carries pedestrians along the bank of the River Lett. The River Lett is a perennial stream of the Hawkesbury-Nepean catchment and rises on the southern slopes of the Bell Range, below Bell, approximately 10 kilometres north of Mount Victoria. It flows generally West South-West, joined by two minor tributaries, before reaching its confluence with the Cox's River at Glenroy.



Case Study, Boardwalk Design & Construct

The township of Hartley lies on the Western edge of the Blue Mountains, 15km South East of Lithgow. It is a rare surviving collection of vernacular buildings which were built around 1840 – 1860. In the design phase, SIS had taken the time to consult a number of documents relating to this unique site including the Conservation Management Plan – 2002 which outlines in great detail the vast history of the site and the requirements of preservation for future generations. It was understood and considered that the design of any structure located in this area of significance would require exceptional design planning to allow it to blend with the environment around it. SIS worked closely with Parks & Wildlife Service NSW to construct a walking track made predominantly in 3 sections with sections 1 & 3 to be a gravel path and section 2 to be a raised boardwalk constructed of SIS composite materials. The final design was then subject to approval by the NSW Heritage Council.

The structure was designed and engineered by SIS and was constructed in 2016 from SIS's StructuralComp™ FRP and also our recycled wood plastic composite material made up of recycled



Case Study, Boardwalk Design & Construct

Testimonials

The decision to choose composites over timber or steel for our project was a simple one. For years we have been dealing with the maintenance issues of timber on pedestrian structures throughout National Parks so we did our research on composite and it ticked all the boxes. The project went to open tender and a number of companies participated in the process. SIS proved to have a good track record of manufacturing quality materials and designing full composite pedestrian structures and were great to deal with throughout the project. The structure is superb and is now being used by school groups, community groups, locals and tourists who are all learning more about this unique area through now having access to it.

Steve Ring
Manager, Hartley Historic Site
National Parks & Wildlife Service, NSW

post-consumer timber and plastic waste. 16,800 kilograms of waste was diverted from landfill and used to construct the River Walk Boardwalk. The materials used also means that the boardwalk is mostly maintenance free and has a life expectancy beyond 70 years. The boardwalk is managed by the National Parks & Wildlife Service of NSW and the design and engineering carried out by SIS was externally certified in accordance with the following SAI Codes of Practice:

- AS 2870 – Residential Slabs and Footings Code
- AS 4100 – Steel Structures Code
- AS 1170.0 – 2002 Structural Design Actions – General Principals
- AS 1170.1 – 2002 Structural Design Actions – Permanent, imposed and other actions
- AS 2156.1 – Walking Tracks, Classification & Signage
- AS 2156.2 – Walking Tracks, Infrastructure Design

Accordingly, the structure was deemed sufficient to carry the relevant loads specified in AS/NZS 1170.0, SAI Structural Design Actions Code.

Case Study, Boardwalk Design & Construct

Project Progress Photos












SISCo-FC construction systems for composite
BRIDGES | BOARDWALKS | VIEWING PLATFORMS

StructuralComp
FIBRE REINFORCED PLASTIC COMPOSITE

Case Study, Boardwalk Design & Material Supply

PROJECT:	Phillip Island Road Boardwalk
PROJECT TYPE:	Boardwalk Design & Material Supply
CLIENT:	Bass Coast Shire Council / ADA Constructions
STATE:	Victoria

The Bass Coast Shire Council's Phillip Island Road Elevated Boardwalk makes up part of Council's Phillip Island Road Shared Bicycle Path, San Remo (Vic) and is approximately 320m in length with a width of 2.5m. SIS were invited to provide pricing on a design and construct using a preliminary design that was prepared by GHD on behalf of Council. On being awarded the project, an SIS project manager then visited the site to gain an understanding of the location and proposed layout before working with Council on a final design.

SIS sub-contracted to ADA Constructions Pty Ltd to provide materials and technical assistance.

Case Study, Boardwalk Design & Material Supply

Testimonials

When the Bass Coast Shire Council asked me to look at replacing the timber decking and handrail on the coast road project with a recycled wood plastic composite, I really didn't know where to start. When I found SIS my crash – course in composites began and they were chosen as our composite material supplier for the project. SIS appointed a project manager from the very beginning which made working with the company seamless and efficient. They liaised with both Council and Council's external engineers and also held our hand with installation including providing on-site installation methodology training.

Andrew Anthony
Managing Director
ADA Construction Services Pty Ltd

The Bass Coast Shire Council had originally advised GHD that the boardwalk was to be of a timber and steel construction before using our StructuralComp™ recycled wood plastic composite on another smaller project. Once further investigations were completed, Council made the decision to change out the deck and handrail materials to StructuralComp™ composite.

Council also identified that it was critically important that the material chosen for decking was available for some time in the future. If Council needs a board replaced it must match precisely to the others dimensionally and aesthetically. This would prevent Council ever having to retain boards for future replacement.

Materials end of life options were also critical. A sustainably driven project is not sustainable at all if the final use of the material is unknown. "Close the loop" thinking is the responsibility of both public and private organisations and means that we must be informed as to what will eventually happen to the materials tomorrow that we are choosing today. SIS worked closely with Council on recycling methodology for StructuralComp™ composite members that may require replacement throughout the structures life.

SIS worked with Council's nominated engineer to ensure that the structure was designed for the following loadings;

- Floor Loads: 5KPA
- Wind Loads: To AS/NZS1170.20
- Region: A1
- Average Recurrence Interval: 100 Years
- Regional Wind Speed VRU: 41m/s
- Terrain Category: 1
- Topographic Multiplier: mt=1.20
- Design Building Height: 3m Average

Case Study, Boardwalk Design & Material Supply

Project Progress Photos












SISCo-FC construction systems for composite
BRIDGES | BOARDWALKS | VIEWING PLATFORMS

StructuralComp
FIBRE REINFORCED PLASTIC COMPOSITE

Case Study, Beach Access Structure Design & Construct

PROJECT:	Henley Beach - Beach Access Ramp
PROJECT TYPE:	Beach Access Structure Design & Construct
CLIENT:	City of Charles Sturt
STATE:	South Australia

The City of Charles Sturt is located in a coastal area of metropolitan Adelaide and enjoys one of the best beach coastlines in Australia. Until recently, Council had relied on basic concrete beach access ramps to deliver pedestrians from the hospitality and parking areas down on to the beach. These ramps had been subject to heavy weather over many years and Council were looking for a better, cost effective and more sustainable solution to replace two heavily used ramps.

Case Study, Beach Access Structure Design & Construct

Testimonials

"When Council made the decision to replace 2 existing concrete beach access structures we knew we needed to use a material and design that would stand up to the harshness of our coastal environment. After inspecting other structures manufactured and installed by Sustainable Infrastructure Systems along with researching StructuralComp FRP's properties, associated data and ISO certification, we commissioned SIS to complete drafting, engineering and design of the two new structures along with material manufacture and supply. SIS assisted us to design something quite unique and now that the structures are complete, the feedback from my colleagues and users has been incredibly positive. SIS were professional and very responsive throughout the entire process."

Deny Chirappuratha
Urban Designer
Open Space Projects - City of Charles Sturt

SIS participated in an open tender process and was successful with the bid put forward. Our project manager met personally with Council and visited other local SIS SISCO-FC™ composite structures, some of which have been installed for many years to give Council an understanding of product performance and longevity. Although basic design criteria was put forward by Council, most part of the design was left up to SIS designers and engineers.

Knowing Council were keen to be offering ratepayers and stakeholders something special, our design team worked to develop new ideas including new connection systems which allowed handrail vertical supports to be connected to the inside of the outer joists through cutting out the top flange, creating a seamless outside beam to the structure. An in-plain design to reduce overall height was also achieved along with colour matching to existing surroundings and connecting via state-of-the-art StructuralComp™ FRP base plates. Given the harshness of the environment of which these two structures were to be installed, SIS designers worked closely with our Product Development Team to design, test and manufacture the all composite base plates to prevent the requirement of steel to be used anywhere in the structure outside of fixings. When tested, the StructuralComp™ FRP base plates recorded no failure up to 12t loading in compression.

SIS project managers and designers participated in a number of design meetings with all contract participants and monitored installation of the two structures giving feedback to Council when required. Once installed, users soon gave Council the feedback that they were after – the structures were of a simple and classic design, easy to use, cool under foot in the hot sun and the non-slip surface was just perfect for use also with bare feet.

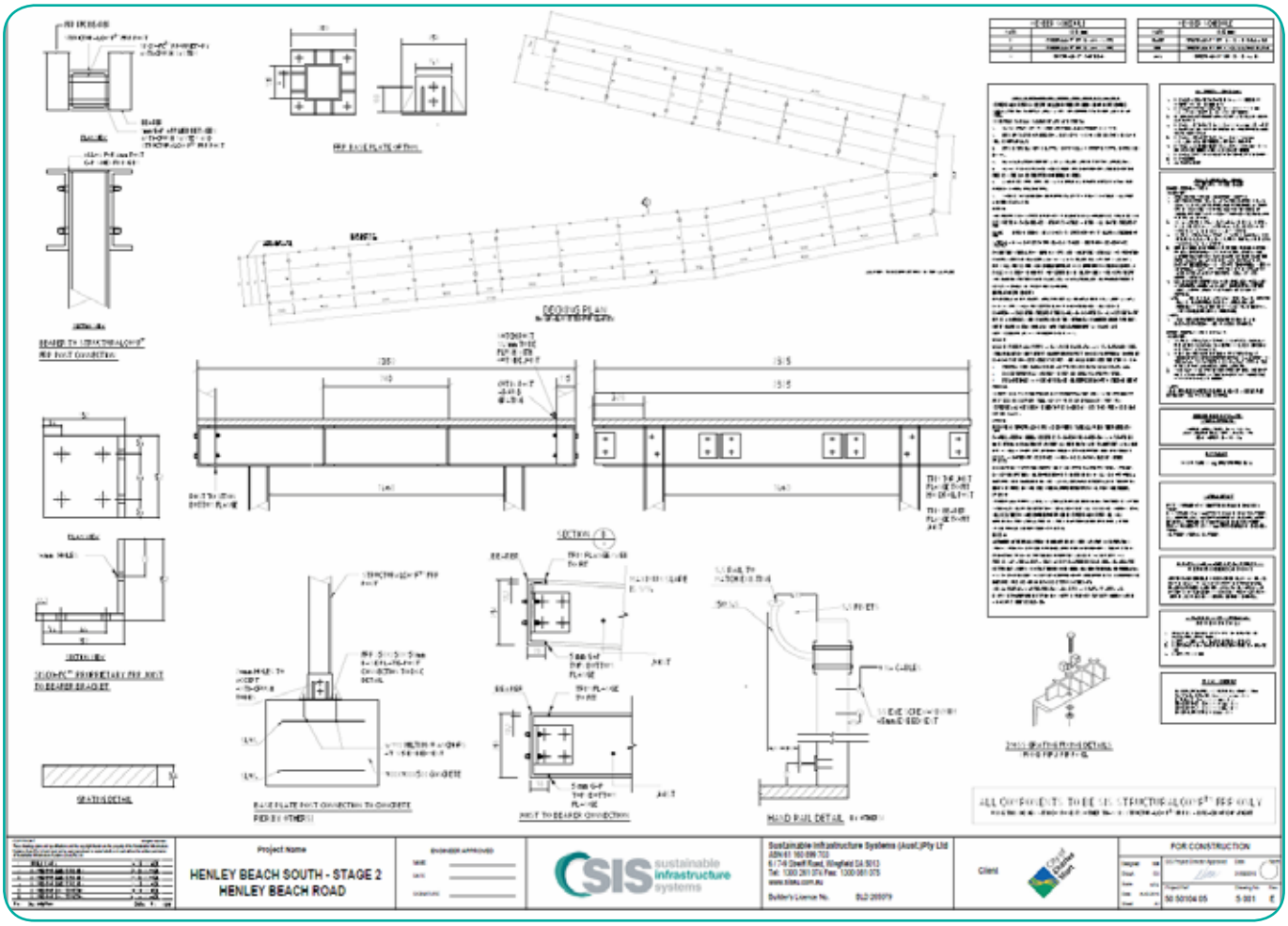
Case Study, Beach Access Structure Design & Construct

Our StructuralComp™ FRP grating was nominated on the structures given their proximity to sand. When used, the mini mesh grating allows sand to fall back through the deck given the materials void ratio of 65%. This prevents the heavy build-up of sand which can occur in high traffic areas on closed top surfaces.

In-house drafting, design and engineering was completed by SIS and certified by a third party for Council in accordance with the following SAI Codes of Practice:

- AS 2870 – Residential Slabs and Footings Code
- AS 4100 – Steel Structures Code
- AS 1170.0 – 2002 Structural Design Actions – General Principals
- AS 1170.1 – 2002 Structural Design Actions – Permanent, imposed and other actions
- AS 2156.1 – Walking Tracks, Classification & Signage
- AS 2156.2 – Walking Tracks, Infrastructure Design

Accordingly, the structure was deemed sufficient to carry the relevant loads specified in AS/NZS 1170.0, SAI Structural Design Actions Code.



Case Study, Beach Access Structure Design & Construct

Project Progress Photos











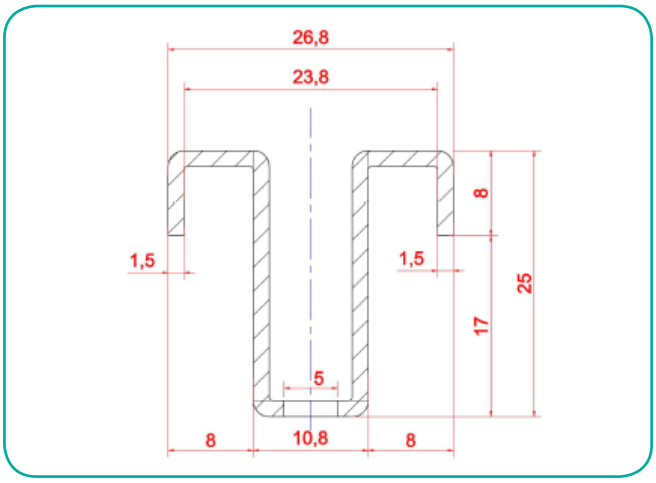

Case Study, Boardwalk Material Supply

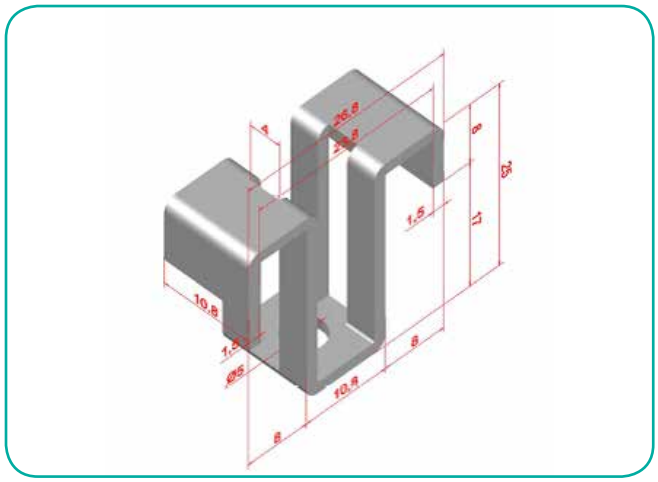
PROJECT:	Great Southern Nature Walk
PROJECT TYPE:	Boardwalk Material Supply
CLIENT:	NSW National Parks & Wildlife
STATE:	New South Wales

The Great Southern Nature Walk, also known as The Coast Track is located in the Royal National Park just West of Sydney, NSW and spans 26km between Bundeena and Otford and takes in cliff tops, beaches and escarpments amongst other rugged beauty. National Parks and Wildlife Service NSW who manages the track, identified the need to protect and conserve the landscape and the Jibbon Headland Aboriginal engravings and have done so through the installation of a StructuralComp™ FRP composite raised boardwalk.

SIS participated in a tender process and were successful with our bid to win the boardwalk contract. The new boardwalk under this contract was 7km in length, 1.007m wide and is made up of 4 different connections – 1) Straight Alignment: 2) Direction Change: 3) Steps: 4) Step & Direction Change. Distributed load and concentrated load were to be as per relative AS and codes, but specifically within the recommendations of A2156 – Walking Tracks, classification Class 3 with design load 3.0kPa or 1.4kN.

Case Study, Boardwalk Material Supply





Fixing clips were re designed by SIS to allow for faster installation.

A SIS design team worked closely with NPWS NSW to improve on an already existing design standard which had been used for the past 4 years in national parks across NSW. Design improvements lead to more cost effective materials and easier installation methodology being used. Overtaking bays and viewing platforms were also designed throughout the contract period and installed giving the project a unique look through the manufacture of curved grating panels. SIS commissioned custom tooling to meet the design requirements imposed by NPWS and allow rapid manufacture of the new and creative curved panels.

SIS worked closely with various professional partners to ensure that all materials were tested and certified for use well beyond the design limitations imposed. Each StructuralComp™ member went through a systematic testing program to investigate the suitability, failure modes and failure mechanisms for use as structural elements on the project. Member loading analysis were also conducted using Finite Element Method in a NATA accredited laboratory with results then sent to the certifying engineers nominated by NPWS NSW for review and certification. The values for the yield moment and ultimate moment were calculated using basic structural principles and analysed statistically to determine a reduction factor in accordance with AS1170.0:2002 Appendix B. The design shear capacity was determined by calculating the reaction force at the supports at the point of yield for a conservative estimate of the shear capacity of the section.

All StructuralComp™ members were certified in accordance with the following SAI Codes of Practice:

- AS/NZS1170.0:2002 - Structural Design Actions: General Principals
- AS/NZS1170.1:2002 - Structural Design Actions: Permanent, Imposed and Other Actions
- AS2156.1:2001 - Walking Tracks: Classification and Signage

Case Study, Boardwalk Material Supply

- AS2156.2:2001 - Walking Tracks: Infrastructure Design

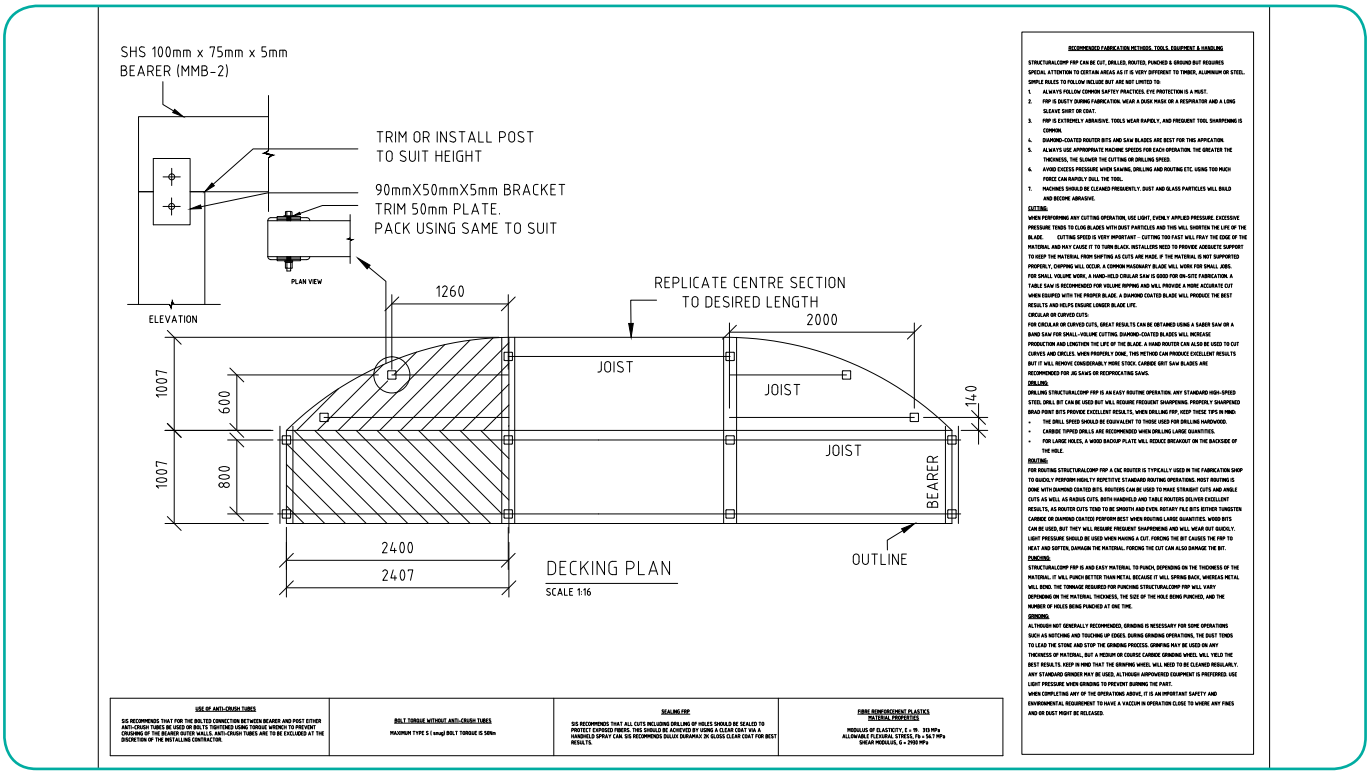
The structure was certified to carry the relevant loads specified in AS/NZS1170.1 and AS2156.2. The design criteria adopted was as follows:

- Design based on a Class 3 walkway structure (as defined in AS/NZS 21.56.1)
- Structure Importance Level 2 (normal structure), in accordance with the BCA
- Super-imposed dead load to walkway = 0.25kPa, and live load to walkway = 3kPa

Clever design and manufacturing techniques also allowed SIS to nominate StructuralComp™ FRP brackets to be used over expensive and heavy 316 stainless steel brackets. Our FRP brackets were shear tested in "in-situ" conditions allowing our engineers and external certifying engineers to see exactly how they perform in the conditions imposed in the field.

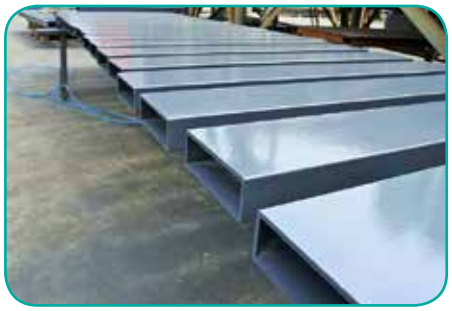
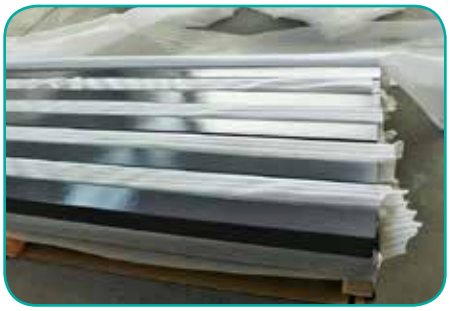
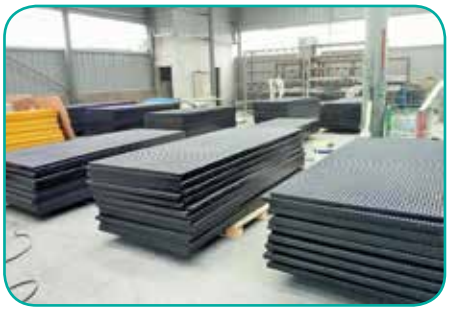
In addition to superior manufacturing techniques, only the very best Vinyl Ester resins were used in the manufacturing process combined with unique painting processes which allowed SIS to provide the highest possible quality materials to NPWS for the Royal Coast project.

Additional demands were placed on our production teams to ensure the packing of materials gave the highest possible level of protection, whilst reducing the amount of packing material used to reduce waste and overall pack weight. Each pack had a specific weight given all materials were delivered to site by helicopter.



Case Study, Boardwalk Material Supply

Project Progress Photos








SISCo-FC construction systems for composite
BRIDGES | BOARDWALKS | VIEWING PLATFORMS

StructuralComp
FIBRE REINFORCED PLASTIC COMPOSITE

Australian Head Office
abn 61160899703
7-9 Streiff Road, Wingfield SA 5013
t +1300 26 10 74 f +1300 08 10 75
service@sisau.com.au
sisau.com.au

sydney
17 Jumal Place
Smithfield
NSW 2164
Australia

melbourne
135 Boundary Road
Laverton North
Victoria 3026
Australia

brisbane
1094 Lytton Road
Murarrie
Queensland 4172
Australia

hong kong
Room 102, 1st Floor
The Centre Mark
287 - 299 Queen´s Rd
Central Hong Kong

shanghai
RM 1001A
Hua Sheng Building
No.398 Han Kou Road
200001 Shanghai
People´s Republic of China

shenzhen
27-3, 27th Floor
Shun Hing Square
Di Wang Commercial Centre
Lu Wu District, Shenzhen
People´s Republic of China

los angeles
Suite 135
5230 Pacific Concourse Dr.
Los Angeles
CA 90045
United States