2025 CONCRETE
Concrete Solutions for a Sustainable Future
ADELAIDE • 7-10 SEPTEMBER 2025

CONCRETE INSTITUTE of AUSTRALIA

Key focus Areas to Achieve Resilient and Sustainable Concrete Structures

Scott Munter, Executive Director/CEO (Presenter)
Steel Reinforcement Institute of Australia
Eric Lume, National Engineer
Steel Reinforcement Institute of Australia

SRIA Steel Reinforcement Institute of Australia

Steel Reinforcement Institute of Australia

Australian peak body representing reinforcing steels (sria.com.au)

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Steel Reinforcement Institute of Australia

ABOUT | MEMBERSHIP | QUALITY GUARANTEED | RESOURCES | EXPERTISE | NEWS & EVENTS | FAQ | LINKS | CONTACT

- Benefits of Steel Reinforcement
- Standards
- Research
- Downloads
- Publications
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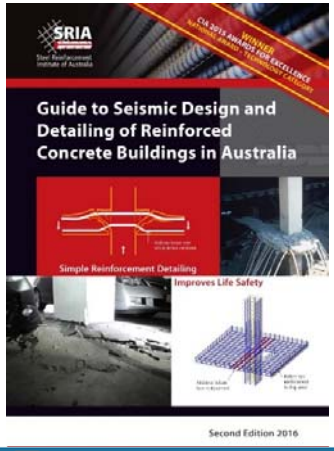
Welcome to SRIA

Steel Reinforcement Institute of Australia

The Steel Reinforcement Institute of Australia is Australia's leading non-profit institute for reinforcing steel, providing the hub for knowledge, industry linkage and support.

- Supports Australian capability & quality
- Offers practical solutions to the Australian building industry
- Educates industry
- Disseminates steel reinforcement knowledge via regular publications, lectures, seminars, research programs and tours
- Primarily funded by the vast majority of the processors of steel reinforcement used in Australian construction
- Supported by the founding Australian mill (supplier) members & associate members

THE BENEFITS OF REINFORCED CONCRETE



Resilient Structures are Sustainable

Resilience encapsulates our ability to not only survive disasters and extreme events such as bushfires, floods and earthquakes, but to also recover more quickly from them, with reduced impact on not only peoples' lives, but also in many cases, their livelihoods.

FIRES: Royal National Park, Sydney, 2018

FLOODS: Maribyrnong Melbourne, 2022

EARTHQUAKES: Newcastle, 1989

Properly designed and detailed RC construction provides resilience in Fires, Floods, Cyclones and Earthquakes

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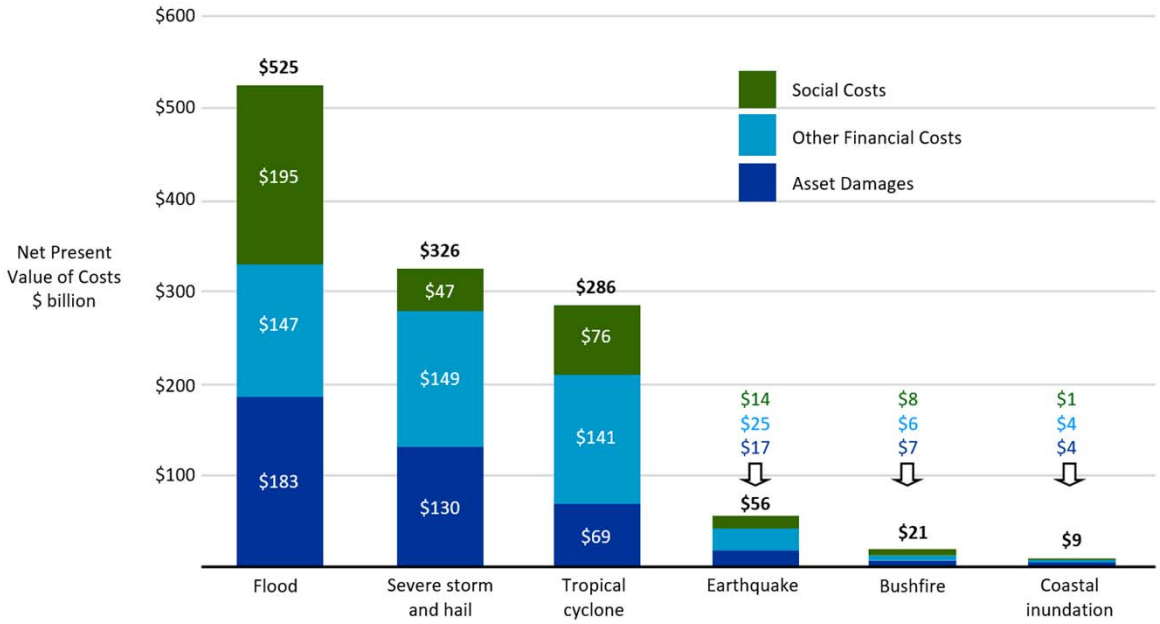
Cost of Natural Disasters

Natural disasters in Australia are increasing in regularity and severity

- **Over the next 40 years, natural disasters will cost Australia $1.2 trillion**
- **Currently $38 billion annually, rising to $73 billion by 2060**
- Cost of earthquakes relatively low due to low to moderate seismicity in Australia



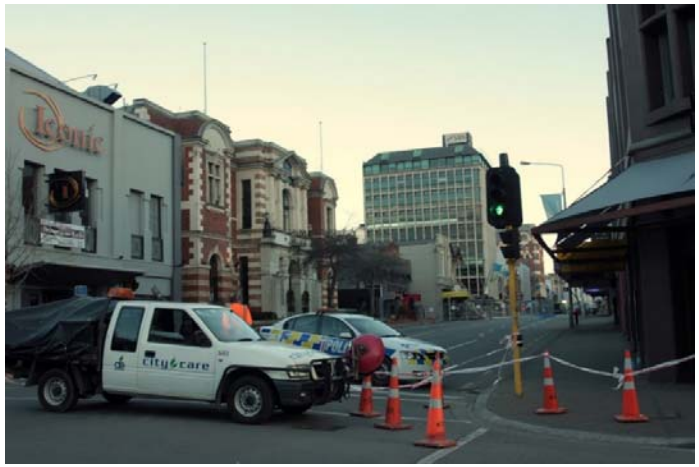
Predicted Costs over next 40 years

Steel Reinforcement Institute of Australia

Cost of Earthquakes

Cost of earthquakes relatively low due to low to moderate seismicity in Australia

- Deloitte predicts $56 billion cost over next 40 years
- Christchurch earthquake in 2011 (M6.2) - $55 billion loss with population of 370,000
- Global reinsurance industry has earthquake in Sydney in top 10 financial risks



Christchurch CBD closed off

Christchurch CBD: 90% demolished (over 800 buildings)

HAZARD NOTE
Bushfire & Natural Hazards CRC Issue 112 February 2022

Summary
Although the international reinsurance industry recognises that a moderate earthquake in Sydney is in their top 10 financial risks, there is a perception in the Australian construction industry that design for earthquakes is a poor use of money due to the low likelihood of a strong earthquake in Australia. As the September 2021 earthquake in Victoria showed, cities like Melbourne are not immune to earthquake damage.

Natural Hazards Set to Increase

Confronting Extremes by Engineers Australia

- Must reduce the prolonged delays that communities are experiencing
- In relation to cyclones, “engineers see a lot of building damage that, according to the Standards, shouldn’t happen. **There is not much point engineers saying we know what the extreme windspeed might be if it’s not actually built to the standard**.”
- In relation to floods, “Climate change means that we are seeing more frequent and more severe floods events, and **we need to be able to expect the unexpected**.”
- In relation to bushfires, “there have been significant advancements in our knowledge of bushfires, overall, there is **still much work to be done to be fully prepared for the next, large wildfire**.”
- “We will **need to design for resilience** where damage and time for recovery is minimised.”
- Focus of funding on recovery rather than avoidance needs to change.
- 97% of funding towards reconstruction and recovery, 3% for mitigation and community resilience measures

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Strategies to Improve Resilience and Sustainability

FM Global Annual Report 2021

- Resilience is a choice by Clients
- Works with clients to improve resilience
- Minimise potential losses from natural disasters
- **Produced Worldwide Earthquake Map**
- Bldg. Fires considered most significant risk exposure
- Strategies to mitigate fire risk include:
  - **Retrofitting of solid (concrete) floors**
  - **Replace combustible walls with fire-retardant ones**
- Strategies also work for flooding:
  - **Solid walling types unaffected by water**

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Natural Hazards Set to Increase

Natural Hazards Research Australia

- States that, “The impacts of natural hazards in Australia are predicted to become more extreme and frequent in the future.”
- **Role is to produce usable research that creates safer and more resilient communities**

February 2022 Queensland floods

ABC Business

- Resilience needs to be educated and embedded in our system
- Needs to start with the homeowner, through to the trades and then the insurance companies
- Reports a homeowner saved 70% of a $18,000 insurance premium following the Queensland floods, by reconstructing a ‘flood-proof’ resilient building
- After the February 2022 flood, the home was livable again after just two weeks
- The Architect stated that “the idea that flood-proofing homes added cost to a building was a myth.”

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Benefits of RC Providing Resilience for over 130 Years

A Paper read before the Queensland Institute of Engineers, Inc. - June 17 1913
by European Engineer L. Messy

- Highlighted the rapid acceptance and widespread use of reinforced concrete.
- Highlighted the many benefits of reinforced concrete:

*"……**fireproof,** termite resistant, **waterproof**, easy to build, no skilled labour needed, lowest cost of insurance, substantiality, light construction, good, aesthetic, and attractive appearance, impermeable, unaffected by hot or cold weather, or by sea water, **durability**, soundproof, **decreased maintenance**, etc."*

Concluded that Reinforced Concrete:

- When properly designed and constructed, is probably the most valuable material for use in buildings (and structures).
- Provides the best and most economical solution to the most difficult problems.
- Can provide long service life.

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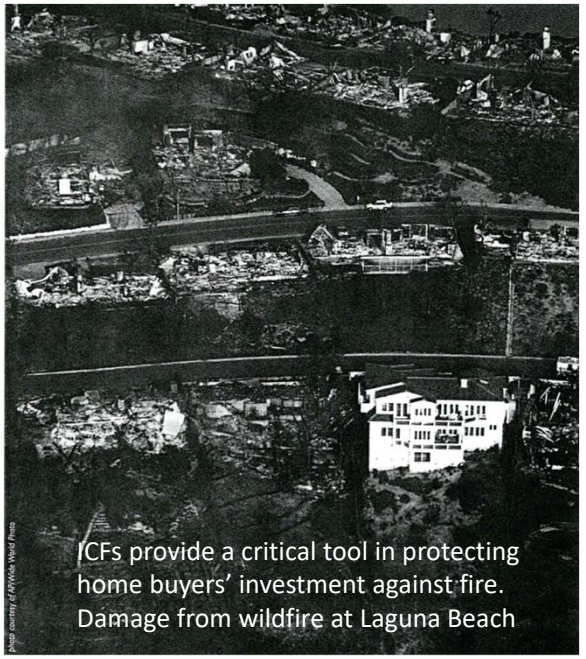
Is Concrete the New Gold?

A question posed on financial news site, '*Wall Street on Parade*'

- Significant part of retirement wealth in homes
- So critical that these assets survive natural disasters
- Natural disasters such as fires and floods can destroy these assets
- Concrete and masonry best suited to provide resilience in major events
- In 2019, 90% of homes in the USA were wood framed
- Many examples of firestorms destroying whole suburbs of timber homes
- However, the few examples built of concrete systems survived



ICFs provide a critical tool in protecting home buyers' investment against fire. Damage from wildfire at Laguna Beach

Concludes that Reinforced Concrete can protect the wealth locked up in homes for future generations

- Thus, concrete homes could be likened to money (gold) in the bank (ie a safer investment)
- Cement and concrete industries moving to decarbonise

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Long-life Structures Deliver Greater Sustainability

RC Solutions Proven to last

- **Resilience and longer service life = sustainable solution**
  - Amortise embodied carbon over longer design life
  - Example: 2,944 kg CO_2-e/sqm, over 50 yrs = 59 kg CO2-e/sqm/annum
- **Should we be designing for 100 year design life or longer?**
  - Example: 2,944 kg CO_2-e/sqm over 100 yrs = 29 kg CO2-e/sqm/annum
  - Nominal cost increase to significantly reduces embodied carbon
- Not replacing buildings or structures, extending design life and adaptation saves embodied carbon
- Do not sacrifice durability for lower embodied carbon
- Low durability solutions or disposable buildings are not sustainable

Johnstons Creek Sewer Aqueduct Annandale, Sydney (1896)

Today

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Ensuring Quality Reinforcement to AS/NZS 4671

Either: 1. Buy from a SRIA Member – All JASANZ accredited 3rd Party Certified

2. Imported: Obtain a JASANZ accredited 3rd Party Mill & Processor Certificates

- Check that Certificates are authentic on the JASANZ website.
- Ensure tags/bar markings match the Certificate when procuring/inspecting.

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Ensuring Quality Reinforcement

JASANZ Accredited 3rd Party Certification

ACRS - Australian Certification Authority for Reinforcing and Structural Steels


2024
VALID TO 31 Dec
Australasian Certification Authority for Reinforcing and Structural Steels Ltd

PRODUCT CERTIFICATION
www.steelcertification.com

CERTIFICATE OF APPROVAL

Product Conformity Certification

Certificate No: 31101
InfraBuild Steel
at
22 Kellogg Rd
Rooty Hill NSW Australia 2766

InfraBuild

Products assessed by ACRS to the following Standards:

AS/NZS 4671 Grade 500N Ribbed Bar 12 to 40 mm
AS/NZS 4671 Grade 500N Thread Bar 12 to 32 mm
AS/NZS 4671 Grade 250N Ribbed Bar 12 mm

Approved Company Information

Bar Markings

Tag

To check the validity of this certificate please scan the above Static QR Code with the ACRS Cloud App or visit www.steelcertification.com

Cert. Ref.: 001-07 31101

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JAS-ANZ
www.jas-anz.org/register
Accreditation certificate number Z5221212AC

ACRS Mill Certificate Example

Certifies the stock bar and rod conforms to AS/NZS 4671

Tag

JASANZ

Joint Accreditation System of Australia and New Zealand

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Steel Reinforcement Institute of Australia

Ensuring Quality Reinforcement

Recent increase in imported mesh product – Image Australian Docks

- No Tags visible. Is it 3rd Party Certified?
- Customs at border control do not check these quality requirements
- Risk is on the local supply chain to check/verify conforming materials!

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Ensuring Quality Reinforcement

<u>False</u> JASANZ 3rd Party Certificates discovered in Australian Market

- Always check Certificates authenticity on the JASANZ website
- Printed copies may have been altered
- SRIA Member's JASANZ 3rd Party Certificates can be found on SRIA website (sria.com.au)

Philip Sanders resigned as Executive Director some years prior to this Certificate

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Steel Reinforcement Institute of Australia

Ensuring Quality Reinforcement

Product bar markings found <u>not matching</u> JASANZ 3rd Party Certificate

- No required ‘TK’ Bar marking
- ACRS Certificate for imported mesh

No ‘TK’ Mark on bar

2023
VALID TO 31 Dec
Australasian Certification Authority for Reinforcing and Structural Steels Ltd

ACRS PRODUCT CERTIFICATION
www.steelcertification.com

CERTIFICATE OF APPROVAL

Product Conformity Certification

This is to certify that

Tianjin Tiankang Metal Products Co. Ltd

at

Tuanbo,
Jinghai County Tianjin China

has satisfied the Authority that it complies with the rules of the ACRS Product Certification Scheme and the relevant ACRS Quality and Operations Assessment Procedures. Where appropriate, and as listed below, it has further satisfied the Authority that it manufactures and/or supplies products that conform with the standards listed below, and is entitled to use the ACRS mark in relation to the products listed on this certificate.

SCOPE OF CERTIFICATION

Steel Reinforcing Mesh Manufacture to AS/NZS 4671:2019

Mesh approved on this certificate is certified only if manufactured from ACRS approved wire or bar. For approval of wire or bar, please refer to the manufacturer's ACRS certificate.

This certificate remains the property of the Authority and is issued subject to the Regulations of the Authority.

CERTIFICATE NUMBER	VERSION	FIRST APPROVAL	ISSUE DATE	EXPIRY DATE
160802	2	30 November 2016	01 January 2023	31 December 2023

SIGNED FOR ACRS

Andrew Wheeler,
Executive Director
AUSTRALASIAN CERTIFICATION AUTHORITY FOR REINFORCING AND STRUCTURAL STEELS LTD | ABN: 40 096 692 545 | PO BOX 1369, CROWS NEST NSW 1585, AUSTRALIA

To check the validity of this certificate please scan the above Static QR Code with the ACRS Cloud App or www.steelcertification.com

Cert. Ref.: 082-01 160802 2

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www.jas-anz.org/register
Accreditation certificate number Z5221212AC

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2023
VALID TO 31 Dec
Australasian Certification Authority for Reinforcing and Structural Steels Ltd

ACRS PRODUCT CERTIFICATION
www.steelcertification.com

CERTIFICATE OF APPROVAL

Product Conformity Certification

Certificate No: 160802
Tianjin Tiankang Metal Products Co. Ltd

at

Tuanbo,
Jinghai County Tianjin China

Products assessed by ACRS to the following Standards:

AS/NZS 4671 Grade 500L Mesh
- Square Mesh SL52, SL62, SL63*, SL72, SL81*, SL82, SL92, SL102
- Trench Mesh L8TM, L11TM, L12TM

Non Structural Mesh (NZ): SL41.5, SL51.5

*added July 2023

Approved Company Information

Bar Markings

TK

Tianjin TianKang Industrial Corporation

Tag

To check the validity of this certificate please scan the above Static QR Code with the ACRS Cloud App or www.steelcertification.com

Cert. Ref.: 082-01 160802 2

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JAS-ANZ
www.jas-anz.org/register
Accreditation certificate number Z5221212AC

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Check for compliant tagging on certified mesh?

Tag received

Tianjin Tian Kang metal products Co., Ltd.			
Address: Zhangjia Fangzi Village, Tuanbo Town, Jinghai County, Tianjin City, China, Post code:301636			
STANDARD: AS/NZS4671:2019		ACRS Cert No.:160802	
DESIGNATION	SL82	SIZE-L×W (mm)	6000×2400
GROSSWEIGHT (Kg)	4004 (77piece)	Batch No.	TJTK-21-116
PO NUMBER	0011	DESTINATION	Melbourne

Tag required

Steel Reinforcement Institute of Australia

Ensuring Quality Reinforcement

ACRS Certificate updated after investigation

- Bar marking now matches ‘interim’ 2023/2024 image
- Ensure Bar Marking matches JASANZ accredited certificate

Bar Mark matches

2024
VALID TO 31 Dec
Australasian Certification Authority for Reinforcing and Structural Steels Ltd

ACRS PRODUCT CERTIFICATION
www.steelcertification.com

CERTIFICATE OF APPROVAL

Product Conformity Certification

This is to certify that
Tianjin Tiankang Metal Products Co., Ltd.
at
Zhangjia Fangzi Village,
Tuanbo Town, Jinghai County, Tianjin China 301636

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AS/NZS 4671 Grade 500L Mesh
- Square Mesh SL52, SL62, SL63, SL72, SL81, SL82, SL92, SL102
- Trench Mesh L8TM, L11TM, L12TM
- Rectangular Mesh RL718, RL818, RL918, RL1018 and RL1218

Non Structural Mesh (NZ): SL41.5, SL51.5

Approved Company Information

Bar Markings

Tag

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Tianjin TianKang Industrial Corporation

2023 and PRIOR

INTRIM 2023/2024

2024 ONWARDS

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Ensuring Quality Reinforcement

Product from uncertified overseas mesh suppliers

An example of an overseas manufacturer who is selling to the Aust. Market but doesn't have a recognised JASANZ accredited 3rd Party Certification.

Home --- Products --- Australian/New Zealand Standard AS-NZS4671-2001 Reinforcement Mesh

Reinforcing Steel Mesh for Austrilian Market

Spelling issues eg Australian

PRODUCT DESCRIPTION

Reinforcement steel mesh was welded by automatic electrical resistance welding machines conformance to standard AS-NZS 4761-2001.

The material of reinforcement steel mesh is 250N, 500N, 500L, 300E, 500E.

Reinforcement steel mesh is very poupular in civil engineering and construction. It always used on road subgrade, building foundation, tunnel support and reinforced,mine and coal reinforced and support, bridge construction etc.

During construction works, It is not only increase our working speed and time but also save 75% construction cost and enhance the crack resistance.

Reinforced mesh export to Ireland Market

Reinforced mesh for UK market

Ensuring Quality Reinforcement

Certification to AS/NZS ISO 9001 does not meet AS/NZS 4671 quality requirements

- Example of Australian Builder providing an ISO 9001 certificate as proof of imported mesh quality stating *“ACRS certificates are not required under Australian Standards /NCC for international steel so the attached certificates should close out your requirements.“*

- AS/NZS 4671 states that a quality management system (AS/NZS ISO 9001) cannot be depended upon to demonstrate conforming materials.

- Quantity surveyors have also identified and warned the market of this issue.

Certificate

Certificate No.: 11422Q48498R5L

This is to certify that the Quality Management System of

GUANGXI SHENGLONG METALLURGICAL CO., LTD.

Unified Social Credit Code: 91450600751222294X6

Registered Address: Floor 1-2, Building 1-2, Qingtian Hai'ao City, No. 5000 Qisha Avenue, Shatanjiang Sub-district, Gangkou District, Fangchenggang City

Production Address: No. 300 Rongmujiang Avenue, Gongche Town, Gangkou District, Fangchenggang City, Guangxi Zhuang Autonomous Region, China

Office Address: Floor 1-2, Building 1-2, Qingtian Hai'ao City, No. 5000 Qisha Avenue, Shatanjiang Sub-district, Gangkou District, Fangchenggang City, Guangxi Zhuang Autonomous Region, China

Has been audited to conform to the following Quality Management System standard

GB/T19001-2016/ISO9001:2015

The Applicable Scope

The production of hot rolled steel bars used for reinforced concrete (within the company's licensed scope), hot rolled coil

Date of initial issuance: May. 20, 2008

Date of issuance: Dec. 12, 2022

Date of expiry: Jan. 16, 2026

Issued by: Wu Fangyu

Beijing East Allreach Certification Center Co., Ltd.

MANAGEMENT SYSTEM CNAS C114-M

Steel Reinforcement Institute of Australia

SRIA Quality Awareness Campaign – Since 2018

Stay informed via SRIA on social media: LinkedIn Facebook Instagram

NON – CONFORMING MESH CAMPAIGN RAISING AWARENESS ON SOCIAL MEDIA

Various regulatory bodies have limited resources but will act if non-conforming material is found or there is a risk to public safety.

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Site Quality Issues

Surface condition of reinforcement

Ensure no loose or flaking rust on surface of bar

- Indicates loss of steel section (or mass) which may affect performance
- Limits on mass provided in Table 7.5 (A) of AS/NZS 4671
- If outside these limits, then non-conforming
- Refer also **SRIA Technical Note 1**

Acceptable – surface corrosion

Unacceptable

Loose and flaking rust

N20 Bar

SL72 Mesh

Steel Reinforcement Institute of Australia

Site Quality Issues

Bending of reinforcement

Often carried out incorrectly

Correct procedures in Clause 17.2.3 of AS 3600

- If bent cold, bend around conforming pin with uniform motion to:

  "Avoid impact loading of the bar and mechanical damage to the bar surface"

- Clause 17.2.3.1
  Reinforcement partially embedded in concrete may be field-bent provided the bending complies with Clauses 17.2.3.1(a) Cold bending and (b) Hot bending

- Offset bars must comply with Clause 10.7.5.5 of AS 3600

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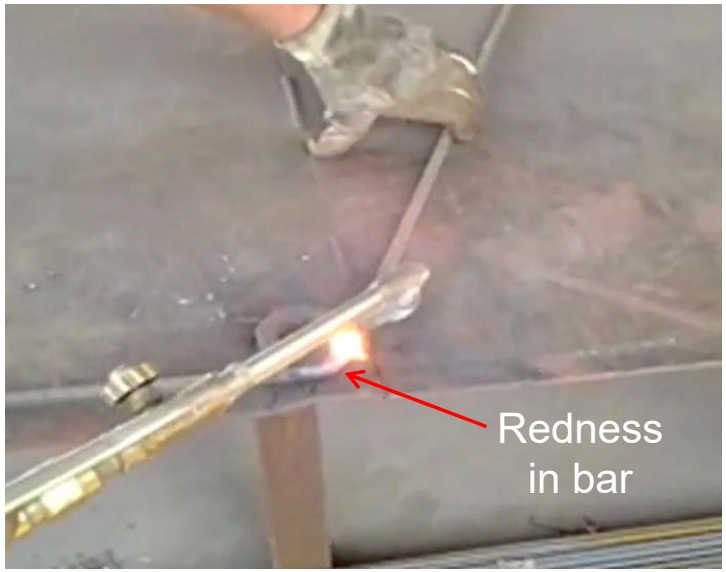
Site Quality Issues

Heating of reinforcement

- Overheating to facilitate bending a common problem
- Maximum 600°C allowed Clause 17.2.3.1
- If temperature exceeds 450°C, yield strength taken as 250 MPa

Bar overheated based on steel colour



Steel colour temperature

Colour	C
Faint Red	600
Dark Red	700
Cherry Red	800
Dull Orange	900
Orange	950
Lemon Yellow	1000
Yellow	1050
Bright Yellow	1100
White	1200
Glowing White	1300

Anneal tempered martensite layer

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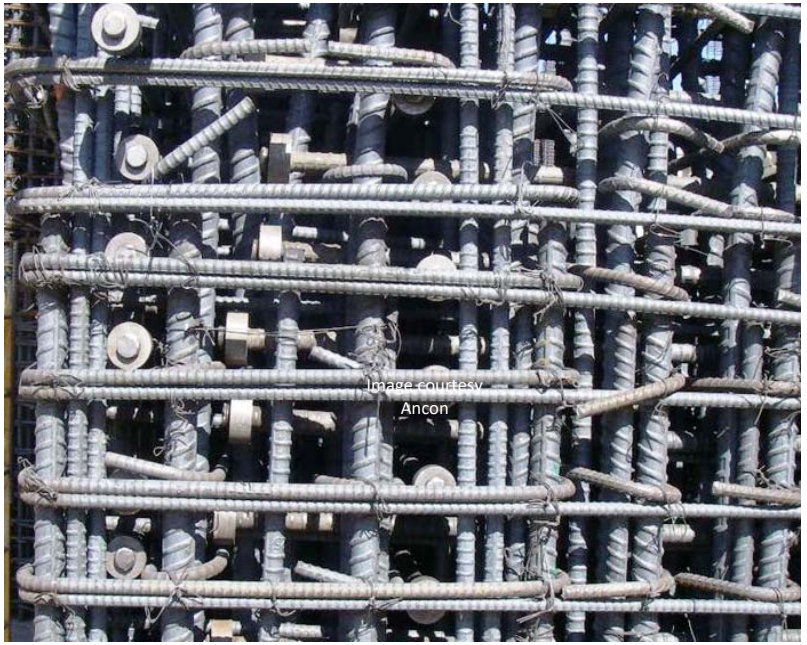
Site Quality Issues

Congested reinforcement

- Avoid areas of congested reinforcement
- Must ensure adequate placement and compaction of concrete



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Site Quality Issues

Cover to reinforcement

Specify bar chairs to AS/NZS 2425 Bar chairs in concrete – Product requirements

Types of bar chairs

Concrete

Plastic

Plastic tipped wire

Hurdles

Spacing of Bar Chairs

- Recommend maximum 600 mm centres to reduce displacement during concreting
- Resources
  - 600 mm centres – Clause 5.4(e) of AS 3727.1 Concrete Pavements Part 1: Residential
  - 800 mm centres – CCAA Data Sheet for Residential Driveways and Paths
  - 800 mm centres – Section 4.2.11(7)(e) of ABCB Housing Provisions Standard

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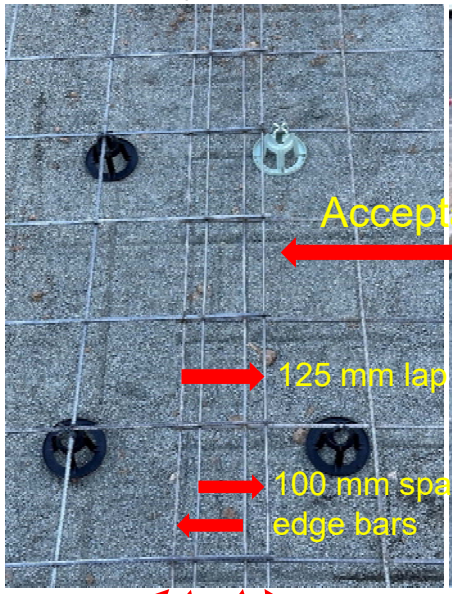
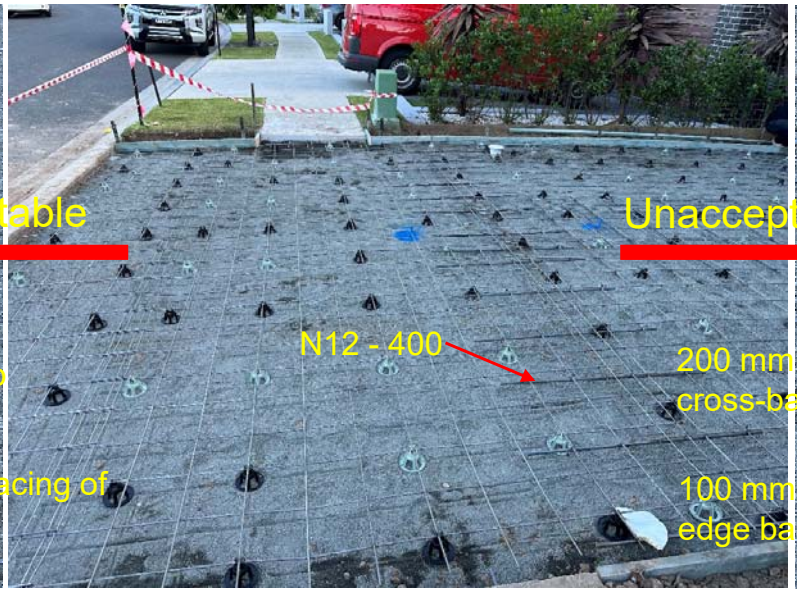
Site Quality Issues

Overlap mesh sheets a minimum of 2 cross-bars

Each welded joint develops 50% of the bar's yield stress (Clause 7.2.5 of AS/NZS 4671)

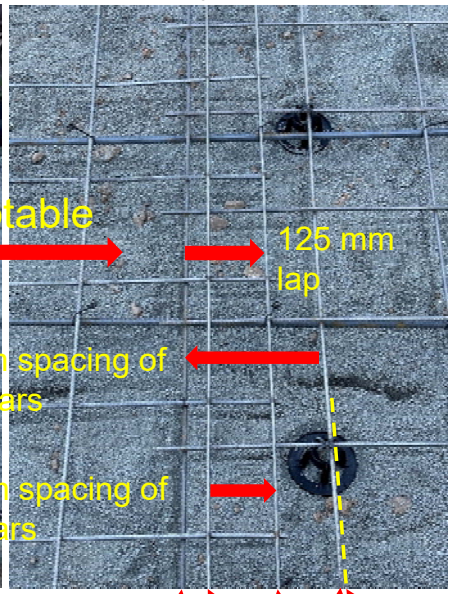
Lapped by 2 cross bars





Residential Driveway

Lapped by 1 cross bar



Note: Concreter taught to overlap mesh by 125 mm

Only correct for edge bars spaced at 100 centres

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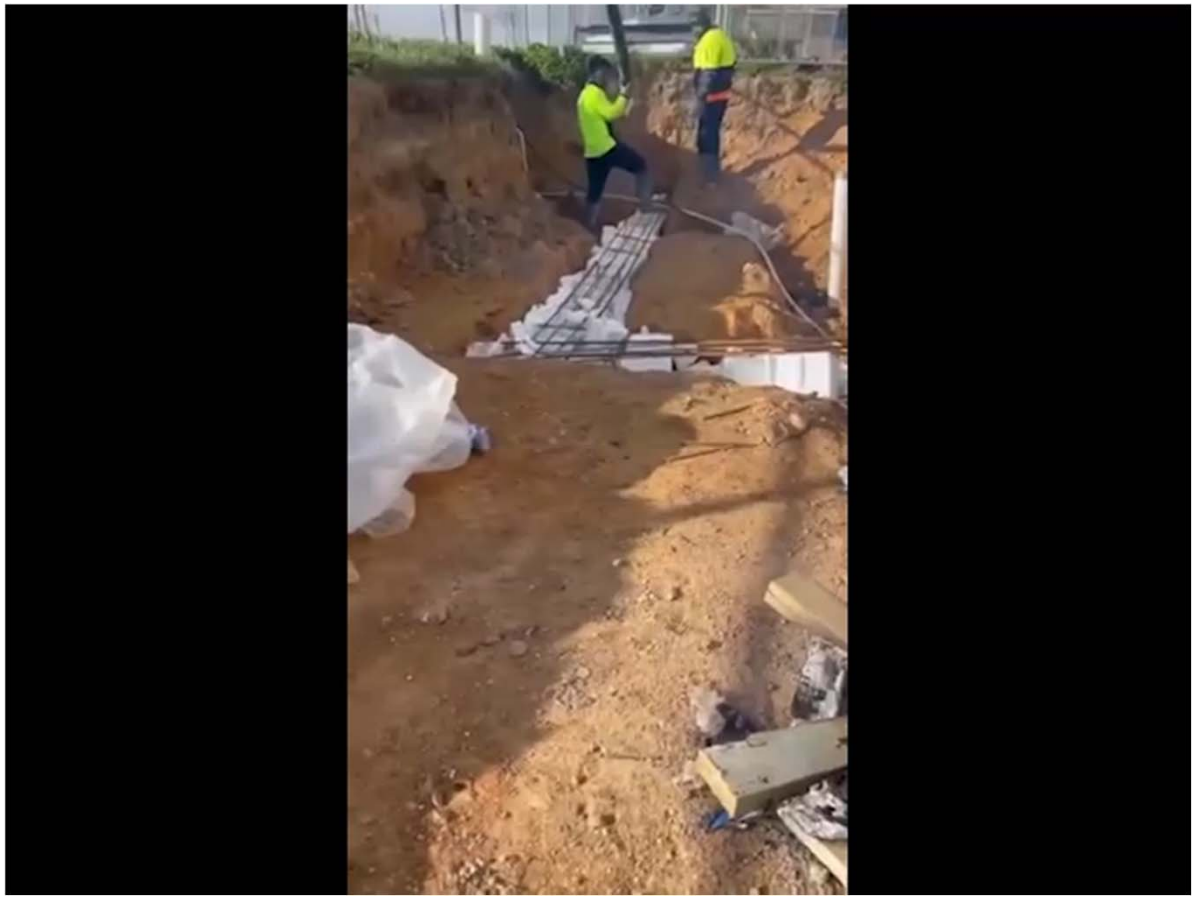
Concrete Quality

Basic quality issues of placing, compaction and curing must be addressed

Construction practices are equally as important as material quality requirements



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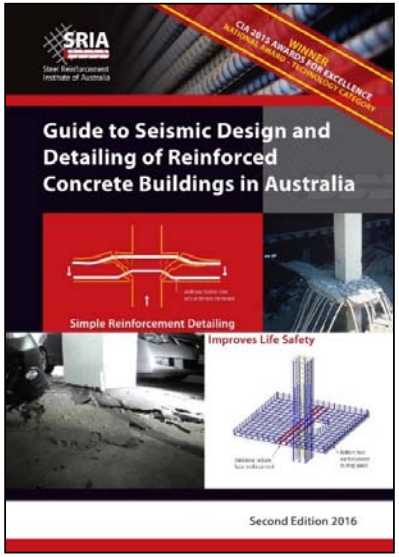
Conclusions

- SRIA provides the market with technical support
- Cost of natural disasters set to increase
- Numerous benefits of reinforced concrete delivers resilience
- Resilience & durability is proven over 130 yrs in Australia
- Resilience and longer service life = sustainable solution
- Do not sacrifice durability for lower embodied carbon
- JASANZ accredited 3rd party certification is essential
- We all have a quality assurance role to play
- Innovative design and construction is fundamental
- Resources available to assist Engineers (SRIA.COM.AU)



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