HANSENYUNCKEN

ATT:

Mr Mauricio Vera
GROUP DLA
Level 7, 10 Bridge Street,
Sydney, NSW 2000
9447

18 January 2021

Dear Mr Vera,

**Project:** New High-Quality Classrooms, Package 2 – Catherine Field Public School

**Subject:** Catherine Field SSD 9477 – Item 15 of DLA Group's Request for Information (Crown Completion Certificate Checklist).

In relation to SSD 9477 – Catherine Field Public School (Lot 1001, DP1234527), this letter is in relation to compliance with Item 15 of DLA Group's Request for Information (Crown Completion Certificate Checklist).

I, Matt McCrohon, who is an appropriately qualified and competent person on behalf on Hansen Yuncken, provide this statement confirming that all structural building eworks have been designed and installed in accordance with the structural engineering drawings, reports, site instructions and the relevant Australian Standards and the BCA 2016 Amendment One.

See documents attached here within as evidence in support of this statement

Kind regards,

Matt McCrohon
**Senior Project Engineer**
HANSENYUNCKEN
**Hansen Yuncken Pty Ltd**
Sydney Corporate Park
Building 1, L3, 75-85 O'Riordan Street Alexandria NSW 2015

NORTHROP

Level 11, 345 George Street
Sydney NSW 2000
02 9241 4188
sydney@northrop.com.au
ABN 81 094 433 100

12.01.2021

Ref: S190518-02-SC05-D

Matt McCrohon
Hansen Yuncken
75-85 O'Riordan Street
Alexandria NSW 2015

Dear Matt,

**Re: Catherine Field Public School – Structural inspection certificate addressing SSD condition D22**

| | | | | | |
|---|---|---|---|---|---|
| **Site Details:** | | | | | |
| Project Name. | Catherine Field Public School | | | | |
| Address: | O'Keefe Drive Oran Park | | | | |
| Suburb: | Catherine Field | State: | NSW | Postcode: | 2557 |
| **Description of Work:** | Construction of a new primary school | | | | |

| | | | |
|---|---|---|---|
| **Development Consent:** | | | |
| SSDA No. | SSD 9477 | Consent authority: | Minister for Planning and Public Spaces |

We, Northrop Engineers, being professional engineers, confirm that structural drawings listed in Appendix A were prepared:

- Under the supervision of a professional chartered structural engineer certified under NER; and
- In accordance with the relevant structural requirements of the Building Code of Australia 2016 Part B (incorporating amendment 1) and Clause D2.16; and
- Building Importance Level 3; and
- In accordance with Fire Engineering Report by MCD Fire Engineering, Catherine Field Public School (Revision FER 2.0 | 20 November 2020 | Ref: S19033.CF); and
- In accordance with the relevant Australian Standards, in particular AS/NZS1170.0-2002, AS/ NZS 1170.1-2002, AS/ NZS 1170.2-2011, AS/ NZS 1170.4-2007, AS3600-2009, AS3700-2011 and AS4100-1998.

Regarding SSD condition D22:

We, Northrop Engineers, being professional engineers, also certify that:

- We have periodically visited the site to observe the structural components during construction; and
- The work required by structural engineering drawings and engineering instructions issued up to the time of inspection generally conformed with the design intent of drawings and instructions.

The structural engineering drawings referred to in this certification are as scheduled in Appendix A. Refer to design certification issued for CC for relevant design standards.

The following structural components have been provided under design and construct subcontracts and Northrop have neither checked the design nor inspected the following components. The following components are not covered by this certificate and separate structural certificates are to be provided for each by the responsible parties.

- Custom Steel Frames
- Screw Piling
- Temporary works
- Proprietary items and items procured under D+C contracts
- Non-structural elements
- Lightweight partition framing
- Waterproofing
- Facades, glazing and glazed assemblies
- Joinery and their fixings
- Fire resistance of applied insulation materials

Certification of the above is to be sought from the relevant appropriately qualified parties as required.

This certificate shall not be construed as relieving any other party of their responsibility.

Yours faithfully,

**Jonathan Low**
Associate | Structural Engineer BE (Hons) MIEAust CPEng NER
On behalf of: Northrop Consulting Engineers Pty Ltd

## Appendix A – Structural Drawings Current as of 18.12.2020

| Document No | Revision | Title |
|---|---|---|
| NHQC2-CF-ST-DWG-00_S00.00 | 1 | COVER SHEET AND DRAWING LIST |
| NHQC2-CF-ST-DWG-00_S01.01 | 1 | STRUCTURAL SPECIFICATION - SHEET 1 |
| NHQC2-CF-ST-DWG-00_S01.02 | 1 | STRUCTURAL SPECIFICATION - SHEET 2 |
| NHQC2-CF-ST-DWG-00_S01.03 | 1 | STRUCTURAL SPECIFICATION - SHEET 3 |
| NHQC2-CF-ST-DWG-00_S02.51 | 1 | LOADING PLANS - SHEET 1 |
| NHQC2-CF-ST-DWG-00_S03.00 | 1 | FOUNDATION PLAN - OVERALL |
| NHQC2-CF-ST-DWG-00_S04.00 | 1 | GROUND SLAB PLAN - OVERALL |
| NHQC2-CF-ST-DWG-00_S05.00 | 1 | LEVEL 1 SLAB PLAN - OVERALL |
| NHQC2-CF-ST-DWG-00_S06.00 | 1 | LEVEL 2 SLAB PLAN - OVERALL |
| NHQC2-CF-ST-DWG-00_S07.00 | 1 | ROOF FRAMING PLAN - OVERALL |
| NHQC2-CF-ST-DWG-01_S03.11 | 1 | FOUNDATION PLAN - BLOCK A |
| NHQC2-CF-ST-DWG-01_S03.21 | 1 | FOUNDATION PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S03.31 | 1 | FOUNDATION PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S03.51 | 2 | FOUNDATION PLAN - BLOCK E |
| NHQC2-CF-ST-DWG-01_S04.11 | 1 | GROUND SLAB PLAN - BLOCK A |
| NHQC2-CF-ST-DWG-01_S04.17 | 1 | SUNSHADE GROUND AND ROOF FRAMING PLAN |
| NHQC2-CF-ST-DWG-01_S04.21 | H | GROUND SLAB PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S04.31 | 1 | GROUND SLAB PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S04.51 | 3 | HALL GROUND SLAB PLAN - BLOCK E |
| NHQC2-CF-ST-DWG-01_S05.11 | J | LEVEL 1 SLAB PLAN - BLOCK A |
| NHQC2-CF-ST-DWG-01_S05.12 | 1 | LEVEL 1 SHEAR REINFORCEMENT PLAN - BLOCK A |
| NHQC2-CF-ST-DWG-01_S05.13 | 1 | LEVEL 1 BOTTOM REINFORCEMENT PLAN - BLOCK A |
| NHQC2-CF-ST-DWG-01_S05.14 | 1 | LEVEL 1 TOP REINFORCEMENT PLAN - BLOCK A |
| NHQC2-CF-ST-DWG-01_S05.21 | 2 | LEVEL 1 SLAB PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S05.23 | 1 | LEVEL 1 BOTTOM REINFORCEMENT PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S05.24 | 1 | LEVEL 1 TOP REINFORCEMENT PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S05.31 | 2 | LEVEL 1 SLAB PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S05.33 | 1 | LEVEL 1 BOTTOM REINFORCEMENT PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S05.34 | 1 | LEVEL 1 TOP REINFORCEMENT PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S06.21 | 2 | LEVEL 2 SLAB PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S06.23 | 2 | LEVEL 2 BOTTOM REINFORCEMENT PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S06.24 | 2 | LEVEL 2 TOP REINFORCEMENT PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S06.31 | 2 | LEVEL 2 SLAB PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S06.33 | 1 | LEVEL 2 BOTTOM REINFORCEMENT PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S06.34 | 1 | LEVEL 2 TOP REINFORCEMENT PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S07.11 | 1 | ROOF FRAMING PLAN - BLOCK A |
| NHQC2-CF-ST-DWG-01_S07.21 | 1 | ROOF FRAMING PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S07.22 | 1 | PURLIN MARKING PLAN - BLOCK B |
| NHQC2-CF-ST-DWG-01_S07.31 | 1 | ROOF FRAMING PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-01_S07.32 | 1 | PURLIN MARKING PLAN - BLOCK C AND D |
| NHQC2-CF-ST-DWG-02_S09.11 | 1 | FRAMING ELEVATIONS - BLOCK A - SHEET 1 |
| NHQC2-CF-ST-DWG-02_S09.21 | 1 | FRAMING ELEVATIONS - BLOCK B - SHEET 1 |
| NHQC2-CF-ST-DWG-02_S09.22 | 1 | FRAMING ELEVATIONS - BLOCK B - SHEET 2 |
| NHQC2-CF-ST-DWG-02_S09.31 | 1 | FRAMING ELEVATIONS - BLOCK C - SHEET 1 |
| NHQC2-CF-ST-DWG-02_S09.32 | 1 | FRAMING ELEVATIONS - BLOCK C - SHEET 2 |
| NHQC2-CF-ST-DWG-02_S09.41 | 1 | FRAMING ELEVATIONS - BLOCK D - SHEET 1 |
| NHQC2-CF-ST-DWG-02_S09.42 | 1 | FRAMING ELEVATIONS - BLOCK D - SHEET 2 |
| NHQC2-CF-ST-DWG-04_S04.61 | 2 | GROUND SLAB DETAILS - SHEET 1 |
| NHQC2-CF-ST-DWG-04_S05.61 | 1 | LEVEL 1 DETAILS - SHEET 1 |

| | | |
|---|---|---|
| NHQC2-CF-ST-DWG-04_S05.62 | 1 | LEVEL 1 DETAILS - SHEET 2 |
| NHQC2-CF-ST-DWG-04_S10.01 | 1 | FOUNDATION DETAILS - SHEET 1 |
| NHQC2-CF-ST-DWG-04_S10.02 | 1 | FOUNDATION DETAILS - SHEET 2 |
| NHQC2-CF-ST-DWG-04_S10.03 | 1 | FOUNDATION DETAILS - SHEET 3 |
| NHQC2-CF-ST-DWG-04_S11.01 | 1 | GROUND FLOOR DETAILS - SHEET 1 |
| NHQC2-CF-ST-DWG-04_S12.01 | 1 | TYPICAL SUSPENDED SLAB DETAILS - SHEET 1 |
| NHQC2-CF-ST-DWG-04_S13.00 | 1 | TYPICAL COLUMN DETAILS - SHEET 1 |
| NHQC2-CF-ST-DWG-04_S14.11 | 1 | TYPICAL WALL DETAILS - SHEET 1 |
| NHQC2-CF-ST-DWG-04_S14.21 | 1 | TYPICAL BLOCK WALL DETAILS - SHEET 1 |
| NHQC2-CF-ST-DWG-04_S15.01 | H | TYPICAL STAIR PLANS AND DETAILS - SHEET 1 |
| NHQC2-CF-ST-DWG-04_S15.02 | F | TYPICAL STAIR PLANS AND DETAILS - SHEET 2 |

barnson
DESIGN | PLAN | MANAGE

a Unit 1 / 1 Rankin Street
Bathurst NSW 2795
t 1300 BARNSON (1300 227 676)
e generalenquiry@barnson.com.au
w www.barnson.com.au

date
29/07/2020
reference
34107-SL01_A_Stage E.docx
receiver
Custom Steel Frames
Attn: Colin Shanks
110 Fitzroy Street
Dubbo NSW 2830

Dear Sir,

# Re: Project 6419- Catherine Fields Public School at Catherine Fields NSW 2557 Stage E: Steel Roof and Wall Frames Structural Design Certification

As requested, we advise that the structural design for the steel roof trusses and wall frames as detailed on your production drawings as per the attached document transmittal form, prepared by Custom Steel Frames for the above project, is structurally adequate to NCC 2016 Amdt 1, section B1 for the below design parameters.

## 1. Loading

General principles of loading calculation and loading combinations to Australian Loading Code AS1170.0-2002 and other relevant codes and parameters as below:

(a) Dead Load
  (i) Roof: Self weight of Steel sheeted roof, battens, truss and ceilings (max 0.3kPa).
  (ii) Roof: solar panel (15 kg/$m^2$ ) on main roof areas.
(b) Live Load
  (i) Roof: Maintenance load of 1.8/A + 0.12kPa (min 0.25kPa) as per AS1170.1-2002.
  (ii) Point Loading: 1.1kN as per AS1170.1-2002.
(c) Wind Load
  (i) Wind Loads: Region A, Terrain Category 2.5, Mt=Ms=1.0, Importance level 2 to AS1170.2-2012.

## 2. Steelwork

a. Cold Formed Sections: Grade 500 to AS4600-2018.
b. Hollow Sections: Grade 450 to AS4100-1998.
c. Durability: Atmospheric Corrosivity Category C3 to AS4312-2008:

i. Covered steelwork: Class 2.5 blast plus 75micron Epoxy Zinc coating to AS2312.1-2014 or ILG 140 to AS4792-2006.
ii. Exposed Steelwork: HDG300 to AS 4680-2006
iii. Cold formed Steelwork: AZ150 or AM150 to AS1397-2011
iv. Screws to be class 3 to AS3566.2, Bolts to be HDG to AS1214.

3. **Serviceability: Design complies with the below mentioned NASH Standard deflection criteria.**
   (a) Roof under dead load: Deflection < Span/500.
   (b) Roof under live load: Deflection < Span/250.
   (c) Roof under wind load: Deflection < Span/150.
   (d) Stud walls under lateral loading (serviceability wind loads): Deflection < Height/200 or max 20mm

4. **Fabrication/Erection/Tie down**

Complies with Custom Steel Frames standard specification drawing no. 4003-01 as approved by undersigned.

If you have any further enquiries regarding this matter, please do not hesitate to contact Barnson.

Yours faithfully

**BARNSON PTY LTD**

Richard J Noonan
BE (Hons) ME FIEAust CPEng NER
**Consulting Engineer/Company Director**

*Encl: Document transmittal form*

CUSTOM STEEL FRAMES

Ph: 02 6884 2266 Fax: 02 6884 3159

**Document Register**

Job No. 6419

Customer Details

Hansen Yuncken

Project

CATHERINE FIELDS PS

Stage Stage E

CUSTOM STEEL FRAMES

Ph: 02 6884 2266 Fax: 02 6884 3159

**Document Register**

Job No. 6419

CATHERINE FIELDS PS

Stage Stage E

| Distributed to: | Distribution Date: | 06/7/20 | 10/07/20 | 13/07/20 | 13/07/20 | 14/07/20 | 16/07/20 | 16/07/20 | 17/07/20 | 19/7/20 | 22/7/20 | 24/07/20 | not sent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Colin Shanks; Custom Steel | No. of Copies | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Brandon McDougall; Custom Steel | | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sharon Mansfield; Custom Steel | | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Tony Collins; Custom Steel | | | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Bac Mai ; Barnson Engineers | | 1 | | | 1 | 1 | 1 | | | 1 | 1 | | |
| Aconex; Hansen Yuncken | | | | | | | | | | | | | |

| Document Title | Document No. | Sheet Size | Drawing Revision (Document Type: Electronic (E) or Print (P)) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | E | E | E | E | E | E | E | E | E | E | E | E |
| Layouts - Structural Plan | 6419-E-01 | A1 | 0 | | | | | | | | A | | | |
| Layouts - Floor Plan | 6419-E-02 | A1 | 0 | 1 | | | | | | | A | | | B |
| Layouts - Roof Plan | 6419-E-03 | A1 | 0 | | | | 1 | | | | A | B | | C |
| Layouts - Sections 1 | 6419-E-04 | A1 | 0 | | | | | | | | A | B | | |
| Layouts - Sections 2 | 6419-E-05 | A1 | 0 | | | | | | | | A | | | |
| | | | | | | | | | | | | | | |
| Wall Production Drawings | 6419-E-W00 | A3 | 0 | | A | A | | | | | | | | |
| Wall Production Drawings | 6419-E-W01 | A3 | 0 | | A | A | | | | | | | | |
| Wall Production Drawings | 6419-E-W02 | A3 | 0 | | A | A | | | | | | | | |
| Wall Production Drawings | 6419-E-W03 | A3 | 0 | | A | A | | | | | | | | |
| Wall Production Drawings | 6419-E-W04 | A3 | 0 | | A | A | | | | | | | | |
| Wall Production Drawings | 6419-E-W05 | A3 | 0 | | A | A | | | | | | | | |
| Wall Production Drawings | 6419-E-W06 | A3 | 0 | | A | A | | | | | | | | |
| Wall Production Drawings | 6419-E-W07 | A3 | 0 | | | | | | A | | | | | |
| Wall Production Drawings | 6419-E-W08 | A3 | 0 | | | | | | A | B | | | | |
| Wall Production Drawings | 6419-E-W09 | A3 | 0 | | | | | | A | | | | | |
| Wall Production Drawings | 6419-E-W10 | A3 | 0 | | | | | | | | A | | | |
| Wall Production Drawings | 6419-E-W11 | A3 | 0 | | | | | | | | A | | | |
| Wall Production Drawings | 6419-E-W12 | A3 | 0 | | | | | | | | A | | | |
| Wall Production Drawings | 6419-E-W13 | A3 | 0 | | | | | | | | A | | | |
| Wall Production Drawings | 6419-E-W14 | A3 | 0 | | | | | | | | A | | | |
| Wall Production Drawings | 6419-E-W15 | A3 | | | | | | | | | | | | A |
| | | | | | | | | | | | | | | |
| Truss Production Drawings | 6419-E-R00 | A3 | 0 | | A | A | | | | | | | | |
| Truss Production Drawings | 6419-E-R01 | A3 | 0 | | A | A | | | | | | | | |
| Truss Production Drawings | 6419-E-R02 | A3 | 0 | | A | A | B | | | | | | | |
| Truss Production Drawings | 6419-E-R03 | A3 | 0 | | | | A | | | | | | | |
| Truss Production Drawings | 6419-E-R04 | A3 | 0 | | | | A | | | | | | | |
| Truss Production Drawings | 6419-E-R05 | A3 | 0 | | | | A | | | | | | | |
| Truss Production Drawings | 6419-E-R06 | A3 | 0 | | | | | | | | A | | | |
| Truss Production Drawings | 6419-E-R07 | A3 | 0 | | | | | | | | A | B | | |
| Truss Production Drawings | 6419-E-R08 | A3 | 0 | | | | | | | | A | | | |
| | | | | | | | | | | | | | | |
| Structural Production Drawings | 6419-E-S01 | A3 | 0 | A | | | | | | | | | | |
| Structural Production Drawings | 6419-E-S02 | A3 | 0 | A | | | | | | | | | | |
| Structural Production Drawings | 6419-E-S03 | A3 | 0 | A | | | | | | | | | | |
| Structural Production Drawings | 6419-E-S04 | A3 | 0 | A | | | | | | | | | | |
| Structural Production Drawings | 6419-E-S05 | A3 | 0 | | | | A | | | | | | | |
| Structural Production Drawings | 6419-E-S06 | A3 | 0 | | | | A | | | | | | | |
| Structural Production Drawings | 6419-E-S07 | A3 | 0 | | | | A | | | | | | | |
| Structural Production Drawings | 6419-E-S08 | A3 | 0 | | | | A | | | | | | | |
| Structural Production Drawings | 6419-E-S09 | A3 | 0 | | | | A | | | | | | | |
| Structural Production Drawings | 6419-E-S10 | A3 | 0 | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S11 | A3 | 0 | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S12 | A3 | 0 | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S13 | A3 | 0 | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S14 | A3 | 0 | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S15 | A3 | 0 | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S16 | A3 | 0 | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S17 | A3 | 0 | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S18 | A3 | | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S19 | A3 | | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S20 | A3 | | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S21 | A3 | | | | | | A | | | | | | |
| Structural Production Drawings | 6419-E-S22 | A3 | | | | | | A | | | | | | |
| | | | | | | | | | | | | | | |
| Dispatch Package (For Custom Steel only) | | | | | | | | | | | | | | |
| ZONE 1 Dispatch | | A4 | | | | | | | | | | | A | |
| Prod. Items page 1 | | A4 | | | | | | | | | | | A | |
| Prod. Items page 2 | | A4 | | | | | | | | | | | A | B |
| Cut Items | | A4 | | | | | | | | | | | A | |
| Cut Items - Purlins | | A4 | | | | | | | | | | | A | |
| Cut Items - Brackets | | A4 | | | | | | | | | | | A | |
| | | | | | | | | | | | | | | |
| ZONE 2 Dispatch | | A4 | | | | | | | | | | | | A |
| Prod. Items page 1 | | A4 | | | | | | | | | | | | A |
| Prod. Items page 2 | | A4 | | | | | | | | | | | | A |
| Cut Items | | A4 | | | | | | | | | | | | A |
| Cut Items - Brackets | | A4 | | | | | | | | | | | | A |
| | | | | | | | | | | | | | | |
| ZONE 3 Dispatch | | A4 | | | | | | | | | | | | A |
| Prod. Items page 1 | | A4 | | | | | | | | | | | | A |
| Cut Items | | A4 | | | | | | | | | | | | A |
| Cut Items - Purlins | | A4 | | | | | | | | | | | | A |
| Cut Items - Purlins + Holes | | A4 | | | | | | | | | | | | A |
| Cut Items - Brackets | | A4 | | | | | | | | | | | | A |

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DESIGN | PLAN | MANAGE

a Unit 1 / 1 Rankin Street
Bathurst NSW 2795
t 1300 BARNSON (1300 227 676)
e generalenquiry@barnson.com.au
w www.barnson.com.au

date
30/10/2020
reference
34107-SL02_B_Stage A
receiver
Custom Steel Frames
Attn: Colin Shanks
110 Fitzroy Street
Dubbo NSW 2830

Dear Sir,

# Re: Project 6419- Catherine Fields Public School at Catherine Fields NSW 2557 Stage A: Steel Roof and Wall Frames Structural Design Certification

As requested, we advise that the structural design for the steel roof trusses and wall frames as detailed on your production drawings as per the attached document transmittal form, prepared by Custom Steel Frames for the above project, is structurally adequate to NCC 2016 Amdt 1, section B1 for the below design parameters.

## 1. Loading

General principles of loading calculation and loading combinations to Australian Loading Code AS1170.0-2002 and other relevant codes and parameters as below:

(a) Dead Load
  (i) Roof: Self weight of Steel sheeted roof, battens, truss and ceilings (max 0.3kPa).
(b) Live Load
  (i) Roof: Maintenance load of 1.8/A + 0.12kPa (min 0.25kPa) as per AS1170.1-2002.
  (ii) Point Loading: 1.1kN as per AS1170.1-2002.
(c) Wind Load
  (i) Wind Loads: Region A, Terrain Category 2.5, Mt=Ms=1.0, Importance level 2 to AS1170.2-2012.

## 2. Steelwork

a. Cold Formed Sections: Grade 500 to AS4600-2018.
b. Hollow Sections: Grade 450 to AS4100-1998.
c. Durability: Atmospheric Corrosivity Category C3 to AS4312-2008:
  i. Covered steelwork: Class 2.5 blast plus 75micron Epoxy Zinc coating to AS2312.1-2014 or ILG 140 to AS4792-2006.

ii. Exposed Steelwork: HDG300 to AS 4680-2006
iii. Cold formed Steelwork: AZ150 or AM150 to AS1397-2011
iv. Screws to be class 3 to AS3566.2, Bolts to be HDG to AS1214.

3. **Serviceability: Design complies with the below mentioned NASH Standard deflection criteria.**
   (a) Roof under dead load: Deflection < Span/500.
   (b) Roof under live load: Deflection < Span/250.
   (c) Roof under wind load: Deflection < Span/150.
   (d) Stud walls under lateral loading (serviceability wind loads): Deflection < Height/200 or max 20mm

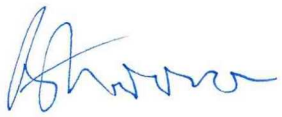
4. **Fabrication/Erection/Tie down**

Complies with Custom Steel Frames standard specification drawing no. 4003-01 as approved by undersigned.

If you have any further enquiries regarding this matter, please do not hesitate to contact Barnson.

Yours faithfully

**BARNSON PTY LTD**



Richard J Noonan
BE (Hons) ME FIEAust CPEng NER
**Consulting Engineer/Company Director**

*Encl: Document transmittal form*

# CUSTOM STEEL FRAMES

Ph: 02 6884 2266 Fax: 02 6884 3159

Probably the best frame money can buy

**Document Register**

Customer Details: **Hansen Yuncken**

Project: **CATHERINE FIELDS PS**

Job No. **6419**

Stage **Stage A**

| Distributed to: | Distribution Date: | 30/7/20 | 06/08/20 | 07/08/20 | 10/08/20 | 12/08/20 | 13/08/20 | 17/08/20 | 20/08/20 | 20/08/20 | 21/08/20 | 11/09/20 | 22/09/20 | 29/10/20 |
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| Sharon Mansfield; Custom Steel | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Tony Collins; Custom Steel | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Bac Mai ; Barnson Engineers | | 1 | | 1 | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 |
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| Aconex; Hansen Yuncken | | | | | | | | | | | | | | |
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| Document Title | Document No. | Sheet Size | Drawing Revision (Document Type: Electronic (E) or Print (P)) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Layouts - Structural Plan | 6419-A-01 | A1 | 0 | | | | A | | B | | | | | | C |
| Layouts - Floor Plan | 6419-A-02 | A1 | 0 | | | | A | B | | | | | | C | D |
| Layouts - Roof Plan | 6419-A-03 | A1 | 0 | | | | A | | B | C | | | | | |
| Layouts - Sections | 6419-A-04 | A1 | 0 | | | | | | A | | | | | | |
| Wall Production Drawings | 6419-A-W00 | A3 | 0 | | | | A | | | | | | | | |
| Wall Production Drawings | 6419-A-W01 | A3 | 0 | | | | A | | | | | | | | |
| Wall Production Drawings | 6419-A-W02 | A3 | 0 | | | | A | | | | | | B | | |
| Wall Production Drawings | 6419-A-W03 | A3 | 0 | | | | A | B | C | | | | | | |
| Wall Production Drawings | 6419-A-W04 | A3 | 0 | | | | A | | | | | | | | |
| Wall Production Drawings | 6419-A-W05 | A3 | 0 | | | | A | | | | | | | | |
| Wall Production Drawings | 6419-A-W06 | A3 | 0 | | | | A | | | | | | | | |
| Wall Production Drawings | 6419-A-W07 | A3 | 0 | | | | A | | | | | | | | |
| Wall Production Drawings | 6419-A-W08 | A3 | 0 | | | | A | | | | | | | | |
| Wall Production Drawings | 6419-A-W09 | A3 | 0 | | | | A | | | | | | | | |
| Wall Production Drawings | 6419-A-W10 | A3 | | | | | | A | | | | | | | B |
| Truss Production Drawings | 6419-A-R00 | A3 | 0 | | | | A | | | | | | | | |
| Truss Production Drawings | 6419-A-R01 | A3 | 0 | | | | A | | | | | | | | |
| Truss Production Drawings | 6419-A-R02 | A3 | 0 | | | | A | | B | | | | | | |
| Truss Production Drawings | 6419-A-R03 | A3 | 0 | | | | A | | B | | | | | | |
| Truss Production Drawings | 6419-A-R04 | A3 | 0 | | | | A | | B | | | | | | |
| Truss Production Drawings | 6419-A-R05 | A3 | 0 | | | | A | | B | | | C | | | |
| Truss Production Drawings | 6419-A-R06 | A3 | 0 | | | | A | | | | | | | | |
| Truss Production Drawings | 6419-A-R07 | A3 | 0 | | | | A | | | | | | | | |

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Customer Details: **Hansen Yuncken**

Project: **CATHERINE FIELDS PS**

Job No. **6419**

Stage **Stage A**

| Distributed to: | Distribution Date: | 30/7/20 | 06/08/20 | 07/08/20 | 10/08/20 | 12/08/20 | 13/08/20 | 17/08/20 | 20/08/20 | 20/08/20 | 21/08/20 | 11/09/20 | 22/09/20 | 29/10/20 |
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| Sharon Mansfield; Custom Steel | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Tony Collins; Custom Steel | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Bac Mai ; Barnson Engineers | | 1 | | 1 | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 |
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| | | | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Structural Production Drawings | 6419-A-S01 | | 0 | A | | | | | | | | | | | |
| Structural Production Drawings | 6419-A-S02 | | 0 | A | | | | | | | | | | | |
| Structural Production Drawings | 6419-A-S03 | | 0 | | A | | | | | | | | | | B |
| Structural Production Drawings | 6419-A-S04 | | 0 | A | | | | | | | | | | | |
| Structural Production Drawings | 6419-A-S05 | | | | | A | | | | | | | | | |
| Structural Production Drawings | 6419-A-S06 | | | | | A | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| Dispatch Package (For Custom Steel only) | | | | | | | | | | | | | | | |
| Dispatch | | A4 | | | | | | | | A | | | | | |
| Prod. Items page 1 | | A4 | | | | | | | | A | | | | | |
| Prod. Items page 2 | | A4 | | | | | | | | A | | | | | |
| Cut Items | | A4 | | | | | | | | A | | | | | |
| Cut Items - Purlins | | A4 | | | | | | | | A | B | | | | |
| Cut Items - Brackets | | A4 | | | | | | | | A | B | | | | |

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e generalenquiry@barnson.com.au
w www.barnson.com.au

date
16/09/2020
reference
34107-SL03_A_Stage E - Awning.docx
receiver
Custom Steel Frames
Attn: Colin Shanks
110 Fitzroy Street
Dubbo NSW 2830

Dear Sir,

# Re: Project 6419- Catherine Field Public School at O'Keefe Drive, Oran Park
# Stage E-Awning: Steel Roof Frames and Columns
# Structural Design Certification

As requested, we advise that the structural design for the steel roof framing and columns as detailed on your production drawings as per the attached document transmittal form, prepared by Custom Steel Frames for the above project, is structurally adequate to NCC 2016 Amdt 1, section B1 for the below design parameters.

## 1. Loading

General principles of loading calculation and loading combinations to Australian Loading Code AS1170.0-2002 and other relevant codes and parameters as below:

(a) Dead Load
  (i) Roof: Self weight of Steel sheeted roof, battens, framing and ceiling (max 0.3kPa).
(b) Live Load
  (i) Roof: Maintenance load of 1.8/A + 0.12kPa (min 0.25kPa) as per AS1170.1-2002.
  (ii) Point Loading: 1.1kN as per AS1170.1-2002.
(c) Wind Load
  (i) Wind Loads: Region A, Terrain Category 2.5, Mt=Ms=1.0, Importance level 2 to AS1170.2-2012.

## 2. Steelwork

a. Cold Formed Sections: Grade 500 to AS4600-2018.
b. Hollow Sections: Grade 450 to AS4100-1998.
c. Durability: Atmospheric Corrosivity Category C3 to AS4312-2008:

i. Covered steelwork: Class 2.5 blast plus 75micron Epoxy Zinc coating to AS2312.1-2014 or ILG 140 to AS4792-2006.
ii. Exposed Steelwork: HDG300 to AS 4680-2006
iii. Cold formed Steelwork: AZ150 or AM150 to AS1397-2011
iv. Screws to be class 3 to AS3566.2, Bolts to be HDG to AS1214.
v. Masonry anchors to have minimum 25 micron zinc coating.

3. **Serviceability: Design complies with the below mentioned NASH Standard deflection criteria.**
   (a) Roof under dead load: Deflection < Span/500.
   (b) Roof under live load: Deflection < Span/250.
   (c) Roof under wind load: Deflection < Span/150.

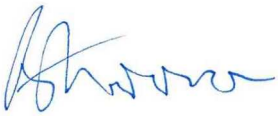
4. **Fabrication/Erection/Tie down**

Complies with Custom Steel Frames standard specification drawing no. 4003-01 as approved by undersigned.

If you have any further enquiries regarding this matter, please do not hesitate to contact Barnson.

Yours faithfully

**BARNSON PTY LTD**



Richard J Noonan
BE(Hons) ME FIEAust CPEng NER
**Consulting Engineer/Company Director**

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Job No. 6419

*Customer Details*

**Hansen Yuncken**

*Project*

**CATHERINE FIELDS PS**

Stage **Stage E**

| ***Distributed to:*** | ***Distribution Date:*** | 19/7/20 | 22/7/20 | 24/07/20 | 27/07/20 | 28/07/20 | 19/08/20 | 27/08/20 | 09/09/19 | 15/09/20 |
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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | E | E | E | E | E | E | E | E | E |
| Layout - Awning | 6419-E-06 | A1 | | | | | | 0 | | A | B |
| Structural Production Drawings | 6419-E-S23 | A3 | | | | | | 0 | | A | |
| Structural Production Drawings | 6419-E-S24 | A3 | | | | | | 0 | | A | |
| Structural Production Drawings | 6419-E-S25 | A3 | | | | | | | | A | |
| Structural Production Drawings | 6419-E-S26 | A3 | | | | | | | | A | |
| Structural Production Drawings | 6419-E-S27 | A3 | | | | | | | | A | B |
| Structural Production Drawings | 6419-E-S28 | A3 | | | | | | | | A | B |

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date
15/10/2020
reference
34107-SL07_A_Stage AG - Lower
receiver
Custom Steel Frames
Attn: Colin Shanks
110 Fitzroy Street
Dubbo NSW 2830

Dear Sir,

# Re: Project 6419- Catherine Fields Public School at Catherine Fields NSW 2557

# Stage AG- Wall Frames
# Structural Design Certification

As requested, we advise that the structural design for the steel wall frames as detailed on your production drawings as per the attached document transmittal form, prepared by Custom Steel Frames for the above project, is structurally adequate to NCC 2016 Amdt 1, section B1 for the below design parameters.

## 1. Loading

General principles of loading calculation and loading combinations to Australian Loading Code AS1170.0-2002 and other relevant codes and parameters as below:

(a) Dead Load
  (i) Roof: Nil.
(b) Live Load
  (i) Point Loading: 1.1kN as per AS1170.1-2002.
(c) Wind Load
  (i) Wind Loads: Region A, Terrain Category 2.5, Mt=Ms=1.0, Importance level 2 to AS1170.2-2012.

## 2. Steelwork

a. Cold Formed Sections: Grade 500 to AS4600-2018.
b. Hollow Sections: Grade 450 to AS4100-1998.
c. Durability: Atmospheric Corrosivity Category C3 to AS4312-2008:
  i. Covered steelwork: Class 2.5 blast plus 75micron Epoxy Zinc coating to AS2312.1-2014 or ILG 140 to AS4792-2006.
  ii. Exposed Steelwork: HDG300 to AS 4680-2006
  iii. Cold formed Steelwork: AZ150 or AM150 to AS1397-2011
  iv. Screws to be class 3 to AS3566.2, Bolts to be HDG to AS1214.

3. **Serviceability: Design complies with the below mentioned NASH Standard deflection criteria.**
   (a) Stud walls under lateral loading (serviceability wind loads):
   Deflection < Height/200 or max 20mm

4. **Fabrication/Erection/Tie down**

Complies with Custom Steel Frames standard specification drawing no. 4003-01 as approved by undersigned.

If you have any further enquiries regarding this matter, please do not hesitate to contact Barnson.

Yours faithfully

**BARNSON PTY LTD**

Richard J Noonan
BE (Hons) ME FIEAust CPEng NER
**Consulting Engineer/Company Director**

*Encl: Document transmittal form*

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Project: **CATHERINE FIELDS PS**

Job No. **6419**

Stage **Stage AG**

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| Document Title | Document No. | Sheet Size | Drawing Revision (Document Type: Electronic (E) or Print: (P)) | |
|---|---|---|---|---|
| | | | E | E |
| Layouts - Structural Plan | 6419-A-01 | A1 | 0 | A |
| Wall Production Drawings | 6419-A-W00 | A3 | 0 | A |
| Wall Production Drawings | 6419-A-W01 | A3 | 0 | A |
| Wall Production Drawings | 6419-A-W02 | A3 | 0 | A |
| Wall Production Drawings | 6419-A-W03 | A3 | 0 | A |
| Wall Production Drawings | 6419-A-W04 | A3 | 0 | A |
| Wall Production Drawings | 6419-A-W05 | A3 | 0 | A |
| Wall Production Drawings | 6419-A-W06 | A3 | 0 | A |
| Wall Production Drawings | 6419-A-W07 | A3 | | A |
| Dispatch Package (For Custom Steel only) | | | | |
| Dispatch | | A4 | | |
| Cut Items | | A4 | | |
| Cut Items - Brackets | | A4 | | |

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date
19/10/2020
reference
34107-SL08_A_Stage AE
receiver
Custom Steel Frames
Attn: Colin Shanks
110 Fitzroy Street
Dubbo NSW 2830

Dear Sir,

# Re: Project 6419- Catherine Field Public School at O'Keefe Drive, Oran Park
# Stage Link A& E: Steel Roof Frames and Columns
# Structural Design Certification

As requested, we advise that the structural design for the steel roof framing and columns as detailed on your production drawings as per the attached document transmittal form, prepared by Custom Steel Frames for the above project, is structurally adequate to NCC 2016 Amdt 1, section B1 for the below design parameters.

## 1. Loading

General principles of loading calculation and loading combinations to Australian Loading Code AS1170.0-2002 and other relevant codes and parameters as below:

(a) Dead Load
  (i) Roof: Self weight of Steel sheeted roof, battens, framing and ceiling (max 0.3kPa).
(b) Live Load
  (i) Roof: Maintenance load of 1.8/A + 0.12kPa (min 0.25kPa) as per AS1170.1-2002.
  (ii) Point Loading: 1.1kN as per AS1170.1-2002.
(c) Wind Load
  (i) Wind Loads: Region A, Terrain Category 2.5, Mt=Ms=1.0, Importance level 2 to AS1170.2-2012.

## 2. Steelwork

a. Cold Formed Sections: Grade 500 to AS4600-2018.
b. Hollow Sections: Grade 450 to AS4100-1998.
c. Durability: Atmospheric Corrosivity Category C3 to AS4312-2008:

i. Covered steelwork: Class 2.5 blast plus 75micron Epoxy Zinc coating to AS2312.1-2014 or ILG 140 to AS4792-2006.
ii. Exposed Steelwork: HDG300 to AS 4680-2006
iii. Cold formed Steelwork: AZ150 or AM150 to AS1397-2011
iv. Screws to be class 3 to AS3566.2, Bolts to be HDG to AS1214.
v. Masonry anchors to have minimum 25 micron zinc coating.

3. **Serviceability: Design complies with the below mentioned NASH Standard deflection criteria.**
   (a) Roof under dead load: Deflection < Span/500.
   (b) Roof under live load: Deflection < Span/250.
   (c) Roof under wind load: Deflection < Span/150.

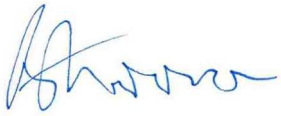
4. **Fabrication/Erection/Tie down**

Complies with Custom Steel Frames standard specification drawing no. 4003-01 as approved by undersigned.

If you have any further enquiries regarding this matter, please do not hesitate to contact Barnson.

Yours faithfully

**BARNSON PTY LTD**



Richard J Noonan
BE(Hons) ME FIEAust CPEng NER
**Consulting Engineer/Company Director**

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**Hansen Yuncken**

*Project*

**CATHERINE FIELDS PS**

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| | | | E | E | E |
| Layouts - Structural Plan | 6419-AE-01 | A1 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S01 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S02 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S03 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S04 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S05 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S06 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S07 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S08 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S09 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S10 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S11 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S12 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S13 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S14 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S15 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S16 | A3 | 0 | 1 | A |
| Structural Production Drawings | 6419-AE-S17 | A3 | 0 | 1 | A |

# CUSTOM STEEL FRAMES

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Job No. 6419

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**Hansen Yuncken**

*Project*

**CATHERINE FIELDS PS**

*Stage* **Stage A**

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| Tony Collins; Custom Steel | | | | | | | | | |
| Bac Mai ; Barnson Engineers | | 1 | 1 | 1 | | | | | |
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| Aconex; Hansen Yuncken | | | | | | | | | |
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| | | | E | E | E | | | | | |
| Structural Production Drawings | 6419-AE-S18 | A3 | 0 | 1 | Deleted | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Dispatch Package (For Custom Steel only) | | | | | | | | | | |
| Dispatch | | A4 | | | | | | | | |
| Prod. Items page 1 | | A4 | | | | | | | | |
| Prod. Items page 2 | | A4 | | | | | | | | |
| Cut Items | | A4 | | | | | | | | |
| Cut Items - Purlins | | A4 | | | | | | | | |
| Cut Items - Brackets | | A4 | | | | | | | | |

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date
2/12/2020
reference
34107-SL10_A Awning BCD
receiver
Custom Steel Frames
Attn: Colin Shanks
110 Fitzroy Street
Dubbo NSW 2830

Dear Sir,

# Re: Project 6419- Catherine Field Public School at O'Keefe Drive, Oran Park
# Stage BCD Walkways: Steel Roof Frames and Columns
# Structural Design Certification

As requested, we advise that the structural design for the steel roof framing and columns as detailed on your production drawings as per the attached document transmittal form, prepared by Custom Steel Frames for the above project, is structurally adequate to NCC 2016 Amdt 1, section B1 for the below design parameters.

## 1. Loading

General principles of loading calculation and loading combinations to Australian Loading Code AS1170.0-2002 and other relevant codes and parameters as below:

(a) Dead Load
  (i) Roof: Self weight of Steel sheeted roof, battens, framing and ceiling (max 0.3kPa).
(b) Live Load
  (i) Roof: Maintenance load of 1.8/A + 0.12kPa (min 0.25kPa) as per AS1170.1-2002.
  (ii) Point Loading: 1.1kN as per AS1170.1-2002.
(c) Wind Load
  (i) Wind Loads: Region A, Terrain Category 2.5, Mt=Ms=1.0, Importance level 2 to AS1170.2-2012.

## 2. Steelwork

a. Cold Formed Sections: Grade 500 to AS4600-2018.
b. Hollow Sections: Grade 450 to AS4100-1998.
c. Durability: Atmospheric Corrosivity Category C3 to AS4312-2008:

i. Covered steelwork: Class 2.5 blast plus 75micron Epoxy Zinc coating to AS2312.1-2014 or ILG 140 to AS4792-2006.
ii. Exposed Steelwork: HDG300 to AS 4680-2006
iii. Cold formed Steelwork: AZ150 or AM150 to AS1397-2011
iv. Screws to be class 3 to AS3566.2, Bolts to be HDG to AS1214.
v. Masonry anchors to have minimum 25 micron zinc coating.

3. **Serviceability: Design complies with the below mentioned NASH Standard deflection criteria.**
   (a) Roof under dead load: Deflection < Span/500.
   (b) Roof under live load: Deflection < Span/250.
   (c) Roof under wind load: Deflection < Span/150.

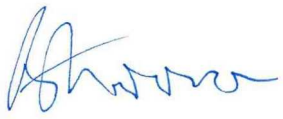
4. **Fabrication/Erection/Tie down**

Complies with Custom Steel Frames standard specification drawing no. 4003-01 as approved by undersigned.

If you have any further enquiries regarding this matter, please do not hesitate to contact Barnson.

Yours faithfully

**BARNSON PTY LTD**



Richard J Noonan
BE(Hons) ME FIEAust CPEng NER
**Consulting Engineer/Company Director**

*Encl: Document transmittal form*

# CUSTOM STEEL FRAMES DUBBO

# Document Register

*Ph: 02 6884 2266 Fax: 02 6884 3159*

*Job No.* **6419**

*Stage* **Stage BCD Walkways**

*Customer Details*

**HANSEN YUNCKEN**

*Project*

**CATHERINE FIELD PS**

***Distribution Date:***

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| ***Document Title*** | ***Sheet Size*** | ***Drawing Revision*** Document Type: Electronic (E) / Print (P) | | | | |
|---|---|---|---|---|---|---|
| | | E | | | | |
| 6419-B-01 | A1 | A | | | | |
| 6419-B-02 | A1 | A | | | | |
| 6419-B-03 | A1 | A | | | | |
| 6419-B-BOLT1 | A4 | A | | | | |
| 6419-B-DISP | A4 | A | | | | |
| 6419-B-PROD1 | A4 | A | | | | |
| 6419-B-PUR1 | A4 | A | | | | |
| 6419-B-PUR2 | A4 | A | | | | |
| 6419-B-R01 | A3 | A | | | | |
| 6419-B-S01 | A3 | A | | | | |
| 6419-B-S02 | A3 | A | | | | |
| 6419-B-S03 | A3 | A | | | | |
| 6419-B-S04 | A3 | A | | | | |
| 6419-B-Tally1 | A4 | A | | | | |
| 6419-B-TRUSS1 | A4 | A | | | | |
| 6419-C01 | A1 | A | | | | |
| 6419-C02 | A1 | A | | | | |
| 6419-C03 | A1 | A | | | | |
| 6419-C04 | A1 | A | | | | |
| 6419-C05 | A1 | A | | | | |
| 6419-C-BOLT1 | A4 | A | | | | |
| 6419-C-DISP | A4 | A | | | | |
| 6419-C-PROD1 | A4 | A | | | | |
| 6419-C-PUR1 | A4 | A | | | | |
| 6419-C-R01 | A3 | A | | | | |
| 6419-C-S01 | A3 | A | | | | |
| 6419-C-S02 | A3 | A | | | | |
| 6419-C-S03 | A3 | A | | | | |
| 6419-C-Tally1 | A4 | A | | | | |
| 6419-C-Truss1 | A4 | A | | | | |
| 6419-D-BOLT1 | A4 | A | | | | |
| 6419-D-BOLT2 | A4 | 0 | | | | |
| 6419-D-CUT1 | A4 | A | | | | |
| 6419-D-DISP | A4 | A | | | | |
| 6419-D-DISP2 | A4 | A | | | | |
| 6419-D-PROD1 | A4 | A | | | | |
| 6419-D-PROD2 | A4 | A | | | | |
| 6419-D-PUR1 | A4 | A | | | | |
| 6419-D-PUR2 | A4 | A | | | | |
| 6419-D-R01 | A3 | A | | | | |
| 6419-D-S01 | A3 | A | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6419-D-S02 | A3 | A | | | | |
| 6419-D-S03 | A3 | A | | | | |
| 6419-D-S04 | A3 | A | | | | |
| 6419-D-S05 | A3 | A | | | | |
| 6419-D-S06 | A3 | A | | | | |
| 6419-D-S11 | A3 | A | | | | |
| 6419-D-Tally1 | A4 | A | | | | |
| 6419-D-Tally2 | A4 | 0 | | | | |

# ENGINEERING REPORT FOR PILE FOUNDATIONS

## Steel Screw Piles Structural Design Certificate

Project No | PE1968
Date | 17 June 2020

Moody Wahba
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## STEEL SCREW PILES STRUCTURAL DESIGN CERTIFICATE

CATHERINE FIELD PUBLIC SCHOOL @ BARRY O'KEEFE DRIVE, CATHERINE FIELD, NSW 17/06/2020

The screw piles for the above-mentioned project, and shown in the table below, have been designed in accordance with the relevant Australian Standards particularly the following:

1. AS2159 – Piling design and installation.
2. AS1163 – Cold formed structural steel hollow sections.
3. AS4100 – Steel structures.
4. AS1170 – Structural design actions.
5. AS3678 – Structural steel - Hot-rolled plates, floorplates and slabs

The piles have been designed for the safe working loads nominated on the structural drawings, and for the sizes and depths as per the table below. All piles should be screwed to refusal in the appropriate founding material as per the geotechnical report.

All piles have been designed based on a Mildly Aggressive soil exposure classification (0.02mm/year corrosion rate) for a 50-year design life in accordance with AS2159 – 2009. Piles should be installed to an average depth of 2.0-3.0m below NGL/BEL to found in the Very Low Strength Siltstone Bedrock Layer as per the geotechnical report, if available. All piles should be core-filled (40MPa Block Mix) as per APE design. (Any parameters that are not provided in tender documents are thereby assumed for design purposes).

**Structural Drawings** | Northrop: Dwg# NHQC2-CF-ST-DWG-01_S03.11, Rev H, dated: 04/06/20

**Geotechnical Report** | JK Geotechnics: Ref# 31912SQrpt, dated: 05/11/18

| Pile Mark | Pile Size | Helix Size | Pile Length | Load/Pile | Driving Torque | Connection Detail |
|---|---|---|---|---|---|---|
| SP1 | 168 x 6.4mm CHS | 600 x 25mm | 2.0-3.0m | 350kN Working<br>525kN Ultimate | 50kNm | 2N28-2000mm<br>300mm Cog |

Digitally signed by Moody Wahba
Date: 2020.06.17 20:59:09 +10'00'

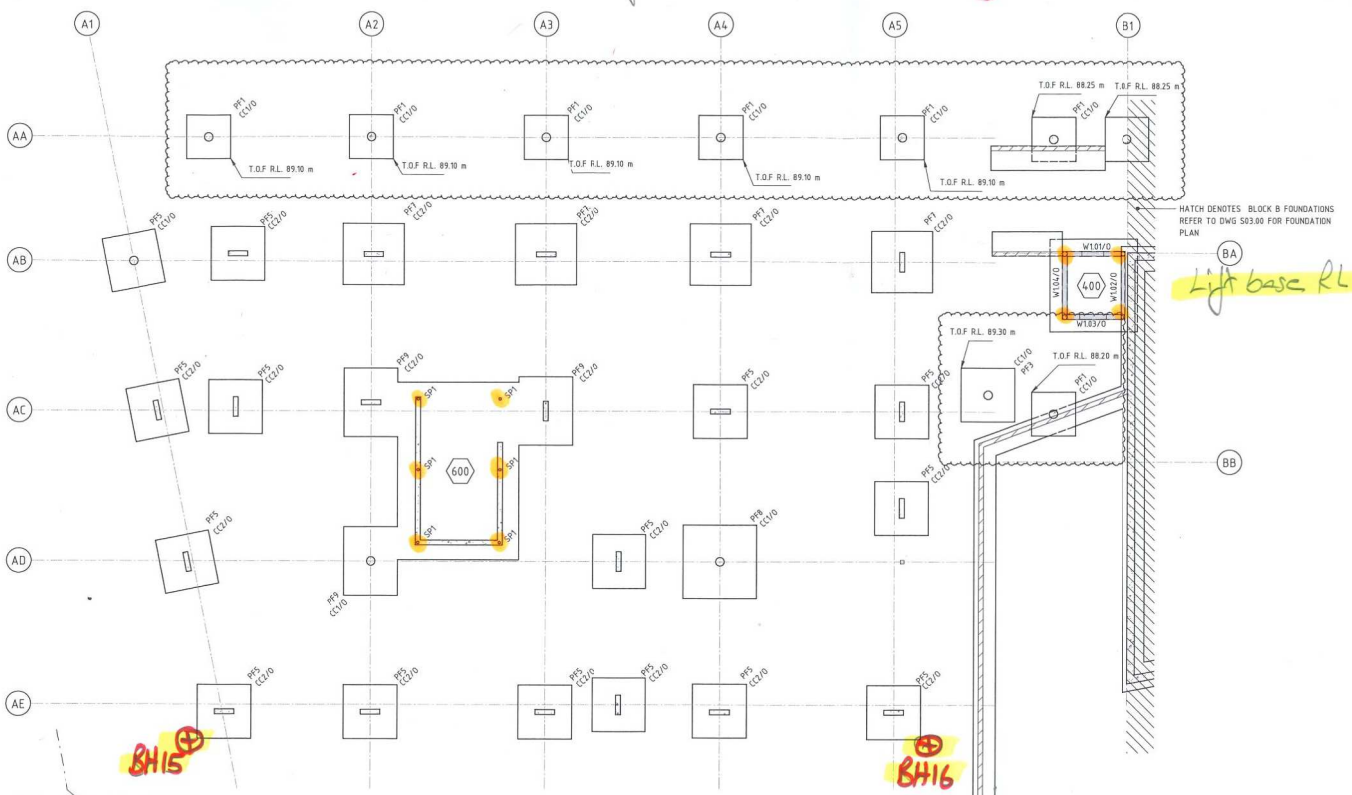
**Moody Wahba** | Civil Engineer

BEng (Civil), MEngSc, MIEAust, CPEng, NER

# Appendix A - Mark-up Plans

BH 11
3.2m to rock
from RL 89.4

Piling Experts mark-up plan Rev 1




FOUNDATION PLAN - BLOCK A

Block A BEL 89.4

(10) 350 UC 137 x 6.4 CHS — (6) @ 3.0 —

(4) @ 2.0 —

## GENERAL NOTES:

- FOR STRUCTURAL SPECIFICATIONS REFER TO DRAWINGS S0.01, S01.02 AND S01.03.
- REFER TO TYPICAL EXTERNAL PAD FOOTING DETAIL ON S10.01 FOR EXTERNAL PAD FOOTING DETAILS
- REFER TO S10.01 FOR PAD FOOTING REINFORCEMENT SPECIFICATIONS
- PAD FOOTINGS TO BE FOUNDED IN MINIMUM 100 kPa ALLOWABLE BEARING CAPACITY MATERIAL. ALLOWABLE BEARING PRESSURE TO BE CONFIRMED ON SITE BY GEOTECHNICAL ENGINEER.
- ALL FOOTINGS TO BE POURED IN 32 MPa CONCRETE

## LEGEND:

| | |
|---|---|
| 200 | DENOTES CONCRETE THICKNESS |
| CC1/0 | DENOTES REINFORCED CONCRETE COLUMN OVER |
| SC1/0 | DENOTES STEEL COLUMN OVER |
| BW1 | DENOTES LOAD BEARING MASONRY WALL OVER AND UNDER |
| -40 | DENOTES SETDOWN VALUE FOR WET AREAS |
| DJ | DENOTES DOWEL JOINT. REFER TO DRAWING S11.01 FOR DETAILS |
| SJ | DENOTES DOWEL JOINT. REFER TO DRAWING S11.01 FOR DETAILS |

### PAD FOOTING SCHEDULE

| MARK | SIZE | REINFORCEMENT BOTTOM B1 | BOTTOM B2 | TOP T1 | TOP T2 | SIDE |
|---|---|---|---|---|---|---|
| PF1 | 1800 x 1800 x 300D | 10N16-200 | 10N16-200 | - | - | - |
| PF2 | 2600 x 1000 x 600D | 6N16-200 | 13N16-200 | 6N16-200 | 13N16-200 | - |
| PF3 | 2200 x 2200 x 450D | 11N16-200 | 11N16-200 | - | - | - |
| PF4 | 1500 x 1500 x 300D | 7N16-200 | 7N16-200 | - | - | - |
| PF5 | 2200 x 2200 x 600D | 11N16-200 | 11N16-200 | - | - | - |
| PF6 | 2200 x 2200 x 300D | 11N16-200 | 11N16-200 | - | - | - |
| PF7 | 2500 x 2500 x 600D | 13N16-200 | 13N16-200 | - | - | - |
| PF8 | 3000 x 3000 x 600D | 15N16-200 | 15N16-200 | - | - | - |
| PF9 | 2800 x 2200 x 600D | 15N16-200 | 12N16-200 | - | - | - |
| PF10 | 2800 x 2800 x 450D | 14N16-200 | 14N16-200 | - | - | - |
| PF11 | 3200 x 1800 x 300D | 10N16-200 | 17N16-200 | 10N16-200 | 17N16-200 | - |

### PILE LOAD SCHEDULE

| MARK | SWL (kN) | ULS GRAVITY (kN) | COMMENT(S) |
|---|---|---|---|
| SP1 | 350 | 525 | |

### FOUNDATION SCHEDULE

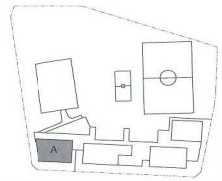
| MARK | SIZE | COMMENT(S) |
|---|---|---|
| STRIP FOOTING | | |
| SF1 | 300 DEEP x 1500 WIDE | N16-200 EW BTM |

### CONCRETE COLUMN SCHEDULE

| MARK | SIZE | COMMENT(S) |
|---|---|---|
| CC1 | 350 DIA | 5N20 VERTICAL + R10-200 TIES |
| CC2 | 200 x 800 | 8N20 VERTICAL + R10-200 TIES |

### WALL SCHEDULE

| MARK | THICKNESS | COMMENT(S) |
|---|---|---|
| BLOCK RETAINING WALL | | |
| RW1 | 190 | REFER TO CIVIL DOCUMENTATION FOR RETAINING WALL SETOUT AND DETAILS |
| CONCRETE | | |
| CW1 | 200 | N16-200 EF VERTICAL + N12-200 EF HORIZONTAL |
| PRECAST | | |
| PCP1 | 200 | |




DRAWN: MH DESIGNED: MK JOB MANAGER: JL VERIFIER: -

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AMMENDMENTS

| REV | BY | DATE | DESCRIPTION |
|---|---|---|---|
| A | JL | 09.08.19 | 50% ISSUE |
| B | JL | 17.09.19 | ISSUED FOR SCHEMATIC DESIGN |
| C | JL | 18.12.19 | 75% ISSUE |
| D | JL | 20.12.19 | ISSUED FOR DETAILED DESIGN |
| E | JL | 24.01.20 | REVISED FOR DETAILED DESIGN |
| F | JL | 20.03.20 | REVISED FOR DETAIL DESIGN |
| G | JL | 12.05.20 | ISSUED FOR REINFORCEMENT SCHEDULING |
| H | JL | 04.06.20 | REVISED FOR REINFORCEMENT SCHEDULING |



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PERUMAL PEDAVOLI ARCHITECTS T: 02 9281 0900 W: www.pp-a.com.au Nominated Architect: Vince Pedavoli NSW reg No.5045
LANDSCAPING: TAYLOR BRAMMER LANDS, ARCH. (02) 9387 8855

PERUMAL PEDAVOLI ARCHITECTS

CATHERINE FIELD PS
NEW HIGH QUALITY CLASSROOMS

DRAWING NAME: FOUNDATION PLAN - BLOCK A

PROJECT NORTH

SCALE 1 : 100 @ A1

| DRAWN | CHECKED | VERIFIED | DATE |
|---|---|---|---|
| MH | JL | - | 04.06.20 |

DRAWING NUMBER: NHQC2 - CF - ST - DWG-01_S03.11
PROJECT CODE | SCH. REF. | DISC. | TYPE | SERIES#
REVISION: H

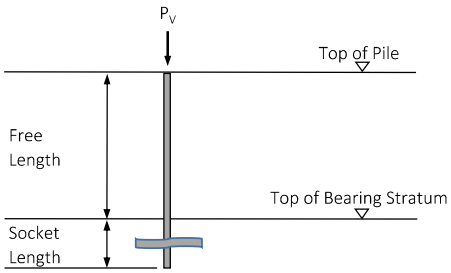
Project Status

# Appendix B - Structural & Geotechnical Capacity Calculations

# Structural & Geotechnical Capacity Calculations

| | | | |
|---|---|---|---|
| **Project Name:** | Catherine Field Public School | **Date:** | 17/06/20 |
| **Project Address:** | Barry O'keefe Drive, Catherine Field, NSW | **Project No:** | PE1968 |
| **Structural Drawings:** | Northrop: Dwg# NHQC2-CF-ST-DWG-01_S03.11, Rev H, dated: 04/06/20 | **Pile Mark:** | SP1 |
| **Geotechnical Report:** | JK Geotechnics: Ref# 31912SQrpt, dated: 05/11/18 | **Prep By:** | Moody Wahba |

## 1 Pile Data




| | | | | | |
|---|---|---|---|---|---|
| Pile No. | | | | **SP1** | |
| Helix | 600 x 25 | $D_h$ | = | 600 | mm |
| CHS Dia | | $D_s$ | = | 168 | mm |
| CHS Thickness | | $t_s$ | = | 6.4 | mm |
| Helix Area | | $A_b$ | = | 0.283 | $m^2$ |
| Helix Thickness | | $t_h$ | = | 25 | mm |
| CHS Circumference | | $C_c$ | = | 0.528 | m |
| Free Length | | $L_f$ | = | 2.0 | m |
| Socket Length | | $L_s$ | = | 0.5 | m |
| Pile Yeild Strength | | $f_y$ | = | 320,000 | kPa |
| Modulus of Elasticity - Pile | | $E_p$ | = | 200,000 | MPa |
| Poisson's Ratio - Pile | | $n$ | = | 0.20 | |

## 2 Structural Loading Data

**Vertical Compression Load Per Pile**

| | | | | | |
|---|---|---|---|---|---|
| Serviceability load per pile | **SLS** | $P_v$ | = | 350 | kN |
| Ultimate load per pile (1.35 x SLS) | **ULS** | $P^*$ | = | 525 | kN |

**Vertical Tension Load Per Pile**

| | | | | | |
|---|---|---|---|---|---|
| Serviceability load per pile | **SLS** | $T_v$ | = | 0 | kN |
| Ultimate load per pile (1.35 x SLS) | **ULS** | $T^*$ | = | 0 | kN |

## 3 Soil Data

Low strength siltstone below hard clay as per the most relevant boreholes (BH 15 & BH 16)

| | | | | |
|---|---|---|---|---|
| Modulus of Elasticity - Bearing Stratum | $E_s$ | = | 80,000 | kPa |
| Poisson's Ratio - Bearing Stratum | $n$ | = | 0.30 | |
| Geotechnical Ultimate End Bearing Capacity | $q_{b\ ult}$ | = | 4,000 | kPa |
| Allowable End Bearing Pressure | $q_a$ | = | 1,200 | kPa |
| Geotechnical Reduction Factor | $\phi_g$ | = | 0.52 | |
| Soil Aggressivity | | = | **Mild** | |
| Soil Corrosion Rate | $C_r$ | = | 0.02 | mm/year |
| Soil Effective Cohesion - Above Helix | $c'$ | = | 10.0 | kPa |
| Soil Effective Friction Angle | $\phi'$ | = | 28.0 | deg |
| Soil Unit Weight - Above Helix | $\gamma'$ | = | 18.0 | $kN/m^3$ |

# Structural & Geotechnical Capacity Calculations

| | | | |
|---|---|---|---|
| **Project Name:** | Catherine Field Public School | **Date:** | 17/06/20 |
| **Project Address:** | Barry O'keefe Drive, Catherine Field, NSW | **Project No:** | PE1968 |
| **Structural Drawings:** | Northrop: Dwg# NHQC2-CF-ST-DWG-01_S03.11, Rev H, dated: 04/06/20 | **Pile Mark:** | SP1 |
| **Geotechnical Report:** | JK Geotechnics: Ref# 31912SQrpt, dated: 05/11/18 | **Prep By:** | Moody Wahba |

## 4 Evaluation of Vertical Ultimate Capacity of Single Pile

*Ultimate Shaft Adhesion ($R_{ug\text{-}s}$) = $\pi$ x Ds x Ls x $\tau_{peak}$*

| Unit | Socket Length m | ULS Shaft Adhesion $\tau_{ave.peak}$ kPa | Shaft Adhesion kN |
|---|---|---|---|
| Fill | 0.2 | 0 | 0 |
| Very Stiff to Hard Clay | 1.8 | 0 | 0 |
| Low Strength Sandstone | 0.5 | 150 | 40 |
| | **$R_{ug\text{-}s}$** | **=** | **40** kN |

*Ultimate End Bearing ($R_{ug\text{-}b}$)*

| | | | | |
|---|---|---|---|---|
| End Bearing Area | $A_b$ | = | 0.283 | $m^2$ |
| Ultimate end bearing | $q_{b\ ult}$ | = | 4,000 | kPa |
| **Ultimate end bearing capacity** | **$R_{ug\text{-}b}$** | **=** | **1,131** | **kN** |

*Total Geotechnical Capacity ($R_{ug}$)*

| | | | | |
|---|---|---|---|---|
| **$R_{ug} = R_{ug\text{-}s} + R_{ug\text{-}b}$** | **$R_{ug}$** | **=** | **1,171** | **kN** |

*Design Geotechnical Capacity ($R_g$ *)*

| | | | | |
|---|---|---|---|---|
| Geotechnical Reduction Factor | $\phi_g$ | = | 0.52 | |
| **$R_g^* = \phi_g.R_{ug}$** | **$R_g^*$** | **=** | **609** | **kN** |
| | | **Check** | **OK** | **> P* = 525** |

*Safe Working Load (SWL)*

| | | | | |
|---|---|---|---|---|
| Geotechnical Reduction Factor | $\phi_g$ | = | 0.52 | |
| Structural Factor of Safety | $F_s$ | = | 1.35 | |
| **$SWL = \phi_g.R_{ug}/ F_s$** | **SWL** | **=** | **451** | **kN** |
| | | **Check** | **OK** | **> Pv = 350** |

## 5 Evaluation of Corrosion and Structural Capacity

| | | | | |
|---|---|---|---|---|
| Shaft Cross Sectional Area before Corrosion | $A_{cs}$ | = | 0.00325 | $m^2$ |
| Shaft Axial Compression Strength before Corrosion | | = | 1,040 | kN |
| Structural Reduction Factor | | = | 0.90 | |
| **Reduced Shaft Axial Compression Strength before Corrosion** | | **=** | **936** | **kN** |
| | | **Check** | **OK** | **> P* = 525** |
| Soil Aggressivity | | = | **Mild** | |
| Corrosion Rate | $C_r$ | = | 0.02 | mm/year |
| Design Life | | = | 50 | years |
| Total Corrosion Thickness | | = | 1.00 | mm |
| Shaft Diameter after Corrosion | $D_s$ | = | 166.0 | mm |
| Shaft Thickness after Corrosion | $t_s$ | = | 5.4 | mm |
| Shaft Cross Sectional Area after Corrosion | $A_{cs}$ | = | 0.00272 | $m^2$ |
| Shaft Axial Compression Strength after Corrosion | | = | 872 | kN |
| Structural Reduction Factor | | = | 0.90 | |
| **Reduced Shaft Axial Compression Strength after Corrosion** | | **=** | **785** | **kN** |
| | | **Check** | **OK** | **> P* = 525** |

# Structural & Geotechnical Capacity Calculations

| | | | |
|---|---|---|---|
| **Project Name:** | Catherine Field Public School | **Date:** | 17/06/20 |
| **Project Address:** | Barry O'keefe Drive, Catherine Field, NSW | **Project No:** | PE1968 |
| **Structural Drawings:** | Northrop: Dwg# NHQC2-CF-ST-DWG-01_S03.11, Rev H, dated: 04/06/20 | **Pile Mark:** | SP1 |
| **Geotechnical Report:** | JK Geotechnics: Ref# 31912SQrpt, dated: 05/11/18 | **Prep By:** | Moody Wahba |

## 6 Evaluation of Tension

**Tension Capacity = Minimum of $R_g{}^*_{Tension}$ and Cone Pull Out Capacity**

**Cone Pull Out Capacity**

| | | | | | |
|---|---|---|---|---|---|
| Cone Length | L | = | 2.50 | m | |
| Cone Base Diameter | $D_b$ | = | 600 | mm | 0.3 |
| Cone Failure Plane Angle (0.5 ϕ') | β | = | 14.0 | deg | |
| Cone Top Diameter | $D_t$ | = | 1223 | m | 0.61166 |
| Cone Slant Height | S | = | 3 | m | |
| Cone Volume | V | = | 1.70 | $m^3$ | |
| Cone Surface Area | $A_{s\ cone}$ | = | 8.84 | $m^2$ | |
| Cone Mass | M | = | 31 | kN | |
| Surface Adhesion | $S_f$ | = | 88 | kN | |
| **Cone Ultimate Pull Out Capacity** | | | **119** | **kN** | |

$R_{ug\ Tension} = R_{ug\text{-}s\ Tension} + R_{ug\text{-}b}$

Shaft Adhesion (Tension)

| | | | | | |
|---|---|---|---|---|---|
| $R_{ug\text{-}s\ Tension}$ = Socket Shaft Adhesion in Rock (Tension) | $R_{ug\text{-}s\ Tension}$ | = | 0 | kN | 0 kPa |
| | $R_{ug\text{-}b}$ | = | 1,131 | kN | |
| | $R_{ug\ Tension}$ | = | 1,131 | kN | |
| $R_g{}^*_{Tension} = \phi_g R_{ug}$ | $R_g{}^*_{Tension}$ | = | **588** | **kN** | |
| **Tension Capacity** | $R_T$ | = | **119** | **kN** | |
| Soil Disturbance Reduction Factor $\lambda_t$ | $\lambda_t$ | | 0.87 | | |
| **Reduced Tension Capacity** | **Reduced $R_T$** | = | **103** | **kN** | |
| | | Check | OK | > T* = 0 | |

## 7 Evaluation of Settlement/Deflection

| | | | | |
|---|---|---|---|---|
| Serviceability load per pile | $P_v$ | = | 350 | kN |
| Allowable Bearing Pressure | $q_a$ | = | 1,200 | kPa |
| Material modulus reduction factor | $f_m$ | = | 0.5 | |
| Settlement Influence Factor | $F_1$ | = | 0.75 | |

Vertical Settlement at the top of Socket

$d_v = Ps \times F_1 / (Es \times f_m \times Ds)$

| | | | | |
|---|---|---|---|---|
| | $d_v$ | = | **3.07** | **mm** |
| | | Check | < 1% of Pile Diameter, OK | |

Elastic Shortening of Pile:

| | | | | |
|---|---|---|---|---|
| Total length of pile $L_T = L_f + L_s$ | $L_T$ | = | 2.50 | m |
| End bearing area of the pile | $A_b$ | = | 0.283 | $m^2$ |
| $d_{v(shortening)} = = (Pv.LT) / (Ep.Ab)$ | $d_{v(shortening)}$ | = | **0.02** | **mm** |
| **Total Vertical Settlement = $d_v + d_{v(shortening)}$** | **$d_{v\ Total}$** | = | **3.09** | **mm** |

# Structural & Geotechnical Capacity Calculations

| | | | |
|---|---|---|---|
| **Project Name:** | Catherine Field Public School | **Date:** | 17/06/20 |
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| **Geotechnical Report:** | JK Geotechnics: Ref# 31912SQrpt, dated: 05/11/18 | **Prep By:** | Moody Wahba |

## 8 Evaluation of Helix Plate Geotechnical Stresses

| | | | | |
|---|---|---|---|---|
| Geotechnical Ultimate End Bearing Capacity | $q_{b\ ult}$ | = | 4,000 | kPa |
| Geotechnical Reduction Factor | $\phi_g$ | | 0.52 | |
| **Maximum Geotechnical Ultimate Stress** | $q_{b\ ult} \times \phi_g$ | **=** | **2,080** | **kPa** |
| | | **=** | **2.08** | **Mpa** |
| Ultimate load applied on Helix Plate ($P^*$-$R_{ug\text{-}s} \times \phi_g$) | ULS-helix | = | 504 | kN |
| Helix Area | $A_b$ | = | 0.283 | $m^2$ |
| **Applied Ultimate Stress** | **ULS / $A_b$** | **=** | **1,784** | **kPa** |
| | | **=** | **1.78** | **Mpa** |
| | | **Check** | **OK** | **< Max Ultimate Stress = 2.08** |

## 9 Evaluation of Helix Plate Welding Capcity

| | | | | |
|---|---|---|---|---|
| Nominal Weld Tensile Strength (AS 4100-1998 Amendment 2012) | $f_{uw}$ | **=** | 430 | MPa |
| **Ultimate Weld Capcity = 0.6 x $f_{uw}$ x $t_t$ x $K_r$** | Leg: $t_w$ | = | 8 | mm |
| **$t_t$ = $t_w$/√2** | Throat: $t_t$ | = | 5.66 | mm |
| | $k_r$ | = | 1 | |
| | Weld Length | = | 0.528 | m |
| | **Ultimate Weld capcpity / Unit Length** | = | **1,459** | **kN/m** |
| | Stuctural Reduction factor | = | 0.9 | |
| | **Ultimate Reduced Weld Capacity / Unit Length** | = | **1,314** | **kN/m** |
| | **Ultimate Reduced Weld Capacity** | **=** | **693** | **kN** |
| | | **Check** | **OK** | **> Ultimate Load on Helix = 504** |

| | | | |
|---|---|---|---|
| **Project Name:** | Catherine Field Public School | **Date:** | 17/06/20 |
| **Project Address:** | Barry O'keefe Drive, Catherine Field, NSW | **Project No:** | PE1968 |
| **Structural Drawings:** | Northrop: Dwg# NHQC2-CF-ST-DWG-01_S03.11, Rev H, dated: 04/06/20 | **Pile Mark:** | SP1 |
| **Geotechnical Report:** | JK Geotechnics: Ref# 31912SQrpt, dated: 05/11/18 | **Prep By:** | Moody Wahba |

## 10 Evaluation of Helix Plate Structural Bending Capacity

| | | | | | |
|---|---|---|---|---|---|
| Nominal Steel Yield Stress Grade 350 (AS 3678-2011) | $f_y$ | = | 320 | MPa | $N/mm^2$ |
| Safe Working Load Applied on Pile | SLS | = | 350,000 | N | |
| Helix Plate Area | $A_b$ | = | 282,743 | $mm^2$ | |
| Allowable Stress Applied on Plate Helix | $\sigma_a$ | = | 1.24 | $N/mm^2$ | |

**Analysing the helix plate moment as a cantilever, fixed from the CHS side, and considering a 1mm wide strip of the helix**

| | | | | | |
|---|---|---|---|---|---|
| Diameter of Helix Plate | | = | 600 | mm | |
| | $r_1$ | = | 300 | mm | |
| Plate Root Diameter at Edge of Weld (CHS diameter + 2 x weld leg) | | = | 184 | mm | |
| | $r_2$ | | 92 | mm | |
| **Cantilever length L = $r_1$ - $r_2$** | **L** | = | **208** | **mm** | |
| **Distributed load on cantilever (1mm wide strip)** | **q** | = | **1.24** | **N/mm** | |
| **Applied Allowable Moment at Plate Root (1mm wide strip)** | | | | | |
| **$M_a$ = (qL^2)/2** | $M_a$ | = | 26,778 | N.mm | |
| | **$M_a$** | = | **0.0268** | **kN.m** | |
| **Plastic Modulus before Corrosion** | | | | | |
| b = 1mm wide strip | b | = | 1 | mm | |
| d = Plate Thickness before Corrosion | d | = | 25 | mm | |
| Plastic Modulus = S = (bd^2)/4 | S | = | 156 | $mm^3$ | |
| **Ultimate Moment Capacity before Corrosion (1mm wide strip)** | | = | **0.0450** | **kN.m** | |
| = ϕ $F_y$ S Where ϕ = 0.9 | | Check | OK | > Applied Moment = 0.0268 | |
| Soil Aggressivity | | = | Mild | | |
| Corrosion Rate | $C_r$ | = | 0.02 | mm/year | |
| Design Life | | = | 50 | years | |
| Total Corrosion Thickness | | = | 1.00 | mm | |
| **Plastic Modulus after Corrosion** | | | | | |
| b = 1mm wide strip | b | = | 1 | mm | |
| d = Plate Thickness after Corrosion | d | = | 23 | mm | |
| Plastic Modulus = S = (bd^2)/4 | S | = | 132 | $mm^3$ | |
| **Ultimate Moment Capacity after Corrosion (1mm wide strip)** | | = | **0.0381** | **kN.m** | |
| = ϕ $F_y$ S Where ϕ = 0.9 | | Check | OK | > Applied Moment = 0.0268 | |