# OBJEKTIF SEMINAR *HANDS-ON CHECKLIST FOR THE CONTRACTOR SUBMISSION COLD FORMED STEEL ROOF TRUSSES*

- Memahami dan memahirkan para Jurutera Awam dan Penolong Jurutera Awam Kanan/ Penolong Jurutera Awam dalam membuat semakan berdasarkan senarai semakan kekuda bumbung jenis Cold Formed sebagaimana *Specification Pre Fabricated Cold Formed Steel Roof Trusses –JKR 20601-0186-11* .

- Berupaya menyemak lukisan dan dokumen berkaitan kekuda bumbung yang dikemukakan oleh pihak kontraktor.

- Berupaya memantau kerja-kerja pemasangan kekuda bumbung jenis *Cold Formed* di tapak.

# KEKUDA BUMBUNG (ROOF TRUSS)

- PENGENALAN
- JENIS KEKUDA BUMBUNG
- KOMPONEN KEKUDA BUMBUNG
- JENIS-JENIS BEBAN
- PERBEZAAN COLD FORMED STEEL  DENGAN HOT ROLLED STEEL ROOF TRUSS

# PENGENALAN

- Kekuda Terbahagi kepada:

a) Kekuda Mudah (Simple Truss)

- Membentuk elemen tiga-segi (triangular)

b) Kekuda Kompaun (Compound Truss)

- Membentuk 2 atau lebih kekuda mudah

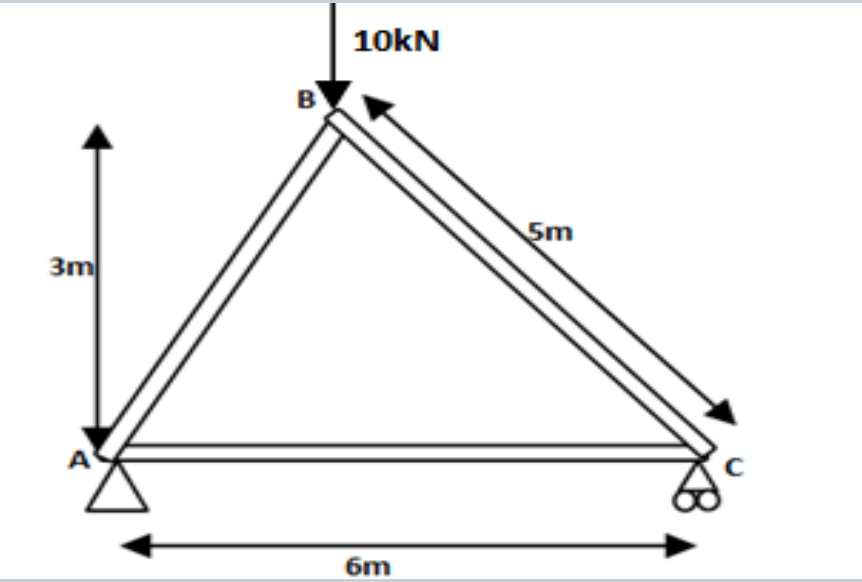
c) Kekuda Kompleks (Complex Truss)

- Selain daripada di atas

# PENGENALAN

- Kekuda Terbahagi kepada:

a) Kekuda Mudah (Simple Truss)

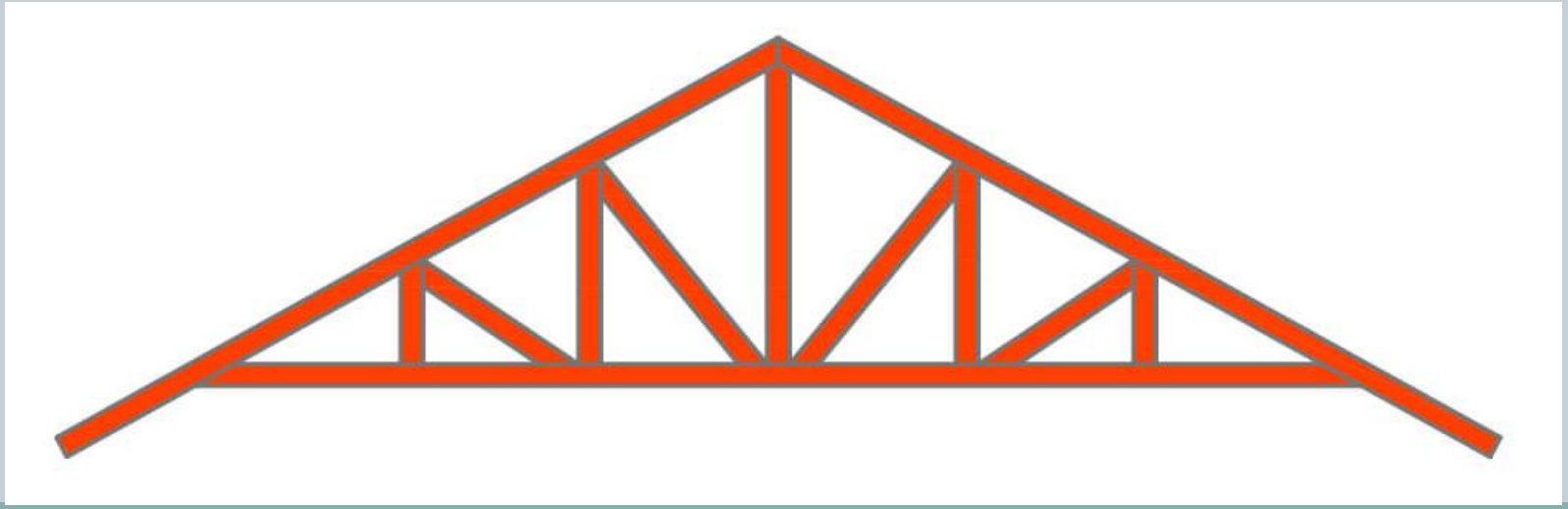


# PENGENALAN

- Kekuda Terbahagi kepada:

b) Kekuda Kompaun (Compound Truss)

- Membentuk 2 atau lebih kekuda mudah



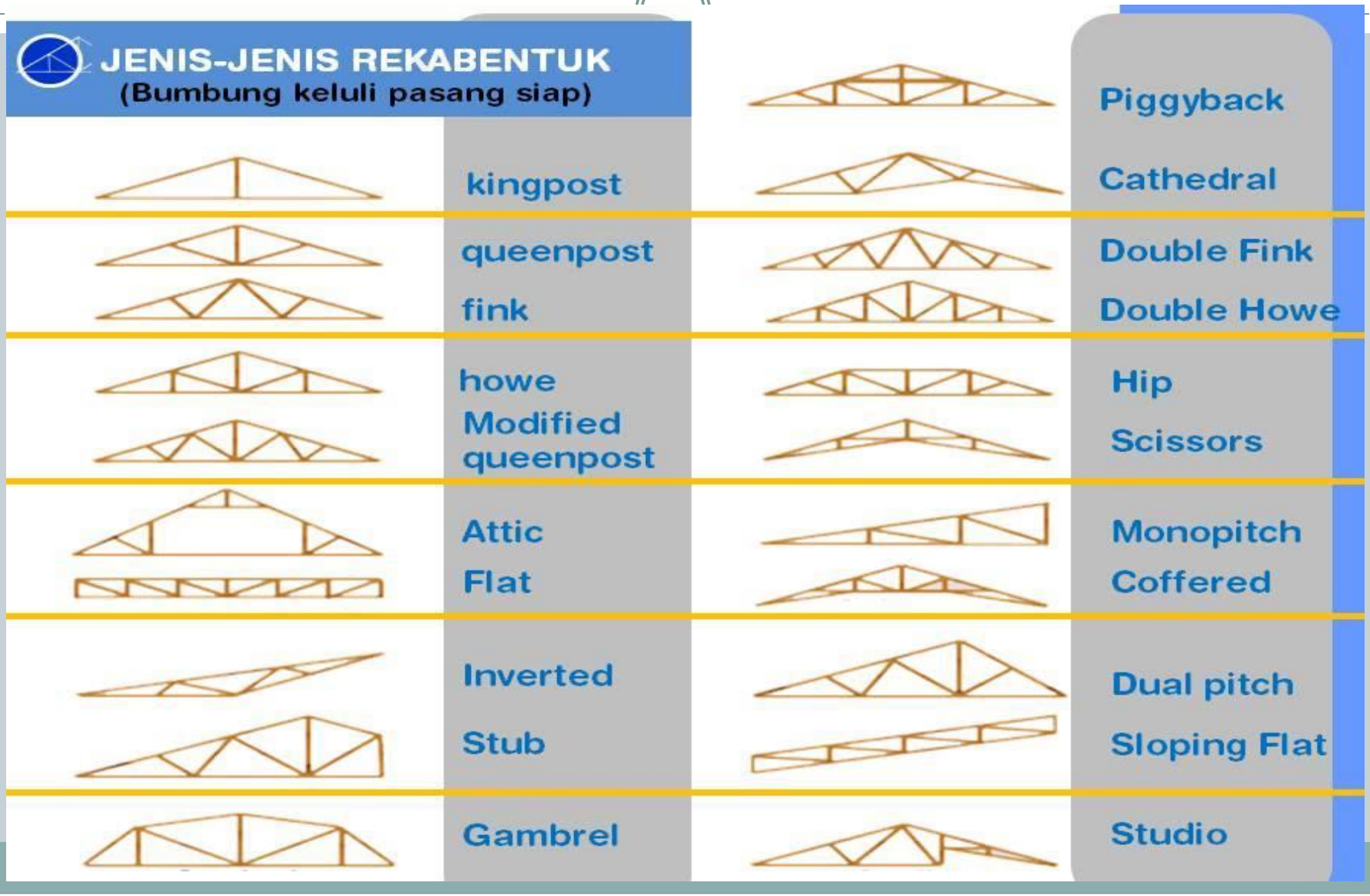
# PENGENALAN

- Kekuda Terbahagi kepada:

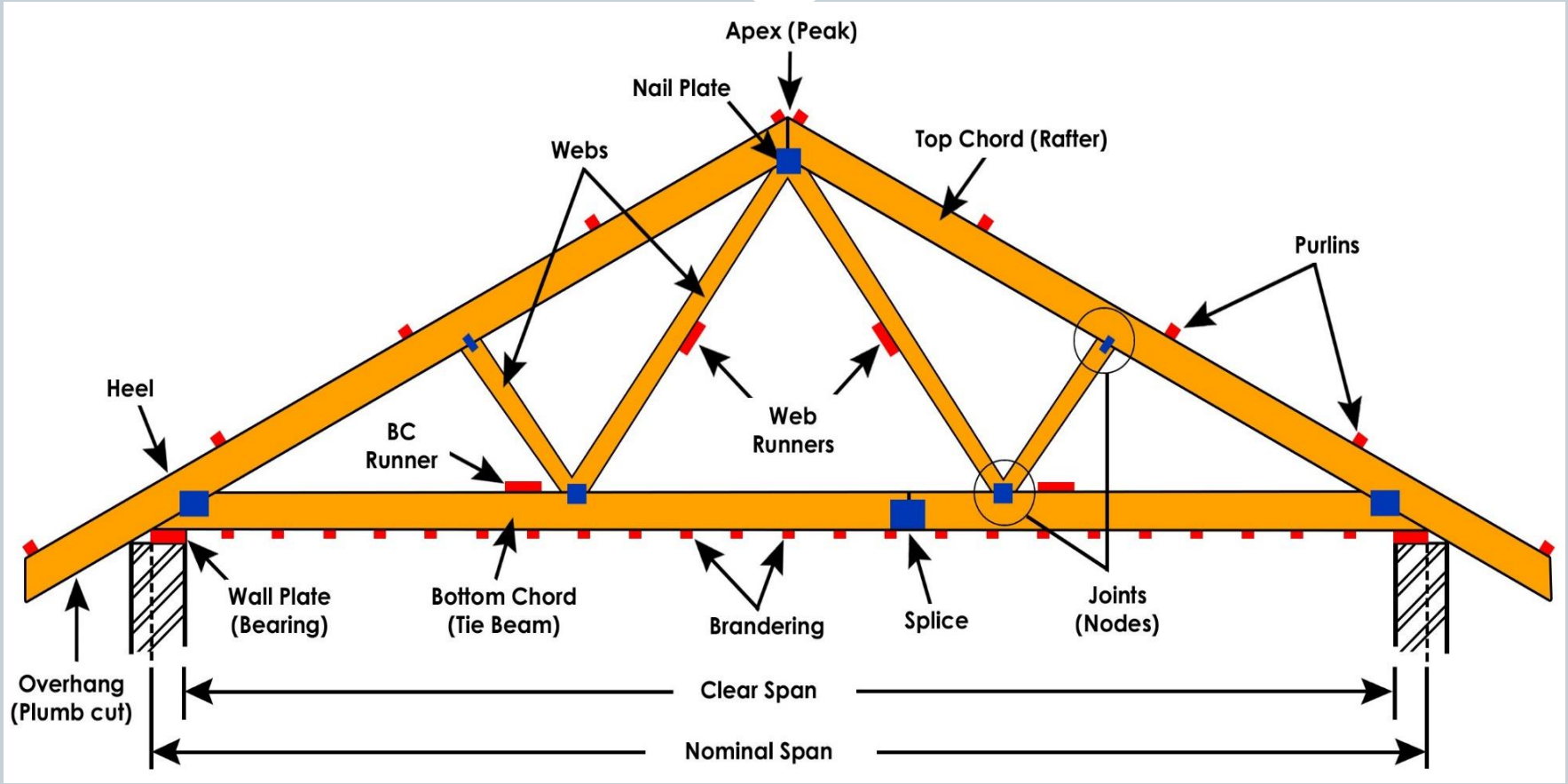
c) Kekuda Kompleks (Complex Truss)

- Selain daripada di atas

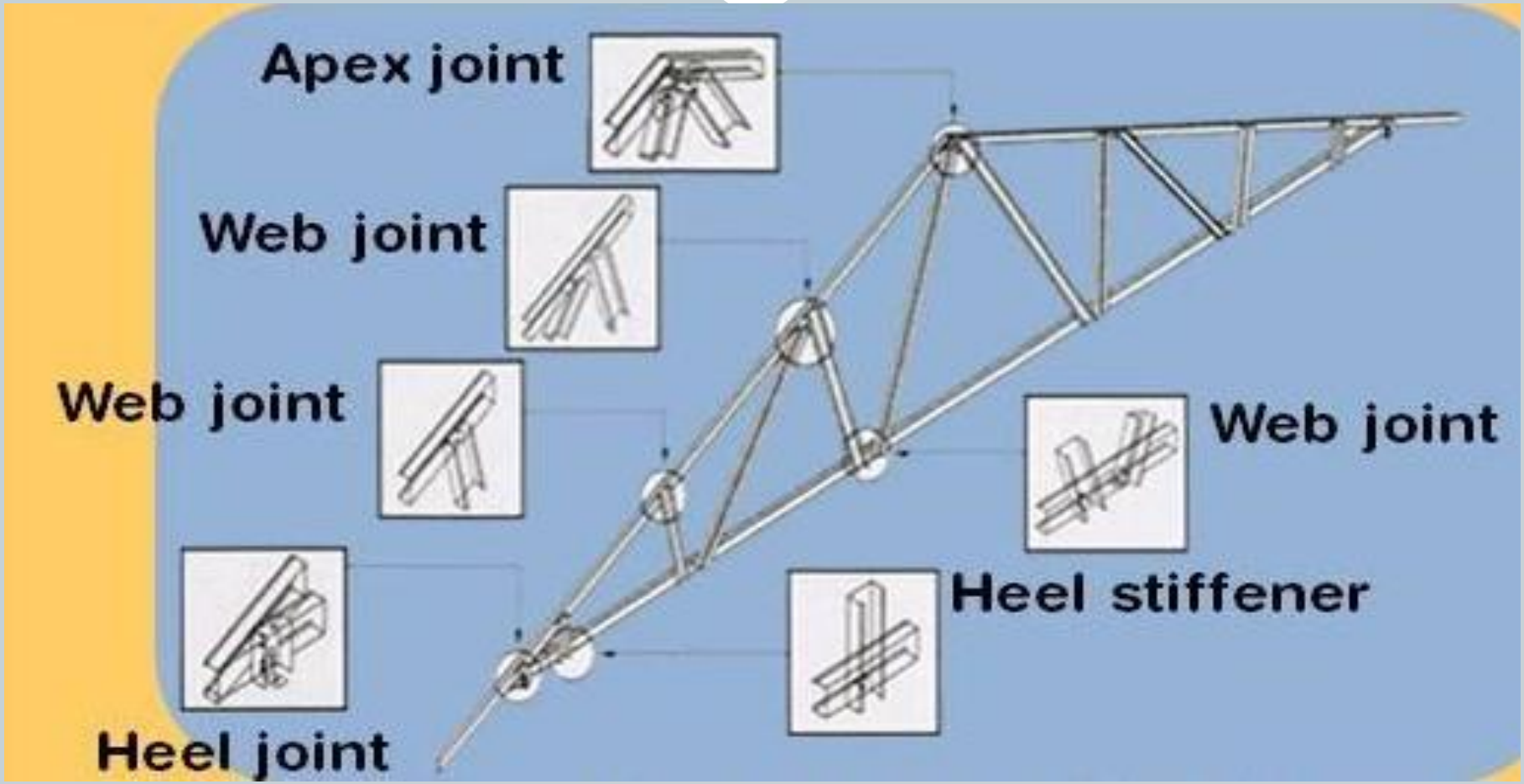
# 2) JENIS-JENIS KEKUDA BUMBUNG



# KOMPONEN KEKUDA BUMBUNG



# KOMPONEN JOINT KEKUDA BUMBUNG



# JENIS-JENIS BEBAN

i) Dead Load

Dead load shall be specified as per requirement in BS 6399: Part 1 or BS EN 1991-1-1: 2002, whichever standard adopted. However, the actual weight of ceiling, mechanical and electrical (M&E) services shall not be less than 0.25 $kN/m^2$

ii) Imposed Load

The value and requirement of imposed load shall be as per BS 6399: Part 1 and Part 3 or BS EN 1991-1-1: 2002, whichever standard adopted. Notwithstanding to the value in the standard, the minimum value of imposed load shall be 0 25 $kN/m^2$ distributed uniformly over the whole area supported and 0 9 kN concentrated over a length of 125 mm (or in the case of

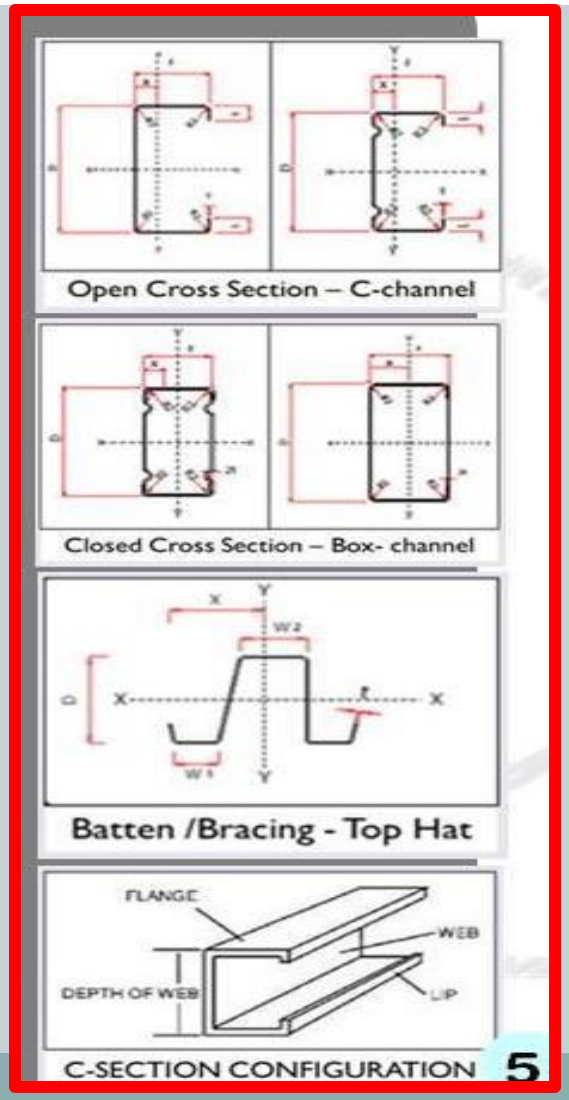
iii) Wind Load

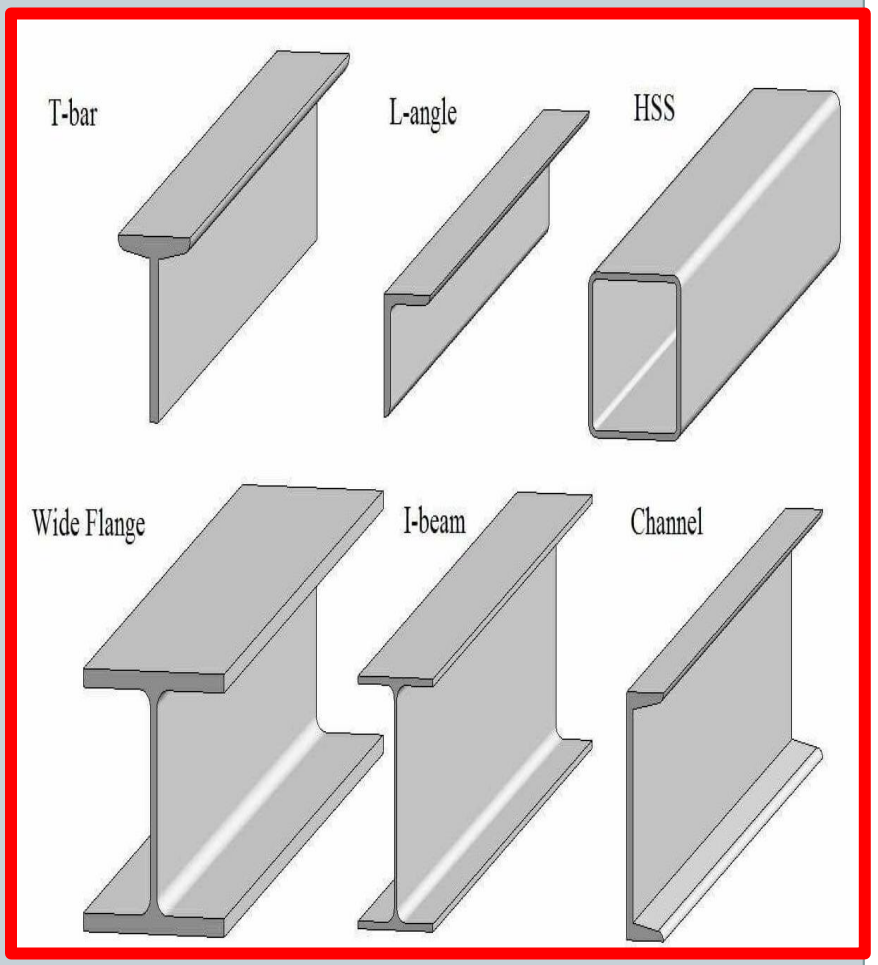
The requirement of wind load shall be as per MS 1553: 2002, BS 6399: Part 2 or BS EN 1991-1-4: 2005, whichever standard adopted, with the minimum basic wind speed as per Clause 2 2 of this specification or the value in MS 1553: 2002 whichever higher

# PERBEZAAN COLD FORMED STEEL DENGAN HOT ROLLED STEEL ROOF TRUSS

1) DEFINISI
2) SECTION
3) KEKUATAN/STRENGTH

# SECTION COLD FORMED VS HOT ROLLED



# NOTA AM COLD FORMED VS HOT ROLLED

NOTA AM SISTEM KEKUDA KELULI ' COLD FORMED'

1. KERJA REKABENTUK DAN PENYEDIAAN LUKISAN SISTEM KEKUDA KELULI 'COLD FORMED' OLEH PIHAK KONTRAKTOR/PEMBEKAL HENDAKLAH MEMATUHI 'JKR STANDARD SPECIFICATIONS FOR BUILDING WORKS 2014' DAN 'STANDARD SPECIFICATION FOR

7. SISTEM KEKUDA HENDAKLAH DIREKABENTUK UNTUK MENANGGUNG BEBAN MENGIKUT SPESIFIKASI B.S. 6399.

| | | |
|---|---|---|
| A. CONCRETE ROOF TILES | ≤ | 0.60 kN/m² |
| B. COLD FORMED STEEL TRUSS + BATTENS + INSULATIONS | ≤ | 0.15 kN/m² |
| C. ROOF METAL DECK | ≤ | 0.04 kN/m² |
| D. CEILING AND M&E SERVICES | ≤ | 1.00 kN/m² |

– BEBAN SISTEM M&E MESTILAH DISAHKAN OLEH JURUTERA M&E.

6. BEBAN MINIMUM BAHAN BERBUMBUNG HENDAKLAH BERPANDUKAN KEPADA LUKISAN ARKITEK BESERTA BEBAN PEMASANGAN SISTEM MEKANIKAL DAN ELEKTRIKAL.

7. SISTEM KEKUDA HENDAKLAH DIREKABENTUK UNTUK MENANGGUNG BEBAN MENGIKUT SPESIFIKASI B.S. 6399.

| | | |
|---|---|---|
| A. CONCRETE ROOF TILES | ≤ | 0.60 kN/m² |
| B. COLD FORMED STEEL TRUSS + BATTENS + INSULATIONS | ≤ | 0.15 kN/m² |
| C. ROOF METAL DECK | ≤ | 0.04 kN/m² |
| D. CEILING AND M&E SERVICES | ≤ | 1.00 kN/m² |

– BEBAN SISTEM M&E MESTILAH DISAHKAN OLEH JURUTERA M&E.

7. SISTEM KEKUDA JUGA DIREKABENTUK UNTUK MENANGGUNG TEKANAN DAN 'SUCTION' BEBAN ANGIN MENGIKUT 'MALAYSIAN STANDARD CODE OF PRACTICE ON WIND LOADING FOR BUILDING STRUCTURE MS 1553:2002'

| | | |
|---|---|---|
| A. WIND SPEED (NORMAL) | = | 35.0 m/s |
| B. WIND SPEED (LIGHTWEIGHT METAL ROOFING) | = | 41.0 m/s |

9. PIHAK KONTRAKTOR HENDAKLAH MEMILIH PEMBEKAL SISTEM KEKUDA BERBUMBUNG MENGIKUT SENARAI TERKINI YANG DILULUSKAN OLEH JKR SAHAJA (MAKLUMAT BOLEH DIDAPATI DILAMAN SESAWANG RASMI JKR, www.jkr.gov.my)

10. PIHAK KONTRAKTOR DAN PEMBEKAL SISTEM ADALAH BERTANGGUNGJAWAB SEPENUHNYA TERHADAP REKABENTUK DAN PEMASANGAN SISTEM KEKUDA BUMBUNG.

NOTA AM KERJA KELULI JENIS TERGELEK PANAS 'HOT ROLLED'

1. SEMUA KERJA STRUKTUR KELULI HENDAKLAH MEMATUHI 'JKR STANDARD SPECIFICATIONS FOR BUILDING WORKS 2014 DAN 'JKR STANDARD SPECIFICATION FOR STRUCTURAL STEEL WORK JKR NO. 20601-0191-12.

2. SEMUA STRUKTUR KELULI TERGELEK PANAS (HOT ROLLED) YANG DIGUNAKAN HENDAKLAH DARIPADA GRED 43 (Py= 275 N/mm²).

3. BAGI STRUKTUR KELULI KEUTAMAAN DIBERIKAN KEPADA

6. STRUKTUR KELULI JUGA DIREKABENTUK UNTUK MENANGGUNG TEKANAN DAN 'SUCTION' BEBAN ANGIN MENGIKUT 'MALAYSIAN STANDARD CODE OF PRACTICE ON WIND LOADING FOR BUILDING STRUCTURE M.S. 1553:2002'.

| | | |
|---|---|---|
| A. CONCRETE ROOF TILES | ≤ | 0.60 kN/m² |
| B. METAL DECKING + BATTENS | ≤ | 0.75 kN/m² |
| C. CEILING AND M&E SERVICES | ≤ | 1.00 kN/m² |

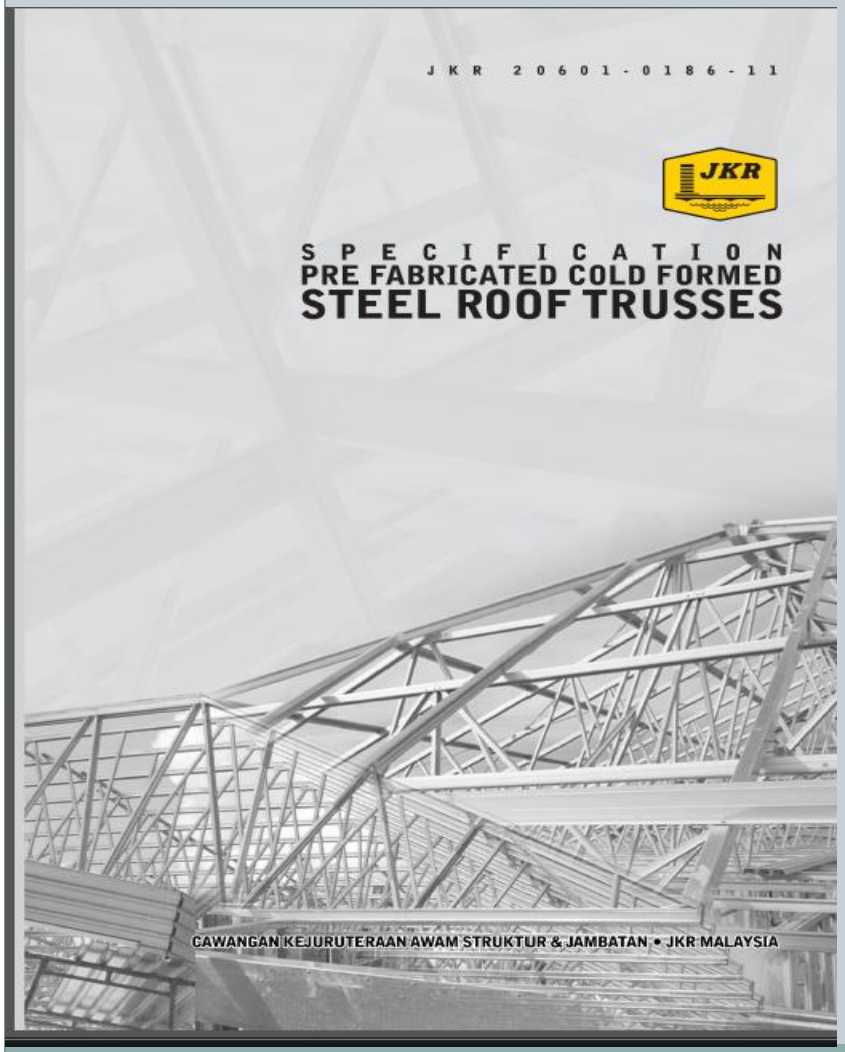
BUILDING STRUCTURE M.S. 1553:2002'.

| | | |
|---|---|---|
| A. CONCRETE ROOF TILES | ≤ | 0.60 kN/m² |
| B. METAL DECKING + BATTENS | ≤ | 0.75 kN/m² |
| C. CEILING AND M&E SERVICES | ≤ | 1.00 kN/m² |

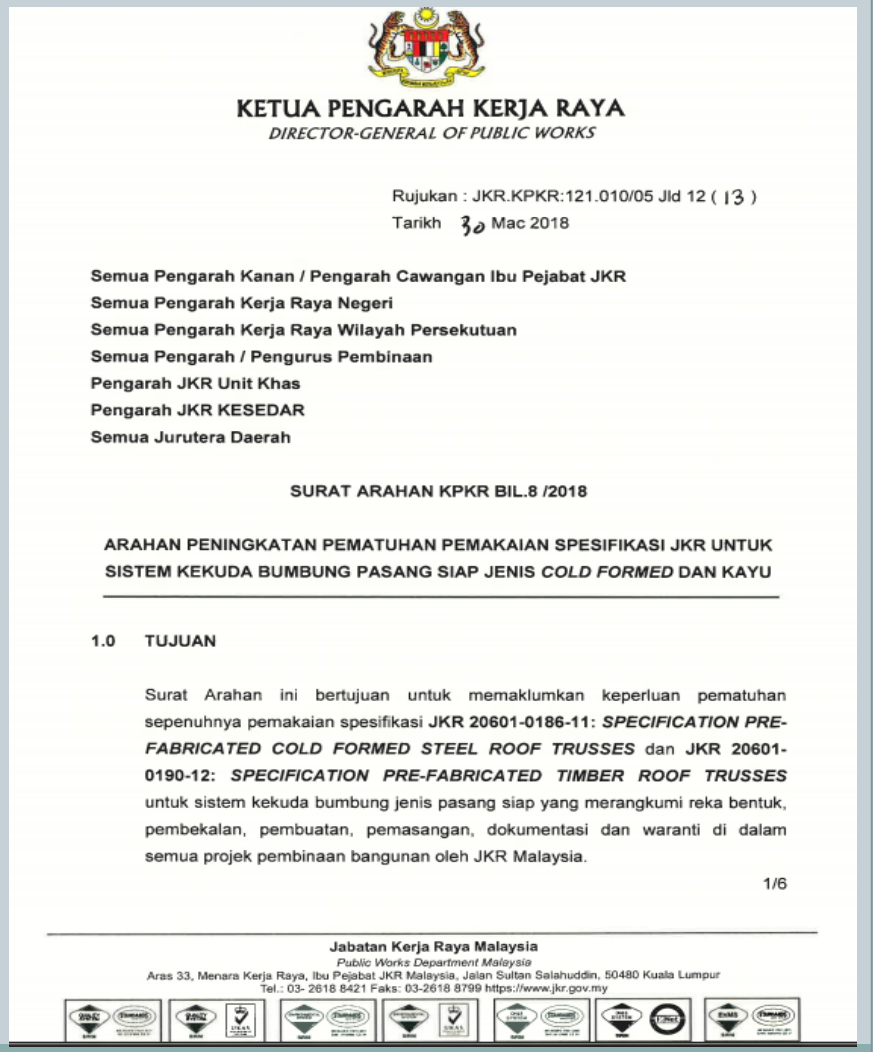
7. STRUKTUR KELULI DIREKABENTUK DENGAN MEMATUHI B.S. 5950 PART 8 UNTUK DIREKABENTUK KETAHANAN API SELAMA 2 JAM.

# Hands-On Checklist For The Contractor Submission Cold Formed Steel Roof Trusses

## SPECIFICATION PRE FABRICATED COLD FORMED STEEL ROOF TRUSSES




## SURAT PEMATUHAN SPESIFIKASI SISTEM KEKUDA BUMBUNG PASANG SIAP JENIS COLD FORMED STEEL DAN KAYU



**KETUA PENGARAH KERJA RAYA**
*DIRECTOR-GENERAL OF PUBLIC WORKS*

Rujukan : JKR.KPKR:121.010/05 Jld 12 ( 13 )
Tarikh 30 Mac 2018

**Semua Pengarah Kanan / Pengarah Cawangan Ibu Pejabat JKR**
**Semua Pengarah Kerja Raya Negeri**
**Semua Pengarah Kerja Raya Wilayah Persekutuan**
**Semua Pengarah / Pengurus Pembinaan**
**Pengarah JKR Unit Khas**
**Pengarah JKR KESEDAR**
**Semua Jurutera Daerah**

**SURAT ARAHAN KPKR BIL.8 /2018**

**ARAHAN PENINGKATAN PEMATUHAN PEMAKAIAN SPESIFIKASI JKR UNTUK SISTEM KEKUDA BUMBUNG PASANG SIAP JENIS *COLD FORMED* DAN KAYU**

**1.0 TUJUAN**

Surat Arahan ini bertujuan untuk memaklumkan keperluan pematuhan sepenuhnya pemakaian spesifikasi **JKR 20601-0186-11: *SPECIFICATION PRE-FABRICATED COLD FORMED STEEL ROOF TRUSSES*** dan **JKR 20601-0190-12: *SPECIFICATION PRE-FABRICATED TIMBER ROOF TRUSSES*** untuk sistem kekuda bumbung jenis pasang siap yang merangkumi reka bentuk, pembekalan, pembuatan, pemasangan, dokumentasi dan waranti di dalam semua projek pembinaan bangunan oleh JKR Malaysia.

1/6

**Jabatan Kerja Raya Malaysia**
*Public Works Department Malaysia*
Aras 33, Menara Kerja Raya, Ibu Pejabat JKR Malaysia, Jalan Sultan Salahuddin, 50480 Kuala Lumpur
Tel.: 03- 2618 8421 Faks: 03-2618 8799 https://www.jkr.gov.my

## ARAHAN PENGGUNAAN SISTEM PERMOHONAN & KELULUSAN SISTEM KEKUDA BUMBUNG (J-TRUSS)

KETUA PENGARAH KERJA RAYA
*DIRECTOR-GENERAL OF PUBLIC WORKS*

Rujukan : JKR.KPKR.121.010/05 Jld.14(8)
Tarikh : 19 September 2018

**Semua Pengarah Kanan / Pengarah Cawangan Ibu Pejabat JKR**
**Semua Pengarah Kerja Raya Negeri**
**Semua Pengarah Kerja Raya Wilayah Persekutuan**
**Semua Pengarah / Pengurus Pembinaan**
**Pengarah JKR Unit Khas**
**Pengarah JKR KESEDAR**
**Semua Jurutera Daerah**

**SURAT ARAHAN KPKR BIL.19 /2018**

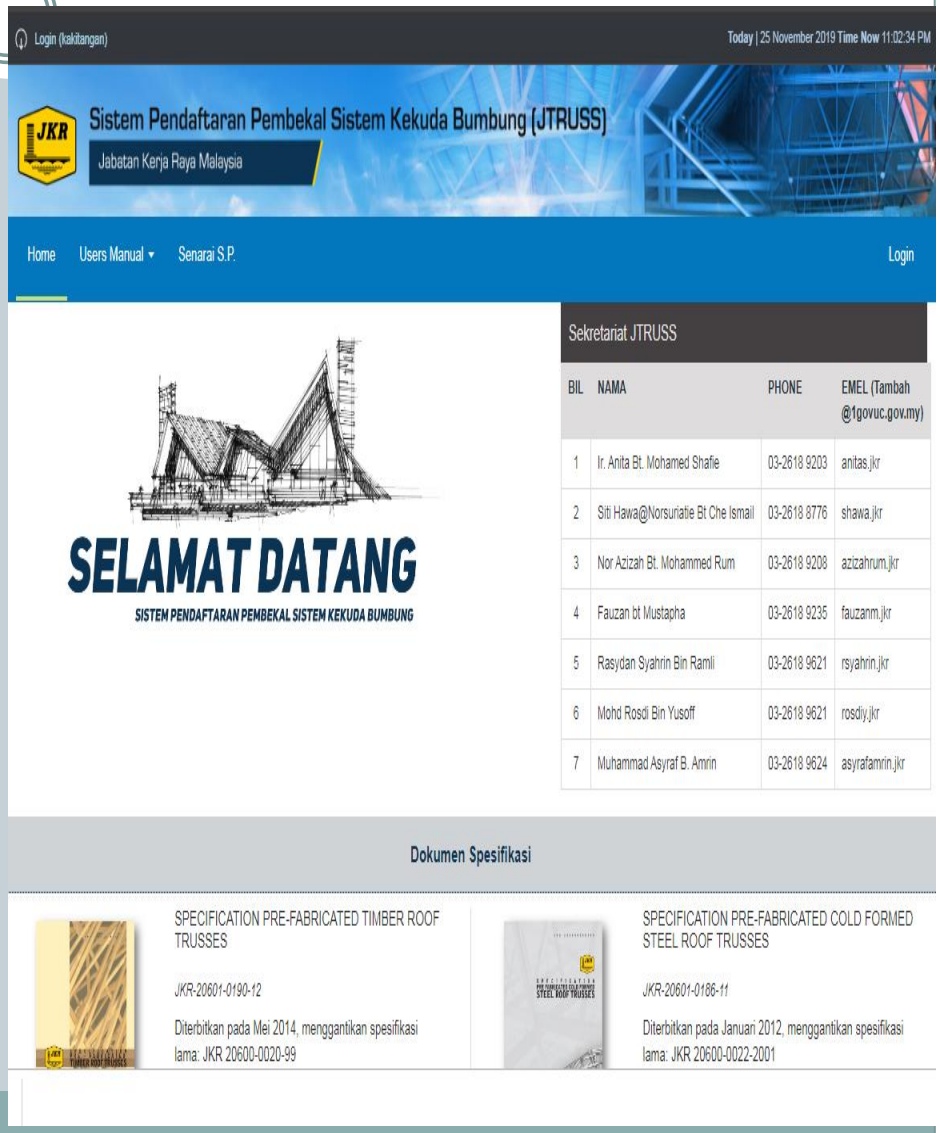
**ARAHAN PENGGUNAAN SISTEM PERMOHONAN DAN KELULUSAN PEMBEKAL KEKUDA BUMBUNG PROJEK-PROJEK BANGUNAN SECARA ATAS TALIAN, *J-TRUSS***

**1.0 TUJUAN**

Surat Arahan ini bertujuan untuk memaklumkan keperluan menggunakan Sistem *J-Truss* yang merupakan sistem permohonan dan kelulusan pembekal kekuda bumbung projek-projek bangunan secara atas talian yang dibangunkan oleh Cawangan Kejuruteraan Awam dan Struktur (CKAS) bagi menggantikan permohonan secara konvensional / manual.

1/5

## LAMAN SESAWANG J-TRUSS (https://jtruss.jkr.gov.my)



# KEPERLUAN PEMATUHAN SPESIFIKASI TELAH DITERJEMAH DAN DIRINGKASKAN SEBAGAIMANA APPENDIX

3.1 Keperluan pematuhan spesifikasi telah diterjemah dan diringkaskan *appendix* seperti berikut:-

a) *Cold Formed Steel*

1

i) *Appendix 1: Application Form* (Lampiran C)

ii) *Appendix 2: Material Testing Requirements*

iii) *Appendix 3: Checklist on the Contractor Submission*

iv) *Appendix 4: Guidelines on the contents of warranty certificate*

v) *Appendix 5: Special provisions for cold formed roof truss with span more than 13 m but not exceeding 20 m.*

# APPENDIX 1: LAMPIRAN C

**Appendix 1:** Application Form — Rev: *CKASJ/SKB/1/2010*

**Permohonan Penggunaan Sistem Kekuda Bumbung :**

☐ *Pre-Fabricated Cold Formed Steel* ☐ *Factory Fabrication*
☐ *Pre-Fabricated Timber* ☐ *On-site Fabrication*

**A. Maklumat Asas Projek**

i. Nama projek : .....
ii. No. Kontrak : .....
iii. Nama dan Alamat Kontraktor Utama : .....

**B. Maklumat Cadangan Sistem Kekuda**

Adalah saya Kontraktor Utama projek ini memohon untuk menggunakan sistem kekuda pasangsiap tersebut sebagaimana butiran di bawah :

i. Nama dan Alamat Pembekal Sistem : .....
ii. Nama dan Alamat Perekabentuk: .....
*(Alamat Perekabentuk)*
*(Nombor Pendaftaran LIM)*
iii. Nama dan Alamat Pemasang Bertauliah: .....
*(Sila sertakan Surat Perakuan Pemasang Bertauliah dari Pembekal Sistem)*

**C. Perakuan Kontraktor Utama**

Adalah saya Kontraktor Utama projek ini yang memohon untuk menggunakan kekuda pasangsiap seperti butiran di atas, mengakui bahawa saya adalah bertanggungjawab sepenuhnya terhadap pembekalan, rekabentuk dan pemasangan kekuda pasangsiap tersebut.

Tarikh : .....
(Tandatangan Kontraktor Utama dan Cop Mohor)

**D. Perakuan Pembekal Sistem**

Saya mengesahkan bahawa sistem kekuda syarikat kami dicadangkan untuk projek di atas mencapai segala keperluan yang dinyatakan di dalam spesifikasi.

Tarikh : .....
(Tandatangan Pembekal Sistem dan Cop Mohor)

JKR-20601-0186-11

# APPENDIX 1: LAMPIRAN C YANG TELAH DI ISI

*Cawangan Kejuruteraan Awam, Struktur & Jambatan*
*Ibu Pejabat JKR Malaysia, Kuala Lumpur*

*CKASJ/SKB/1/2010*
Lampiran C

**Permohonan Penggunaan Sistem Kekuda Bumbung :**

☒ *Pre-Fabricated Cold Formed Steel* ☐ *Factory Fabrication*
☐ *Pre-Fabricated Timber* ☒ *On-site Fabrication*

**A. Maklumat Asas Projek**

i. Nama projek : Cadangan Pembinaan Semula Dan Menaikteraf Sekolah Daif Menggunakan Kaedah IBS Di Semenanjung Malaysia (Fasa 1) Tahun 2018 Bg Negeri Terengganu Pakej 3 (Tumpat)-SK Pengkalan Kubor 1, SMK Chabang Empat & SK Chabang Empat
ii. No. Kontrak : Jkr/ves (p) 05 (1) 2018 - Pakej 3 Tumpat
iii. Nama dan Alamat Kontraktor Utama : SERASI VENTURES SDN BHD (Co. No: 213851-U) PT 457, Tgkt 1, Jln Jambatan Sultan Yahya, [illegible] TEL: 09-743 5025 FAX: 09-743 4125

**B. Maklumat Cadangan Sistem Kekuda**

Adalah saya Kontraktor Utama projek ini memohon untuk menggunakan sistem kekuda pasangsiap tersebut sebagaimana butiran di bawah :

i. Nama dan Alamat Pembekal Sistem : ARI Timur (KB) Sdn Bhd (714587-K) Lot 1306, Kawasan Perindustrian Pengkalan Chepa II, 16100 Kota Bharu, Kelantan.
ii. Nama dan Alamat Perekabentuk : Ir. Saw Han Woei
(Alamat Perekabentuk)
C112236
(Nombor Pendaftaran LIM)
iii. Nama dan Alamat Pemasang Bertauliah : Drexham Holding Sdn. Bhd S/53, Lot 78, Kg Darat Demit, Jalan Raja Perempuan Zainab II, 16150 Kota Baharu Kelantan
*(Sila sertakan Surat Perakuan Pemasang Bertauliah dari Pembekal Sistem)*

**C. Perakuan Kontraktor Utama**

Adalah saya Kontraktor Utama projek ini yang memohon untuk menggunakan kekuda pasangsiap seperti butiran di atas, mengakui bahawa saya adalah bertanggungjawab sepenuhnya terhadap pembekalan, rekabentuk dan pemasangan kekuda pasangsiap tersebut.

Tarikh : 24/05/2018
(Tandatangan Kontraktor Utama dan Cop Mohor)

**D. Perakuan Pembekal Sistem**

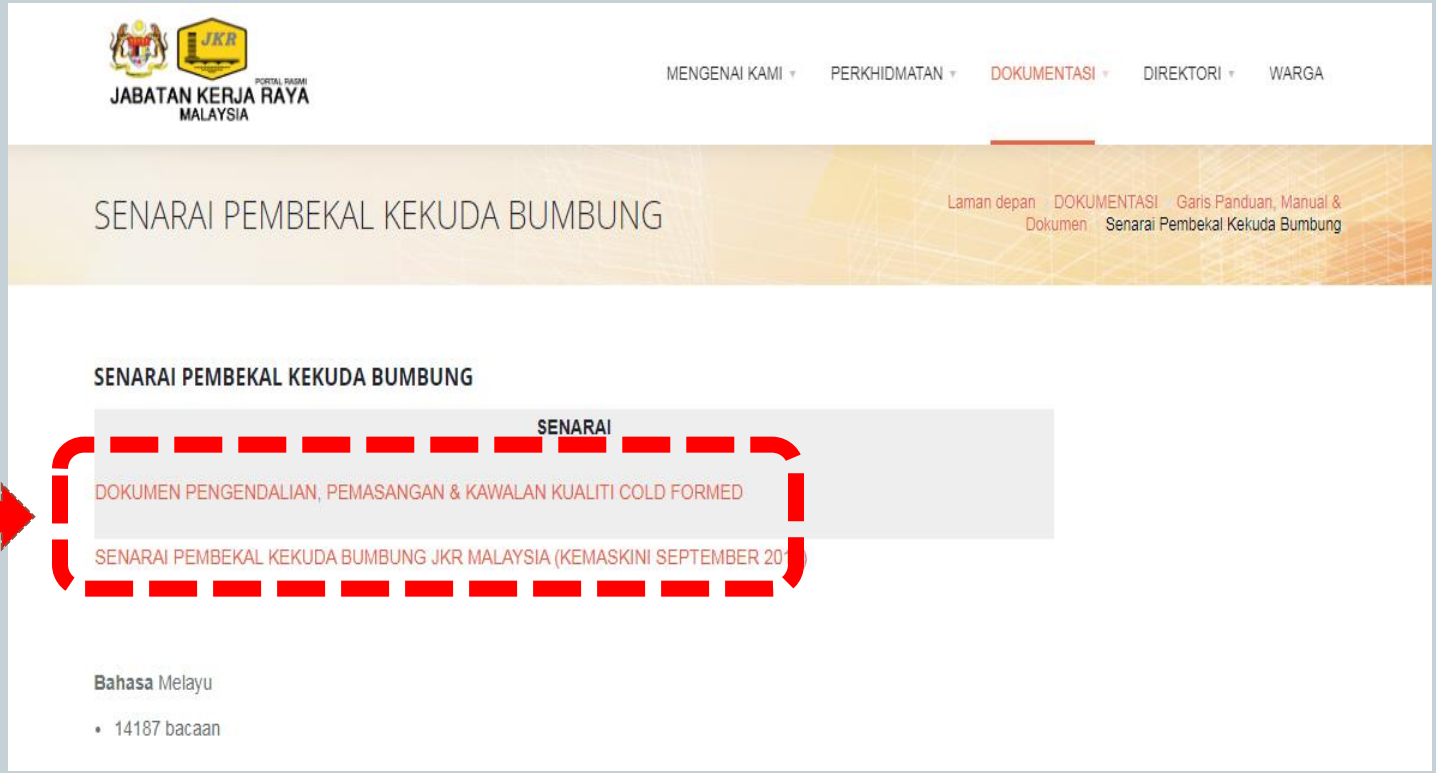
Saya mengesahkan bahawa sistem kekuda syarikat kami dicadangkan untuk projek di atas mencapai segala keperluan yang dinyatakan di dalam spesifikasi.

Tarikh : 23/05/2018.
(Tandatangan Pembekal Sistem dan Cop Mohor)

ARI TIMUR (KB) SDN BHD
Lot 1306, Kawasan Perindustrian
Pengkalan Chepa II,
16100 Kota Bharu, Kelantan.
Tel: 09-774 6946 Fax: 09-774 6946

# SENARAI PEMBEKAL KEKUDA BUMBUNG (www.jkr.gov.my)

# PRE FABRICATED COLD FORMED STEEL ROOF TRUSSES




3

# SENARAI PEMBEKAL KEKUDA SISTEM BUMBUNG JKR MALAYSIA (ZON TIMUR)

CAWANGAN KEJURUTERAAN AWAM & STRUKTUR
JABATAN KERJA RAYA MALAYSIA, KUALA LUMPUR

LAMPIRAN A (Rev. 30 September 2019)

**Senarai Pembekal Sistem Kekuda Bumbung JKR Malaysia**

**2. Cold Formed Steel Truss (Zon Pantai Timur)**

| No. | Name and Address of System Provider | Material Properties | Minimum Corrosion Protection | Approved Fastener a) Manufacturer b) Head Marking (Class) | Approved Anchor Bolt (Manufacturer) | Site Area | Current Status |
|---|---|---|---|---|---|---|---|
| | **ARI TIMUR (KB) SDN. BHD.**<br>Lot 1306<br>Kawasan Perindustrian Pengkalan Chepa II<br>16100 Kota Bharu<br>Kelantan<br><br>Tel : 09-774 5946<br>Faks : 09-774 6946<br><br>Nama P.E.:<br>Ir. Saw Han Woei (C112236) | **C-Lipped Channel & Batten**<br><br>Wall Plate: Min. Thickness 1.2mm<br>Main Truss Member & Bracing: Min. Thickness 1.0mm<br>Batten: Min. Thickness 0.5mm<br><br>*For base metal thickness less than or equal to 1.2mm then Min. Yield Stress 550 MPa*<br><br>*For base metal thickness greater than 1.2mm then Min. Yield Stress 450 MPa* | Hot-dipped Aluminium / Zinc Coated (AZ150) Truecore | a) Fast Mark (Self-drilling Screws)<br>b) F2 (Class 2) | TENN<br><br>*Min.thickness of 42 micron coating by Hot-dipped Galvanized* | **C2 (Normal Site)** | **Approval Validity Period Until**<br><br>**31/12/2020** |
| 16 | **DUNGUN INTEGRABLE SDN. BHD.**<br>Lot 6069, Batu 5, Jalan Paka,<br>23000 Dungun, Terengganu,<br>Terengganu Darul Iman<br><br>Tel : 09 - 8422710<br>Fax : 09 - 8422712<br><br>Nama P.E.:<br>Ir. Mohamad Sahide Bin Ibrahim (12140)<br>Ir. Safnawati Binti Sharbini (C110186) | **C-Lipped Channel & Batten**<br><br>Wall Plate: Min. Thickness 1.2mm<br>Main Truss Member & Bracing: Min. Thickness 1.0mm<br>Batten: Min. Thickness 0.5mm<br><br>*For base metal thickness less than or equal to 1.2mm then Min. Yield Stress 550 MPa*<br><br>*For base metal thickness greater than 1.2mm then Min. Yield Stress 450 MPa* | Hot-dipped Aluminium / Zinc Coated (AZ150) Truecore & Hot-dipped Zinc Coated (Z200) | a) TENN (Self-drilling Screws)<br>b) F2(Class 2) | TENN<br><br>*Min.thickness of 42 micron coating by Hot-dipped Galvanized* | **C2 (Normal Site)** | **Approval Validity Period Until**<br><br>**13/01/2022** |
| 17 | **HS HENG SENG METAL SDN. BHD.**<br>PT 1431, Seksyen 39<br>Kawasan Perindustrian Pengkalan Chepa II<br>Mukim Kemumin<br>16100 Kota Bharu<br>Kelantan Darul Naim<br><br>Tel : 09-773 6233 / 0132 / 0136<br>Faks : 09-773 6135<br><br>Nama P.E.:<br>Ir. Khor Phing Cheong (12028) | **C-Lipped Channel & Batten**<br><br>Wall Plate: Min. Thickness 1.2mm<br>Main Truss Member & Bracing: Min. Thickness 1.0mm<br>Batten: Min. Thickness 0.5mm<br><br>*For base metal thickness less than or equal to 1.2mm then Min. Yield Stress 550 MPa*<br><br>*For base metal thickness greater than 1.2mm then Min. Yield Stress 450 MPa* | Hot-dipped Zinc Coated (AZ150) | a) Ocean Fastrade (Self-drilling Screws)<br>b) DX (Class 2) | OCEAN<br><br>*Min.thickness of 42 micron coating by Hot-dipped Galvanized* | **C2 (Normal Site)** | **Approval Validity Period Until**<br><br>**03/06/2021** |

# SENARAI PEMBEKAL KEKUDA SISTEM BUMBUNG JKR MALAYSIA (ZON TIMUR)

NO. SIJIL : CKAS 040

JABATAN KERJA RAYA MALAYSIA

AKUAN PENDAFTARAN PEMBEKAL SISTEM JKR

Bahawa dengan ini diperakui syarikat :-

**ARI TIMUR (KB) SDN. BHD.**

Lot 1306,
Kawasan Perindustrian Pengkalan Chepa II
16100 Kota Bharu, Kelantan

Telah berdaftar dengan JKR sebagai Pembekal Sistem dalam bidang

***' PRE-FABRICATED COLD FORMED STEEL ROOF TRUSSES '***

yang membenarkan syarikat tersebut menyertai projek-projek JKR.

Kelulusan ini adalah tertakluk kepada syarat-syarat pematuhan spesifikasi **JKR 20601-0186-11**

NO. RUJUKAN PENDAFTARAN : **CF 14 / 1 / 2015**

**TEMPOH SAH LAKU** : **01/01/2017 - 31/12/2018**

(KAMALUDDIN BIN HJ. ABDUL RASHID)
Pengarah Kanan
Cawangan Kejuruteraan Awam dan Struktur
Ibu Pejabat Jabatan Kerja Raya Malaysia
Kuala Lumpur

Tarikh Keluar Sijil : 27 Januari 2017

Kelulusan sah laku sijil hendaklah dirujuk di laman web : http://www.jkr.gov.my pada ruangan Pengumuman

AKUAN PENDAFTARAN PEMBEKAL

# KEPERLUAN PEMATUHAN SPESIFIKASI TELAH DITERJEMAH DAN DIRINGKASKAN SEBAGAIMANA APPENDIX

3.1 Keperluan pematuhan spesifikasi telah diterjemah dan diringkaskan *appendix* seperti berikut:-

a) *Cold Formed Steel*

i) *Appendix 1: Application Form* (Lampiran C)

ii) *Appendix 2: Material Testing Requirements*

iii) *Appendix 3: Checklist on the Contractor Submission*

iv) *Appendix 4: Guidelines on the contents of warranty certificate*

v) *Appendix 5: Special provisions for cold formed roof truss with span more than 13 m but not exceeding 20 m.*

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# KEPERLUAN PEMATUHAN SPESIFIKASI TELAH DITERJEMAH DAN DIRINGKASKAN SEBAGAIMANA APPENDIX

3.1 Keperluan pematuhan spesifikasi telah diterjemah dan diringkaskan *appendix* seperti berikut:-

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3

## APPENDIX 3: A (DOCUMENT SUBMISSION)

**Appendix 3:** Checklist on the Contractor Submission

**A. Document Submission**

| No. | Submission Item | Check |
|---|---|---|
| 1 | Completed Application Form | ☐ |
| 2 | Construction Drawing | ☐ |
| 3 | Analysis and Design Calculation | ☐ |
| 4 | Curriculum Vitae | |
| | i) Professional Engineer | ☐ |
| | ii) Installer | ☐ |
| 5 | Particular of the Fabricator | ☐ |
| 6 | Base Steel Mill Certificate | ☐ |
| 7 | Base Steel Lab Test Certificate (if required) | ☐ |
| 8 | Technical Specification for Screw, Bolt and Anchor Bolt | ☐ |
| 9 | Fastener Lab Test Certificate (if required) | ☐ |
| 10 | Bomba's approval | ☐ |
| 11 | Quality Assurance and Quality Control | ☐ |

## APPENDIX 3: B (COMPLETENESS OF SUBMISSION)

1

**B. Completeness of submission**

| No. | Submission Item | | Check |
|---|---|---|---|
| 1.0 | **Application Form:** | | |
| | - Completed with type of fabrication | | ☐ |
| | - Information on P E and Fabricator | | ☐ |
| | - Endorsed by the S P | | ☐ |
| 2.0 | **Particular and the C.V:** | | |
| | - Valid P E registration with Board of Engineer Malaysia (BEM) | | ☐ |
| | - Fabricator appointment document by the S P | | ☐ |
| | - Fabricator acceptance document on the appointment | | ☐ |
| | - Fabricator registration certificate with CIDB | | ☐ |
| | - Installer competency certificate from CIDB | | ☐ |
| 3.0 | **Analysis and Design Calculation** | | |
| | - Endorsed by the P E | | ☐ |
| | - Loading criteria | | ☐ |
| | - Truss analysis | | ☐ |
| | - Member design | | ☐ |
| | - Bracing design | | ☐ |
| | - Tie down and anchorage design | | ☐ |
| | - Connection design | | ☐ |
| | - Fastener and anchor technical specification | | ☐ |
| | - Base steel mill certificate | | ☐ |
| 4.0 | **Construction Drawing (minimum content):** | | |
| | - Endorsed by the P E on every sheet of drawings | | ☐ |
| | - Layout drawing | | ☐ |
| | - Section properties | | ☐ |
| | - Accessories properties (ex. L-Bracket, Triple L-grip etc) | | ☐ |
| | - Bracing layout | | ☐ |
| | - Truss configuration | | ☐ |
| | - Connection detail | | ☐ |
| | - Support detail (wall plate and anchor) | | ☐ |
| | - Technical notes on base steel, fastener, anchor bolt and protective coating | | ☐ |
| 5.0 | **Construction Drawing (Compliance to specification):** | | |
| | - Maximum span | ≤ 13 m | ☐ |
| | - Maximum spacing | ≤ 1.2 m | ☐ |
| | - Minimum base steel thickness (truss member: open section & bracing) | ≥ 1.0 mm | ☐ |
| | - Minimum base steel thickness (truss member: closed section) | ≥ 0.6 mm | ☐ |
| | - Minimum base steel thickness (batten) | ≥ 0.5 mm | ☐ |
| | - Minimum base steel thickness (wall plate) | ≥ 1.2 mm | ☐ |
| | - Minimum depth of section (open section) | ≥ 75 mm | ☐ |
| | - Minimum width of section | ≥ 35 mm | ☐ |

1

# APPLICATION FORM

*Cawangan Kejuruteraan Awam, Struktur & Jambatan*
*Ibu Pejabat JKR Malaysia, Kuala Lumpur*

*CKASJ/SKB/1/2010*

Lampiran C

**Permohonan Penggunaan Sistem Kekuda Bumbung :**

[X] *Pre-Fabricated Cold Formed Steel* [ ] *Factory Fabrication*
[ ] *Pre-Fabricated Timber* [X] *On-site Fabrication*

**A. Maklumat Asas Projek**

i. Nama projek : Cadangan Pembinaan Semula Dan Menaiktaraf Sekolah Dalf Menggunakan Kaedah IBS Di Semenanjung Malaysia (Fasa 1) Tahun 2018 Bg Negeri Terengganu Pakej 3 (Tumpat)-SK Pengkalan Kubor 1, SMK Chabang Empat & SK Chabang Empat

ii. No. Kontrak : Jkr/kon. (p) 05 (1) 2018 - Pakej 3 Tumpat

iii. Nama dan Alamat Kontraktor Utama : SERASI VENTURES SDN BHD (CO. NO: 313851-U) PT 457, Tgkt 1, Jln Jambatan Sultan Yahya, Lembah Sireh, 15050 Kota Bharu Kelantan. TEL: 09-743 5025 FAX: 09-743 5129

**B. Maklumat Cadangan Sistem Kekuda**

Adalah saya Kontraktor Utama projek ini memohon untuk menggunakan sistem kekuda pasangsiap tersebut sebagaimana butiran di bawah :

i. Nama dan Alamat Pembekal Sistem : ARI Timur (KB) Sdn Bhd (714587-K) Lot 1306, Kawasan Perindustrian Pengkalan Chepa II, 16100 Kota Bharu, Kelantan.

ii. Nama dan Alamat Perekabentuk : Ir. Saw Han Woei Lot 1306, Kawasan Perindustrian Pengkalan Chepa II, 16100 Kota Bharu, Kelantan. (Alamat Perekabentuk)
C112236 (Nombor Pendaftaran LJM)

iii. Nama dan Alamat Pemasang Bertauliah : Drexham Holding Sdn. Bhd. S/53, Lot 78, Kg Darat Demit, Jalan Raja Perempuan Zainab II, 16150 Kota Baharu Kelantan

*(Sila sertakan Surat Perakuan Pemasang Bertauliah dari Pembekal Sistem)*

**C. Perakuan Kontraktor Utama**

Adalah saya Kontraktor Utama projek ini yang memohon untuk menggunakan kekuda pasangsiap seperti butiran di atas, mengakui bahawa saya adalah bertanggungjawab sepenuhnya terhadap pembekalan, rekabentuk dan pemasangan kekuda pasangsiap tersebut.

Tarikh : 24/05/2018

(Tandatangan Kontraktor Utama dan Cop Syarikat)

**D. Perakuan Pembekal Sistem**

Saya mengesahkan bahawa sistem kekuda syarikat kami dicadangkan untuk projek di atas mencapai segala keperluan yang dinyatakan di dalam spesifikasi.

Tarikh : 23/05/2018

ARI TIMUR (KB) SDN BHD
Lot 1306, Kawasan Perindustrian
Pengkalan Chepa II,
16100 Kota Bharu, Kelantan.
Tel: 09-774 6946 Fax: 09-774 6946

(Tandatangan Pembekal Sistem dan Cop Syarikat)

Lampiran C

## APPENDIX 3: A (DOCUMENT SUBMISSION)

**Appendix 3:** Checklist on the Contractor Submission

**A. Document Submission**

| No. | Submission Item | Check |
|---|---|---|
| 1 | Completed Application Form | ☐ |
| 2 | Construction Drawing | ☐ |
| 3 | Analysis and Design Calculation | ☐ |
| 4 | Curriculum Vitae | |
| | i) Professional Engineer | ☐ |
| | ii) Installer | ☐ |
| 5 | Particular of the Fabricator | ☐ |
| 6 | Base Steel Mill Certificate | ☐ |
| 7 | Base Steel Lab Test Certificate (if required) | ☐ |
| 8 | Technical Specification for Screw, Bolt and Anchor Bolt | ☐ |
| 9 | Fastener Lab Test Certificate (if required) | ☐ |
| 10 | Bomba's approval | ☐ |
| 11 | Quality Assurance and Quality Control | ☐ |

## APPENDIX 3: B (COMPLETENESS OF SUBMISSION)

**B. Completeness of submission**

| No. | Submission Item | | Check |
|---|---|---|---|
| 1.0 | **Application Form:** | | |
| | - Completed with type of fabrication | | ☐ |
| | - Information on P E and Fabricator | | ☐ |
| | - Endorsed by the S.P | | ☐ |
| 2.0 | **Particular and the C.V:** | | |
| | - Valid P E registration with Board of Engineer Malaysia (BEM) | | ☐ |
| | - Fabricator appointment document by the S P | | ☐ |
| | - Fabricator acceptance document on the appointment | | ☐ |
| | - Fabricator registration certificate with CIDB | | ☐ |
| | - Installer competency certificate from CIDB | | ☐ |
| 3.0 | **Analysis and Design Calculation** | | |
| | - Endorsed by the P E | | ☐ |
| | - Loading criteria | | ☐ |
| | - Truss analysis | | ☐ |
| | - Member design | | ☐ |
| | - Bracing design | | ☐ |
| | - Tie down and anchorage design | | ☐ |
| | - Connection design | | ☐ |
| | - Fastener and anchor technical specification | | ☐ |
| | - Base steel mill certificate | | ☐ |
| 4.0 | **Construction Drawing (minimum content):** | | |
| | - Endorsed by the P E on every sheet of drawings | | ☐ |
| | - Layout drawing | | ☐ |
| | - Section properties | | ☐ |
| | - Accessories properties (ex. L-Bracket, Triple L-grip etc) | | ☐ |
| | - Bracing layout | | ☐ |
| | - Truss configuration | | ☐ |
| | - Connection detail | | ☐ |
| | - Support detail (wall plate and anchor) | | ☐ |
| | - Technical notes on base steel, fastener, anchor bolt and protective coating | | ☐ |
| 5.0 | **Construction Drawing (Compliance to specification):** | | |
| | - Maximum span | ≤ 13 m | ☐ |
| | - Maximum spacing | ≤ 1.2 m | ☐ |
| | - Minimum base steel thickness (truss member: open section & bracing) | ≥ 1.0 mm | ☐ |
| | - Minimum base steel thickness (truss member: closed section) | ≥ 0.6 mm | ☐ |
| | - Minimum base steel thickness (batten) | ≥ 0.5 mm | ☐ |
| | - Minimum base steel thickness (wall plate) | ≥ 1.2 mm | ☐ |
| | - Minimum depth of section (open section) | ≥ 75 mm | ☐ |
| | - Minimum width of section | ≥ 35 mm | ☐ |

# 2 PARTICULAR & THE C.V

(Form B5)

REGISTRATION OF ENGINEERS ACT 1967
REGISTRATION OF ENGINEERS REGULATIONS 1990

Certificate No. : 1815-0100-PC-C112236

BOARD OF ENGINEERS MALAYSIA

CERTIFICATE OF REGISTRATION OF
PROFESSIONAL ENGINEER WITH PRACTISING CERTIFICATE

THIS IS TO CERTIFY THAT

Name : Ir. SAW HAN WOEI
Address : JS WARISAN SDN BHD
M5C/18 JALAN PANDAN INDAH 4/1
PANDAN INDAH
55100 KUALA LUMPUR
W. PERSEKUTUAN (K.L), MALAYSIA

Identification Card No : 760524086557 Nationality : MALAYSIAN

having complied with the requirements of the Registration of Engineers Act 1967 is registered as a PROFESSIONAL ENGINEER WITH PRACTISING CERTIFICATE in the branch of engineering specified below -

Registration No : C112236
Branch of Engineering : CIVIL

subject to the conditions stipulated below -
Not Applicable

This certificate of registration shall expire on 31 DECEMBER 2018

(DATO' Sri Ir. Dr. ROSLAN BIN MD. TAHA)
President

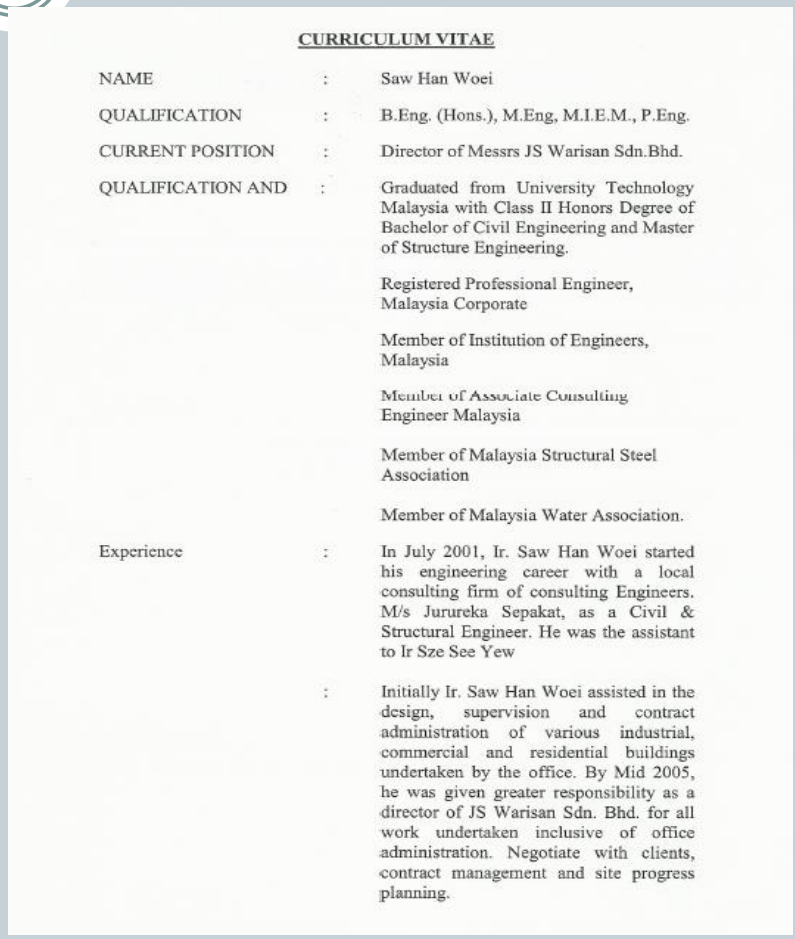
(Ir. HIZAMUL-DIN BIN AB. RAHMAN)
Registrar

Date of Issue :

** Receipt No. 324745 ** HLBB 801874 ** RM400.00 ** Payment Date:09-01-2018**
[ RM400.00(Renewal Fee) ]

Scan QR code or barcode at visit BEM website (www.bem.org.my) for confirmation of registration

P.E Registration



CURRICULUM VITAE

NAME : Saw Han Woei

QUALIFICATION : B.Eng. (Hons.), M.Eng, M.I.E.M., P.Eng.

CURRENT POSITION : Director of Messrs JS Warisan Sdn.Bhd.

QUALIFICATION AND : Graduated from University Technology Malaysia with Class II Honors Degree of Bachelor of Civil Engineering and Master of Structure Engineering.

Registered Professional Engineer, Malaysia Corporate

Member of Institution of Engineers, Malaysia

Member of Associate Consulting Engineer Malaysia

Member of Malaysia Structural Steel Association

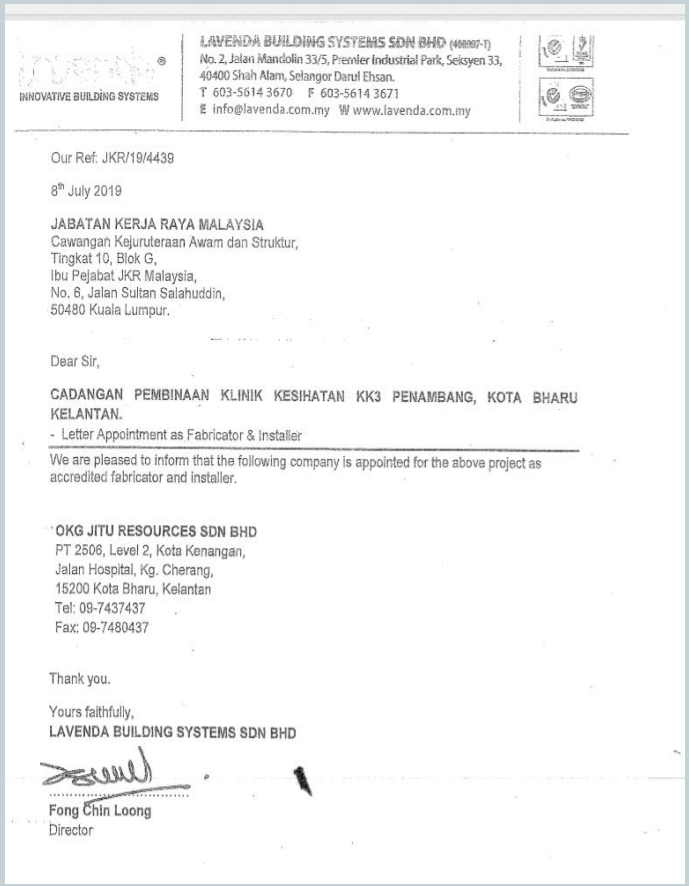
Member of Malaysia Water Association.

Experience : In July 2001, Ir. Saw Han Woei started his engineering career with a local consulting firm of consulting Engineers. M/s Jururekа Sepakat, as a Civil & Structural Engineer. He was the assistant to Ir Sze See Yew

: Initially Ir. Saw Han Woei assisted in the design, supervision and contract administration of various industrial, commercial and residential buildings undertaken by the office. By Mid 2005, he was given greater responsibility as a director of JS Warisan Sdn. Bhd. for all work undertaken inclusive of office administration. Negotiate with clients, contract management and site progress planning.

C.V

# 2 PARTICULAR & THE C.V



LAVENDA BUILDING SYSTEMS SDN BHD (468907-T)
No. 2, Jalan Mandolin 33/5, Premier Industrial Park, Seksyen 33,
40400 Shah Alam, Selangor Darul Ehsan.
T 603-5614 3670 F 603-5614 3671
E info@lavenda.com.my W www.lavenda.com.my

INNOVATIVE BUILDING SYSTEMS

Our Ref: JKR/19/4439

8th July 2019

JABATAN KERJA RAYA MALAYSIA
Cawangan Kejuruteraan Awam dan Struktur,
Tingkat 10, Blok G,
Ibu Pejabat JKR Malaysia,
No. 6, Jalan Sultan Salahuddin,
50480 Kuala Lumpur.

Dear Sir,

CADANGAN PEMBINAAN KLINIK KESIHATAN KK3 PENAMBANG, KOTA BHARU KELANTAN.
- Letter Appointment as Fabricator & Installer

We are pleased to inform that the following company is appointed for the above project as accredited fabricator and installer.

OKG JITU RESOURCES SDN BHD
PT 2506, Level 2, Kota Kenangan,
Jalan Hospital, Kg. Cherang,
15200 Kota Bharu, Kelantan
Tel: 09-7437437
Fax: 09-7480437

Thank you.

Yours faithfully,
LAVENDA BUILDING SYSTEMS SDN BHD

Fong Chin Loong
Director

Fabricator Appointment by. S.P

Fabricator Acceptance Document

# 2 PARTICULAR & THE C.V

AT01RTL2-10020416

CIDB MALAYSIA

Sijil Kecekapan Kemahiran

*Dengan ini adalah disahkan bahawa*

**MUHAMAD SUKRI BIN IBRAHIM**

**No.Kad Pengenalan : 740911-03-6359**

*telah diperakui sebagai*

**PEMASANG KEKUDA BUMBUNG(KELULI) - TAHAP 2**

***ROOF TRUSS INSTALLER(STEEL)-LEVEL 2***

*dan telah mencapai prestasi kemahiran yang ditetapkan*

*oleh*

Lembaga Pembangunan Industri Pembinaan Malaysia

*di*

Akademi Binaan Malaysia Wilayah Timur

*pada*

09 April 2016

IR AHMAD 'ASRI ABDUL HAMID
Pengurus Besar Kanan
Lembaga Pembangunan Industri Pembinaan Malaysia

Fabricator Registration Cert. CIDB

Installer Competency Cert. CIDB

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| 9 | Fastener Lab Test Certificate (if required) | ☐ |
| 10 | Bomba's approval | ☐ |
| 11 | Quality Assurance and Quality Control | ☐ |

## APPENDIX 3: B (COMPLETENESS OF SUBMISSION)

**B. Completeness of submission**

| No. | Submission Item | | Check |
|---|---|---|---|
| 1.0 | **Application Form:** | | |
| | - Completed with type of fabrication | | ☐ |
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| | - Endorsed by the S P | | ☐ |
| 2.0 | **Particular and the C.V:** | | |
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| | - Fabricator appointment document by the S P | | ☐ |
| | - Fabricator acceptance document on the appointment | | ☐ |
| | - Fabricator registration certificate with CIDB | | ☐ |
| | - Installer competency certificate from CIDB | | ☐ |
| 3.0 | **Analysis and Design Calculation** | | |
| | - Endorsed by the P E | | ☐ |
| | - Loading criteria | | ☐ |
| | - Truss analysis | | ☐ |
| | - Member design | | ☐ |
| | - Bracing design | | ☐ |
| | - Tie down and anchorage design | | ☐ |
| | - Connection design | | ☐ |
| | - Fastener and anchor technical specification | | ☐ |
| | - Base steel mill certificate | | ☐ |
| 4.0 | **Construction Drawing (minimum content):** | | |
| | - Endorsed by the P E on every sheet of drawings | | ☐ |
| | - Layout drawing | | ☐ |
| | - Section properties | | ☐ |
| | - Accessories properties (ex. L-Bracket, Triple L-grip etc) | | ☐ |
| | - Bracing layout | | ☐ |
| | - Truss configuration | | ☐ |
| | - Connection detail | | ☐ |
| | - Support detail (wall plate and anchor) | | ☐ |
| | - Technical notes on base steel, fastener, anchor bolt and protective coating | | ☐ |
| 5.0 | **Construction Drawing (Compliance to specification):** | | |
| | - Maximum span | ≤ 13 m | ☐ |
| | - Maximum spacing | ≤ 1.2 m | ☐ |
| | - Minimum base steel thickness (truss member: open section & bracing) | ≥ 1.0 mm | ☐ |
| | - Minimum base steel thickness (truss member: closed section) | ≥ 0.6 mm | ☐ |
| | - Minimum base steel thickness (batten) | ≥ 0.5 mm | ☐ |
| | - Minimum base steel thickness (wall plate) | ≥ 1.2 mm | ☐ |
| | - Minimum depth of section (open section) | ≥ 75 mm | ☐ |
| | - Minimum width of section | ≥ 35 mm | ☐ |

3

# 3 ANALYSIS & DESIGN CALCULATION

**ARIT TRUSS SYSTEM**

**ARI Timur (KB) Sdn Bhd**
Factory: Lot 1306, Kawasan Perindustrian Pengkalan Chepa 2, 16100 Kota Baharu, Kelantan.

**DESIGN CRITERIA:**

1) All drawings shall be read in conjunction with Truss Detail and Architecture / Structural Drawings. Any discrepancy between drawings should be notified immediately to the Architect and the Engineer before work commences.

2) **ARIT** Steel Truss components: Chords & Webs incorporates 1.0mm (BMT) thickness only and manufactured from G550-AZ150. The components are manufactured in accordance with BS 5950-5:1998: Code of Practice for design of cold formed sections.

3) **ARIT** batten are made from 0.50mm base metal thick G550-AZ150.

4) All Truss component and battens are manufactured from Truecore Zincalume High Tensile Steel, G550-AZ150.

5) ARIT Steel Truss System are designed to satisfy the following Design Code of Practice:-

| | |
|---|---|
| BS 5950-5:1998 | Structural design actions: Part 5: General principles |
| UBL: 1984 | Structural design actions: Permanent, imposed & other actions. |
| BS 6399:2 or CP3 | Structural design actions: Part 1: Wind actions |
| BS 5950-5:1998 | Cold-formed steel structures |
| BS 5950-5:1998 | Steel Structural Codes |
| AS 3566.1:2002 | Self Drilling Screws |

6) Roof Truss Loading to be applied according the Design Code of Practice

a) Roof Dead Load = 0.12 KN/m2 for Metal Roofing
b) Roof Live Load = 0.25kN/m2 follows Uniform Building By-Law 1984
c) Ceiling Dead Load = 0.14kN/m2
d) Ceiling Services Load = 0.15 kN/m2
e) Basic Wind Speed = 45m/s. Limit State Design Wind Speed = 45 x √1.5 = 55.11m/s.
These winds create upward pressures on both the truss top chord (external win pressure) and truss bottom chord (internal wind pressure) as :-

- External Wind Pressure ( kPa ), $Q_{ze}$ = $0.6 \times 10^{-3} \times V_z^2 \times C_{pe}$
- Internal Wind Pressure ( kPa ), $Q_{zi}$ = $0.6 \times 10^{-3} \times V_z^2 \times C_{pi}$

Where
$C_{pe}$ = External Pressure Coefficient = 0.9
$C_{pi}$ = Internal Pressure Coefficient = 0.2 (default) for non cyclonic but can be varied.
$V_z$ = Limit State Design Wind Speed in m/s

Loading Criteria

Quik Series Framing Module Truss Analysis Report

| | |
|---|---|
| Company Name | ARI Timur |
| Job Name | SEKOLAH DAIF |
| Job Number | 18134 |
| Drawing Name | 18134p0t1_SEKOLAH DAIF |
| Print date | 19-06-2018 |
| Truss Name | N1 |
| System Name | ARI_Timur |
| Design Code | BS5950-5:1998 D |
| Status | Passed |

Node Results for Load Case 4 (1.4G + 1.6Q)

| Node | IDplacement | lacement | esultant | Rotation | Reaction | Reaction | Reaction | int Load | Capacity | Shortage | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | -0.21 | 0 | 583 | 0 | -5494 | 13238 | 19280 | 0 |
| 2 | 0.05 | -1.07 | 1.07 | -0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0.10 | -2.14 | 2.14 | -0.28 | 0 | 0 | 0 | 0 | 607 | 11568 | 0 |
| 4 | 0.22 | -4.62 | 4.62 | -0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0.33 | -6.56 | 6.57 | -0.18 | 0 | 0 | 0 | 0 | 616 | 11568 | 0 |
| 6 | 0.35 | -6.80 | 6.81 | -0.17 | 0 | 0 | 0 | 0 | 1898 | 11568 | 0 |
| 7 | 0.49 | -8.31 | 8.33 | -0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0.63 | -8.24 | 8.26 | 0.05 | 0 | 0 | 0 | 0 | 2011 | 11568 | 0 |
| 9 | 0.64 | -8.17 | 8.19 | 0.04 | 0 | 0 | 0 | 0 | 3048 | 11568 | 0 |
| 10 | 0.75 | -8.02 | 8.06 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0.85 | -8.16 | 8.21 | -0.04 | 0 | 0 | 0 | 0 | 3025 | 11568 | 0 |
| 12 | 0.87 | -8.23 | 8.28 | -0.05 | 0 | 0 | 0 | 0 | 1991 | 11568 | 0 |
| 13 | 1.01 | -8.31 | 8.37 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 1.14 | -6.79 | 6.89 | 0.17 | 0 | 0 | 0 | 0 | 1873 | 11568 | 0 |
| 15 | 1.16 | -6.55 | 6.65 | 0.18 | 0 | 0 | 0 | 0 | 613 | 11568 | 0 |
| 16 | 1.28 | -4.60 | 4.78 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 1.39 | -2.13 | 2.54 | 0.28 | 0 | 0 | 0 | 0 | 617 | 11568 | 0 |
| 18 | 1.44 | -1.06 | 1.79 | 0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 1.49 | 0.00 | 1.49 | 0.21 | 0 | 678 | 0 | -5557 | 13160 | 19280 | 0 |
| 20 | 1.93 | -7.21 | 7.47 | 0.41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 0.85 | -3.19 | 3.30 | 0.39 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 0.00 | 0.00 | 0.00 | 0.22 | 0 | 279 | 0 | -1457 | 0 | 0 | 0 |
| 23 | -0.34 | 1.29 | 1.33 | -0.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 0.21 | -0.98 | 1.01 | -0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 | 0.46 | -2.13 | 2.18 | -0.30 | 0 | 0 | 0 | 0 | 607 | 11568 | 0 |
| 26 | 0.93 | -4.27 | 4.37 | -0.26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27 | 1.30 | -6.04 | 6.18 | -0.21 | 0 | 0 | 0 | 0 | 616 | 11568 | 0 |
| 28 | 1.45 | -7.65 | 7.78 | -0.07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 | 1.23 | -7.90 | 7.99 | -0.01 | 0 | 0 | 0 | 0 | 1898 | 11568 | 0 |
| 30 | 1.21 | -7.93 | 8.02 | -0.03 | 0 | 0 | 0 | 0 | 2011 | 11568 | 0 |
| 31 | 1.17 | -8.65 | 8.72 | -0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | 0.81 | -8.13 | 8.17 | 0.15 | 0 | 0 | 0 | 0 | 3048 | 11568 | 0 |
| 33 | 0.75 | -7.97 | 8.00 | 0.16 | 0 | 0 | 0 | 0 | 8323 | 15424 | 0 |
| 34 | 0.69 | -8.13 | 8.16 | -0.15 | 0 | 0 | 0 | 0 | 3025 | 11568 | 0 |
| 35 | 0.32 | -8.64 | 8.65 | 0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0.29 | -7.92 | 7.92 | 0.03 | 0 | 0 | 0 | 0 | 1991 | 11568 | 0 |
| 37 | 0.26 | -7.89 | 7.89 | 0.01 | 0 | 0 | 0 | 0 | 1873 | 11568 | 0 |
| 38 | 0.05 | -7.64 | 7.64 | 0.07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0.20 | -6.03 | 6.03 | 0.21 | 0 | 0 | 0 | 0 | 613 | 11568 | 0 |
| 40 | 0.57 | -4.26 | 4.30 | 0.26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 | 1.03 | -2.12 | 2.36 | 0.30 | 0 | 0 | 0 | 0 | 617 | 11568 | 0 |
| 42 | 1.28 | -0.98 | 1.61 | 0.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 1.78 | 1.09 | 2.09 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 44 | 1.87 | 1.42 | 2.35 | 0.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Truss Analysis

**ARI Timur (KB) SDN. BHD**

BENDING AND DEFLECTION CHECK FOR BATTEN MB35.50

Batten Type : AJIYA MB35.50

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Batten Spacing | = | 0.90 | m | | | | |
| Truss Spacing | = | 1.200 | m | | | | |
| Cantilever Span | = | 0.950 | m | | | | |
| **DATA** | | | | | | | |
| a Roofing Weight | = | 5.000 | kg/m2 | = | 0.049 | kN/m2 | = 0.044 kN/m |
| b Insulation Thickness | = | 50.000 | mm | | | | |
| c Insulation Weight | = | 10.000 | kg/m3 | = | 0.005 | kN/m2 | = 0.004 kN/m |
| d Yield Stress | = | 550.000 | Mpa | | | | |
| e Self Weight | = | 0.494 | Kg/m | = | 0.005 | kN/m | |
| f Workers Load | = | 26.000 | Kg/m2 | = | 0.255 | kN/m2 | = 0.230 kN/m |
| g Height of Purlin | | 35.000 | mm | | | | |
| h Thickness | | 0.500 | mm | | | | |
| i Ixx = | | 0.0183 | x | $10^{6}$ | mm | 4 | |
| j Zxx = | | 0.821 | x | $10^{3}$ | mm | 3 | |

**FAST RESULT CHECK**

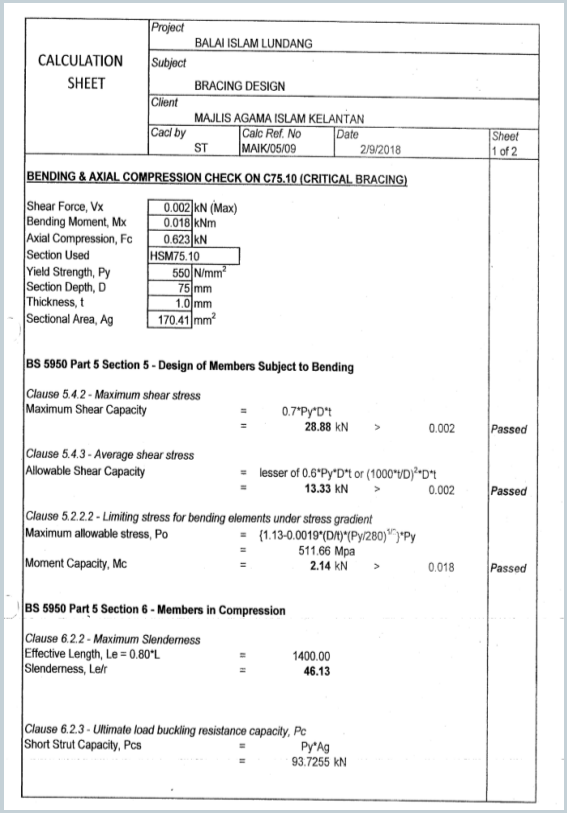
| | | | | | |
|---|---|---|---|---|---|
| a) SIMPLY SUPPORTED | | | | | |
| i Bending | PASSED | Actual | 97 Mpa | Allowable = | 467 Mpa |
| ii Deflection (unfactored Dead Load) | PASSED | Actual | 0 mm | Allowable = | 4.8 mm |
| iii Deflection (Unfactored Total Load) | PASSED | Actual | 2 mm | Allowable = | 4.8 mm |
| a) CANTILEVER | | | | | |
| i Bending | PASSED | Actual | 243 Mpa | Allowable = | 467 Mpa |
| ii Deflection (unfactored Dead Load) | PASSED | Actual | 1.449 mm | Allowable = | 5.3 mm |
| ii Deflection (Unfactored Total Load) | FAILED | Actual | 7.679 mm | Allowable = | 5.3 mm |
| iii Allowable Deflection Load | | | 0.190 kN/m | | |
| iv Allowable Loads | | | 0.845 kN/m | | |

**LOADINGS**

| | | | | |
|---|---|---|---|---|
| a) ii. Roof Sheet | = 0.044 | kN/m | | |
| iii. Insulation | = 0.004 | kN/m | | |
| iii. Self Weight | = 0.005 | kN/m | | |
| Total Dead Load | = 0.0534 | kN/m | | |
| b) Imposed Load (Spacing 0.9 m c/c) | = 0.255 | x | 0.90 = 0.230 | kN/m |
| c) Total Load | = 0.283 | kN/m | | |
| d) Total Factored Load | = ( 1.4 x 0.053406 + 1.6 x 0.23 ) kN /m | | | |
| | = 0.442 | kN/m | | |

Member Design

# 3 ANALYSIS & DESIGN CALCULATION



CALCULATION SHEET

Project: BALAI ISLAM LUNDANG
Subject: BRACING DESIGN
Client: MAJLIS AGAMA ISLAM KELANTAN
Cacl by: ST | Calc Ref. No: MAIK/05/09 | Date: 2/9/2018 | Sheet: 1 of 2

**BENDING & AXIAL COMPRESSION CHECK ON C75.10 (CRITICAL BRACING)**

| | | |
|---|---|---|
| Shear Force, Vx | 0.002 | kN (Max) |
| Bending Moment, Mx | 0.018 | kNm |
| Axial Compression, Fc | 0.623 | kN |
| Section Used | HSM75.10 | |
| Yield Strength, Py | 550 | N/mm² |
| Section Depth, D | 75 | mm |
| Thickness, t | 1.0 | mm |
| Sectional Area, Ag | 170.41 | mm² |

**BS 5950 Part 5 Section 5 - Design of Members Subject to Bending**

*Clause 5.4.2 - Maximum shear stress*
Maximum Shear Capacity = 0.7*Py*D*t
= **28.88** kN > 0.002 — *Passed*

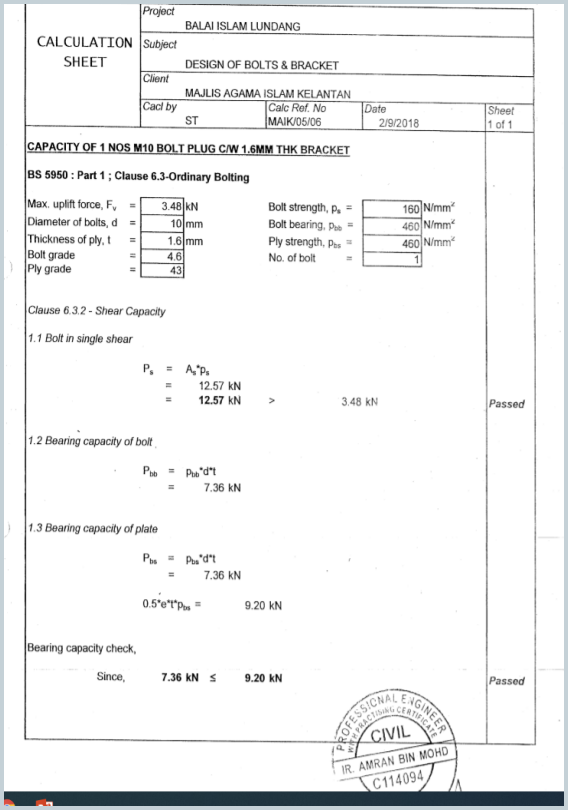
*Clause 5.4.3 - Average shear stress*
Allowable Shear Capacity = lesser of 0.6*Py*D*t or (1000*t/D)²*D*t
= **13.33** kN > 0.002 — *Passed*

*Clause 5.2.2.2 - Limiting stress for bending elements under stress gradient*
Maximum allowable stress, Po = {1.13-0.0019*(D/t)*(Py/280)^1/2}*Py
= 511.66 Mpa
Moment Capacity, Mc = **2.14** kN > 0.018 — *Passed*

**BS 5950 Part 5 Section 6 - Members in Compression**

*Clause 6.2.2 - Maximum Slenderness*
Effective Length, Le = 0.80*L = 1400.00
Slenderness, Le/r = **46.13**

*Clause 6.2.3 - Ultimate load buckling resistance capacity, Pc*
Short Strut Capacity, Pcs = Py*Ag
= 93.7255 kN



CALCULATION SHEET

Project: BALAI ISLAM LUNDANG
Subject: DESIGN OF BOLTS & BRACKET
Client: MAJLIS AGAMA ISLAM KELANTAN
Cacl by: ST | Calc Ref. No: MAIK/05/06 | Date: 2/9/2018 | Sheet: 1 of 1

**CAPACITY OF 1 NOS M10 BOLT PLUG C/W 1.6MM THK BRACKET**

**BS 5950 : Part 1 ; Clause 6.3-Ordinary Bolting**

| | | | | |
|---|---|---|---|---|
| Max. uplift force, $F_v$ | 3.48 | kN | Bolt strength, $p_s$ | 160 N/mm² |
| Diameter of bolts, d | 10 | mm | Bolt bearing, $p_{bb}$ | 460 N/mm² |
| Thickness of ply, t | 1.6 | mm | Ply strength, $p_{bs}$ | 460 N/mm² |
| Bolt grade | 4.6 | | No. of bolt | 1 |
| Ply grade | 43 | | | |

*Clause 6.3.2 - Shear Capacity*

*1.1 Bolt in single shear*
$P_s = A_s * p_s$
= 12.57 kN
= **12.57 kN** > 3.48 kN — *Passed*

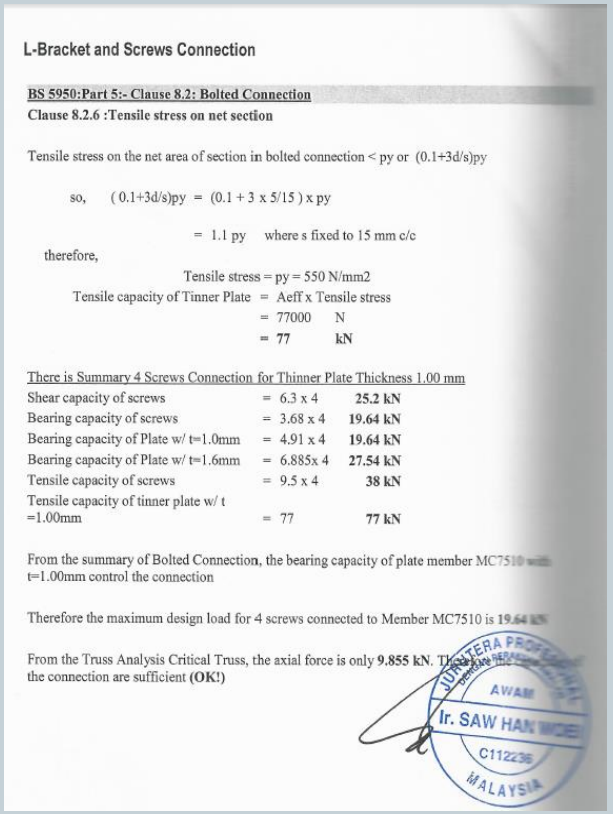
*1.2 Bearing capacity of bolt*
$P_{bb} = p_{bb} * d * t$
= 7.36 kN

*1.3 Bearing capacity of plate*
$P_{bs} = p_{bs} * d * t$
= 7.36 kN

$0.5 * e * t * p_{bs}$ = 9.20 kN

Bearing capacity check,
Since, **7.36 kN** ≤ **9.20 kN** — *Passed*

PROFESSIONAL ENGINEER CIVIL IR. AMRAN BIN MOHD C114094



**L-Bracket and Screws Connection**

**BS 5950:Part 5:- Clause 8.2: Bolted Connection**
**Clause 8.2.6 :Tensile stress on net section**

Tensile stress on the net area of section in bolted connection < py or (0.1+3d/s)py

so, (0.1+3d/s)py = (0.1 + 3 x 5/15 ) x py
= 1.1 py where s fixed to 15 mm c/c

therefore,
Tensile stress = py = 550 N/mm2
Tensile capacity of Tinner Plate = Aeff x Tensile stress
= 77000 N
= **77** kN

There is Summary 4 Screws Connection for Thinner Plate Thickness 1.00 mm

| | | |
|---|---|---|
| Shear capacity of screws | = 6.3 x 4 | **25.2 kN** |
| Bearing capacity of screws | = 3.68 x 4 | **19.64 kN** |
| Bearing capacity of Plate w/ t=1.0mm | = 4.91 x 4 | **19.64 kN** |
| Bearing capacity of Plate w/ t=1.6mm | = 6.885x 4 | **27.54 kN** |
| Tensile capacity of screws | = 9.5 x 4 | **38 kN** |
| Tensile capacity of tinner plate w/ t =1.00mm | = 77 | **77 kN** |

From the summary of Bolted Connection, the bearing capacity of plate member MC7510 with t=1.00mm control the connection

Therefore the maximum design load for 4 screws connected to Member MC7510 is 19.64 kN

From the Truss Analysis Critical Truss, the axial force is only **9.855 kN**. The [illegible] the connection are sufficient **(OK!)**

JURUTERA PROFESIONAL AWAM Ir. SAW HAN WEE C112236 MALAYSIA

Bracing Design

Tie Down & Anchorage Design

Connection Design

## APPENDIX 3: A (DOCUMENT SUBMISSION)

**Appendix 3:** Checklist on the Contractor Submission

**A. Document Submission**

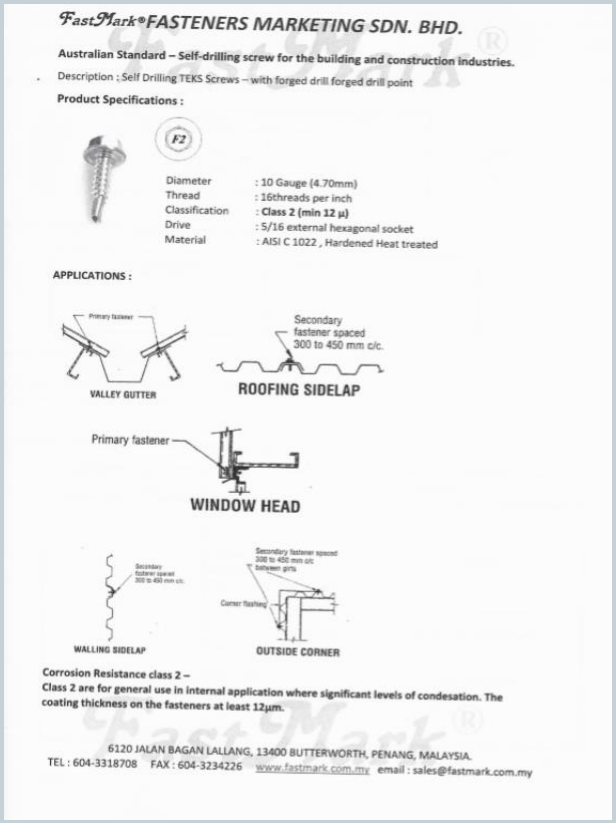
| No. | Submission Item | Check |
|---|---|---|
| 1 | Completed Application Form | ☐ |
| 2 | Construction Drawing | ☐ |
| 3 | Analysis and Design Calculation | ☐ |
| 4 | Curriculum Vitae | |
| | i) Professional Engineer | ☐ |
| | ii) Installer | ☐ |
| 5 | Particular of the Fabricator | ☐ |
| 6 | Base Steel Mill Certificate | ☐ |
| 7 | Base Steel Lab Test Certificate (if required) | ☐ |
| 8 | Technical Specification for Screw, Bolt and Anchor Bolt | ☐ |
| 9 | Fastener Lab Test Certificate (if required) | ☐ |
| 10 | Bomba's approval | ☐ |
| 11 | Quality Assurance and Quality Control | ☐ |

## APPENDIX 3: B (COMPLETENESS OF SUBMISSION)

**B. Completeness of submission**

| No. | Submission Item | | Check |
|---|---|---|---|
| 1.0 | **Application Form:** | | |
| | - Completed with type of fabrication | | ☐ |
| | - Information on P E and Fabricator | | ☐ |
| | - Endorsed by the S P | | ☐ |
| 2.0 | **Particular and the C.V:** | | |
| | - Valid P E registration with Board of Engineer Malaysia (BEM) | | ☐ |
| | - Fabricator appointment document by the S P | | ☐ |
| | - Fabricator acceptance document on the appointment | | ☐ |
| | - Fabricator registration certificate with CIDB | | ☐ |
| | - Installer competency certificate from CIDB | | ☐ |
| 3.0 | **Analysis and Design Calculation** | | |
| | - Endorsed by the P E | | ☐ |
| | - Loading criteria | | ☐ |
| | - Truss analysis | | ☐ |
| | - Member design | | ☐ |
| | - Bracing design | | ☐ |
| | - Tie down and anchorage design | | ☐ |
| | - Connection design | | ☐ |
| | - Fastener and anchor technical specification | | ☐ |
| | - Base steel mill certificate | | ☐ |
| 4.0 | **Construction Drawing (minimum content):** | | |
| | - Endorsed by the P E on every sheet of drawings | | ☐ |
| | - Layout drawing | | ☐ |
| | - Section properties | | ☐ |
| | - Accessories properties (ex. L-Bracket, Triple L-grip etc) | | ☐ |
| | - Bracing layout | | ☐ |
| | - Truss configuration | | ☐ |
| | - Connection detail | | ☐ |
| | - Support detail (wall plate and anchor) | | ☐ |
| | - Technical notes on base steel, fastener, anchor bolt and protective coating | | ☐ |
| 5.0 | **Construction Drawing (Compliance to specification):** | | |
| | - Maximum span | ' 13 m | ☐ |
| | - Maximum spacing | ' 1.2 m | ☐ |
| | - Minimum base steel thickness (truss member' open section & bracing) | ' 1.0 mm | ☐ |
| | - Minimum base steel thickness (truss member' closed section) | ' 0.6 mm | ☐ |
| | - Minimum base steel thickness (batten) | ' 0.5 mm | ☐ |
| | - Minimum base steel thickness (wall plate) | ' 1.2 mm | ☐ |
| | - Minimum depth of section (open section) | ' 75 mm | ☐ |
| | - Minimum width of section | ' 35 mm | ☐ |

# 3 ANALYSIS & DESIGN CALCULATION



FastMark® FASTENERS MARKETING SDN. BHD.

Australian Standard – Self-drilling screw for the building and construction industries.

Description : Self Drilling TEKS Screws – with forged drill forged drill point

Product Specifications :

F2

Diameter : 10 Gauge (4.70mm)
Thread : 16threads per inch
Classification : Class 2 (min 12 µ)
Drive : 5/16 external hexagonal socket
Material : AISI C 1022 , Hardened Heat treated

APPLICATIONS :

VALLEY GUTTER

Secondary fastener spaced 300 to 450 mm c/c.

ROOFING SIDELAP

Primary fastener

WINDOW HEAD

WALLING SIDELAP

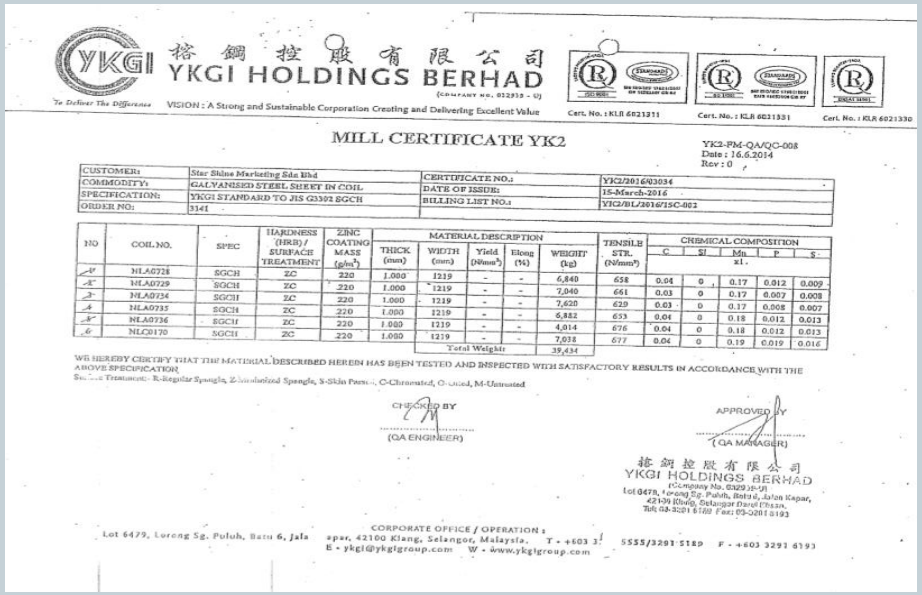
Secondary fastener spaced 300 to 450 mm c/c between girts

Corner flashing

OUTSIDE CORNER

Corrosion Resistance class 2 –
Class 2 are for general use in internal application where significant levels of condesation. The coating thickness on the fasteners at least 12µm.

6120 JALAN BAGAN LALLANG, 13400 BUTTERWORTH, PENANG, MALAYSIA.
TEL : 604-3318708 FAX : 604-3234226 www.fastmark.com.my email : sales@fastmark.com.my



YKGI 裕鋼控股有限公司 YKGI HOLDINGS BERHAD (COMPANY NO. 612938 - U)

To Deliver The Difference VISION : A Strong and Sustainable Corporation Creating and Delivering Excellent Value

Cert. No. : KLR 6021311 Cert. No. : KLR 6021331 Cert. No. : KLR 6021330

MILL CERTIFICATE YK2

YK2-PM-QA/QC-008
Date : 16.6.2014
Rev : 0

| | | | |
|---|---|---|---|
| CUSTOMER: | Star Shine Marketing Sdn Bhd | CERTIFICATE NO.: | YK2/2016/03034 |
| COMMODITY: | GALVANISED STEEL SHEET IN COIL | DATE OF ISSUE: | 15-March-2016 |
| SPECIFICATION: | YKGI STANDARD TO JIS G3302 SGCH | BILLING LIST NO.: | YK2/BL/2016/15C-002 |
| ORDER NO: | 3141 | | |

| NO | COIL NO. | SPEC | HARDNESS (HRB) / SURFACE TREATMENT | ZINC COATING MASS ($g/m^2$) | MATERIAL DESCRIPTION THICK (mm) | WIDTH (mm) | Yield ($N/mm^2$) | Elong (%) | WEIGHT (kg) | TENSILE STR. ($N/mm^2$) | CHEMICAL COMPOSITION C | Si | Mn x1. | P | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | NLA0728 | SGCH | ZC | 220 | 1.000 | 1219 | - | - | 6,840 | 658 | 0.04 | 0 | 0.17 | 0.012 | 0.009 |
| B | NLA0729 | SGCH | ZC | 220 | 1.000 | 1219 | - | - | 7,040 | 661 | 0.03 | 0 | 0.17 | 0.007 | 0.008 |
| C | NLA0734 | SGCH | ZC | 220 | 1.000 | 1219 | - | - | 7,620 | 629 | 0.03 | 0 | 0.17 | 0.008 | 0.007 |
| D | NLA0735 | SGCH | ZC | 220 | 1.000 | 1219 | - | - | 6,882 | 653 | 0.04 | 0 | 0.18 | 0.012 | 0.013 |
| E | NLA0736 | SGCH | ZC | 220 | 1.000 | 1219 | - | - | 4,014 | 676 | 0.04 | 0 | 0.18 | 0.012 | 0.013 |
| F | NLC0170 | SGCH | ZC | 220 | 1.000 | 1219 | - | - | 7,038 | 677 | 0.04 | 0 | 0.19 | 0.019 | 0.016 |
| | | | | | | | Total Weight: | | 39,434 | | | | | | |

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN TESTED AND INSPECTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE ABOVE SPECIFICATION.

Surface Treatment : R-Regular Spangle, Z-Minimized Spangle, S-Skin Pass, C-Chromated, O-Oiled, M-Untreated

CHECKED BY (QA ENGINEER)

APPROVED BY (QA MANAGER)

裕鋼控股有限公司 YKGI HOLDINGS BERHAD (Company No. 612938-U)
Lot 6479, Lorong Sg. Puloh, Batu 6, Jalan Kapar, 42100 Klang, Selangor Darul Ehsan.
Tel: 03-3291 5189 Fax: 03-3291 6193

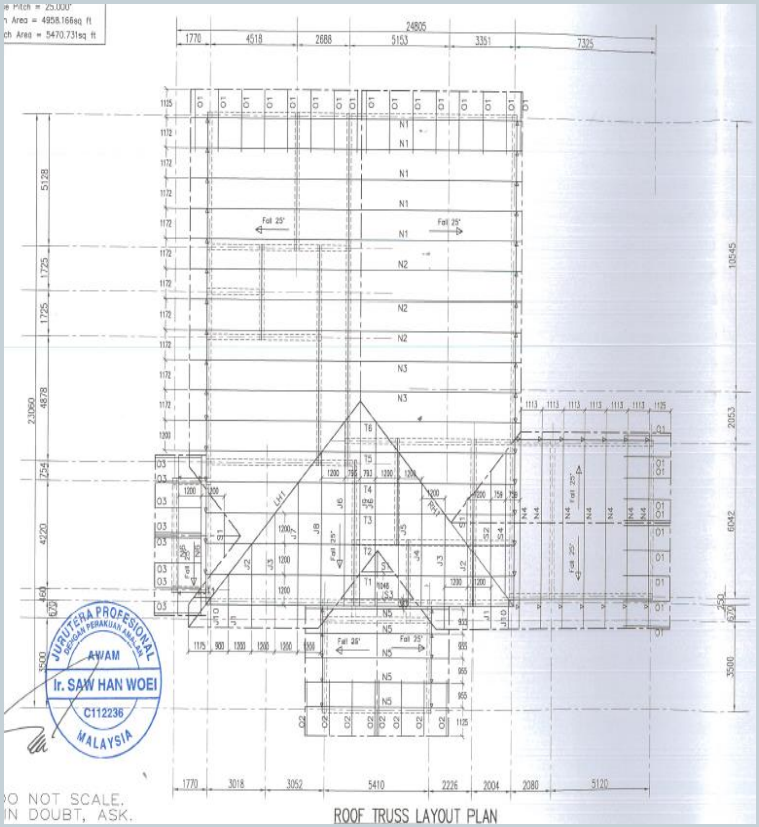
Lot 6479, Lorong Sg. Puloh, Batu 6, Jala... CORPORATE OFFICE / OPERATION : ...spar, 42100 Klang, Selangor, Malaysia. T - +603 3... 5555/3291 5189 F - +603 3291 6193
E - ykgi@ykgigroup.com W - www.ykgigroup.com

Fastener & Anchor Technical Specification

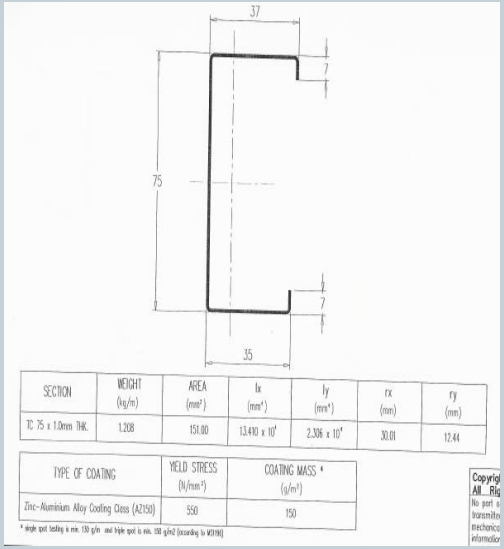
Base Steel Mill Certificate

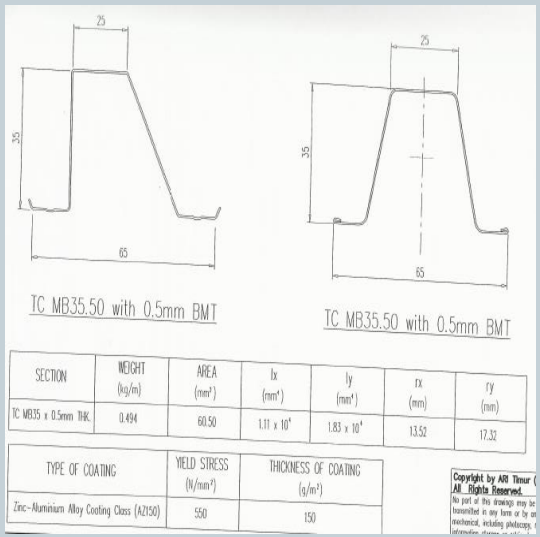
4

# CONSTRUCTION DRAWING




Layout Drawing

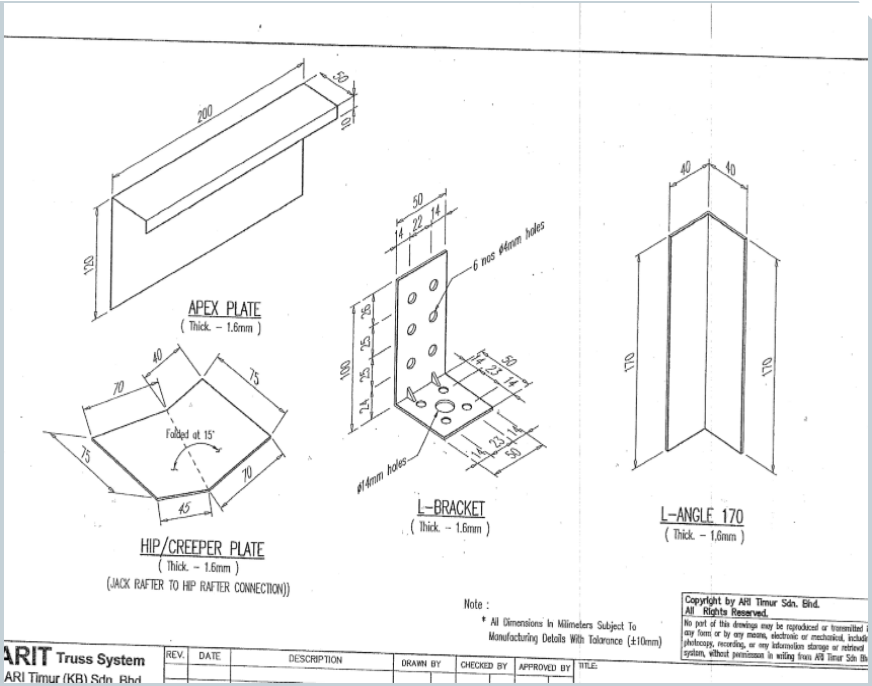


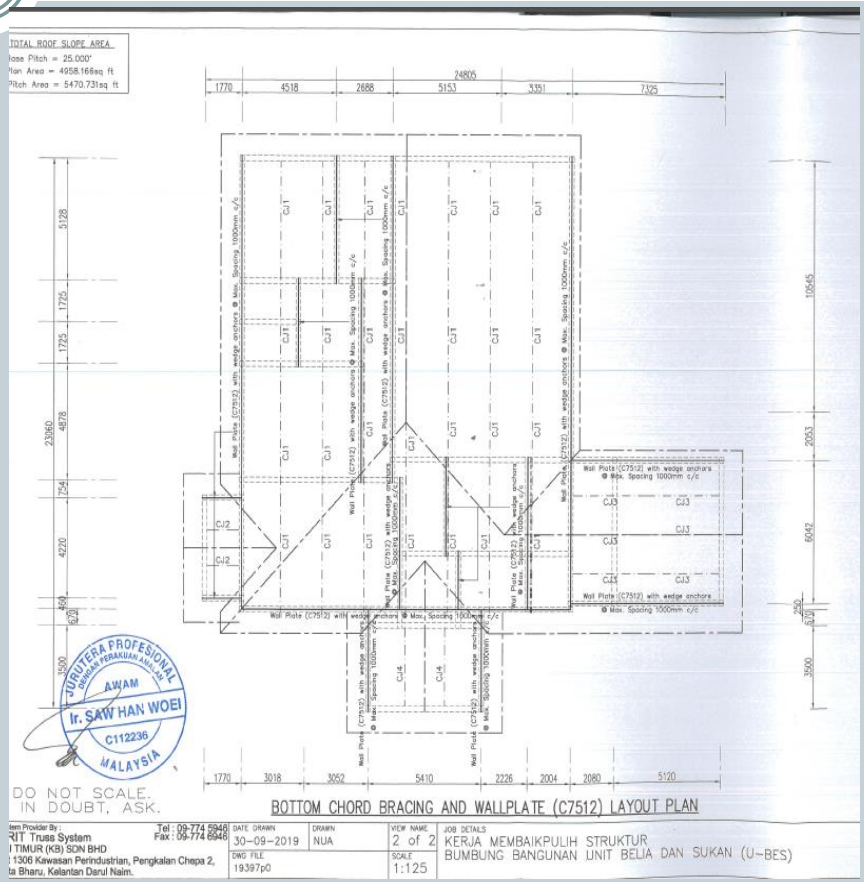

Section Properties

4

# CONSTRUCTION DRAWING



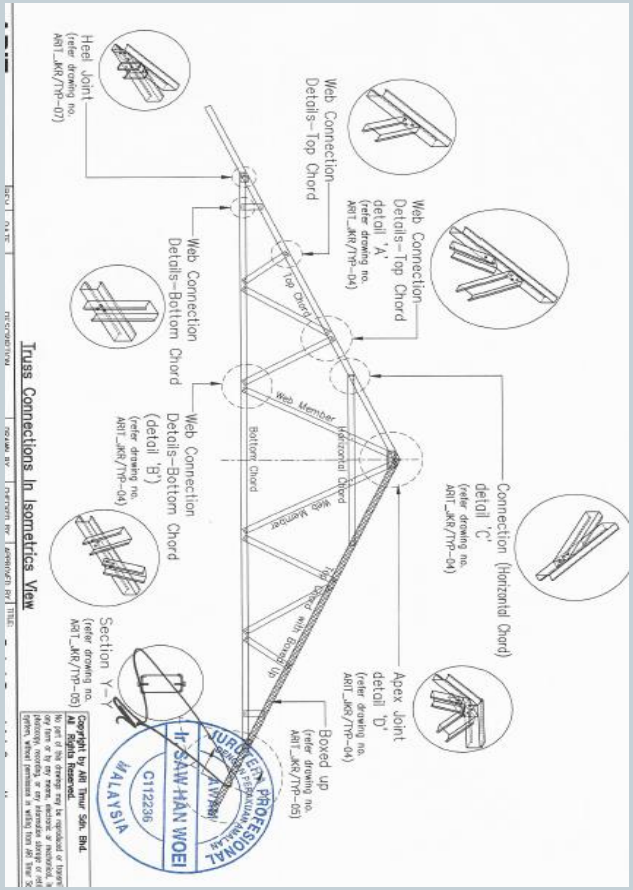

Accessories Properties



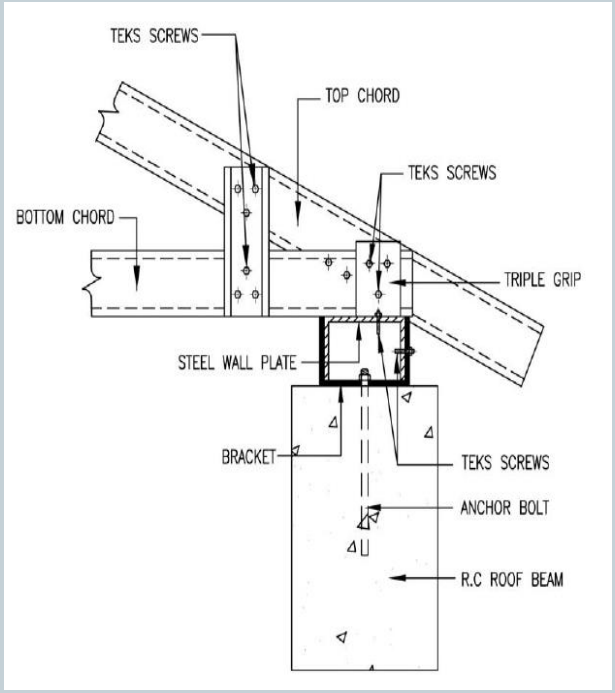

Bracing Layout

4

# CONSTRUCTION DRAWING




Connection Detail




Support Detail

Technical Note

## APPENDIX 3: A (DOCUMENT SUBMISSION)

Appendix 3: Checklist on the Contractor Submission

A. Document Submission

| No. | Submission Item | Check |
|---|---|---|
| 1 | Completed Application Form | ☐ |
| 2 | Construction Drawing | ☐ |
| 3 | Analysis and Design Calculation | ☐ |
| 4 | Curriculum Vitae | |
| | i) Professional Engineer | ☐ |
| | ii) Installer | ☐ |
| 5 | Particular of the Fabricator | ☐ |
| 6 | Base Steel Mill Certificate | ☐ |
| 7 | Base Steel Lab Test Certificate (if required) | ☐ |
| 8 | Technical Specification for Screw, Bolt and Anchor Bolt | ☐ |
| 9 | Fastener Lab Test Certificate (if required) | ☐ |
| 10 | Bomba's approval | ☐ |
| 11 | Quality Assurance and Quality Control | ☐ |

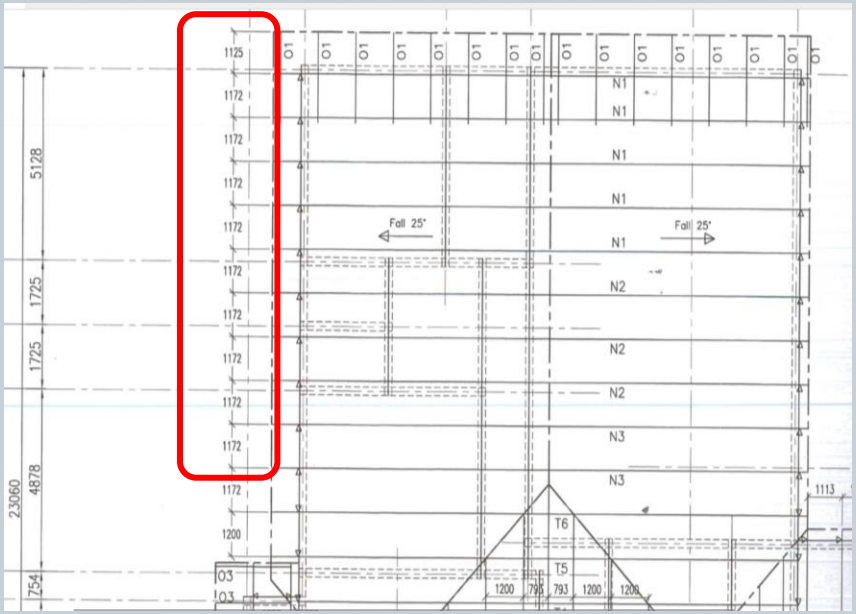
## APPENDIX 3: B (COMPLETENESS OF SUBMISSION)

B. Completeness of submission

| No. | Submission Item | | Check |
|---|---|---|---|
| 1.0 | **Application Form:** | | |
| | - Completed with type of fabrication | | ☐ |
| | - Information on P E and Fabricator | | ☐ |
| | - Endorsed by the S P | | ☐ |
| 2.0 | **Particular and the C.V:** | | |
| | - Valid P E registration with Board of Engineer Malaysia (BEM) | | ☐ |
| | - Fabricator appointment document by the S P | | ☐ |
| | - Fabricator acceptance document on the appointment | | ☐ |
| | - Fabricator registration certificate with CIDB | | ☐ |
| | - Installer competency certificate from CIDB | | ☐ |
| 3.0 | **Analysis and Design Calculation** | | |
| | - Endorsed by the P E | | ☐ |
| | - Loading criteria | | ☐ |
| | - Truss analysis | | ☐ |
| | - Member design | | ☐ |
| | - Bracing design | | ☐ |
| | - Tie down and anchorage design | | ☐ |
| | - Connection design | | ☐ |
| | - Fastener and anchor technical specification | | ☐ |
| | - Base steel mill certificate | | ☐ |
| 4.0 | **Construction Drawing (minimum content):** | | |
| | - Endorsed by the P E on every sheet of drawings | | ☐ |
| | - Layout drawing | | ☐ |
| | - Section properties | | ☐ |
| | - Accessories properties (ex. L-Bracket, Triple L-grip etc) | | ☐ |
| | - Bracing layout | | ☐ |
| | - Truss configuration | | ☐ |
| | - Connection detail | | ☐ |
| | - Support detail (wall plate and anchor) | | ☐ |
| | - Technical notes on base steel, fastener, anchor bolt and protective coating | | ☐ |
| 5.0 | **Construction Drawing (Compliance to specification):** | | |
| | - Maximum span | ≤ 13 m | ☐ |
| | - Maximum spacing | ≤ 1.2 m | ☐ |
| | - Minimum base steel thickness (truss member: open section & bracing) | ≥ 1.0 mm | ☐ |
| | - Minimum base steel thickness (truss member: closed section) | ≥ 0.6 mm | ☐ |
| | - Minimum base steel thickness (batten) | ≥ 0.5 mm | ☐ |
| | - Minimum base steel thickness (wall plate) | ≥ 1.2 mm | ☐ |
| | - Minimum depth of section (open section) | ≥ 75 mm | ☐ |
| | - Minimum width of section | ≥ 35 mm | ☐ |

# 5 CONSTRUCTION DRAWING (compliance to spec)


Maximum Span



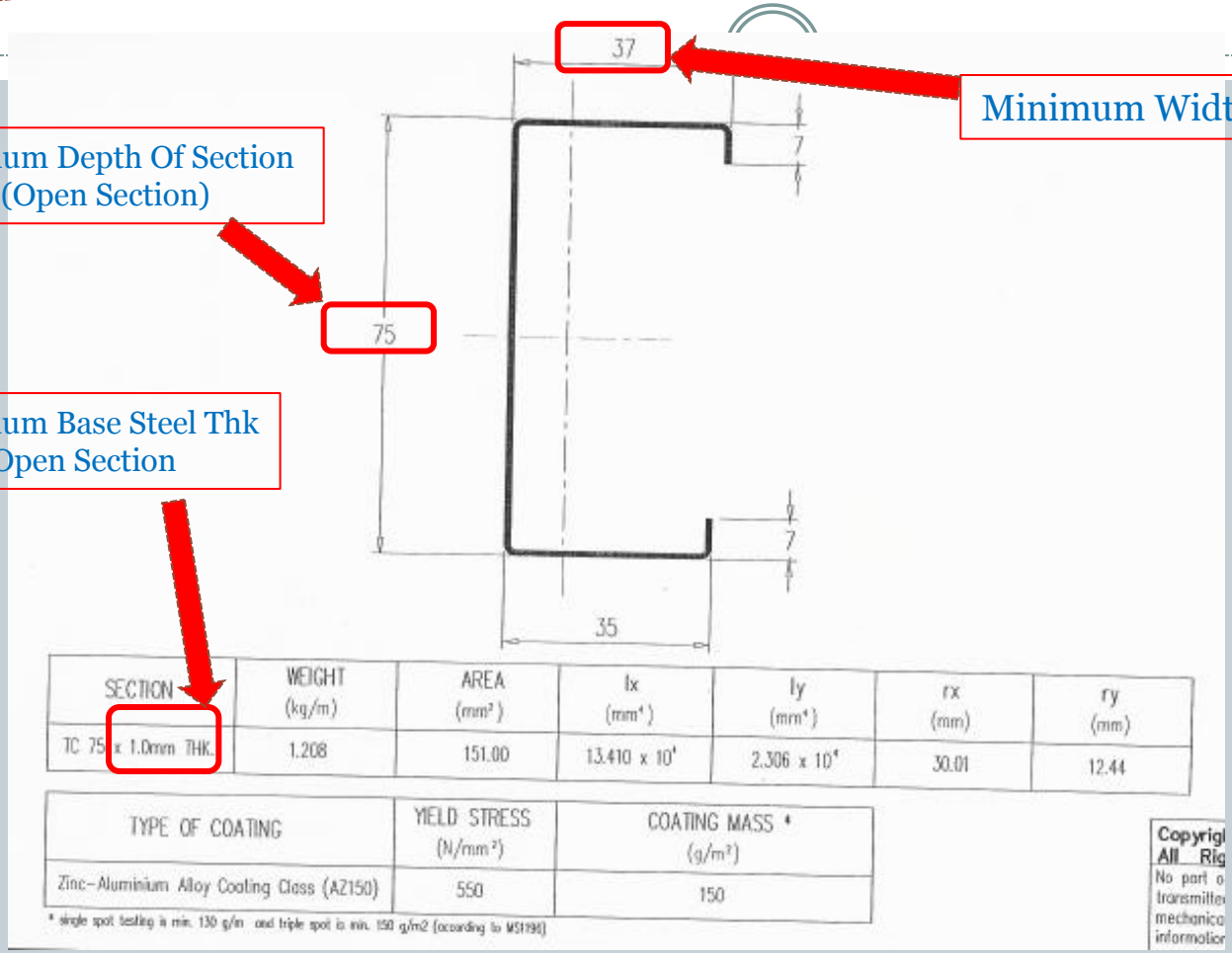

Maximum Spacing

# 5 CONSTRUCTION DRAWING (compliance to spec)

Minimum Width Section

Minimum Depth Of Section (Open Section)

Minimum Base Steel Thk Open Section




| SECTION | WEIGHT (kg/m) | AREA ($mm^2$) | Ix ($mm^4$) | Iy ($mm^4$) | rx (mm) | ry (mm) |
|---|---|---|---|---|---|---|
| TC 75 x 1.0mm THK. | 1.208 | 151.00 | 13.410 x $10^4$ | 2.306 x $10^4$ | 30.01 | 12.44 |

| TYPE OF COATING | YIELD STRESS ($N/mm^2$) | COATING MASS * ($g/m^2$) |
|---|---|---|
| Zinc-Aluminium Alloy Coating Class (AZ150) | 550 | 150 |

* single spot testing is min. 130 g/m and triple spot is min. 150 g/m2 (according to MS1196)

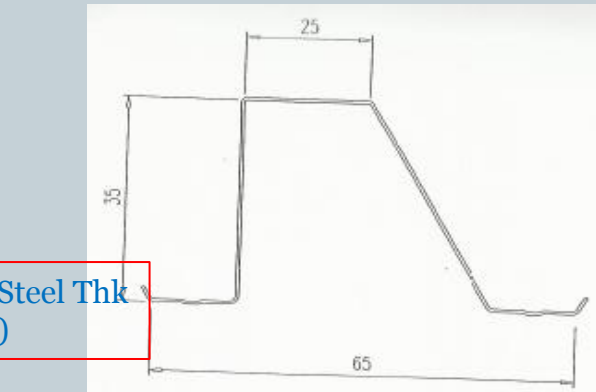


Minimum Base Steel Thk (Batten)

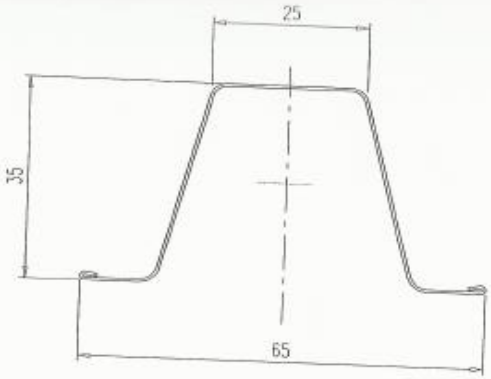
Minimum Base Steel Thk (Wall Plate)

# 5 CONSTRUCTION DRAWING (compliance to spec)

Minimum Base Steel Thk (Batten)




TC MB35.50 with 0.5mm BMT




TC MB35.50 with 0.5mm BMT

| SECTION | WEIGHT (kg/m) | AREA ($mm^2$) | Ix ($mm^4$) | Iy ($mm^4$) | rx (mm) | ry (mm) |
|---|---|---|---|---|---|---|
| TC MB35 x 0.5mm THK. | 0.494 | 60.50 | $1.11 \times 10^4$ | $1.83 \times 10^4$ | 13.52 | 17.32 |

| TYPE OF COATING | YIELD STRESS ($N/mm^2$) | THICKNESS OF COATING ($g/m^2$) |
|---|---|---|
| Zinc-Aluminium Alloy Coating Class (AZ150) | 550 | 150 |

## APPENDIX 3: A (DOCUMENT SUBMISSION)

Appendix 3: Checklist on the Contractor Submission

A. Document Submission

| No. | Submission Item | Check |
|---|---|---|
| 1 | Completed Application Form | ☐ |
| 2 | Construction Drawing | ☐ |
| 3 | Analysis and Design Calculation | ☐ |
| 4 | Curriculum Vitae: | |
| | i) Professional Engineer | ☐ |
| | ii) Installer | ☐ |
| 5 | Particular of the Fabricator | ☐ |
| 6 | Base Steel Mill Certificate | ☐ |
| 7 | Base Steel Lab Test Certificate (if required) | ☐ |
| 8 | Technical Specification for Screw, Bolt and Anchor Bolt | ☐ |
| 9 | Fastener Lab Test Certificate (if required) | ☐ |
| 10 | Bomba's approval | ☐ |
| 11 | Quality Assurance and Quality Control | ☐ |

## APPENDIX 3: B (COMPLETENESS OF SUBMISSION)

Appendix 3: Checklist on the Contractor Submission

6

| No. | Submission Item | Check |
|---|---|---|
| 6.0 | Technical notes and certificate compliance to specification: | |
| | - Minimum grade for base steel to the requirement of Clause 7 1 1 | ☐ |
| | - Minimum thread of screw to the requirement of Clause 7 2 1 | ☐ |
| | - Minimum protective coating for base steel to the requirement of Clause 7 1 2 | ☐ |
| | - Minimum protective coating for fastener to the requirement of Clause 7 2 2 | ☐ |
| | - Minimum protective coating for anchor to the requirement of Clause 7 3 2 | ☐ |
| | - Minimum for wall plate (grade and strength) to the requirement of Clause 7 4 | ☐ |
| 7 0 | Quality Assurance and Control | |
| | - Quality Assurance and Control Plan | ☐ |
| | - Method Statement | ☐ |
| | - Installation Team Chart | ☐ |
| | - Inspection Checklist | ☐ |

6

# TECHNICAL NOTE & CERTIFICATE COMPLIANCE TO SPEC

## GENERAL NOTES

Minimum Grade

Minimum Thread of Screw

i) All steels, fasteners and anch bolts used for the roof truss system shall comply with the JKR's specification.

ii) Steel grade used for the roof truss ll be G550 with the minimum yield strength of 550 MPa. For the steel thickness greater than 1.2mm, steel gra shall be G450 with the minimum yield strength of 450 MPa. Coating mass for the roof truss shall be AZ150 or Z200.

iii) Steel grade for wall plate shall be G550 with the base steel thickness 1.2mm.

iv) Fastener used for the connection between steel shall be MKT M2 10-16 x 16 HO (class 2) or MKT M3 10-16 x 16 (class 3) self-drilling screw with 16 threads per inch (TPI).

v) Anchor bolt TENN HPK Wedge Anchor, HPK 10 with minimum 42 micron hot-dipped galvanized coating shall be used for the truss connection to reinforced concrete structure.

vi) Ceiling & services loads shall be supported to the truss bottom chord. Truss top chord, web member and bracing shall not use to support the ceiling & services loads.

vii) The roof truss should not be used for supporting water tank load. Independent supports shall be provided by the contractor to support the water tank.

viii) The roof truss should not use for supporting any high magnitude of vibration such as air-condition ducting and air-condition fan.

ix) Lead, copper and copper containing alloys should not in contact with or receive run-off water from it to the truss system as it will cause the galvanic corrosion. Painting and insulated by a suitable barrier on the lead or copper containing material are recommended.

x) Truss installer should re-check the actual dimension on site prior truss fabrication, installation & erection works to ensure the trusses are able to be fixed.

xi) The recommended allowable load on the roof trusses during the roofing installation works should not be exceeded:

$50kg/m^2$ or 60kg/m for metal roofing (truss spacing at 1.2m)
$166\ kg/m^2$ or 200 kg/m for tile roofing (truss spacing at 1.2m)
* For tile roofing, each stack must be not more than 6 numbers of tile. If stacks are lay between trusses, not more than 4 numbers of tile per stack is recommended.

6

# TECHNICAL NOTE & CERTIFICATE COMPLIANCE TO SPEC

## GENERAL NOTES

i) All steels, fasteners and anchor bolts used for the roof truss system shall comply with the JKR's specification.

ii) Steel grade used for the roof truss shall be G550 with the minimum yield strength of 550 MPa. For the steel thickness greater than 1.2mm, steel grade shall be G450 with the minimum yield strength of 450 MPa. Coating mass for the roof truss shall be AZ150 or Z200.

iii) Steel grade for wall plate shall be G550 with the base steel thickness 1.2mm.

iv) Fastener used for the connection between steel shall be MKT M2 10-16 x 16 HQ (class 2) or MKT M[illegible]0-16 x 16 (class 3) self-drilling screw with 16 threads per inch (TPI).

v) Anchor bolt TENN HPK Wedge Anchor, HPK 10 with minimum 42 micron hot-dipped galvanized coating shall be used for the truss connection to reinforced concrete structure.

vi) Ceiling & services loads shall be supported to the truss bottom chord. Truss top chord, web member and bracing shall not use to support the ceiling & services loads.

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Minimum Protective Coating Anchor

## APPENDIX 3: A (DOCUMENT SUBMISSION)

**Appendix 3:** Checklist on the Contractor Submission

**A. Document Submission**

| No. | Submission Item | Check |
|---|---|---|
| 1 | Completed Application Form | ☐ |
| 2 | Construction Drawing | ☐ |
| 3 | Analysis and Design Calculation | ☐ |
| 4 | Curriculum Vitae: | |
| | i) Professional Engineer | ☐ |
| | ii) Installer | ☐ |
| 5 | Particular of the Fabricator | ☐ |
| 6 | Base Steel Mill Certificate | ☐ |
| 7 | Base Steel Lab Test Certificate (if required) | ☐ |
| 8 | Technical Specification for Screw, Bolt and Anchor Bolt | ☐ |
| 9 | Fastener Lab Test Certificate (if required) | ☐ |
| 10 | Bomba's approval | ☐ |
| 11 | Quality Assurance and Quality Control | ☐ |

## APPENDIX 3: B (COMPLETENESS OF SUBMISSION)

**Appendix 3:** Checklist on the Contractor Submission

| No. | Submission Item | Check |
|---|---|---|
| 6.0 | **Technical notes and certificate compliance to specification:** | |
| | - Minimum grade for base steel to the requirement of Clause 7 1 1 | ☐ |
| | - Minimum thread of screw to the requirement of Clause 7 2 1 | ☐ |
| | - Minimum protective coating for base steel to the requirement of Clause 7 1 2 | ☐ |
| | - Minimum protective coating for fastener to the requirement of Clause 7 2 2 | ☐ |
| | - Minimum protective coating for anchor to the requirement of Clause 7 3 2 | ☐ |
| | - Minimum for wall plate (grade and strength) to the requirement of Clause 7.4 | ☐ |
| 7 0 | **Quality Assurance and Control** | |
| | - Quality Assurance and Control Plan | ☐ |
| | - Method Statement | ☐ |
| | - Installation Team Chart | ☐ |
| | - Inspection Checklist | ☐ |

7

7

# QUALITY ASSURANCE & CONTROL

QUALITY ASSURANCE

ARI TIMUR (KB) SDN BHD
*Light Weight Steel Truss System*

**QUALITY CONTROL PROCEDURE**

Production planning and quality control are the most importance aspects that will contribute to the value of the products that have been produced as an effort to meet the standard specification stated by JKR. Starting from production material until completing of the system installation, there are 4 sections of quality control that need to be pass; *Material, Product, Fabrication and Installation.*

1. **Quality Control of Material**
   Every raw materials (coil sheet) that are use to produce the sections received from supplier need to be properly check by the in-charge person to make sure that it was free from any defect such as; coating damage, crumpled, insufficient thickness etc.

2. **Quality Control of Product**
   Right after the coil sheets are ready to be forming into its specified shapes using roll forming machines, this section will be controlled by two persons each which is the machine operator and product quality controller. Every sections produced must be checked in terms of accuracy of dimensions and shapes of stiffeners that must be match the specified profiles.

3. **Quality Control of Fabrication**
   During fabrication on site, a supervisor is responsible to monitor and measures the cutting length of the sections to make sure that it were exactly matched the size specified in shop drawing. Every single truss that have completely fabricated must be properly inspects on the joint connections such as; sufficient number of screws, exact dimensions and arrangement of truss member etc.

Quality Assurance & Control Plan

METHOD STATEMENTS

*Light Weight Steel Truss System*

**INTRODUCTION**

This document is intended to facilities ARI TIMUR (KB) Sdn Bhd installation teams on all works related to the installation of Light weight steel roof system in accordance to the standard set by the company.

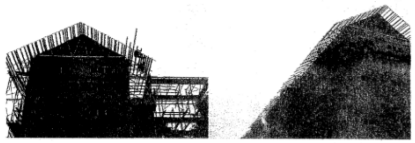


*Figure 1 : Installation of Light weight steel roof system*

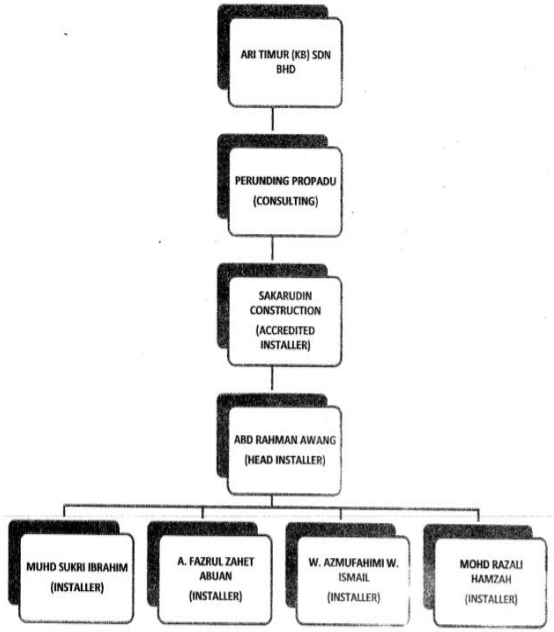
**DELIVERY AND UNLOADING**

1. **Assembly Yard**
   Truss members and components are pre cut to length/size and packed in the factory before delivery to site. Prior to the delivery, especially the first batch delivery, a suitable yard for stacking of truss members and components and truss assembly works must be identified. Tips for selection of Stock/Assembly yard;

   - Level ground and not prone to flash flood or ponding.
   - Not too far from subject building. Negotiate with Client/Main contractor for ground floor of the subject building as stock and fabrication yard during contract negotiation.
   - Stock /assembly yard layout plan must be pre plan to determine the area (Space) required.

Method Statement

**INSTALLATION TEAM CHART**




Installation Team Chart

# 7 QUALITY ASSURANCE & CONTROL

## SENARAI PEMERIKSAAN (QC) UNTUK PENYAMBUNGAN & PEMASANGAN KEKUDA

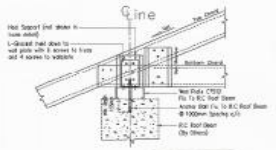
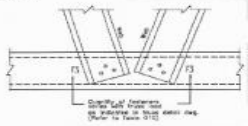
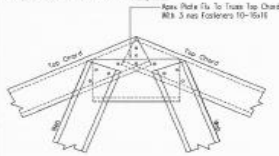
1. Sila sertakan **Plan Kekuda** (Truss Layout) dan **Rekaan Kekuda** (Truss Designs).
2. Sila sertakan gambar, bagi setiap pemeriksaan yang telah dijalankan.

| | |
|---|---|
| Tajuk Projek : | |
| Projek No.: | |
| Tempat : | |
| Bangunan : | |
| Pemilik Projek : | |
| Kontraktor Utama : | |
| Pemasang Kekuda : | |
| Jenis Bumbung : | ☐ Concrete Tiles ☐ Metal Deck ☐ Metal Tiles ☐ Others : |
| Jenis Pemeriksaan : | ☐ Inspection No.1 ☐ Rectification Inspection : ☐ Others : |
| Tarikh Pemeriksaan : | |
| Masa Pemeriksaan : | |
| Pegawai Pemeriksaan : | |

Sila tanda ✓ untuk 'Betul', X jika tidak.

| # | Perkara | Penemuan | | Catatan |
|---|---|---|---|---|
| | | Betul | Tidak | |
| | **A. PENGGUNAAN BAHAN** | | | |
| 1 | **Truss Components -** All components manufactured from Galvanized or Zincalume (JKR) high tensile steel? | | | |
| 2 | **Material Conditions -** All components are straight, no rust, not buckled, not dented or damaged? | | | |
| 3 | **BMT Thickness of C-Sections :** ( tanda ☒ )<br>☐ C7512 (JKR) – 1.2mm ☐ C7508 – 0.80mm<br>☐ C7510 (JKR) – 1.0mm ☐ C7575 – 0.75mm | | | |
| 4 | **BMT Thickness of Battens :** ( tanda ☒ )<br>☐ MB60 ☐ MB41 ☐ MB35<br>☐ 0.50mm ☐ 0.48mm ☐ 0.42mm | | | |
| 5 | **Size & Thickness of Accessories –** Minimum thickness of Apex Plates, Creeper Plates, and L-Brackets & L-Angles is 1.6mm? | | | |

Sila tanda ✓ untuk 'Betul', X jika tidak.

| # | Perkara | Penemuan | | Catatan |
|---|---|---|---|---|
| | | Betul | Tidak | |
| 6 | **Fasteners Used -** Self drilling screws #10-16x16 Hex Head (Class 2) or DX516 HC? | | | |
| 7 | **Anchor Bolts Used -** M10x120mm used? | | | |
| | **B. PENYAMBUNGAN KEKUDA** | | | |
| 8 | **Heel Joints –** Notched Bottom Chord and Soldier Webs are secured to Top & Bottom Chords with 3 fasteners at each connection?  | | | |
| 9 | **Web Joints -** Webs are secured at the right locations with minimum 3 fasteners to Top & Bottom Chords?  | | | |
| 10 | **Apex Joint -** Webs first, and then Apex Plate is secured to Notched Top Chords with 9 fasteners (3 fasteners each connection)?  | | | |

Inspection Checklist

## APPENDIX 3: A (DOCUMENT SUBMISSION)

Appendix 3: Checklist on the Contractor Submission

A. Document Submission

| No. | Submission Item | Check |
|---|---|---|
| 1 | Completed Application Form | ☐ |
| 2 | Construction Drawing | ☐ |
| 3 | Analysis and Design Calculation | ☐ |
| 4 | Curriculum Vitae | |
| | i) Professional Engineer | ☐ |
| | ii) Installer | ☐ |
| 5 | Particular of the Fabricator | ☐ |
| 6 | Base Steel Mill Certificate | ☐ |
| 7 | Base Steel Lab Test Certificate (if required) | ☐ |
| 8 | Technical Specification for Screw, Bolt and Anchor Bolt | ☐ |
| 9 | Fastener Lab Test Certificate (if required) | ☐ |
| 10 | Bomba's approval | ☐ |
| 11 | Quality Assurance and Quality Control | ☐ |

8

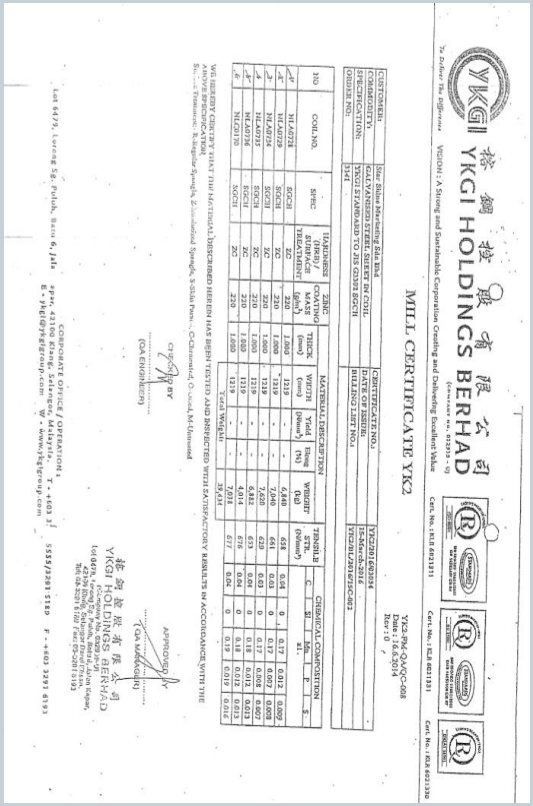
## APPENDIX 3: B (COMPLETENESS OF SUBMISSION)

B. Completeness of submission

| No. | Submission Item | | Check |
|---|---|---|---|
| 1.0 | **Application Form:** | | |
| | - Completed with type of fabrication | | ☐ |
| | - Information on P E and Fabricator | | ☐ |
| | - Endorsed by the S P | | ☐ |
| 2.0 | **Particular and the C.V:** | | |
| | - Valid P E registration with Board of Engineer Malaysia (BEM) | | ☐ |
| | - Fabricator appointment document by the S P | | ☐ |
| | - Fabricator acceptance document on the appointment | | ☐ |
| | - Fabricator registration certificate with CIDB | | ☐ |
| | - Installer competency certificate from CIDB | | ☐ |
| 3.0 | **Analysis and Design Calculation** | | |
| | - Endorsed by the P E | | ☐ |
| | - Loading criteria | | ☐ |
| | - Truss analysis | | ☐ |
| | - Member design | | ☐ |
| | - Bracing design | | ☐ |
| | - Tie down and anchorage design | | ☐ |
| | - Connection design | | ☐ |
| | - Fastener and anchor technical specification | | ☐ |
| | - Base steel mill certificate | | ☐ |
| 4.0 | **Construction Drawing (minimum content):** | | |
| | - Endorsed by the P E on every sheet of drawings | | ☐ |
| | - Layout drawing | | ☐ |
| | - Section properties | | ☐ |
| | - Accessories properties (ex. L-Bracket, Triple L-grip etc) | | ☐ |
| | - Bracing layout | | ☐ |
| | - Truss configuration | | ☐ |
| | - Connection detail | | ☐ |
| | - Support detail (wall plate and anchor) | | ☐ |
| | - Technical notes on base steel, fastener, anchor bolt and protective coating | | ☐ |
| 5.0 | **Construction Drawing (Compliance to specification):** | | |
| | - Maximum span | ≤ 13 m | ☐ |
| | - Maximum spacing | ≤ 1.2 m | ☐ |
| | - Minimum base steel thickness (truss member: open section & bracing) | ≥ 1.0 mm | ☐ |
| | - Minimum base steel thickness (truss member: closed section) | ≥ 0.6 mm | ☐ |
| | - Minimum base steel thickness (batten) | ≥ 0.5 mm | ☐ |
| | - Minimum base steel thickness (wall plate) | ≥ 1.2 mm | ☐ |
| | - Minimum depth of section (open section) | ≥ 75 mm | ☐ |
| | - Minimum width of section | ≥ 35 mm | ☐ |

8

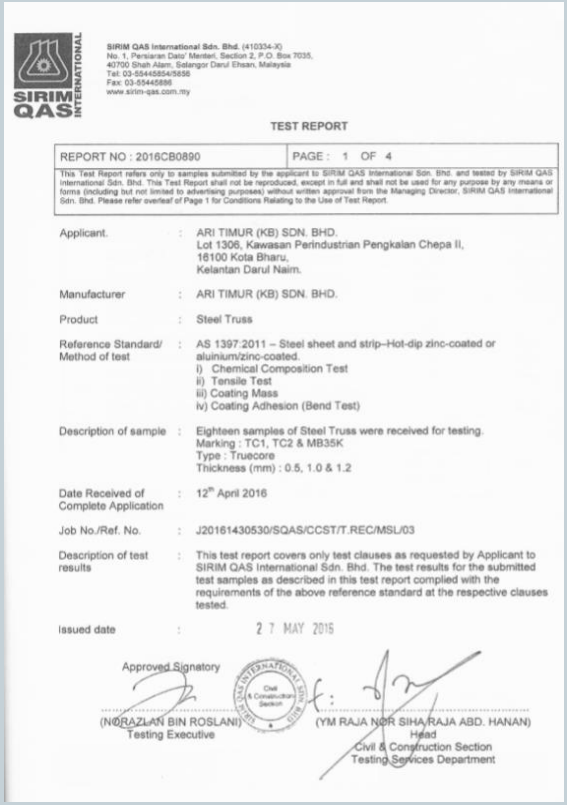
# DOCUMENT SUBMISSION



YKGI HOLDINGS BERHAD

MILL CERTIFICATE YK2

Base Steel Mill Cert.



SIRIM QAS INTERNATIONAL

SIRIM QAS International Sdn. Bhd. (410334-X)
No. 1, Persiaran Dato' Menteri, Section 2, P.O. Box 7035,
40700 Shah Alam, Selangor Darul Ehsan, Malaysia
Tel: 03-55445854/5856
Fax: 03-55445886
www.sirim-qas.com.my

TEST REPORT

REPORT NO : 2016CB0890 | PAGE : 1 OF 4

This Test Report refers only to samples submitted by the applicant to SIRIM QAS International Sdn. Bhd. and tested by SIRIM QAS International Sdn. Bhd. This Test Report shall not be reproduced, except in full and shall not be used for any purpose by any means or forms (including but not limited to advertising purposes) without written approval from the Managing Director, SIRIM QAS International Sdn. Bhd. Please refer overleaf of Page 1 for Conditions Relating to the Use of Test Report.

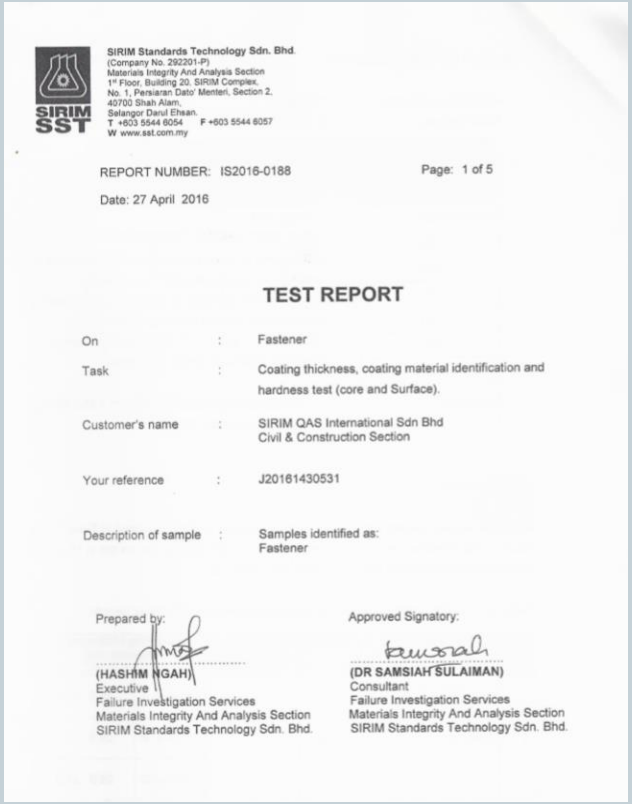
| | | |
|---|---|---|
| Applicant. | : | ARI TIMUR (KB) SDN. BHD.<br>Lot 1306, Kawasan Perindustrian Pengkalan Chepa II,<br>16100 Kota Bharu,<br>Kelantan Darul Naim. |
| Manufacturer | : | ARI TIMUR (KB) SDN. BHD. |
| Product | : | Steel Truss |
| Reference Standard/ Method of test | : | AS 1397:2011 – Steel sheet and strip–Hot-dip zinc-coated or aluinium/zinc-coated.<br>i) Chemical Composition Test<br>ii) Tensile Test<br>iii) Coating Mass<br>iv) Coating Adhesion (Bend Test) |
| Description of sample | : | Eighteen samples of Steel Truss were received for testing.<br>Marking : TC1, TC2 & MB35K<br>Type : Truecore<br>Thickness (mm) : 0.5, 1.0 & 1.2 |
| Date Received of Complete Application | : | 12th April 2016 |
| Job No./Ref. No. | : | J20161430530/SQAS/CCST/T.REC/MSL/03 |
| Description of test results | : | This test report covers only test clauses as requested by Applicant to SIRIM QAS International Sdn. Bhd. The test results for the submitted test samples as described in this test report complied with the requirements of the above reference standard at the respective clauses tested. |
| Issued date | : | 27 MAY 2016 |

Approved Signatory

(NORAZLAN BIN ROSLANI)
Testing Executive

(YM RAJA NOR SIHA RAJA ABD. HANAN)
Head
Civil & Construction Section
Testing Services Department

Base Steel Lab Test



SIRIM SST

SIRIM Standards Technology Sdn. Bhd.
(Company No. 292201-P)
Materials Integrity And Analysis Section
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REPORT NUMBER: IS2016-0188 Page: 1 of 5

Date: 27 April 2016

TEST REPORT

| | | |
|---|---|---|
| On | : | Fastener |
| Task | : | Coating thickness, coating material identification and hardness test (core and Surface). |
| Customer's name | : | SIRIM QAS International Sdn Bhd<br>Civil & Construction Section |
| Your reference | : | J20161430531 |
| Description of sample | : | Samples identified as:<br>Fastener |

Prepared by:

(HASHIM NGAH)
Executive
Failure Investigation Services
Materials Integrity And Analysis Section
SIRIM Standards Technology Sdn. Bhd.

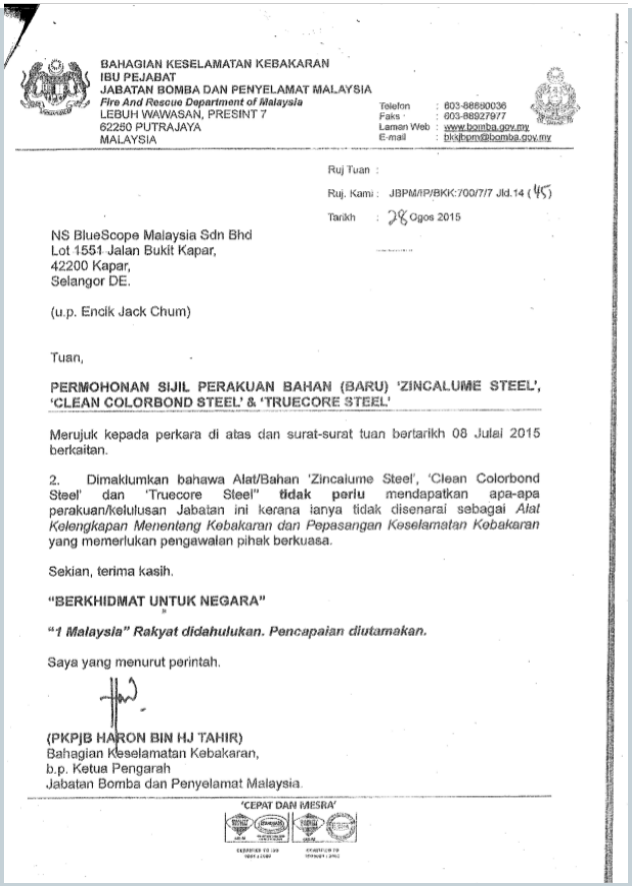
Approved Signatory:

(DR SAMSIAH SULAIMAN)
Consultant
Failure Investigation Services
Materials Integrity And Analysis Section
SIRIM Standards Technology Sdn. Bhd.

Fastener Lab Test Cert.

8

# DOCUMENT SUBMISSION



BAHAGIAN KESELAMATAN KEBAKARAN
IBU PEJABAT
JABATAN BOMBA DAN PENYELAMAT MALAYSIA
*Fire And Rescue Department of Malaysia*
LEBUH WAWASAN, PRESINT 7
62250 PUTRAJAYA
MALAYSIA

Telefon : 603-88890036
Faks : 603-88927977
Laman Web : www.bomba.gov.my
E-mail : bkk@bpm@bomba.gov.my

Ruj Tuan :
Ruj. Kami : JBPM/IP/BKK:700/7/7 Jld.14 (45)
Tarikh : 28 Ogos 2015

NS BlueScope Malaysia Sdn Bhd
Lot 1551 Jalan Bukit Kapar,
42200 Kapar,
Selangor DE.

(u.p. Encik Jack Chum)

Tuan,

**PERMOHONAN SIJIL PERAKUAN BAHAN (BARU) 'ZINCALUME STEEL', 'CLEAN COLORBOND STEEL' & 'TRUECORE STEEL'**

Merujuk kepada perkara di atas dan surat-surat tuan bertarikh 08 Julai 2015 berkaitan.

2. Dimaklumkan bahawa Alat/Bahan 'Zincalume Steel', 'Clean Colorbond Steel' dan 'Truecore Steel" **tidak perlu** mendapatkan apa-apa perakuan/kelulusan Jabatan ini kerana ianya tidak disenaraí sebagai *Alat Kelengkapan Menentang Kebakaran dan Pepasangan Keselamatan Kebakaran* yang memerlukan pengawalan pihak berkuasa.

Sekian, terima kasih.

**"BERKHIDMAT UNTUK NEGARA"**

***"1 Malaysia" Rakyat didahulukan. Pencapaian diutamakan.***

Saya yang menurut perintah.

(PKPJB HARON BIN HJ TAHIR)
Bahagian Keselamatan Kebakaran,
b.p. Ketua Pengarah
Jabatan Bomba dan Penyelamat Malaysia.

'CEPAT DAN MESRA'

Bomba Approval

# KEPERLUAN PEMATUHAN SPESIFIKASI TELAH DITERJEMAH DAN DIRINGKASKAN SEBAGAIMANA APPENDIX

3.1 Keperluan pematuhan spesifikasi telah diterjemah dan diringkaskan *appendix* seperti berikut:-

a) *Cold Formed Steel*

i) *Appendix 1: Application Form* (Lampiran C)
ii) *Appendix 2: Material Testing Requirements*
iii) *Appendix 3: Checklist on the Contractor Submission*
iv) *Appendix 4: Guidelines on the contents of warranty certificate*
v) *Appendix 5: Special provisions for cold formed roof truss with span more than 13 m but not exceeding 20 m.*

4

# APPENDIX 4: Guidelines On The Contents Of Warranty Certificate

**Appendix 4:** Guidelines on the contents of warranty certificate

Warranty certificate from the S.P. shall have contents not limited to the followings;

1) Statement that the S.P. is registered with the regulatory body by stating the registered name, registration type, field, category or class; whichever applicable, registration number and registered business address.

2) Statement that the truss system has been design in accordance to the adopted principal design standard.

3) Statement that the truss system has been designed, fabricated, supplied and installed by the S.P. in accordance to the S.P.'s requirements and this specification.

4) Statement that the warranty will be extended to the Government of Malaysia as the users of the truss system.

5) Statements that the period of warranty shall not be less than ten (10) years commencing from the date of Certificate of Practical Completion (CPC) issued to the main contractor. Commencement and expiry date of warranty shall be clearly written in the warranty certificate.

6) Statement that the S.P. warrants all elements encompass the truss system; the steel sections, fasteners, bracing, batten and anchor:-

   i) Will not corrode under the specified environment corrosivity within the warranty period;

   ii) Will not deflect excessively beyond the specified tolerance or fail under the intended designed parameter within the warranty period;

   iii) Shall not have any defect and damages; corrosion, perforation, buckle, twisting or distorted, due to workmanship at the time of issuance of CPC.

7) Statement that, if truss system under warranty period are found to have defect or damage under the S.P.'s fault, the S.P. will undertake to investigate, test, repair or replace at S.P.'s own cost.

8) The S.P. may insert the term and condition in the warranty statement for the warranted item, but shall be limited to the extent that such term and conditions are not effecting or reducing the S.P.'s undertaking in paragraph (7).

9) The warranty statements shall be signed-off only by the S.P.'s where information on the names, I/C. no. and designation shall be clearly stated. The warranty statements shall then be endorsed with S.P.'s seal.

# KEPERLUAN PEMATUHAN SPESIFIKASI TELAH DITERJEMAH DAN DIRINGKASKAN SEBAGAIMANA APPENDIX

3.1 Keperluan pematuhan spesifikasi telah diterjemah dan diringkaskan *appendix* seperti berikut:-

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5

# APPENDIX 5: Guidelines On The Contents Of Warranty Certificate

**Appendix 5:** Special provisions for cold formed steel roof truss with span more than 13 m but not exceeding 20 m

The information not limited to the followings shall be submitted to Pengarah Kanan, Cawangan Kejuruteraan Awam, Struktur & Jambatan (CKASJ) for the written consent on the construction of roof truss with span more than 13 m but not exceeding 20 m:-

1.0 **Analysis, design and drawings duly endorsed by the P.E.:-**

1.1 Actual design load data which also included construction loads; Raw data submission without analysis is unacceptable.

1.2 Truss stability design and drawings with information on:-

- 1.2.1 Permanent bracing and ties design at every plane of trusses;
- 1.2.2 Design for hoisting and temporary stability;
- 1.2.3 Analytical magnitude of translation or rotation at trusses hill points; at truss support position;
- 1.2.4 Checking on the truss supporting structure;
- 1.2.5 Details of bracings termination points;
- 1.2.6 Deflection limits and camber requirement;
- 1.2.7 Provision of thermal expansion
- 1.2.8 Drawings on the truss layout and bracings; clearly presented to enable checking.

1.3 Truss member design and drawings with information on:-

- 1.3.1 Specified position of permanent restraint of compression steel section on both directions of the section's local axes;
- 1.3.2 Where applicable, a design shall consider effect of construction in stages;
- 1.3.3 Splicings or stiffeners design at a specified location;
- 1.3.4 Local buckling check at the location of point load;
- 1.3.5 Drawings with clear member length for every truss configuration.

1.4 Design and drawings of joints with information on:-

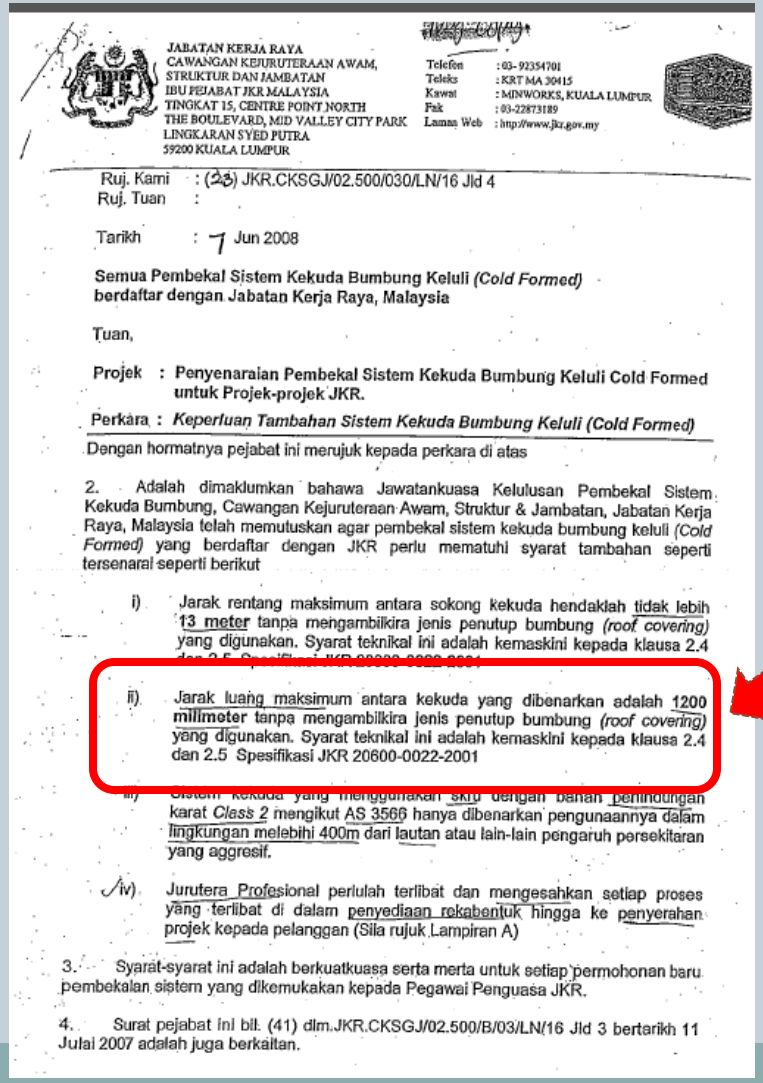
- 1.4.1 Type, strength and dimension of fasteners/connector;
- 1.4.2 Type, strength and dimension of truss accessories whereby connected to the fasteners/connectors;
- 1.4.3 Where applicable, a design shall consider effect of construction in stages;
- 1.4.4 Stress distribution at every point of fastener/connector;
- 1.4.5 Design calculation of joint;
- 1.4.6 Design of truss accessories;
- 1.4.7 Design of joint for splicings or stiffeners;
- 1.4.8 Joint details with specified spacing of fasteners/connectors;
- 1.4.9 Joint details at support and bracings termination point.

1.5 Information that all minimum provisions for trusses up to 13 m have been included.

**Appendix 5:** Special provisions for cold formed steel roof truss with span more than 13 m but not exceeding 20 m

The information not limited to the followings shall be submitted to Pengarah Kanan, Cawangan Kejuruteraan Awam, Struktur & Jambatan (CKASJ) for the written consent on the construction of roof truss with span more than 13 m but not exceeding 20 m:-

# KEPERLUAN TAMBAHAN SISTEM KEKUDA BUMBUNG KELULI (COLD FORMED)



JABATAN KERJA RAYA
CAWANGAN KEJURUTERAAN AWAM,
STRUKTUR DAN JAMBATAN
IBU PEJABAT JKR MALAYSIA
TINGKAT 15, CENTRE POINT NORTH
THE BOULEVARD, MID VALLEY CITY PARK
LINGKARAN SYED PUTRA
59200 KUALA LUMPUR

Telefon : 03- 92354701
Teleks : KRT MA 30415
Kawat : MINWORKS, KUALA LUMPUR
Fak : 03-22873189
Laman Web : http://www.jkr.gov.my

Ruj. Kami : (28) JKR.CKSGJ/02.500/030/LN/16 Jld 4
Ruj. Tuan :

Tarikh : 7 Jun 2008

**Semua Pembekal Sistem Kekuda Bumbung Keluli *(Cold Formed)***
**berdaftar dengan Jabatan Kerja Raya, Malaysia**

Tuan,

Projek : **Penyenaraian Pembekal Sistem Kekuda Bumbung Keluli Cold Formed untuk Projek-projek JKR.**

Perkara : ***Keperluan Tambahan Sistem Kekuda Bumbung Keluli (Cold Formed)***

Dengan hormatnya pejabat ini merujuk kepada perkara di atas

2. Adalah dimaklumkan bahawa Jawatankuasa Kelulusan Pembekal Sistem Kekuda Bumbung, Cawangan Kejuruteraan Awam, Struktur & Jambatan, Jabatan Kerja Raya, Malaysia telah memutuskan agar pembekal sistem kekuda bumbung keluli *(Cold Formed)* yang berdaftar dengan JKR perlu mematuhi syarat tambahan seperti tersenarai seperti berikut

i) Jarak rentang maksimum antara sokong kekuda hendaklah tidak lebih 13 meter tanpa mengambilkira jenis penutup bumbung *(roof covering)* yang digunakan. Syarat teknikal ini adalah kemaskini kepada klausa 2.4

ii) Jarak luang maksimum antara kekuda yang dibenarkan adalah 1200 millimeter tanpa mengambilkira jenis penutup bumbung *(roof covering)* yang digunakan. Syarat teknikal ini adalah kemaskini kepada klausa 2.4 dan 2.5 Spesifikasi JKR 20600-0022-2001

iii) Sistem kekuda yang menggunakan skru dengan bahan perlindungan karat *Class 2* mengikut AS 3566 hanya dibenarkan pengunaannya dalam lingkungan melebihi 400m dari lautan atau lain-lain pengaruh persekitaran yang aggresif.

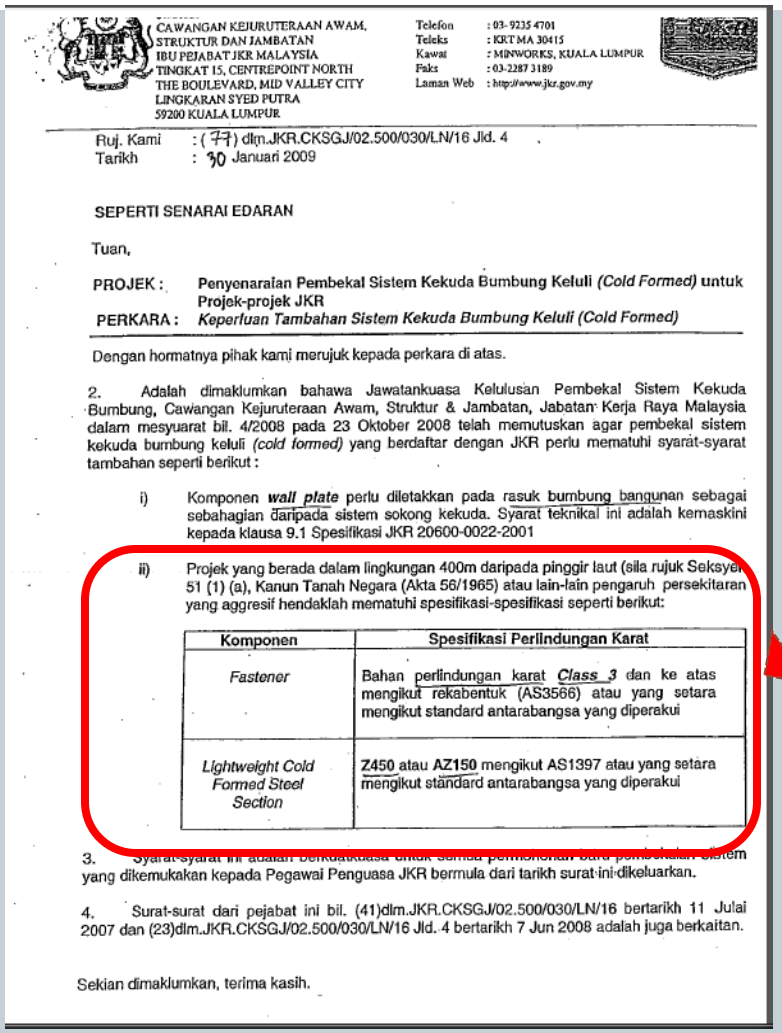
iv) Jurutera Profesional perlulah terlibat dan mengesahkan setiap proses yang terlibat di dalam penyediaan rekabentuk hingga ke penyerahan projek kepada pelanggan (Sila rujuk Lampiran A)

3. Syarat-syarat ini adalah berkuatkuasa serta merta untuk setiap permohonan baru pembekalan sistem yang dikemukakan kepada Pegawai Penguasa JKR.

4. Surat pejabat ini bil. (41) dlm.JKR.CKSGJ/02.500/B/03/LN/16 Jld 3 bertarikh 11 Julai 2007 adalah juga berkaitan.

Sistem kekuda yang menggunakan skru dengan bahan perlindungan karat *Class 2* mengikut AS 3566 hanya dibenarkan pengunaannya dalam lingkungan melebihi 400m dari lautan atau lain-lain pengaruh persekitaran yang aggresif.

# KEPERLUAN TAMBAHAN SISTEM KEKUDA BUMBUNG KELULI (COLD FORMED)



CAWANGAN KEJURUTERAAN AWAM,
STRUKTUR DAN JAMBATAN
IBU PEJABAT JKR MALAYSIA
TINGKAT 15, CENTREPOINT NORTH
THE BOULEVARD, MID VALLEY CITY
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59200 KUALA LUMPUR

Telefon : 03- 9235 4701
Teleks : KRT MA 30415
Kawat : MINWORKS, KUALA LUMPUR
Faks : 03-2287 3189
Laman Web : http://www.jkr.gov.my

Ruj. Kami : (77) dlm.JKR.CKSGJ/02.500/030/LN/16 Jld. 4
Tarikh : 30 Januari 2009

SEPERTI SENARAI EDARAN

Tuan,

PROJEK : Penyenaraian Pembekal Sistem Kekuda Bumbung Keluli *(Cold Formed)* untuk Projek-projek JKR
PERKARA : *Keperluan Tambahan Sistem Kekuda Bumbung Keluli (Cold Formed)*

Dengan hormatnya pihak kami merujuk kepada perkara di atas.

2. Adalah dimaklumkan bahawa Jawatankuasa Kelulusan Pembekal Sistem Kekuda Bumbung, Cawangan Kejuruteraan Awam, Struktur & Jambatan, Jabatan Kerja Raya Malaysia dalam mesyuarat bil. 4/2008 pada 23 Oktober 2008 telah memutuskan agar pembekal sistem kekuda bumbung keluli *(cold formed)* yang berdaftar dengan JKR perlu mematuhi syarat-syarat tambahan seperti berikut :

i) Komponen ***wall plate*** perlu diletakkan pada rasuk bumbung bangunan sebagai sebahagian daripada sistem sokong kekuda. Syarat teknikal ini adalah kemaskini kepada klausa 9.1 Spesifikasi JKR 20600-0022-2001

ii) Projek yang berada dalam lingkungan 400m daripada pinggir laut (sila rujuk Seksyen 51 (1) (a), Kanun Tanah Negara (Akta 56/1965) atau lain-lain pengaruh persekitaran yang aggresif hendaklah mematuhi spesifikasi-spesifikasi seperti berikut:

| Komponen | Spesifikasi Perlindungan Karat |
|---|---|
| *Fastener* | Bahan perlindungan karat ***Class 3*** dan ke atas mengikut rekabentuk (AS3566) atau yang setara mengikut standard antarabangsa yang diperakui |
| *Lightweight Cold Formed Steel Section* | **Z450** atau **AZ150** mengikut AS1397 atau yang setara mengikut standard antarabangsa yang diperakui |

3. Syarat-syarat ini adalah berkuatkuasa untuk semua permohonan baru pembekalan sistem yang dikemukakan kepada Pegawai Penguasa JKR bermula dari tarikh surat ini dikeluarkan.

4. Surat-surat dari pejabat ini bil. (41)dlm.JKR.CKSGJ/02.500/030/LN/16 bertarikh 11 Julai 2007 dan (23)dlm.JKR.CKSGJ/02.500/030/LN/16 Jld. 4 bertarikh 7 Jun 2008 adalah juga berkaitan.

Sekian dimaklumkan, terima kasih.

Projek yang berada dalam lingkungan 400m daripada pinggir laut (sila rujuk Seksyen 51 (1) (a), Kanun Tanah Negara (Akta 56/1965) atau lain-lain pengaruh persekitaran yang aggresif hendaklah mematuhi spesifikasi-spesifikasi seperti berikut:

| Komponen | Spesifikasi Perlindungan Karat |
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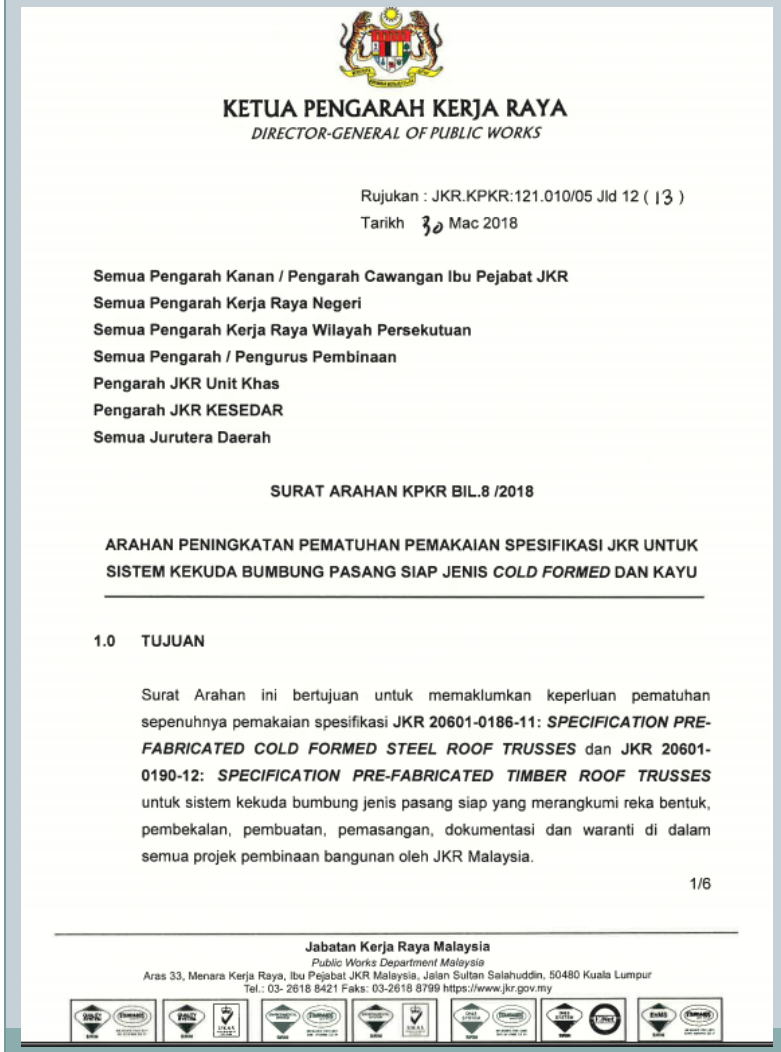
| *Fastener* | Bahan perlindungan karat ***Class 3*** dan ke atas mengikut rekabentuk (AS3566) atau yang setara mengikut standard antarabangsa yang diperakui |
| *Lightweight Cold Formed Steel Section* | **Z450** atau **AZ150** mengikut AS1397 atau yang setara mengikut standard antarabangsa yang diperakui |

# SURAT PEMATUHAN SPESIFIKASI SISTEM KEKUDA BUMBUNG PASANG SIAP JENIS COLD FORMED STEEL DAN KAYU



KETUA PENGARAH KERJA RAYA
*DIRECTOR-GENERAL OF PUBLIC WORKS*

Rujukan : JKR.KPKR:121.010/05 Jld 12 ( 13 )
Tarikh 30 Mac 2018

**Semua Pengarah Kanan / Pengarah Cawangan Ibu Pejabat JKR**
**Semua Pengarah Kerja Raya Negeri**
**Semua Pengarah Kerja Raya Wilayah Persekutuan**
**Semua Pengarah / Pengurus Pembinaan**
**Pengarah JKR Unit Khas**
**Pengarah JKR KESEDAR**
**Semua Jurutera Daerah**

**SURAT ARAHAN KPKR BIL.8 /2018**

**ARAHAN PENINGKATAN PEMATUHAN PEMAKAIAN SPESIFIKASI JKR UNTUK SISTEM KEKUDA BUMBUNG PASANG SIAP JENIS *COLD FORMED* DAN KAYU**

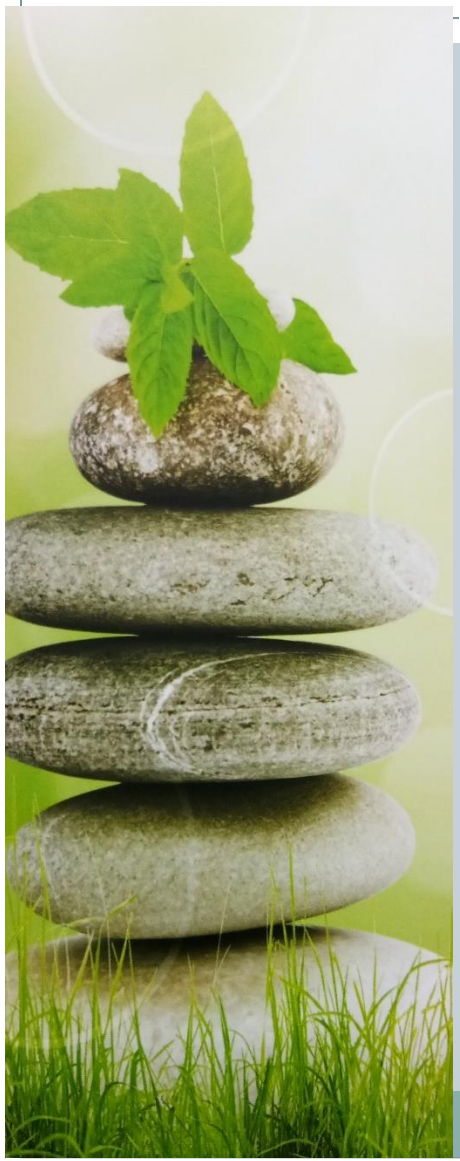
**1.0 TUJUAN**

Surat Arahan ini bertujuan untuk memaklumkan keperluan pematuhan sepenuhnya pemakaian spesifikasi **JKR 20601-0186-11: *SPECIFICATION PRE-FABRICATED COLD FORMED STEEL ROOF TRUSSES*** dan **JKR 20601-0190-12: *SPECIFICATION PRE-FABRICATED TIMBER ROOF TRUSSES*** untuk sistem kekuda bumbung jenis pasang siap yang merangkumi reka bentuk, pembekalan, pembuatan, pemasangan, dokumentasi dan waranti di dalam semua projek pembinaan bangunan oleh JKR Malaysia.

1/6

**Jabatan Kerja Raya Malaysia**
*Public Works Department Malaysia*
Aras 33, Menara Kerja Raya, Ibu Pejabat JKR Malaysia, Jalan Sultan Salahuddin, 50480 Kuala Lumpur
Tel.: 03- 2618 8421 Faks: 03-2618 8799 https://www.jkr.gov.my

3.4 Jarak rentang maksimum bagi kekuda bumbung *cold formed* yang dibenarkan adalah 13m manakala bagi kekuda bumbung *timber* jarak rentang maksimum adalah 12m. Sekiranya rentang melebihi 13m tetapi kurang daripada 20m bagi *cold formed* atau melebihi 12m tetapi kurang dari 16m bagi *timber* ianya perlu di rujuk kepada Cawangan Kejuruteraan Awam dan Struktur, Ibu Pejabat JKR untuk kelulusan. Sekiranya melebihi rentang maksimum, penggunakan *hot rolled steel roof truss* adalah diwajibkan.



# SEKIAN
# TERIMA KASIH

# PERTANYAAN

Ir. Faizul Izuan Bin Shaimi
Jurutera Awam Kanan (Rekabentuk)
Bahagian Rekabentuk Awam & Struktur
JKR Negeri Kelantan
Jln Kuala Krai
15050 Kota Bharu, Kelantan
Tel. Pejabat : 09-745 9512