



STRUCTURAL DESIGN

ENCLOSED BUILDING EXPOSURE B

**MAXIMUM 40'-0" WIDE X 20'-0" EAVE HEIGHT- BOX EAVE
FRAME**

15 January 2021

Revision 5

M&A Project No. 16022S/16072S/16073S/17301S/20352S

Prepared for:

**Tubular Building Systems, LLC
631 SE Industrial Circle
Lake City, Florida 32025**

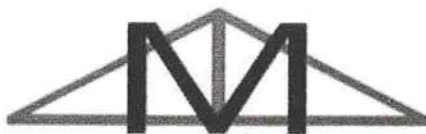


Prepared by:

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**Digitally signed
by Wayne S
Moore
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PROJECT MGR: VSM

CLIENT: TBS

**TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B**

DATE: 1-15-21

SCALE: NTS

SHT. 1

DWG. NO: SK-3

**JOB NO:
16022S/17301S/20352S**

REV: 5

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INSTALLATION NOTES AND SPECIFICATIONS

1. DESIGN IS FOR A MAXIMUM 40'-0" WIDE x 20'-0" EAVE HEIGHT ENCLOSED STRUCTURES
2. DESIGN WAS DONE IN ACCORDANCE WITH THE 2020 FLORIDA BUILDING CODE (FBC) 7TH EDITION, 2018 INTERNATIONAL BUILDING CODE (IBC), 2015 IBC AND 2012 IBC
3. DESIGN LOADS ARE AS FOLLOWS:
 - A) DEAD LOAD = 15 PSF
 - B) LIVE LOAD = 12 PSF
 - C) GROUND SNOW LOAD = 10 PSF

NOTE: UNBALANCED SNOW LOAD DUE TO DRIFTING HAS NOT BEEN EVALUATED
4. LOW ULTIMATE WIND SPEED 105 TO 140 MPH (NOMINAL WIND SPEED 81 TO 108 MPH): MAXIMUM RAFTER/POST AND END POST SPACING = 50 FEET
5. HIGH ULTIMATE WIND SPEED 141 TO 170 MPH (NOMINAL WIND SPEED 109 TO 132 MPH): MAXIMUM RAFTER/POST AND END POST SPACING = 40 FEET
6. END WALL COLUMNS (POSTS) AND SIDE WALL COLUMNS ARE EQUIVALENT IN SIZE AND SPACING (UNLESS NOTED OTHERWISE)
7. RISK CATEGORY I
8. WIND EXPOSURE CATEGORY B
9. SPECIFICATIONS APPLICABLE TO 29 GAUGE METAL PANELS FASTENED DIRECTLY TO 2 1/2" x 2 1/2" - 14 GAUGE TUBE STEEL (TS) FRAMING MEMBERS FOR VERTICAL PANELS, 29 GAUGE METAL PANELS SHALL BE FASTENED TO 18 GAUGE HAT CHANNELS (U.N.D)
10. AVERAGE FASTENER SPACING ON-CENTERS ALONG RAFTERS OR PURLINS, AND POSTS, INTERIOR = 9" AND END = 6" (MAX.)
11. FASTENERS CONSIST OF #12-14x3/4" SELF-DRILLING FASTENER (SDF), USE CONTROL SEAL WASHER WITH EXTERIOR FASTENERS. SPECIFICATIONS APPLICABLE ONLY FOR MEAN ROOF HEIGHT OF 20 FEET OR LESS, AND ROOF SLOPES OF 14" (3:12 PITCH) OR LESS SPACING REQUIREMENTS FOR OTHER ROOF HEIGHTS AND/OR SLOPES MAY VARY
12. ANCHORS SHALL BE INSTALLED THROUGH BASE RAIL WITHIN 6" OF EACH RAFTER COLUMN ALONG SIDES AND ENDS.
13. STANDARD GROUND ANCHORS (SOIL NAILS) CONSIST OF #4 REBAR W/ WELDED NUT x 30" LONG AND MAY BE USED IN SUITABLE SOILS. OPTIONAL ANCHORAGE MAY BE USED IN SUITABLE SOILS AND MUST BE USED IN UNSUITABLE SOILS AS NOTED. SOIL NAILS MAY BE USED FOR WIND SPEEDS ≤ 145 MPH. COORDINATE WITH LOCAL CODES/ORDINANCES REGARDING MINIMUM LENGTH FOR FROST DEPTH PROTECTION
14. WIND FORCES GOVERN OVER SEISMIC FORCES. SEISMIC PARAMETERS ANALYZED ARE:
 - SOIL SITE CLASS = D
 - RISK CATEGORY I
 - R = 325 I_E = 10
 - S_{DS} = 2.039 g V = C_SW
 - S_{D1} = 1.258 g



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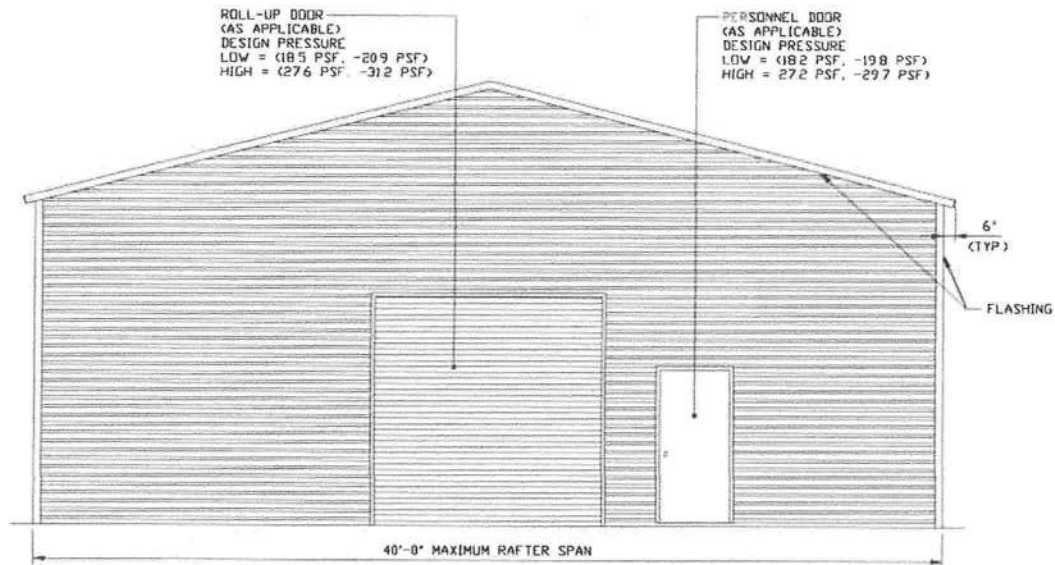
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BOX EAVE FRAME RAFTER ENCLOSED BUILDING



TYPICAL END ELEVATION-HORIZONTAL ROOF
SCALE: 1/8" = 1'-0"



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SHT. 4

SCALE: NTS

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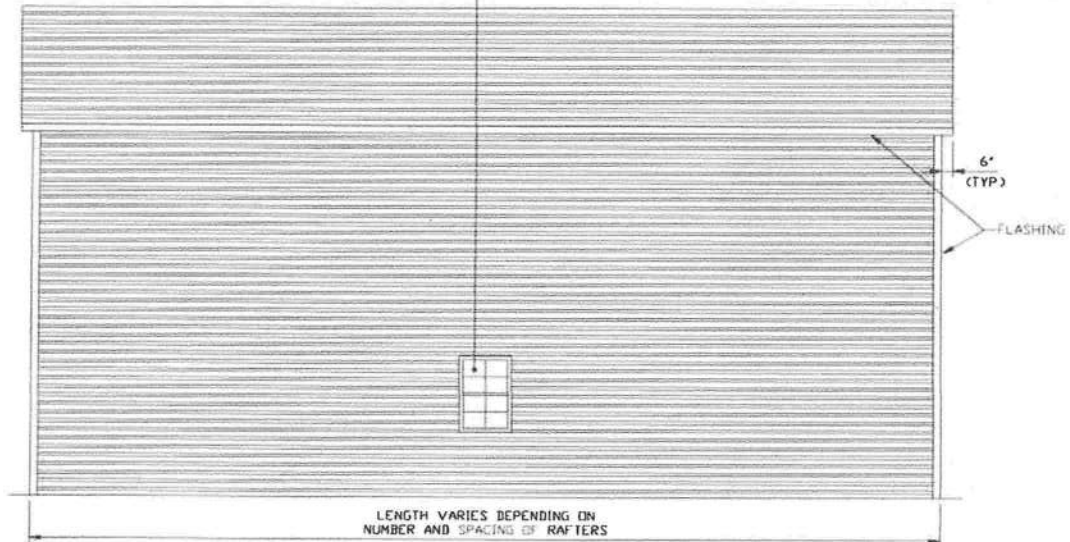
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BOX EAVE FRAME RAFTER ENCLOSED BUILDING

WINDOW (AS APPLICABLE)
DESIGN PRESSURE
LOW = (191 PSF, -20.7 PSF)
HIGH = (286 PSF, -31.0 PSF)



TYPICAL SIDE ELEVATION-HORIZONTAL ROOF

SCALE: 1/8" = 1'-0"



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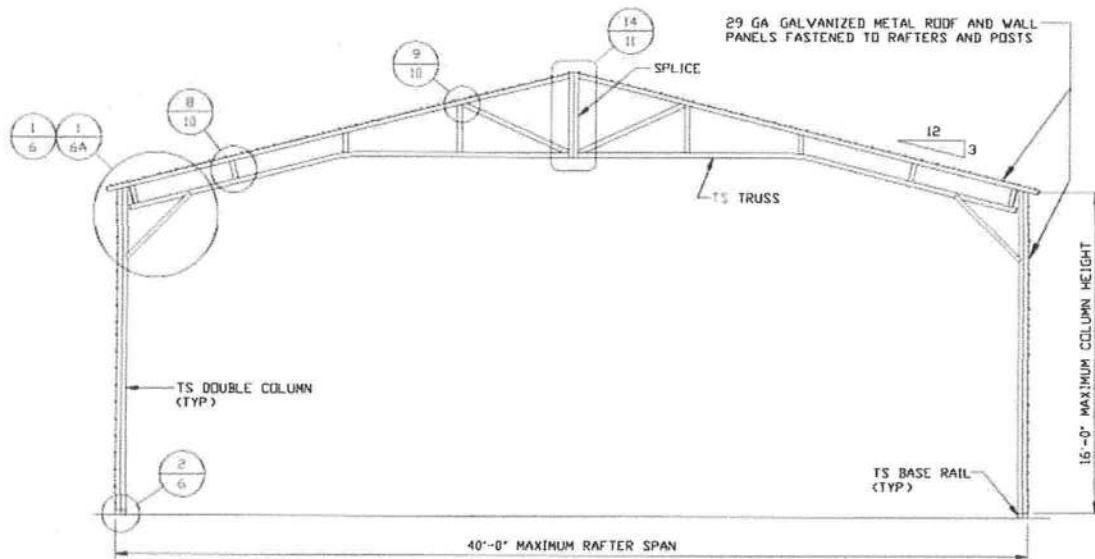
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SCALE: NTS

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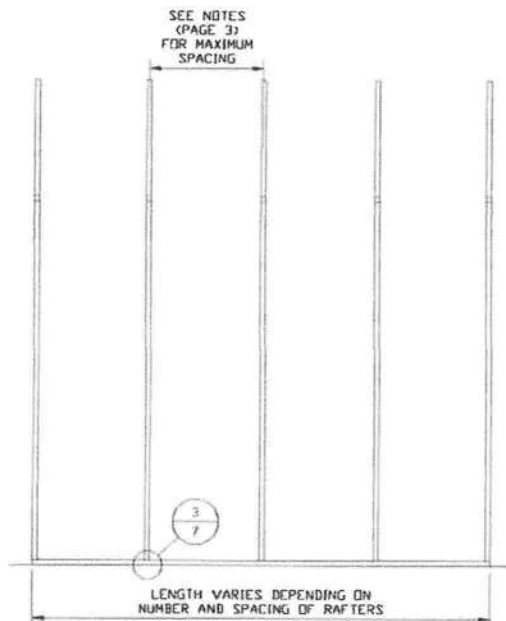
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TYPICAL RAFTER/POST FRAME SECTION

SCALE: 1/8" = 1'-0"



TYPICAL RAFTER/POST SIDE FRAMING SECTION

SCALE: 1/8" = 1'-0"



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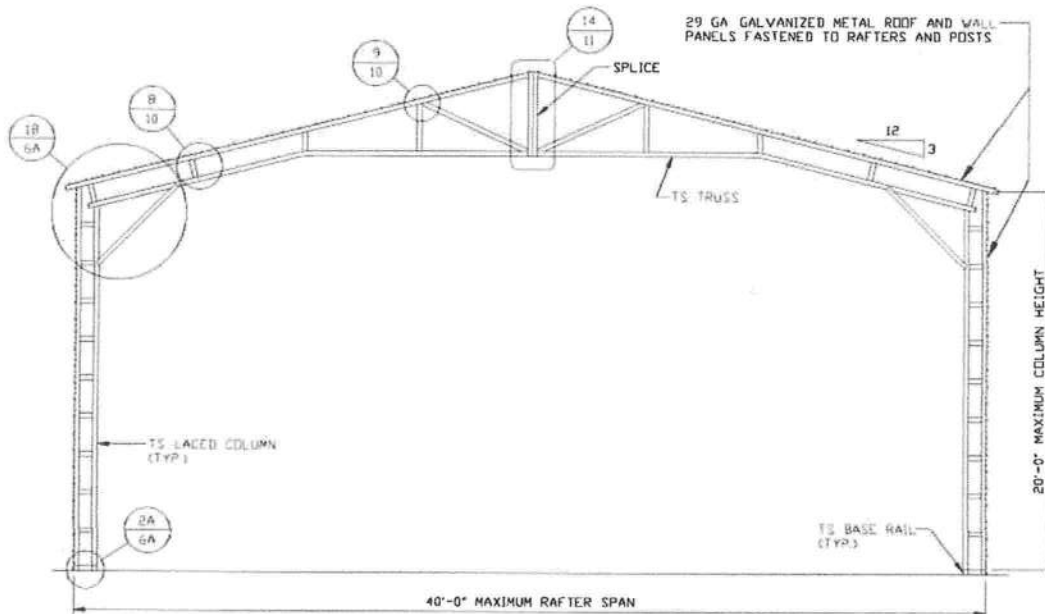
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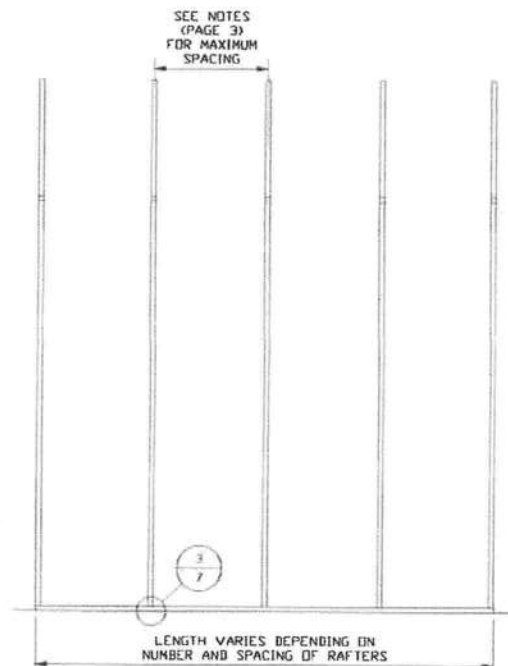
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TYPICAL RAFTER/POST FRAME SECTION
SCALE: 1/8" = 1'-0"



TYPICAL RAFTER/POST SIDE FRAMING SECTION
SCALE: 1/8" = 1'-0"



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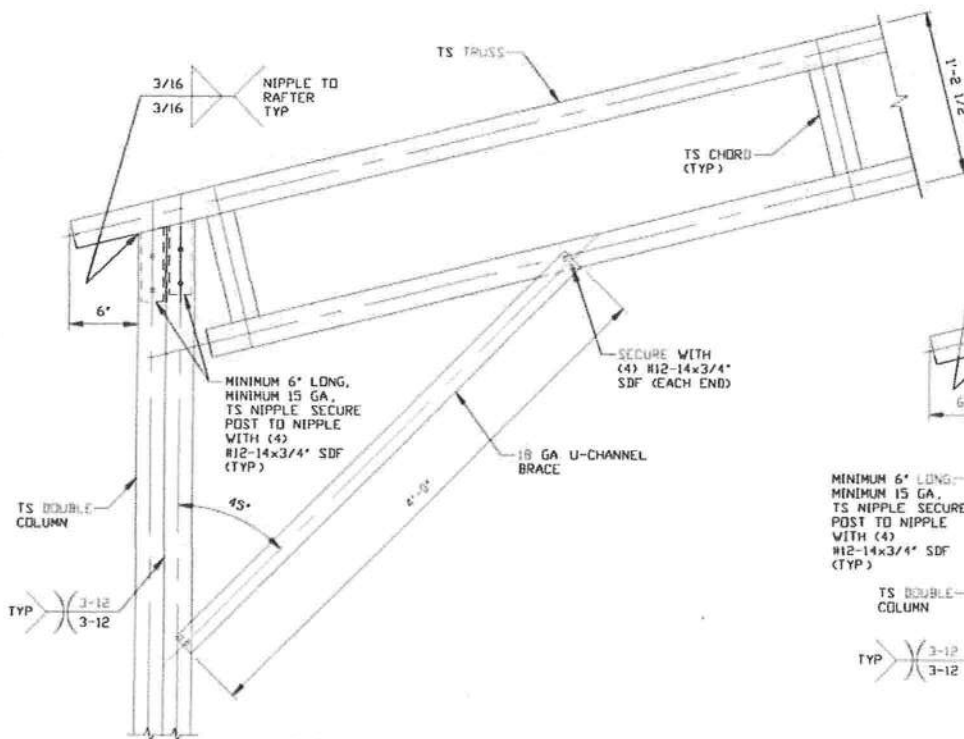
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**DATE: 1-15-21
SHT. 3A**

**SCALE: NTS
DWG. NO: SK-3**

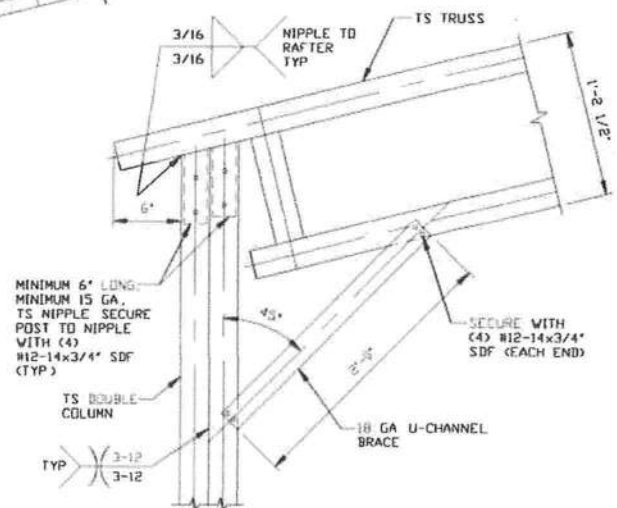
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**BOX EAVE RAFTER/CORNER POST
CONNECTION DETAIL FOR
HEIGHTS 10'-0" < TO ≤ 16'-0"**

1

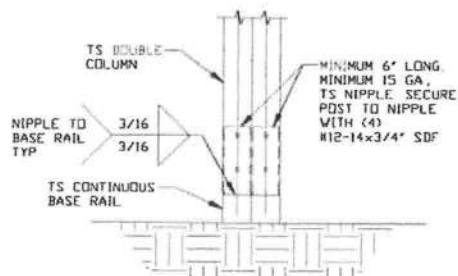
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**BOX EAVE RAFTER/CORNER
POST CONNECTION DETAIL
FOR HEIGHTS ≤ 10'-0"**

1A

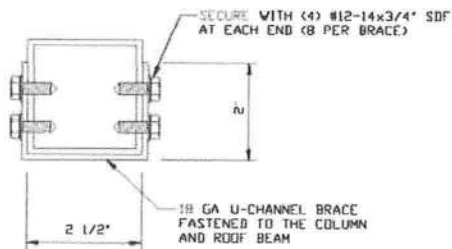
SCALE: NTS



2

POST/BASE RAIL CONNECTION DETAIL

SCALE: NTS



BRACE SECTION

SCALE: NTS



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SHT. 6

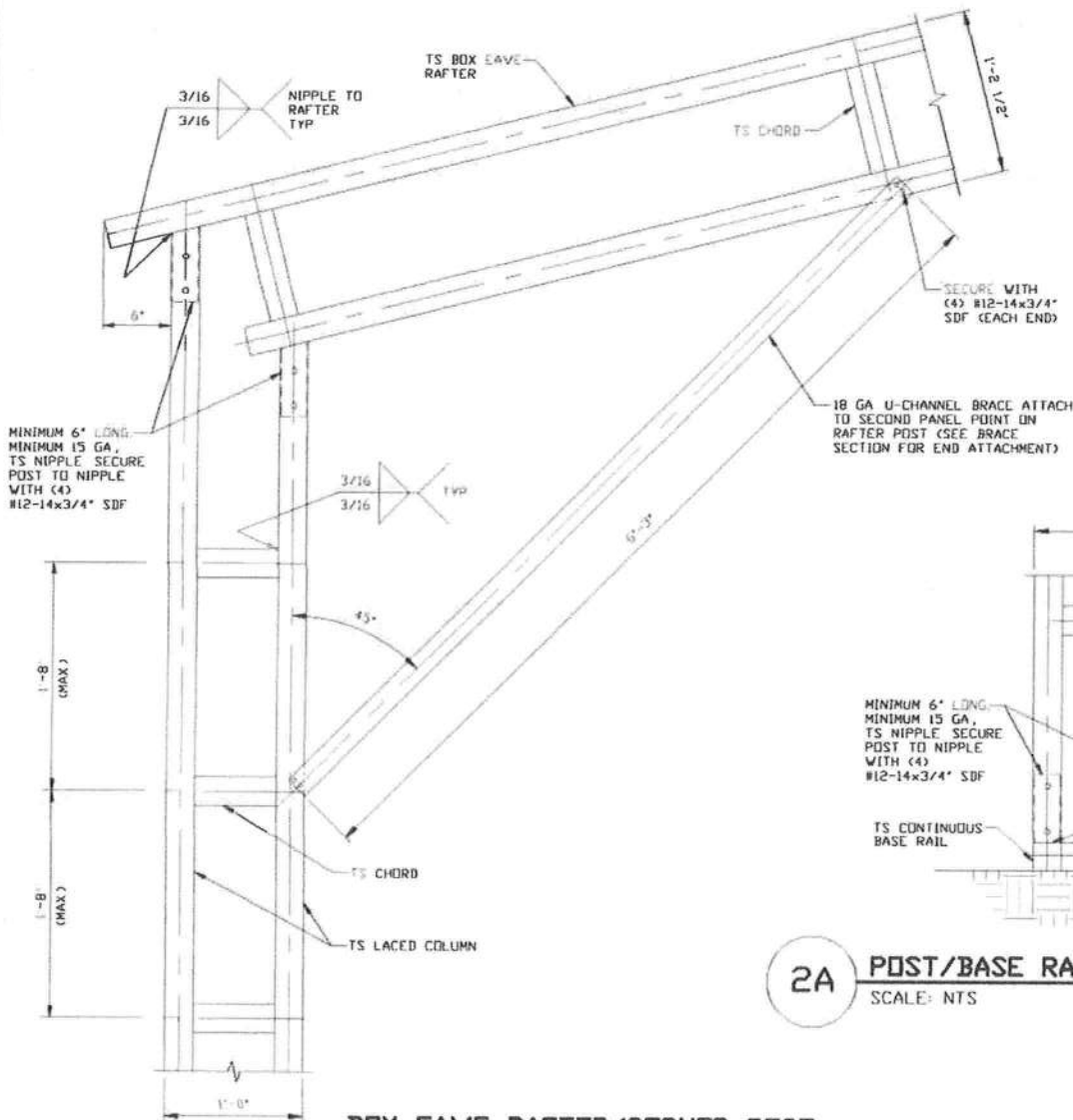
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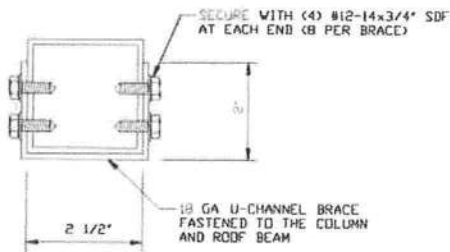
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1B BOX EAVE RAFTER/CORNER POST
CONNECTION DETAIL FOR
HEIGHTS 16'-0" < TO < 20'-0"
SCALE: NTS



2A POST/BASE RAIL CONNECTION DETAIL
SCALE: NTS



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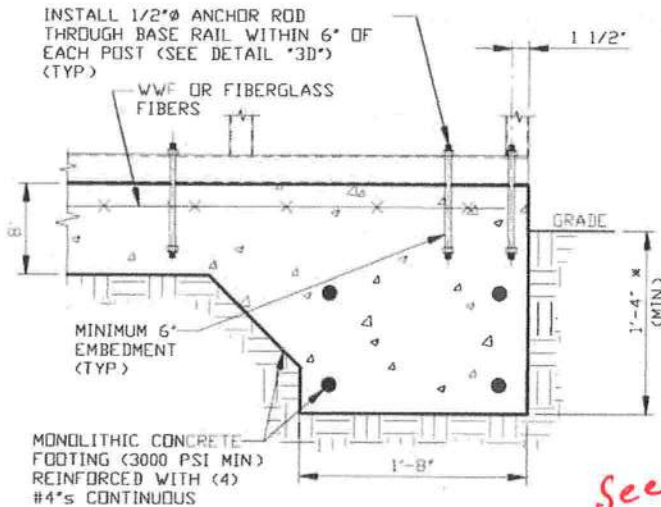
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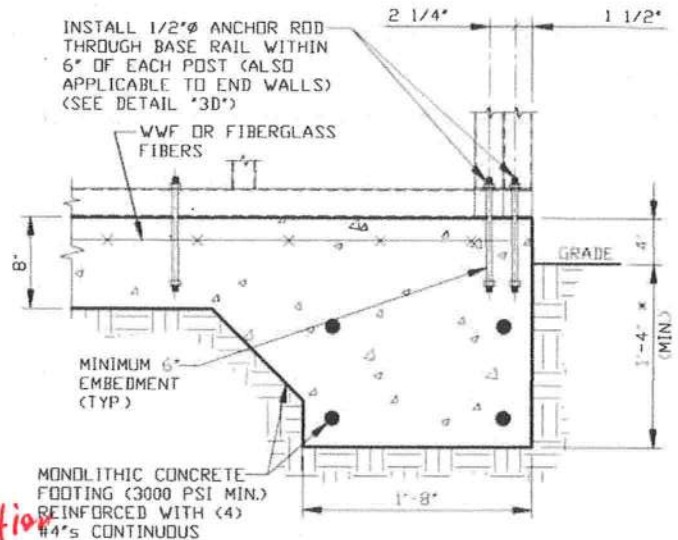
OPTIONAL FOUNDATION ANCHORAGE FOR LOW AND HIGH WIND SPEED



3B

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS
(MINIMUM ANCHOR EDGE DISTANCE IS 1 1/2")
* COORDINATE WITH LOCAL CODES/ORD.

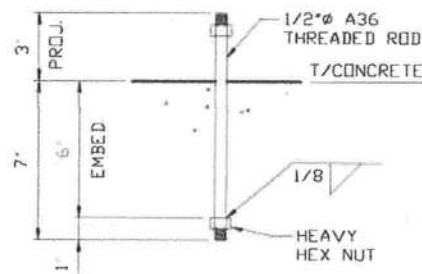


3C

CONCRETE MONOLITHIC SLAB BASE RAIL ANCHORAGE

SCALE: NTS
(MINIMUM ANCHOR EDGE DISTANCE IS 1 1/2")
* COORDINATE WITH LOCAL CODES/ORD.

*See
Foundation
plan
on
structural
plans*



3D

ANCHOR ROD THROUGH BASE RAIL DETAIL

SCALE: NTS

GENERAL NOTES

NOTE: CONCRETE MONOLITHIC SLAB DESIGN BASED ON MINIMUM SOIL BEARING CAPACITY OF 1,500 PSF.

CONCRETE:

CONCRETE SHALL HAVE A MINIMUM SPECIFIED COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS.

COVER OVER REINFORCING STEEL:

FOR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE PER ACI-318:
3 INCHES IN FOUNDATIONS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

REINFORCING STEEL:

THE TURNDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. THE SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR FIBERGLASS FIBER REINFORCEMENT.

REINFORCEMENT MAY BE BENT IN THE SHOP OR THE FIELD PROVIDED:

1. REINFORCEMENT IS BENT COLD.
2. THE DIAMETER OF THE BEND, MEASURED ON THE INSIDE OF THE BAR, IS NOT LESS THAN SIX-BAR DIAMETERS.
3. REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT.



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SHT. 7A

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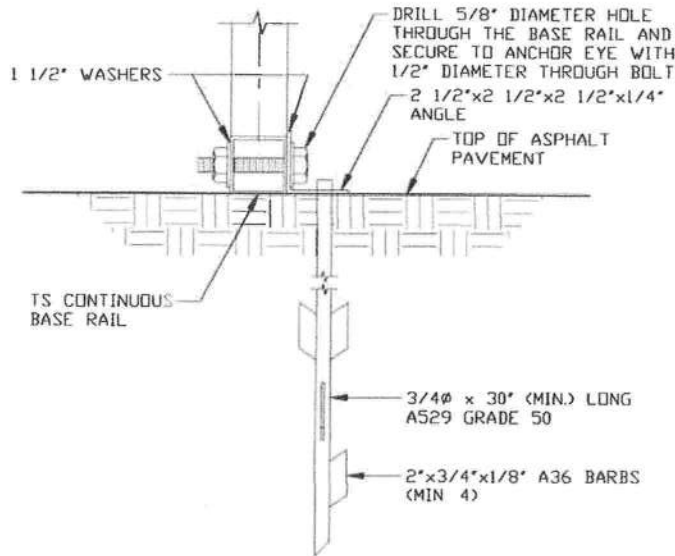
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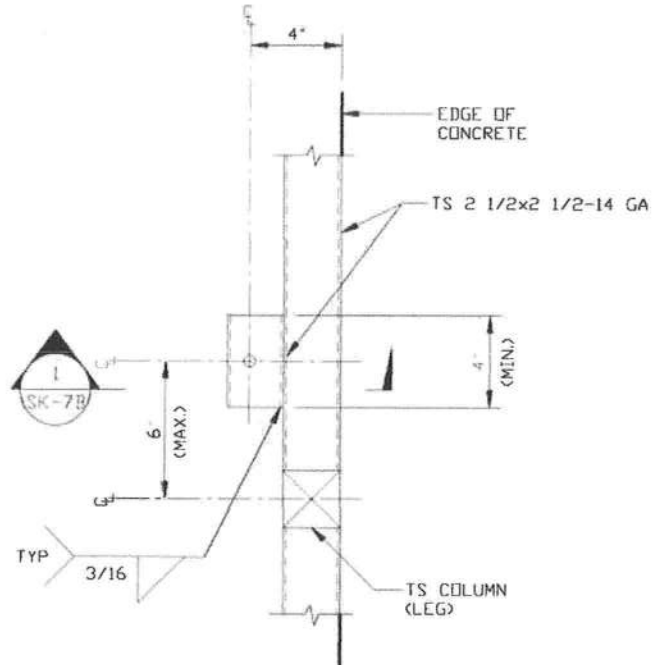
BASE RAIL ANCHORAGE OPTION



ASPHALT BASE ANCHORAGE (HP 9 BARBED DRIVE ANCHOR)

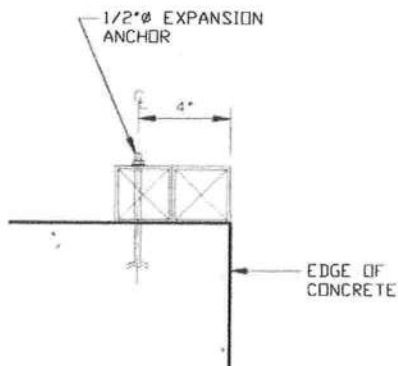
3E

SCALE: NTS
(CAN BE USED FOR ASPHALT)
* COORDINATE WITH LOCAL CODES/ORD
REGARDING MINIMUM FROST DEPTH REQ



TYPICAL ANCHOR DETAIL WHEN BASE RAIL IS NEAR EDGE OF CONCRETE

SCALE: NTS



SECTION 1
SCALE: NTS



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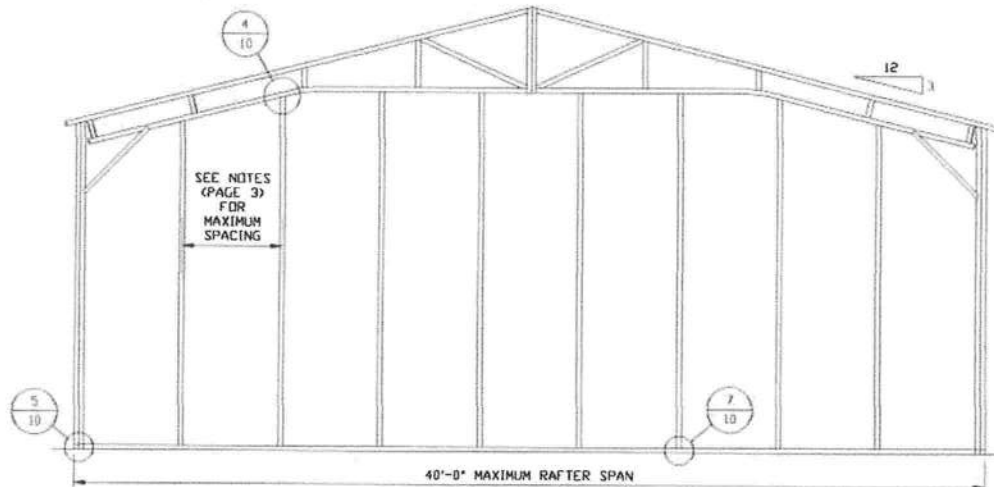
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BOX EAVE RAFTER END WALL AND WALL OPENINGS



TYPICAL BOX EAVE RAFTER END WALL FRAMING SECTION

SCALE: 1/8" = 1'-0"



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SHT. 8

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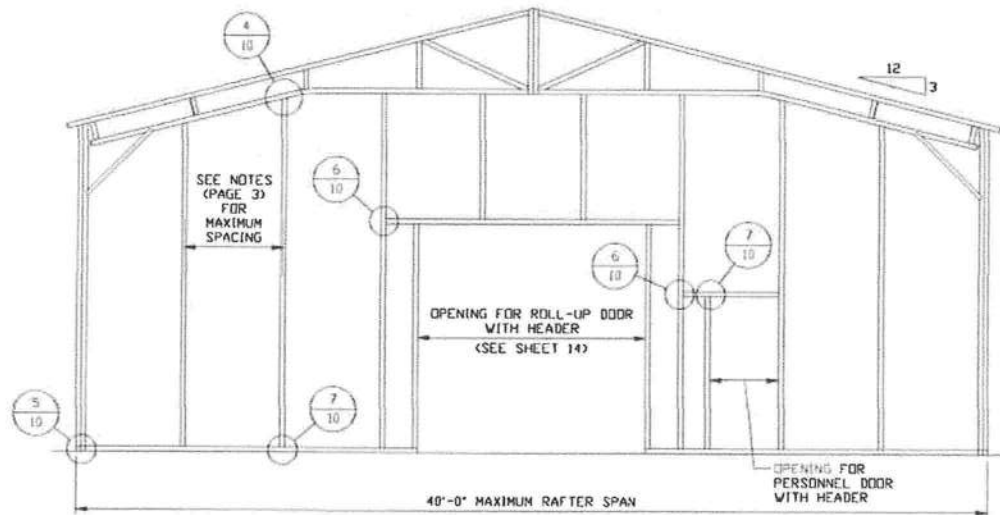
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BOX EAVE RAFTER END WALL AND WALL OPENINGS



TYPICAL BOX EAVE RAFTER END WALL OPENINGS FRAMING SECTION
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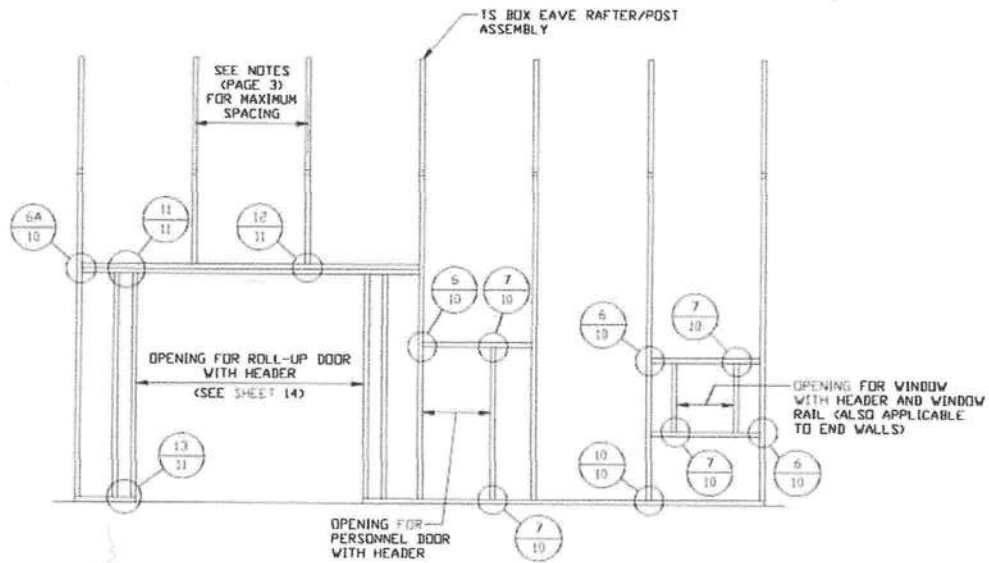
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BOX EAVE RAFTER SIDE WALL AND WALL OPENINGS



TYPICAL BOX EAVE RAFTER SIDE WALL OPENINGS FRAMING SECTION

SCALE: 1/8" = 1'-0"



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DRAWN BY: LT

CHECKED BY: PDH

PROJECT MGR: VSM

CLIENT: TBS

**TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B**

DATE: 1-15-21

SCALE: NTS

JOB NO:
16022S/17301S/20352S

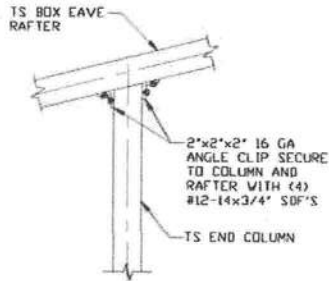
SHT. 9

DWG. NO: SK-3

REV: 5

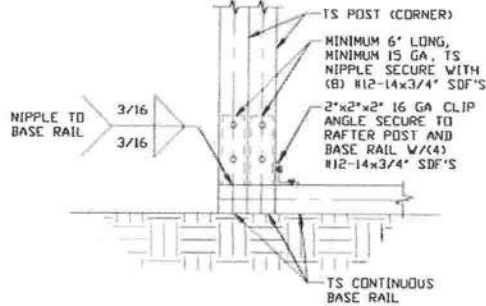
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CONNECTION DETAILS



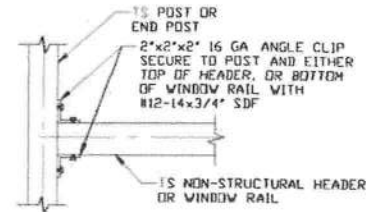
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**END POST/RAFTER
CONNECTION DETAIL**
SCALE: NTS



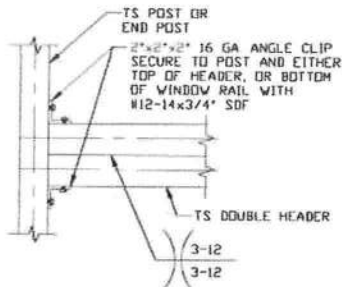
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**END POST/BASE RAIL
CONNECTION DETAIL**
SCALE: NTS



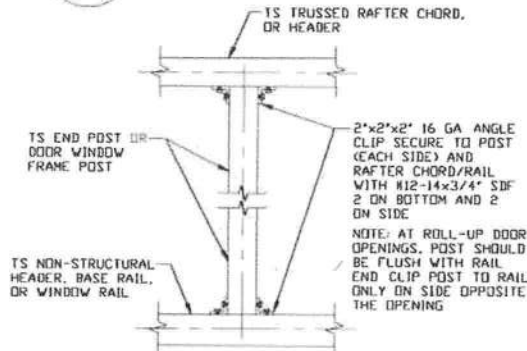
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**HEADER OR WINDOW
RAIL TO POST
CONNECTION DETAIL**
SCALE: NTS



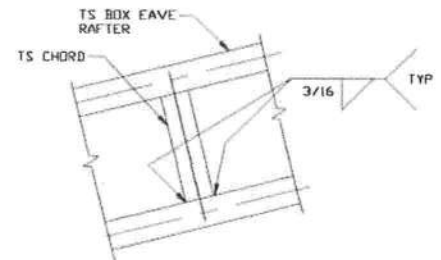
6A

**DOUBLE HEADER
TO COLUMN
CONNECTION DETAIL**
SCALE: NTS



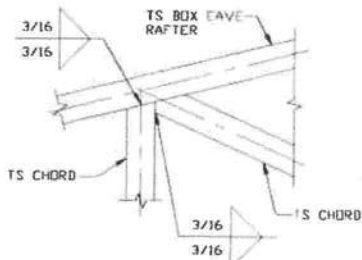
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**POST TO HEADER, BASE
RAIL OR WINDOW RAIL
CONNECTION DETAIL**
SCALE: NTS



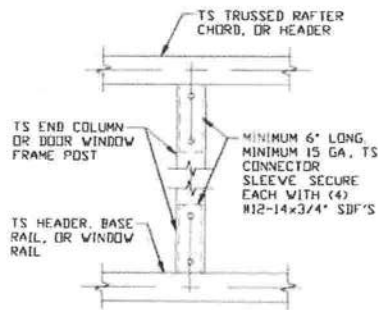
8

**CHORD/RAFTER
CONNECTION DETAIL**
SCALE: NTS



9

**TRUSS POST AND
CORD TO RAFTER
CONNECTION DETAIL**
SCALE: NTS



10

**COLUMN TO HEADER/
BASE RAIL
CONNECTION DETAIL**
SCALE: NTS



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TUBULAR BUILDING SYSTEMS
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DATE: 1-15-21

SHT. 10

SCALE: NTS

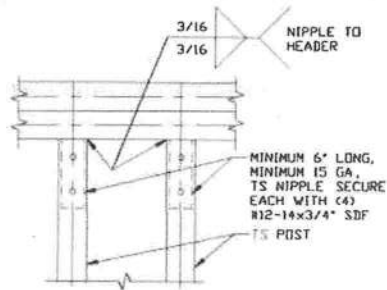
DWG. NO: SK-3

JOB NO:
16022S/17301S/20352S

REV: 5

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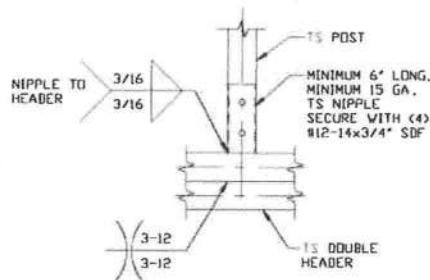
CONNECTION DETAILS



11

DOUBLE HEADER/POST CONNECTION DETAIL

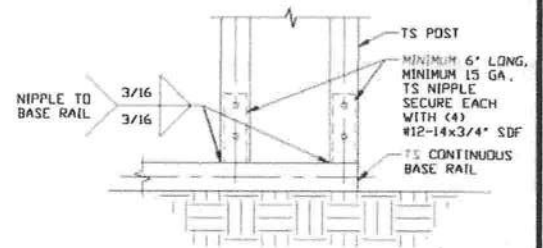
SCALE: NTS



12

POST/DOUBLE HEADER CONNECTION DETAIL

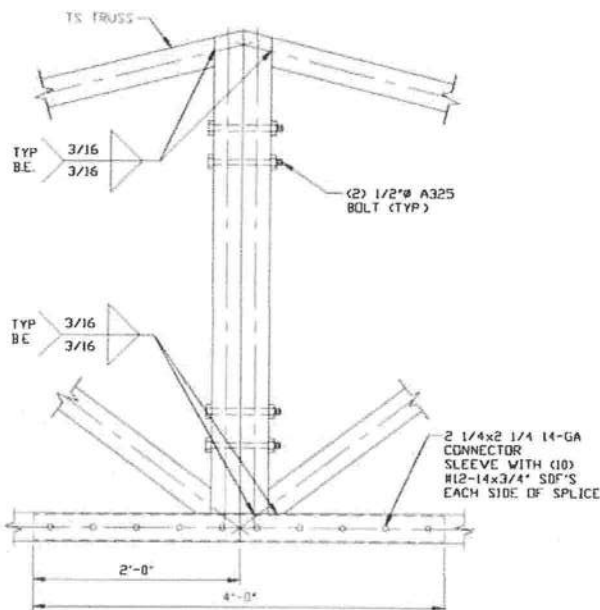
SCALE: NTS



13

POST/BASE RAIL CONNECTION DETAIL

SCALE: NTS



14

SPLICE CONNECTION DETAIL

SCALE: NTS



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TUBULAR BUILDING SYSTEMS
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DATE: 1-15-21

SHT. 11

SCALE: NTS

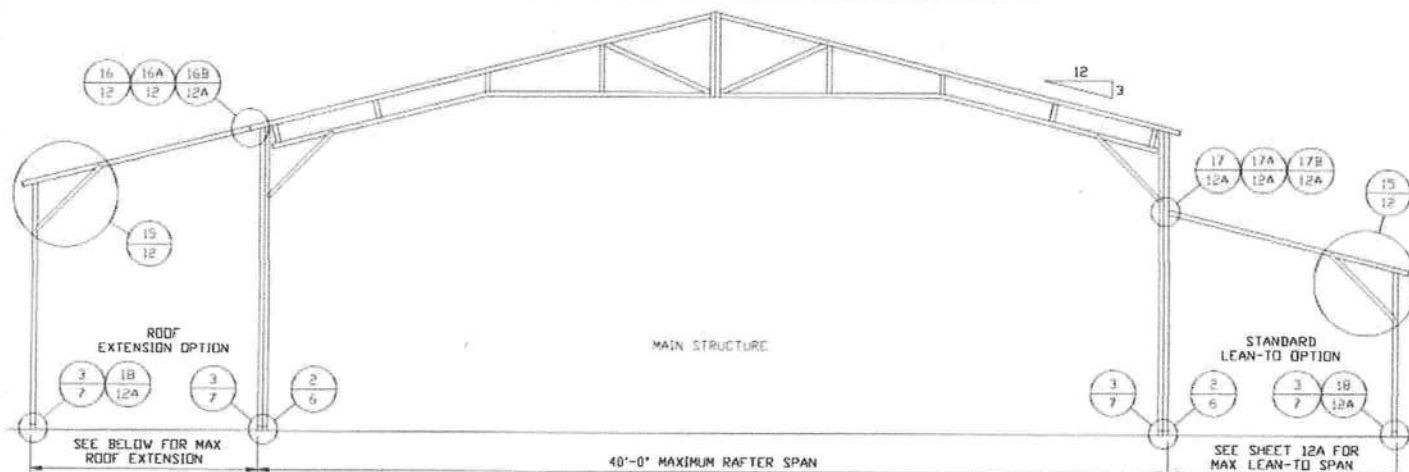
DWG. NO. SK-3

JOB NO:
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REV: 5

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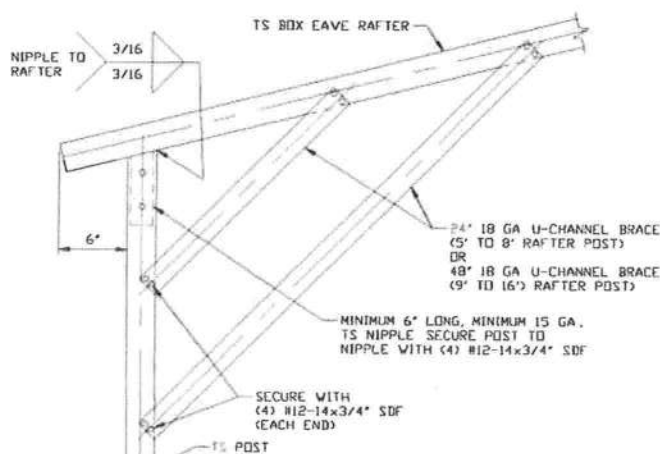
BOX EAVE RAFTER LEAN-TO OPTIONS



TYPICAL BOX EAVE RAFTER LEAN-TO OPTIONS FRAMING SECTION (BOTH OPTIONS SHOWN)

SCALE: NTS

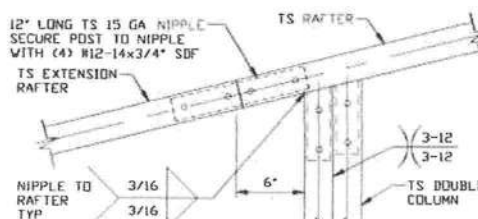
MAIN BUILDING COLUMNS WITH LEAN-TO OR ROOF EXTENSION ATTACHED ARE REQUIRED TO BE LACED COLUMNS FOR EAVE HEIGHTS 16'-0" < TO < 20'-0"
 MAIN BUILDING COLUMNS WITH LEAN-TO OR ROOF EXTENSION ATTACHED ARE REQUIRED TO BE DOUBLE COLUMNS FOR EAVE HEIGHTS 11'-0" < TO < 16'-0"
 MAIN BUILDING COLUMNS WITH LEAN-TO OR ROOF EXTENSION ATTACHED ARE REQUIRED TO BE SINGLE COLUMNS FOR EAVE HEIGHTS < 10'-0"



15

LEAN-TO RAFTER/ CORNER POST DETAIL

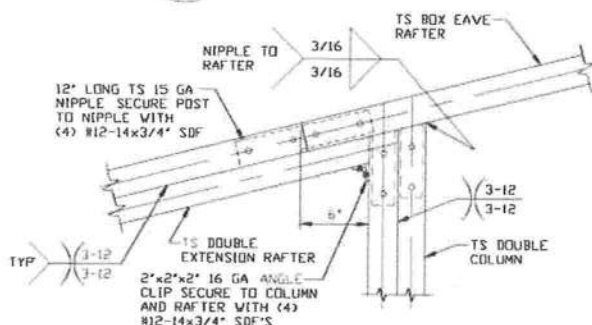
SCALE: NTS



16

SIDE EXTENSION RAFTER/COLUMN DETAIL FOR RAFTER SPANS < 12'-0"

SCALE: NTS



16A

SIDE EXTENSION RAFTER/COLUMN DETAIL FOR RAFTER SPANS 12'-0" < L < 16'-0"

SCALE: NTS



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CLIENT: TBS

TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B

DATE: 1-15-21

SHT. 12

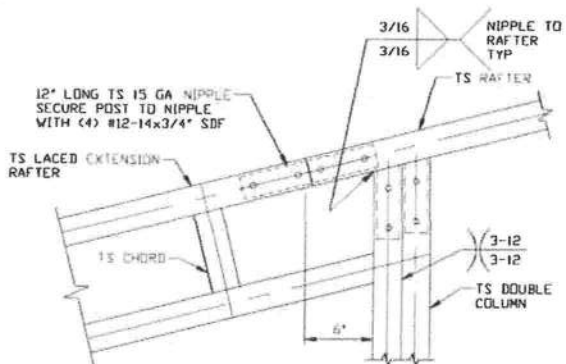
SCALE: NTS

DWG. NO: SK-3

JOB NO:
16022S/17301S/20352S

REV: 5

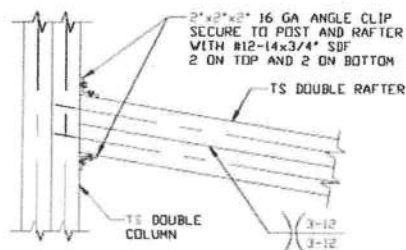
BOX EAVE RAFTER LEAN-TO OPTIONS



16B

SIDE EXTENSION RAFTER/COLUMN DETAIL FOR RAFTER SPANS 16'-0" < L ≤ 24'-0"

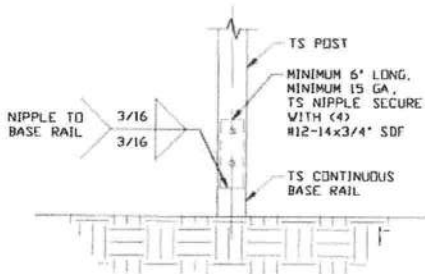
SCALE: NTS



17A

LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS 12'-0" < L ≤ 16'-0"

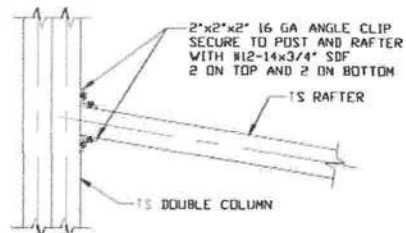
SCALE: NTS



18

LEAN-TO POST CONNECTION DETAIL

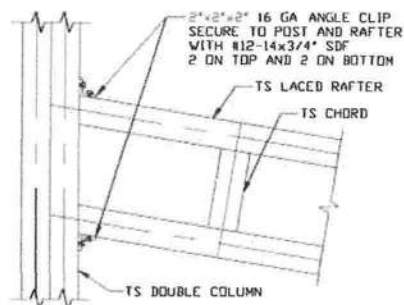
SCALE: NTS



17

LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS 12'-0"

SCALE: NTS



17B

LEAN-TO RAFTER TO RAFTER COLUMN CONNECTION DETAIL FOR RAFTER SPANS 16'-0" < L ≤ 24'-0"

SCALE: NTS



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DATE: 1-15-21

SHT. 12A

SCALE: NTS

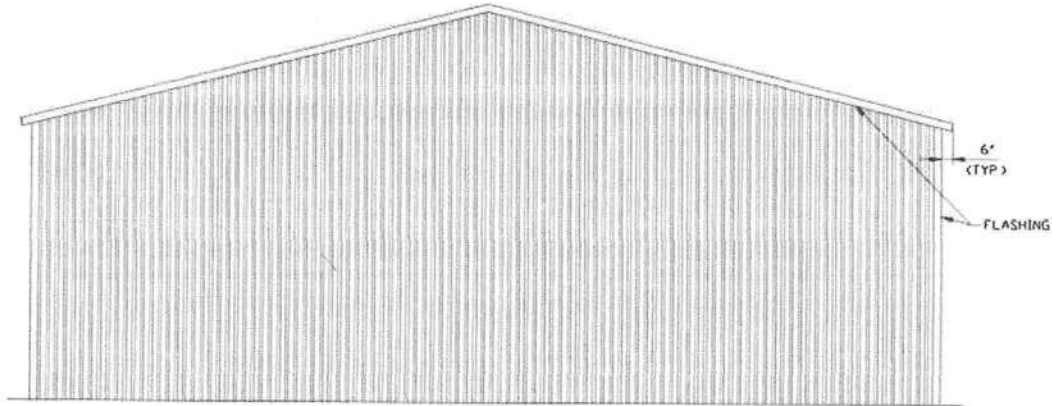
DWG. NO: SK-3

JOB NO:

16022S/17301S/20352S

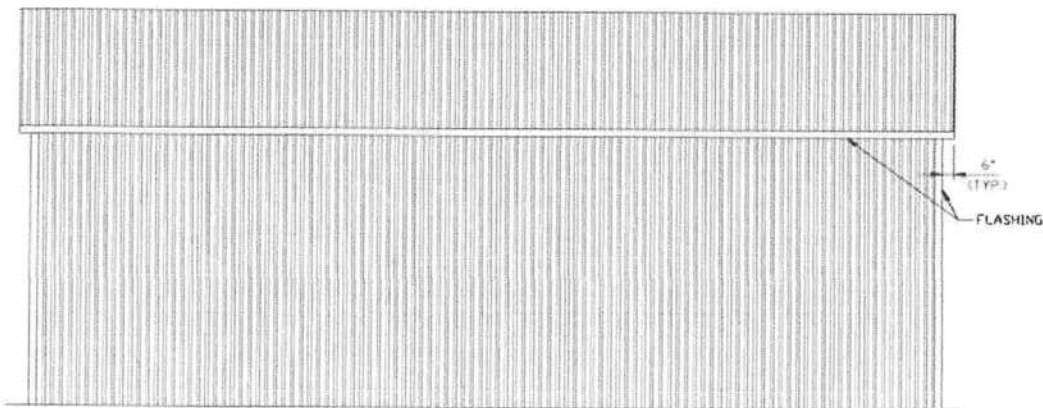
REV: 5

BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



TYPICAL END ELEVATION VERTICAL ROOF/SIDING

SCALE: 1/8" = 1'-0"



TYPICAL SIDE ELEVATION VERTICAL ROOF/SIDING

SCALE: 1/8" = 1'-0"



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TUBULAR BUILDING SYSTEMS
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DATE: 1-15-21

SHT. 13

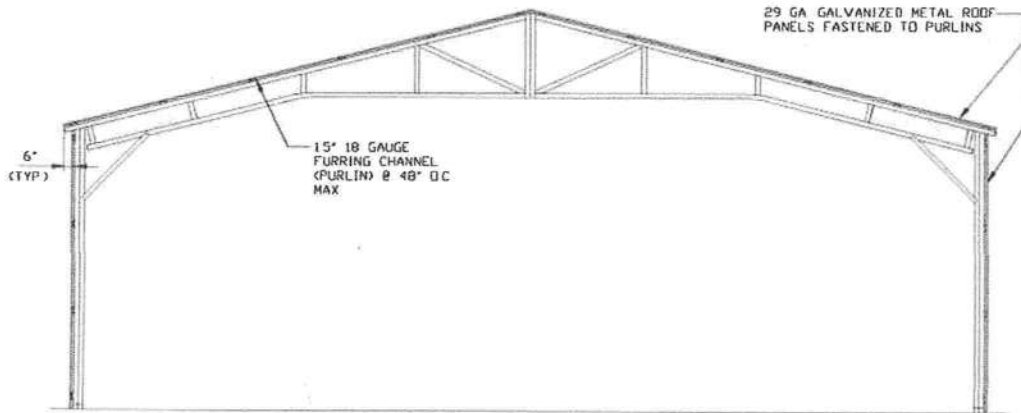
SCALE: NTS

DWG. NO: SK-3

JOB NO:
16022S/17301S/20352S

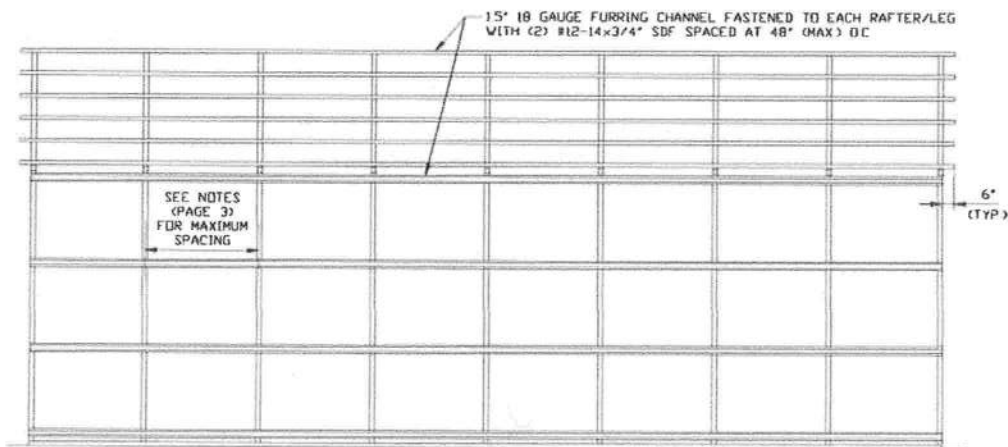
REV: 5

BOX EAVE RAFTER VERTICAL ROOF/SIDING OPTION



TYPICAL SECTION VERTICAL ROOF/SIDING OPTION

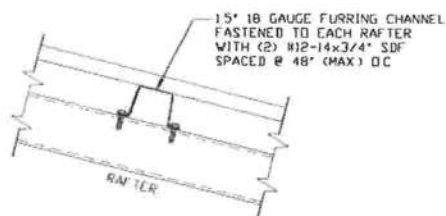
SCALE: 1/8" = 1'-0"



TYPICAL FRAMING SECTION VERTICAL ROOF/SIDING OPTION

SCALE: 1/8" = 1'-0"

NOTE: TS 2 1/2"x2 1/2"-14 GA WALL GIRTS CAN BE USED AS AN OPTION IN PLACE OF HAT CHANNELS TS GIRTS MUST BE SPACED AT 4'-0" (MAX) OC



PANEL ATTACHMENT

(ALTERNATE FOR VERTICAL ROOF PANELS)



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TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B

DATE: 1-15-21

SHT. 13A

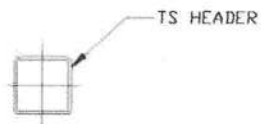
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DWG. NO: SK-3

JOB NO:
16022S/17301S/20352S

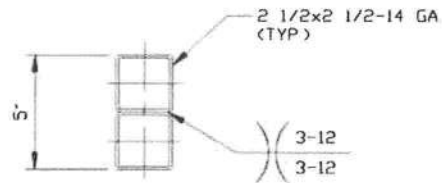
REV: 5

SIDE WALL OPTIONAL HEADER



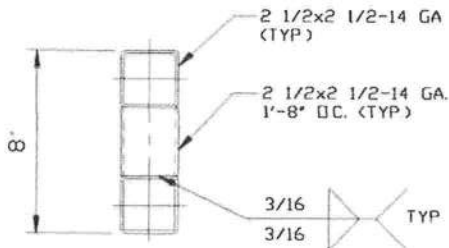
HEADER DETAIL FOR OPENINGS LENGTH $\leq 8'-0"$

SCALE: NTS



HEADER DETAIL FOR OPENINGS 8'-0" < LENGTH $\leq 10'-0"$

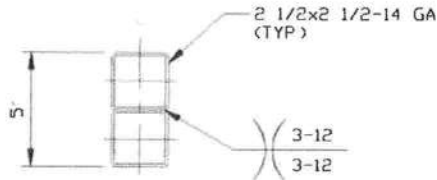
SCALE: NTS



HEADER DETAIL FOR OPENINGS 10'-0" < LENGTH $\leq 15'-0"$

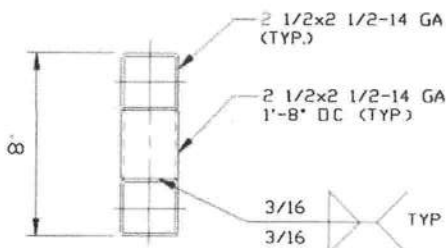
SCALE: NTS

END WALL OPTIONAL HEADER



HEADER DETAIL FOR OPENINGS LENGTH $\leq 10'-0"$

SCALE: NTS



HEADER DETAIL FOR OPENINGS 10'-0" < LENGTH $\leq 15'-0"$

SCALE: NTS



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40'-0"x20'-0" ENCLOSED BUILDING EXP. B**

DATE: 1-15-21

SHT. 14

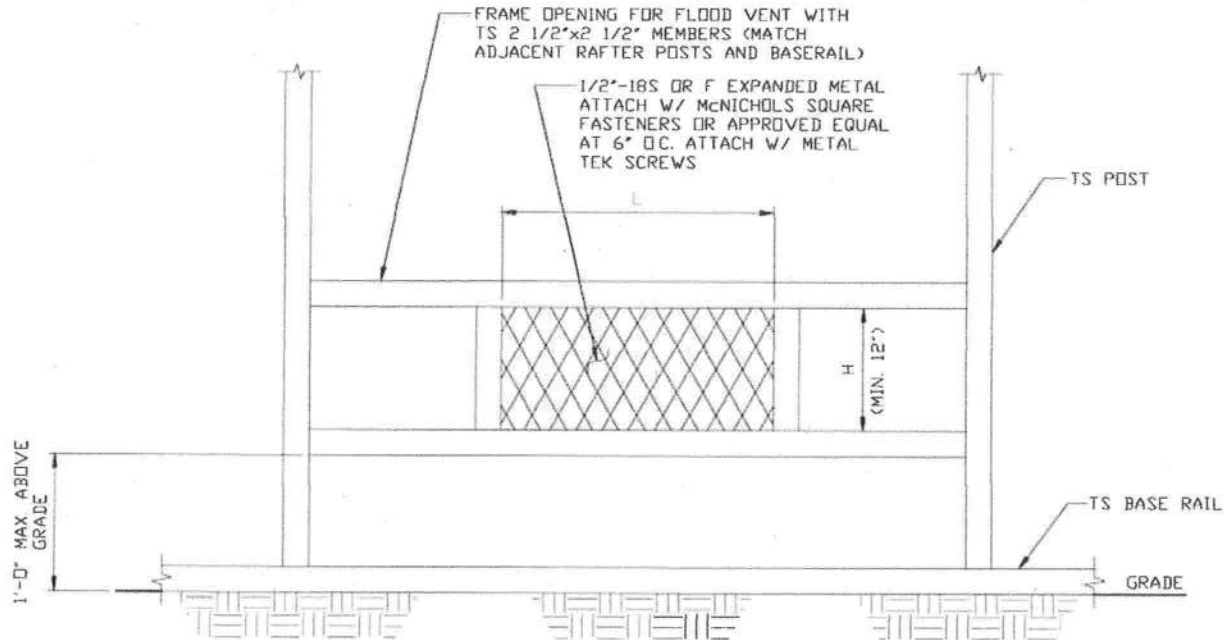
SCALE: NTS

DWG. NO: SK-3

JOB NO:
16022S/17301S/20352S

REV: 5

FLOOD VENT DETAIL



TYPICAL FLOOD VENT DETAIL

SCALE: NTS

1. MINIMUM VENT SPACE REQUIRED = 1 SQ. INCH OF OPEN VENT AREA PER SQ. FOOT OF BUILDING AREA
2. THERE SHALL BE A MINIMUM OF TWO OPENINGS ON DIFFERENT SIDES FOR EACH ENCLOSED BUILDING.
3. APPLY 1.3 FACTOR WHEN CALCULATING TOTAL OPEN AREA WHEN USING 1/2"-18GA S OR F EXPANDED METAL.
4. TOTAL OPEN AREA OF VENT = $L \times H (\text{MIN } 12")$.
5. FLOOD VENT DETAIL COMPLIES WITH FEMA/NFIP
6. PREFABRICATED FLOOD VENTS MEETING THE REQUIREMENTS OF FEMA/NFIP MAY BE USED



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40'-0"x20'-0" ENCLOSED BUILDING EXP. B**

DATE: 1-15-21

SHT. 15

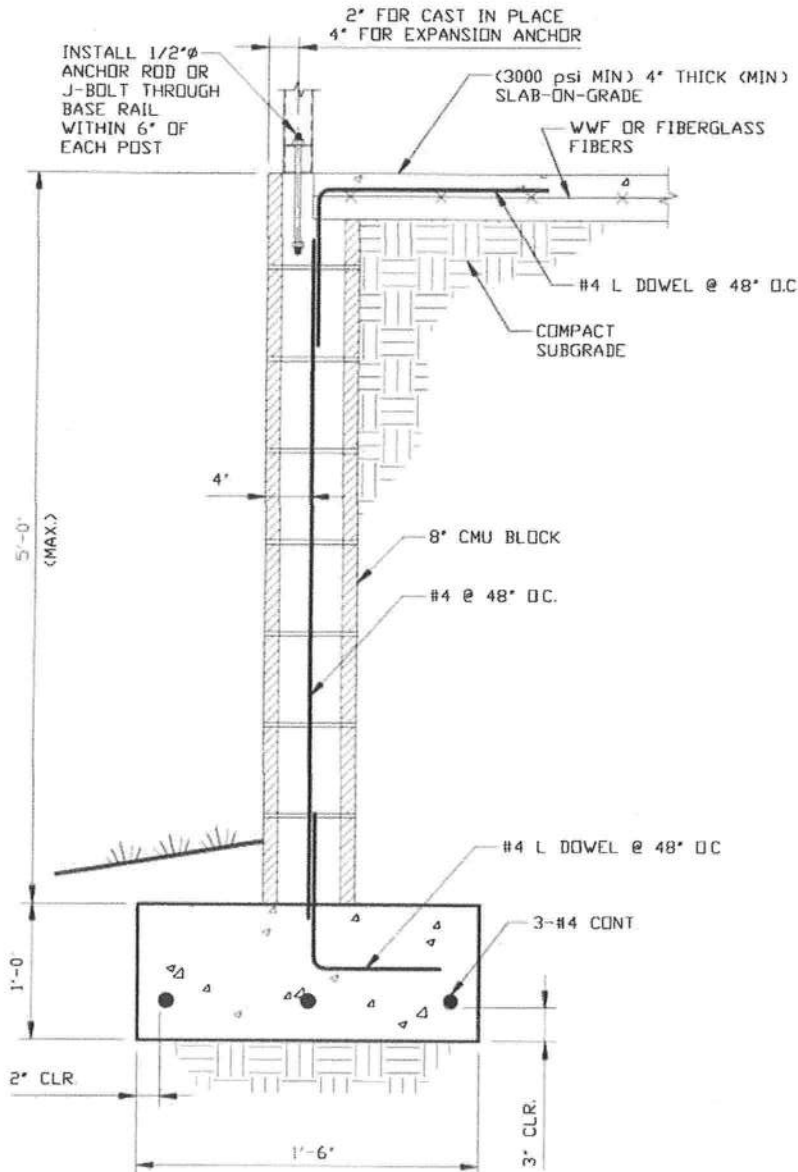
SCALE: NTS

DWG. NO: SK-3

**JOB NO:
16022S/17301S/20352S**

REV: 5

STAND-ALONE STEM WALL DETAIL



STAND-ALONE CONCRETE MASONRY UNIT (CMU) FOUNDATION STEM WALL DETAIL

SCALE: NTS



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TUBULAR BUILDING SYSTEMS
40'-0" x 20'-0" ENCLOSED BUILDING EXP. B

DATE: 1-15-21

SHT. 16

SCALE: NTS

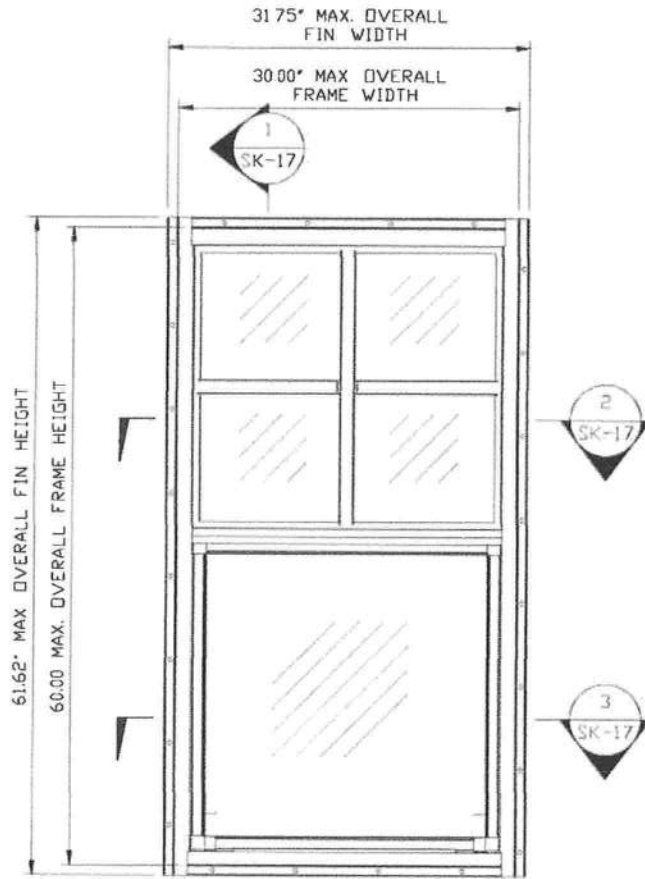
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JOB NO:
16022S/17301S/20352S

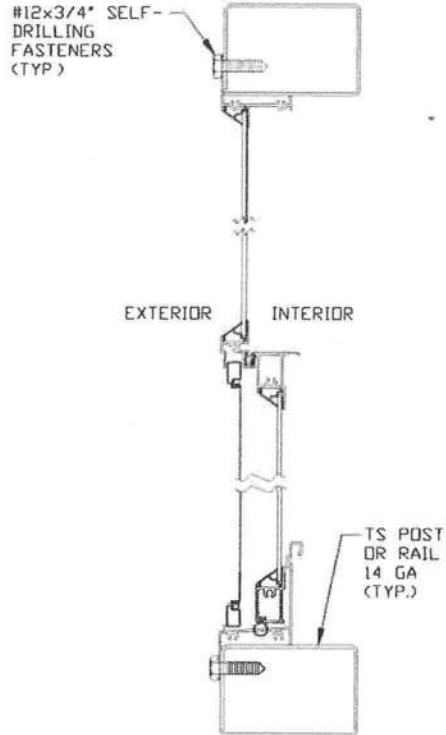
REV: 5

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VERTICAL SLIDING WINDOW DETAIL



ELEVATION VIEW
SCALE: NTS

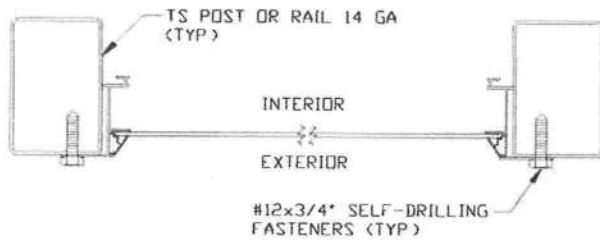


SECTION

SCALE: 3"=1'-0"

NOTE: KINRD SERIES 18000-R VS OR EQUIVALENT WINDOW IS REQUIRED

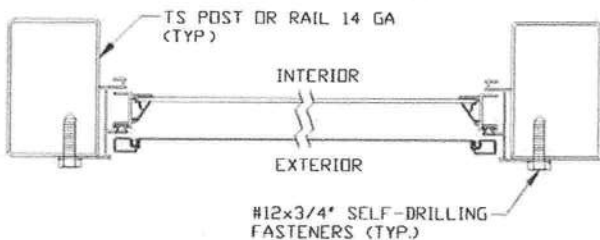
POSITIVE WALL PRESSURE: +40.0 PSF
NEGATIVE WALL PRESSURE: -40.0 PSF



SECTION

SCALE: 3"=1'-0"

2 SK-17



SECTION

SCALE: 3"=1'-0"

3 SK-17



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**TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B**

DATE: 1-15-21

SHT. 17

SCALE: NTS

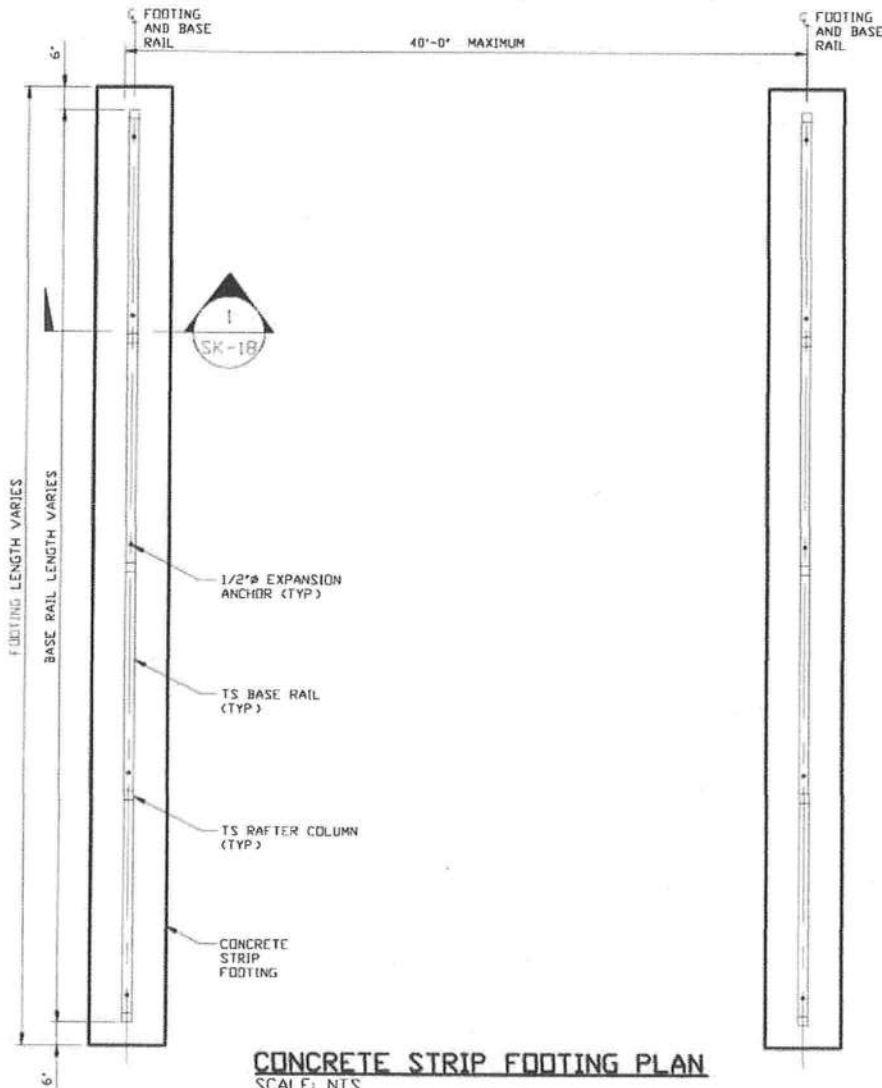
DWG. NO: SK-3

JOB NO:
16022S/17301S/20352S

REV: 5

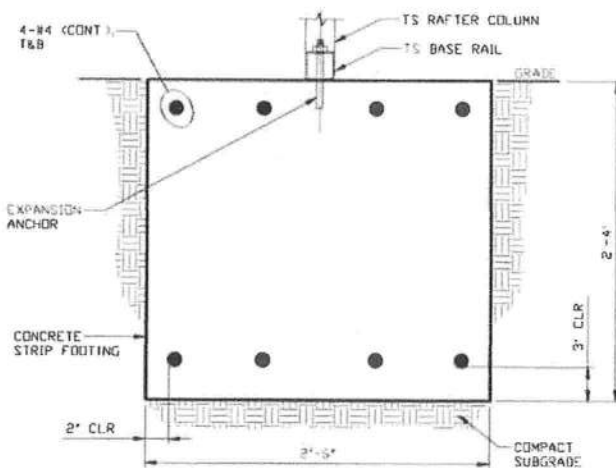
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OPTIONAL CONCRETE STRIP FOOTING



CONCRETE STRIP FOOTING PLAN

SCALE: NTS



SECTION 1

SCALE: NTS

SK-18

* COORDINATE WITH LOCAL CODES/ORD

GENERAL NOTES

NOTE: CONCRETE MONOLITHIC SLAB DESIGN BASED ON MINIMUM SOIL BEARING CAPACITY OF 1,500 PSF.

CONCRETE:

CONCRETE SHALL HAVE A MINIMUM SPECIFIED COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS

COVER OVER REINFORCING STEEL:

FOR FOUNDATIONS, MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE PER ACI-318:

3 INCHES IN FOUNDATIONS WHERE THE CONCRETE IS CAST AGAINST AND PERMANENTLY IN CONTACT WITH THE EARTH OR EXPOSED TO THE EARTH OR WEATHER, AND 1 1/2 INCHES ELSEWHERE.

REINFORCING STEEL:

THE TURNDOWN REINFORCING STEEL SHALL BE ASTM A615 GRADE 60 THE SLAB REINFORCEMENT SHALL BE WELDED WIRE FABRIC MEETING ASTM A185 OR FIBERGLASS FIBER REINFORCEMENT

REINFORCEMENT MAY BE BENT IN THE SHOP OR THE FIELD PROVIDED:

1. REINFORCEMENT IS BENT COLD
2. THE DIAMETER OF THE BEND, MEASURED ON THE INSIDE OF THE BAR, IS NOT LESS THAN SIX-BAR DIAMETERS
3. REINFORCEMENT PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT



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ENGINEERING AND CONSULTING, INC.**

DRAWN BY: LT

CHECKED BY: PDH

PROJECT MGR: WSM

CLIENT: TBS

**TUBULAR BUILDING SYSTEMS
40'-0"x20'-0" ENCLOSED BUILDING EXP. B**

DATE: 1-15-21

SHT. 18

SCALE: NTS

DWG. NO: SK-3

JOB NO:
16022S/17301S/20352S

REV: 5

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