

INDUSTRY GUIDELINES

STRUCTURAL STEEL ERECTION

STEEL DECK ERECTION

**TO THE REQUIREMENTS OF THE APPROPRIATE CURRENT
OCCUPATIONAL HEALTH AND SAFETY REGULATIONS**

DECEMBER, 1996

PREAMBLE

The provisions of the attached codes of practice are based upon the use of a CSA approved full body harness with a shock absorber attached to the "D" ring and a double lanyard. Free fall distance is limited to no more than 1200 mm (4'0").

Based upon the foregoing free fall, impact can be limited to a force of 4kn. Designs of all fall arrest systems used in these procedures are based upon this figure.

The drawings attached hereto are provided as samples of what are **believed** to be satisfactory solutions for the situation indicated.

Any erector making use of these procedures must have the drawings reviewed and stamped by a professional engineer who will then assume responsibility for their accuracy.

Sketch #6 is not shown and is to be included by each erector showing details which are particular to the erector.

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PROCEDURES FOR STRUCTURAL STEEL ERECTION

1.0 INTRODUCTION

The following pages show a fall arrest that was developed in conjunction with experienced employees and tradesmen in the steel erection industry and the guidelines introduced by the Department of Labour in January, 1996.

These guidelines were developed by the Department of Labour to help erectors comply with the Nova Scott Fall Protection and Scaffolding Regulations which sets out safety requirements of fall protection equipment where workers are exposed to the hazards of falling a distance of 3 metres (10.0 ft) or more.

2.0 PROVIDING ACCESS

2.1 Use of Stairs and Landings;

Whenever stairs and landings are part of the structure being erected, they should be installed along with the structure to make access for bolting, welding and deck installation activities safer and less strenuous. Design consideration for this should be done during the initial stages of project design.

2.2 Access Points

An access ladder will be provided as soon as the first portion of the frame structure is tied together.

Access points should be arranged so that travel on the frame structure does not exceed a horizontal distance of 30 metres (100 ft). This means that where stairs are not available, ladders must be provided and secured to the structure.

2.3 Use of Ladders and Wooden Platforms

1. Ladders must be in good condition and extend at least one metre (3 ft) above the landing area. A wooden plank platform may be necessary where materials such as bolts are pulled up by hand. Ladders must be correctly placed so that they can access a point of connection to a fall arrest system or an access platform.
2. Ladders can be used to access vertical columns or other areas in which the top of the ladder cannot be tied off. A fellow worker will hold the base of the ladder steady while the worker is on a ladder which is not tied off. Where possible, the worker will connect a fall arrest system or attach to an existing fall arrest system.

3. Access ladders to be erected as per the Nova Scotia Occupational Health and Safety Act.

2.4 Planking Requirements

Where an access platform is required, planking to be as required by the Nova Scotia Occupational Health and Safety Act. All landings are have a fall arrest system or approved type railing attached.

3.0 LIFELINES

1. A lifeline should consist of a 16 mm (5/8 inch) diameter or larger polypropylene fibre rope attached to a fixed support.
2. One person only shall be attached to a vertical line.

***SEE SKETCH # SK7.3 FOR VERTICAL LIFELINE CONNECTIONS.**

4.0 USE OF HORIZONTAL STATIC LINES

Horizontal static lines to be in compliance with the Nova Scotia Fall Protection and Scaffolding Regulations, issued January, 1996.

5.0 CONNECTING STRUCTURAL STEEL

Workers erecting structural steel shall be instructed and trained to install and use the fall protection system before commencing work.

5.1 Connector

1. A "connector" is a trained ironworker who makes the initial connection of structural steel members. The connector(s) shall be designated by the supervisor of the work for each crane or mechanically powered hoisting device.
2. Unless a safety net or travel restraint system is being used, fall arrest systems on beams or columns shall be provided for connectors. These may be installed while the beams/columns are on the ground.
3. A fall arrest system shall be arranged in such a manner that the process of raising and connecting structural steel members allows the designated connector(s) freedom of movement to avoid an incoming member. Planning is required prior to any steel erection to have connecting procedures in place.
4. Special attention shall be given to the use of tag lines to control the movement of the load being positioned.

5. "Christmas Treeing" is not to be used in hoisting structural steel to connectors.

5.2 Column Erection

1. Before a worker ascends a column, the column shall be adequately secured or braced and a fall arrest/fall prevention system shall be provided.

*SEE SKETCH #SK7.3

5.3 Installation of Vertical Lifelines and Horizontal Static Lines

1. Two methods of attaching a vertical lifeline to a column may be performed. The first method involves attaching the lifeline to the top of the column before its placement, while the column is on the ground. Alternatively, if the column is already in place, workers may attach the vertical lifeline to the top of a column with the use of a ladder or a powered elevating work platform, provided that the configuration of the steel lattice structure and the location allows for this method of installation.
2. While the installation of horizontal static lines should preferably be done prior to erection of steel beams, horizontal static lines may also be installed after erection. This procedure can be accomplished provided that some means of fall arrest for the workers is already in place and that there are points of attachment on the structural members, such as welded lugs or punched holes, to allow for the installation of an adequate anchor, such as a shackle or turnbuckle, at the end of the static line.
3. Fall arrest shall be provided for workers making the connections and installing the lines.

5.4 Work position

While placing, tightening and painting of bolts and other work, the worker shall use a full body harness and be tied off to a fixed support on the project or to a lifeline or to a horizontal static line by means of a lanyard equipped with a shock absorber.

NOTE: The free fall distance can be no more than 1200 mm (4'-0").

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5.5 Travel.

1. For walking on the structural steel beams on most structures, the best means of fall protection will be a fall arrest system using a horizontal static line.

2. All workmen while on structural steel beams shall wear a full body harness with a shock absorber attached to the 'D' ring with a double lanyard attached to the shock absorber and this double lanyard arrangement will be used to ensure the security of attachment at transfer points. Workmen will attach their secondary lanyard to the fall arrest system. (Horizontal static line) when maneuvering around vertical columns or other objects that impede the travel to the workman's initial lanyard connection.
3. As discussed in section 5.5, horizontal static lines may be installed on the beams while on the ground or after columns have been erected.

NOTE: In some cases where a fall arrest system is not installed the following procedure can be used.

4. The worker is to walk on top of the bottom flanges of the beam. A 10 MM (3/8 inch) diameter choker is wrapped around the beam and the ironworker attached to the choker with his lanyard.

NOTE: The free fall distance can be **no more than 1200 MM (4'-0")**.

PROCEDURES FOR STRUCTURAL STEEL ERECTION

6.0 TEMPORARY BRACING

6.1 Columns

1. Column anchor bolt assemblies, including the welding of the column to the base plate shall be designed to resist a 136.2 KG (300 lbs.) eccentric load located 0.46 M (18") from the column face in each direction at the top of the column shaft. Where two anchor bolts are deemed adequate by the engineer details are to be provided by the engineer on how shim plates are to be installed.
2. Columns shall be set on level finished floors, pre-grouted levelling plates, levelling nuts, or shim packs which are adequate to transfer the construction loads.
3. Anchor bolts may not be repaired, replaced or field modified without the approval of the project structural engineer or record.
4. The erector should obtain written confirmation of the integrity of embedded anchor bolts and or plates from the constructor prior to commencement of erection of structural steel.

6.2 UNCOMPLETED STRUCTURE

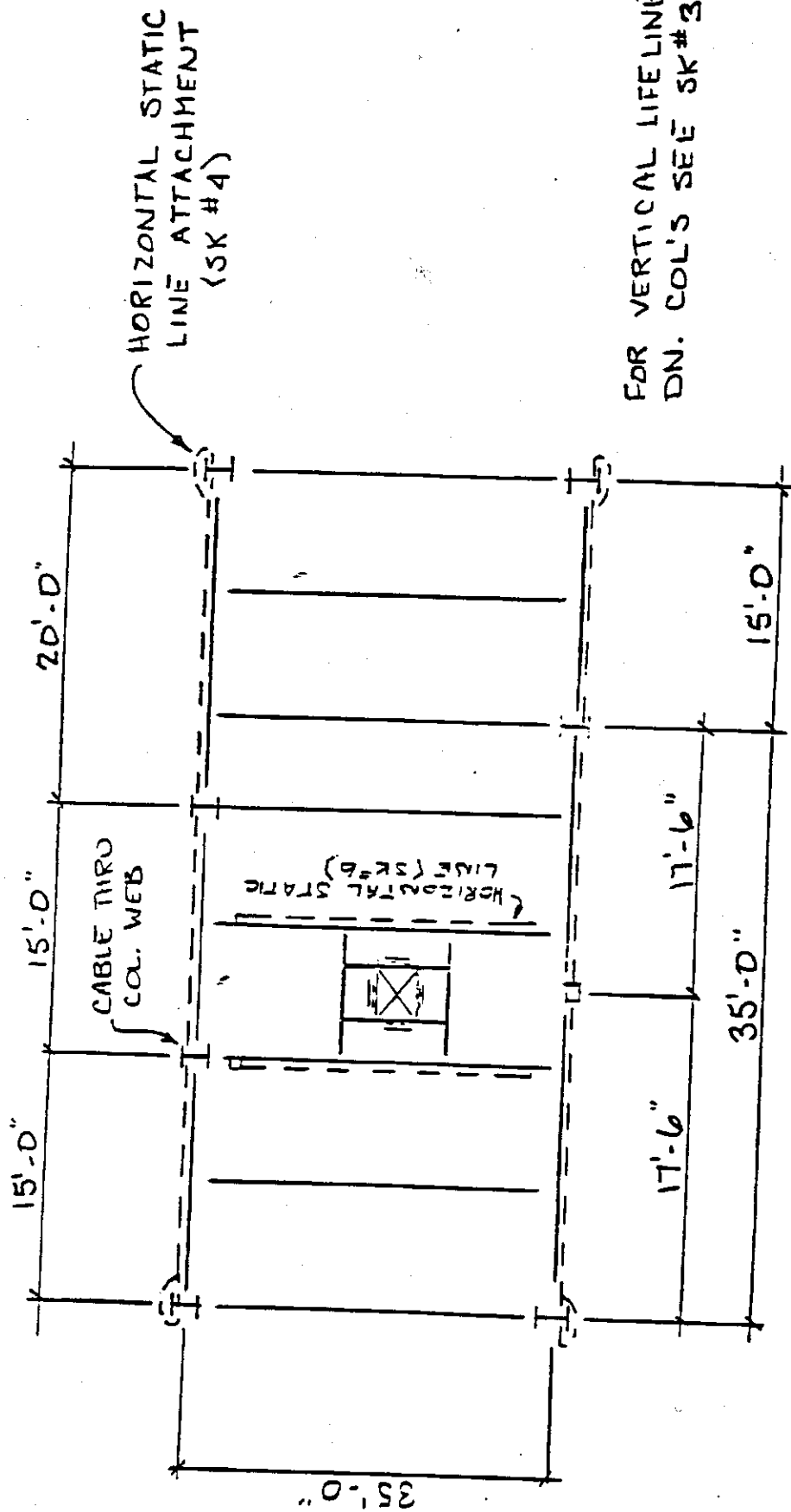
The requirement for temporary bracing is specified in Article 4.2.4, 20.1.3 and 30.1 of CAN/CSA - S16.1-94 limit states design of steel structures.

It is the erectors responsibility to insure compliance with the requirements of these sections.

Standard engineered temporary bracing drawings may be used where certified by an engineer as being acceptable for a specific job.

7.0

SKETCHES

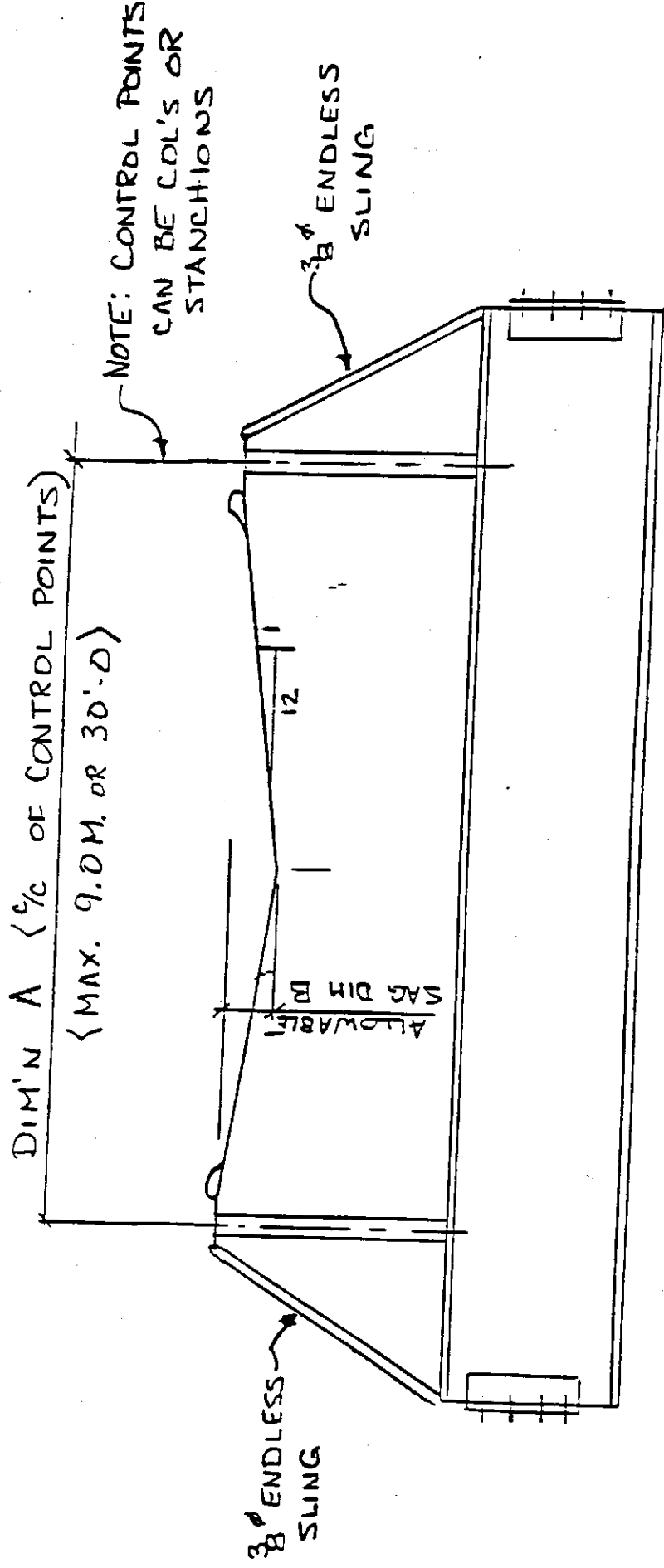


SAMPLE PLAN

NOTES:

1. SEE SK # 2 FOR MAX. SAG IN HORIZONTAL LINES
2. ERECTOR TO CONNECT TO SYSTEM WITH 5/8" LANYARD
3. ALL COMPONENTS OF SYSTEM TO BE CHECKED DAILY FOR POTENTIAL HAZARDS

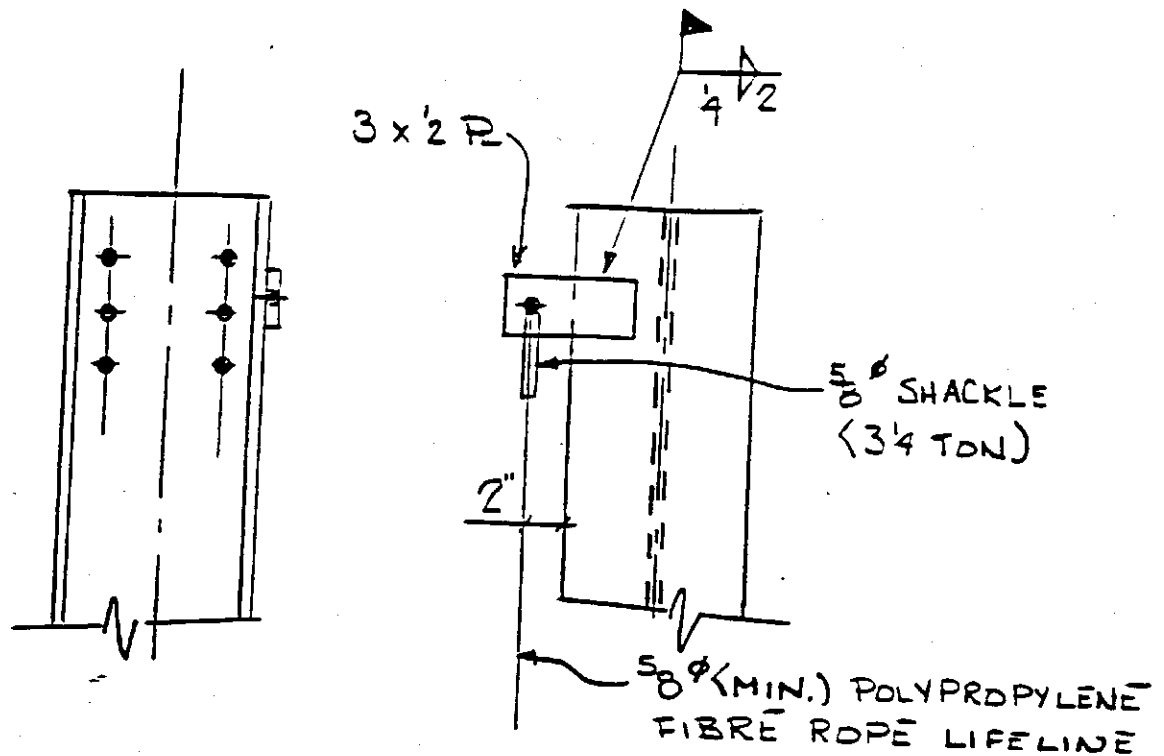
SK 7.1



DIM A	DIM B
10'-0	5"
15'-0	7½
20'-0	10"
25'-0	1'-0½
30'-0	1'-3

DIM A	DIM B
3.0M	125mm
4.5	190
6.0	250
7.5	315
9.0	375

SK 7.2

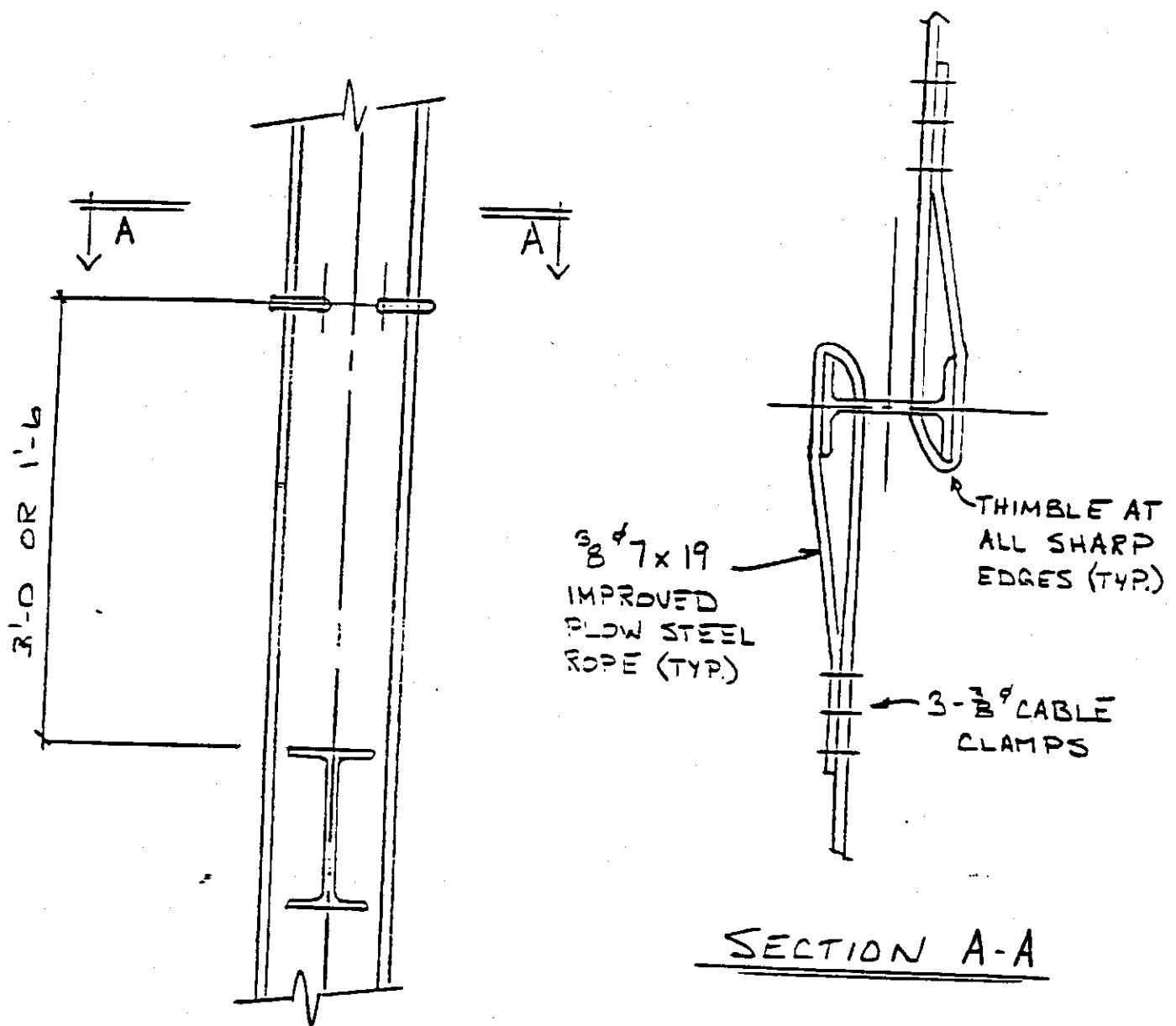


VERTICAL LIFELINE CONNECTION

NOTES:

1. WHERE POSSIBLE ATTACH SHACKLE TO EXISTING HOLES IN COLUMNS
2. WHERE POSSIBLE ATTACH 3 x 2 R SO REMOVAL IS NOT REQUIRED.
3. ATTACH LIFELINE PRIOR TO COLUMN ERECTION
4. COLUMN TO BE ADEQUATELY BRACED BEFORE WORKER ASCENDS COLUMN.
5. WORKER TO BE ATTACHED TO 5/8" LIFELINE WITH A "KOMET" ROPE GRAB.
6. ONLY ONE WORKER SHALL BE ATTACHED TO EACH VERTICAL LIFELINE.

SK 7.3

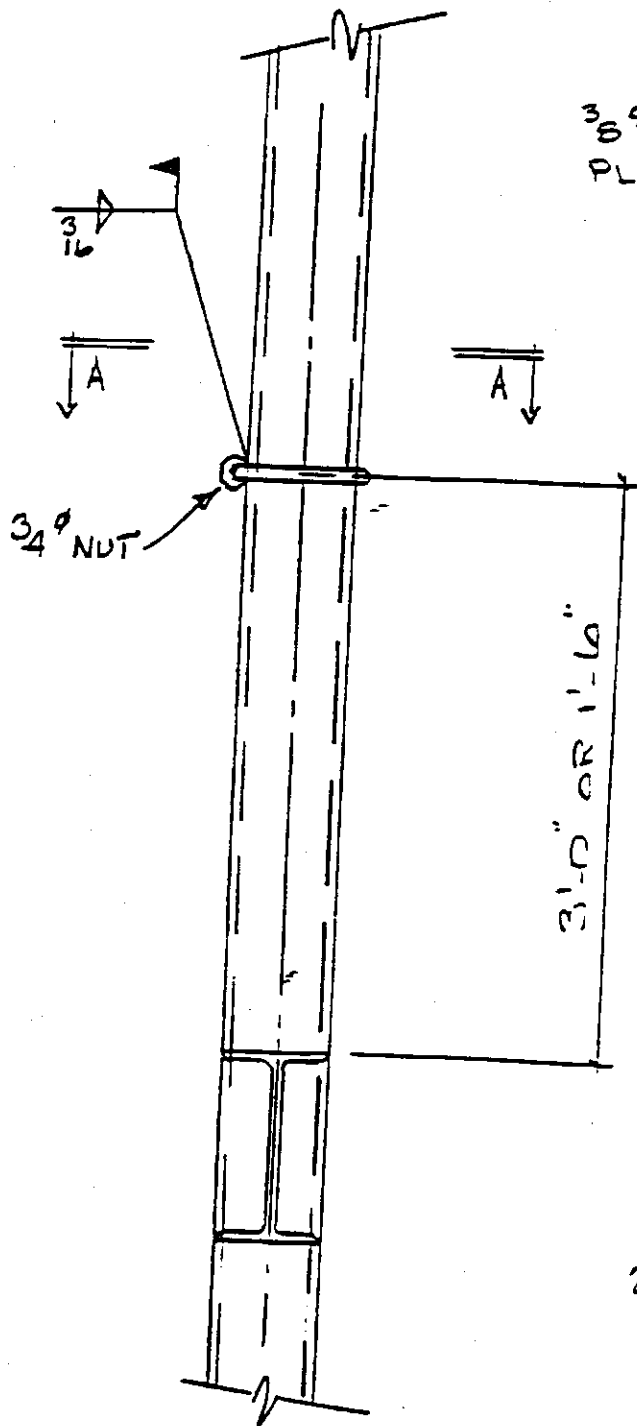


HORIZONTAL STATIC LINE AT CDL.

NOTE:

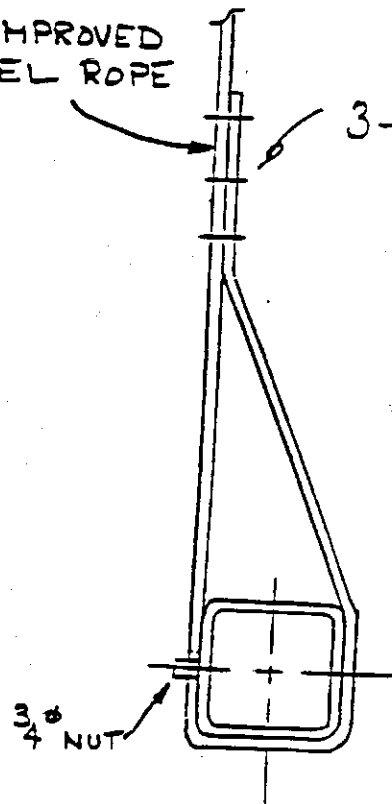
1. ERECTOR TO USE VERTICAL LIFELINE (SK #3) WHEN INSTALLING THIS SYSTEM
2. IF COL'S ARE MORE THAN 9.0 M (30'-0) APART AN INTERMEDIATE SUPPORT IS REQ'D (SEE SK #6)

SK 7.4



3/8" 7x19 IMPROVED
PLOW STEEL ROPE

3-3/8" CABLE CLIP



SECT. A-A

NOTE:

1. ERECTOR TO USE VERTICAL LIFELINE (SK # 3) WHEN INSTALLING THIS SYSTEM.
2. IF COL'S ARE MORE THAN 9.0 M. (30'-0") APART AN INTERMEDIATE SUPPORT IS REQ'D (SEE SK # 6)

HORIZONTAL STATIC LINE AT COL.

SK 7.5

PROCEDURES FOR STEEL DECK ERECTION

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INTRODUCTION

Steel deck is to be placed on supporting steel of OWSJ and or beams. The supporting steel is to be securely welded and or bolted in place so as to adequately support the bundles of deck.

PROCEDURE

1. Steel deck to be placed commencing at the starting point and perpendicular to OWSJ and or beams. For the placement of the bundles with the crane the erector is to be tied to the safety lines. The erector shall be provided with full protection as required by the regulations when exposed to a fall distance exceeding 3.5 metres.

Every reasonable effort to be made to keep the bundles at right angles with the support members and close together eg. 150 MM(6").

At no time shall materials be placed on the structure so as to overload it. Bundles should not be placed on top of one another unless specifically authorized in writing by an engineer.

2. A secured working platform shall be constructed immediately in front of the placed bundles of deck. Additional bundles of deck can then be placed on the working platform provided adequate blocking is provided so as not to damage deck of working platform. These bundles should have a safe working area of 1 metre (3 ft.) in front of them.

After the working platform has been safely welded and during the laying of deck, as described above, the erector does not have to be tied to the safety lines. However, should the erector go within 1 metre (3 ft.) Of the edge then the erector must be tied off.

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3. All roof openings that the deck erector cuts in the roof must be safety covered or must have a temporary warning rail located 1 metre (3 ft.) In from the hole on all accessible sides.
4. The safety of the roof area is the responsibility of the deck erector until he has completed the deck. Should other trades move on the deck area then the responsibility for the safety of the area is to be signed over to the constructor.
5. All loose pieces of deck or portions of broken bundles must be securely tied down at the end of every shift and whenever the wind is sufficiently strong to cause danger from

