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Date: November 6, 2001

Project No.: M3-PN01183

To: The Larson Co.
Attn: Mr. Robert Amaro
6701 S. Midvale Park Rd.

Project Name: Santa Claus/Moon Icon
Marshall Fields Dept Store

M3 IS SENDING TO YOU:

<input type="checkbox"/>	Attached	<input type="checkbox"/>	Delivered via Pick up	<input type="checkbox"/>	Under Separate Cover Via	<input type="checkbox"/>	Specifications
<input type="checkbox"/>	Shop Drawings	<input type="checkbox"/>	Prints	<input type="checkbox"/>	Sepias/Mylars	<input type="checkbox"/>	Plans
<input type="checkbox"/>	Copy of Letter	<input type="checkbox"/>	Change Order	<input type="checkbox"/>	Other	<input type="checkbox"/>	

QUANTITY

DOCUMENT NO.

REVISION

DESCRIPTION

5 each

"Sealed" Bound Structural Calculations

THESE ARE TRANSMITTED AS INDICATED BELOW:

<input type="checkbox"/>	For Information	<input type="checkbox"/>	For Review and Comment
<input type="checkbox"/>	For Approval	<input type="checkbox"/>	Approved
<input type="checkbox"/>	As Requested	<input type="checkbox"/>	Approved as Noted
<input type="checkbox"/>		<input type="checkbox"/>	

/djv

REMARKS: _____

COPY TO: M3 File

SIGNED: _____

Harry J. Lewsley, P.E.

PLEASE ACKNOWLEDGE RECEIPT OF DOCUMENTS LISTED BY SIGNING THE ATTACHED COPY AND RETURNING IT TO THE ABOVE SIGNED WITHIN ONE WEEK AFTER RECEIPT.

ACKNOWLEDGEMENT: _____

MEGN 481 Example Executive Summary for Project: Santa Clause/Moon Icon, Marshall Fields Dept. Store. (This was created by me and is not an actual executive summary provided by the consulting engineers. Rather it is being provided to show what is expected in a complete engineering package)

Date: November 6, 2001
To: The Larson Co.
Attn: Mr. Robert Amaro
6701 S. Midvale Park Rd.

Project No.: M3-Pn01183
Project Name: Santa Clause/Moon Icon
Marshall Fields Department Store

From: XXX X. XXX, P.E.
Engineers R Us.
Blah Blah Blah
Tucson, AZ 85705

Executive Summary:

Engineers R Us have been contracted by The Larson Co. to perform engineering services for two themed structural icons, one to be placed in Chicago, IL, and the other to be placed in Minneapolis MN. The icons are roughly circular, 10' in diameter, and will be placed above street level on the side of their respective buildings. The design and engineering of the Chicago icon is governed by the 1999 Chicago Building Code, while the Minneapolis icon is governed by the 1997 Unified Building Code. Engineering design/build drawings were supplied by the client. Engineering services include determination of tube steel icon armature structure, icon foam/Styrothane integrity, icon mounting plates, icon mounting structure, and icon mounting hardware to the existing buildings.

General construction:

Construction of the icons consist of a square tube steel armature which mimics the final shape and provides structural integrity. Plywood is bolted to the steel armature to act as foam backing. Expandable spray foam is then applied to the steel armature and plywood backing. Once carved to final shape, the foam is covered in Styrothane 5321. The final themed icon is then installed above ground level to the corner of their respective buildings.

Boundary Conditions:

Icons are to be mounted to existing buildings, one building is made of cast concrete, the other made of concrete and having a brick facade. Loading to include dead, live (if applicable) and 30 PSF wind load in the Chicago installation per the 1999 Chicago Building Code. Loading to include dead, live (if applicable) and 80 MPH, Exposure "B" wind load in the Minneapolis installation per the 1997 Unified Building Code

Materials:

Structural tubing: ASTM A500

Structural Piping: ASTM A53 Gr B, Type E of S

Threaded Rod: ASTM A36

Welding: E70XX

Urethane Shell: Styrothane 5321 by Futura Coatings

Findings:

- Structural steel armature to be made of ASTM A500 tube steel, 2" x 2" x 1/4"
- All welds per supplied engineering design/build drawings are acceptable
- Icon must be made of 6" thick foam core (minimum) and completely covered/sealed in 1/8" thick (minimum) Styrothane 5321.
- Mounting plates in Chicago to be made of 5 each, 6" x 18" x 1/4" thick steel, A36 or better
- Mounting plates in Minneapolis to be made of 5 each, 7" x 8" x 3/8" thick steel, A36 or better
- Attachment to existing facility to be done using 5/8"-11 UNC Grade 8 bolts, 4 places per mount, 5 mounts total. Attach to facility using stainless steel threaded inserts in HILTY HIT-HY 150.
- Mounting structure in Chicago and Minneapolis to consist of 3" diameter STD Schedule steel pipe. Mounting details on supplied drawings are acceptable.
- All safety factors were determined to be SF > 2 in all applications.

STRUCTURAL CALCULATIONS

FOR

Santa Claus/Moon Icon
Marshall Fields Dept. Store
Minneapolis, Minnesota

PREPARED FOR

The Larson Company
6701 S. Midvale Park Rd.
Tucson, AZ 85746

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota.

November 2001

Conrad E. Huse
Date 6 Nov 2001 Registration No. 14931

M3 Engineering &
Technology Corp.

M3-PN01183

3



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M3 ENGINEERING & TECHNOLOGY

PROJECT No. 01183
PROJECT MARSHALL FIELDS SANTA MONICA
SHEET No. 0 OF 2 BY RJC
DRAWING No. _____

SUBJECT: INDEX

DATE: 11/01

SUBJECT

PAGE

GENERAL INFORMATION

1

DESIGN

2-8

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota.

Conrad E. Huse
Date NOV 2001 Registration No. 14931

SUBJECT: GENERAL INFORMATION

DATE: 11/01

PROJECT DESCRIPTION

TWO LARGE URETHANE/FOAM ICONS ARE TO BE MOUNTED ON THE CORNERS OF DEPARTMENT STORES, ONE IN CHICAGO, ILLIONIS AND ANOTHER IN MINNEAPOLIS, MINN. THE CHICAGO ICON WILL BE WELDED TO A STEEL PLATE ANCHORED TO THE BUILDING CORNER. THE MINNEAPOLIS ICON WILL DIRECTLY ANCHORED TO THE CONCRETE WALL.

LOADS

CHICAGO PER 1997 CHICAGO BUILDING CODE

WIND: 30 PSF

MINNEAPOLIS PER 1997 CBC

WIND: 30 MPH, EXPOSURE "B"

MATERIAL:

STRUCTURAL TUBING: ASTM A500

STRUCTURAL PIPING: ASTM A53 GRADE C, THICKENS

THICKENED RODS: ASTM A36

WELDING: E70XX

WELDING STICKS: E70XX 5321 BY E70XX
COLUMBIA

PROJECT No. 21183
PROJECT MARSHALL FIELD SAVING KILL
SHEET No. 2 OF 8 BY U.S.
DRAWING No.

SUBJECT: *DESIGN*

DATE: 11/01

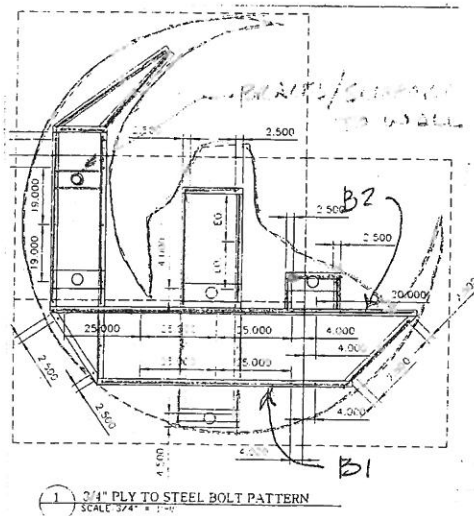
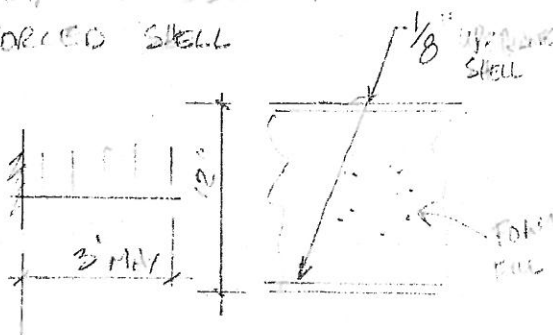
CANADA 100M

WIND LOAD

PER TABLE 16 (B-52-310)

$\phi = 30^\circ$

CHECK MAY SANDLEVER FOR
UNREINFORCED SHELL



$$M = 30 \times 3^2 / 2 = 135 \frac{1 \cdot 16}{100}$$

$$S = \frac{12(12^3 - 11.75^3)}{6 \times 12} = 17.6 \text{ in}^3$$

$$f_{b_t} = \frac{135 \times 12}{17.6} = 92 \text{ psi} \rightarrow FS = \frac{3500 \text{ psi}}{92 \text{ psi}} = 38 \text{ OK}$$

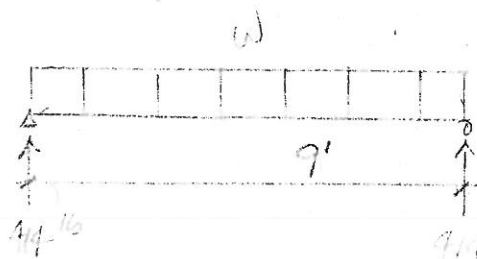
BEAM B-1 TS 2020/19

$$WC = 30 \times \frac{25^2}{2 \times 2} = 92 \text{ HP}$$

$$M = 92 \times 9^2 / 5^2 = 920^{16}$$

$$f_b = 930 \times 12 / 716 = 14,513 \text{ psi} < 40,469 \text{ psi} \quad \underline{OK}$$

USC 15 2x2x1/4



Aug. 11.

4.16

SUBJECT: DESIGN

DATE: 11/01

CHICAGO ICON

WIND LOAD

STAIN 2-2 $\rightarrow 2 \times 2 \times 1/4$

$$P = 414 \text{ lb (2-1)}$$

$$W = \frac{3}{2} \times 60 = 90 \text{ PLF}$$



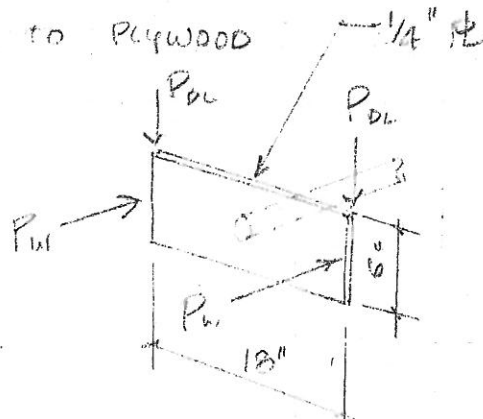
$$M = (414 \times 2) + (90 \times \frac{2^2}{2}) = 1008 \text{ lb-ft}$$

$$f_b = 1008 \times 12 / .766 = 15,791 \text{ psi} < 40,469 \text{ psi} \quad \underline{\underline{OK}}$$

PLATES CONNECTING SUPPORTS TO PLYWOOD

$$P_{DL} = \frac{600}{5 \times 2} = 60 \text{ lb}$$

$$P_W = \frac{.6 \times 11.5^2 \times \frac{1}{4} \times 30 \text{ PSF}}{5 \times 2} = 187 \text{ lb}$$



$$M_{DL} = 60 \times 9 = 540 \text{ lb-ft} \rightarrow f_b = 540 / (.25 \times 6^2 / 6) = 360 \text{ psi}$$

$$M_W = 187 \times 9 = 1683 \text{ lb-ft} \rightarrow f_b = 1683 / (.60 \times 6^2 / 6) = 2692 \text{ psi}$$

$$\frac{f_{b1}}{F_{b1}} + \frac{f_{b2}}{F_{b2}} = \frac{360}{17000} + \frac{2692}{27000} = 1.01 < 1.33 \quad \underline{\underline{OK}}$$

USE 3 - 1/4" x 6" x 18" MOUNTING PLATES

SUBJECT: DESIGN

DATE: 11/01

CHICAGO ILLINOIS

WALL BRACE / SUPPORT

$$W = \frac{6.5}{2} \times 30 \text{ PSF} = 98 \text{ PLF}$$

$$R_1 = \frac{98 \times 8^2}{2 \times 3.33} = 942 \text{ lb}$$

$$R_2 = \frac{98 (3.33^2 - 4.67^2)}{2 \times 3.33} = -158 \text{ lb}$$

$$W_D = \frac{600 \text{ lb}}{2} = 300 \text{ lb} \rightarrow \text{SAY } 400 \text{ lb}$$

$$M_{DL} = \frac{400}{2} \times 2.5 = 500 \text{ lb-ft}$$

USE 3" ϕ STD. ST. PIPE

$$f_b = \frac{500 \times 12}{1.72} = 3488 \text{ psi}$$

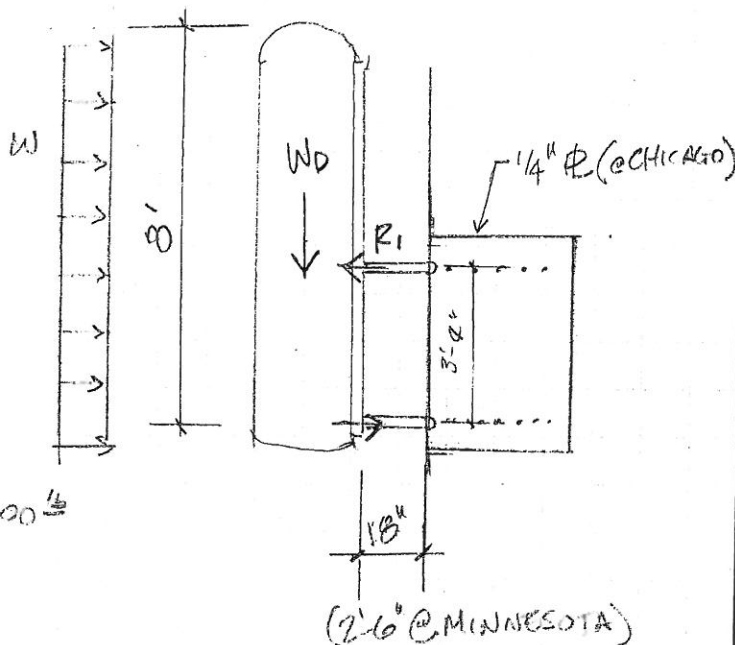
$$\frac{KL}{r} = \frac{2 \times 30}{1.16} = 52 \rightarrow P_a = 18,170 \text{ psi}$$

$$f_a = \frac{942}{2.68} = 351 \text{ psi}$$

$$f_b / P_a = \frac{351}{18170} = .02$$

$$f_b / P_a + f_c / P_c = .02 + \frac{3488}{18170} = 0.17 < 1.33 \text{ OK}$$

USE 3" ϕ STD. ST. PIPE



SUBJECT: DESIGN

DATE: 11/01

CHICAGO ICON

LEFT WALL BRACE/SUPPORT

$$W = 2 \times 30 = 60 \text{ PLF}$$

$$R_1 = \frac{60 \times 7.5^2}{2 \times 7} = 422 \text{ lb}$$

$$C = \frac{422}{\sin 40^\circ} = 656 \text{ lb} \rightarrow \text{say } 800 \text{ lb}$$

$$W_D = 400 \text{ lb}$$

$$M_{DL} = 400 \times 3.6 = 1440 \text{ lb-ft}$$

TRY 3" ϕ STD. STEEL PIPE

$$f_b = 1440 \times 12 / 1.72 = 10,047 \text{ psi}$$

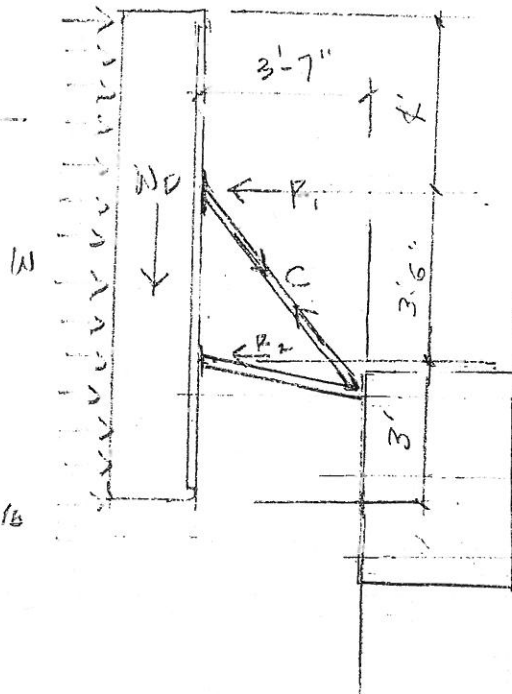
$$\frac{KL}{r} = \frac{2 \times 5.6 \times 12}{1.616} = 116 \rightarrow F_a = 10850 \text{ psi}$$

$$f_a = 800 / 2.23 = 359 \text{ psi}$$

$$f_a / F_a = 359 / 10850 = 0.033$$

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} = 0.033 + \frac{10047}{72500} = 0.47 < 1.33 \text{ OK}$$

USE 3" ϕ STD. STEEL PIPE



SUBJECT: DESIGN

DATE: 11/01

CHECK STRESS ON CANTILEVERED URETHANE FORM SECTION WITHOUT PLYWOOD:

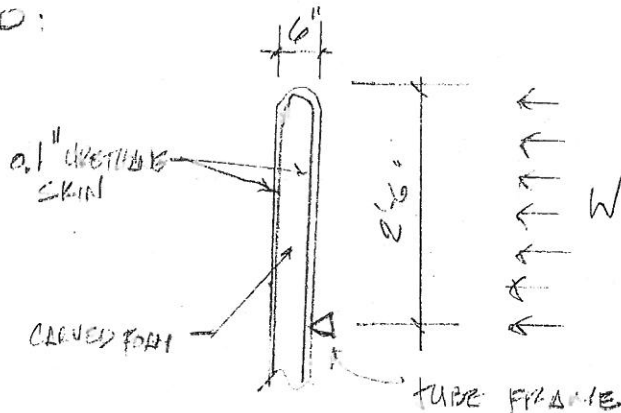
$$S = \frac{12(6^3 - 5.8^3)}{6 \times 6} = 7.14$$

$$W = 30 \text{ PLF}$$

$$M = 30 \times 2.5^2 / 2 = 94 \text{ ft-lb}$$

$$f_b = 94 \times 12 / 7 = 161 \text{ psi}$$

$$FS_{\text{tension}} = \frac{3500}{161} = 22 > 4 \quad \underline{\underline{OK}}$$



1/8" STYROPLANE 5321 OVER
 6" FORM CORE OK TO CANTILEVER
 UP TO 2'6" FOR 30PSF WIND LOAD

SUBJECT: DESIGN

DATE: 11/01

MINNEAPOLIS ICON

WIND LOAD PER 1997 UBC.
 80 MPH, EXPOSURE B
 HT = 50'

$$P = C_e C_g I q_s$$

$$= 0.9 \times 1.4 \times 1 \times 16.4 = 20.7 \text{ PSF} < 30 \text{ PSF}$$

← USE FOR BOLT CONNECTION.

CHICAGO WIND LOAD GOVERNS, THEREFORE
 ICON OR FOR MINNEAPOLIS WIND LOAD
 OR 80 MPH, EXP. B (PER 1997 UBC)
 SAME DEAD LOAD AS CHICAGO ICON

CONNECTION PLATE FOR BRACE/SUPPORT.

$$M = 1440 \text{ lb DL}$$

$$T = 800 \text{ lb W}$$

$$V = 400 \text{ lb DL}$$

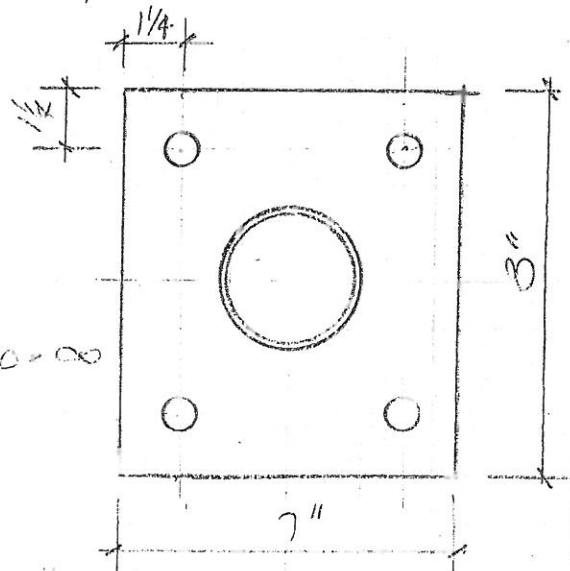
TRY - 4 - $\frac{7}{8}$ " ϕ BOLTS, $SP = 4.5$ ", $EO = \infty$
 IN THREADED INSERTS

SET 5" INTO EXIST'G CONG. WALL
 w/ 14"11 HT 11"150

$$t/\text{anchor} = \frac{300}{4} + \frac{1440(12)}{2 \times 5.3} = 1771 \text{ lb}$$

$$11/\text{anchor} = \frac{900}{9} = 100 \text{ lb}$$

$$\frac{t}{F} + \frac{11}{V} = \frac{1771}{.8 \times 4872} + \frac{100}{.8 \times 9000} = 0.49 < 1.00 \text{ OK}$$



USE $\frac{5}{8}$ " ϕ BOLTS IN
 SS THD. INSERTS IN
 14"11 HT 11"150

M3 ENGINEERING & TECHNOLOGY

PROJECT No. 01183

PROJECT HAVERHILL FIELDS SANTA 1001

SHEET No. 8 OF 8 BY U.S.L.

DRAWING No. _____

SUBJECT: DESIGN

DATE: 11/01

HAVERHILL FIELDS 1001 (CONT)

MOUNTING PLATE FOR BRACE/SUPPORT

PLATE THICKNESS

$$M_E = 2 \times 1771 \times 2.25/2 = 3985 \text{ " - lb}$$

$$t_E = \sqrt{\frac{6 \times 3985}{27000 \times 7}} = 0.36"$$

USE: PL 3/8" x 8" x 0'-7"

