

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK

# CITY OF PORTLAND

BUILDING INSPECTION

## PERMIT

Please Read Application And Notes, If Any, Attached

PERMIT ISSUED  
Permit Number: 050598  
JUN 17 2005  
CITY OF PORTLAND

This is to certify that City Of Portland/E & D Specialty Stands  
has permission to Install Bleacher Stands in Memorial Field  
AT 404 Stevens Ave 175 B002001

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statutes of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of buildings and structures, and of the application on file in this department.

Apply to Public Works for street line and grade if nature of work requires such information.

Notification of inspection must be given and written permission procured before this building or part thereof is altered or closed-in. **HEAR NOTICE IS REQUIRED.**

A certificate of occupancy must be procured by owner before this building or part thereof is occupied.

**OTHER REQUIRED APPROVALS**

Fire Dept. Capt. Corey Cross #48 6-6  
Health Dept. \_\_\_\_\_  
Appeal Board \_\_\_\_\_  
Other \_\_\_\_\_  
Department Name

*[Signature]*  
Director - Building & Inspection Services

**PENALTY FOR REMOVING THIS CARD**

**City of Portland, Maine - Building or Use Permit Application**

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 05-0598	Issue Date: <b>PERMIT ISSUED</b> JUN 17 2005	CDL: 781-G-1 175-1002001
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<b>Location of Construction:</b> 404 Stevens Ave <i>Lebanon St</i>	<b>Owner Name:</b> City Of Portland	<b>Owner Address:</b> 389 Congress St	<b>Phone:</b>
<b>Business Name:</b> <i>fuca</i>	<b>Contractor Name:</b> E & D Specialty Stands Inc.	<b>Contractor Address:</b> Portland	<b>Phone:</b>
<b>Lessee/Buyer's Name</b>	<b>Phone:</b>	<b>Permit Type:</b> Additions - Commercial	<b>Zone:</b> <i>ROS</i>
<b>Past Use:</b> Commercial	<b>Proposed Use:</b> Commercial Install Bleacher Stands in Memorial Field	<b>Permit Fee:</b> \$2,847.00	<b>Cost of Work:</b> \$313,905.00
<b>Proposed Project Description:</b> Install Bleacher Stands in Memorial Field		<b>FIRE DEPT:</b> <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Denied <i>with condition</i>	<b>INSPECTION:</b> Use Group: <i>A5</i> Type: <i>2B</i> <i>6/15/05</i>
		Signature: <i>Capt Greg Cross</i>	Signature: <i>[Signature]</i>
<b>PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)</b>			
Action: <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied			
		Signature:	Date:

<b>Permit Taken By:</b> dmartin	<b>Date Applied For:</b> 05/18/2005	<b>Zoning Approval</b>		
<ol style="list-style-type: none"> <li>This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.</li> <li>Building permits do not include plumbing, septic or electrical work.</li> <li>Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work..</li> </ol>	<b>Special Zone or Reviews</b> <input type="checkbox"/> Shoreland <input type="checkbox"/> Wetland <input type="checkbox"/> Flood Zone <input type="checkbox"/> Subdivision <input checked="" type="checkbox"/> Site Plan <i>plans has</i> Maj <input type="checkbox"/> Minor <input type="checkbox"/> MM <input type="checkbox"/> Date: <i>6/6/05</i>	<b>Zoning Appeal</b> <input type="checkbox"/> Variance <input type="checkbox"/> Miscellaneous <input type="checkbox"/> Conditional Use <input type="checkbox"/> Interpretation <input type="checkbox"/> Approved <input type="checkbox"/> Denied Date:	<b>Historic Preservation</b> <input checked="" type="checkbox"/> Not in District or Landmark <input type="checkbox"/> Does Not Require Review <input type="checkbox"/> Requires Review <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied Date:	
				<i>9</i>

**CERTIFICATION**

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT	ADDRESS	DATE	PHONE
RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE	DATE	PHONE	

**City of Portland, Maine - Building or Use Permit**

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No:	05-0598
Date Applied For:	05/18/2005
CBL:	181 g001

Location of Construction:	404 Stevens Ave/ Leland St	Owner Name:	City Of Portland
Business Name:	E & D Specialty Stands Inc.	Contractor Name:	E & D Specialty Stands Inc.
Lessee/Buyer's Name		Contractor Address:	Portland
		Contractor Address:	389 Congress St
		Phone:	
		Permit Type:	Additions - Commercial

Proposed Use:	Commercial Install Bleacher Stands in Memorial Field
Proposed Project Description:	Install Bleacher Stands in Memorial Field

**Dept:** Zoning      **Status:** Approved      **Reviewer:** Marge Schmuckal      **Approval Date:** 06/06/2005  
**Note:** 5/19/05 actually on hold - no site plan attached - talked to Tim G. - also needs to apply for site plan review -  **Ok to Issue:**  
 in my hold area  
 5/24/05 I received a site plan - planning has site plan application

**Dept:** Building      **Status:** Approved with Conditions      **Reviewer:** Mike Nugent      **Approval Date:** 06/15/2005  
**Note:** 1) The ladder access to the roof is still under discussion. This permit includes the remainder of the project  
 **Ok to Issue:**

**Dept:** Fire      **Status:** Approved with Conditions      **Reviewer:** Cptn Greg Cass      **Approval Date:** 06/06/2005  
**Note:** 1) To comply with NPFA 101, chapter 13.4.8 Grandstands.  
 **Ok to Issue:**

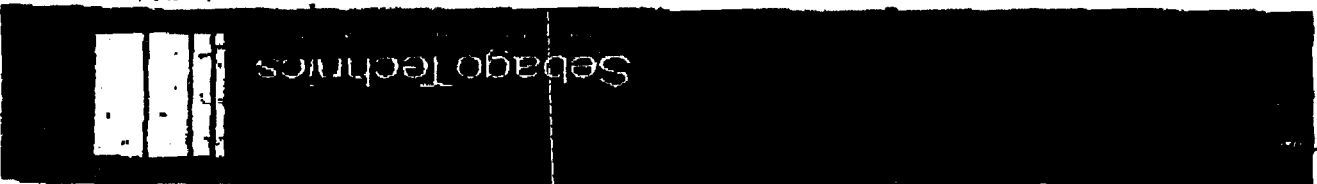
**APPENDUM #3**  
**CITY OF PORTLAND, MAINE**  
**Furnish and Install Bleachers at Memorial Field**  
**RFP #3505**

**DATE: December 1, 2004**

Please note the following responses to questions we have received regarding the City of Portland's RFP # 3505 -- **Furnish and Install Bleachers at Memorial Field.**

1 ) We received the soil report for Memorial Field and were wondering if someone could review the soil boring and come up with a recommended soil pressure (PSF).

*See Attached.*



One Cambridge  
 P.O. Box 1368  
 Westbrook, Maine  
 04095-1368  
 PH: 207-856-0277  
 Fax: 207-856-1206

**MEMORANDUM**

To: Chris Dildareo  
 From: Ken Recker  
 Date: December 3, 2004  
 Subject: Allowable Bearing Stress  
 Memorial Field, Portland, Maine

*TO: JEP*  
*SWCL/VAW*

This memorandum presents our recommendation for allowable bearing stress for new foundation foundations.

In summary, we recommend that the new grandstands be supported on spread footings bearing on the undisturbed, naturally deposited sand, or on compacted structural fill placed after removal of unsuitable soil.

Introduction

Memorial Field is located at the northwest corner of the intersection of Ludlow and Leland Streets in Portland, Maine. The field presently consists of a grassed multi-use field, gravel track, and grandstands. Results of our subsurface investigation are presented in our memorandum dated November 29, 2004.

Discussion

The undisturbed, naturally deposited sand encountered at the site is generally medium dense with Standard Penetration Resistance "N" values varying from approximately 8 to 75. In our opinion, the grandstands may be supported on the undisturbed, naturally deposited sand, or on compacted structural fill placed after removal of unsuitable soils.

Footings should be proportioned for an allowable bearing stress in pounds per square foot (psf) equal to 1,000 multiplied by the tank lateral dimension of the footing in feet up to a maximum of 3,000 psf. All footings should be at least 1.5 feet wide.

Footings should be founded a minimum of 4.5 feet below the lowest adjacent ground surface exposed to freezing.

KLR:km/jc



**E & D SPECIALTY STANDS, INC.**  
MANUFACTURERS OF QUALITY STANDS AND SEATING  
2081 FRANKLIN STREET - P.O. BOX 700 - NORTH COLLINS, NEW YORK 14111  
716-337-0161 - 1-800-525-8515  
FAX 716-337-2903 - SALES FAX 716-337-3436

**FAX TRANSMITTAL COVER SHEET**

**DATE:** June 13, 2005  
**PAGES:** 22 (Including Cover)  
**TO:** Mike Nugent - Enforcement Officer  
**AT:** City of Portland  
**FAX #:** (207) 756-8090  
**FROM:** Gerry Sullivan  
Professional Engineer  
E & D Specialty Stands, Inc.

**RE: Memorial Field - Portland, ME**

Please review the **attached** Memorandum from Ken Recker and the 2002 ICC-300 standards.

Call me with any questions

(The page numbers that are **missing from the standards** were actually **blank.**)

(05-1013-L1/12)

# All Purpose Building Permit Application

If you or the property owner owes real estate or personal property taxes or user charges on any property within the City, payment arrangements must be made before permits of any kind are accepted.

Location/Address of Construction: <u>MEMORIAL FIELD, DEERING HIGH SCHOOL</u>		
Total Square Footage of Proposed Structure <u>6500SF (HOME) , 4500SF (VISITOR)</u>	Square Footage of Lot <u>UNKNOWN</u>	
Tax Assessor's Chart, Block & Lot Chart# <u>175</u> Block# <u>B</u> Lot# <u>002</u>	Owner: <u>CITY OF PORTLAND, PARKS</u>	Telephone: <u>207-874-8793</u>
Lessee/Buyer's Name (if Applicable) <u>MATT FITZGERALD</u>	Applicant name, address & telephone: <u>E &amp; D SPECIALTY STANDS, INC. 2081 FRANKLIN STREET</u>	Cost Of Work: \$ <u>313,905</u> Fee: \$
Current use: <u>UNKNOWN</u>	<u>NORTH COLLINS, NY 14111</u> <u>716-337-0161</u>	
If the location is currently vacant; what was prior use: <u>UNKNOWN</u>		
Approximately how long has it been vacant: <u>UNKNOWN</u>		
Proposed use: <u>BLEACHERS (HOME AND VISITOR)</u>		
Project description:		
<div style="border: 2px solid black; padding: 5px; display: inline-block;"> <p style="text-align: center; margin: 0;">DEPT. OF BUILDING INSPECTION CITY OF PORTLAND, ME</p> <p style="text-align: center; font-size: 1.2em; margin: 5px 0;">MAY 16 2005</p> <p style="text-align: center; font-size: 1.5em; margin: 0;">RECEIVED</p> </div>		
Contractor's name, address & telephone: <u>E &amp; D SPECIALTY STANDS, INC , 2081 FRANKLIN ST. NORTH COLLINS, NEW YORK 14111</u>		
Who should we contact when the permit is ready: <u>GERALD P. SULLIVAN, PE</u>		
Mailing address: <u>E &amp; D SPECIALTY STANDS, INC 2081 FRANKLIN ST NORTH COLLINS, NEW YORK, 14111</u>		
We will contact you by phone when the permit is ready. You must come in and pick up the permit and review the requirements before starting any work, with a Plan Reviewer. A stop work order will be issued and a \$100.00 fee if any work starts before the permit is picked up. <b>PHONE: 716-337-0161</b>		

**IF THE REQUIRED INFORMATION IS NOT INCLUDED IN THE SUBMISSIONS THE PERMIT WILL BE AUTOMATICALLY DENIED AT THE DISCRETION OF THE BUILDING/PLANNING DEPARTMENT, WE MAY REQUIRE ADDITIONAL INFORMATION IN ORDER TO APPROVE THIS PERMIT.**

*I hereby certify that I am the Owner of record of the named property, or that the owner of record authorizes the proposed work and that I have been authorized by the owner to make this application as his/her authorized agent. I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in this application is issued, I certify that the Code Official's authorized representative shall have the authority to enter all areas covered by this permit at any reasonable hour to enforce the provisions of the codes applicable to this permit.*

Signature of applicant: Gerald P. Sullivan Date: 5/13/05

**This is NOT a permit, you may not commence ANY work until the permit is Issued, If you are in a Historic District you may be subject to additional permitting and fees with the Planning Department on the 4th floor of City Hall**



CITY OF PORTLAND  
 BUILDING CODE CERTIFICATE  
 389 Congress St., Room 315  
 Portland, Maine 04101

ACCESSIBILITY CERTIFICATE

Designer: E & D SPECIALTY STANDS, INC.

Address of Project: PORTLAND, MAINE DEERING HIGH SCHOOL

Nature of Project: MEMORIAL FIELDS

The technical submissions covering the proposed construction work as described above have been designed in compliance with applicable referenced standards found in the Maine Human Rights Law and Federal Americans with Disability Act.

Signature: Gerald P. Sullivan

Title: ENGINEER

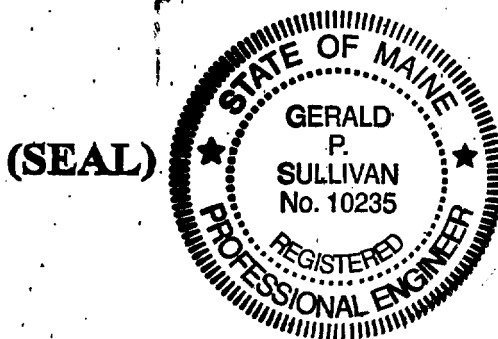
Firm: E & D SPECIALTY STANDS, INC.

Address: 2081 FRANKLIN ST.

NORTH COLLINS, NEW YORK 14111.

Phone: 716-337-0161.

1-800-525-8575



**NOTE: If this project is a new Multi Family Structure of 4 units or more, this project must also be designed in compliance with the Federal Fair Housing Act. On a separate submission, please explain in narrative form the method of compliance.**





CITY OF PORTLAND  
 BUILDING CODE CERTIFICATE  
 389 Congress St., Room 315  
 Portland, Maine 04 101

TO: Inspector of Buildings City of Portland, Maine  
 Department of Planning & Urban Development  
 Division of Housing & Community Service

FROM: E&D SPECIALTY STANDS, INC.

RE: Certificate of Design

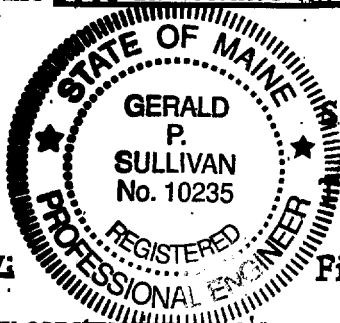
DATE: 5/13/05

These plans and/ or specifications covering construction work on:

GRANDSTANDS AT MEMORIAL FIELDS AT  
DEERING HIGH SCHOOL

Have been designed and drawn up by the undersigned, a Maine registered Architect / Engineer according to the 2003 International Building Code and local amendments.

(SEAL)



Signature: Gerald P. Sullivan

Title: ENGINEER

Firm: E&D SPECIALTY STANDS, INC.

Address: 2081 FRANKLIN ST.  
NORTH COLLINS, NEW YORK  
14111

As per Maine State Law:

\$50,000.00 or more in new construction, repair expansion, addition, or modification for Building or Structures, shall be prepared by a registered design Professional.

FROM DESIGNER: E & O SPECIALTY STANDS, INC. (GERALD P. SULLIVAN)

DATE: 5/13/05

Job Name: MEMORIAL FIELDS

Address of Construction: DEERING HIGH SCHOOL (CORNER LEE LANO & LUDLOW)

**2003 International Building Code**

Construction project was designed according to the building code criteria listed below:

Building Code and Year IBC 2003 Use Group Classification(s) ASSEMBLY - 5

Type of Construction 2B

Will the Structure have a Fire suppression system in Accordance with Section 903.3.1 of the 2003 IRC NO

Is the Structure mixed use? NO if yes, separated or non separated (see Section 302.3) -

Supervisory alarm system? NO Geotechnical/Soils report required? ( See Section 1802.2) YES - SEE CALC'S

**STRUCTURAL DESIGN CALCULATIONS**

2 COPIES submitted for all structural members (102.7, 102.7.1)

**DESIGN LOADS ON CONSTRUCTION DOCUMENTS (1803)**

Uniformly distributed floor live loads (7603.11, 1807)

Floor Area Use	Loads Shown
<u>ASSEMBLY</u>	<u>100 PSF</u>
_____	_____
_____	_____
_____	_____

**Wind loads (1803.1.4, 1806)**

<u>1</u>	Design option utilized (1803.1.1, 1803.3)
<u>100</u>	Basic wind speed (1803.3)
<u>1.15</u>	Building category and wind importance factor, $I_w$ (Table 1804.5, 1803.5)
<u>C</u>	Wind exposure category (1803.4)
<u>0.55</u>	Internal pressure coefficient (ASCE 7)
<u>N/A</u>	Component and cladding pressures (1803.1.1, 1803.5.2.2)
<u>30 PSF</u>	Main force wind pressures (7603.1.1, 1803.5.2.1)

**Earthquake design data (1803.7.5, 1814 - 1823)**

<u>1</u>	Design option utilized (1814.1)
<u>II</u>	Seismic use group ("Category") (Table 1804.5, 1816.2)
<u>0.32, 0.16</u>	Spectral response coefficients, $S_{DS}$ & $S_{D1}$ (1815.1)
<u>D (ASSUME)</u>	Site class (1815.1.5)

(BASED ON SOIL)

25%

Live load reduction (1803.1.1, 1807.8, 1807.10)

N/A

Roof live loads (1803.1.2, 1807.11)

Roof snow loads (7603.7.3, 1808)

60 PSF

Ground snow load,  $P_g$  (1803.2)

N/A

If  $P_g > 10$  psf, flat-roof snow load,  $P_f$  (1803.5)

N/A

If  $P_g > 10$  psf, snow exposure factor,  $C_e$  (Table 1803.3.1)

N/A

If  $P_g > 10$  psf, snow load importance factor,  $I_s$  (Table 1804.5)

N/A

Roof thermal factor,  $C_t$  (Table 1803.3.2)

N/A

Sloped roof snowload,  $P_s$  (1803.4)

C

Seismic design category (1816.3)

2 D

Basic seismic-force-resisting system (Table 1817.2.2)

5, 4 1/2

Response modification coefficient,  $R$ , and deflection amplification factor,  $C_d$  (Table 1817.2.3)

SIMPLIFIED

Analysis procedure (1816.5, 1817.5)

300#

Design base shear (1817A, 1817.5.1)

**Flood loads (1803.1.6, 1812)**

N/A

Flood hazard area (1812.3)

N/A

Elevation of structure

**Other loads**

200#

Concentrated loads (1807A) (RAIL POST

Partition loads (1807.5) MIN)

Impact loads (1807.8)

50 PLF

Misc. loads (Table 1807.8, 1807.8.1, 1807.7, 1807.12, 1807.13, 1810, 1811, 1804)

(RAIL POST UNIFORM LOAD)

## CHAPTER 4

## EGRESS

## SECTION 401

## GENERAL

491.1 **General.** The means of egress for new bleachers, folding and telescopic seating, and grandstands shall comply with this chapter.

## SECTION 402

## TRAVEL

402.1 **Travel.** Travel within tiered seating shall be considered exit access. Exit access includes aisles, crosswalks, vomitories, tunnels, stairs and sloped or level ramps connecting the tiered seating structure to other portions of a building, structure or grade.

SECTION 403  
OCCUPANT LOAD

403.1 **Occupant load.** Where bench seating is used, the number of persons shall be based on one person for each 18 inches (457 mm) of length of the bench. Where individual seats are provided, the occupant load shall be based on one person per seat. The occupant load of reviewing stands and press boxes shall be based on 5 square feet (0.465 m<sup>2</sup>) per person for standing space and 7 square feet (0.65 m<sup>2</sup>) per person for movable chair seating space. The occupant load for security, audio and camera platforms shall be based on the actual number of occupants.

SECTION 404  
GENERAL MEANS OF EGRESS

404.1 **Minimum number of exits.** The minimum number of exits shall be provided from the seating area based on the following occupant loads and in accordance with the calculated width requirement for egress capacity in Section 404.5.

OCCUPANT LOAD	REQUIRED MEANS OF EGRESS
0-250	1
251-750	2
751- 2,500	3
Over 2,500	4

404.2 **Room or space means of egress.** Rooms or spaces in which tiered seating is located shall be provided with the required means of egress in accordance with the building code.

404.3 **Exterior installations.** For exterior installations where the means of egress converges, a minimum of two egress paths shall be provided, sized to accommodate the occupant load served. Where the exit discharge does not lead directly to a street or public way, it shall lead to an area of refuge sized to contain the full capacity and located a minimum of 50 feet (15 240 mm) from the structure.

404.4 **Travel distance.** For installations located inside a building, the travel distance from each seat to an exit shall comply with the building code. For exterior installations, the travel distance from each seat to the perimeter of the seating structure shall not exceed 400 feet (122 m). Where aisles are provided for seating, the distance shall be measured along the aisles and aisle accessway without travel over or on the seats.

404.5 **Required width.** The clear width of aisles and other means of egress for indoor smoke-protected assembly seating shall comply with Table 404.5(1). The clear width of aisles and other means of egress for indoor assembly seating that is not smoke protected shall comply with Table 404.5(2). The clear width of aisles and other means of egress for outdoor smoke-protected assembly seating shall comply with Table 404.5(3).

Aisles shall also comply with Section 405. The clear width shall be measured to walls, edges of seating and tread edges except for permitted projections. There shall be no obstructions in the required width of aisles except for handrails as provided in Section 409.7.

SECTION 405  
AISLES

405.1 **Aisles.** The minimum width of aisles shall be in accordance with Section 404.5, but not less than that required by this section. An aisle is not required in seating facilities where all of the following conditions exist:

1. Seats are without backrests.
2. The rise from row to row does not exceed 6 inches (152 mm) per row.
3. The row spacing does not exceed 28 inches (711 mm) unless the seat boards and foot boards are at the same elevation.
4. The number of rows does not exceed 16 rows in height.
5. The first seating board is not more than 12 inches (305 mm) above the ground or floor below or a cross aisle.
6. Seat boards have a continuous flat surface.
7. Seat boards provide a walking surface with a minimum width of 11 inches (279 mm).
8. Egress from seating is not restricted by rails, guards or other obstructions.

ICC STANDARD ON BLEACHERS, FOLDING AND TELESCOPIC SEATING, AND GRANDSTANDS

e

1. Thirty-six inches (914 mm) where the aisle does not serve more than 50 seats.
2. Thirty inches (762 mm) where the aisle does not serve more than 14 seats.
3. Thirty-six inches (914 mm) for level or ramped aisles having seating on only one side.
4. Exception: Thirty inches (762 mm) where the aisle does not serve more than 14 seats.

1. Forty-eight inches (1219 mm) for a stepped aisle having seating on each side.
2. Exception: Thirty-six inches (914 mm) where the aisle does not serve more than 50 seats.
3. Thirty-six inches (914 mm) for a stepped aisle having seating on only one side.
4. Twenty-three inches (584 mm) between an aisle stair handrail or guard and seating where the aisle has a mid-aisle handrail.

405.2 Minimum aisle width. The minimum clear width of aisles shall be as follows.

TABLE 405.2 (a)

INCHES OF CLEAR WIDTH OF MEANS OF EGRESS PER SEAT SERVED

TOTAL NUMBER OF SEATS IN THE ASSEMBLY	Stairs and aisle steps		Ramps, cross aisles, corridors, tunnels, vomitories	
	Portions with handrails within 30 inches	Portions without handrails within 30 inches	With level routes or ramps not steeper than 1:12 slope	With ramped routes steeper than 1:12 slope
25,000 or more	0.060	0.075	0.044	0.048
15,001 to 24,999	0.076	0.095	0.056	0.060
15,000 and less	0.080	0.080	0.060	0.060

1 inch = 25.4 mm. Interpolation is permitted between specific values shown.

TABLE 405.2 (b)

INCHES OF CLEAR WIDTH OF MEANS OF EGRESS PER SEAT SERVED

TOTAL NUMBER OF SEATS IN THE ASSEMBLY	Stairs and aisle steps		Ramps, cross aisles, corridors, tunnels, vomitories	
	Portions with handrails within 30 inches	Portions without handrails within 30 inches	With level routes or ramps not steeper than 1:12 slope	With ramped routes steeper than 1:12 slope
15,001 to 24,999	0.375	0.375	0.2	0.22
15,000 and less	0.3	0.3	0.2	0.22

1 inch = 25.4 mm. Values in the table are applicable to steps with riser heights of 7 inches and below. Add 0.005 inch of additional stair width for each occupant for a total of 0.10 inch of riser height above 7 inches.

TABLE 405.2 (c)

INCHES OF CLEAR WIDTH OF MEANS OF EGRESS PER SEAT SERVED

TOTAL NUMBER OF SEATS IN THE ASSEMBLY	Stairs and aisle steps		Ramps, cross aisles, corridors, tunnels, vomitories	
	Portions with handrails within 30 inches	Portions without handrails within 30 inches	With level routes or ramps not steeper than 1:12 slope	With ramped routes steeper than 1:12 slope
750 or more	0.300	0.375	0.200	0.220
501 to 749	0.300	0.250	0.150	0.165
251 to 500	0.300	0.163	0.100	0.110
101 to 250	0.130	0.130	0.070	0.077
51 to 100	0.096	0.120	0.056	0.062
26 to 50	0.076	0.095	0.044	0.048
1 to 25	0.060	0.075	0.044	0.048

1 inch = 25.4 mm. Interpolation is permitted between specific values shown.

EGRESS

405.2

405.3 - 407.1

EGRESS

6. Twenty-three inches (584 mm) between an aisle stair handrail and seating where an aisle does not serve more than five rows on one side.

405.3 Aisle width. The aisle width shall provide sufficient egress capacity for the number of persons accommodated by the catchment area served by the aisle in accordance with Section 404.5. The catchment area served by an aisle is that portion of the total space that is served by that section of the aisle. In establishing catchment areas, the assumption shall be made that there is a balanced use of all means of egress, with the number of persons in proportion to egress capacity.

405.4 Converging aisles. Where aisles converge to form a single path shall not be less than the combined required capacity of the converging aisles.

405.5 Uniform width. Those portions of aisles, where egress is possible in either of two directions, shall be uniform in required width.

405.6 Dead ends. The length of a dead-end aisle shall not exceed 16 rows in nonsmoke-protected assembly seating and 21 rows in smoke-protected assembly seating.

Exceptions: Dead-end aisles terminating at a cross aisle or doorway providing access to an exit at only one end and complying with any one of the following shall be permitted.

1. In nonsmoke-protected assembly seating, dead-end aisles exceeding 16 rows are permitted where seats beyond the 16th row are no more than 24 seats from another aisle, measured along a row of seats having an aisle accessway with a minimum clear width of 12 inches (305 mm) plus 0.6 inch (15.2 mm) for each additional diagonal seat beyond seven in the row.

2. For smoke-protected seating, dead-end aisles exceeding 21 rows are permitted where seats beyond the 21st row are no more than 40 seats from another aisle, measured along a row of seats having an aisle accessway with a minimum clear width of 12 inches (305 mm) plus 0.3 inch (7.6 mm) for each additional seat beyond seven in the row.

405.6.1 Dead-end cross aisles. Dead-end cross aisles shall not exceed 20 feet (6096 mm).

SECTION 406 AISLE STAIRS

406.1 Treads and risers. Aisle stairs shall consist of a series of treads and risers that extend across the full width of the aisle. Aisle stairs shall be constructed in accordance with the requirements of this section.

406.2 Tread depth. Tread depth shall be a minimum of 11 inches (279 mm). The tolerance between adjacent treads shall not exceed 0.188 inch (4.8 mm).

406.3 Tread construction. Treads constructed of more than two elements shall not have a gap of more than 0.25 inch (6.4 mm) between adjacent treads. Treads constructed of grating shall not permit a sphere of 0.25 inch (6.4 mm) in diameter to pass through.

ICC STANDARD ON BLEACHERS, FOLDING AND TELESCOPIC SEATING, AND GRANDSTANDS

406.4 Riser height. Riser height shall be not less than 4 inches (102 mm) nor more than 8 inches (203 mm).

Exception: Riser height not exceeding 9 inches (229 mm) shall be permitted where necessitated by the slope of the adjacent seating areas to maintain sightlines.

406.5 Riser construction. Risers shall be of solid construction.

Exceptions:

1. Openings in risers are permitted provided the opening does not exceed 0.5 inches (12.7 mm) in height and width.

2. Solid risers are not required in telescopic and folding seating where necessary to maintain opening and closing operational clearances.

406.6 Dimensional uniformity. Stair treads and risers shall be of uniform size and shape. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 0.375 inch (9.5 mm) in any flight of stairs.

Exception: Treads and risers in transition areas and parallel seating configurations in accordance with Section 406.6.1.

406.6.1 Tread and riser nonuniformity permitted. Treads and risers located in transition areas between adjacent tiered seating elements, parabolic seating configurations or onto or off of tiered seating are not required to be of uniform depth or height where a mid-aisle handrail is provided. The handrail shall meet the requirements of Section 409. Mid-aisle handrails in transition areas shall extend the full length of the transition and a minimum of one tread depth, parallel to the run of the stairs, above and below the uppermost and lowermost riser in the transition. Where extensions of the aisle handrail interfere with adjacent means of egress, the handrail extension shall terminate at the riser.

406.6.2 Tread marking stripe. Where tread or riser nonuniformity exceeds 0.188 inch (4.8 mm), a distinctive marking stripe shall be provided on each tread adjacent to the nonuniform tread or riser. The marking shall be provided on each tread at the nosing or leading edge such that the location of each tread is readily apparent when viewed in descent. Such stripe shall be a minimum of 1 inch (25 mm) wide and a maximum of 3 inches (76 mm) wide.

Exception: The contrasting marking stripe is permitted to be omitted where tread surfaces are such that the location of each tread is readily apparent when viewed in descent. Where bleacher-type seating is utilized, such seats shall be a minimum depth of 9 inches (229 mm).

SECTION 407 AISLE ACCESSWAYS

407.1 Required aisle accessways. Aisle accessways shall be provided above the first row of seating. Aisle accessways located more than 30 inches (762 mm) above the floor or ground below shall be constructed such that openings shall not allow the passage of a sphere greater than 4 inches (102 mm) in diameter. Where bleacher-type seating is utilized, such seats shall be a minimum depth of 9 inches (229 mm).

407.2 - 408.1

EGRESS

**407.2 Minimum width.** Where seating rows have 14 or fewer seats, the minimum clear aisle accessway width shall not be less than 12 inches (305 mm) measured as the clear horizontal distance from the back of the row ahead and the nearest projection of the row behind. Where chairs have automatic or self-rising seats, the measurement shall be made with seats in the raised position. Where any chair in the row does not have an automatic or self-rising seat, the measurements shall be made with the seat in the down position. For seats with folding tablet arms, row spacing shall be determined with the tablet arm down.

**407.3 Dual access.** For rows of seating served by aisles or doorways at both ends, there shall not be more than 100 seats per row. The minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.3 inch (7.6 mm) for every additional seat beyond 14, but the minimum clear width is not required to exceed 22 inches (559 mm).

**Exceptions:**

1. For smoke-protected assembly seating, the row length limits for a 12-inch-wide (305 mm) aisle accessway, beyond which the aisle accessway minimum clear width shall be increased in accordance with Section 407.5.
2. Where seats are without backrests, 21 seats between aisles shall be permitted with a minimum clear width of 12 inches (305 mm).

**407.4 Single access.** For rows of seating served by an aisle or doorway at only one end of the row, the minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.6 inch (15.2 mm) for every additional seat beyond seven seats, but the minimum clear width is not required to exceed 22 inches (559 mm). The path of egress travel, however, shall not exceed 30 feet (9144 mm) from any seat to a point where a person has a choice of two paths of egress travel to two exits. Where one of the two paths of travel is across the aisle through a row of seats to another aisle, there shall not be more than 24 seats between the two aisles; and the minimum clear width between rows for the row between the two aisles shall be 12

inches (305 mm) plus 0.6 inch (15.2 mm) for each additional seat above seven in the row between aisles.

**Exceptions:**

1. For smoke-protected assembly seating, the row length limits for a 12-inch-wide (305 mm) aisle accessway, beyond which the aisle accessway minimum clear width shall be increased, are in Table 407.5.
2. Where seats are without backrests, a maximum of 10 seats to an aisle shall be permitted with a minimum clear width of 12 inches (305 mm).
3. In smoke-protected assembly seating, the path of egress travel shall not exceed 50 feet (15 240 mm) from any seat to a point where a person has a choice of two paths of egress travel to two exits.

**407.5 Smoke-protected aisle accessways.** The design of smoke-protected aisle accessways shall comply with Table 407.5.

**SECTION 408  
GUARDS**

**408.1 Required guards.** Guards shall be provided in the following areas.

1. Along open-sided walking surfaces, cross aisles, stepped aisles, ramps and landings of tiered seating areas which are located more than 30 inches (762 mm) above the floor or grade below. Such guards shall be not less than 42 inches (1067 mm) high, measured vertically above the leading edge of the tread, adjacent walking surface or adjacent bench seat.

**Exception:** A guard is not required where the tiered seating is located adjacent to a wall and the space between the wall and the tiered seating is less than 4 inches (102 mm).

2. Where an elevation change of 30 inches (762 mm) or less occurs between a cross aisle and the adjacent floor or

**TABLE 407.5  
SMOKE-PROTECTED AISLE ACCESSWAYS**

TOTAL NUMBER OF SEATS IN THE SMOKE-PROTECTED ASSEMBLY OCCUPANCY	MAXIMUM NUMBER OF SEATS PER ROW PERMITTED TO HAVE A MINIMUM 12-INCH CLEAR WIDTH AISLE ACCESSWAY	
	Aisle or doorway at both ends of row	Aisle or doorway at one end of row only
Less than 4,000	14	7
4,000	15	7
7,000	16	8
10,000	17	8
13,000	18	9
16,000	19	9
19,000	20	10
22,000 and greater	21	11

For SI: 1 inch = 25.4 mm.

grade below, guards not less than 26 inches (660 mm) above the aisle floor shall be provided.

**Exception:** Where the backs of seats on the front of the cross aisle project 24 inches (610 mm) or more above the adjacent floor of the aisle, a guard need not be provided.

3. A guard shall be provided for the full width of an aisle where the lowest point of the aisle is more than 30 inches (762 mm) above the floor or ground below. The guard shall be a minimum of 36 inches (914 mm) high and shall provide a minimum of 42 inches (1067 mm) measured diagonally between the top of the rail and the posting of the nearest aisle step.

4. Unless subject to the requirements of Item 3, a guard with a minimum height of 26 inches (660 mm) shall be provided where the floor or foothold elevation is more than 30 inches (762 mm) above the floor or grade below and the guard would otherwise interfere with the sightlines of immediately adjacent seating.

1. The triangular opening formed by the riser, tread and bottom rail at the open side of an aisle stair or tread seating shall be of a maximum size such that a sphere of 6 inches (152 mm) in diameter cannot pass through the opening.

2. Guards at the end of aisles where they terminate at fascias of boxes, balconies and galleries shall have balusters or ornamental patterns such that a 4-inch-diameter (102 mm) sphere cannot pass through any opening up to a height of 26 inches (660 mm). From a height of 26 inches (660 mm) or greater above the adjacent walking surfaces, a sphere 8 inches (203 mm) in diameter shall not pass.

3. The opening limitation shall not apply to guards required in accordance with Item 2 of Section 408.1.

### SECTION 408 HANDRAILS

409.1 Required handrails. Where seats are located on both sides of an aisle stair, a minimum of one mid-size handrail shall be provided. Where seats are located on one side of the stair where there are no seats, a minimum of one handrail shall be provided on the side of the stair where there are no seats.

**Exception:** A handrail is not required for an aisle stair serving a single row of seating.

409.1.1 Mid-size handrails. Where there is seating on both sides of the aisle, the mid-size handrails shall be discontinuous with gaps at intervals not exceeding five rows to facilitate access to seating and permit crossing from one side of the aisle to the other. These gaps or breaks shall have a clear width of at least 22 inches (559 mm) and not greater than 36 inches (914 mm), measured horizontally, and the handrail shall have rounded terminations or bends. Such discontinuities shall also be permitted where there is seating on one or both sides of the aisle, and where there are no handrails complying with the responsibility requirements for handrails. An additional rail shall be provided below the handrail, located parallel to, and approximately 12 inches (305 mm) below, the handrail. The additional rail need not comply with the responsibility provisions of Section 409.3.

409.2 Height. Handrail height, measured above aisle stair tread nosings, shall be uniform, not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

409.3 Circularity. Handrails with a circular cross section shall have an outside diameter of at least 1.25 inches (32 mm) and not greater than 2 inches (51 mm) or shall provide equivalent graspability. If the handrail is not circular, it shall have a perimeter dimension of at least 4 inches (102 mm) and not greater than 6.25 inches (159 mm) with a maximum cross-section dimension of 2.25 inches (57 mm). Edges shall have a minimum radius of 0.01 inch (3.2 mm).

409.4 Continuity. Handrail-gripping surfaces shall be continuous, without interruption by newel posts or other obstructions.

1. Mid-size handrails in accordance with Section 409.1.1.

2. Handrail brackets or balusters attached to the bottom surface of the handrail that do not project horizontally beyond the sides of the handrail within 1.5 inches (38 mm) of the bottom of the handrail shall not be considered to be obstructive.

409.5 Handrail termination. Handrails located on the side of an aisle stair shall remain to a wall, guard or the walking surface or shall be continuous to the handrail of an adjacent aisle stair flight.

409.5.1 Mid-size handrail termination. Mid-size handrails shall not extend beyond the lowest riser and shall terminate within 30 inches (762 mm), measured horizontally, from the face of the lowest riser. Handrail extensions are not required.

409.6 Clearance. Clear space between a handrail and a wall or other surface shall be a minimum of 1.5 inches (38 mm). A handrail and a wall or other surface adjacent to the handrail shall be free of any sharp or abrasive elements.

409.7 Projections. Projections into the required width at each handrail shall not exceed 4.5 inches (114 mm) at or below the handrail height.

409.8 Handrail design. Handrails and their attachment shall be designed to resist the loads indicated in Section 303.

## CHAPTER 6

EXISTING BLEACHERS, FOLDING AND  
TELESCOPIC SEATING, AND GRANDSTANDSSECTION 501  
APPLICATION AND ADMINISTRATION

**11.1 General.** Existing bleachers, folding and telescopic seating, and grandstands that exist prior to the adoption of this standard shall comply with this chapter and the applicable provisions of Chapter 1.

**Exception:** Tiered seating when: the top of footboards, seatboards, aisles and cross aisles are not more than 30 inches (762 mm) above the floor or grade below, unless judged by the code official to represent a distinct hazard

**501.2 Inspection.** All existing tiered seating shall be inspected and evaluated at least once a year by a qualified person for compliance with the provisions of this chapter. All folding and telescopic seating shall be inspected to evaluate compliance with the manufacturer's installation and operational instructions, including an inspection during the opening and closing of such seating.

**501.3 Violations.** Where deficiencies are identified, the owner shall have until [DATE TO BE INSERTED BY JURISDICTION] to abate the unsafe condition as deemed necessary by the code official

**501.4 Alterations.** Alterations to any tiered seating shall conform with the requirements of this standard for new construction. Portions of the structure not altered and not affected by the alteration are not required to comply with the requirements in this standard for a new structure.

SECTION 502  
MAINTENANCE AND REPAIRS

**502.1 Structural.** Existing tiered seating shall be maintained structurally sound as follows.

1. Components or fasteners shall not be broken, damaged, badly deteriorated or missing.
2. Adequate bearing shall be provided. The structure shall bear uniformly on the floor or ground in a manner so as to safely support the structure.
3. All components and systems shall be in proper working condition.

**502.2 Durability.** Materials used in the construction of outdoor installations shall be weather resistant. Where wood is used, it shall be naturally durable or preservative-treated wood as defined in the building code or other approved material. Where ferrous metal is used, it shall be protected from corrosion. Fasteners shall consist of aluminum or other approved corrosion-resistant materials or shall be provided with approved corrosion-resistant coatings such as copper or zinc.

**502.3 Interior corrosive environment.** Installations located in interior corrosive environments, such as those located in conjunction with indoor pools, shall be corrosion resistant.

**502.4 Spaces beneath seats.** Spaces beneath or adjacent to seating structures shall comply with the fire code

SECTION 503  
GUARDS

**503.1 Required guards.** Guards shall be provided in the following areas.

1. Along open-sided walking surfaces, cross aisles, stepped aisles, ramps and landings of tiered seating areas which are located more than 30 inches (762 mm) above the floor or grade below. Such guards shall be not less than 36 inches (914 mm) high, measured vertically above the leading edge of the tread, adjacent walking surface or center of adjacent bench seat

**Exceptions:**

1. Where the uppermost seat is located less than or equal to 55 inches (1397 mm) above the floor or ground below.
2. Where located adjacent to a wall and the space between the wall and the tiered seating is less than 4 inches (102 mm).
2. Unless subject to the requirements of Item 3, a guard with a minimum height of 26 inches (660 mm) shall be provided where the floor or footboard elevation is more than 30 inches (762 mm) above the floor or grade below and the guard would otherwise interfere with the sightlines of immediately adjacent seating.
3. A guard shall be provided for the full width of the aisle where the foot of the aisle is more than 30 inches (762 mm) above the floor or ground below. The guard shall be a minimum of 36 inches (914 mm) high.

**503.2 Opening limitations.** Open guards shall be constructed of materials such that a 4-inch-diameter (102 mm) sphere cannot pass through any opening.

**Exception:** The triangular opening formed by the riser, tread and bottom rail at the open side of an aisle stair or tiered seating shall be of a maximum size such that a sphere of 6 inches (152 mm) in diameter cannot pass through the opening.

**503.3 Guard design.** Guards and their attachment shall be designed to resist the loads indicated in Section 303.



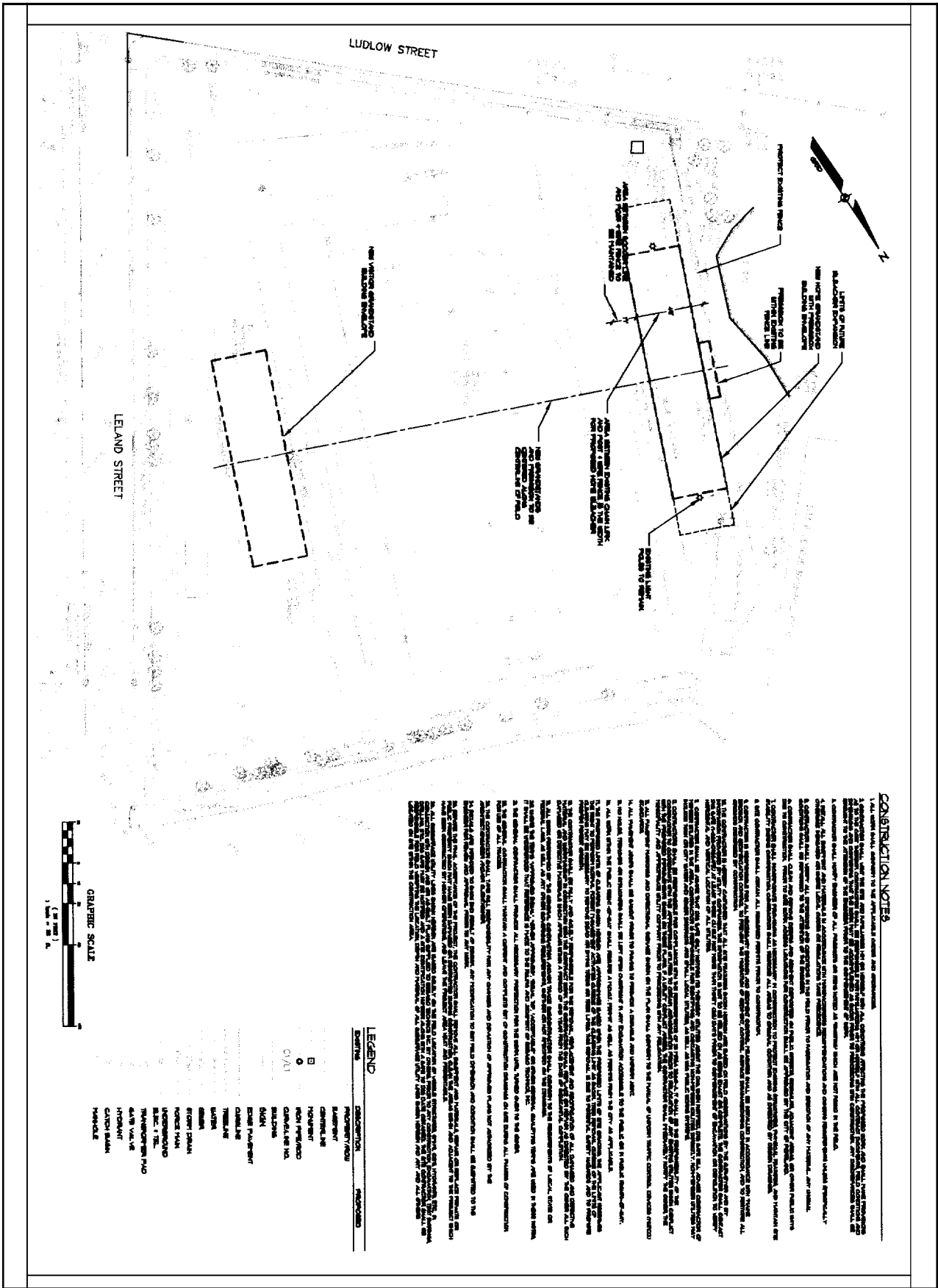
504-504.1

EXISTING BLEACHERS, FOLDING AND TELESCOPIC SEATING, AND GRANDSTANDS

**SECTION 504  
OPEN SPACES AT FOOTBOARDS AND  
SEATBOARDS**

504.1 Open spaces at footboards and seatboards. Where an opening between the seatboard and footboard is located more than 30 inches (762 mm) above the floor or ground below, the opening shall be closed with construction such that a 4-inch-diameter (102 mm) sphere cannot pass through.

**Exception:** Where the uppermost seat is located less than or equal to 55 inches (1397 mm) above the floor or ground below.



**CONSTRUCTION NOTES**

1. All work shall conform to the applicable codes and ordinances.

2. The contractor shall be responsible for obtaining all necessary permits and approvals from the appropriate authorities.

3. The contractor shall be responsible for maintaining access to all existing utilities and structures on the site.

4. The contractor shall be responsible for protecting all existing structures and utilities on the site.

5. The contractor shall be responsible for maintaining the site in a safe and sanitary condition at all times.

6. The contractor shall be responsible for maintaining the site in a safe and sanitary condition at all times.

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18. The contractor shall be responsible for maintaining the site in a safe and sanitary condition at all times.

19. The contractor shall be responsible for maintaining the site in a safe and sanitary condition at all times.

20. The contractor shall be responsible for maintaining the site in a safe and sanitary condition at all times.

**LEGEND**

- | SYMBOL | DESCRIPTION                           | REMARKS |
|--------|---------------------------------------|---------|
| —      | PROPERTY LINE                         |         |
| —      | EXISTING CURB                         |         |
| —      | EXISTING SIDEWALK                     |         |
| —      | EXISTING DRIVE                        |         |
| —      | EXISTING UTILITY                      |         |
| —      | EXISTING FENCE                        |         |
| —      | EXISTING WALL                         |         |
| —      | EXISTING ROOF                         |         |
| —      | EXISTING FLOOR                        |         |
| —      | EXISTING CEILING                      |         |
| —      | EXISTING DOOR                         |         |
| —      | EXISTING WINDOW                       |         |
| —      | EXISTING STAIR                        |         |
| —      | EXISTING ELEVATOR                     |         |
| —      | EXISTING ESCAPE ROUTE                 |         |
| —      | EXISTING FIRE ALARM                   |         |
| —      | EXISTING SMOKE DETECTOR               |         |
| —      | EXISTING SPRINKLER                    |         |
| —      | EXISTING EXHAUST FAN                  |         |
| —      | EXISTING MECHANICAL EQUIPMENT         |         |
| —      | EXISTING ELECTRICAL EQUIPMENT         |         |
| —      | EXISTING TELEPHONE EQUIPMENT          |         |
| —      | EXISTING CABLE TV EQUIPMENT           |         |
| —      | EXISTING SATELLITE EQUIPMENT          |         |
| —      | EXISTING SECURITY EQUIPMENT           |         |
| —      | EXISTING ACCESS CONTROL EQUIPMENT     |         |
| —      | EXISTING VIDEO SURVEILLANCE EQUIPMENT |         |
| —      | EXISTING SOUND EQUIPMENT              |         |
| —      | EXISTING LIGHTING EQUIPMENT           |         |
| —      | EXISTING SIGNAGE EQUIPMENT            |         |
| —      | EXISTING LANDSCAPE EQUIPMENT          |         |
| —      | EXISTING PAVING EQUIPMENT             |         |
| —      | EXISTING CONCRETE EQUIPMENT           |         |
| —      | EXISTING MASONRY EQUIPMENT            |         |
| —      | EXISTING METALWORK EQUIPMENT          |         |
| —      | EXISTING WOODWORK EQUIPMENT           |         |
| —      | EXISTING GLASSWORK EQUIPMENT          |         |
| —      | EXISTING PLASTERWORK EQUIPMENT        |         |
| —      | EXISTING PAINTWORK EQUIPMENT          |         |
| —      | EXISTING FINISHES EQUIPMENT           |         |
| —      | EXISTING SPECIALTIES EQUIPMENT        |         |
| —      | EXISTING OTHER EQUIPMENT              |         |



<b>SITE PLAN</b>
<b>MEMORIAL FIELD GRANDSTANDS</b>
17 ANDOVER STREET PORTLAND, MAINE 04103
FOR <b>PORTLAND PARKS AND RECREATION</b>
DATE: 7-14-05
SCALE: 1"=30'
SHEET 1 OF 1

**Sebago Technics**  
Engineering • Planning • Construction Management  
100 South Street  
Portland, Maine 04103  
Tel: (207) 886-8877

PROJECT NO.	FIELD BOOK	DESIGN	CHG	ISSUED
00245	...	CD	DM	CD

REV.	DATE	BY	RELATION
A	05	2-17-05	SUBMITTED TO J & D STANGE INC. AND BALLHAW COMPANY

5/2

causes or forces. All material which might cause fumes or dust, or constitute a fire hazard if stored out-of-doors, shall be only in closed containers. Areas attracting large numbers of birds, rodents or insects are prohibited.

(Ord. No. 291-88, 4-4-88)

**Sec. 14-152. Reserved.**

**DIVISION 8.5. R-OS RECREATION AND OPEN SPACE ZONE**

**Sec. 14-153. Purpose.**

(a) The purpose of this division is:

- (1) To preserve and protect open space as a limited and valuable resource;
- (2) To permit the reasonable use of open space, while simultaneously preserving and protecting its inherent open space characteristics to assure its continued availability for public use as scenic, recreation, and conservation or natural resource area, and for the containment and structuring of urban development;
- (3) To coordinate with and carry out federal, state, regional, and city recreation and open space plans; and
- (4) To provide a suitable location for large-scale regional sports and athletic facilities.

(b) The recreation open space zone may include major parcels (over two (2) acres) of public property, and private property legally restricted from intensive use or development through deed, covenant, or otherwise.

(Ord. No. 232-81, § 602.9B.1, 11-16-81; Ord. No. 187-01/02, § 2, 4-17-02)

**Sec. 14-154. Permitted uses.**

The following uses are permitted uses within the recreation and open space zone, subject to the development standards contained herein:

- (a) Municipal parks, public open spaces, picnic areas, playgrounds and playlots;

- (b) Cemeteries;
- (c) Arboretums;
- (d) Golf courses, excluding miniature golf;
- (e) Boat landings, beaches, and marinas for public uses;
- (f) Outdoor ballfields and public athletic fields;
- (g) Swimming pools and tennis courts;
- (h) Picnic groves and areas;
- (i) Natural parks and scenic overlooks;
- (j) Hiking, walking, bicycling or cross-country ski trails;
- (k) Community gardens for cultivation by and for city residents;
- (l) Sewage pumping stations and sewage treatment facilities;
- (m) Sports complexes;
- (n) Accessory uses, including structures or buildings of less than two thousand five hundred (2,500) square feet of floor area.

(Ord. No. 232-81, § 602.7B.2, 11-16-81; Ord. No. 60-91, § 1, 8-5-91; Ord. NO. 187-01/02, § 3, 4-17-02)

**Sec. 14-155. Conditional uses.**

The following uses are conditional uses in the recreation and open space zone, subject to approval by the board of appeals.

- (a) Accessory uses with structures or buildings of two thousand five hundred (2,500) square feet or more of floor area;
- (b) Other recreational facilities and uses that are open to the public;
- (c) Water pumping stations.

(Ord. No. 232-81, § 602.7B.3, 11-16-81; Ord. No. 67-89, § 1, 8-7-89; Ord. No. 60-91, § 2, 8-5-91)

**Sec. 14-156. Standards for conditional uses.**

In addition to the criteria listed in section 14-474(c), the board of appeals shall consider the following criteria when reviewing conditional uses in the recreation and open space zone:

- (a) The use shall be in conformity with or satisfy a deficiency identified in a federal, **state**, regional, or city recreation and open space plan, including **but** not limited to the state comprehensive outdoor recreation plan, as such plans may from time to time be created or revised.
- (b) Buildings and structures shall not obstruct significant scenic views presently enjoyed by nearby residents, passersby, or users of the site.
- (c) Indoor recreation or nonrecreational uses shall serve a significant **public** purpose that cannot reasonably be accommodated outside of the recreation and open space zone.

(Ord. No. 232-81, § 602.7B.4, 11-16-81)

**Sec. 14-157. Space and bulk requirements.**

No building or structure of a permanent nature shall be erected, altered, enlarged, rebuilt, or **used** unless it **meets** the following requirements:

**(a) Minimum front yard:**

- 1. Principal buildings or structures: Twenty-five (25) feet.
- 2. Accessory buildings or structures: **Twenty-five (25)** feet.

**(b) Minimum rear yard:**

- 1. Principal buildings or structures: Twenty-five (25) **feet.**
- 2. Accessory buildings or structures: Twenty-five **(25)**

feet.

**(c) Minimum side yard:**

1. Principal buildings or structures: **Twelve (12)** feet.
2. Accessory buildings or structures: Twelve (12) feet.

**(d) Minimum lot size: Two (2)** acres, except that sewage treatment facilities are not required to meet this standard.

**(e) Maximum building height: Thirty-five (35) feet, unless** more than one thousand (1,000) feet from a shoreland zone. The maximum building height for buildings located more than one thousand (1,000) feet from a shoreland zone shall be forty-five (45) feet.

**(f) Maximum coverage of lot by buildings, structures and other impervious site improvements such as paved sidewalks, drives and parking lots:**

1. Sewage treatment facilities: No limit on maximum coverage.
2. Sports complexes: Seventy-five (75) percent of lot area.
3. All other uses: Twenty-five (25) percent of lot area.

**(g) Maximum floor area ratio: Five-tenths (0.5).**

(Ord. No. 232-81, § 602.7B.5, 11-16-81; Ord. No. 67-89, § 2, 8-7-89; Ord. No. 205-93, 2-2-93; Ord. No. 187-01/02, § 4, 4-17-02)

\_\_\_\_\_ with the site plan

\_\_\_\_\_ review:

- (a) All ground areas not used for parking, loading, vehicular or pedestrian areas and not left in their natural state shall be suitably landscaped.**
- (b) Natural features, such as mature trees and natural surface drainageways, shall be preserved to the greatest possible extent consistent with the uses of the property.**

**SEBAGO TECHNICS, INC.**

One Chabot Street  
P.O. Box 1339  
WESTBROOK, ME 04098-1339

**LETTER OF TRANSMITTAL**

2124

Phone (207) 856-0277 FAX (207) 856-2206

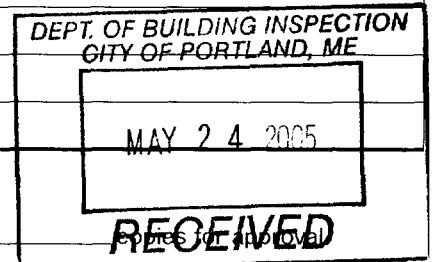
TO MARGE  
INSPECTIONS

DATE	5/24/05	JOB NO.	03245
ATTENTION			
RE:	BLEACHERS AT MEMORIA FIELD		

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings     Prints     Plans     Samples     Specifications  
 Copy of letter     Change order     \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
3			- RFP SITE PLAN - EXISTING CONDITIONS PLAN - SITE PLAN WITH PROPOSED BLEACHERS.



THESE ARE TRANSMITTED as checked below:

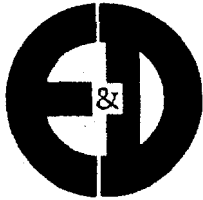
- For approval     Approved as submitted     Resubmit \_\_\_\_\_  
 For your use     Approved as noted     Submit \_\_\_\_\_ copies for distribution  
 As requested     Returned for corrections     Return \_\_\_\_\_ corrected prints  
 For review and comment     \_\_\_\_\_  
 FOR BIDS DUE \_\_\_\_\_     PRINTS RETURNED AFTER LOAN TO US

REMARKS

MARGE,  
E & D STAMPS WILL BE SENDING YOU A SITE PLAN WITH THE BLEACHERS IN THEIR FORMAL APPLICATION.  
UNTIL THEN PLEASE USE THESE FOR REFERENCE AND CALL WITH ANY QUESTIONS.  
CHRIS DiMATTEO

COPY TO \_\_\_\_\_

SIGNED: Chris DiMatteo

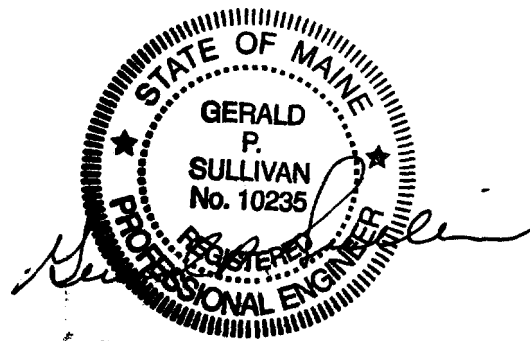


**E & D SPECIALTY STANDS, INC.**  
MANUFACTURERS OF QUALITY STANDS AND SEATING  
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## CALCULATION PACKAGE

**05-1013**  
**MEMORIAL FIELD**  
**PORTLAND, MAINE**

**STRUCTURAL STEEL DESIGN**



MAY 13 2005





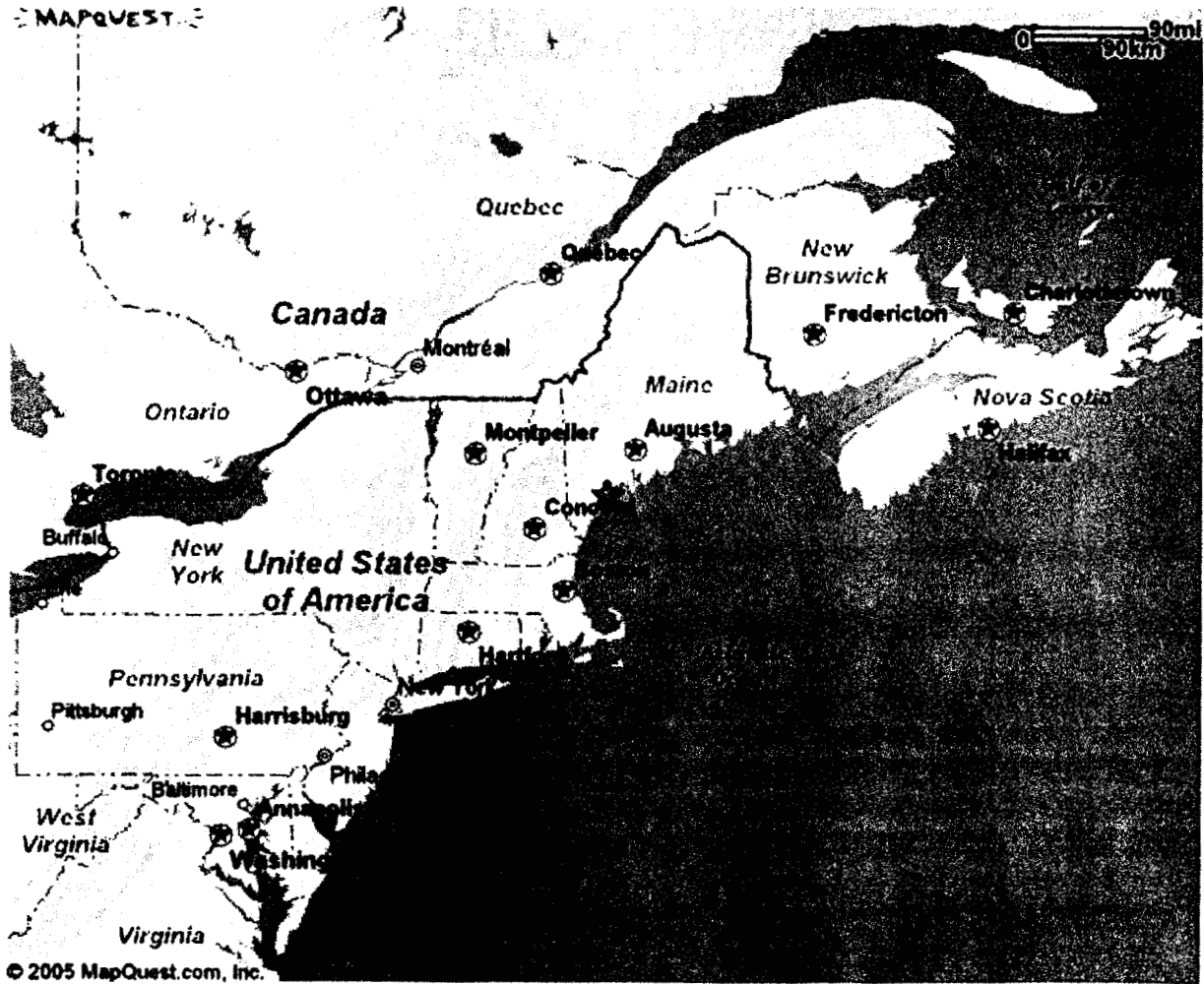
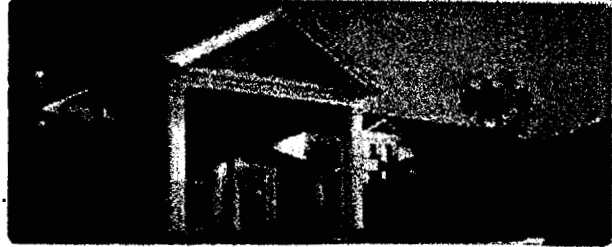
where would you like to stay? ▶

Send To Printer Back to Map

Portland ME  
US

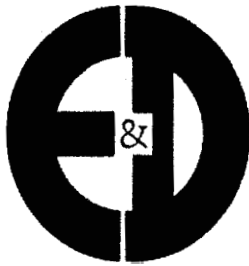
Notes:

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**LOAD PAGE  
E&D JOB NO. 05-1013  
MEMORIAL FIELD  
PORTLAND, MAINE  
ELEVATED BEAM**

<b>LIVE LOAD</b>	PER IBC 2003 TABLE 1607.1	100 psf
<b>DEAD LOAD</b>	SUPPLIER DEPENDANT	7 psf
<b>WIND LOAD</b>	SEI/ASCE 7-02	
	$q_z = 0.00256 * K_z * K_{zt} * K_d * V^2 * I =$	29.44 / SAY 30 psf
	$K_z :$	1
	$K_{zt} :$	1
	$K_d :$	1
	$V^2 :$	100 mph
	$I =$	1.15
		VELOCITY FIGURE 6-1 IMPORTANCE FACTOR TABLE 6-1
<b>SWAY LOADS PER NFPA 102</b>		
	APPLIED PERPENDICULAR ACTING PARALLEL	24 plf
	APPLIED PERPENDICULAR ACTING PERPENDICULAR	10 plf
<b>HANDRAIL LOADS</b>	PER IBC 2003 § 1607.7.1	
	ANY DIRECTION	50 plf
	CONCENTRATED MINIMUM	200 lbs
<b>FOOTBOARD AND SEATBOARD LIVE LOADS</b>		
	LIVE LOAD ACTING VERTICALLY	120 plf
<b>SOIL BEARING 3000 psf</b>		

05-10/3

MEMORIAL FIELD  
PORTLAND, ME

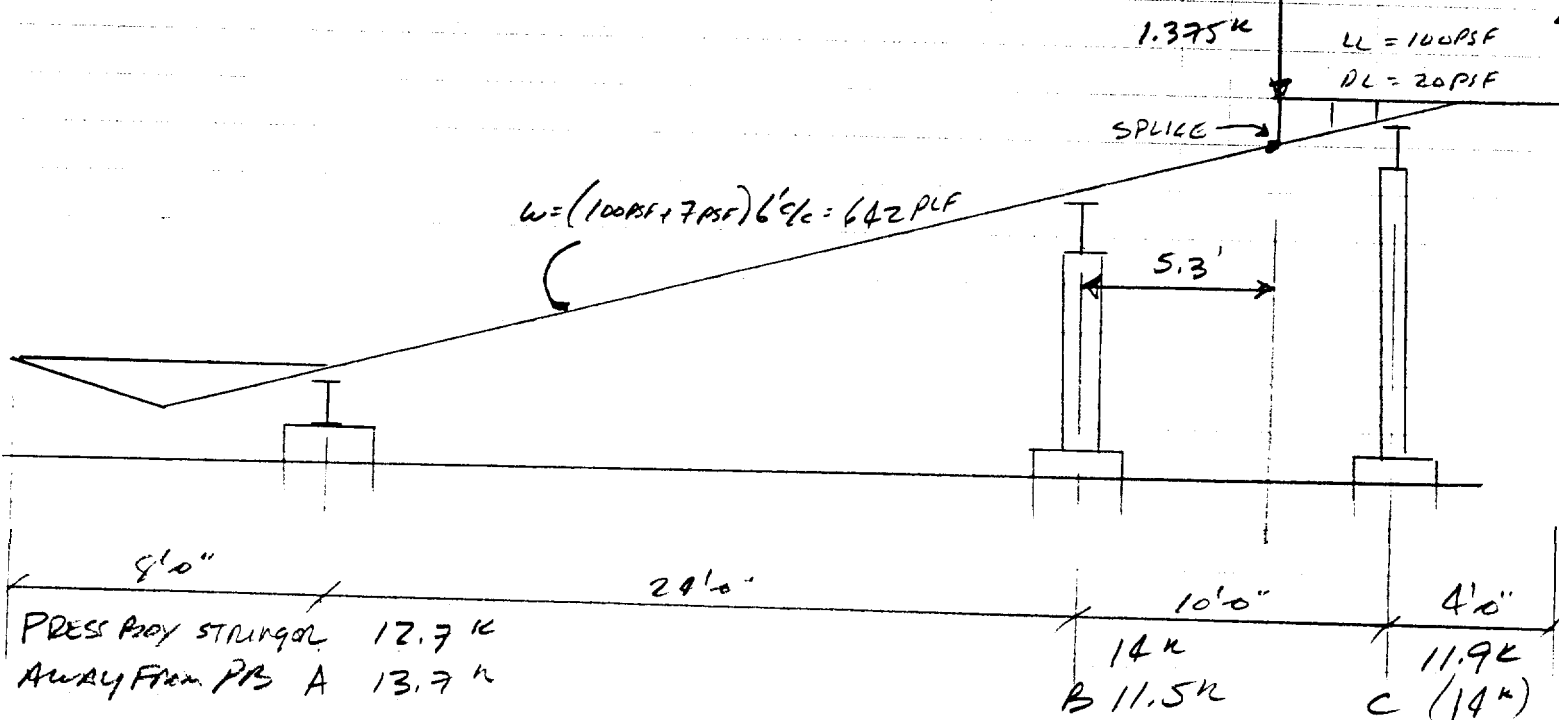
5/11/05

1 OF 38

LL TOP = 50 PSF  
DL TOP = 20 PSF

# HOME SIDE STRINGER DESIGN

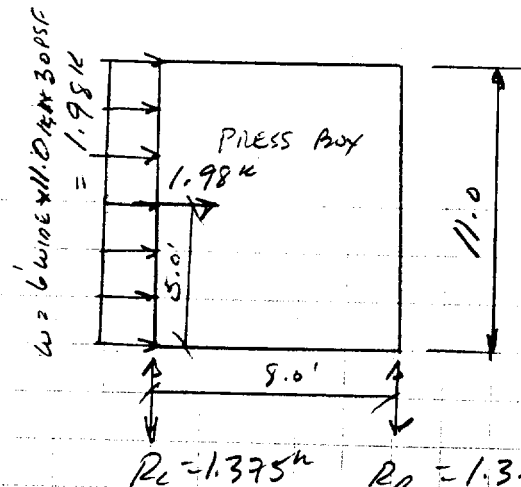
REFER TO PG. 2 TO 4 + 5 TO 7 FOR STRINGER ANALYSIS



$$w = (100 \text{ PSF} + 7 \text{ PSF}) 6' \text{ c/c} = 642 \text{ PLF}$$

WIND LOAD: ON BOX

$$R_L = R_R = \frac{1.98 \text{ k} (11'0")}{8'} \approx 1.375 \text{ k} \text{ APPLIED AT P/B STRINGER LOCATIONS.}$$



$$M_x = 24.165 \text{ k-FT (SHT 4)}$$

$$M = \frac{wL^2}{8} = \frac{0.642 \text{ k/ft} (24')^2}{8} = 46.22 \text{ k-FT}$$

$$S_{req} = \frac{46.22 \text{ k-FT} \times 12''/1}{0.66 (50 \text{ ksi})} = 16.8 \text{ in}^3$$

$$S_x (\text{PROVIDED}) = 17.1 \text{ in}^3 \quad \text{OK!}$$

$$A_{req} = \frac{24' \times 12''}{2 \times 11} = 1.44 \text{ in}^2$$

$$A_{act} = 0.69 \text{ in}^2 \quad \text{OK}$$

**Project:**

**By:**                      **Date:**                      **Checked:**                      **Date:**                      **Page:** 2 of 38

Description:

05-1013  
Memorial Field  
Portland, ME  
Home  
Stringer at PB

Units: English

Properties - X = feet, E = ksi, I = in<sup>4</sup>  
X = 0; E = 29000; I = 103;  
X = 45.3; E = 29000; I = 103;

Moment Releases - X = feet  
X = 37.3;

Supports - X = feet, Displacement = inches, Rotation = radians  
X = 8; Disp = 0;  
X = 32; Disp = 0;  
X = 41.3; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft  
X = 37.3; PLoad = -1.375;  
X = 45.3; PLoad = 1.375;

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft  
XStart = 0; XEnd = 37.3; UStart = -0.642; UEnd = -0.642;  
XStart = 37.3; XEnd = 45.3; UStart = -1.14; UEnd = -1.14;

Project:

By:

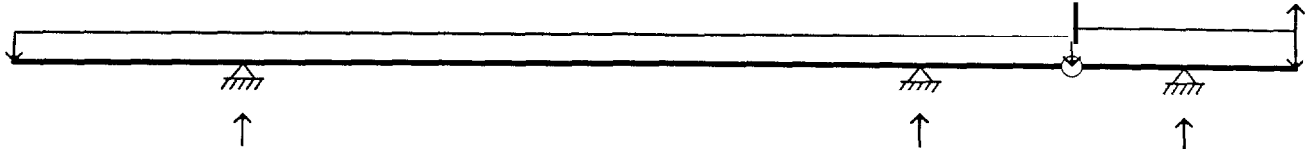
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Checked:

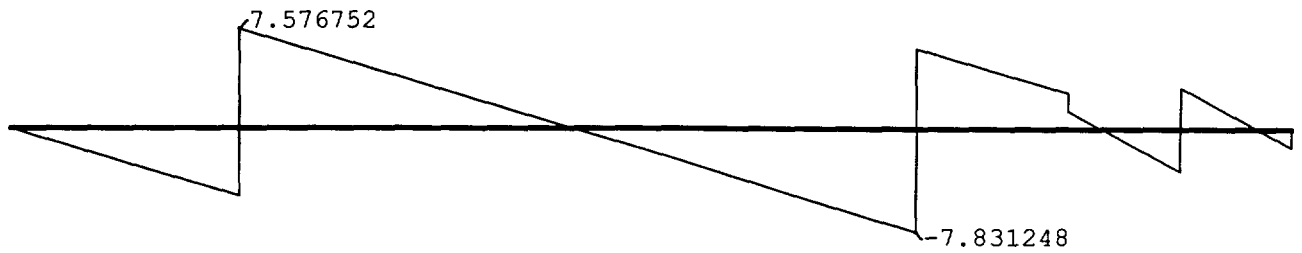
Date:

Page: 3 of 38

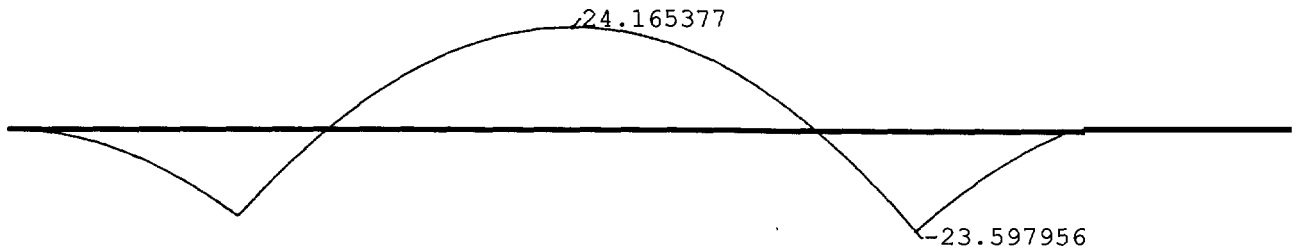
Reactions - kips, kip ft



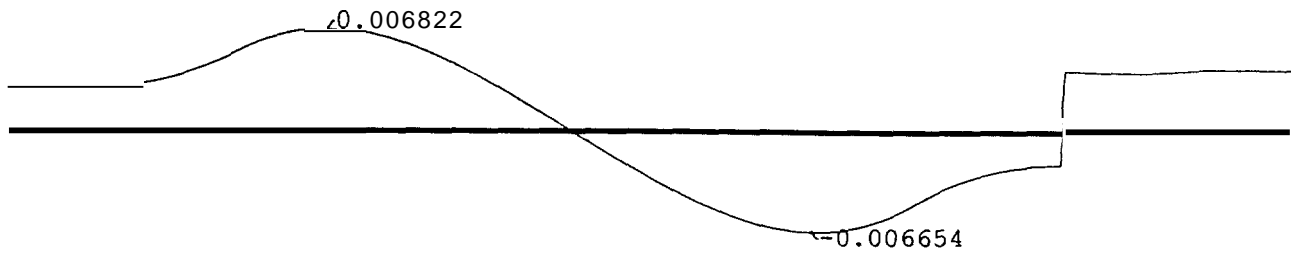
Shear - kips



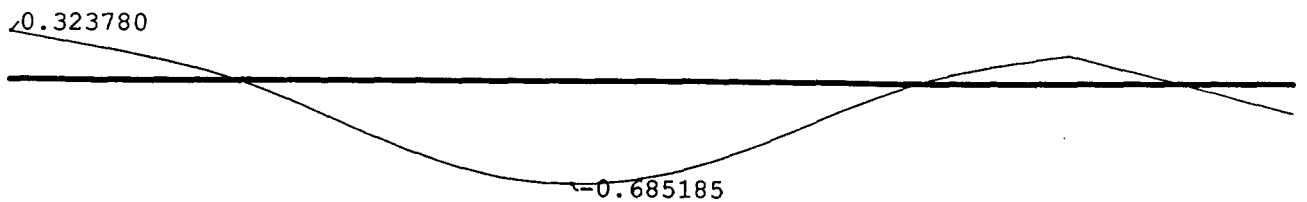
Moment - kip ft



Rotation - radians



Deflection - inches



# WinBeam

Project:

By:                      Date:                      Checked:                      Date:                      Page: 4 of 38

Analysis Data:

Beam Length = 45.3 feet  
Number of Nodes = 203  
Number of Elements = 202  
Number of Degrees of Freedom = 406

Reactions:

X feet	Vert kips	Rot kip ft
8.000	12.713	
32.000	13.985	
41.300	6.369	

Equilibrium:

	Force	Reaction	Diff
Vert	-33.067	33.067	0.000 kips
Rot	812.260	-812.260	-0.000 kip ft

Min & Max values:

Min Shear	=	-7.831 kips	at	32.000 feet
Max Shear	=	7.577 kips	at	8.000 feet
Min Moment	=	-23.598 kip ft	at	32.000 feet
Max Moment	=	24.165 kip ft	at	19.774 feet
Min Rotation	=	-0.006654 radians	at	28.377 feet
Max Rotation	=	0.006822 radians	at	11.170 feet
Min Deflection	=	-0.685185 in	at	19.774 feet
Max Deflection	=	0.323780 in	at	0 feet

# WinBeam

Project:

By:                      Date:                      Checked:                      Date:                      Page: 5 of 38

Description:

05-1013  
Memorial Field  
Portland, ME  
Home  
Stringer away from PB

Units: English

Properties - X = feet, E = ksi, I = in<sup>4</sup>  
X = 0; E = 29000; I = 103;  
X = 37.3; E = 29000; I = 103;

Moment Releases - X = feet

Supports - X = feet, Displacement = inches, Rotation = radians  
X = 8; Disp = 0;  
X = 32; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft  
XStart = 0; XEnd = 37.3; UStart = -0.642; UEnd = -0.642;

# WinBeam

Project:

By:

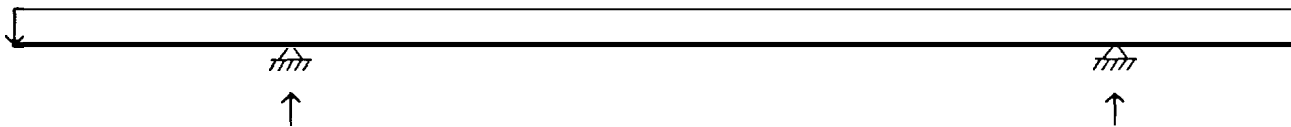
Date:

Checked:

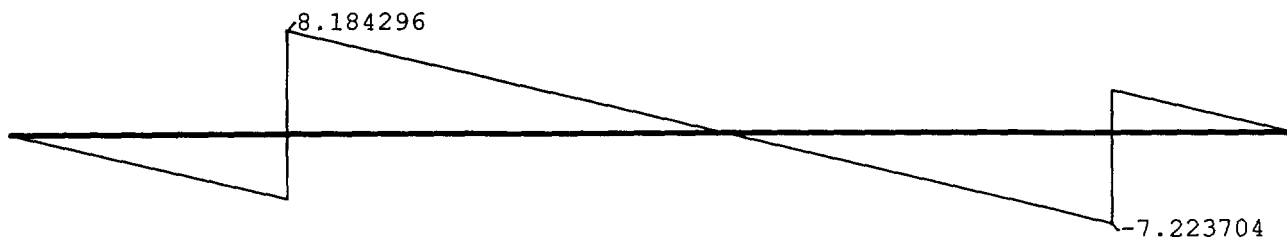
Date:

Page: 6 of 38

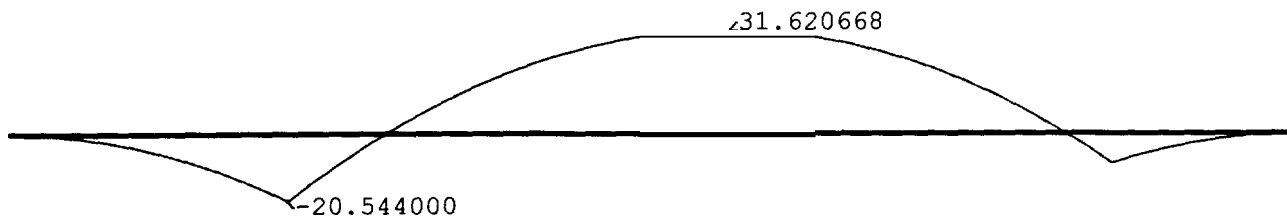
Reactions - kips, kip ft



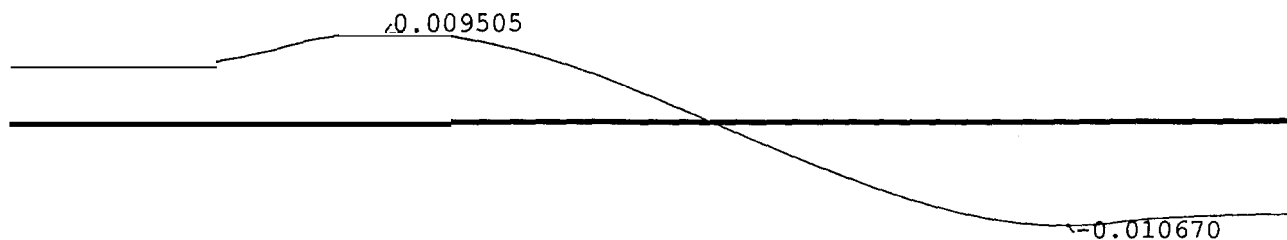
Shear - kips



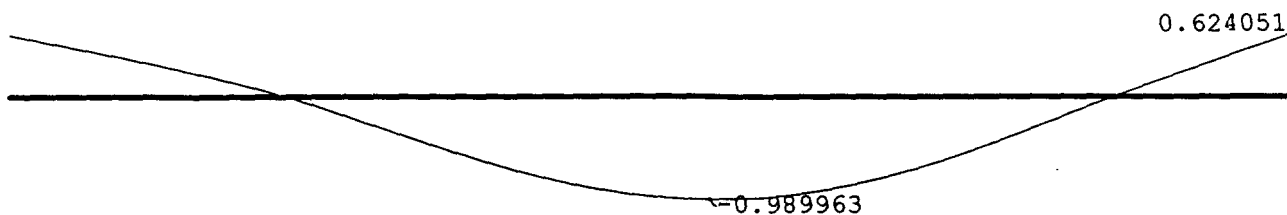
Moment - kip ft



Rotation - radians



Deflection - inches





Project:

By:

Date:

Checked:

Date:

Page: 7 of 38

Analysis Data:

Beam Length = 37.3 feet  
Number of Nodes = 202  
Number of Elements = 201  
Number of Degrees of Freedom = 404

Reactions:

X feet	Vert kips	Rot kip ft
8.000	13.320	
32.000	10.626	

Equilibrium:

	Force	Reaction	Diff
Vert	-23.947	23.947	0.000 kips
Rot	446.604	-446.604	-0.000 kip ft

Min & Max values:

Min Shear	=	-7.224 kips	at	32.000 feet
Max Shear	=	8.184 kips	at	8.000 feet
Min Moment	=	-20.544 kip ft	at	8.000 feet
Max Moment	=	31.621 kip ft	at	20.837 feet
Min Rotation	=	-0.010670 radians	at	30.698 feet
Max Rotation	=	0.009505 radians	at	10.791 feet
Min Deflection	=	-0.989963 in	at	20.279 feet
Max Deflection	=	0.624051 in	at	37.300 feet

HOME SIDE

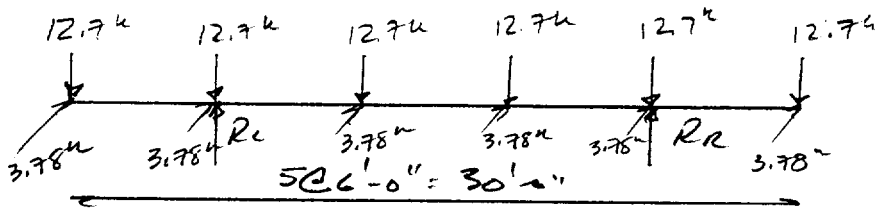
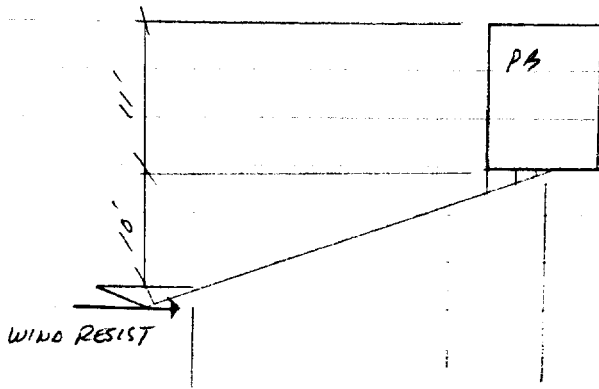
CROSS BEAM, Row 'A' AT PB

WIND RESIST =  $(10' + 11') / (6' \text{ CLK}) (30 \text{ PSF}) = 3.78$

EA. STRINGER CARRIES 3.78k OF WIND RESISTANCE TO FRONT CROSS BEAM.

THE TOTAL RESISTANCE TO THE PIEN:

$3 \times 3.78k = 11.34k$



$R_1 = R_2 = R_3 = 3(12.7k) = 38.34k$

REFER TO SHEET 9 TO 11

$M_x = 12.7k (6') = 76.68 \text{ k-FT}$   
 $M_y = 3.78k (6') = 22.68 \text{ k-FT}$

TRY W14x43  $S_x = 62.7 \text{ IN}^3$   
 $S_y = 11.3 \text{ IN}^3$

APPLY 25% REDUCTION TO LL & WL, AS THEY ARE TRANSIENT LOADS (33% INCREASE IN ALLOWABLE STRESS)

$\frac{f_{bx}(DL)}{F_{bx}} + \frac{f_{bx}(LL)}{F_{bx}} + \frac{f_{by}(WL)}{F_{by}} < 1.0$

$\frac{76.68 \text{ k-FT} \left( \frac{7 \text{ PSF}}{10.7 \text{ PSF}} \right) 12 \text{ IN}}{62.7 \text{ IN}^3} + \frac{76.68 \text{ k-FT} \times 12 \text{ IN} \left( \frac{100}{107} \right) (0.75)}{62.7 \text{ IN}^3} + \frac{22.68 \text{ k-FT} \times 12 \text{ IN} (0.75)}{11.3 \text{ IN}^3}$   
 $\frac{0.66 (50 \text{ ksi})}{0.66 (50 \text{ ksi})} \quad \text{DL} \quad \text{LL} \quad \text{WL}$   
 $0.0299 + 0.3117 + 0.4817 = 0.8233 < 1.0$   
 SO, USE W14x43 OK!

# WinBeam

Project:

By:                      Date:                      Checked:                      Date:                      Page: 9 of 38

Description:

05-1013  
Memorial Field  
Portland, ME  
Home  
CB-A AT PB

Units: English

Properties - X = feet, E = ksi, I = in<sup>4</sup>

X = 0; E = 29000; I = 428; /14X43

X = 30; E = 29000; I = 291;

Moment Releases - X = feet

Supports - X = feet, Displacement = inches, Rotation = radians

X = 6; Disp = 0;

X = 24; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft

X = 0; PLoad = -12.7;

X = 6; PLoad = -12.7;

X = 12; PLoad = -12.7;

X = 18; PLoad = -12.7;

X = 24; PLoad = -12.7;

X = 30; PLoad = -12.7;

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft

# WinBeam

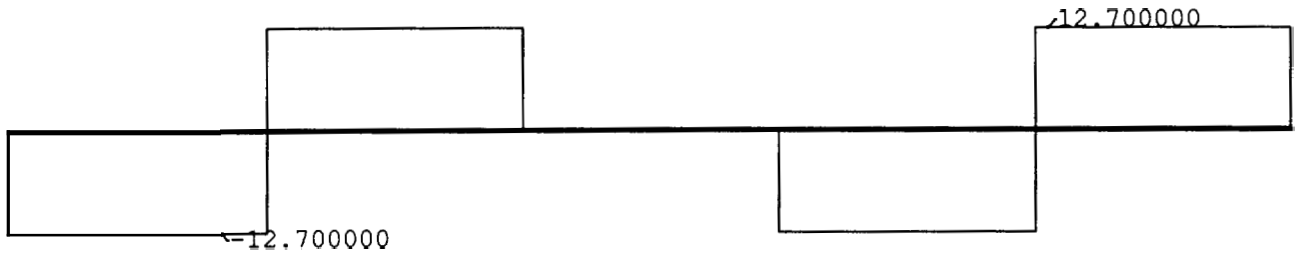
Project:

By: \_\_\_\_\_ Date: \_\_\_\_\_ Checked: \_\_\_\_\_ Date: \_\_\_\_\_ Page: 10 of 38

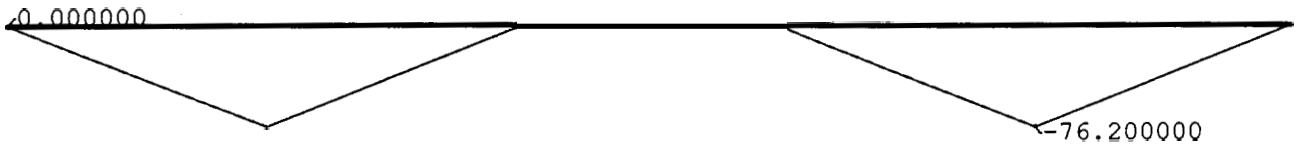
Reactions - kips, kip ft



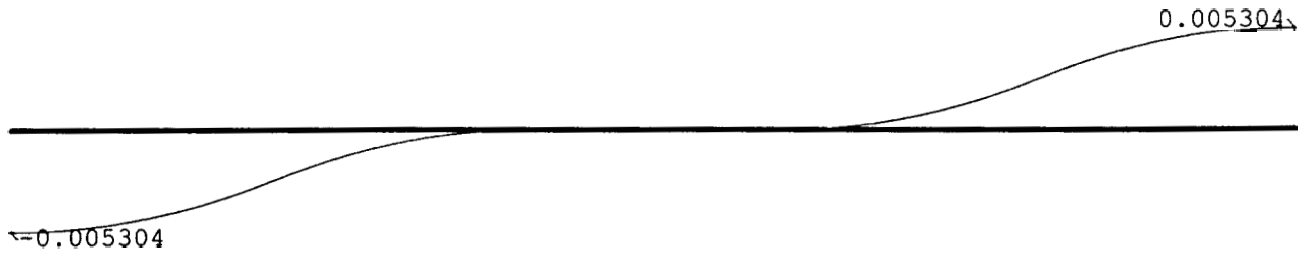
Shear - kips



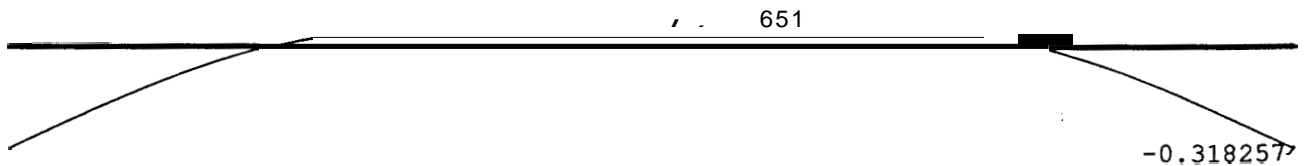
Moment - kip ft



Rotation - radians



Deflection - inches



Project:

By:                      Date:                      Checked:                      Date:                      Page: 11 of 38

Analysis Data:

Beam Length = 30. feet  
Number of Nodes = 201  
Number of Elements = 200  
Number of Degrees of Freedom = 402

Reactions:

X feet	Vert kips	Rot kip ft
6.000	38.100	
24.000	38.100	

Equilibrium:

	Force	Reaction	Diff
Vert	-76.200	76.200	-0.000 kips
Rot	1143.000	-1143.000	0.000 kip ft

Min & Max values:

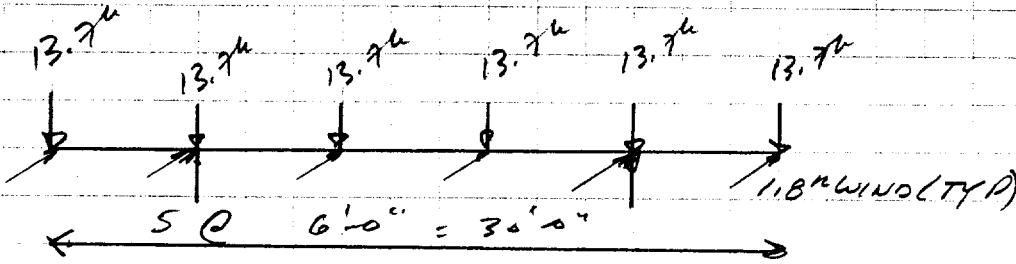
Min Shear	=	-12.700 kips	at	4.950 feet
Max Shear	=	12.700 kips	at	24.300 feet
Min Moment	=	-76.200 kip ft	at	24.000 feet
Max Moment	=	0 kip ft	at	0 feet
Min Rotation	=	-0.005304 radians	at	0 feet
Max Rotation	=	0.005304 radians	at	30.000 feet
Min Deflection	=	-0.318257 in	at	30.000 feet
Max Deflection	=	0.063651 in	at	15.300 feet

05-1013  
 MEMORIAL FIELD  
 5/11/05  
 12 OF 38

HOME SIDE (CON'T)

CROSS BEAM AWAY FROM PB

WIND LOAD =  $10 \text{ mph} \times 6 \text{ cm} \times 30 \text{ psf}$   
 $= 1.8 \text{ k}$



REFER TO 13 TO 15 FOR CROSS BEAM ANALYSIS

$M_x = 82.2 \text{ k-ft}$   
 $M_y = 1.8 \text{ k} (6') = 10.8 \text{ k-ft}$

} Try W14x38  $S_x = 54.6 \text{ in}^3$   
 $S_y = 7.8 \text{ in}^3$

$$\frac{82.2 \text{ k-ft} \times 12 \text{ in/ft} \times 7 \text{ psf} / 107 \text{ psf}}{54.6 \text{ in}^3} \quad \text{DL} \quad + \quad \frac{82.2 \text{ k-ft} \times 12 \text{ in/ft} \times 100 / 107 \times 0.75}{54.6 \text{ in}^3} \quad \text{LL} \quad + \quad \frac{10.8 \text{ k-ft} \times 12 \text{ in/ft} \times 0.7}{7.8 \text{ in}^3} \quad \text{LL}$$

$$0.0358 \quad + \quad 0.3837 \quad + \quad 0.3289$$

$$= 0.7485 < 1.0 \quad \underline{\text{ok!}}$$

USE W14x38 GR 50

**Project:**

By:                      Date:                      Checked:                      Date:                      Page: 13 of 38

## Description:

05-1013  
Memorial Field  
Portland, ME  
Home  
**CB-A AWAY PB**

Units: English

Properties - X = feet, E = ksi, I = in<sup>4</sup>

X = 0; E = 29000; I = 385; /W14x38

X = 30; E = 29000; I = 291;

Moment Releases - X = feet

Supports - X = feet, Displacement = inches, Rotation = radians

X = 6; Disp = 0;

X = 24; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft

X = 0; PLoad = -13.7;

X = 6; PLoad = -13.7;

X = 12; PLoad = -13.7;

X = 18; PLoad = -13.7;

X = 24; PLoad = -13.7;

X = 30; PLoad = -13.7;

Uniform Loads - XStart &amp; XEnd = feet, UStart &amp; UEnd = kip/ft

Project:

By:

Date:

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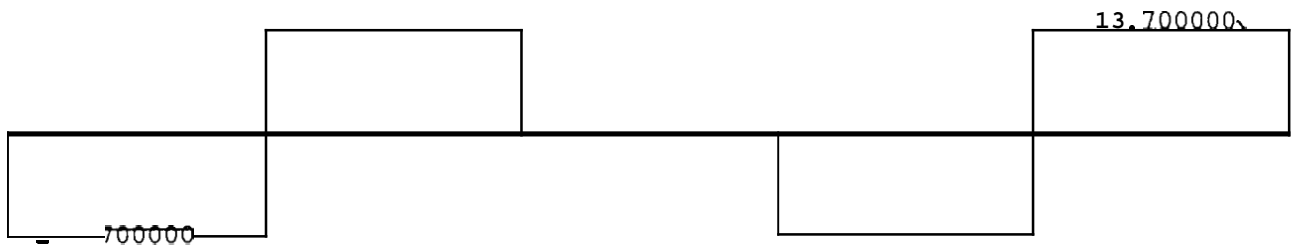
Date:

Page: 14 of 38

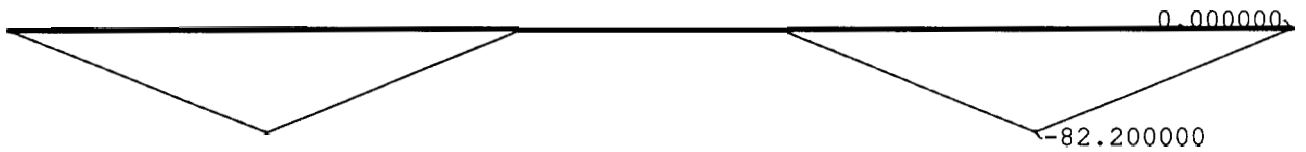
Reactions - kips, kip ft



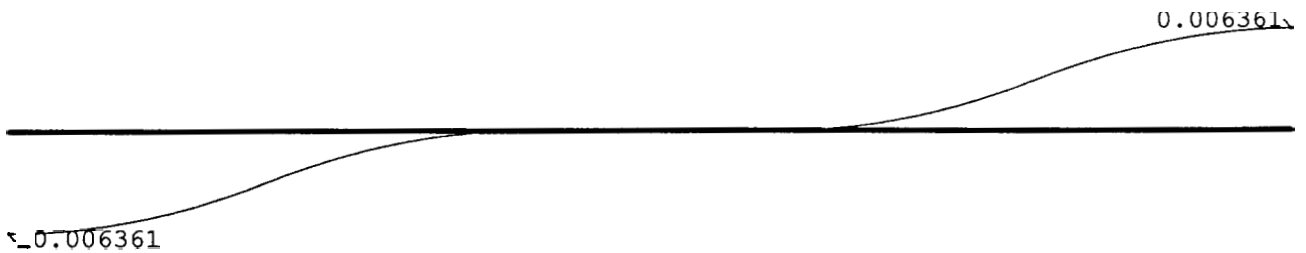
Shear - kips



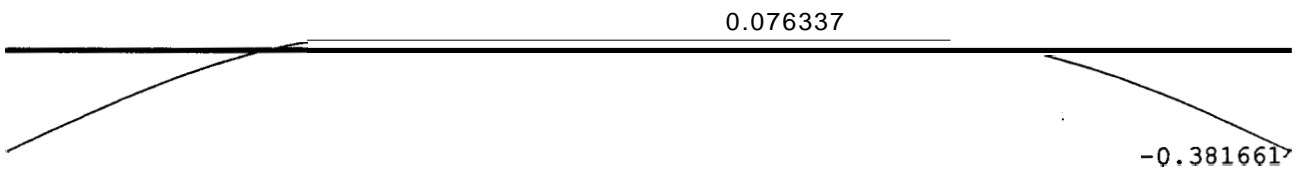
Moment - kip ft



Rotation - radians



Deflection - inches





Project:

By:                      Date:                      Checked:                      Date:                      Page: 15 of 38

Analysis Data:

Beam Length = 30. feet  
Number of Nodes = 201  
Number of Elements = 200  
Number of Degrees of Freedom = 402

Reactions:

X feet	Vert kips	Rot kip ft
6.000	41.100	
24.000	41.100	

Equilibrium:

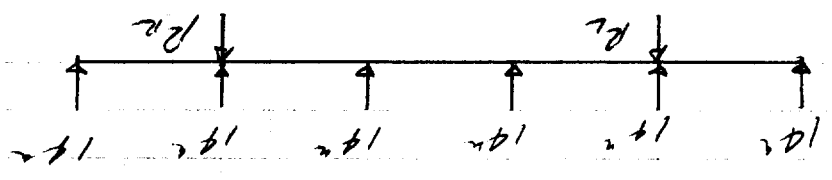
	Force	Reaction	Diff
Vert	-82.200	82.200	-0.000 kips
Rot	1233.000	-1233.000	0.000 kip ft

Min & Max values:

Min Shear	=	-13.700 kips	at	0.450 feet
Max Shear	=	13.700 kips	at	28.950 feet
Min Moment	=	-82.200 kip ft	at	24.000 feet
Max Moment	=	0 kip ft	at	30.000 feet
Min Rotation	=	-0.006361 radians	at	0 feet
Max Rotation	=	0.006361 radians	at	30.000 feet
Min Deflection	=	-0.381661 in	at	30.000 feet
Max Deflection	=	0.076332 in	at	16.500 feet

HOME SIDE (cont)

Row 'B' CLASS BEAM (AT PRESS BOX)



$R_u - R_c = 42k$

SEE PG 17 TO 19

$M_x = 14k(\ell) = 84k-ft$       TRY W14x38

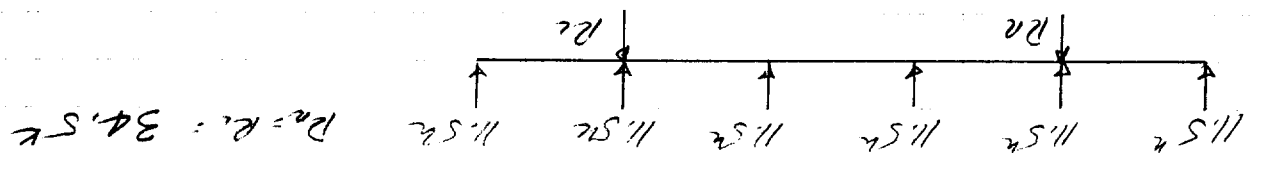
$S_x (req'd) = \frac{84k-ft \times 12/in}{0.66 (SAFE)} = 30,541.3$       OK!

$S_x (provided) = 54,612.3$

$\Delta = 0.39"$       OK!  
 $Defn: \frac{180}{6 \times 12} = 0.4"$

USE W14x38

Row 'B' CLASS BEAM (AWAY FROM PS)



$R_u - R_c = 34.5k$

$M_x = 11.5k(\ell) = 69k-ft$       SEE PG 20 TO 22

$S_x (req'd) = \frac{69k-ft \times 12/in}{0.66 (SAFE)} = 25,112.3$       OK!  
 $S_x (provided) = 42,113$

Project:

By:                      Date:                      Checked:                      Date:                      Page: 17 of 3 P

Description:

05-1013  
Memorial Field  
Portland, ME  
Home  
CB-B AT PB

Units: English

Properties - X = feet, E = ksi, I = in<sup>4</sup>  
X = 0; E = 29000; I = 385; /W14x38  
X = 30; E = 29000; I = 245;

Moment Releases - X = feet

Supports - X = feet, Displacement = inches, Rotation = radians  
X = 6; Disp = 0;  
X = 24; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft  
X = 0; PLoad = -14;  
X = 6; PLoad = -14;  
X = 12; PLoad = -14;  
X = 18; PLoad = -14;  
X = 24; PLoad = -14;  
X = 30; PLoad = -14;

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft

Project:

By:

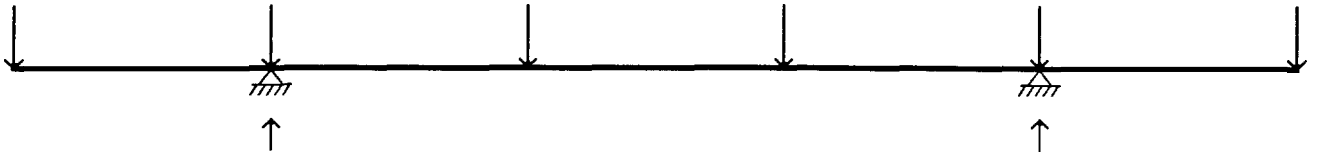
Date:

Checked:

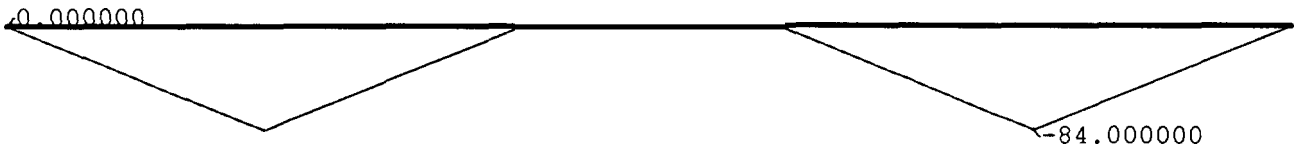
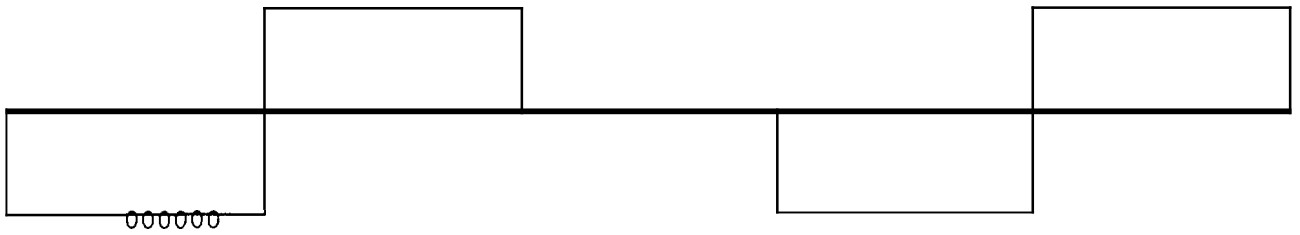
Date:

Page: 18 of 38

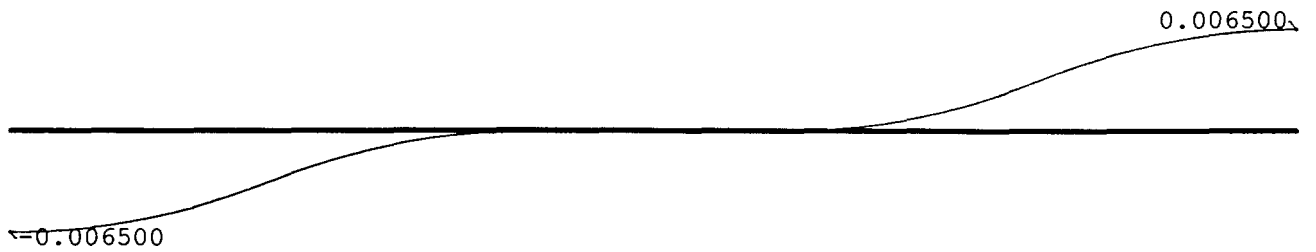
Reactions - kips, kip ft



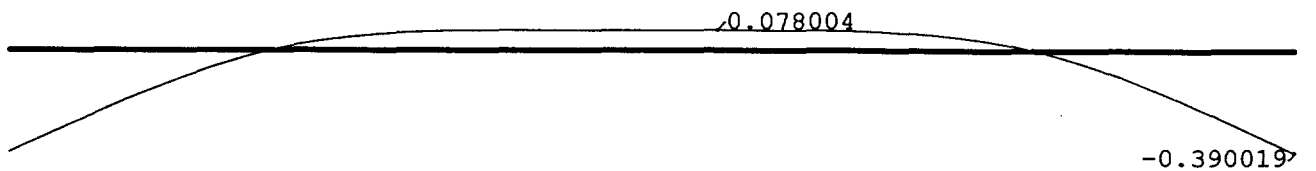
Shear - kips



Rotation - radians



Deflection - inches



# WinBeam

Project:

By:                      Date:                      Checked:                      Date:                      Page: 19 of 38

Analysis Data:

Beam Length = 30. feet  
Number of Nodes = 201  
Number of Elements = 200  
Number of Degrees of Freedom = 402

Reactions:

X feet	Vert kips	Rot kip ft
6.000	42.000	
24.000	42.000	

Equilibrium:

	Force	Reaction	Diff
Vert	-84.000	84.000	-0.000 kips
Rot	1260.000	-1260.000	0.000 kip ft

Min & Max values:

Min Shear	-	-14.000 kips	at	1.050 feet
Max Shear	-	14.000 kips	at	29.700 feet
Min Moment	-	-84.000 kip ft	at	24.000 feet
Max Moment	-	0 kip ft	at	0 feet
Min Rotation	=	-0.0065 radians	at	0 feet
Max Rotation	=	0.006500 radians	at	30.000 feet
Min Deflection	=	-0.390019 in	at	30.000 feet,
Max Deflection	=	0.078004 in	at	16.500 feet

Project:

By:                      Date:                      Checked:                      Date:                      Page: 20 of 38

Description:

05-1013  
Memorial Field  
Portland, ME  
Home  
CB-B AWAY PB

Units: English

Properties - X = feet, E = ksi, I = in<sup>4</sup>

X = 0; E = 29000; I = 291; /W14x30

X = 30; E = 29000; I = 245;

Moment Releases - X = feet

Supports - X = feet, Displacement = inches, Rotation = radians

X = 6; Disp = 0;

X = 24; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft

X = 0; PLoad = -11.5;

X = 6; PLoad = -11.5;

X = 12; PLoad = -11.5;

X = 18; PLoad = -11.5;

X = 24; PLoad = -11.5;

X = 30; PLoad = -11.5;

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft

Project:

By:

Date:

Checked:

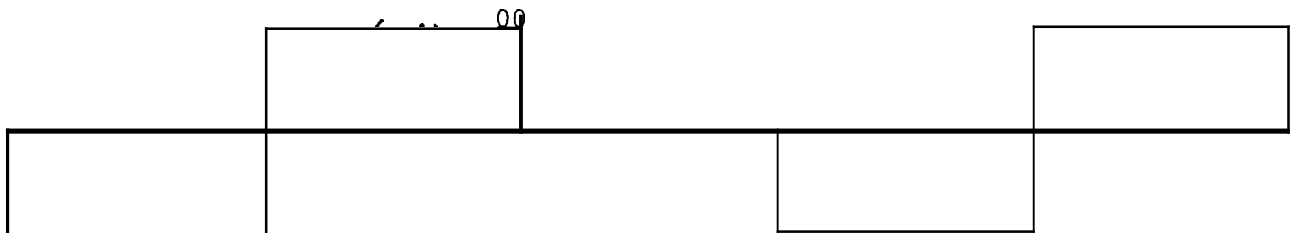
Date:

Page: 21 of 38

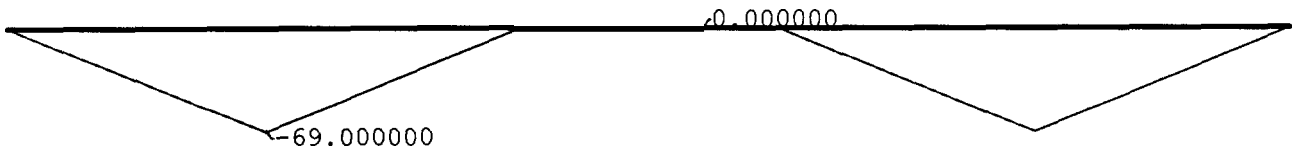
Reactions - kips, kip ft



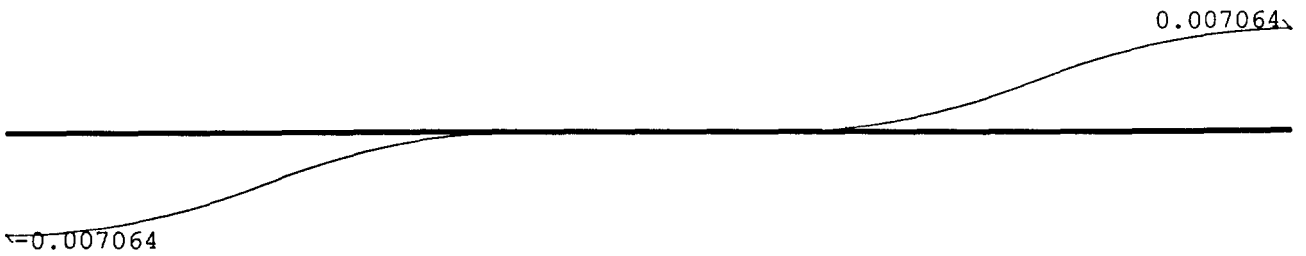
Shear - kips



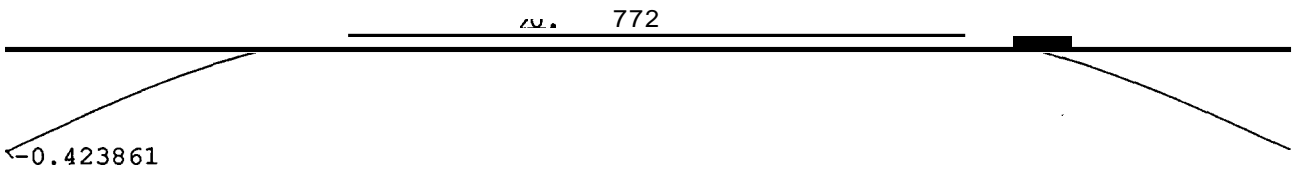
Moment - kip ft



Rotation - radians



Deflection - inches



Project:

By:                      Date:                      Checked:                      Date:                      Page: 22 of 38

Analysis Data:

Beam Length = 30. feet  
Number of Nodes = 201  
Number of Elements = 200  
Number of Degrees of Freedom = 402

Reactions:

X feet	Vert kips	Rot kip ft
6.000	34.500	
24.000	34.500	

Equilibrium:

	Force	Reaction	Diff
Vert	-69.000	69.000	0.000 kips
Rot	1035.000	-1035.000	0.000 kip ft

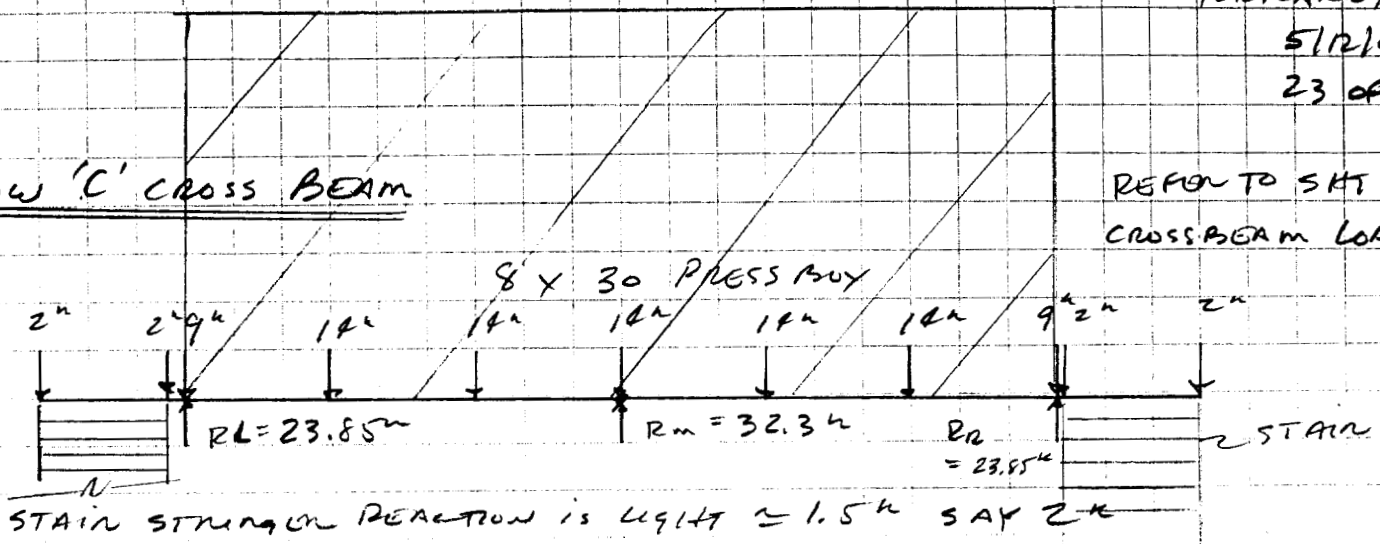
Min & Max values:

Min Shear	-	-11.500 kips	at	23.550 feet
Max Shear	-	11.500 kips	at	8.550 feet
Min Moment	-	-69.000 kip ft	at	6.000 feet
Max Moment	=	9.977e-008 kip ft	at	16.200 feet
Min Rotation	=	-0.007064 radians	at	0 feet
Max Rotation	=	0.007064 radians	at	30.000 feet
Min Deflection	=	-0.423861 in	at	0 feet
Max Deflection	=	0.084772 in	at	12.000 feet



Row 'C' CROSS BEAM

REFER TO SHEET FOR  
 CROSS BEAM LOADS.



REFER TO SHEETS 24 TO 26

$M_y = 61.35$  BY OBSERVATION, USE  $V111 \times 3.0$

$$S_x = \frac{61.35 \text{ k-FT} \times 12 \text{ in/ft}}{0.66 (58 \text{ ksi})} = 22.3 \text{ in}^3$$

$S_x (\text{PROVIDED}) = 42 \text{ in}^3$

} OK

SWAY LOADS

Row 'B' TRIBUTARY # OF SEATS \* LENGTH OF STAND \* 24 PLF OF SEAT  
NUMBER OF 'X' BRACES

$$\frac{9 \text{ SEATS} \times 175 \text{ LF} \times 24 \text{ PLF}}{5 \text{ 'X' BRACES}} = 7.56 \text{ k}$$

Row 'C' EA. 6' PB STRINGER TAKES 2.5k (MFE)

$$\frac{6 \text{ STRINGERS} \times 2.5 \text{ k}}{2 \text{ 'X' BRACES}} = 7.5 \text{ k}$$

Project:

By:                      Date:                      Checked:                      Date:                      Page: 24 of 38

Description:

05-1013  
Memorial Field  
Portland, ME  
Home  
CB-C AT PB

Units: English

Properties - X = feet, E = ksi, I = in<sup>4</sup>

X = 0; E = 29000; I = 291;

X = 42; E = 29000; I = 291;

Moment Releases - X = feet

X = 21;

Supports - X = feet, Displacement = inches, Rotation = radians

X = 6; Disp = 0;

X = 21; Disp = 0;

X = 36; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft

X = 0; PLoad = -1.5;

X = 5.5; PLoad = -1.5;

X = 6; PLoad = -9;

X = 12; PLoad = -14;

X = 18; PLoad = -14;

X = 24; PLoad = -14;

X = 30; PLoad = -14;

X = 36; PLoad = -9;

X = 36.5; PLoad = -1.5;

X = 42; PLoad = -1.5;

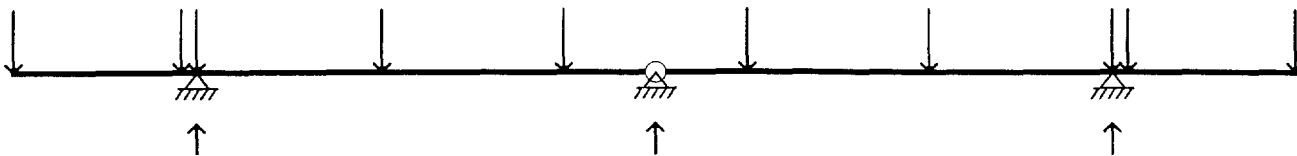
Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft

# WinBeam

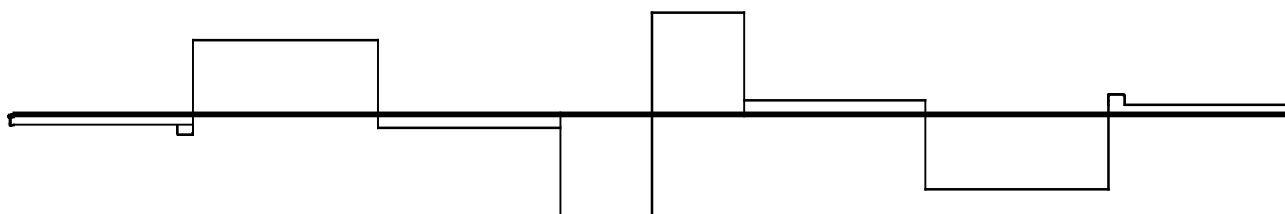
Project:

By:                      Date:                      Checked:                      Date:                      Page: 25 of 38

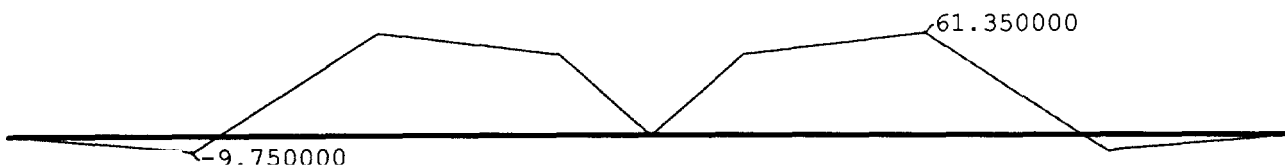
Reactions - kips, kip ft



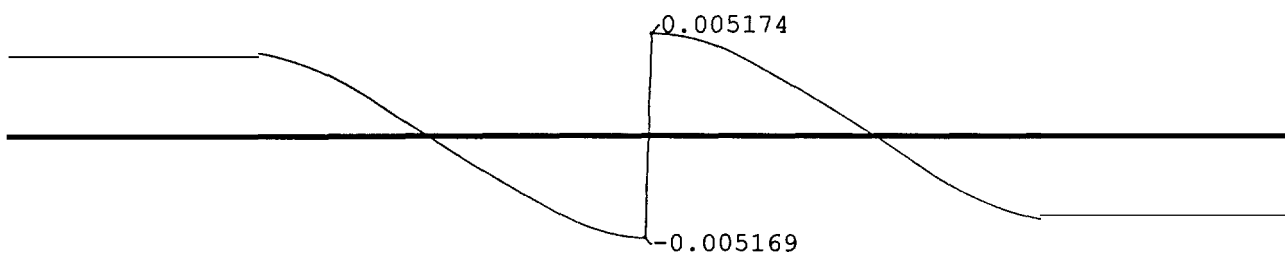
Shear - kips



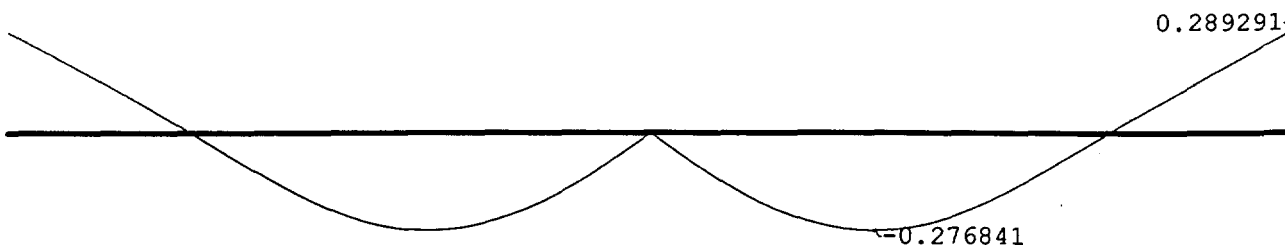
Moment - kip ft



Rotation - radians



Deflection - inches



Project:

By: \_\_\_\_\_ Date: \_\_\_\_\_ Checked: \_\_\_\_\_ Date: \_\_\_\_\_ Page: 26 of 36

Analysis Data:

Beam Length = 42. feet  
Number of Nodes = 207  
Number of Elements = 206  
Number of Degrees of Freedom = 414

Reactions:

X feet	Vert kips	Rot kip ft
6.000	23.850	
21.000	32.300	
36.000	23.850	

Equilibrium:

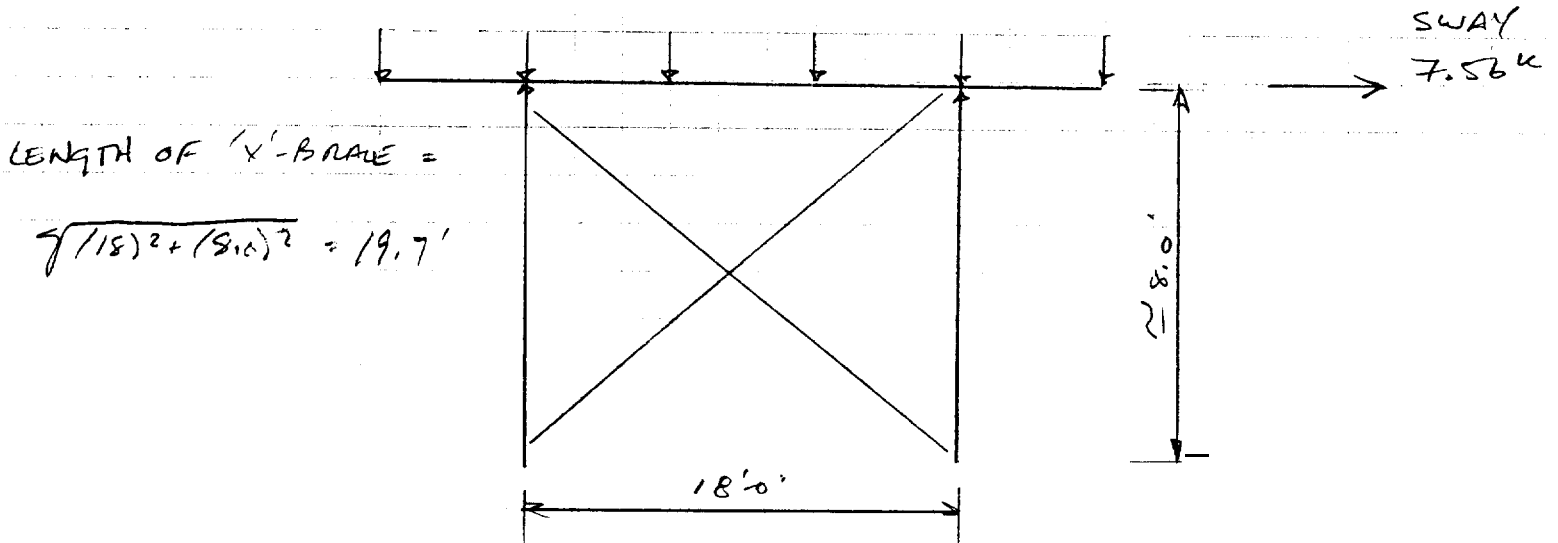
	Force	Reaction	Diff
Vert	-80.000	80.000	-0.000 kips
Rot	1680.000	-1680.000	0.000 kip ft

Min & Max values:

Min Shear	-	-16.150 kips	at	18.200 feet
Max Shear	-	16.150 kips	at	23.600 feet
Min Moment	-	-9.750 <b>kip</b> ft	at	6.000 feet
Max Moment	-	61.350 kip ft	at	30.000 feet
Min Rotation	=	-0.005169 radians	at	20.800 feet
Max Rotation	=	0.005174 radians	at	21.000 feet
Min Deflection	=	-0.276841 in	at	28.345 feet
Max Deflection	=	0.289291 in	at	42.000 feet

CROSS BRAKE DESIGN

Row 'B'



TENSION FORCE:  $\frac{19.7}{18'} (7.56k) = 8.27k$

TENSION

$\frac{KL}{r_y} \leq 300 \quad r_y \geq \frac{19.7' \times 12''/1.}{300} = 0.788''$

USE  $3 \times 2 \times 1/4$  LCH OK! SIMILAR TO Row 'C'  
 $r_y = 0.957'' > 0.788$  in

$T_{all} = F_c(A) = [0.6/50^{KSE}] (1.19 - 1/4(3/16)^2) = 22.95k \gg 8.27k$  OK!  
 Gross Area

CHECK WEAR DIRECTION:

$\frac{L}{2} = \frac{19.7'}{2} = 9.6' \quad \frac{KL}{r} \leq 300 \quad r \geq \frac{9.6' \times 12}{300} = 0.384$  in

$r_y (L3 \times 2 \times 1/4) = 0.574$  in  $> 0.384$  in OK!

05-1013

MEMORIAL FILE

5/12/15

28 OK:

## COLUMN DESIGN

Row 'B'

$$P = 42 \text{ k} \quad (P916)$$

$$l = 8'0"$$

$$P_{CAP} = 102 \text{ k} \gg 42 \text{ k} \quad \text{ok!}$$

Row 'C'

$$P = 32.3 \text{ k}$$

$$L = 11.75'$$

TRY W6X15

$P_{CAP} \Rightarrow$  INTERPOLATE

$L$	$P_{CAP}$ k
11	74
11.75	X
12	66

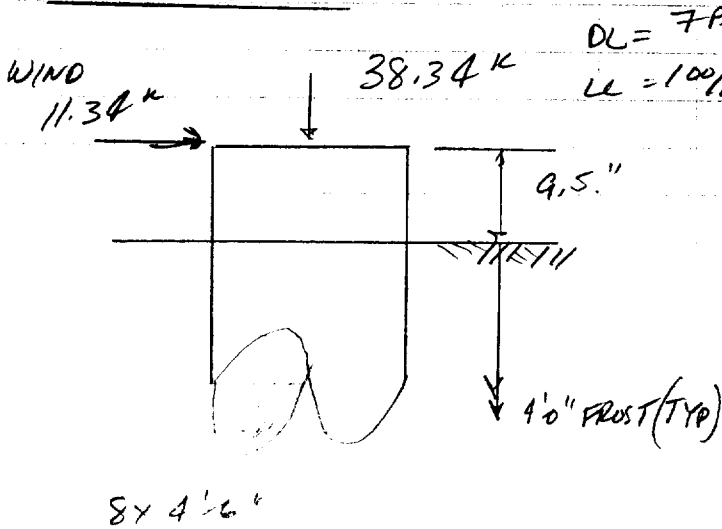
BY INSPECTION,  $P_{CAP} \gg 32.3 \text{ k}$  so, USE W6X15

FOUNDATION DESIGN

ALLOWABLE SOIL BLY PRESSURE USED IN DESIGN IS 3000 PSF PER MEMORANDUM DATED 12/3/04 FROM SEBAGO TECHNICUS. (SEE SHET 30)

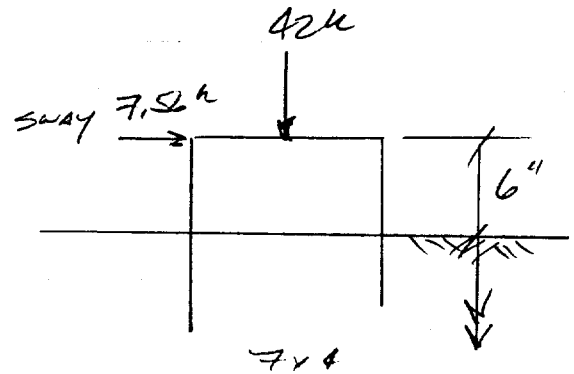
Row 'A'

AT PRESS BOX

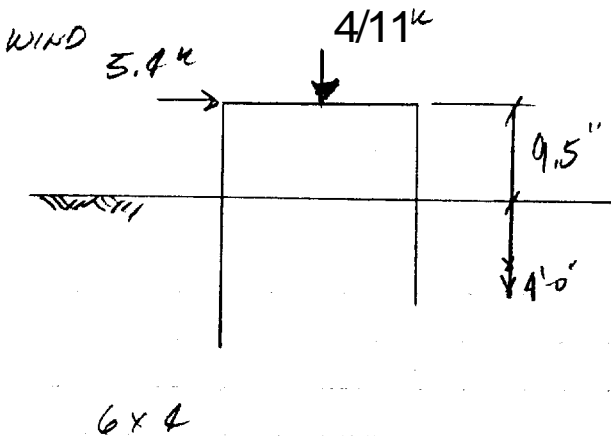


$DL = 7 PF / 107 PSF (38.34 k) = 2.51 k$   
 $LL = 100 / 107 PF (38.34 k) = 35.83 k$

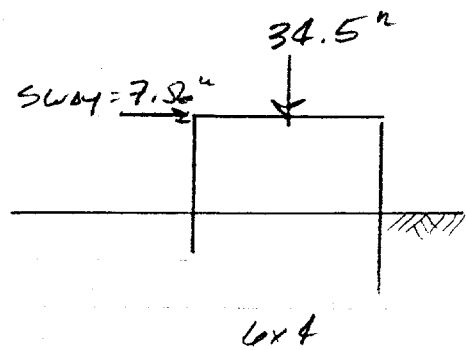
Row 'B' (AT PB)



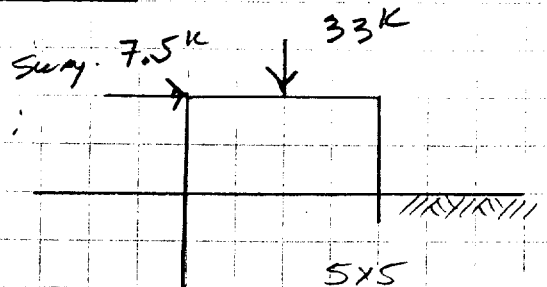
AWAY FROM PB



Row 'B' (AWAY FROM PB)



Row 'C'



REFER TO SHETS 31 TO 35 FOR FOOTING SIZES:

# Sebago Technics

sebagotechnics.com  
One Canal Street  
P.O. Box 1339  
Westbrook, Maine  
04098-1339  
Ph. 207-856-0277  
Fax 858-2206

## MEMORANDUM

03245

To: Chris DiMatteo  
From: Ken Recker  
Date: December 3, 2004  
Subject: Allowable Bearing Stress  
Memorial Field, Portland, Maine

TO: JERRY  
SULLIVAN

This memorandum presents our recommendation for allowable bearing stress for new grandstand foundations.

In summary, we recommend that the new grandstands be supported on spread footings bearing on the undisturbed, naturally deposited sand, or on compacted structural fill placed after removal of unsuitable soil.

### Introduction

Memorial Field is located at the northwest corner of the intersection of Ludlow and Leland Streets in Portland, Maine. The field presently consists of a grassed multi-use field, gravel track, and grandstands. Results of our subsurface investigation are presented in our memorandum dated November 29, 2004.

### Discussion

The undisturbed, naturally deposited sand encountered at the site is generally medium dense with Standard Penetration Resistance "N" values varying from approximately 9 to 75. In our opinion, the grandstands may be supported on the undisturbed, naturally deposited sand, or on compacted structural fill placed after removal of unsuitable soils.

Footings should be proportioned for an allowable bearing stress in pounds per square feet (psf) equal to 1,000 multiplied by the least lateral dimension of the footing in feet up to a maximum of 3,000 psf. All footings should be at least 1.5 feet wide.

Footings should be founded a minimum of 4.5 feet below the lowest adjacent ground surface exposed to freezing.

KLR:klr/jc



SECTION I FOOTING DESIGN TYPE II AWAY FROM FB

DESIGN STABILITY

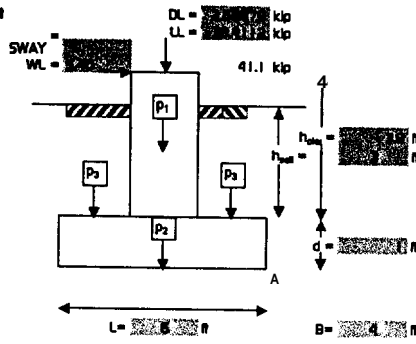
OW = 0.0000 ksf

B O & = 0.0000 ft

$$e = \frac{W_L(h+d)}{DL+W_L}$$
  

$$e_{max} = 0$$
  

$$e_{min} = 0.63066$$



$$q = \frac{DL+LL}{L^2} [1+6(e/L)]$$

$Q_{allow} = 0$ ksf	$Q_{fact} = 0.6325$ ksf	$Q_{req} = 3$ ksf	NG	NON-CRITICAL VALUE
$Q_{allow} = 2.7925$ ksf	$Q_{fact} = 0.6325$ ksf	$Q_{req} = 3$ ksf	OK	CRITICAL VALUE

CHECK WL OVERTURNING

$$FS = \frac{M_{resisting}}{M_{overturning}}$$

resisting = 44.8872  
 overturning = 25.92

$P_1 = 1.7898$  k  
 $P_2 = 3.6$  k  
 $P_3 = 6.8838$  k

FS = 1.7318 \* 1.5

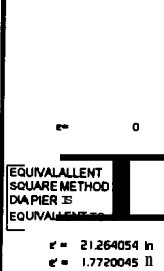
FOUNDATION DESIGN (ACI 318)

CALCULATE FACTORED SOIL BEARING PRESSURE

FACTORED LOADS UNITS KIP, FT

FORMULA 1  $U = 0.75(1.4DL+1.7LL+1.7WL)$   
 FORMULA 2  $U = 1.4DL+1.7LL$

FORMULA 1



$e = 21.264054$  in  
 $e = 1.7720045$  ft

EQUIVALENT SQUARE METHOD  
 DIA PIER IS  
 EQUIVALENT

FORMULA 2



CHECK SHEAR  
 $\phi = 0.9$   
 $f_c = 4.0$  ksi  
 $d = 1.0$  ft  
 $f_u = 60.0$  ksi

$q_u = 2.88$  KSF  
 $b_o = 4(c+d) = 144$  IN

$\phi V_{cn} > V_u = P_u - Q_u(c+d) = 50.7601$  K OK  
 $= 40d_o f_u j' = 7.53211$  K

DESIGN FLEXURE

$M_u = q_u B L / 2 - c / 2)^2 / 2$   
 $M_u = 5.75528$  FT-K FACTORED MOMENT

$A_s = 0.0017$  in<sup>2</sup>/ft

$a = A_s f_y / 0.85 f_c b = 0.39216$  "

$M_u = 0.85 A_s f_y (d - a/2) = 89.8$  k-ft  
 $7.48333$  FT-K

OK

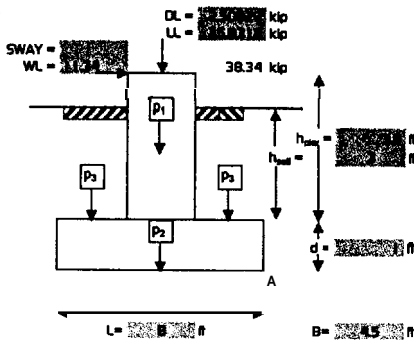
SECTION I FOOTING DESIGN TYPE b AT PB

DESIGN STABILITY

DW = [REDACTED]

ER DIA = [REDACTED] ft

$e = \frac{W_L(d+c)}{D_L+W_L}$   
 $e_{max} = 0$   
 $e_{min} = 1.41972$



$$q = \frac{(D_L+LL)}{L^2} [1+6e/L]$$

$q_{max}$	0	ksf	0	ksf	$< q_{all}$	3	ksf	NG	NON-CRITICAL VALUE
$q_{min}$	2.199	ksf	-0.069	ksf	$< q_{all}$	3	ksf	OK	CRITICAL VALUE

CHECK WL OVERTURNING

$FS = M_{resisting} / M_{overturning}$

$M_{resisting}$	82.1673		$P_1$	1.7898	k
$M_{overturning}$	54.432		$P_2$	5.4	k
$FS$	1.5095		$P_3$	10.8438	k

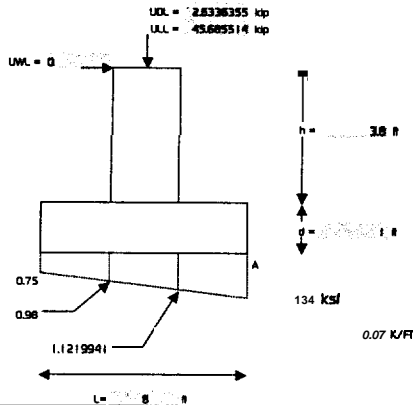
FOUNDATION DESIGN (ACI 318)

CALCULATE FACTORED SOIL BEARING PRESSURE

FACTORED LOADS UNITS KIP, FT

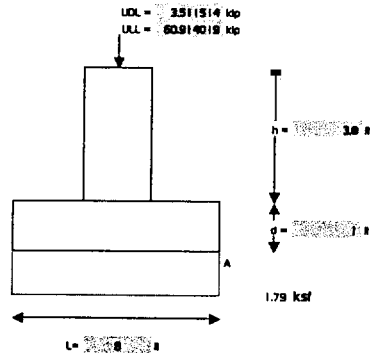
FORMULA 1  $U = 0.75(1.4D_L + 1.7L + 1.7W_L)$   
 FORMULA 2  $U = 1.4D_L + 1.7L$

FORMULA 1



3) UNVALLENT SQUARE METHOD 2 ft DIA PIER IS UNVALLENT TO:  
 $e = 21.264054$  in  
 $e = 1.7720045$  ft

FORMULA 2



CHECK SHEAR

$\phi$	0.85		
$f_c$	3	ksf	
$d$	8	in	
$f_u$	60	ksf	
$q_u$	1.79	KSF	
$D_p$	$4(c+d)$	144	in

$\phi V_n > V_u - \phi_u(c+d)^2 = 53.0428$  K OK  
 $= 40d\phi_u f_u = 7.63211$  K

DESIGN FLEXURE

$M_u = q_u B L / 2 - c / 2 P^2 / 2$   
 $M_u = 8.05319$  FT-K FACTORED MOMENT

$A_s = [REDACTED] \text{ in}^2 / \text{ft}$   
 $\phi = A_s / (0.85 f_c b d) = 0.39216$   
 $M_u = 0.85 A_s f_u (d - a/2) = 89.8 \text{ K-ft}$   
 $7.48333 \text{ FT-K}$

$A_s = 0.4418$   
 $\#6 @ 12"$

OK

SECTION 1 FOOTING DESIGN: TYPE C AWAY FB

DESIGN STABILITY

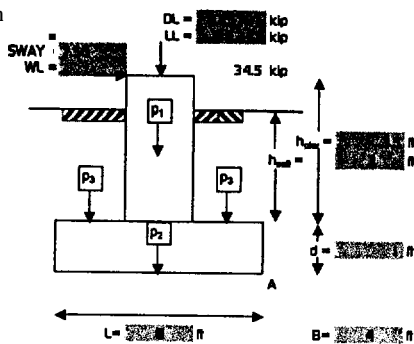
DW = [REDACTED]

= OW = [REDACTED] II

$$e = \frac{W(x)(h+d)}{DL+WL}$$
  

$$e_{max} = 0.98609$$
  

$$e_{min} = 0$$



$$q = \frac{DL+LL}{L^2} [1+6(e/L)]$$

$q_{max}$	2.99 ksf	0.02 ksf	$< q_{all}$	3 ksf	OK	$\Leftarrow$ CRITICAL VALUE
$q_{min}$	0 ksf	0 ksf	$< q_{all}$	3 ksf	NG	NON-CRITICAL VALUE

CHECK WL OVERTURNING

NOT REQUIRED IN CALCULATION

$$FS = \frac{M_{resisting}}{M_{overturning}}$$

$M_{resisting} = 43.1679$   
 $M_{overturning} = 0$

$P_1 = 1.6485 \text{ k}$   
 $P_2 = 3.5 \text{ k}$   
 $P_3 = 6.8838 \text{ k}$

$$FS = \frac{M_{resisting}}{M_{overturning}} > 1.5$$

FOUNDATION DESIGN (ACI 318)

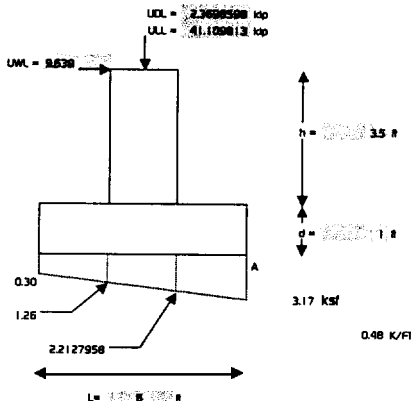
CALCULATE FACTORED SOIL BEARING PRESSURE

FACTORED LOADS UNITS KIP, FT

FORMULA 1  $U = 0.75(1.4DL + 1.7LL + 1.7WL)$   
 FORMULA 2  $U = 1.4DL + 1.7LL$

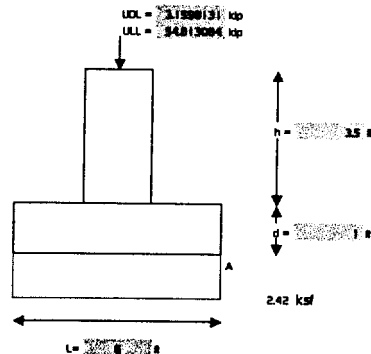
FORMULA 1

$e = 0.7482031$   
 UNVALLENT SQUARE METHOD 2 R  
 COLUMN IS UNVALLENT TO:  
 $e = 21.264054 \text{ in}$   
 $e = 1.7720045 \text{ ft}$



FORMULA 2

$e = 0.7482031$   
 UNVALLENT SQUARE METHOD 2 R  
 COLUMN IS UNVALLENT TO:  
 $e = 21.264054 \text{ in}$   
 $e = 1.7720045 \text{ ft}$



CHECK SHEAR

$\phi = 0.85$   
 $f_c = 4 \text{ ksf}$   
 $d = 14 \text{ in}$   
 $f_u = 60 \text{ ksf}$   
 $q_u = 2.42 \text{ KSF}$   
 $b_0 = 4(c+d) = 144 \text{ IN}$

$\phi V_{cn} > V_u = P_u - Q_u(c+d) = 42.6089 \text{ K}$  OK  
 $\phi V_{cn} = \phi(0.85 f_c b_0 d) = 7.63211 \text{ K}$

DESIGN FLEXURE

$M_u = q_u B L / 2 - c/2^2 / 2$   
 $M_u = 4.83107 \text{ FT-K}$  FACTORED MOMENT

$A_s = 1.12 \text{ in}^2 / \text{ft}$  OK

$s = A_s f_y / 0.85 f_c b = 0.39216 \text{ "}$

$M_u = 0.85 A_s f_y (d - s/2) = 89.8 \text{ k-ft}$   
 $7.46333 \text{ FT-K}$

SECTION I FOOTING DESIGN TYPE d AT PR

DESIGN STABILITY

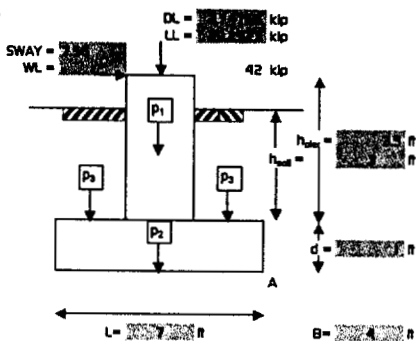
ROW

PIER DIA =

$$e = \frac{W(L+h+d)}{DL+WL}$$

$$e_{max} = 0.81$$

$$e_{min} = 0$$



$$q = \frac{(DL+LL)}{L^2} [1+6|e|/L]$$

$q_{max}$	2.54	ksf	0.458571	ksf	$< q_{all}$	3	ksf	OK	= CRITICAL VALUE
$q_{min}$	0	ksf	0	ksf	$< q_{all}$	3	ksf	NG	NON-CRITICAL VALUE

CHECK WL OVERTURNING

NOT REQUIRED IN CALCULATION

$$FS = M_{resisting} / M_{overturning}$$

$$M_{resisting} = 58.7999$$

$$M_{overturning} = 0$$

$$FS = \infty / 0 > 1.5$$

$$P_1 = 1.5485 \text{ k}$$

$$P_2 = 4.2 \text{ k}$$

$$P_3 = 8.2038 \text{ k}$$

FOUNDATION DESIGN (ACI 318)

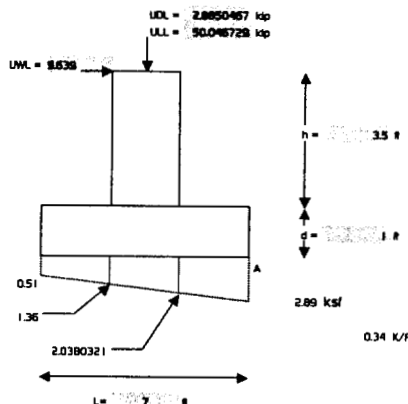
CALCULATE FACTORED SOIL BEARING PRESSURE

FACTORED LOADS UNITS KIP, FT

FORMULA 1  $U = 0.75(1.4DL + 1.7LL + 1.7WL)$

FORMULA 2  $U = 1.4DL + 1.7LL$

FORMULA 1

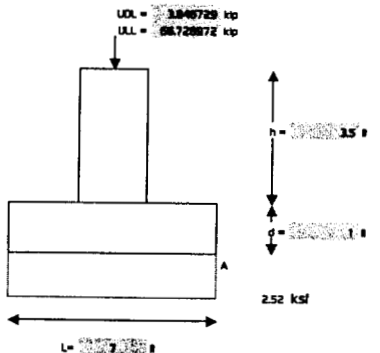


EQUIVALENT SQUARE METHOD 2 R  
 DIA PIER IS EQUIVALENT TO :

$$e = 21.264054 \text{ in}$$

$$e = 1.7720045 \text{ ft}$$

FORMULA 2



CHECK SHEAR

$$Q = 0.85$$

$$f_c = 3 \text{ ksf}$$

$$d = 8 \text{ in}$$

$$f_u = 80 \text{ ksf}$$

$$q_u = 2.52 \text{ KSF}$$

$$b_o = 4(c+d) = 144 \text{ IN}$$

$$V_u > V_c = P_u - Q_u(c+d) = 59.5437 \text{ K} \quad \text{OK}$$

$$= 40 Q_u d / j' = 7.63211 \text{ K}$$

DESIGN FLEXURE

$$M_u = q_u B L / 2 - c / 2 l^2 / 2$$

$$M_u = 7.87675 \text{ FT-K} \quad \text{FACTORED MOMENT}$$

$$A_s = 0.4418 \text{ in}^2$$

$$a = A_s f_y / 0.85 P_u b = 0.39216 \text{ in}$$

$$M_u = 0.85 A_s f_y (d - a/2) = 89.8 \text{ k-in}$$

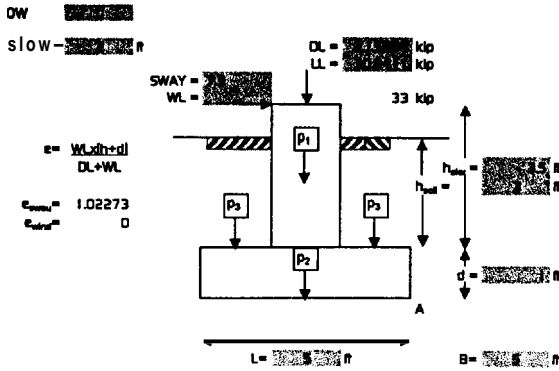
$$= 7.48333 \text{ FT-K}$$

$A_s = 0.4418 \text{ in}^2$

OK

**SECTION I FOOTING DESIGN: TYPE & AT PB**

**DESIGN STABILITY**



$q = \frac{DL+LL}{L^2} [1+6(e/L)]$   
 $q_{allow} = 3.00 \text{ ksf}$      $q_{fact} = 0 \text{ ksf}$      $0.3 \text{ ksf}$      $q_{net} = 3 \text{ ksf}$     OK     $\leftarrow$  CRITICAL VALUE  
 $q_{net} = 0 \text{ ksf}$      $0 \text{ ksf}$      $q_{net} = 3 \text{ ksf}$     NG    NON-CRITICAL VALUE

CHECK WL OVERTURNING      NOT REQUIRED IN CALCULATION  
 $FS = M_{resisting} / M_{overturning}$

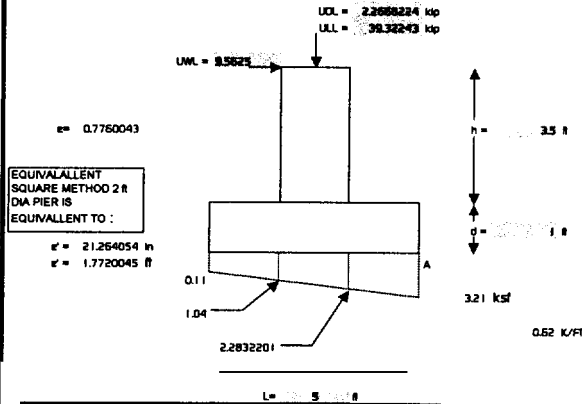
$M_{resisting} = 36.9279$        $P_1 = 1.6485 \text{ k}$   
 $M_{overturning} = 0$        $P_2 = 3.75 \text{ k}$   
 $FS = \#DIV/0!$        $P_3 = 7.2138 \text{ k}$   
 $FS > 1.5$

**FOUNDATION DESIGN (AO 318)**

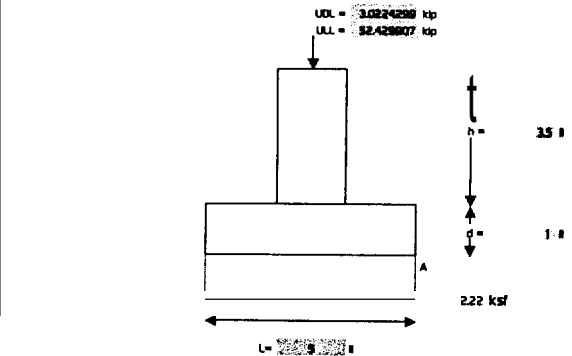
CALCULATE FACTORED SOIL BEARING PRESSURE  
 FACTORED LOADS UNITS KIP, FT

FORMULA 1       $U = 0.75(1.4DL + 1.7LL + 1.7WL)$   
 FORMULA 2       $U = 1.4DL + 1.7LL$

**FORMULA 1**

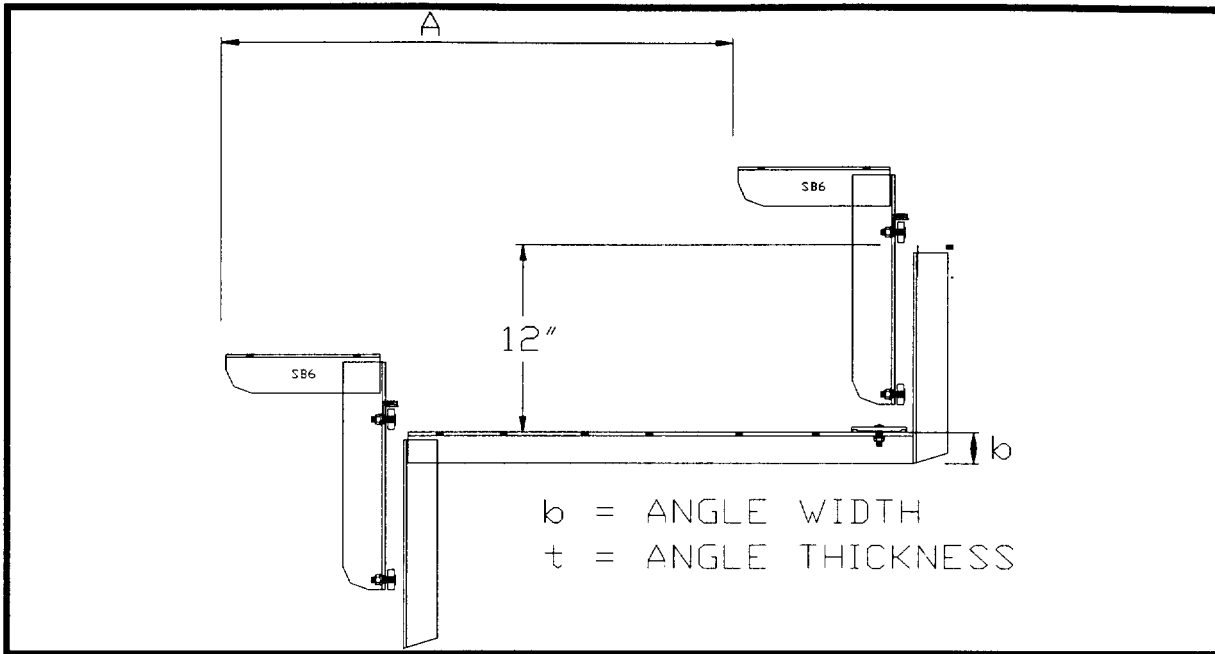


**FORMULA 2**



**CHECK SHEAR**  
 $\phi = 0.85$   
 $f_c = 4 \text{ ksf}$   
 $d = 1 \text{ ft}$   
 $f_u = 60 \text{ ksf}$   
 $q_u = 2.22 \text{ KSF}$   
 $b_o = 4(c+d) = 144 \text{ IN}$   
 $\phi V_{cn} > V_u = P_u - Q_u c + d^2 = 41.3441 \text{ K}$   
 $\phi V_{cn} = 4\phi b_o f_c d = 7.53211 \text{ K}$

**DESIGN FLEXURE**  
 $M_u = q_u B L^2 / 2 - c/2 P^2 / 2$   
 $M_u = 2.49536 \text{ FT-K}$       FACTORED MOMENT  
 $A_s = 0.39216 \text{ IN}^2 / \text{FT}$   
 $A_s = A_s f_y / 0.85 f_c b = 0.39216$   
 $M_u = 0.85 A_s f_y (d - a/2) = 7.48333 \text{ FT-K}$       OK



F <sub>y</sub> =	50	ksi
76/(F <sub>y</sub> ) <sup>1/2</sup> =	10.748023	ksi
155/(F <sub>y</sub> ) <sup>1/2</sup> =	21.92031	ksi
SPACING	6	ft
b =	2.5	in
t =	0.1875	in
b/t =	13.333333	
Q <sub>s</sub> =	0.919	
F <sub>b</sub> =	27556.931	psi
LL =	100	psf
DL =	7	psf
W =	642	plf
A =	2	ft

**Bending Stress Unstiffened  
Compression Elements**

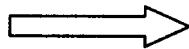
If,  
 $b/t < 76/(F_y)^{1/2}$   
 $F_b = 0.6F_y$

If,  
 $76/(F_y)^{1/2} \leq b/t \leq 155/(F_y)^{1/2}$   
 $F_b = 0.6Q_sF_y$   
 $Q_s = 1.34 - 0.00447(b/t)(F_y)^{1/2}$

If,  
 $b/t > 155/(F_y)^{1/2}$   
 $F_b = 0.6Q_sF_y$   
 $Q_s = 15500/[F_y(b/t)^2]$   
(AISC 9<sup>th</sup> ED PP 5-98)

$M = WA^2/8$

M = 321 ft-lbs



S <sub>REQUIRED</sub> =	0.139783	in <sup>3</sup>	<b>OK!!</b>
S <sub>PROVIDED</sub> =	0.19	in <sup>3</sup>	

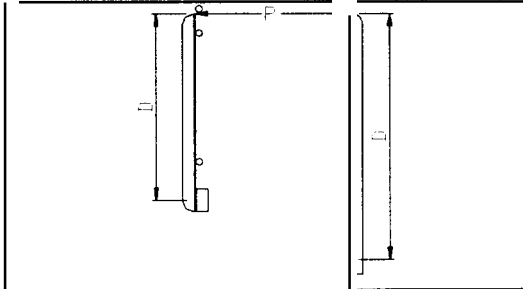
L2x2x3/16

IBC 2003  
RAIL POST LOAD 200 lbs Point load or 50 lbs/ft Uniform Load

RAIL POST CALCULATION

$F_y$  50 ksi  
 $76/(F_y)^{1/2}$  10.74802  
 $155/(F_y)^{1/2}$  21.92031

AISC APPENDIX B (PG. 5-98)



Bending Stress Unstiffened Compression Elements  
 If,  
 $b/t < 76/(F_y)^{1/2}$   
 $F_b = 0.6F_y$   
 If,  
 $76/(F_y)^{1/2} \leq b/t \leq 155/(F_y)^{1/2}$   
 $F_b = 0.6Q_s F_y$   
 $Q_s = 1.34 - 0.00447(b/t)(F_y)^{1/2}$   
 If,  
 $b/t > 155/(F_y)^{1/2}$   
 $F_b = 0.6Q_s F_y$   
 $Q_s = 15500/[F_y(b/t)^2]$

FRONT RAIL POST (6'-0" c/c)

P(LBS)	D(IN)	M(IN-LBS)	b(IN)	t(IN)	b/t	$Q_s$	Fb(PSI)	$S_{REQ}(IN^3)$	SECTION	$S_{GIVEN}(IN^3)$	WEIGHT
300	42.25	12675	3	0.25	12	0.960708	28821.24	0.43978	3x2x1/4	0.542	4.1

SIDE RAIL POST (4'-0" c/c)

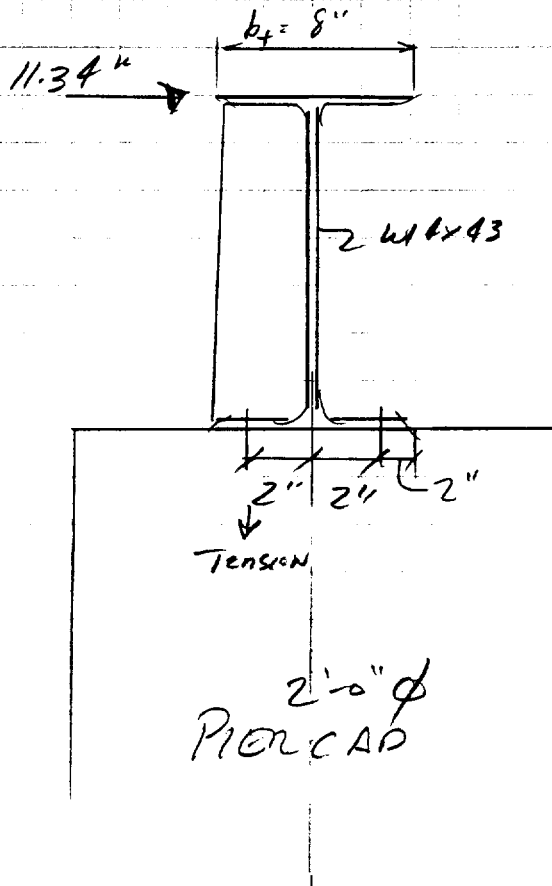
P(LBS)	D(IN)	M(IN-LBS)	b(IN)	t(IN)	b/t	$Q_s$	Fb(PSI)	$S_{REQ}(IN^3)$	SECTION	$S_{GIVEN}(IN^3)$	WEIGHT
200	70	14000	3	0.25	12	0.960708	28821.24	0.485753	3x2x1/4	0.542	4.1

REAR RAIL POST (6'-0" c/c) \* INCREASE IN ALLOWABLE STRESS 1/3

P(LBS)	D(IN)	M(IN-LBS)	b(IN)	t(IN)	b/t	$Q_s$	Fb(PSI)	$S_{REQ}(IN^3)$	SECTION	$S_{GIVEN}(IN^3)$	WEIGHT
300	59	17700	3	0.25	12	0.960708	38332.25	0.461752	3x2x1/4	0.542	4.1

ANCHOR BOLTS

ROW 'A' CHECK WIND AT PRESS BOX



$$T_{\text{Anchor Bolt}} = \frac{11.34 \text{ k} (13.66 \text{ in})}{6 \text{ in}} = 25.82 \text{ k}$$

$$2 \text{ ANCHOR BOLTS} = \frac{25.82 \text{ k}}{2 \text{ ANCHORS}} = 12.91 \text{ k}$$

ANCHOR BOLT A193 B-7

$$F_y = 105 \text{ KSI} \quad F_u = 125 \text{ KSI}$$

TAU  $\Rightarrow$ 

$$F_t = 0.33 F_u = 0.33 (125 \text{ KSI}) = 41.25 \text{ k}$$

$$T_{\text{AU}} = F_t A = 41.25 \text{ k} \left[ \frac{1}{4} \pi (3/4 \text{ in})^2 \right] = 18.22 \text{ k}$$

$$T_{\text{AU}} = 18.22 \text{ k} > T_{\text{ACT}} = 12.91 \text{ k} \quad \text{OK!}$$



SEISMIC ANALYSIS (IBC 2003)

$$\left. \begin{aligned} S_s &= 0.30 && (\text{Fig 1615(1)}) \\ S_1 &= 0.10 && (\text{Fig 1615(2)}) \end{aligned} \right\}$$

ASSUME SITE CLASS 'D' (TABLE 1615.1.1)

$$\left. \begin{aligned} F_a &= 1.6 && (\text{TABLE 1615.1.2(1)}) \\ F_v &= 2.4 && (\text{TABLE 1615.1.2(2)}) \end{aligned} \right\}$$

$$\left. \begin{aligned} S_{ms} &= F_a S_s = (1.6)(0.3) = 0.48 \\ S_{m1} &= F_v S_1 = (2.4)(0.1) = 0.24 \end{aligned} \right\} \text{ADJUSTED}$$

$$S_{0s} = 2/3 S_{ms} = 2/3 (0.48) = 0.32$$

$$S_{01} = 2/3 S_{m1} = 2/3 (0.24) = 0.16$$

SEISMIC USE GROUP II, FAILURE WOULD RESULT IN SUBSTANTIAL PUBLIC HARM

SEISMIC DESIGN CAT 'C' (TABLE 1616.3(1)) (TABLE 1616.3(2))

MINIMUM LATERAL FORCE  $\Rightarrow$

THE CRITICAL LOAD IS APPLIED TO THE FOUNDATION.

$$F_x = 0.01 W_x \quad W_x = W \text{ APPLIED TO STRUCTURE AT LEVEL } x$$

$$W \Rightarrow \text{USE LARGEST PIER REACTION} = 42 \text{ k}$$

$$DL = 7 \text{ psf} / 107 \text{ psf} (42 \text{ k}) = 2.75 \text{ k}$$

$$LL = 100 / 107 (42 \text{ k}) = 39.25 \text{ k} \quad (\text{ASSUME STORAGE})$$

$$W = 2.75 \text{ k} + 0.25 (39.25 \text{ k}) = 26.986 \text{ k}$$

$$F_x = 0.01 (26.986 \text{ k}) = 0.27 \text{ k} \quad \text{BY INSPECTION, THIS LOAD IS}$$

SMALL AND NEGLIGIBLE!