

# DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK CITY OF PORTLAND

Please Read Application And Notes, If Any, Attached

BUILDING DEPARTMENT

## PERMIT

Permit Number: 031285

This is to certify that Pjh Associates Limited/LCC International, Inc.  
has permission to Install 6 Antennas and Base Station Equipment/Use Cellular  
AT 1050 Westbrook St 210A A005001

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 leased or occupied. 24 HOUR 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. [Signature]  
Health Dept. \_\_\_\_\_  
Appeal Board \_\_\_\_\_  
Other \_\_\_\_\_  
Department Name \_\_\_\_\_

[Signature] 11/14/05  
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: 03-1285	Issue Date:	CEB: 210A A005001
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Location of Construction: 1050 Westbrook St	Owner Name: Pjh Associates Limited	Owner Address: 1050 Westbrook St	Phone: 775-2200
Business Name:	Contractor Name: LCC International, Inc.	Contractor Address: 482 Congress Street Portland	Phone: 2077719992
Lessee/Buyer's Name	Phone:	Permit Type: Additions - Commercial	Zone: AB

Past Use: Embassy Suites Hotel/Commercial	Proposed Use: Embassy Suites Hotel/Commercial	Permit Fee: \$291.00	Cost of Work: \$30,000.00	CEO District: 3
		FIRE DEPT: <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Denied	INSPECTION: Use Group: J Type: NA 11/14/03 Signature: [Signature]	

Proposed Project Description:  
Install 6 Antennas and Base Station Equipment/US Cellular

Signature: [Signature] Signature: [Signature]

PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)

Action:  Approved  Approved w/Conditions  Denied

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

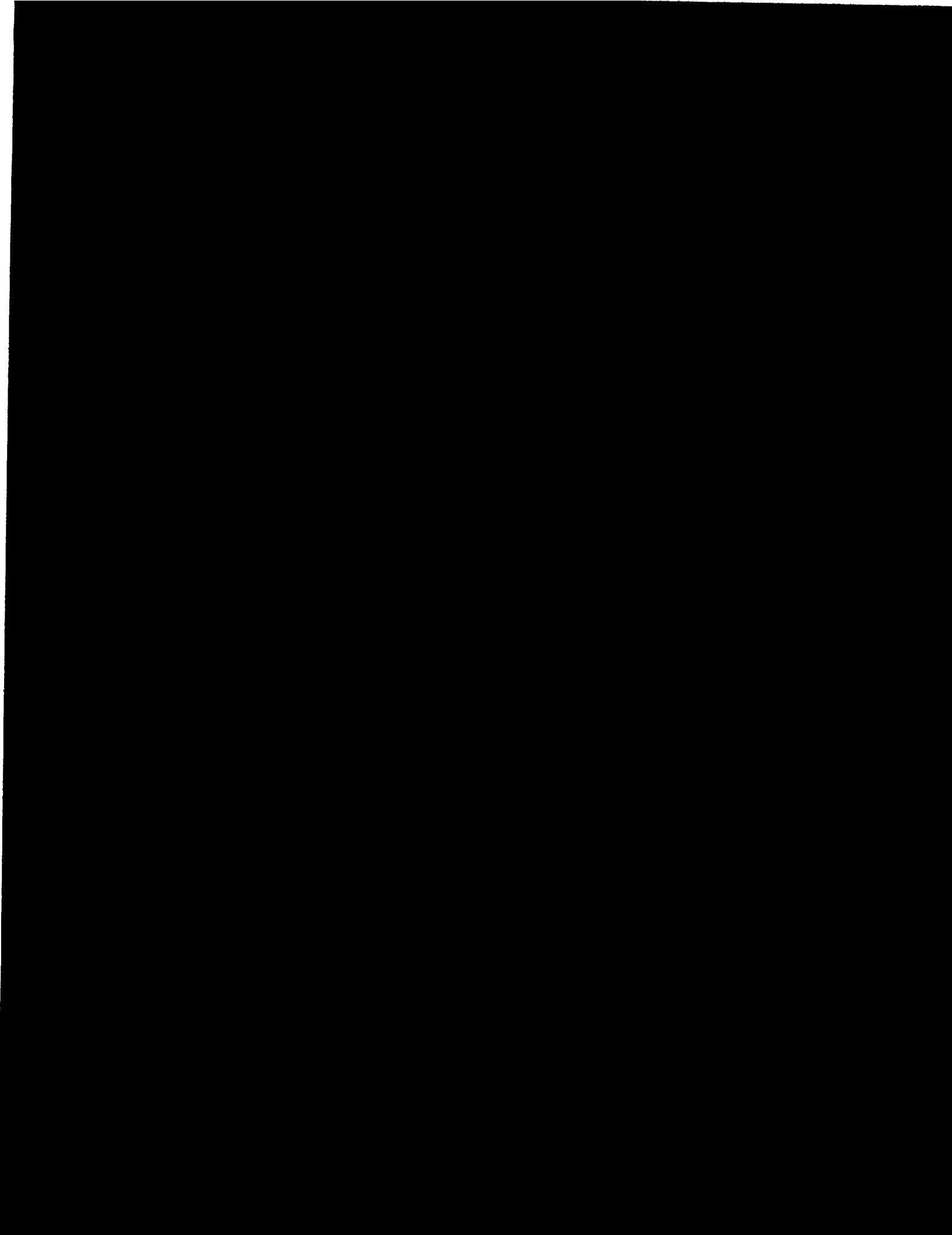
Permit Taken By: gad	Date Applied For: 10/20/2003	<b>Zoning Approval</b>
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1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules. 2. Building permits do not include plumbing, septic or electrical work. 3. 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..	Special Zone or Reviews <input type="checkbox"/> Shoreland <input type="checkbox"/> Wetland <input type="checkbox"/> Flood Zone <input type="checkbox"/> Subdivision <input type="checkbox"/> Site Plan Maj <input type="checkbox"/> Minor <input type="checkbox"/> MM <input type="checkbox"/> Date: [Signature] 11/3/03	Zoning Appeal <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: _____	Historic Preservation <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: [Signature]
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**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**  
**Planning And Urban Development**  
**Application For Exemption From Site Plan Review**

Pjh Associates Limited  
Applicant Phone

1050 Westbrook St  
Address

Portland ME 04102  
City State Zip

Pjh Associates Limited  
Consultant/Agent Phone

08/28/2003 20030180  
Application Date Application ID

Exemption  
Project Name/Description

210A A005001  
CBL

1050 Westbrook St  
Address of Proposed Site

**Description of Proposed Development:**

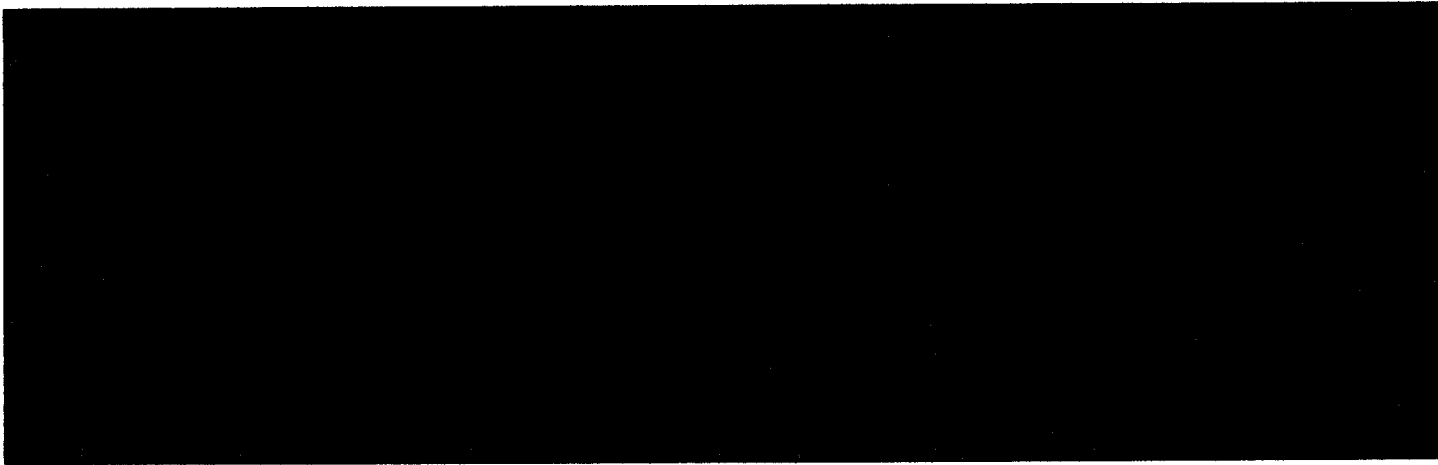
Place base station equipment cabinet on roof with 6 antennas (see sketch). Structural analysis and site plan in progress by Oest Engineering.

**PLEASE ATTACH SKETCH/PLAN OF PROPOSAL/DEVELOPMENT**

**Criteria for Exemptions:**

**Applicant**  
**(Yes, No, N/A)**

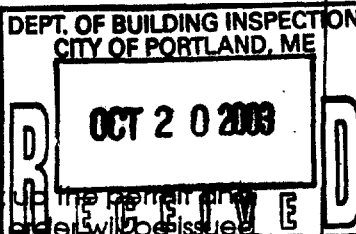
- |   |            |
|---|------------|
| a) within existing structures: No New Buildings, Demolitions or Additions | <u>Yes</u> |
| b) footprint increase less than 500 sq ft                                 | <u>Yes</u> |
| c) no new curb cuts, driveways, parking areas                             | <u>Yes</u> |
| d) curbs and sidewalks in sound condition and comply with ADA             | <u>Yes</u> |
| e) no additional parking / no traffic increase                            | <u>Yes</u> |
| f) no stormwater problems   | <u>Yes</u> |
| g) sufficient property screening  | <u>Yes</u> |
| h) adequate utilities   | <u>Yes</u> |



03-1285

# 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>1050 Westbrook Street</u>		
Total Square Footage of Proposed Structure <u>200 square feet</u>	Square Footage of Lot	
Tax Assessor's Chart, Block & Lot Chart# <u>210A</u> Block# <u>A</u> Lot# <u>5</u>	Owner: <u>PJH Assoc. Limited Liability Co.</u>	Telephone: <u>2200 775-2500</u>
Lessee/Buyer's Name (if Applicable) <u>U.S. Cellular</u>	Applicant name, address & telephone: <u>US Cellular</u> <u>482 Congress Street</u> <u>Portland Me 04101</u>	Cost Of Work: \$ <u>30,000</u> Fee: \$ <u>291.00</u>
Current use: <u>Hotel</u>		
If the location is currently vacant, what was prior use: _____		
Approximately how long has it been vacant: _____		
Proposed use: <u>Install (6) six antennas + Base Station Equipment</u> Project description:		
Contractor's name, address & telephone: <u>TBD</u>		DEPT. OF BUILDING INSPECTION CITY OF PORTLAND, ME  PHONE: <u>771-9992</u>
Who should we contact when the permit is ready: <u>Ed Shaw</u>		
Mailing address:		
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.		

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.

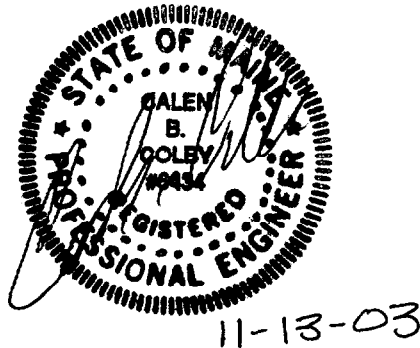
Signature of applicant: <u>Edward Shaw</u>	Date: <u>9/15/03</u>
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This is NOT a permit, you may not commence ANY work until the permit is issued. If you are in a Historic District you may be subject to additional permitting and fees with the Planning Department on the 4th floor of City Hall

**EMBASSY SUITES HOTEL**  
Portland, Maine

**CELLULAR TELEPHONE ANTENNA SUPPORT  
STRUCTURAL CALCULATIONS**

**SUBMITTAL #2**



**Prepared for:**

LCC International, Inc.  
482 Congress Street Suite 502  
Portland, ME 04101

**Prepared by:**

OEST Associates, Inc.  
343 Gorham Rd.  
South Portland, ME 04106-2317

November 13, 2003

# OEST ASSOCIATES, INC.

PREPARED BY J. Walker

DATE 11/13/03

PROJECT NO. 390.30.01

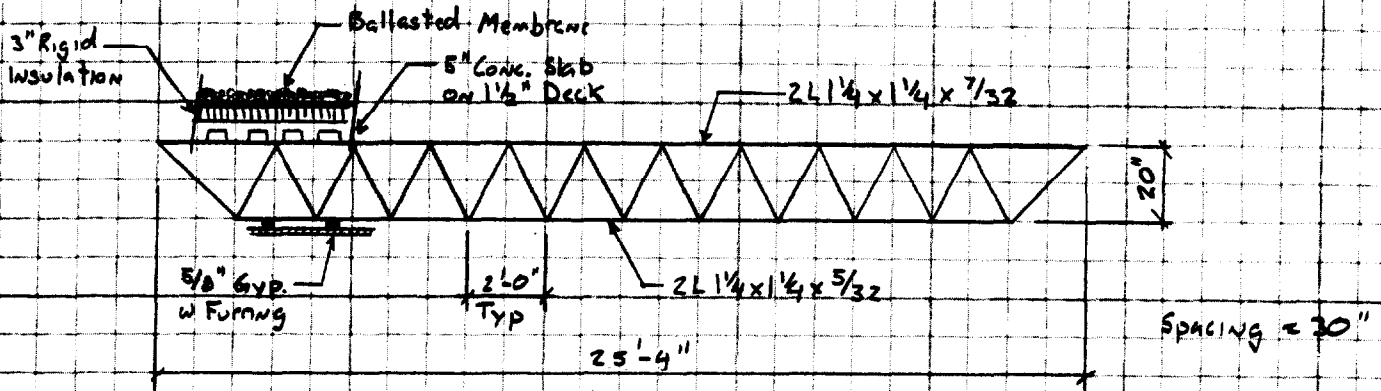
CALCULATIONS CHECKED BY \_\_\_\_\_

DATE \_\_\_\_\_

SHEET NO. 1 OF 2

SUBJECT Roof Analysis for Antenna Frames

## Existing Roof Framing:



## Calculate Roof Loads:

Ballasted Membrane	=	12.5 psf
3" Rigid Insulation	=	4.5 psf
5" Slab on 1 1/2" Deck	=	65 psf
5/8" Gyp & Furring	=	4 psf
Joint	=	3 psf
Mech. Allowance	=	5 psf
		84 psf

DL = 85 psf

$P_g = 50 \text{ psf} \quad \therefore P_f = 0.7(1.0)(1.0)(50 \text{ psf}) = 35 \text{ psf}$

SL = 35 psf

$W_{t, \text{frame}} = \frac{2(257') + 300'}{7'(8')} = 15.6 \text{ psf}$

FL = 16 psf

# OEST ASSOCIATES, INC.

PREPARED BY J. Walker

DATE 11/13/03

PROJECT NO. 390.30.01

CALCULATIONS CHECKED BY \_\_\_\_\_

DATE \_\_\_\_\_

SHEET NO. 3 OF 2

SUBJECT Roof Analysis for Antenna Frames

## Estimate Joist Capacity

$$A_{\text{chord}} = 2 \left[ 1.25' \left( \frac{5}{32}' \right) + \left( 1.25' - \frac{5}{32}' \right) \left( \frac{5}{32}' \right) \right] = 0.7324 \text{ in}^2$$

$$M_{\text{joist}} \approx 0.6 (60 \text{ ksi}) (0.7324 \text{ in}^2) [0.95 (20')] = 417 \text{ K-in} = 34,789 \text{ #-ft}$$

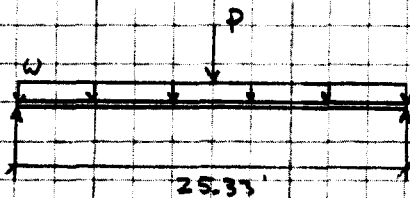
$$w_{\text{joist}} = \frac{8 (34,789 \text{ #-ft})}{(25.33')^2} = 433 \text{ plf}$$

$$P_{\text{all}} = \frac{433 \text{ plf}}{30'/12} = 174 \text{ psf}$$

$$P_{\text{all}} = 174 \text{ psf} > P_{\text{applied}} = 85 + 35 + 16 = 136 \text{ psf} \quad \text{OK}$$

## Check Steel Framing:

Worst Case is Frame on W6x26 Infill Beam



$$w = 136 \text{ psf} \left( \frac{30'}{12} \right) = 340 \text{ plf}$$

$$P = 2(287 \text{ #}) + 300 \text{ #} = 874 \text{ #}$$

$$M = \frac{340 \text{ plf} (25.33')^2}{8} + \frac{874 \text{ #} (25.33')}{4} = 32,592 \text{ #-ft}$$

$$f_b = \frac{32.6 \text{ K-ft} (12)}{38.4 \text{ in}^3} = 10.2 \text{ ksi} \quad \text{OK}$$

$$V = \frac{340 \text{ plf} (25.33')}{2} + \frac{874 \text{ #}}{2} = 4,744 \text{ #}$$

$$f_v = \frac{4.7 \text{ K}}{164 \text{ in}^2 (0.25')} = 1.2 \text{ ksi} \quad \text{OK}$$





LCC International  
482 Congress Street  
Suite 502  
Portland, ME 04101  
(207) 771-9992 (Office)  
(207) 771-9993 (Fax)

September 15, 2003

Building Department  
389 Congress Street  
Portland, Me 04101

To Whom It May Concern:

United States Cellular Corporation (USCC) received a License authorizing them to provide service in Cumberland County. USCC has since hired LCC International to accomplish that objective. LCC is currently locating, leasing, and receiving zoning approvals and acquiring building permits for several approved locations in Portland.

Embassy Suites has been chosen as one of the approved locations. USCC is proposing to place (6) six cellular antennas on top of the building located at 1050 Westbrook Street in Portland, Maine. The Antennas and Base Station Equipment will be located as shown on the attached drawing.

USCC has already received an Exemption from Site Plan Review and would now like to receive a building permit to do the work as proposed.

We would appreciate consideration at the earliest possible date. In addition, I would appreciate it if you, or someone on your staff, would contact me if any additional material or information is required at this stage of the process.

Thank you for your consideration of this application.

Respectfully submitted,

A handwritten signature in cursive script that reads 'Edward A. Shaw'.

Edward A. Shaw  
LCC International Inc.  
482 Congress Street  
Suite 502  
Portland, ME 04101



LCC International, Inc.  
482 Congress Street  
Portland, ME 04101  
(207) 771-9992 (Office)  
(207) 771-9993 (Fax)

Embassy Suites  
% Stuart Barwise  
1050 Westbrook Street  
Portland, ME 04102

Re: Site # 853326.1

Dear Stuart,

LCC has been contracted by US Cellular to design, develop and deploy their new PCS network in York, Cumberland and Sagadahoc Counties. As part of LCC's scope of work, we negotiate leases on behalf of our client, to secure space to construct repeater sites. When we reach a point in lease negotiations where both parties (land owner and US Cellular) are in agreement on lease terms and language, we initiate the building permit process to determine if and when the lease will commence.

At this time we are in good faith negotiations with you and feel we will consummate our deal on your property in a relatively short period. We would like to request your permission to apply for all regulatory approvals required (including, but not limited to; zoning permit, building permit, FAA and FCC filings) to build our repeater site on your property. By granting your approval, you are not contractually binding yourself to any lease contract that has not been fully executed to date. Please signify your consent to grant LCC permission to file for necessary permits for constructing a repeater site on your property by signing below.

Thank You,

A handwritten signature in black ink, appearing to read 'Tom Powell'.

Thomas W. Powell  
Program Manager  
LCCI, Inc.

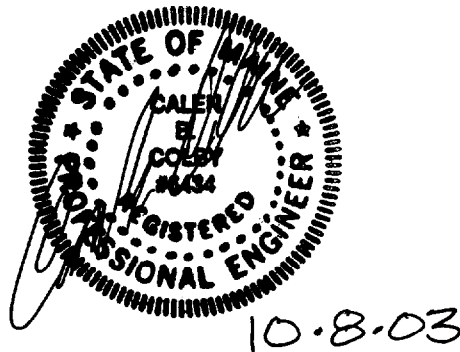
A handwritten signature in black ink, appearing to read 'Stuart Barwise'.

Stuart Barwise  
General Manager  
Embassy Suites Hotel

**EMBASSY SUITES HOTEL**  
Portland, Maine

**CELLULAR TELEPHONE ANTENNA SUPPORT  
STRUCTURAL CALCULATIONS**

**SUBMITTAL #1**



**Prepared for:**

LCC International, Inc.  
482 Congress Street Suite 502  
Portland, ME 04101

**Prepared by:**

OEST Associates, Inc.  
343 Gorham Rd.  
South Portland, ME 04106-2317

October 8, 2003

343 Gorham Road • South Portland, ME 04106  
(207) 761-1770 • FAX (207) 774-1246  
[www.oest.com](http://www.oest.com) • [mail@oest.com](mailto:mail@oest.com)



# Fax

To: Mike From: Jeff

Fax #: 874-8716 Pages: 4 (including this cover sheet)

Job #: \_\_\_\_\_ Date: 11/14/03

Subject: Embassy Suits CC: \_\_\_\_\_

Urgent     For Review     Please Comment     Please Reply     Please Recycle

• Comments:

Additional Calculations for Embassy Suits Roof.  
Call if you have any questions

**EMBASSY SUITES HOTEL**  
Portland, Maine

**CELLULAR TELEPHONE ANTENNA SUPPORT  
STRUCTURAL CALCULATIONS**

**SUBMITTAL #2**



11-13-03

**Prepared for:**

LCC International, Inc.  
482 Congress Street Suite 502  
Portland, ME 04101

**Prepared by:**

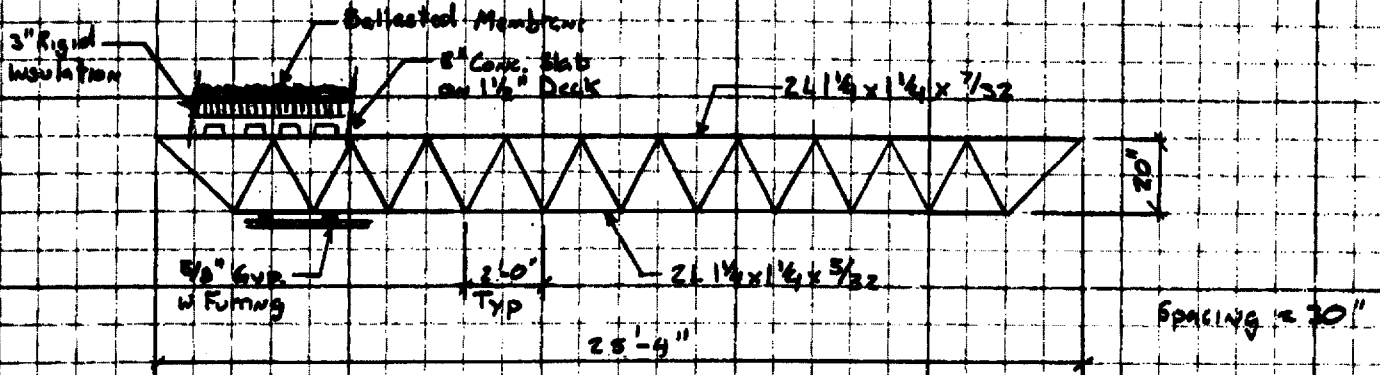
OEST Associates, Inc.  
343 Gorham Rd.  
South Portland, ME 04106-2317

November 13, 2003

**OEST ASSOCIATES, INC.**

PREPARED BY J. Walker DATE 11/13/03 PROJECT NO. 39030.01  
 CALCULATIONS CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_ SHEET NO. 1 OF 2  
 SUBJECT Roof Analysis for Antenna Frames

Existing Roof Framing:



Calculate Roof Loads:

Ballasted Membrane	=	12.5 psf
3" Rigid Insulation	=	4.5 psf
8" Slab on 1 1/2" Deck	=	65 psf
5/8" Gyp & Furring	=	4 psf
Joist	=	3 psf
Mech. Allowance	=	5 psf
		<u>84 psf</u>

DL = 85 psf

$P_g = 50 \text{ psf}$  ;  $P_f = 0.7(1.0)(1.0)(50 \text{ psf}) = 35 \text{ psf}$

SL = 35 psf

$W_{frame} = \frac{2(257') + 300'}{7(0')} = 15.6 \text{ psf}$

FL = 16 psf

**OEST ASSOCIATES, INC.**

PREPARED BY J. Walker DATE 11/13/03 PROJECT NO. 350.30.01  
 CALCULATIONS CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_ SHEET NO. 8 OF 2  
 SUBJECT Roof Analysis for Antenna Frames

Estimate Joint Capacity

$$A_{chord} = 2 \left[ (1.25' \times \frac{5}{32}') + (.25' \times \frac{5}{32}') \right] = 0.7324 \text{ m}^2$$

$$M_{joint} \approx 0.6 (50 \text{ ksi}) (0.7324 \text{ m}^2) [0.95 (60)] = 4.7 \text{ k-in} = 34,709 \text{ #-ft}$$

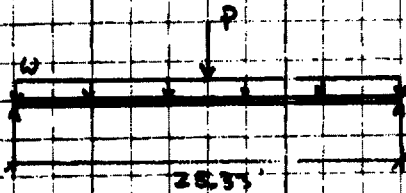
$$w_{joint} = \frac{8 (34,709 \text{ #-ft})}{(25.33)^2} = 433 \text{ plf}$$

$$P_{all} = \frac{433 \text{ plf}}{30/12} = 174 \text{ psf}$$

$$P_{all} = 174 \text{ psf} > P_{applied} = 85 + 35 + 16 = 136 \text{ psf} \quad \text{OK}$$

Check Steel Framing

Worst Case is Frame on W4x26 Infill Beam



$$w = 136 \text{ psf} \left( \frac{20'}{12} \right) = 390 \text{ plf}$$

$$P = 2(287 \text{ #}) + 300 \text{ #} = 874 \text{ #}$$

$$M = \frac{390 \text{ plf} (25.33')^2}{8} + \frac{874 \text{ #} (25.33')}{4} = 32,892 \text{ #-ft}$$

$$f_b = \frac{32.6 \text{ k-in} (12)}{38.4 \text{ in}^2} = 10.2 \text{ ksi} \quad \text{OK}$$

$$V = \frac{390 \text{ plf} (25.33')}{2} + \frac{874 \text{ #}}{2} = 4,744 \text{ #}$$

$$f_v = \frac{4.7 \text{ k}}{1.64 (0.25)} = 1.2 \text{ ksi} \quad \text{OK}$$

# OEST ASSOCIATES, INC.

PREPARED BY J. Walker

DATE 10/2/03

PROJECT NO. 390.30.01

CALCULATIONS CHECKED BY \_\_\_\_\_

DATE \_\_\_\_\_

SHEET NO. 1 OF \_\_\_\_\_

SUBJECT Equipment Platform

## Equipment Platform Design Criteria:

Dead Loads:      ⇒      1,300 \* Each      [30' x 42' x 70']

Snow Loads:      ⇒       $P_g = 50 \text{ psf}$       [Portland, ME]

ASCE 7-98

$$C_e = C_g = I = 1.0 \quad \therefore \quad P_g = 0.7(1.0)^3(50 \text{ psf}) = \underline{35 \text{ psf}}$$

Wind Loads:      ⇒

ASCE 7-98

$$q_z = 0.00256 K_z K_{zt} K_d V^2 I = 27.0 \text{ psf}$$

$$K_z = 1.17$$

Tbl 6-5,  $h = 70'$ , Exposure C

$$K_{zt} = 1.0$$

$$K_d = 0.90$$

Tbl 6-6, Square Chimney

$$V = 100 \text{ mph}$$

Fig 6-1c

$$I = 1.0$$

Tbl 6-1

$$P_w = q_z G C_f = \underline{30 \text{ psf}}$$

$$q_z = 27 \text{ psf}$$

See Above

$$G = 0.85$$

Sect 6.5.8

$$C_f = 1.3$$

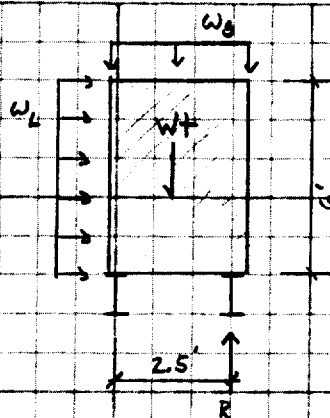
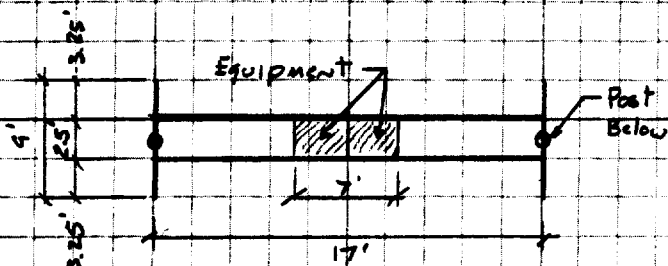
Tbl 6-10



# OEST ASSOCIATES, INC.

PREPARED BY J. Walker DATE 10/2/03 PROJECT NO. 390.30.01  
 CALCULATIONS CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_ SHEET NO. 2 OF \_\_\_\_\_  
 SUBJECT Equipment Platform

## Size Platform:



## Find R:

$$W_g = \text{Snow} = 35 \text{ psf}$$

$$R = 35 \text{ psf} \left( \frac{2.5'}{2} \right) = 44 \text{ plf}$$

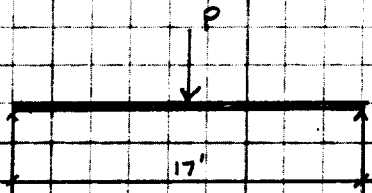
$$W_t = 2(1,300^{\#}) = 2,600^{\#}$$

$$R = \frac{2,600^{\#}}{2(7')} = 186 \text{ plf}$$

$$W_L = \text{Wind} = 30 \text{ psf}$$

$$R = \frac{30 \text{ psf} \left( \frac{4'}{2} \right)}{2.5'} = 216 \text{ plf}$$

## Size Beam:



$$\begin{aligned} P &= DL + WL = 7'(186 + 216) \text{ plf} = 2,814^{\#} \\ &= DL + SL = 7'(186 + 44) \text{ plf} = 1,610^{\#} \\ &= DL + 0.75(WL + SL) = 7'(186 + 0.75(216 + 44)) \text{ plf} = 2,667^{\#} \end{aligned}$$

Try W8x24

$$S_x = 20.9 \text{ in}^3$$

$$d = 7.93 \text{ in}$$

$$t_w = 0.245 \text{ in}$$

$$I = 82.8 \text{ in}^4$$

Bending  $\Rightarrow M = \frac{2,814^{\#}(17')}{4} = 11,960^{\#}\text{-ft} < M_R = 33,750^{\#}\text{-ft} \quad \text{OK} \quad \text{ASDM pg 2-26}$

Shear  $\Rightarrow V = \frac{2,814^{\#}}{2} = 1,407^{\#} \therefore f_v = \frac{1,407^{\#}}{7.93 \text{ in}(0.245 \text{ in})} = 0.7 \text{ ksi} \quad \text{OK}$

Deflection  $\Rightarrow \delta = \frac{2,814^{\#}(17 \cdot 12)^3}{48(29,000 \text{ ksi})(82.8 \text{ in}^4)} = 0.21 \text{ in} \approx \frac{L}{970} \quad \text{OK}$

Use W8x24

# OEST ASSOCIATES, INC.

PREPARED BY J. Walker DATE 10/2/03 PROJECT NO. 350.30.01  
 CALCULATIONS CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_ SHEET NO. 3 OF \_\_\_\_\_  
 SUBJECT Equipment Platform

## Size Platform Cant.

### Size Post:

$$KL = 2(20') = 4.0'$$

$$P = \frac{2,814^*}{2} = 1,407^*$$

} (OK)

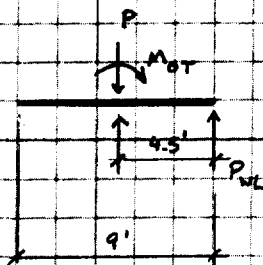
Use 4" Std Pipe

$$P_{cap} = 81,000^*$$

[ASDM Pg B-37]

## Check Outrigger

By Inspection, Use W6x29. Check Reaction on Roof



$$M_{OT} = \frac{9'}{2} \left[ 30 \text{ psf} (6') \left( \frac{9'}{2} \right) \right] = 1,690^* \text{ -ft}$$

$$P_{WL} = \frac{1,690^* \text{ -ft}}{4.5'} = 420^*$$

By Inspection (OK)

## Check Connection of Beam Below

W10x40 @ 20' Long  $\Rightarrow$   $\frac{1}{2}$  UDL = 27K for A36 Steel

[ASDM Pg 2-61]

This Load Requires a (2) Bolt Clip Angle Connection  $\Rightarrow$   $V = 37.1^K$

[Tbl 11-A]

$$\text{Total Reaction} = 27^K + 1.4^K = 28.4^K > V_{cap} = 37.1^K \quad (OK)$$

# OEST ASSOCIATES, INC.

PREPARED BY J. Walker

DATE 10/2/03

PROJECT NO. 390.30.01

CALCULATIONS CHECKED BY \_\_\_\_\_

DATE \_\_\_\_\_

SHEET NO. 4 OF \_\_\_\_\_

SUBJECT Antenna Frames

## Antenna Support Frames Design Criteria

Wind Loads  $\Rightarrow$   $q_z = 0.00256 K_z V^2 = 23 \text{ psf}$

TIA/EIA-222

$$K_z = \left(\frac{70}{33}\right)^{2.7} = 1.24$$

$$V = 85 \text{ mph}$$

$$P_a = q_z G_H C_A = \underline{40.25 \text{ psf}}$$

$$q_z = 23 \text{ psf}$$

$$G_H = 0.65 + \frac{0.6}{\left(\frac{70}{60}\right)^{2.7}} = 1.25$$

$$C_A = 1.4$$

[Tbl 3]

Antenna Force  $\Rightarrow$   $A_e = 3.1 \text{ ft}^2$  [See Attached Sheet]

$$P_a = 40.25 \text{ psf} (3.1 \text{ ft}^2) = \underline{125 \text{ lb}}$$

## Calculate Req'd Frame Ballast

Use Valmet Rooftop Frames, See Attached Sheet

$$W_t = 0.058 (2)(125 \text{ lb}) \left[ 12 \left( 2' + \frac{1}{2}' \right) \right] + 58 = 271 \text{ lb}$$

$$4" \times 8" \times 16" \text{ Solid CMU Block} \Rightarrow \frac{3\% (7\%) (15\%)}{12"} (115 \text{ psf}) = 28.7 \text{ lb/block}$$

$$N = \frac{271 \text{ lb}}{28.7 \text{ lb/block}} = 9.4$$

Use (10) 4" x 8" x 16" Solid CMU Blocks

# OEST ASSOCIATES, INC.

PREPARED BY J. Walker DATE 10/2/03 PROJECT NO. 390.30.01  
CALCULATIONS CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_ SHEET NO. 5 OF \_\_\_\_\_  
SUBJECT \_\_\_\_\_

## Check Roof e Antenna Frame

$$w_{\text{frame}} = \frac{2(267^*) + 300^*}{7'(8')} = 15.6 \text{ psf}$$

Note: In the Past, Portland had Required a 50psf minimum Roof Snow Load. Today's Code only Requires a 35psf Load. Therefore the Additional Antenna Frame Load is offset by the Reduction in Snow Load

$$\underline{35 \text{ psf (Snow)} + 15.6 \text{ psf} \approx 60 \text{ psf} \quad \text{OK}}$$

# VERTICAL PRODUCT DATA SHEETS



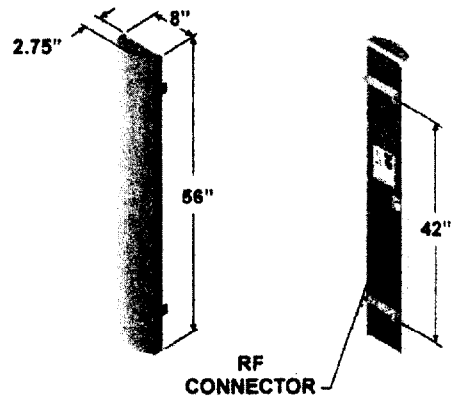
## FV65-17-XXDP

Vertical Polarization  
1850 MHz - 1990 MHz



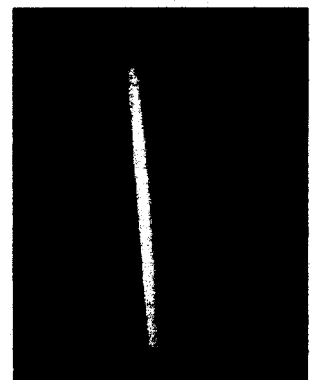
### Electrical Specifications

Azimuth Beamwidth	65°
Elevation Beamwidth	7°
Gain	16.5 dBi (14.4 dBd)
Polarization	Linear, Vertical
Front-to-Back Ratio	≥ 25 dB (≥ 30 dB Typ.)
Electrical Downtilt Options	0°, 2°, 4°
VSWR	1.35:1 Max
Connectors	1; 7-16 DIN (female)
Power Handling	250 Watts CW
Passive Intermodulation	≤ -150 dBc [2 x 20W (+ 43 dBm)]
Lightning Protection	Chassis Ground



### Mechanical Specifications

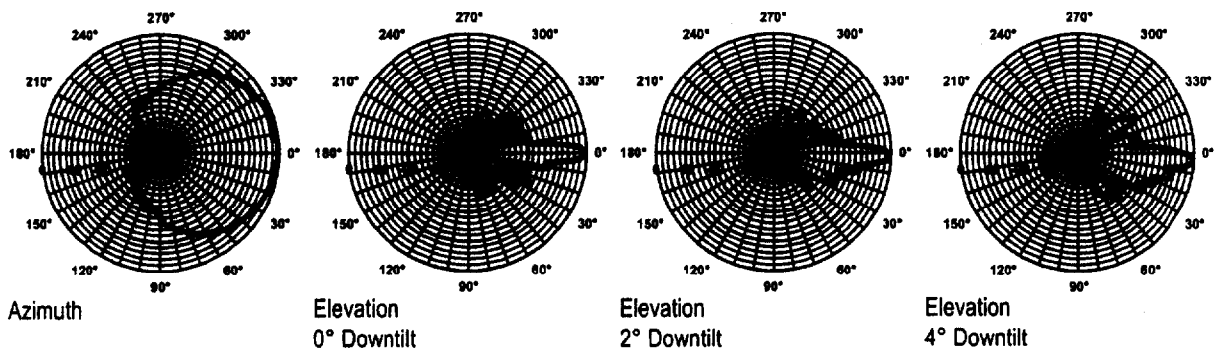
Dimensions (L x W x D)	56 in x 8 in x 2.75 in (142 cm x 20.3 cm x 7.0 cm)
Rated Wind Velocity	150 mph (241 km/hr)
Equivalent Flat Plate Area	3.1ft <sup>2</sup> (.29 m <sup>2</sup> )
Front Wind Load @ 100 mph (161 kph)	90 lbs (400 N)
Side Wind Load @ 100 mph (161 kph)	31 lbs (139 N)
Weight	18 lbs (8.2 kg)



### Mounting Options

MTG-P00-10, MTG-S02-10, MTG-DXX-20\*, MTG-CXX-10\*, MTG-C02-10, MTG-TXX-10\*

Note: \*Model number shown represents a series of products. See Mounting Options section for specific model number.



Revised 05/15/02

# Roof Mounts

## Formula for determining ballast for Tripod Ballast Adapter

$$W = (0.15)(H)(P)$$

P = Wind load of antenna (pounds)

H = Height of antenna centerline above roof (feet)

W = Weight of ballast required (pounds)

Note: Total ballast weight per tripod is 3(W)

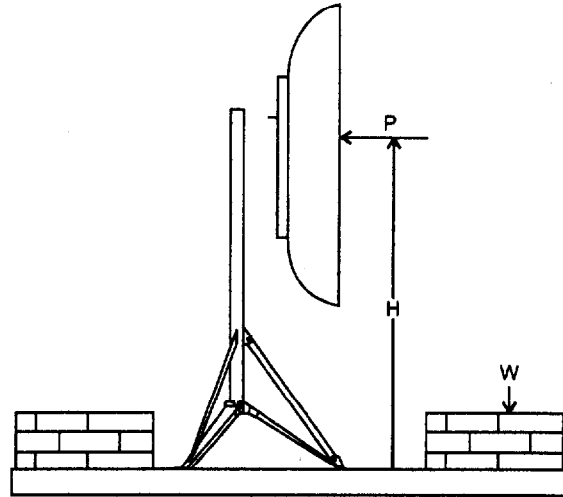
Example: P = 1132 lbs. 40 PSF wind (100 mph) on 6' antenna

H = 6'

$$W = (0.15)(6)(1132) = 1019 \text{ lbs.}$$

$$\text{Total ballast weight per tripod: } 3(W) = 3(1019) = 3057$$

Note: A nominal 4x8x16 solid concrete block (CMU) weighs 20-30 lbs. Verify weight with local supplier.



## Rooftop Ballast Frame for Wireless Antennas

Non-penetrating, Rooftop Ballast Frames enable installation of wireless panel antennas for a sector. The Frames are secured using concrete-block ballast (not included) placed on the Frame's ballast trays. Alternatively, the frames can be anchored to a roof structure using 5/8" diameter anchor bolts.

The frame's bottom surface is smooth to prevent roof damage. The B1567 Rubber Mat Kit is also available to further protect the roof's surface.

Wireless panel antennas mount to the Frames on separately ordered Antenna-Mounting Pipes. Pipe lengths are selected according to antenna length and required mounting height above the roof.

Call for information regarding wind loading on a Frame using specific antennas and Antenna-Mounting Pipes.

H = Height of antenna centerline above roof (inches)

W = Weight of ballast on each side of frame assembly

Note: Equation includes a 1.5 factor of safety for overturning

$$(W)(2) = \text{Total ballast required}$$

Example:

N = 3 antennas

P = 135 lbs.

H = 90" antenna

centerline above roof

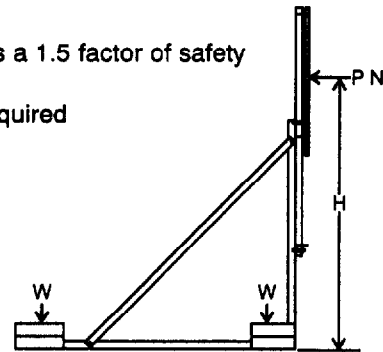
W =

$$(0.0158)(3)(135)(90) + (58) =$$

634 lbs.

$$\text{Total ballast required: } (W)(2) = (634)(2) = 1,268 \text{ lbs.}$$

Note: A nominal 4x8x16 solid concrete block (CMU) weighs 20-30 lbs. Verify weight with local supplier.



## Formula for Determining Frame Ballast:

$$W = (0.0158)(N)(P)(H) + (58)$$

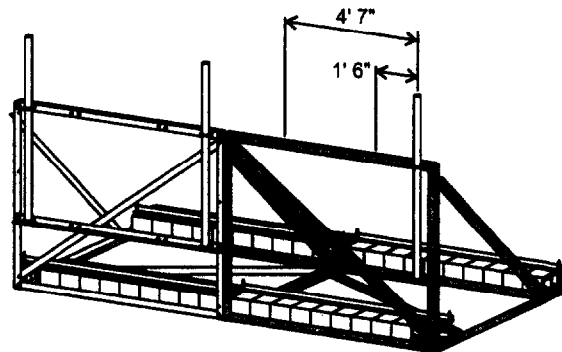
N = Number of antennas

P = Wind load of one antenna (pounds)

## Rooftop Ballast Frame for Two Wireless Antennas

Supports two wireless antennas on a single Frame and provides a maximum 6' 1" antenna separation. The Frame is modular and multiple units may be bolted together to support more antennas and provide greater outside antenna separation. The Frame's footprint is 7'-3/8" wide and 7' 11" deep.

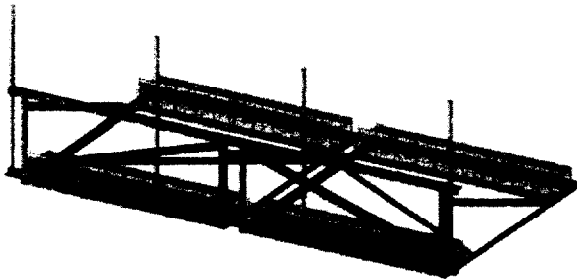
One B1567 Rubber Mat Kit protects the roof under the front and rear ballast trays. An optional 99544 Ballast Tie-Down Kit (page 56) is available to secure the concrete-block ballast.



Rooftop Frame 6' Max Separation	99540	370.00
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## Non-Penetrating Rooftop Ballast Frame Low Visibility Profile

Frames are designed to securely support up to four wireless antennas, while keeping the roof surface damage-free. B1567 Rubber Mat Kits, sold separately, offer additional roof protection under the front and rear ballast trays. An optional 99544 Ballast Tie-Down Kit is available to secure the concrete block ballast. The Frames have a face width of 16' and are 13' high.



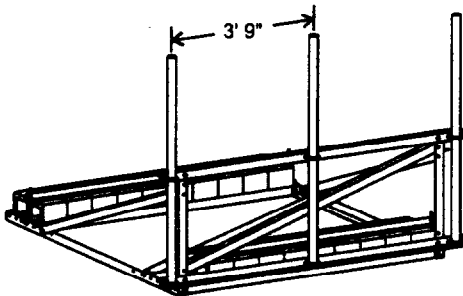
See below for B1567 Rubber Mat Kit and page 56 for 99544 Ballast Tie-Down Kits. Antenna mounting pipes ordered separately.

Non-Penetrating Rooftop Ballast Frame 15' 5" separation	B2530	760.00
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## Low Profile Rooftop Ballast Frame for Three Wireless Antennas

B2096 Low Profile Rooftop Ballast Frame supports three wireless antennas on a single frame and provides a maximum 7' 6" antenna separation. The frame's footprint is 7' 3/8" wide and 7' 11" deep.

One Rubber Mat Kit, sold separately, protects the roof under the front and rear ballast trays. An optional 99544 Ballast Tie-Down Kit is available to secure the concrete block ballast.



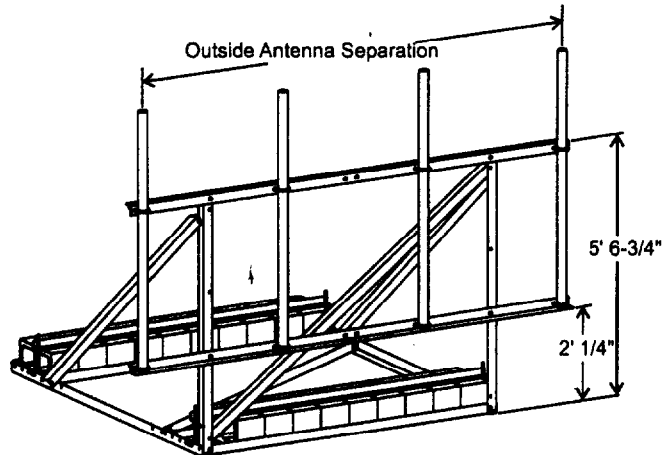
See below for B1567 Rubber Mat Kit and page 56 for 99544 Ballast Tie-Down Kits. Antenna mounting pipes ordered separately.

Low Profile Rooftop Ballast Frame 90" max separation	B2096	345.00
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## Rooftop Ballast Frame for Three or Four Wireless Antennas

Three Rooftop Ballast Frames, each with an extended-width antenna-mounting face, support up to four wireless antennas on a Frame. The frame's footprint is 7' 3/8" wide and 7' 11" deep.

One B1567 Rubber Mat Kit, sold separately, protects the roof under the front and rear ballast trays. An optional 99544 Ballast Tie-Down Kit is available to secure the concrete-block ballast. Mounting pipe O.D. is 2-3/8" (\*2-7/8").



See below for B1567 Rubber Mat Kit and page 56 for 99544 Ballast Tie-Down Kits. Antenna mounting pipes ordered separately.

Rooftop Frame 10' max separation	99546	390.00
Rooftop Frame 12' max separation	99547	390.00
Rooftop Frame 10' max separation	B2737*	550.00

## Rubber Mat Kit for Rooftop Ballast Frame

The Rubber Mat Kit provides protection of the roof surface for a Rooftop Ballast Frame. Each Kit, furnished with four 1/2" thick, 1' 6" wide, by 4' long mats, protects under the two trays of a single, 7' wide Rooftop Ballast Frame.



Rubber Mat Kit for Rooftop Ballast Frame (4 mats)	B1567	55.00
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