



# Certificate of Design

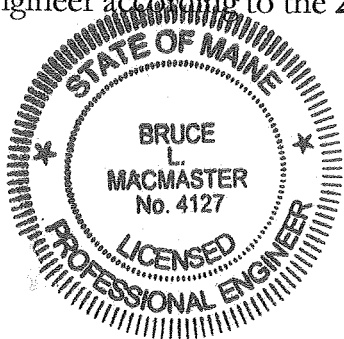
Date: SEPT 28 2012

From: ATLANTIC ENG SERVICES INC

These plans and / or specifications covering construction work on:

ECO MAINE STORAGE SHELVES AES #682  
DW'GS D1682-1 THRU-9

Have been designed and drawn up by the undersigned, a Maine registered Architect / Engineer according to the **2009 International Building Code** and local amendments.



(SEAL)

Signature: Bruce MacMaster

Title: PRESIDENT

Firm: ATLANTIC ENGINEERING SERV INC

Address: 207 WOODVILLE RD  
FALMOUTH ME

Phone: 878-2918

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# Certificate of Design Application

From Designer: ATLANTIC ENGINEERING SERVICES  
 Date: SEPT 28 2012  
 Job Name: ECO MAINE STORAGE RACKS/SHELVES  
 Address of Construction: 64 BLUEBERRY RD PORTLAND

## 2009 International Building Code

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

Building Code & Year 2009 Use Group Classification (s) N/A  
 Type of Construction TYPE 1 (STEEL FRAME)  
 Will the Structure have a Fire suppression system in Accordance with Section 903.3.1 of the 2009 IRC NO  
 Is the Structure mixed use? NO If yes, separated or non separated or non separated (section 302.3) —  
 Supervisory alarm System? NO Geotechnical/Soils report required? (See Section 1802.2) NO

### Structural Design Calculations

YES Submitted for all structural members (106.1 – 106.11)

### Design Loads on Construction Documents (1603)

Uniformly distributed floor live loads (7603.11, 1807)

Floor Area Use	Loads Shown
<u>SEE DRAWINGS</u>	<u>(100 PSF) LL</u>

### Wind loads (1603.1.4, 1609)

— Design option utilized (1609.1.1, 1609.6)  
— Basic wind speed (1809.3)  
N/A Building category and wind importance Factor,  $K_d$ , table 1604.5, 1609.5  
N/A Wind exposure category (1609.4)  
— Internal pressure coefficient (ASCE 7)  
— Component and cladding pressures (1609.1.1, 1609.6.2.2)  
— Main force wind pressures (7603.1.1, 1609.6.2.1)

### Earth design data (1603.1.5, 1614-1623)

N/A Design option utilized (1614.1)  
N/A Seismic use group ("Category")  
— Spectral response coefficients,  $S_D$  &  $S_{D1}$  (1615.1)  
— Site class (1615.1.5)

— Live load reduction  
— Roof live loads (1603.1.2, 1607.11)  
— Roof snow loads (1603.7.3, 1608)  
— Ground snow load,  $P_g$  (1608.2)  
— If  $P_g > 10$  psf, flat-roof snow load  $P_f$   
— If  $P_g > 10$  psf, snow exposure factor,  $C_e$   
— If  $P_g > 10$  psf, snow load importance factor,  $I_s$   
— Roof thermal factor,  $C_t$  (1608.4)  
— Sloped roof snowload,  $P_s$  (1608.4)  
— Seismic design category (1616.3)  
— Basic seismic force resisting system (1617.6.2)  
— Response modification coefficient,  $R_f$  and deflection amplification factor,  $C_d$  (1617.6.2)  
— Analysis procedure (1616.6, 1617.5)  
— Design base shear (1617.4, 16175.5.1)

SEE DWG'S LETTER

### Flood loads (1803.1.6, 1612)

NOVE Flood Hazard area (1612.3)  
— Elevation of structure

### Other loads

NOVE Concentrated loads (1607.4)  
— Partition loads (1607.5)  
— Misc. loads (Table 1607.8, 1607.6.1, 1607.7, 1607.12, 1607.13, 1610, 1611, 2404)

# Atlantic Engineering Services Inc.

207 WOODVILLE ROAD – FALMOUTH, MAINE 04105 / PHONE - FAX (207) 878-2918

Building Inspections Division  
389 Congress St  
Portland , ME.04101

September 28, 2012

**Re : Outside storage shelves / racks AES Job # 1682 AES Drawings D1682-1 Thru -9**

Attached please find the Certificate of Design and the Certificate of Design Application

On the Certificate of Design application most of the issues do not apply to this project.

Shelf loads are 10 PSF DL and 100 PSF LL as indicated on the drawings.

There no wind loads as there are no enclosed walls.

There are no occupancy issues.

The roof has a 50 PSF snow load which meets IBC Code for the area

The foundation column loads were designed using the SW Cole data which was used when the facility was constructed and design is very conservative

The project is outside the 100 year flood zone with base elevation 41'-6".

There no combustible materials used.

There are no other loads needed.

All structural designs meet requirements of The American Institute of Steel Construction.

Inspections: Although not necessary, I would like to inspect the concrete piers before backfilling and a final inspection before use.

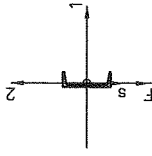
Sincerely



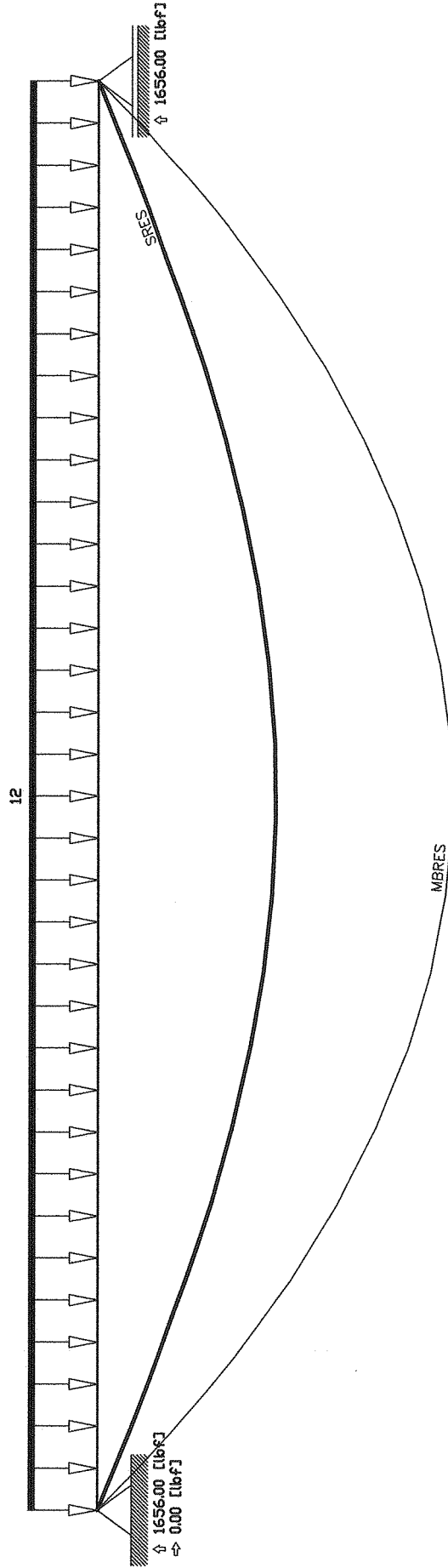
Bruce L. Macmaster PE  
President

MOMENT OF INERTIA I1	INCH <sup>4</sup>	36.1763
MOMENT OF INERTIA I2	INCH <sup>4</sup>	1.525466
MOMENT OF INERTIA Ieff	INCH <sup>4</sup>	36.1763
MAX. BARRIER DIST.	INCH	4
SAFETY FACTOR		2.8494
YIELD POINT	PSI	36000
E-MODULUS	PSI	29000000
MATERIAL	STEEL STRUCTURAL SHAPES	
MAX. DEFLECTION S1	INCH	1.013803 E-15
MAX. DEFLECTION S2	INCH	0.864240
MAX. BENDING MOMENT MB1	LB-FT	5.8772 E-12
MAX. BENDING MOMENT MB2	LB-FT	114.26 E3
MAX. STRESS RES.	PSI	12634
MAX. DEFLECTION SRES	INCH	0.864240
MAX. BENDING MOMENT MBRES	LB-FT	114.26 E3
SCALE FOR DEFL. LINE		3'-3" 29/32" 1
SCALE FOR BENDING MOM. LINE		1138'-0"

C8X13	
I1 INCH <sup>4</sup>	36.1763
I2 INCH <sup>4</sup>	1.525466
S1 INCH	4
S2 INCH	4
A INCH <sup>2</sup>	4.044538



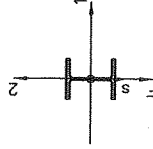
→ 22,000 ALLOWABLE  
→ 1/330 SPAN



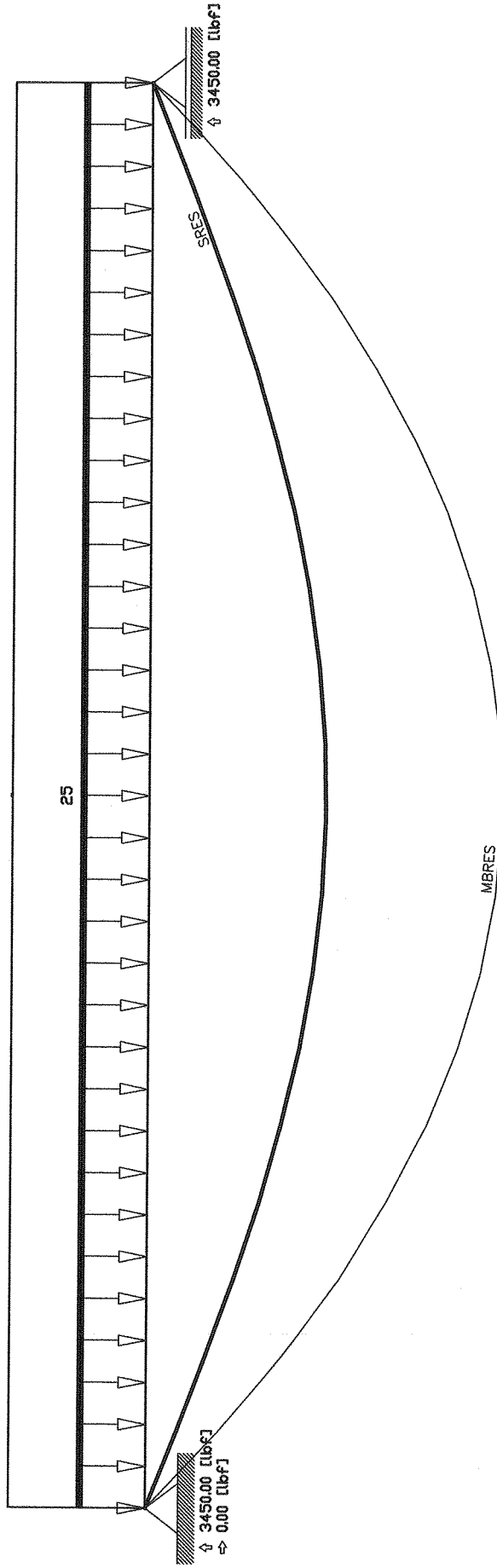
ROOF SUPPORT 50PSF

MOMENT OF INERTIA I1	INCH <sup>4</sup>	98.6575
MOMENT OF INERTIA I2	INCH <sup>4</sup>	21.6561
MOMENT OF INERTIA Ieff	INCH <sup>4</sup>	98.6575
MAX. BORDER DIST.	INCH	4.03
SAFETY FACTOR		3.7022
YIELD POINT	PSI	36000
E-MODULUS	PSI	29000000
MATERIAL		STEEL STRUCTURAL COMB
MAX.DEFLECTION S1	INCH	0.149752 E-15
MAX.DEFLECTION S2	INCH	0.0122 E-9
MAX.BENDING MOMENT MB1	DLF IN	238.05 E3
MAX.BENDING MOMENT MB2	DLF IN	0.660217
MAX.STRESS RES	PSI	97239
MAX.DEFLECTION SRES	INCH	0.660217
MAX.BENDING MOMENT MRES	DLF IN	238.05 E3
SCALE FOR DEF. LINE		4'-4 1/4"-1
SCALE FOR BENDING MOM. LINE		1/287'-6"

W8x28	
I1 INCH <sup>4</sup>	98.6575
I2 INCH <sup>4</sup>	21.6561
S INCH	4.03
A INCH <sup>2</sup>	8.301244



← 22,000 ALLOWABLE  
← 1/430 SPAN



SHELF SUPPORT 100PSF

$K = 0.5$   
 $L = 20'$

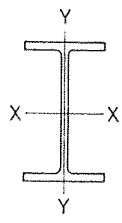
$24 \times 5 = 120$

MAX  $P_{allow} = 28K$

$F_y = 36$  ksi  
 $F_y = 50$  ksi

$F_y = 36$  ksi  
 $F_y = 50$  ksi

COLUMNS  
 W shapes



Allowable axial loads in kips

35		31	
36	50	36	50
22	309	197	274
01	272	178	241
97	264	174	234
91	255	170	226
86	246	165	217
80	236	160	208
74	225	154	199
68	214	149	189
62	202	143	179
55	190	137	168
48	177	131	156
41	164	124	145
33	150	117	132
25	136	110	119
17	122	103	107
09	110	95	97
91	91	80	80
76	76	67	67
65	65	57	57
56	56	49	49
49	49	43	43
43	43	38	38
40	40	35	35

Designation	W8				W6						
	Wt./ft.	28		24		25		20		15	
		$F_y$	36	50	36	50	36	50	36	50	36†
Effective length in ft. KL with respect to least radius of gyration $r_y$	0	178	248	153	212	159	220	127	176	96	133
	6	155	208	133	178	136	182	109	145	81	108
	7	150	198	129	170	131	173	105	137	78	102
	8	144	188	124	161	126	163	100	129	75	96
	9	138	178	118	152	120	152	95	121	71	89
	10	132	166	113	142	114	141	90	112	67	82
	11	125	154	107	132	107	129	85	102	62	74
	12	118	142	101	121	100	117	79	92	58	66
	13	111	128	95	109	93	103	73	81	53	57
	14	103	114	88	97	85	90	67	70	48	49
	15	95	100	81	85	77	78	60	61	43	43
	16	87	88	74	74	69	69	54	54	38	38
	17	78	78	66	66	61	61	47	47	33	33
	18	69	69	59	59	54	54	42	42	30	30
	19	62	62	53	53	49	49	38	38	27	27
	20	56	56	48	48	44	44	34	34	24	24
	22	46	46	39	39	36	36	28	28	20	20
	24	39	39	33	33	31	31	24	24	17	17
	25	36	36	30	30	28	28	22	22		
	26	33	33	28	28						
	27	31	31								

59	2.59	2.61	2.61
56	78	48	67
11	16	10	14
20	141	93	110
55	77	43	59
15	7.2	8.4	7.2
16	16.3	20.1	14.5
10.3		9.13	
127		110	
42.6		37.1	
2.03		2.02	
1.73		1.72	
0.330		0.332	
0.972		0.985	
18.9		16.4	
6.3		5.6	

Properties										
$U$	3.23	3.23	3.27	3.27	2.38	2.07	2.43	1.86	1.93	1.45
$P_{un}$ (kips)	48	67	39	54	47	65	35	49	26	36
$P_{un}$ (kips/in.)	10	14	9	12	12	16	9	13	8	12
$P_{ub}$ (kips)	93	110	59	70	170	200	91	107	63	74
$P_{fb}$ (kips)	49	68	36	50	47	65	30	42	15	21
$L_c$ (ft.)	6.9	5.9	6.9	5.8	6.4	5.4	6.4	5.4	6.3	5.4
$L_u$ (ft.)	17.5	12.6	15.2	10.9	20.0	14.4	16.4	11.8	12.0	8.7
$A$ (in. <sup>2</sup> )	8.25		7.08		7.34		5.87		4.43	
$I_x$ (in. <sup>4</sup> )	98.0		82.8		53.4		41.4		29.1	
$I_y$ (in. <sup>4</sup> )	21.7		18.3		17.1		13.3		9.32	
$r_y$ (in.)	1.62		1.61		1.52		1.50		1.45	
Ratio $r_x/r_y$	2.13		2.12		1.78		1.77		1.77	
$B_x$ } Bending factors	0.340		0.339		0.440		0.438		0.456	
$B_y$ }	1.244		1.258		1.308		1.331		1.424	
$a_x$ }	14.63		12.34		7.97		6.19		4.33	
$a_y$ } *	3.23		2.73		2.53		1.97		1.39	

\* Tabulated values of  $a_x$  and  $a_y$  must be multiplied by  $10^6$ .  
 † Flange is non-compact; see discussion preceding column load tables.  
 Note: Heavy line indicates  $Kl/r$  of 200.



# Accessibility Building Code Certificate

N/A

Designer: \_\_\_\_\_

Address of Project: \_\_\_\_\_

Nature of Project: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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. Residential Buildings with 4 units or more must conform to the Federal Fair Housing Accessibility Standards. Please provide proof of compliance if applicable.

**(SEAL)**

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

Title: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_

For more information or to download this form and other permit applications visit the Inspections Division on our website at [www.portlandmaine.gov](http://www.portlandmaine.gov)

**Fire Department requirements.**

N/A

The following shall be submitted on a separate sheet:

- Name, address and phone number of applicant **and** the project architect.
- Proposed use of structure (NFPA and IBC classification)
- Square footage of proposed structure (total and per story)
- Existing and proposed fire protection of structure.
- Separate plans shall be submitted for
  - a) Suppression system
  - b) Detection System (separate permit is required)
- A separate Life Safety Plan must include:
  - a) Fire resistance ratings of all means of egress
  - b) Travel distance from most remote point to exit discharge
  - c) Location of any required fire extinguishers
  - d) Location of emergency lighting
  - e) Location of exit signs
  - f) NFPA 101 code summary
- Elevators shall be sized to fit an 80" x 24" stretcher.

For questions on Fire Department requirements call the Fire Prevention Officer at (207) 874-8405.

**Please submit all of the information outlined in this application checklist. If the application is incomplete, the application may be refused.**

In order to be sure the City fully understands the full scope of the project, the Planning and Development Department may request additional information prior to the issuance of a permit. For further information or to download copies of this form and other applications visit the Inspections Division on-line at [www.portlandmaine.gov](http://www.portlandmaine.gov), or stop by the Inspections Division office, room 315 City Hall or call 874-8703.

Permit Fee: \$30.00 for the first \$1000.00 construction cost, \$10.00 per additional \$1000.00 cost

**This is not a Permit; you may not commence any work until the Permit is issued.**