RS. 08.106515 DFS. 01.

B

19

CITY OF
PORTLAND, OREGON
BUREAU OF DEVELOPMENT SERVICES
1900 SW 4th Ave., Suite 5000
Portland, OR 97201

MULTNOMAH COUNTY

RESIDENTIAL 1 & 2 FAMILY PERMIT

08-106515-DFS-01-RS

Site Address: 1504 SW KARI LN

Issued: 3/24/08

PROJECT INFORMATION		Occ. Group	Const. Type
Decks, Fences, Retaining Walls	Alteration	U	V-B

Project Description: DFS - GUARDRAILS

APPLICANT	NORTHWEST DECKSCAPES, INC.	Phone (503) 297-5397
PROPERTY OWNER	J SCOTT FERRIS & SUSAN M FERRIS	Phone
CONTRACTOR	NORTHWEST DECKSCAPES, INC.	Phone

Project Details

Code Edition	2005 ORSC
Final adj to ICC Value reason - Display	Final overrides ICC-b
Square Footage - Occ 1	280
Total Square Footage - Display Only	280
Zoning Enforcement Agency	Portland

Project Details

Construction Type 4	
GIS Update Flag	02/01/08
Table-based Construction Val Adj - Dis	5000
Valuation at Issuance	18000

PAID

MAR 2 4 2008

CITY OF PORTLAND

This permit expires if, at any time, 180 days pass without an approved inspection. If you are not able to obtain an inspection approval within 180 days, you may request a one-time only extension of 180 days by calling 503-823-7388.

BEFORE YOU DIG ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of the rules by calling the center. (Note: the telephone number for the Oregon Utility Notification Center is 1-800-332-2344).

CITY CONTACT

E-Mail:

Phone:

Fax: (503) 823-4172

INSPECTION REQUEST PHONE NUMBERS

TDD: (503) 823-6868

Building/Trade Inspections - Call Before 6:00 AM: (503) 823-7000

IVR Inspection Request Number: 2734118

Talbott Associates Incorporated
Consulting Engineers

7 SW 97th Avenue
Portland, OR 97216-2427
(503) 256-5852
FAX (503) 252-7806
www.talbottassociates.com

November 29, 2007
TAI File 3016401.0001

Sapa Profiles, Inc.
7320 N.E. 55th Ave.
Portland, OR 97218

Attn: Alyssa Stibolt, Fabricated Components

Re: Analysis of Residential Guardrail System

Dear Ms. Stibolt:

Talbott Associates, Inc. (TAI) is pleased to submit this report which summarizes the results of the analysis of Sapa's Residential Guardrail System.

Michael Hagerty, senior engineer for TAI, served as the Primary engineer for analyzing the Residential Guardrail system. Gerald P. Marx, P.E., of TAI was the Technical Reviewing engineer for the analysis.

Previous reports for the Residential Guardrail System prepared by us include one for Sapa dated December 10, 2004 as well as one for the Alumarail division of Anodizing, Inc. dated August 29, 1997.

CONCLUSIONS

1. The analysis demonstrates that the Sapa Profiles Residential guardrail system meets the requirements of the 2006 International Building Code and 2006 International Residential Code for systems used in one- and two-family dwellings as defined in those codes.

2. The analysis utilizes allowable stress design (working stress design). With few exceptions, the one-third stress increase permitted by Section 1607.7.1.3 of the IBC was not utilized. The analysis provides a suitably conservative demonstration that the residential guardrail system meets the applicable code requirements.

3. ~~Some methods for attaching the railing system to decks or balconies are shown on pages 19 – 22 of the calculations. Because of the great variability of designs and building materials used in residences, other means of attachment of the railing system to~~

(3) SEE AM ENGINEERING & DETAILS

08-105515 DFS 01 of 84

the deck or balcony as well as the design of the deck or balcony structural framing supporting the guardrail system and the structural elements for the building containing the deck or balcony are not part of this analysis.

PRODUCT DESCRIPTION

The Sapa Residential Railing System consists of extruded 6005-T5 aluminum alloy framing members (posts and rails) with aluminum balustrades (for which Sapa uses the term "pickets") or glass balustrade panels or stainless steel cables. (Balustrade material is designated "infill" in the industry.) Aluminum members are connected together with cadmium-coated Torx Drive flat head steel screws and coated with a pigmented enamel finish for durability and aesthetics.

The railing systems are typically sold for use as exterior residential guardrails on balconies, decks, porches, stairs and similar installations where railings are required or desired.

These systems are designed to be partially field-fabricated using stock components. The frames are designed to attach the systems to structures composed of wood and other components. The screw and lag connectors used to connect to the supporting structures should be either hot dipped galvanized steel or stainless steel.

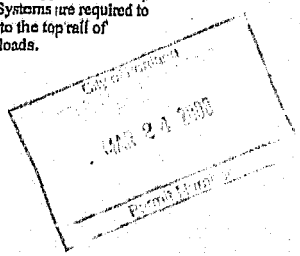
The top railing for these systems is offered in rounded cross-sectional configurations (Series 100 and 999) or flat configurations (Series 375 and 200). Railing sections are fabricated for 5 foot spacing for glass infill systems between vertical posts or 6 foot spacing for other infill. These sections are attached to a short railing block which in turn is attached to the vertical posts. The posts are attached to mounting brackets which are attached to the deck or balcony framing.

STANDARDS

Sapa products are marketed in the western United States. Therefore, it was determined that standard used for analysis should be the minimum loads specified in the 2006 International Building Code (IBC) and the 2006 International Residential Code (IRC), which are the basis for state building codes in the Western United States.

Guardrails and handrails are required by both codes where safety from falling is involved in the design and construction of buildings. A subset of the load provisions of the IBC are incorporated into the IRC, which is widely used by state building code organizations as the minimum standard for construction of one- and two-family dwellings as well as townhouses.

It was determined that the loading provisions of Table R301.5 of the IRC applied to the Sapa residential railing systems. A copy of the table is attached. Railing Systems are required to withstand a specified loading of 200 pounds applied in any direction to the top rail of guardrails. This load is not required to be concurrent with any other loads.



The terminology of the IBC "be designed to resist" was interpreted to mean that the railing system being analyzed would resist the forces applied without any material yielding (breaking or permanent bending). Because railing system members are not considered to be structural components of a building, the material deflection limit requirements do not apply; however, it is obvious that a railing system must resist minimum loads without plastic deformation which would compromise safety. As a result, the analysis utilizes allowable stress design (working stress design). With few exceptions, the one-third stress increase permitted by Section 1607.7.1.3 of the IBC was not utilized. The analysis provides a suitably conservative demonstration that the residential guardrail system meets the applicable code requirements.

ANALYSIS RESULTS

The analysis is elaborated as follows:

- Calculations.....Pages 1 – 24
- Section Properties.....Pages S1 – S25
- Code References.....Pages R1 – R2

We are pleased to submit this report. Please call us if questions arise.

Respectfully submitted,

TALBOTT ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER #9657 OREGON JULY 14, 1995 MICHAEL R. HAGERTY 11-29-07

Expires 6-30-2009
Michael R. Hagerty, P.E.
Primary Engineer

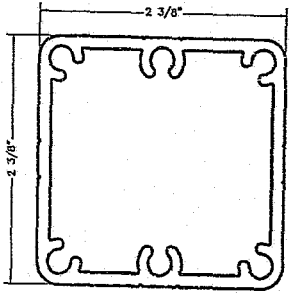
REGISTERED PROFESSIONAL ENGINEER 74299PE OREGON MARCH 9, 2004 GERALD PAUL MARX 11-29-07

Expires 12-31-2008
Gerald P. Marx, P.E.
Reviewing Engineer

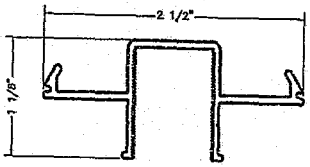
City of [illegible]
MAR 2 [illegible]
Permit

sapa:

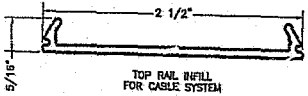
SERIES 200 PROFILES



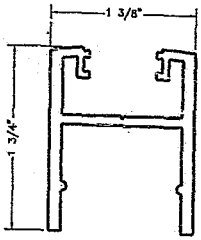
LIGHT COMMERCIAL POST
FOR 42" HIGH RAILING



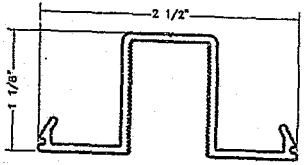
TOP RAIL INFILL
FOR PICKET SYSTEM



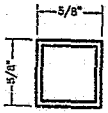
TOP RAIL INFILL
FOR CABLE SYSTEM



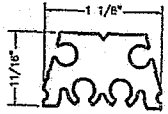
SERIES 200 BOTTOM RAIL



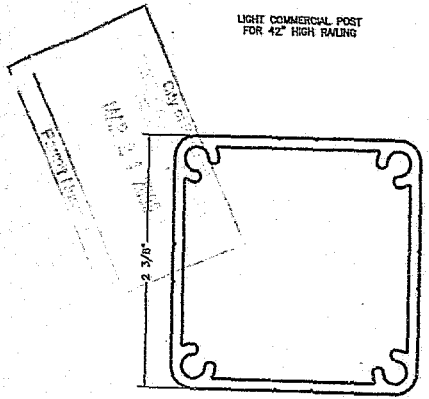
TOP RAIL INFILL
FOR GLASS SYSTEM



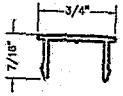
PICKET
(IF APPLICABLE)



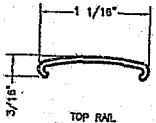
BOTTOM RAIL
CONNECTION BRACKET



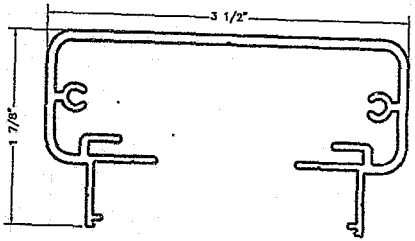
RESIDENTIAL POST



BOTTOM RAIL
PICKET SPACER

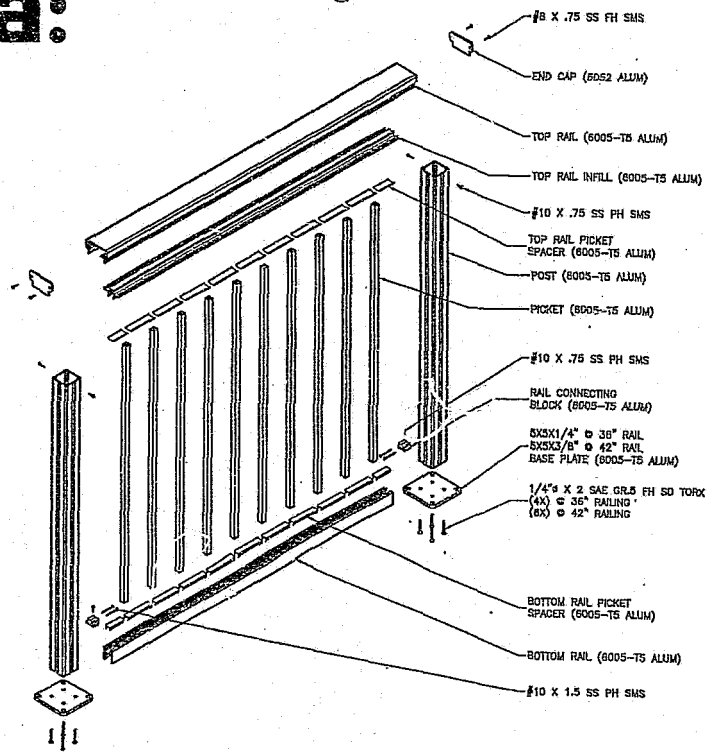


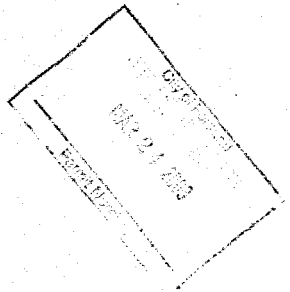
TOP RAIL
PICKET SPACER



SERIES 200 TOP RAIL

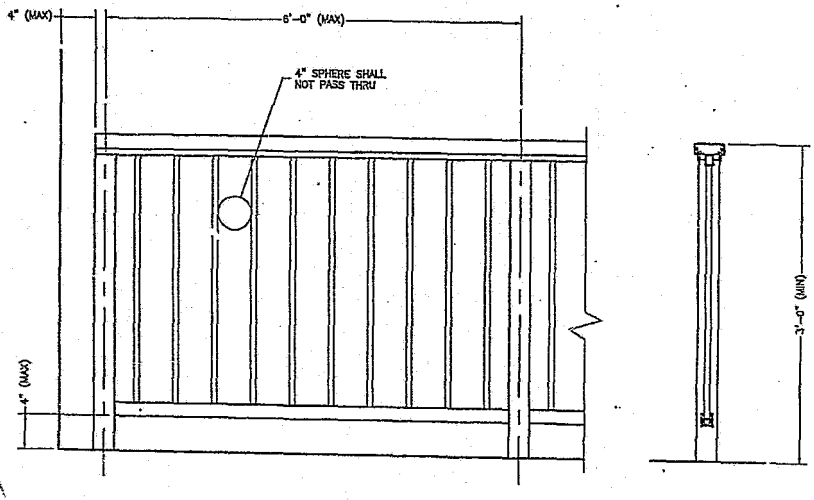
sapa:



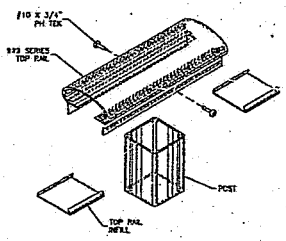


SERIES 200 PICKET RAILING

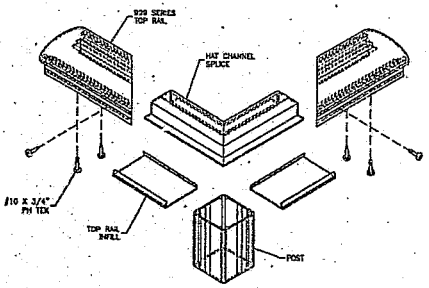
sapa:



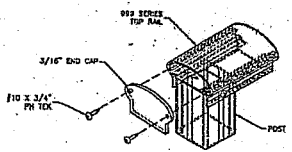
SERIES 200 PICKET RAILING



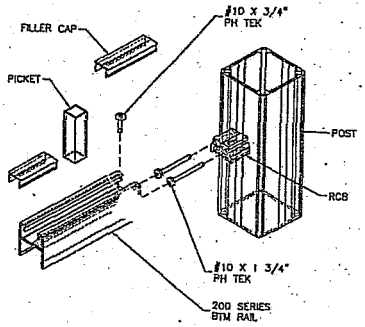
TYPICAL TOP RAIL CONNECTION
3"=1'-0"



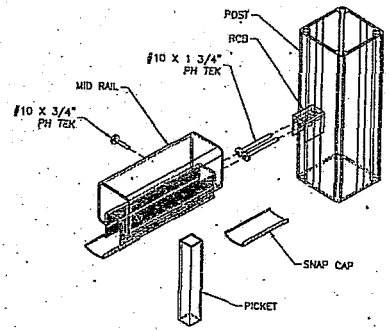
TYPICAL TOP RAIL CORNER CONNECTION
3"=1'-0"



END CAP DETAIL
3"=1'-0"



TYPICAL BOTTOM RAIL CONNECTION DETAIL
3"=1'-0"



TYPICAL MID RAIL CONNECTION DETAIL
3"=1'-0"

AAI aghus associates, inc.
ENGINEERING

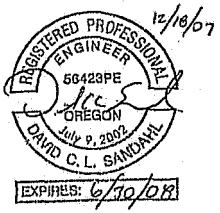
STRUCTURAL CALCULATIONS

PROJECT: SAPA - One & Two Family Dwelling Railings

ADDRESS: 3640 SW Nevada Ct.
Portland, OR 97219

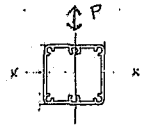
PROJECT No.: A07210.01
DATE: December 18, 2007

PERMIT SUBMITTAL



Contents:

4875 SW Griffith Drive | Suite 300 | Beaverton, OR | 97005
503.620.3030 | tel 503.620.6539 | fax
www.aafeng.com



½" HIGH RAILING

$M_w = 32(5)(½+4) = 7360$

$M = 200(½) = 8400$

$f_{b_x} = \frac{8400}{.8743} = 9.6 ksi$

$\Delta = \frac{200(½)^3}{3(10.1E6)1.0387} = .47 \Rightarrow \ell/178$

SECTION 3.4.2 : $F_b = 19ksi(1.33) = 25.27ksi$

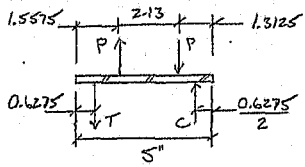
SECTION 3.4.14 : $S_1 = ½(.8743)/.5\sqrt{.9509(1.9896)} = .53 \Rightarrow F_b = 27.93 ksi$

BASE SCREWS :

$T=C = 8400/2.13 = 3944/3 \text{ SCREWS} = 1315^{\#}$

$\Rightarrow$ [(6) ¼"ϕ SAE GRADE 5 STEEL SCREWS] ALLOW = $1526^{\#}$

BASE PLATES :



$M_{PL} = \frac{3944(1.5575-.6275)(2.13)}{(.93+2.13)} = .2553$

$t_{PL} = \sqrt{\frac{6(.2553)}{37.2ksi(5-3(.5))}} = .317$

$\Rightarrow$ [PL ⅜ x 5 x 5]

$T_{BOLT} = 8400/5" = 1680^{\#}$

$\Rightarrow T = 1680^{\#}/2 \text{ BOLTS} = 840^{\#}/\text{BOLT}$

$\Rightarrow$ [⅜"ϕ x 6" LAGS W/ 3½" MIN EMBED]

$W_{ALLOW} = 305(1.33).7(3.28) = 932^{\#}$

$\#\text{BOLTS} = \frac{1680/2}{\pi(1.33)\pi(.5)} = 9.5$

$\Rightarrow$ [(10) 16d]

JCS 10/10/07

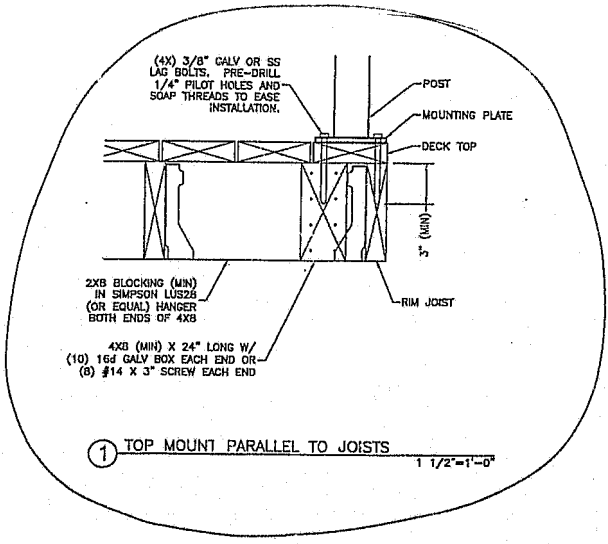
AAI afshan associates, inc. ENGINEERING
4175 SW Griffith Drive | Suite 300 | Beaverton, OR | 97005
503.620.3030 | tel 503.620.5539 | fax
www.aaieng.com

SAPA - RESIDENTIAL RAILINGS

By: DS Date: NOV 07

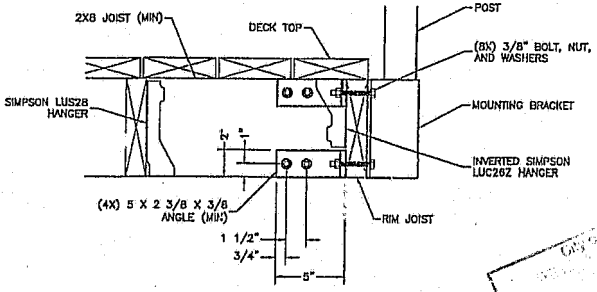
Project No: A07210

Sheet: 8 of: 10



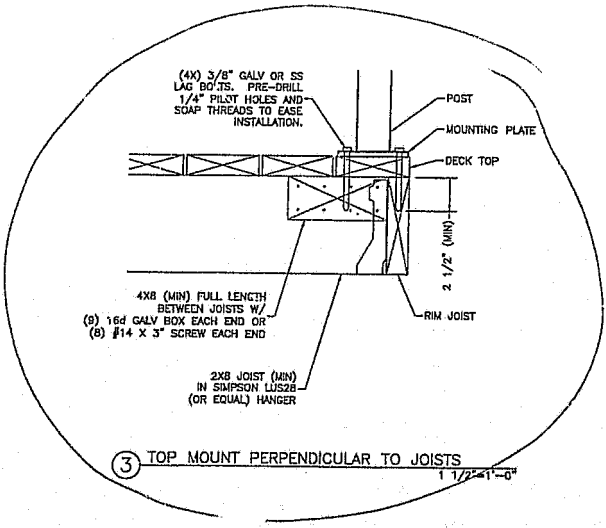
1 TOP MOUNT PARALLEL TO JOISTS

1 1/2"=1'-0"

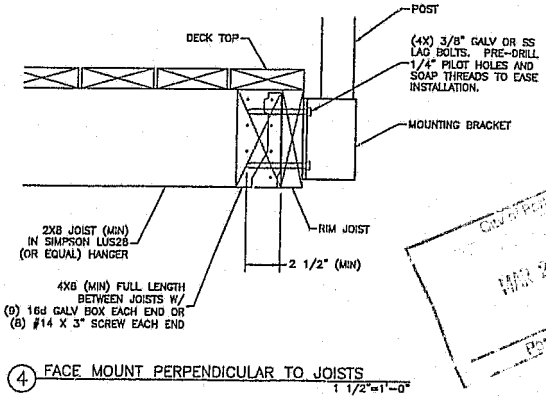


2 FACE MOUNT PARALLEL TO JOISTS

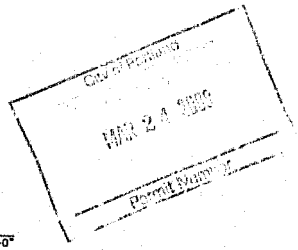
1 1/2"=1'-0"

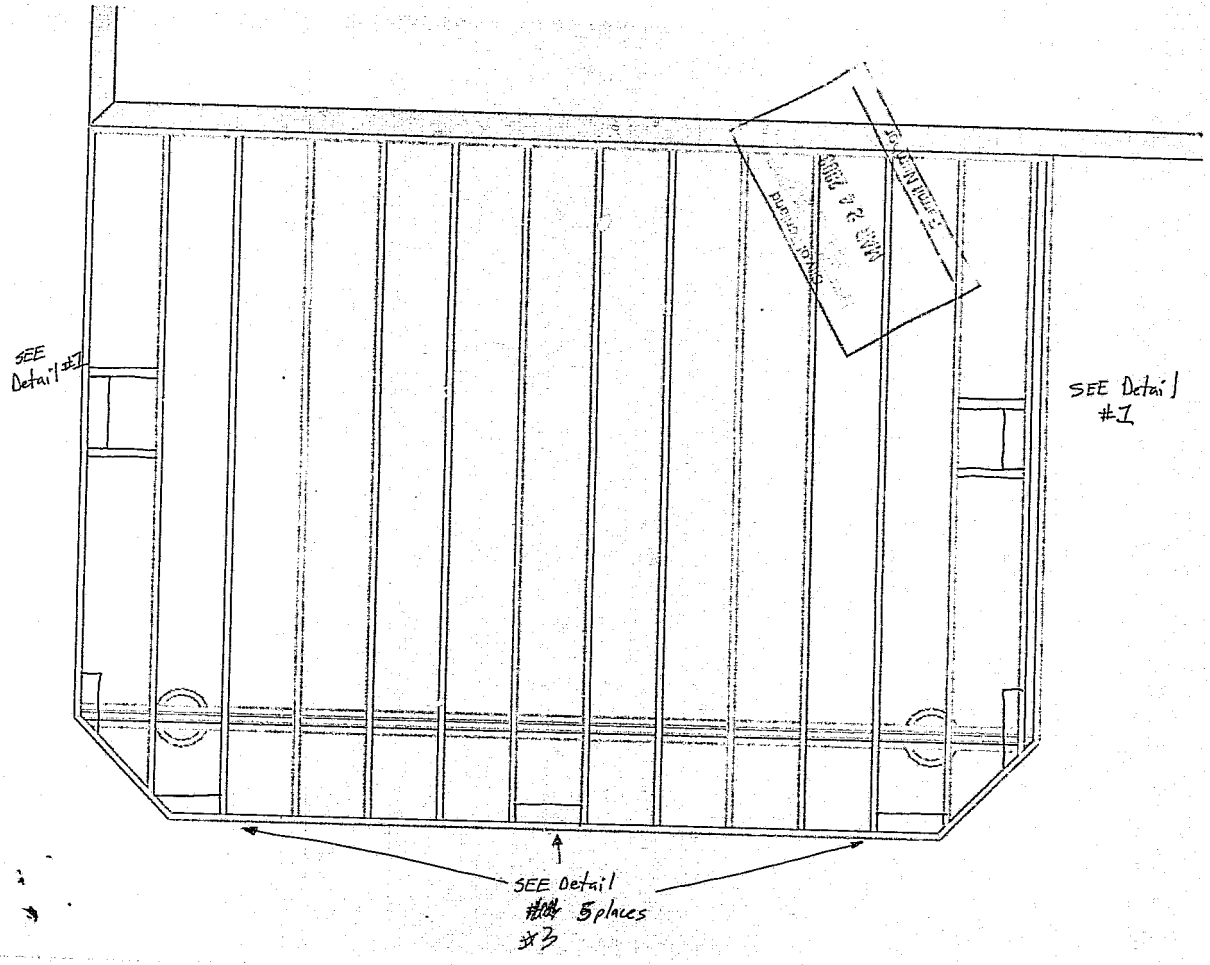


3 TOP MOUNT PERPENDICULAR TO JOISTS
1 1/2"=1'-0"



4 FACE MOUNT PERPENDICULAR TO JOISTS
1 1/2"=1'-0"




SEE Detail #1
SEE Detail #1
SEE Detail #3 5places