B
Type

29
Docs

12
Plans

B-045920
Building Permit Number

22855
Street Number

MOSCOW RD
Street Name

MRO
Community Code

097-130-015
APN

BUILDING DATA FORM
BUILDING ENVELOPE COMPLIANCE

MORTON TECHNOLOGIES, INC.
P.O. Box 11129, Santa Rosa, CA, 95406
(707) 527-8500

Form 1

Project Title Store

Documented by Terry Laird

Location Casini Ranch, Duncan Mills

Date 3/20/81

Project Designer Larry Eto — Donald T. Morton RCE 8966

Checked by _____

Date _____

Job No. 81177

SITE DESCRIPTION	Location Code Number (from Table 2 of Appendix 1) Santa Rosa	1	208
	Latitude	2	38.4
	Degree Days-heating (from Table 2 of Appendix 1)	3	2980
	SF, Solar Factor (from Fig. 4.1.17 or Table 2 of Appendix 1)	4	126.0
	ΔT, ASHRAE design temp – 78° (from Table 2 of Appendix 1)	5	15
BLDG. DESCRIPTION	Occupancy Type Code Number (from Table 1 of Appendix 1)	6	074
Laundry, Restrooms not heated.	Gross heated floor area, sq. ft.	7	1727
	Number of floors	8	1
	Ground Floor Perimeter, ft.	9	179.2
	~~Longest diagonal dimension at ground floor, ft.~~	10	___
	Height, ft. plate/ridge	11	10/20

Record the detailed materials data on the Materials Data Form - Form 2

Wall	Surface Areas	$A_{opaque\ wall}$	12	1832
		A_{window}	13	154
		A_{door}	14	106
		Total A_{ow} Line 12 + 13 + 14	15	2092
	Heat Transfer Coefficients (see Section 4.1.8)			
	winter (heating)	U_{wall}	16	.083
		U_{window}	17	1.10
		U_{door}	18	.55
	summer (cooling)	U_w	19	NA
		U	20	NA
		U_{door}	21	NA
	Shading coefficient of glass, (from Table 3 of Appendix 1)	SC	22	NA
	Weight of Wall Construction, lb/ft²	W	23	< 25
	Mass Correction Factor (from Fig. 4.1.16)	MCF	24	1.0
	Equivalent Temperature Difference (from Fig. 4.1.16)	TD_{eq}	25	NA
Roof	Surface Areas	$A_{opaque\ roof}$	26	1163
		$A_{skylight}$	27	24
	Total	A_{or} (26 + 27)	28	1187
	% skylights	(27/28)	29	.02 (2%)

Note: If Line 29 is 5% or greater, automatic light-sensitive switching systems are required in the area lighted by skylight.

Enter the difference between line 27 and 5% of line 28, or zero, whichever is the greater	30	0
Enter the sum of line 26 and line 30	31	1163

Heat Transfer Coefficients (see Section 4.1.8)

winter (heating)	U_{roof}	32	.050/.049
	$U_{skylight}$	33	1.23
	U_r	34	NA
summer (cooling)	U_s	35	NA
Shading Coefficient of skylight (from Table 3 of Appendix 1)	SC_s	36	NA
Mass Coefficient (from Fig. 4.1.16)	Mc	37	NA
Absorptance (from Fig. 4.1.16)	A_c	38	NA

Floor

☐ Check if slab on grade (exempt).

Floor Area over unheated space	A_{of}	39	1727
U-value for floor	U_{of}	40	.333

HEATING DESIGN CRITERION

Standard U_{ow} (from Fig. 4.1.2)	43	.408
Standard U_{or} (from Fig. 4.1.3)	44	.100
Standard U_{of} (from Fig. 4.1.5)	45	.188
Maximum allowable U_o (from Fig. 4.1.1)	46	.259
Proposed U_{ow} (from Fig. 4.1.7)	47	.182
Proposed U_{or} (from Fig. 4.1.10)	48	.050
Proposed U_{of} (from line 40)	49	.333
Proposed U_o (from Fig. 4.1.1)	50	.203

Line 50 must not exceed line 46

Note: U_{or} is calculated from the equation of Fig. 4.1.10 for the proposed building using the value from line 30 for the area of skylights, and the value from line 31 for the overall roof area A_{or}.

NA

COOLING DESIGN CRITERION

Standard $OTTW_w$ (from Fig. 4.1.15)	51	
Standard $OTTV_r$ (41 x line 44)	52	
Standard OTTV (from Fig. 4.1.13)	53	
Proposed $OTTV_w$ (from Fig. 4.1.14)	54	
Proposed $OTTV_r$ (from Fig. 4.1.14)	55	
Proposed OTTV (from Fig. 4.1.13)	56	

Line 56 must not exceed line 53

Note: $OTTV_r$ for the proposed building is calculated from the equation of Fig. 4.1.14 using the value from line 27 for the area of skylights, and the value from line 28 for the overall roof area A_{or}

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SANTA ROSA, CA 95406 • 707/527-8500
CIVIL & STRUCTURAL ENGINEERING / PLAN CHECKING / ENERGY CONSERVATION / DISCO-TECH MICROCOMPUTER PRODUCTS

JOB NO. 81177	BY:	CK'D:	DATE:
PROJECT: FORM 1 and FORM 4 worksheet			SHEET OF

Heating Design (Form 1)

Max Allowable $U_o = \frac{(2092)(.408) + (1187)(.100) + (1727)(.188)}{5006} = .259$

Proposed $U_{ow} = \frac{(1832)(.083) + (154)(1.10) + (106)(.55)}{2092} = .182$

Proposed $U_o = \frac{(2092)(.182) + (1187)(.05) + (1727)(.333)}{5006} = .203$

Heating Load (Form 4)

Transmission $= (A_o)(U_o)(\Delta T) = (5006)(.203)(72-29) = 43{,}697$ BTU/h

Infiltration: Rate $= (22215\ ft^3/air\ change)(.5\ a.ch./hr)(1\ hr/60\ min)$
$= 185$ cfm

loss $= (185\ cfm)(72-29)(1.08) = 8591$ BTU/h

Duct loss $= (43697 + 8591)(.05) = 2614$ BTU/h

Form 2
Altered

MATERIALS DATA FORM
BUILDING ENVELOPE COMPLIANCE

Project Title _____

Location _____

Project Designer _____

Job No. 81177

Documented by T. Laird

Date _____

Checked by _____

Date _____

Wall

Wall Type 1

Weight of wall construction, lb/ft² (see Sec. 4.1.8)	W_1 1	<25
Heat Transfer Coefficient (see Sec. 4.1.8)	U_1 2	.083
Surface Areas (attach sheets to document any additional compass orientations)	Orientation 3	"All"
	Area 4	1832
	Orientation 5	
	Area 6	
	Orientation 7	
	Area 8	
	Orientation 9	
	Area 10	

Wall Type 2

Weight of wall construction, lb/ft²	W_2 11	
Heat Transfer Coefficient	U_2 12	
Surface Areas (Attach sheets to document any additional compass orientations)	Orientation 13	
	Area 14	
	Orientation 15	
	Area 16	
	Orientation 17	
	Area 18	
	Orientation 19	
	Area 20	

Glass Type 1

Shading coefficient (from Table 3 of Appendix I or mfrs data)	41	.95
Heat Transfer Coefficient (from mfrs data)	42	1.10
Surface Areas (Attach sheets to document any additional compass orientations)	Orientation 43	E
	Area 44	124
	Orientation 45	S
	Area 46	30
	Orientation 47	
	Area 48	
	Orientation 49	
	Area 50	

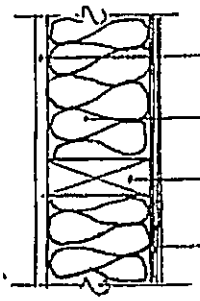
PROJECT TITLE _____

	Glass Type 2		
	Shading coefficient (from Table 3 of Appendix 1 or mfrs. data)	71	
	Heat Transfer Coefficient (from mfrs. data)	72	
	Surface Areas (Attach sheets to document any additional compass orientations).	Orientation 73	
		Area 74	
		Orientation 75	
		Area 76	
		Orientation 77	
		Area 78	
		Orientation 79	
		Area 80	
Roof	Roof Type 1		
	Weight of roof construction, lb/ft^2 (see Section 4.1.8)	81	215
	Heat Transfer Coefficient (see Section 4.1.8)	82	.050
	Surface Area (Attach sheets to document any additional roof types)	83	738
Roof	Roof Type 2		
	Weight of roof construction, lb/ft^2 (see Section 4.1.8)	81.1	<15
	Heat Transfer Coefficient (see Section 4.1.8)	82.1	.049
	Surface Area (Attach sheets to document any additional roof types)	83.1	1187
	Skylight Area	84	24
	Skylight Shading Coefficient (from Table 3 of Appendix 1)	85	NA.
	Skylight Heat Transfer Coefficient (U-value)	86	1.23
Floor	Floor Type 1 (floors over non-air conditioned spaces only)		
	Weight of floor construction, lb/ft^2 (see Section 4.1.8)	87	NA
	Heat Transfer Coefficient (see Section 4.1.8)	88	.333
	Surface Area (attach sheets to document any additional floor types)	89	1727
	Doors, Type 1		
	Surface Area	90	106
	Heat Transfer Coefficient (U-value, see Table 4 of Appendix 1)	91	.55
	Doors, Type 2		
	Surface Area	92	
	Heat Transfer Coefficient (U-value, see Table 4 of Appendix 1)	93	

HEAT TRANSFER COEFFICIENT
PROPOSED CONSTRUCTION ASSEMBLY

Form 3

Job No. 81177



PLAN VIEW

	List of Construction Components	R
1.	½" Gyp. Bd	.45
2.	Insulation (R=11.0)	10.33. *
3.	2x4's @ 16" o.c. (R=4.35)	—
4.	3/8" plywood	.47
5.		
6.		
7.		
8.		
	Inside Surface Air Film	NA cooling / .68 heating
	Outside Surface Air Film	.17 cooling / heating
	Total Resistance R_t	12.10 cooling / heating
	U-Value ($1/R_t$)	.083 cooling / heating

Sketch of Construction Assembly

WEIGHT: < 25 lb/ft²

Check one:

Wall ✓

Roof —

Floor —

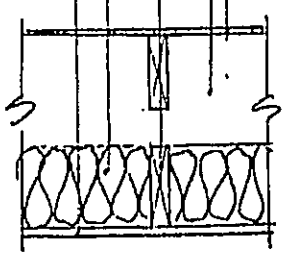
* Average R-value of framing (10% of area) and insulation:

$$R_{avg} = (.1)x(4.35)+(.9)x(11.0) = 10.33$$

HEAT TRANSFER COEFFICIENT
PROPOSED CONSTRUCTION ASSEMBLY

Form 3

Job No. 81177



List of Construction Components	R
1. ½" Gyp. Bd.	.45
2. insulation (R=19.0)	18.15
3. 2x6's @ 24" o.c. (R=6.88) (TRUSS)	—
4. vented attic	⊖
5. roof	⊖
6.	
7.	
8.	
Inside Surface Air Film	NA cooling / .61 heating
Outside Surface Air Film	.61 cooling / heating
Total Resistance R_t	19.82 cooling / heating
U-Value ($1/R_t$)	.050 cooling / heating

Sketch of Construction Assembly

WEIGHT: < 15 lb/ft²

Check one:

Wall ___

Roof ✓ Type 1

Floor ___

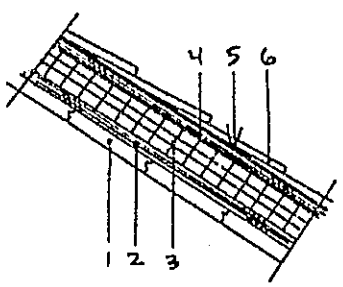
* Average R-value of framing (7% of area) and insulation:

$$R_{avg} = (.07)\times(6.88)+(.93)\times(19.0) = 18.15$$

HEAT TRANSFER COEFFICIENT
PROPOSED CONSTRUCTION ASSEMBLY

Form 3

Job No. 81177



Sketch of Construction Assembly

WEIGHT: < 15 lb/ft²

Check one:

Wall ___

Roof X Type 2

Floor ___

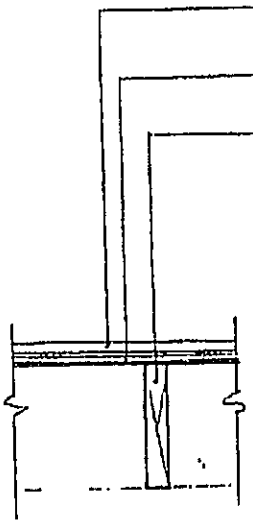
List of Construction Components	R
1. 2×6 T&G Decking	1.89
2. 3/8" plywood	.47
3. 2" Technifoam	16.0
4. 1/2" plywood	.62
5. 15# felt	.05
6. Asphalt shingles	.44
7.	___
8.	___
Inside Surface Air Film	NA cooling / .61 heating
Outside Surface Air Film	.17 cooling / .17 heating
Total Resistance R_t	20.25 cooling / 20.25 heating
U-Value ($1/R_t$)	.049 cooling / .049 heating

HEAT TRANSFER COEFFICIENT
PROPOSED CONSTRUCTION ASSEMBLY

Form 3

Job No. 81177

List of Construction Components	R
1. Tile	.05
2. 3/4" plywood	.93
3. 2x12 @16" o.c. (effective R = 1.8)	.18
4.	
5.	
6.	
7.	
8.	
Inside Surface Air Film	NA cooling / .92 heating
Outside Surface Air Film	.92 cooling / .92 heating
Total Resistance R_t	3.00 cooling / 3.00 heating
U-Value ($1/R_t$)	.333 cooling / .333 heating



Sketch of Construction Assembly

WEIGHT: NA lb/ft^2

Check one:

Wall ____

Roof ____

Floor ✓

* Average R-value of framing (10% of area):

$R_{avg} = (.1)\times(1.8) = .18$

DOCUMENTATION FORM
HVAC SYSTEMS COMPLIANCE (Complete for each system)

Form 4 (Rev. 1 5/78)
(ALTERED. See reverse)

Project Title _____ Documented by Thaiss

Location _____ Date _____

Project Designer _____ Checked by _____

Job No. 81177 Date _____

DESIGN CONDITIONS

1	Building occupancy type (Table 1 of Appendix I)	074	
2	Project Latitude (Table 2 of Appendix I)	38.4	
3	Heating Degree Days (Table 2 of Appendix I)	2980	

HEATING LOAD DOCUMENTATION (Attach calculations) see worksheet following Form 1

4	Outdoor Design Temperature, Winter	29	°F
5	Indoor Design Temperature	72	°F
6	Outdoor Air	X	CFM
7	Heat Loss From Outdoor Air	X	Btu/Hr.
8	Temperature of adjacent unheated spaces	29	°F
9	Transmission Heating Losses	43697	Btu/Hr.
10	Infiltration Air	185	CFM
11	Heat Loss From Infiltration	8591	Btu/Hr.
12	Ventilation Air	X	CFM
13	Heat Loss From Ventilation	X	Btu/Hr.
14	Outdoor Air for Special Processes	X	CFM
15	Heat Loss From Process Air	X	Btu/Hr.
16	Other Heat Losses (describe)	2614	Btu/Hr.
17	Total Heat Losses	54,902	Btu/Hr.

COOLING LOAD DOCUMENTATION (Attach calculations) No cooling equipment is proposed

18	Outdoor Design Temperature, summer, dry bulb	NA	°F
19	Outdoor Design Temperature, summer, wet bulb		°F
20	Indoor Design Temperature, summer, dry bulb		°F
21	Indoor Design Temperature, summer, wet bulb		°F
22	Transmission Heat Gain		Btu/Hr.
23	Infiltration Air		CFM
24	Heat Gain From Infiltration		Btu/Hr.
25	Outdoor Air for Special Processes		CFM
26	Heat Gain for Process Air		Btu/Hr.
27	Solar Heat Gain Through Windows, etc.		Btu/Hr.
28	Heat Gain From Lights, Equipment, People, etc.		Btu/Hr.
29	Heat Gain From Other Sources		Btu/Hr.

Outdoor Air:
Fixed Minimum Type System
CFM Per Person (Not to Exceed Tabulated Minimum Ventilation Rates)

30			CFM/Person
31	Heat Gain From Outdoor Air		Btu/Hr.
34	Total Cooling Load	NA	Btu/Hr.

REVISION:

The following items have been eliminated from this Form 4 as they are considered to be non-applicable to this project;

1) Simultaneous heating and cooling. (all requirements)
2) Constant volume reheat system requirement.
3) Dual duct requirement.
4) Economiser requirement.
5) Electric resistance heating requirement.
6) Fan power consumption reference. (this is a low pressure system. FPI < 5)

TEMPERATURE CONTROL

Attach manufacturer's data or other, give specification or drawing reference which shows in detail the following information:

	REFERENCE (page or sheet No.)
• capability to sequence heating and cooling	36 NA
• temperature control device set point limits. 55°–85°	36
• temperature set point range between full heating and full cooling	37 NA
• setback and shutoff controls	38
• capability to terminate heating at 70° F ~~and cooling at 78° F~~	39

Indicate drawing or specification reference where the temperature control device requirements given below are documented.

An automatic temperature control device shall be provided for:

• each separate HVAC system	40
• each zone.	41

HVAC SYSTEM RESTRICTIONS & SPECIAL REQUIREMENTS

Several HVAC System types have special requirements or restrictions. In this section, the type of system used in the design must be listed and any special restrictions given here referenced to show compliance. Supply references to proper specifications page or drawing numbers.

Type HVAC Systems Used – List type of system to be used here (include all systems for heating or cooling in the building) include reference for specifications for each system.

Gas Fired Forced air Furnace 40

MECHANICAL AND GRAVITY VENTILATION

Mechanical ventilation – Dampers which are automatically interlocked and closed on fan shutdown are required.

REFERENCE 54

Gravity Ventilators – Either automatic or readily accessible manually operated dampers must be provided for all openings to the outside with the exception of combustion air openings.

REFERENCE 55

PIPING AND DUCT INSULATION AND DUCT CONSTRUCTION

References to the piping insulation, duct insulation and duct construction requirements presented in Section 4.2 of the Energy Conservation Design Manual must be given below:

REFERENCE 68

Form 5

DOCUMENTATION FORM
BUILDING LIGHTING COMPLIANCE

Project Title _____ Documented by Thaird

Location _____ Date _____

Project Designer _____ Checked by _____

Job No. 81177 Date _____

Room No.	Room Sq. Ft.	RCR	Task Areas	Note Appl.	Sq. Ft. /Occ.	No. Occ.	Sq. Ft. /Task	Total Sq. Ft.	Watts /Sq. Ft.	Allotted Watts	Design Watts
	192	5+	Storeroom 331					192	1.4	268.8	
	504	0-5	Recreation *					504	1.4	705.6	
	960	0-5	store 334	1	30	32	30	960	3.1	2976.0	
			Non task					-0-	NA	-0-	X
	234	0-5	Laundry 191					234	1.3	304.2	
	71	5+	Restroom 313					71	1.6	113.6	
	71	5+	Restroom 313					71	1.6	113.6	
	14	5+	Vestibule 312					14	1.0	14.0	
	19	5+	Water Heater 058					19	1.4	26.6	

* IES recommendation for recreational billiards used:
20 Footcandles = 1.4 watt/ft²

Total Not to Exceed

Page Total 4522

Form 6

DOCUMENTATION FORM &
HVAC EQUIPMENT COMPLIANCE

Job No. 81177

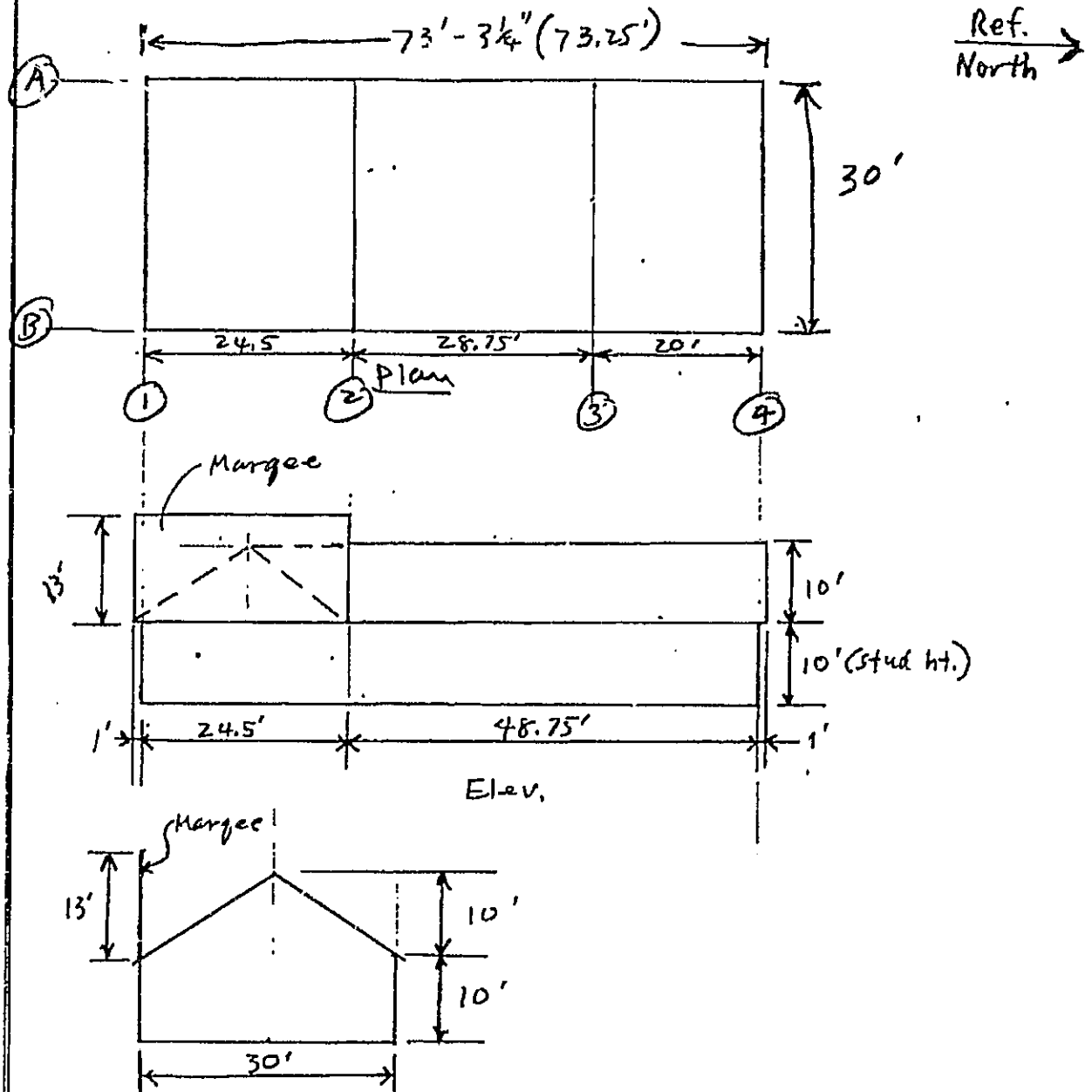
References giving the specification page or drawing sheet number or manufacturer's data must be submitted to demonstrate compliance with Division 6 of the standards.

ELECTRICALLY OPERATED COOLING SYSTEM EQUIPMENT	Standard rating capacity, Btu/hr	1
	Minimum EER (COP)	2
	Reference	3
ABSORPTION WATER CHILLING COOLING SYSTEM EQUIPMENT	Heat source (check one)	4
	Direct fired (gas-oil)	5
	Indirect fired (steam-hot water)	6
	Minimum EER (COP)	7
	Reference	8
COMBUSTION HEATING EQUIPMENT (Oil and gas-fired comfort heating equipment— DAY & NITE, Mod # 3946-00150 150,000 BTU, 75% Eff.	Minimum combustion efficiency at maximum rated output 75% required min.	9
	Reference	10
ELECTRICALLY OPERATED HEATING HEAT PUMPS	Minimum EER (COP)	11
	Reference	12
	Supplementary Heater Control	13
	Reference	14
ELECTRICAL RESISTANCE SPACE HEATING EQUIPMENT	REFERENCE FOR FULL-LOAD ENERGY INPUT AND OUTPUT	15

REQUIREMENT FOR MAINTENANCE FOR MANUFACTURER'S MAINTENANCE AND, FULL AND PARTIAL CAPACITY AND STAND-BY INPUT(S) AND OUTPUT(S) SPECIFICATION REFERENCE 16

Geo Casini - Store Bldg Moscow Rd. (22855) Duncan Mills	LARRY ETO - CIVIL ENGINEER PHONE (707) 526-3848 2952 MENDOCINO AVE. SUITE D Santa Rosa, California 95401		
Foundations Only	3/9/81	81-12	1

Larry Eto #15778



File

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Santa Rosa, California 95401

Roof:	Asphalt shingles	3.0 PSF
w/o Ceiling	½" PLY'WD	1.5
	2" Rigid Insul	0.5
	⅜" PLY'WD	1.1
	2x Pine decking	4.3
	Misc (incl. truss' @ 7'o.c.)	1.6
		12.0 PSF

w/ceiling	Asphalt shingles	3.0
	½" PLY'WD	1.5
	Trusses @ 24" o.c.	2.0
	6" Batt/Glass	1.8
	Susp/Gyp Bd Ceil	2.5
	Misc	1.2
		12.0 PSF

Roof L.L. = 16.0 PSF pitch > 4:12
Wall D.L. = 8 PSF
Floor D.L. = 10 PSF wd. frame
Floor L.L. = 75 PSF for store, recreation, & laundry (slab)
Floor L.L. = 125 PSF = storeroom

Seismic Force:

D.L. Roof = $32 \times 75 \times 12^{PSF} = 28,800$ #

Walls = $(30'+30'+73'+73'+24'+30'+30'+30'+20')\frac{1}{2} \times 8\,PSF = 2720$ #

$31,520$ #

F(seismic) = $0.186 \times 31,520 = 5863$ #

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Santa Rosa, California 95401

North-South Wind load

$$\left[\left(\frac{30 \times 10}{2}\right)_{\text{wall}} + \left(\frac{1}{2}\right)(10 \times 30)_{\text{Gable}}\right] \times 20\ \text{PSF} = 6000\ \#$$

East-West dir.

$$\left[(10)(48.75+1) + (13 \times 24.5) + \left(73.25 \times 19\tfrac{1}{2}\right)\right] 20\ \text{PSF} = 23{,}645\ \#$$

Wind Load governs lateral in both dir.

ck for holdown locations & requirements

North-South Wind (take shears to ext. walls only

West wall:

$$v = \frac{6000\ \#}{2} \div (73.25' - 6'_{\text{doors}}) = 45\ \#/\text{Ft}$$

No HD's req'd

½" AB GF 650 X 1.33 = 865 #/bolt

Spacing $\frac{865}{45} = 19.2'$/bolt, use 4' o.c.

East Wall

$$v = \frac{6000\ \#}{2} \div (7' + 4.5' + 5.5' + 7.5'_{45'}{}_{29.5'}) = 102\ \#/\text{Ft}$$

OTM = 102 X 5 X 10 = 5100 '#

RM = ⅔ X 10' X 8 PSF X $\frac{5}{2}$ = 133 '#

4967 '#

Tie down F = $\frac{4967}{5'} = 993.4\ \#$ use PA-18, 1600 #/end

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Santa Rosa, California 95401

East - West Wind

Distribute shears to Lines ① ② ③ & ④ (see Fig 1. calcs)

V to Line ①

$$23{,}645^{\#} \times \frac{24.5}{73.25} \div 2 = 3955^{\#}$$

V to Line ②

$$\left(23{,}645 \times \frac{28.75}{73.25} \div 2\right) + 3955 = 8595^{\#}$$

4640#

V to Line ③

$$\left(23{,}645 \times \frac{20}{73.25} \div 2\right) + 4640 = 7868^{\#}$$

V to Line ④

$$\left(23{,}645 \times \frac{20}{73.25} \div 2\right) = 3228^{\#}$$

$23646^{\#} = 23{,}645^{\#}$ ck

Line ①, $V = 3955^{\#}$

$$w = \frac{3955^{\#}}{8+12} = 198\ ^{\#}/_{ft}$$

OTM = $198 \times 8 \times 10 = 15840'^{\#}$

RM = $\frac{2}{3} \times 1792 \times \frac{8}{2} = 4779$

$11{,}061'^{\#}$

D.L: Roof $\left(\frac{24}{2} \times 8\right)(12) = 1152$

Wall $8 \times 8 \times 10 = \frac{640}{1792^{\#}}$

$F_{(tie)} = \frac{11{,}061'^{\#}}{8'} = 1383^{\#}$, PA 18, $1600 \times 1.33 = 2128^{\#}$

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Line (2), V = 8595 #

$v = \frac{8595\ \#}{16'} = 538\ \#/Ft$

Note: Wall length was revised on plans to longer than 16', but HD installed under Fdn only @ 16'; so design remains @ 16'

D.L. Roof $\frac{24}{2} \times 16 \times 12 = 2304\ \#$
Wall $16 \times 8 \times 10 = 1280$
$3584\ \#$

OTM = $538 \times 16 \times 10 = 86{,}080'\#$
RM = $\frac{2}{3} \times 3584 \times \frac{16}{2} = 19{,}115$
$66{,}965'\#$

$F_{(tie)} = \frac{66{,}965'\#}{16'} = 4186\ \#$

HD-5, $3610 \times 1.33 = 4801\ \#$
A.B. Space $\frac{865}{538} = 1.6' \approx 19"$ o.c.

Line (3), V = 7868 #

$v = \frac{7868\ \#}{10'} = 787\ \#/Ft$

D.L. Roof $\left(\frac{7}{2} + \frac{3}{2}\right)(10)(12.5\#) = 540\ \#$
Wall. $10 \times 10 \times 8 = 800$
$1340\ \#$

OTM = $7868 \times 10' = 78680'\#$
RM = $\frac{2}{3} \times 1340 \times \frac{10}{2} = 4467'\#$
$74{,}213'\#$

$F_{(tie)} = \frac{74213'\#}{10'} = 7422\ \#$,

HD-7, $6500 \times 1.33 = 8645\ \#$

A.B. Space: $\frac{865}{787} = 1.1' \approx 13"$ o.c.

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Line ④, $V = 3228\#$

$$v = \frac{3228\#}{30'} = 108\ \#/Ft$$

D.L. Roof $\frac{3}{2} \times 30 \times 12 = 360\#$
Wall $10 \times 30 \times 8 = 2400\#$
Gable $30 \times 10 \times \frac{1}{2} \times 8 = 1200\#$
$3960\#$

$OTM = 3228\# \times 10' = 32280'\#$
$RM = \frac{2}{3} \times 3960\# \times \frac{30}{2} = 39600'\#$
$-7320\#$ No HD Req'd

See Pg 6-A

Foundation Design –
Vertical loads - Perimeter footing

$w = \frac{30}{2}(12+16) = 420\ \#/Ft$		Roof
$10 \times 8\ PSF = 80\ \#/Ft$		Wall
$\frac{30}{4}(10+75) = 638\ \#/Ft$		Floor
$1238\ \#/Ft$		

$$Width = \frac{1238\ \#/Ft}{1000\ PSF/Ft} = 1.3\ ft \simeq 16"\ wide$$

Interior footing
East-West @ Rec. Room

$w = \frac{24}{2}(12+16) = 336$		Roof
$\frac{24}{4}(10+75) = 1020$		Floor
$10 \times 8 = 80$		Wall
$1436 \simeq 18"$ wide		

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chord stress

$q = \left(\frac{10}{2} + 10\right)(20) = 300\ \#/Ft$

Between lines ② & ③ is max.

$F_{ch} = \frac{300 \times 28.75^2}{8 \times 30} = 1033\ \#$

8 - 16^d per 2x4 plate Lap.

$G.F = 107 \times 1.33 \times 8 = 1140\ \#$

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North-South through store

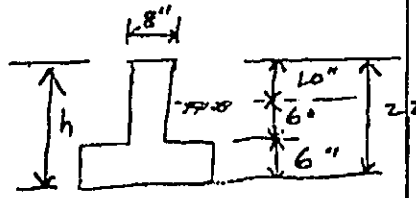
$w = \frac{30}{2}(10+75) = 1225$ #/ft Floor only

$= 16"$

Use min 18" wide through out w/ 8" stem.

Bm footing design

For HD-7, $F = 7422$ #



$$L_H = 2.22\sqrt[4]{\frac{IE}{F}}$$

$$L_H = 5.99\,h^{3/4} = 5.99 \times \left(\frac{22}{12}\right)^{3/4} = 5.99 \times 1.57$$

$$L_H = 9.4'$$

$$P_c = \frac{6}{7}\frac{W}{L_H} = \frac{6}{7} \times \frac{7422^{\#}}{9.4} = 677^{\#} < 1000 \text{ PSF OK}$$

$$M_c = \frac{17}{84} P_c L_H^2 = \frac{17}{84} \times 677 \times 9.4^2$$

$$M_c = 12{,}107^{\#'}$$

$$A_s = \frac{12.2^{K'}}{1.44 \times (22-3.5)} = 0.46 \text{ in}^2$$

$d = 18.5$

2 - #5 top & Bottom, $A_s = 2 \times .31 = 0.62 \text{ in}^2$

Size Girders for center support for Floor Joists

Two conditions

Store Floor w/ D+L = $(10+75)$ #/ft²

Storeroom w/ D+L = $(10+125)$ #/ft²

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Store Floor:

$$w = \frac{30}{2}(10+75) = 1275\ \#/ft$$

@ 4.5' span

$$S = \frac{1275 \times 4.5^2 \times 1.2}{8 \times 1300} = 30.\ in^3$$

$$A = \frac{1.5 \times 1275 \times \frac{4.5}{12} - 2\left(\frac{7.5}{12}\right)}{85} = 37\ in^2$$

6X8 DF No. 1
S = 51.6
A = 41.25

Storeroom Floor

$$w = \frac{24}{2}(10+125) = 1620\ \#/ft$$

@ 4.5' span

$$S = 30 \times \frac{1620}{1275} = 38.1$$

$$A = 37 \times \frac{1620}{1275} = 47\ in^2$$

6X10
S = 82
A = 52

Pier Size - Storeroom

$$A = \frac{4.5 \times 1620}{1000} = 7.3\ ft^2 = 2.7\text{' square (33")}$$

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Pier Size - store

$$A = \frac{1275 \times 4.5}{1000} = 5.7\ ft^2 \quad 2 - 28" \text{ Square}$$

ck Floor joist

store

$$w = 1.33(10 + 75) = 113\ \#/ft$$

$$S = \frac{113 \times 15^2 \times 12}{8 \times 1450} = 26.3\ in^3$$

$$A = \frac{1.5 \times 113 \times \frac{15}{2}}{95} = 15\ in^2$$

2x12 @ 16" O.C.

$S = 31.6$

$A = 16.875$

Storeroom

$$w = 1.33(10 + 125) = 180\ \#/ft$$

$$S = \frac{180 \times 12^2 \times 12}{8 \times 1450} = 26.8\ in^3$$

$$A = \frac{1.5 \times 180 \times \frac{12 - 2\left(\frac{11.25}{12}\right)}{2}}{85} = 16.1\ in^2 \quad \text{ok.}$$

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Porch Footing

Roof
Tar & Gravel	7.0 PSF
½" PLY	1.5
2x6 @ 16"	1.1
	9.6 ≈ 10 PSF

L.L. = 20 PSF

Floor D.L. = 10 PSF
L.L. = 60 PSF

$w = \frac{8}{2}(10+60) = 280$ #/Ft

plus roof load via posts @ 10' oc.

$P = 10 \times \frac{8}{2} \times (10+20) = 1200$ #

use 12" wide cont. Ftg.

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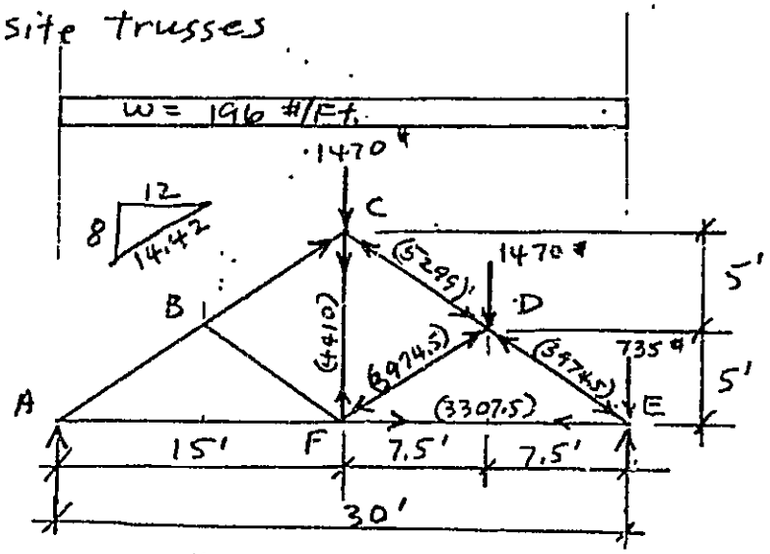
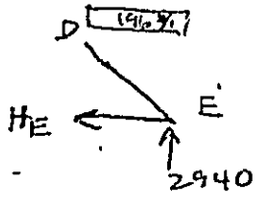
Job site trusses



$R_L = 2940\ \#$ $R_R = 2940\ \#$

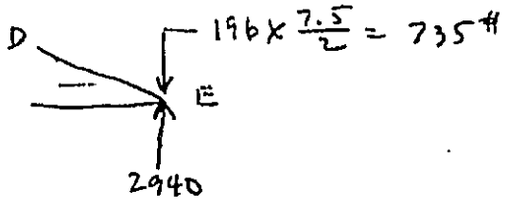
$w = 7(12+16) = 196\ \#/Ft$

$R_L = R_R = 196 \times \frac{30}{2} = 2940\ \#$



$\Sigma M_D = 5H_E + (196)(7.5)\left(\frac{7.5}{2}\right) - (7.5)(2940) = 0$

$H_E = 3307.5\ \#$



$\Sigma F_V = -2940 + 735 + DE_V = 0$

$DE_V = 2205\ \#$

$DE = \frac{14.45}{8} \times 2205$

$DE = 39745\ \#$

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$DF_H = 3307.5^{\#}$

$DF = \frac{14.42}{12} \times 3307.5 = 3974.5$

$FC = DF_V + BF_V = \frac{8}{14.42}(3974.5) + \frac{8}{14.42}(3974.5)$

$FC = 4410$

$BC_V + CD_V = 1470 + 4410 = 5880^{\#}$

$BC_V = CD_V = \frac{5880}{2} = 2940^{\#}$

$CD = BC = \frac{14.42}{8} \times 2940 = 5299^{\#}$

$\Sigma V_D = 1470 + \frac{8}{14.42}(5299) - \frac{8}{14.42}(3974.5) - \frac{8}{14.42}(3974.5) = 0$

$0 = 0$

Bearing seat @ truss supports

$P = 2940^{\#}$

$A = \frac{2940}{385} = 7.6\ in^2$; w/ 3 - 2x Rough

$l_b = \frac{7.6\ in^2}{3 \times 2"} = 1.27"$ use min 2"

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Joint A/E
3975# compression
3308# Tension

			Parallel to grain		Short Term
		2" Rough	w/Steel plates		1.25
Bolts	1/2" DBL Shear	1125#	1406#		
	3/4" " "	1540#	1925#		
		1 grain			
		575#	719#		898

Joint B/D - 3975# compression

Joint C = 5300# comp
4410# Tens

Joint F = 3308# tens
3975# comp.
4410# Tens

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Porch Roof frame

D.L.:	Built up roofing	7.0 PSF
	5/8" PLY	1.8
	2x8 @ 24" O.C.	1.5
		10.3
L.L.		20
		30.3 PSF

2x8 @ 24" O.C.

$w = 2(30.3) = 6.$ #/Ft

$S = \frac{61 \times 8^2 \times 12}{8 \times 1450 \times 1.25} = 3.23 \text{ in}^3$ 2x8 OK.

Bms, Span 12'

$w = \left(\frac{8}{2}+1\right)(30.3) = 152$ #/Ft

$S = \frac{152 \times 12^2 \times 12}{8 \times 1500 \times 1.25} = 17.5 \text{ in}^3$.

$A = \frac{1.5 \cdot 152 \times \frac{12}{2}}{85 \times 1.5} = 13 \text{ in}^2$

4x8
S = 30+
A = 25+

Porch ledger for 2x8 rafters

$P = \frac{8}{2}(30.3) = 122$ #/Ft, 16d @ 10" O.C.

Porch floor ledger

$w = \frac{8}{2}(10+60) = 280$ #/Ft, 16d @ 4" O.C.

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Marquee 24'-7" wide x 13' high

Use 2x4 @ 16" O.C. framing & frame up @ gable end of roof (over Rec. Rm) Center support by roof ridge & edges by diagonal brace @ 45° to roof

Force @ brace

$$\text{Area} = \left[\left(3' \times \frac{24.6}{2}\right) + \frac{1}{2}\left(\frac{24.6}{2} \times 10\right)\right]\frac{1}{2} = 50\ ft^2$$

$$F_H = 50\ ft^2 \times 20\ \overset{W.L.}{PSF} = 1000\ \#$$