New Modular Building for

North Kitsap School District

Poulsbo, Washington

Code Compliance

Applicable Codes: WASHINGTON:
2015 International Building Code with WA Amendments
2015 International Mechanical Code with WA Amendments
2015 Uniform Plumbing Code by IAPMO with WA Amendments
2017 National Electrical Code (NEC) with WA Amendments
2015 International Energy Conservation Code with WA Amendments
2009 ICC A117.1 Accessibility Standard

Type of Construction: VB

Description: Classroom

Occupancy: E

Floor Area: 1674 square feet

Gross Wall Area: 1500 square feet

Occupant Load: 71 (Education - Net occupiable area of both classrooms = 1420 sf / 20sf/p = 71p)

Job Number: 19668

Energy Zone: 4c

Project Information

Site Address: Hilder Pearson Elementary School
15650 Central Valley Rd.
Poulsbo, WA 98370
Kitsap County

Dealer: Pacific Mobile
13806 45th Ave.
Marysville, WA 98271

Builder: Blazer Industries, Inc.
PO Box 489
Aumsville, OR 97325
Contact: Jamie Holmes
Phone: (503) 749-1900
Fax: (503) 749-3969
E-mail: james@blazerind.com

N.L.E.A.'s

1. Foundation plan review and inspection.
2. Air barrier test where required by the individual state.
3. An accessible route shall be provided to the building area as required in 2015 IBC section 1104.
4. Electrical connection to service.
5. On site electrical service grounding, electrode system and bonding.
6. Required arc flash labeling per NEC 110.16
7. Available fault current field markings per NEC 110.24.
8. Plumbing connection to service.
9. Installation of heat tape.
10. Water heater pressure relief valve and/or drain pan disposal terminates at building exterior.
11. Fire extinguisher installed near exterior door on site when required.
12. Fire alarm system review, testing and inspection.
13. Register airflow test and balancing of HVAC system to be performed by others on site when required by the state.
14. Ridge-venting, insulation, vapor barriers, air barriers and draftstopping at marriage line installed on site.
15. Mid-span floor support.
16. Site completion or installation of siding, roofing, exterior/interior trim, floor covering and any electrical, plumbing or mechanical crossover connections as they pertain to mod connections.
17. Site installed gutters & downspouts or roof drains as applicable.
18. Per WAC 296-150F Section 0500 Item No. 1: The installation of the interior equipment and appliances associated with the modular unit shall be completed under permit and inspection with the local building department.

Index to Drawing

General Notes

- The Structural Design Details Herein are Specific to the Building Size and Module Configuration Shown on the Floor Plan of These Drawings.
- No Authorization is Given or Implied for use of the Modules in the Initial or Subsequent Installation Which Results in a Building Size or Installed Module Configuration Different Than Shown on These Drawings.
- This Building will be sited a minimum of 10 feet from all Property Lines and 10 feet from any assumed Property Lines between existing structures on this site.
- Site contractor bears responsibility for providing handicap accessibility to this structure in conformance with appropriate codes.

Design Loads

Roof ..... 30 psf (Snow)

Wind ..... 120 mph Exposure "B" (V_{ULT})

Floor ..... 40 psf or 1000 lb.

Seismic ..... Site Class D, S_{DS}=1.0, S_{D1}=0.6

Risk Category II

Reviewed for Code Compliance
Kitsap County Building/ Fire Marshals
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Subject to Field Inspection

04/22/2020

ROCK M. SHETLER
STATE OF WASHINGTON
35006
REGISTERED
PROFESSIONAL ENGINEER

Hilder Pearson Elementary School

DATE	REVISION	BY

Blazer INDUSTRIES, INC.
P.O. BOX 489 945 Olney St. Aumsville, OR 97325-0489
www.blazerind.com

MODULAR
28x64
WA GOLD

Classroom w/ HCRR for:
North Kitsap School District
Pacific Mobile WA

Approved for Const:	
File Copy:	
Drawn By:	AJB
Issue Date:	3-24-20
Job No:	19668

T-1

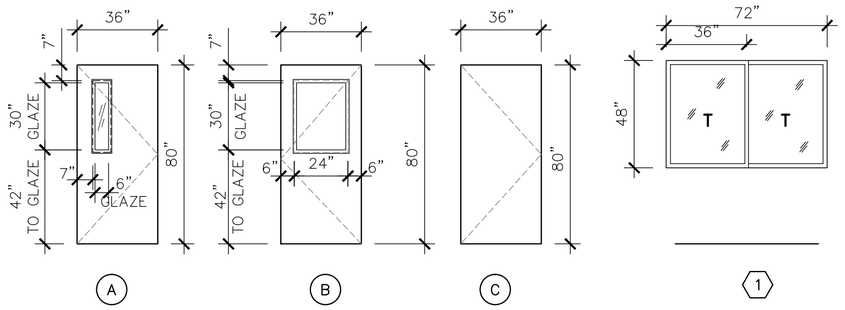
Permit Number: 20-02306

		STYLE	QTY.	SIZE	DESCRIPTION	LOCK	REMARKS
DOORS	(1)	A	2	3^0 6^8	INSULATED GALV. STEEL w/ WELDED STEEL JAMB AND WEATHERSTRIPPING DEFAULT .37 U-FACTOR	CYLINDER	S.S. BBR'G NRP HINGES TEXTURED PAINT FINISH CLOSER PANIC DEVICE 8" x 32" LITE
	(2)	B	2	3^0 6^8	INSULATED GALV. STEEL w/ WELDED STEEL JAMB AND WEATHERSTRIPPING DEFAULT .37 U-FACTOR	CYLINDER	S.S. BBR'G NRP HINGES TEXTURED PAINT FINISH CLOSER PANIC DEVICE 24" x 30" LITE
	(3)	C	2	3^0 6^8	SOLIDCORE VINYLWRAP w/ TIMELY FRAME	PRIVACY LEVER	STANDARD HINGES VW OAK FINISH

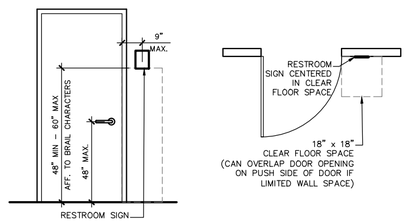
NOTE: DOOR HARDWARE SHALL BE COMPLIANT WITH ICC A117.1-2009 SECTION 404.2.6

WINDOWS	(1)		2	72 x 48	PRIME- HORIZONTAL SLIDER - DUAL GLAZE - LOW "E" WHITE VINYL FINISH-ARGON-TEMPERED-MINI BLINDS NFRC 0.29 U-FACTOR, SHGC = 0.39, V.T.=0.56

NOTES:
-GALVANIZED FLASHING INSTALLED UNDER EXTERIOR TRIM ABOVE WINDOWS
-INSTALL SELF-ADHESIVE FLASHING OVER EXTERIOR FLANGES PER RECOMMENDED INSTALLATION PATTERN



NOTE: DOOR SWINGS MAY BE MIRRORED. REFER TO FLOOR PLAN.



REQUIRED RESTROOM SIGNS
PER 2019 OSSC 1111 & ICC A117.1-2009 703

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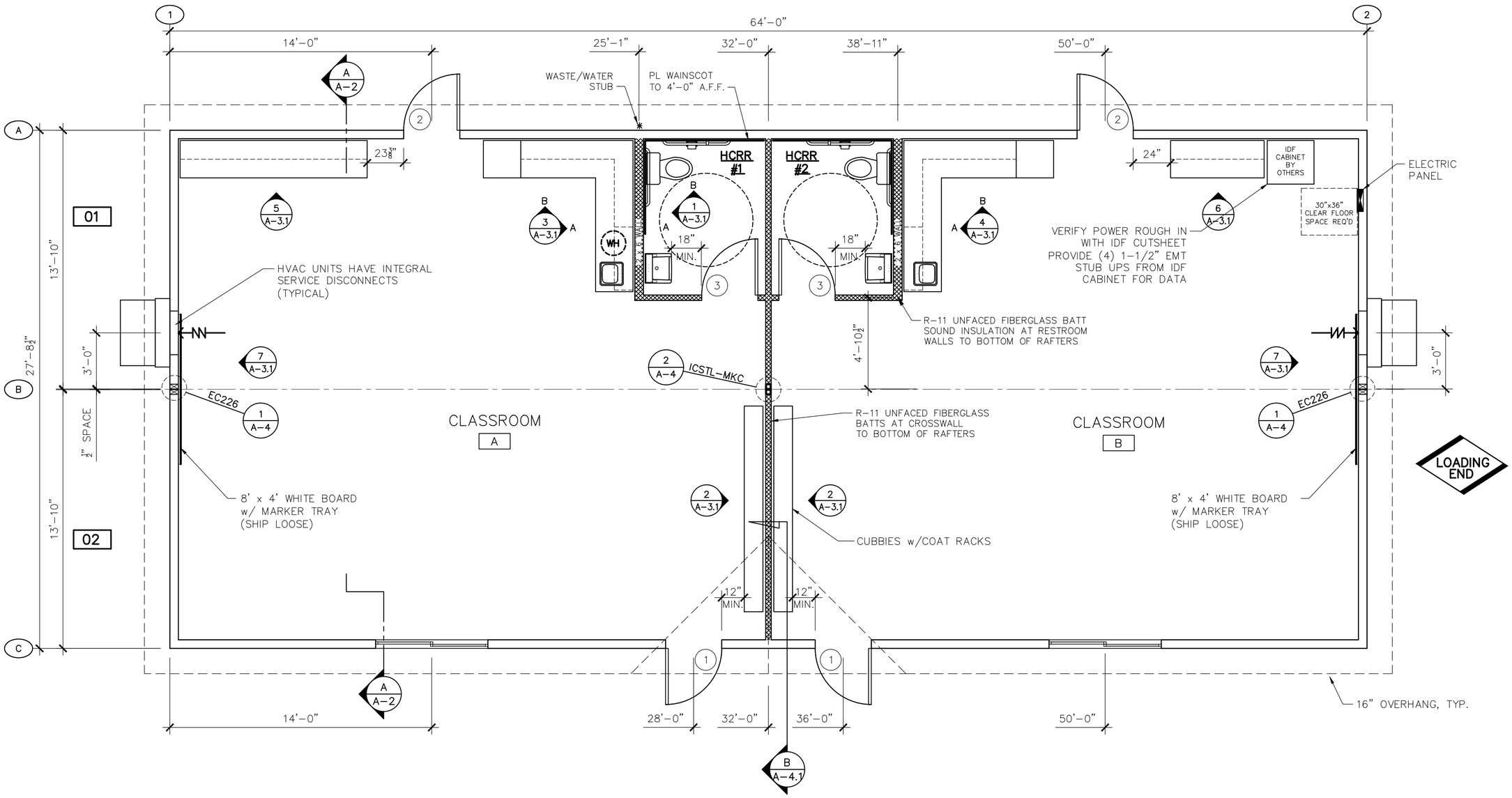
A-0.1



FLOOR PLAN

SCALE: 1/4" = 1'-0"

Reviewed for Code Compliance
Kitsap County Building/ Fire Marshals
07/17/202012:16:23 PM kwlodarchak

NOTES:
- THE TOP PLATES OF THE INTERIOR WALLS CAN SPAN A MAXIMUM OF 10'-0" BEFORE REQUIRING BRACING TO THE ROOF STRUCTURE OR AN INTERSECTING WALL.

04/22/2020

ROCK M. SHETLER — STATE OF WASHINGTON — 35006 — REGISTERED PROFESSIONAL ENGINEER

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Permit Number: 20-02306

FASTENING SCHEDULE

WALLS:

PLATE–TO–STUD	MIN. OF 2– 0.121 x 3" NAILS
SHEETROCK–TO–STUD @ INTERIOR	0.091 x 1⅞" SHEETROCK NAILS @ 16"oc EDGE AND CONSTRUCTION ADHESIVE IN FIELD
VW TACKBOARD–TO–STUD @ INTERIOR	16 ga. x 2" WIDECROWN STAPLES (SENCO P21) @ 6"oc TOP & BOTTOM AND GLUE IN FIELD
BOTTOM PLATE–TO–FLOOR	0.131 x 3" NAILS @ 8"oc (SENCO KC27 OR EQUAL)
EXT. GYPSUM SHEATING–TO–STUD @ EXTERIOR	6d COATED NAILS @ 7"oc EDGE AND 7"oc FIELD
7/16" SHEATHING–TO–STUD AT SIDEWALL	0.113x2⅜" NAILS @ 6"oc EDGE, 12"oc FIELD. ALL EDGES SUPPORTED BY FRAMING OR BLOCKING
7/16" SHEATHING–TO–STUD AT ENDWALL	SEE ENDWALL FASTENING NOTES ON ELEVATIONS
LAP SIDING–TO–STUD	PER MANUFACTURER'S RECOMMENDATION
THREE STUD CORNER CONNECTION	0.131 x 3" NAILS @ 12"oc (SENCO KC27 OR EQUAL)

AIR BARRIER NOTES:

THESE KEY AREAS SHALL BE SEALED BY CAULKING, GASKETS, TAPE OR WEATHER–STRIPPING:
- –JOINTS AROUND FENESTRATION (WINDOWS AND DOOR FRAMES): USE APPROPRIATELY SIZED BACKER ROD WITH MINIMUM 2" LAP AT ENDS.
- –JUNCTIONS BETWEEN WALLS AT:
  - –BUILDING CORNERS: USE CAULKING
  - –STRUCTURAL FLOORS: USE SILL SEAL OR CAULKING
  - –ROOFS (AT RIM): USE SILL SEAL OR CAULKING
- –PENETRATIONS OF UTILITY SERVICES THRU THE AIR BARRIER @ ROOFS, WALLS, AND FLOORS: USE CAULKING, SPRAY FOAM, OR AIR BARRIER TAPE.
- –BUILDING ASSEMBLIES USED AS DUCTS OR PLENUMS: USE BACKER ROD, CAULK, SPRAY FOAM OR AIR BARRIER TAPE.
- –JOINTS, SEAMS, AND PENETRATIONS OF VAPOR RETARDANTS: USE CAULK OR APPROVED TAPE.
- –RECESSED LIGHTING FIXTURES: USE CAULK OR SPRAY FOAM

FLOOR:

2 x 8 FLOOR JOIST–TO–RIM	MIN. OF 4– 0.131" x 3" NAILS (SENCO KC27 OR EQUAL)
CLASS "A" BOTTOM BOARD–TO–JOIST	16 GA. x 3/8" WIDE CROWN @ 12" MAX. EDGES ONLY
FLOOR DECKING–TO–2x JOIST	.113" x 2 3/8" RING SHANK @ 6"oc EDGE, 12"oc FIELD (SENCO GE–24). USE CONSTRUCTION ADHESIVE (AFG01) ON JOISTS

ROOF:

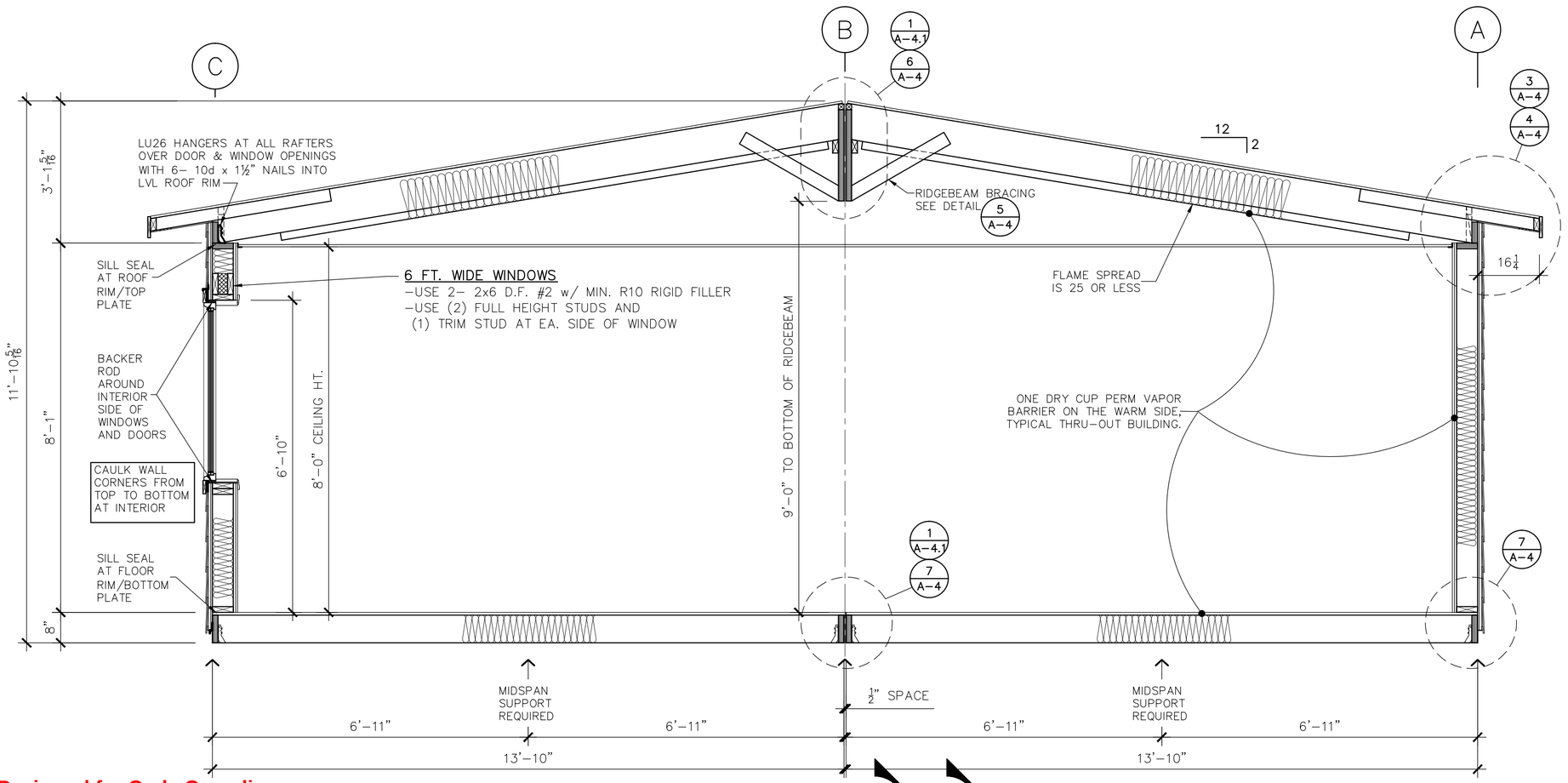
FURRING–TO–RAFTERS	MIN. OF 4– M20 2" x 3" (MIN.) RATED EACH SIDE
RIM–TO–RAFTERS	MIN. OF 3– 0.131 x 3" NAILS (SENCO KC27 OR EQUAL)
ROOF RIM–TO–TOP PLATE	0.131" x 3" NAILS @ 8"oc (SENCO KC27 OR EQUAL)
LEDGER–TO–RIDGEBEAM	0.131" x 3" NAILS @ 3" oc & 3 @ BUTT JOINTS (SENCO KC27 OR EQUAL)
RAFTER–TO–RIDGEBEAM	4– 0.131" x 3" NAILS (SENCO KC27 OR EQUAL)
SHEATHING–TO–ROOF MEMBERS	16 GA. x 1 3/4" STAPLES @ 6"oc EDGE, 12"oc FIELD, AND 4"oc AT VENTED EAVES

NOTE: SHEATHING TO BE INSTALLED PERPENDICULAR TO THE RAFTERS. OFFSET SHEATHING 4 ft. BLOCK EDGES OF ANY PIECES LESS THAN 24"

MODLINE CONNECTION:

NOTE: ALL MODLINES (DEFINED AS THE SPACE BETWEEN ADJOINING MODULES) MUST BE INSULATED AT THE ROOF, FLOOR AND WALLS ON SITE.

RIDGEBEAMS	1/2" BOLTS w/ 1 1/2" DIA. WASHERS @ 6'–0"oc AND 8" FROM EACH END (MINIMUM 2" EDGE DISTANCE)
RIM JOISTS	1/2" BOLTS w/ 1 1/2" DIA. WASHERS @ 4'–0"oc AND 8" FROM EACH END (MINIMUM 2" EDGE DISTANCE)



SECTION - A A

SCALE: 1/2" = 1'-0"

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MATERIAL LIST

ROOF:

ROOFING	24 GA. STANDING SEAM METAL 18" WIDE PANELS OVER "HIGH TEMP" SELF ADHERED ROOFING UNDERLAYMENT
SHEATHING	15/32" APA RATED (32/16)(½" PLYWOOD)
FRAMING	2 x 10 DF #2 RAFTERS @ 24"oc w/ 2" FURRING ON BOTTOM FOR R–38
RIDGEBEAM	1 1/2" x 24" CONT. LVL 2.0E
LEDGERS	2 x 4 D.F. TAPER CUT
RIMS	2 x 6 CONTINUOUS LVL 2.0E WITH 2 x 10 DF VENT BLOCKS
INSULATION	R–38 CELLULOSE BLOW–IN OVER CLASS 'A' MATERIAL (AIR BARRIER COMPONENT) NOTE: MIN. 1" AIR SPACE REQUIRED AT ROOF SHEATHING. USE BAFFLES IF REQUIRED FOR VENT CLEARANCE
CEILING	SUSPENDED T–BAR (PER IBC 808.1)
ARCHITECTURAL	16" OVERHANG
SOFFIT	¼" FIBER CEMENT PANEL, PERFORATED FOR VENTING
VENTING	SOFFIT AND RIDGE

WALLS:

SIDING	FIBER CEMENT LAP SIDING w/ 8" EXPOSURE. WRAP LOWER 12" OF BUILDING WITH MOIST–STOP. WRAP BUILDING WITH BUILDING WRAP
SHEATHING	7/16" APA RATED UNDER 5/8" EXTERIOR GYPSUM WITH TREATED CORE
FASCIA	1 x 6
TRIM	5/4 x 4 AT CORNERS, WINDOWS AND DOORS NOTE: 2"x 2" GALV. FLASHING UNDER CORNER TRIM 5/4 x 6 AT MODLINES (SHIP LOOSE)
FRAMING	EXT: 2 x 6 D.F. #3 or BETTER STUDS @ 16"oc INT: 2 x 4 H.F. @ 16"oc PLUMBING WALLS TO BE 2 x 6 H.F. NOTE: CROSSWALL AND RESTROOM WALLS FRAMED FULL HEIGHT TO BOTTOM OF RAFTERS
TOP PLATE	2 x 6 CONTINUOUS (DF#2 OR LVL 2.0E)
BOTTOM PLATE	2 x 6 D.F.
INSULATION	EXT: R–21 FIBERGLASS BATTS INT: R–11 UNFACED FIBERGLASS INSULATION BATTS AT CROSSWALL AND RESTROOM WALLS TO BOTTOM OF RAFTERS
INTERIOR FINISH	½" VINYLWRAP TACKBOARD OVER 5/8" TYPE 'X' SHEETROCK, AND SHEETROCK ABOVE WALL FINISH AT GABLE ENDS (AIR BARRIER COMPONENT). PLASTIC LAMINATE PER CODE IN RESTROOMS

FLOOR:

COVERING	RESTROOMS: SHEET VINYL ALL ELSE: ON SITE BY OTHERS
DECKING	1st: 23/32" APA RATED T&G – GLUED AND NAILED (AIR BARRIER COMPONENT) 2nd: ¼" ULTRAPLY XL IN RESTROOMS
FRAMING	2 x 8 DF#2 JOISTS @ 16"oc
RIMS	2 x 8 CONTINUOUS LVL 2.0E
JOIST HANGERS	AT ALL JOISTS
INSULATION	R–30 (USE TWO LAYERS OF R15 FIBERGLASS)
BOTTOM COVER	CLASS "A"

04/22/2020

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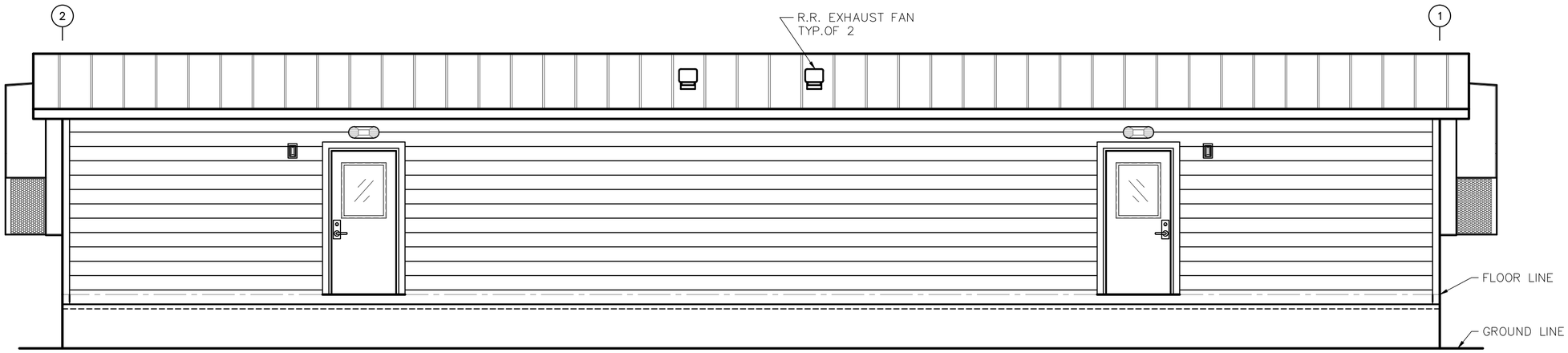
Drawn By:	AJB
Issue Date:	3-24-20

Job No: 19668

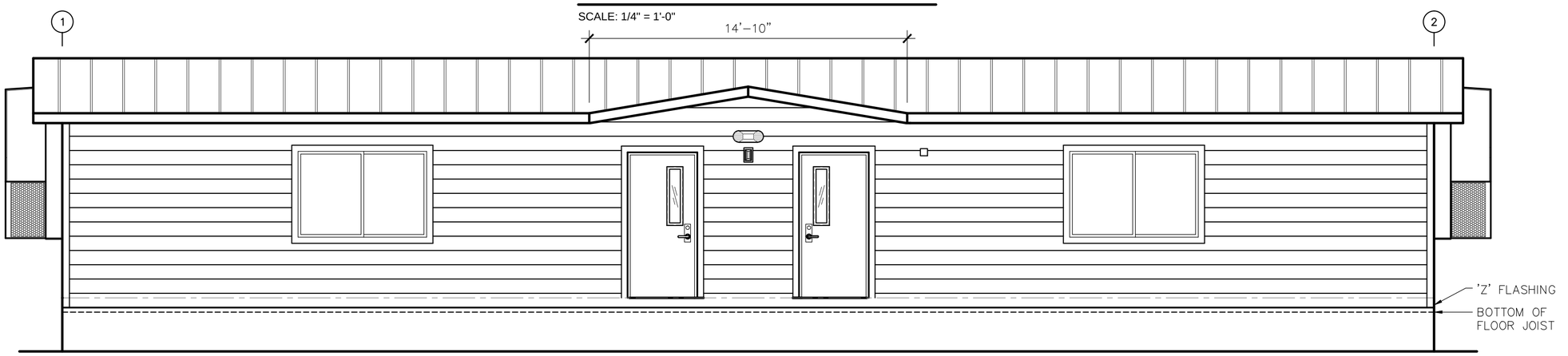
A-2

Permit Number: 20-02306



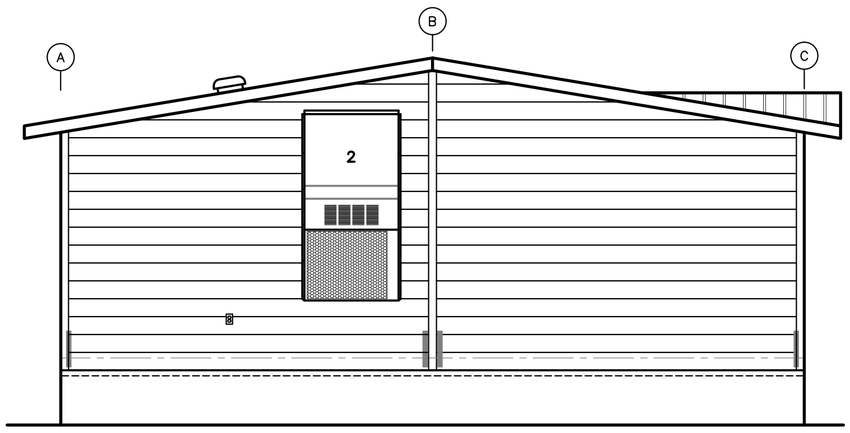
WALL A ELEVATION

SCALE: 1/4" = 1'-0"



WALL C ELEVATION

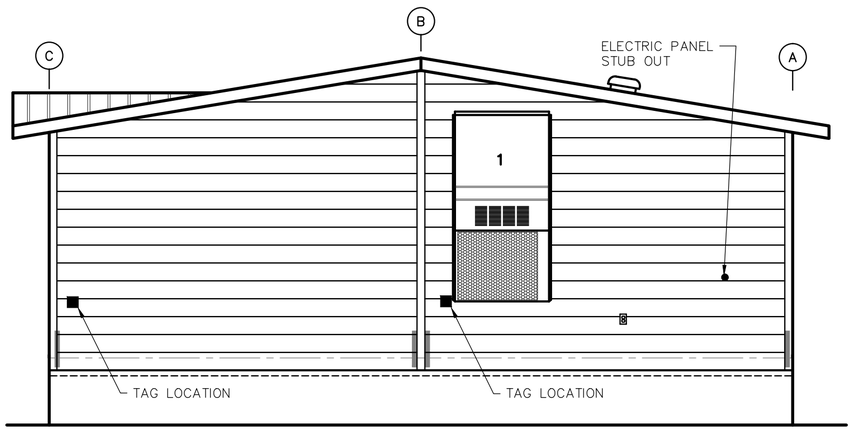
SCALE: 1/4" = 1'-0"



ENDWALL FASTENING:

1. INSTALL 7/16" RATED SHEATHING w/ ALL EDGES SUPPORTED. FASTEN w/ 0.113 x 2 3/8" GALV. NAILS @ 6"oc EDGE, 12"oc FIELD

2. INSTALL ST2215 STRAPS WHERE SHOWN w/ 7– 10d x 1 1/2" NAILS EACH END OF EACH STRAP



WALL 1 ELEVATION

SCALE: 1/4" = 1'-0"

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Kitsap County Building/ Fire Marshals
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WALL 2 ELEVATION

SCALE: 1/4" = 1'-0"

04/22/2020

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A-3

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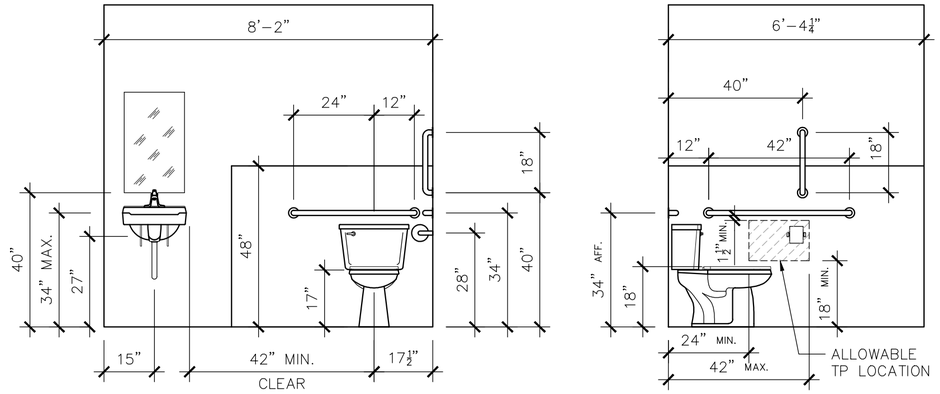
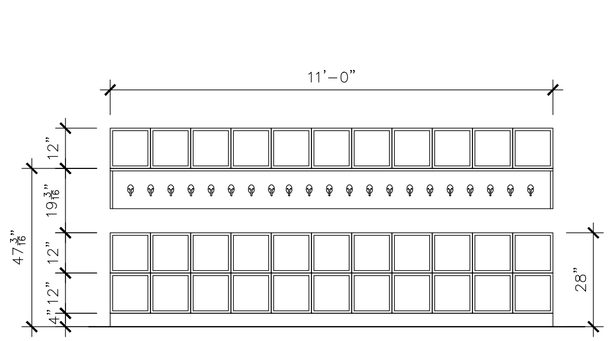
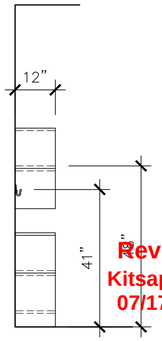


VIEW 'A' VIEW 'B'

1 H.C.R.R. ELEVATIONS

3/8" = 1'–0"

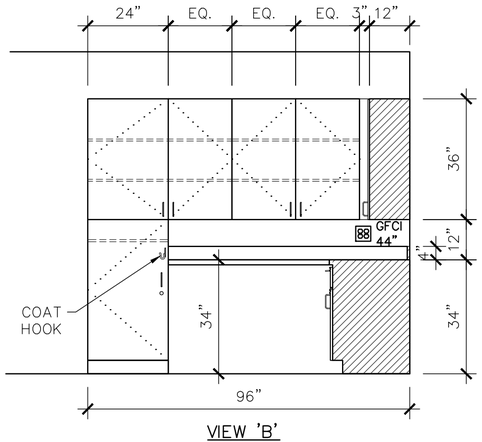




SIDE VIEW

2 CUBBIES w/ COATRACK ELEVATION

3/8" = 1'–0"



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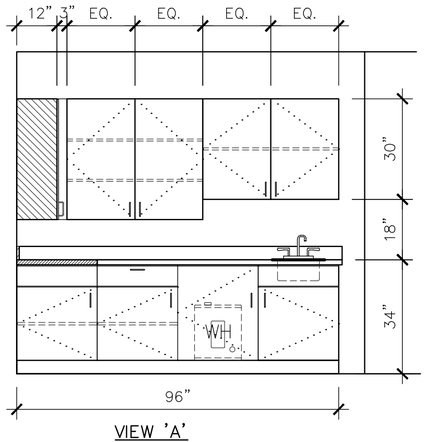
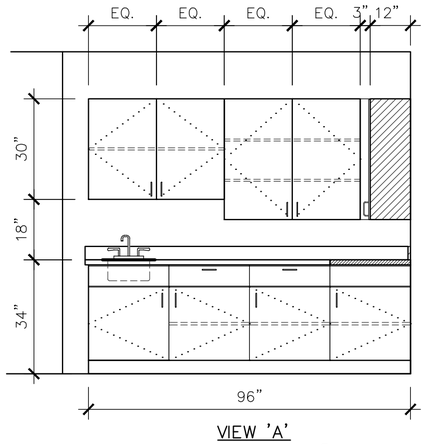


VIEW 'A'

3 CABINET ELEVATIONS

3/8" = 1'–0"



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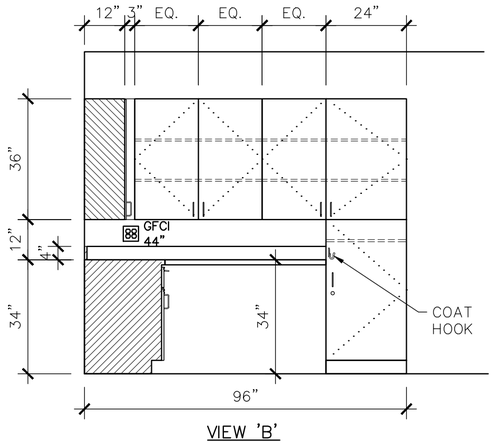
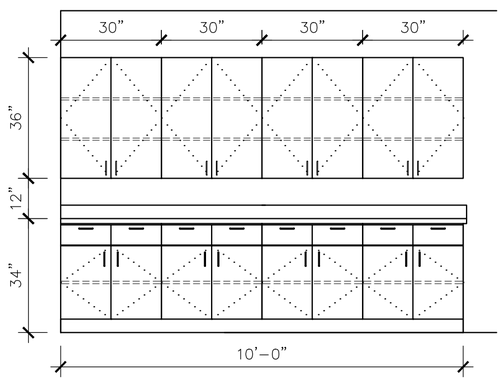


VIEW 'B'

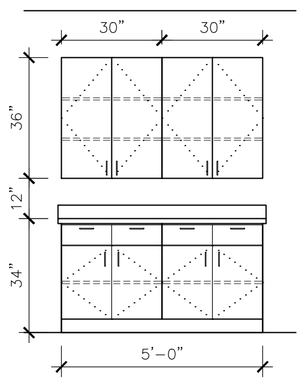
4 CABINET ELEVATIONS

3/8" = 1'–0"



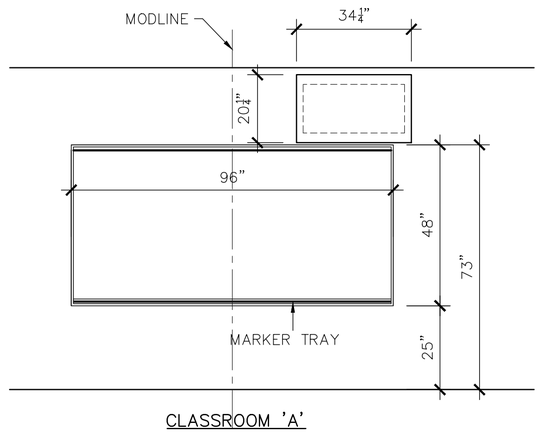
5 CABINET ELEVATION

3/8" = 1'–0"

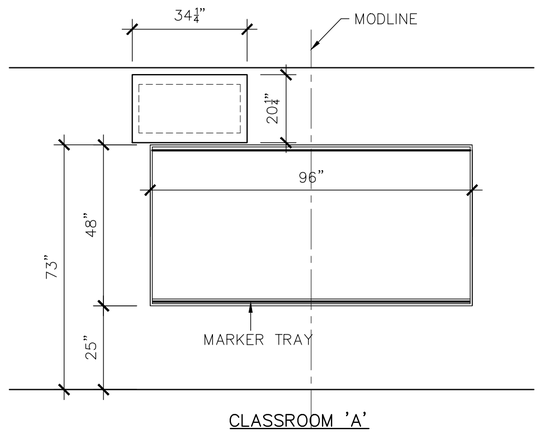


6 CABINET ELEVATION

3/8" = 1'–0"



CLASSROOM 'A'



CLASSROOM 'A'

7 WHITEBOARD ELEVATIONS

3/8" = 1'–0" (SHIP LOOSE)

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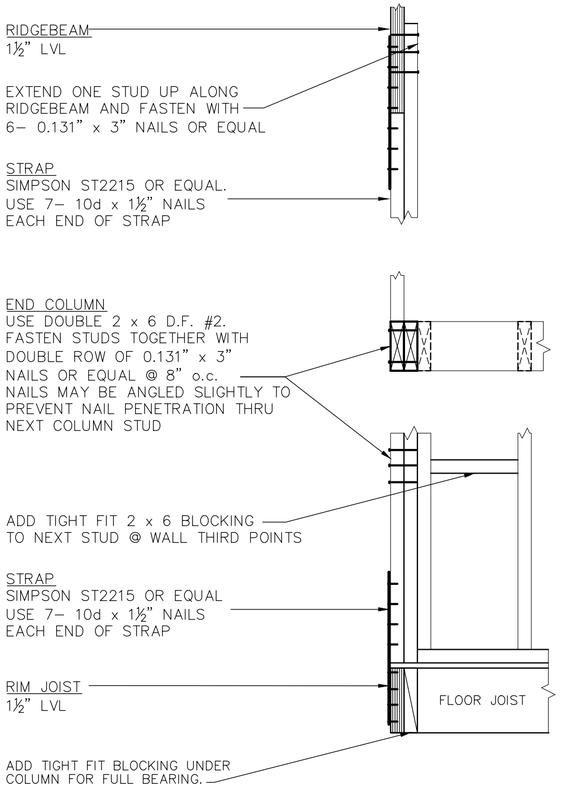
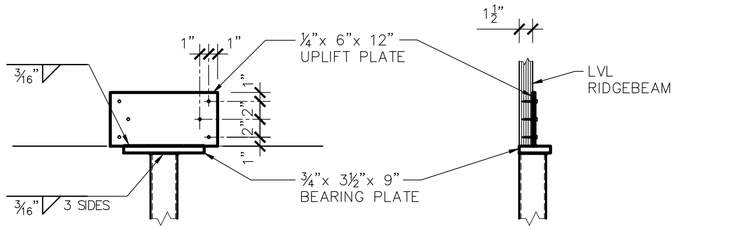


1 EC226:END COL. DETAIL - DBL 2 x 6

1" = 1'–0"



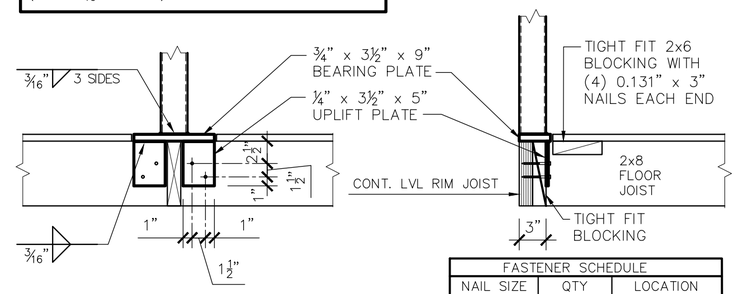
WELDING:
G.M.A.W. – AWS A5.18
F.C.A.W. – AWS A5.20

ALL WELDS TO BE SINGLE PASS FILLET BY CERTIFIED WELDER TO A.W.S. D1.1 CODE.

ASTM A500 GRADE B STEEL TUBE
ASTM A36 STEEL PLATE

(6) SIMPSON SDS1/4x1½" SCREWS (TOP)
(4) SIMPSON SDS1/4x2½" SCREWS (BOTTOM)
(DRILL 5/16" HOLES)

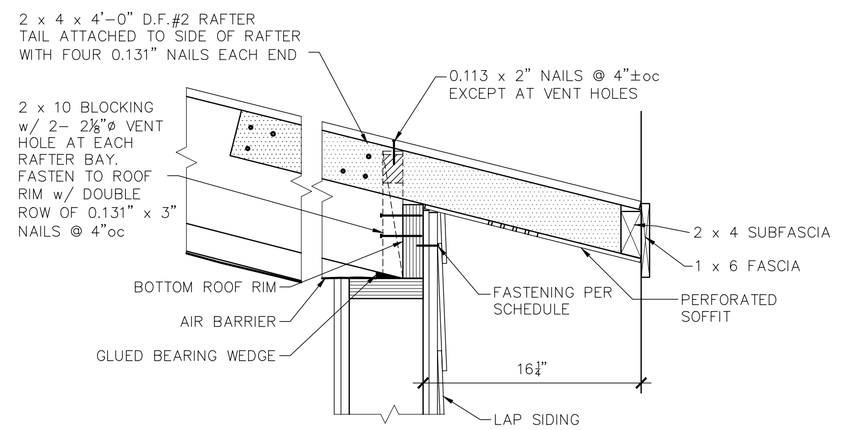
HSS3x3x3/16 COLUMN



FASTENER SCHEDULE		
NAIL SIZE	QTY	LOCATION
0.131" x 3"	5	EACH END
0.131" x 3"	2 ROWS AT 4"oc.	TO RIM

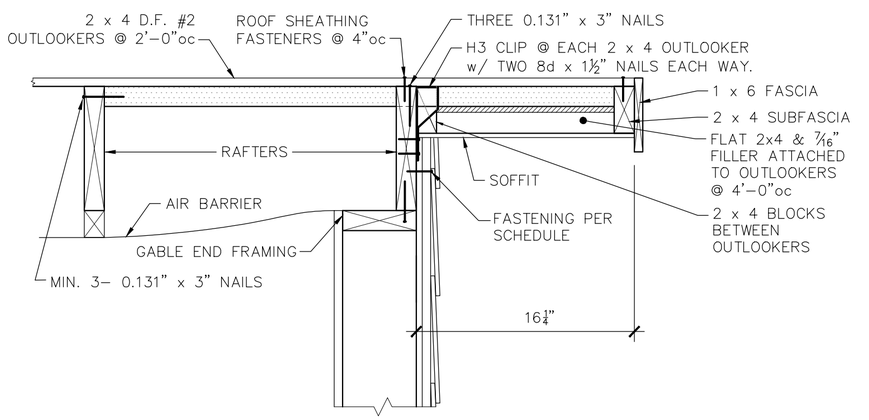
2 ICSTL-MKC: INTERIOR COLUMN DETAIL

1" = 1'–0"



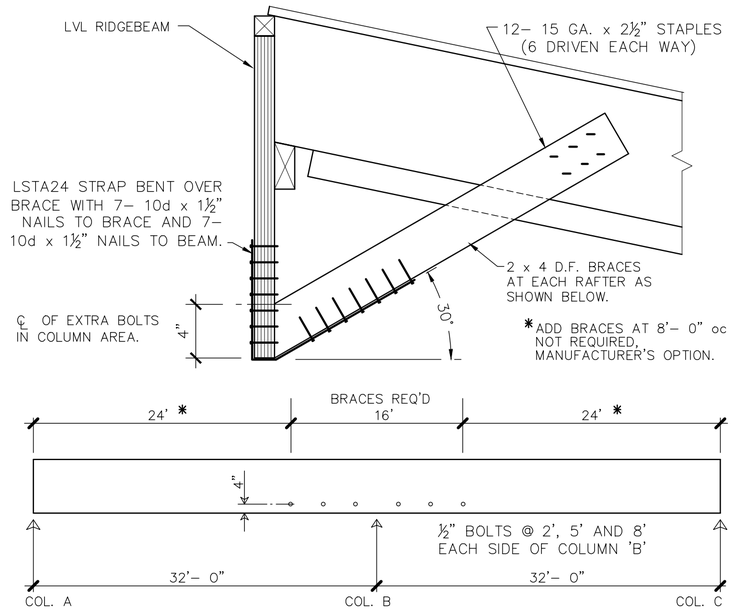
3 EAVE DETAIL

1 1/2" = 1'–0"



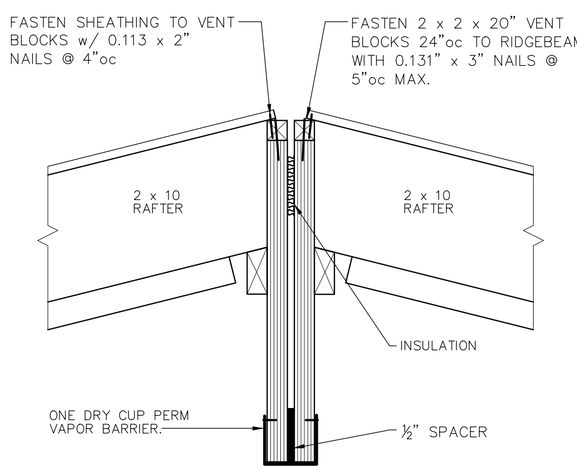
4 ENDWALL ROOF OVERHANG DETAIL

1 1/2" = 1'–0"



5 RIDGEBEAM BRACING DETAIL

1 1/2" = 1'–0"



SITE WORK:

1. INSTALL RIDGEVENT PER MANUFACTURER'S INSTRUCTIONS
2. INSTALL INSULATION @ MARRIAGE LINE
3. INSTALL VAPOR BARRIER ACROSS MARR. LINE, 2 MIL MIN. (CLOSE–UP PLASTIC SUPPLIED w/ BUILDING MAY BE USED)

6 RIDGE DETAIL

1 1/2" = 1'–0"

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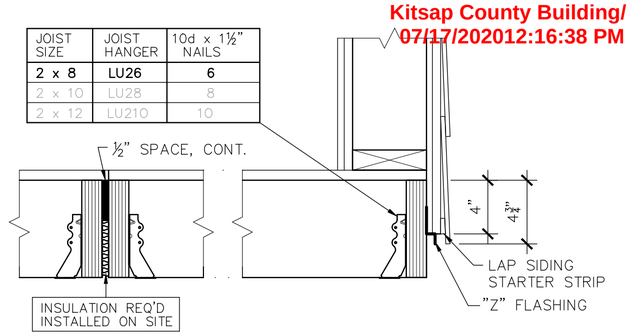
JOIST SIZE	JOIST HANGER	10d x 1½" NAILS
2 x 8	LU26	6
2 x 10	LU28	8
2 x 12	LU210	10



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STATE OF WASHINGTON
35006
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7 FLOOR DETAIL

1 1/2" = 1'–0"

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Classroom w/ HCRR for:
North Kitsap School District
Pacific Mobile WA

Approved for Const:
File Copy:
Drawn By: AJB
Issue Date: 3-24-20

Job No: 19668

A-4

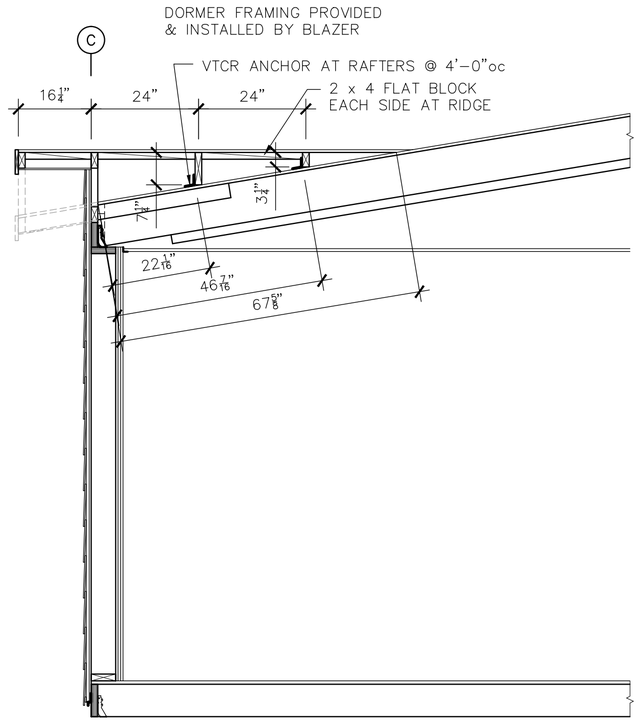
Permit Number: 20-02306

1 CHORD SPLICE DETAIL

1 1/2" = 1'–0" SIMILAR AT FLOOR

2 DORMER FRAMES

1/2" = 1'–0"



SECTION - B

SCALE: 1/2" = 1'-0"

04/22/2020

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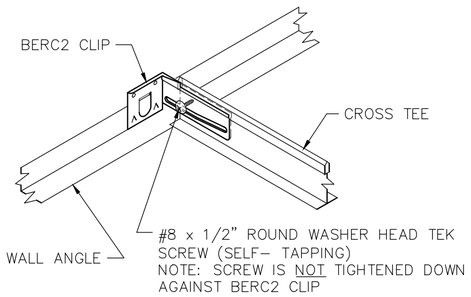
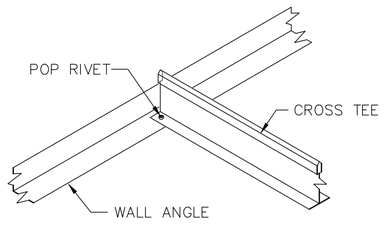
Issue Date:	3-24-20
Job No:	19668

A-4.1





UNATTACHED WALL
(TWO ADJACENT WALLS)

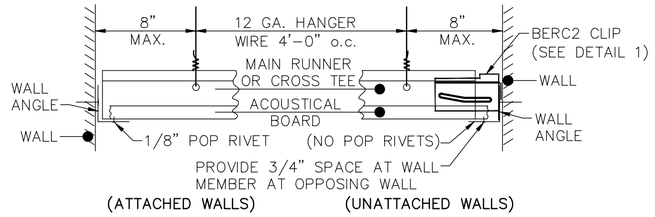
ATTACHED WALL
(TWO ADJACENT WALLS)

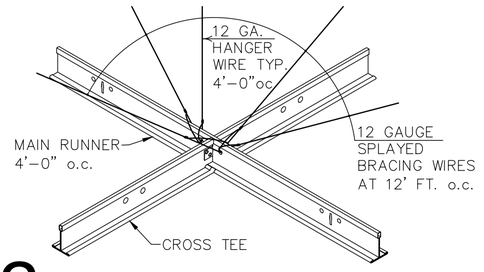
SEISMIC BERC2 CLIP
–FACTORY INSTALLED AT TWO ADJACENT WALLS.
–SCREW TIGHTENED FOR SHIPPING IN ROOMS WHERE CEILING CROSSES MOD LINE, LOOSEN SCREW ON SITE BY SET UP CREW

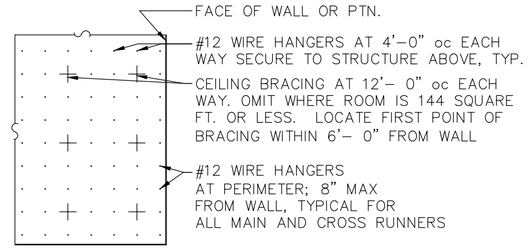
1 SEISMIC ATTACHMENT AT WALLS

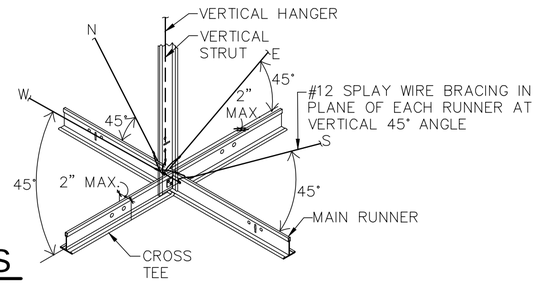
N.T.S.

[ARMSTRONG SEISMIC 'Rx' SUSPENSION SYSTEM (ESR 1308)]



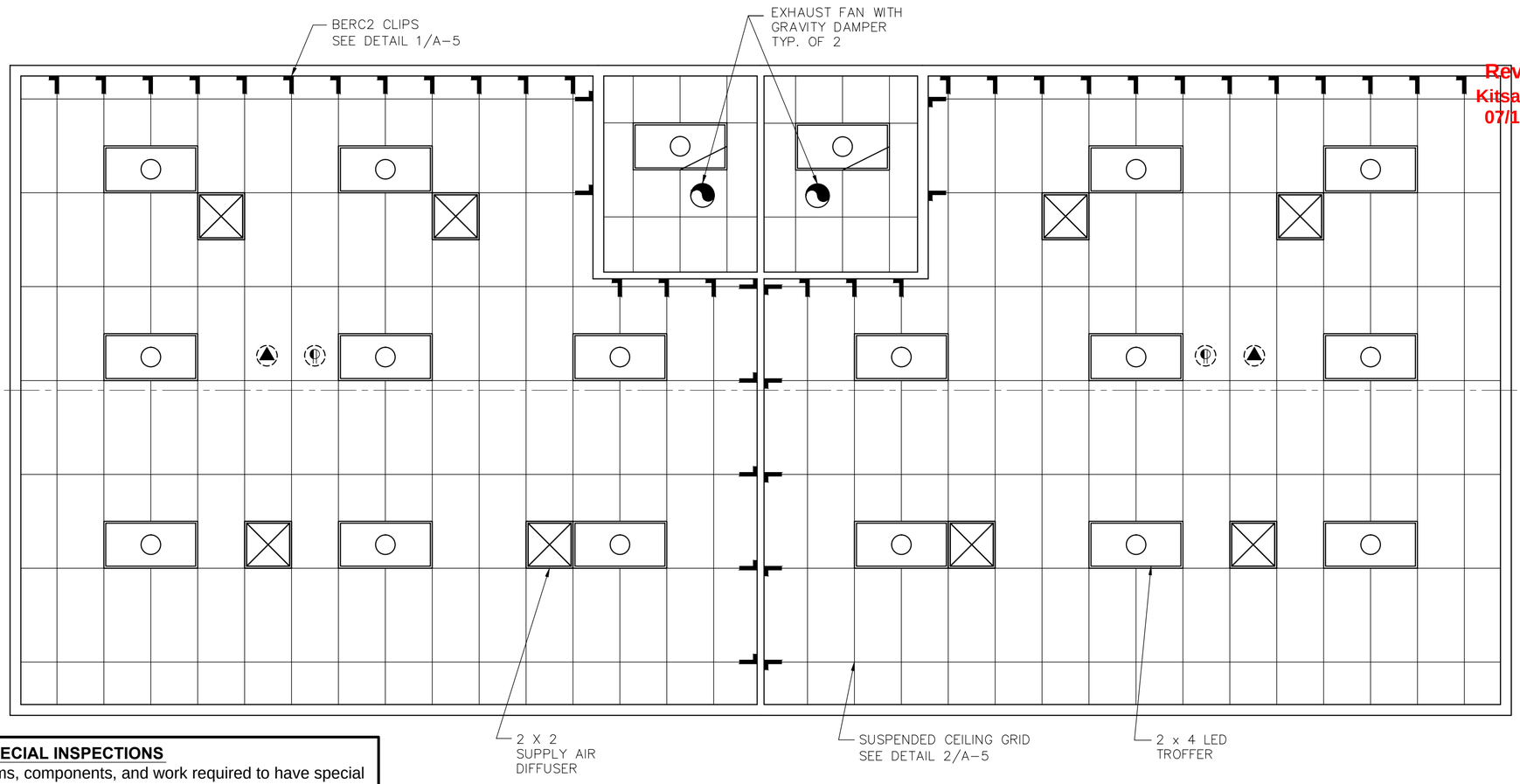






2 STANDARD T-BAR DETAILS

N.T.S.



STATEMENT OF SPECIAL INSPECTIONS
The materials, systems, components, and work required to have special inspections are listed below. Inspections will be completed by the engineer of record.

Special inspection for suspended ceiling system:
Periodic inspection of the suspended ceiling system to verify that it complies with ESR-1308.

REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"

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Kitsap County Building/ Fire Marshals
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04/22/2020

ROCK M. SHETLER
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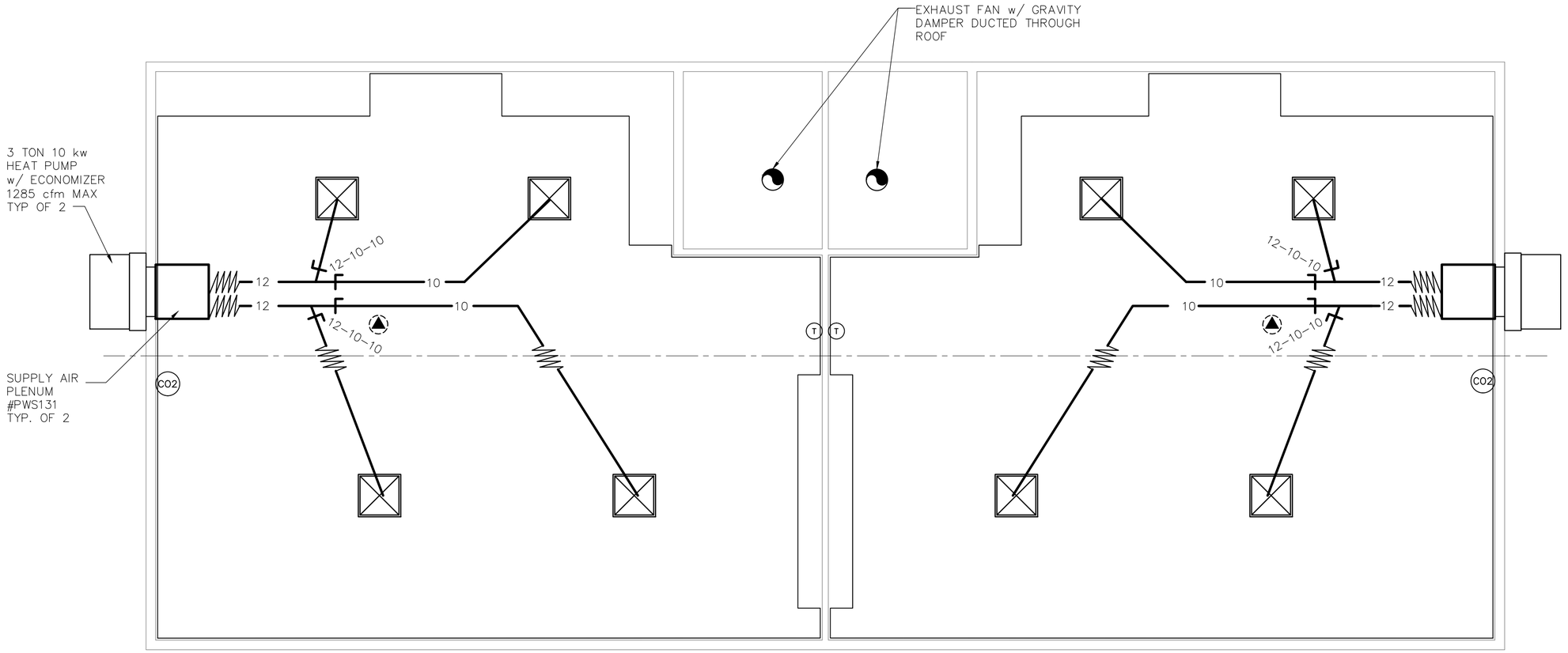
Issue Date: 3-24-20

Job No: 19668

A-5

Permit Number: 20-02306



MECHANICAL PLAN

SCALE: 1/4" = 1'-0"

MECHANICAL NOTES:

1. DUCT MATERIAL IS 26 GA. GALV. AND FLEX DUCT. DUCTWORK SHALL BE SUPPORTED PER 2015 IMC WAC CHAPTER 6. SECTION 603.
2. MATERIAL IN DUCTS SHALL HAVE A FLAME SPREAD INDEX OF LESS THAN 25, SMOKE DEVELOPMENT OF 50 PER 2015 IMC WAC CHAPTER 6. SECTION 602.
3. LOW PRESSURE DUCT SYSTEMS SHALL HAVE LONGITUDINAL AND TRANSVERSE JOINTS, SEAMS AND CONNECTIONS OF SUPPLY AND RETURN DUCTS AND PLENUMS SECURELY FASTENED AND SEALED WITH WELDS, GASKETS, MASTICS (ADHESIVES), MASTIC-PLUS EMBEDDED-FABRIC SYSTEMS OR APPROVED TAPES INSTALLED IN ACCORDANCE WITH 2015 IMC WAC CHAPTER 6 SECTION 603.9.
4. WHEN ISOLATION SLEEVES ARE USED AT LINE CONNECTIONS TO PLENUMS, THEN THEY SHALL COMPLY WITH IMC CHAPTER 6.
5. 10" DIFFUSERS WITH NO MANUAL DAMPERS. USE FLOW CONTROLS AT WYES, TYPICAL AS NOTED ON PLAN.
6. MINIMUM OUTSIDE AIR VENTILATION PER 2015 IMC WAC CHAPTER 4, TABLE 403.3.1.1.
7. OUTSIDE AIR DAMPERS SHALL COMPLY WITH 2015 WSEC, SECTION C403.2.4.3.
8. ALL NEW SYSTEMS HAVING A TOTAL COOLING CAPACITY OF GREATER THAN 20,000 Btu/h REQUIRE ECONOMIZERS PER WSEC 403.3 EXCEPT AS PERMITTED BY C403.3 EXCEPTION 1
9. THIS BUILDING IS EQUIPPED WITH A DOAS PER 2015 WSEC SECTION C 403.6.

	QTY.	SIZE	DESCRIPTION
HVAC	2	3 TON	10 KW BARD WALL HUNG HEAT PUMP w/ ERV – 11 EER
INT. THERMOSTAT	2		BARD #8403-060 w/ MICROPROCESSOR– 7 DAY PROGRAMMABLE AUTOMATIC SETBACK– DEADBAND CONTROL
CO2 SENSOR	2		BARD #8403-067
EXHAUST FAN	2	80 cfm	SWITCHED WITH LIGHTS IN RESTROOMS

MECHANICAL NOTES: *(cont.)*

MECHANICAL EQUIPMENT INSTALLATION IN OR ON THIS BUILDING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2015 IMC WAC CHAPTER 6.

ROUND FLEX DUCT SHALL BE U.L. LISTED CLASS 1, STANDARD 181 - FACTORY MADE AIR DUCTS AND AIR CONNECTORS. MEASURED IN ACCORDANCE TO ASTM C 518 OR ASTM C 177 AT 75DEG F MEAN TEMPERATURE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURERS INSTALLATION INSTRUCTIONS.

MECHANICAL DRAWINGS SHOW DUCTWORK SIZES TO BE CLEAR INSIDE DIMENSION.

DUCT INSULATION SHALL COMPLY WITH 2015 IMC WAC CHAPTER 6, SEC 604.

ELECTRICIAN MUST VERIFY ALL ELECTRICAL REQUIREMENTS AND LOCATIONS.

THERMOSTAT SCHEDULING TO BE PERFORMED ON SITE BY OTHERS.

ALL HVAC EQUIPMENT LEAVES FACTORY WIRED FOR 240 VOLT OPERATION

THE ACCEPTABLE OPERATING RANGE FOR THE 240V & 208V TAPS ARE:

TAP	RANGE
240	253 -216
208	220-187

SITE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR MAKING SURE THE RIGHT TAP IS CONNECTED FOR THE APPLIED SITE VOLTAGE.

AIR FILTERS IN HVAC UNITS OR SYSTEMS ARE TO BE CHANGED EVERY 30 DAYS BY OTHERS ON SITE.

REGISTER AIR FLOW TEST AND BALANCE OF HVAC SYSTEM TO BE PROVIDED AND PERFORMED BY OTHERS ON SITE.

HVAC SITE CONTRACTOR IS RESPONSIBLE FOR BALANCING THE SYSTEM. (2015 IMC WAC 403.3.1.5)

MECHANICAL SYMBOLS

SYMBOL	DESCRIPTION
	2'x2' SUPPLY AIR DIFFUSER
	FLEX DUCT
—12—	SUPPLY DUCT w/DIAMETER INDICATOR
	DAMPER IN SUPPLY DUCT AT WYE
X–X–X	SUPPLY WYE w/ DUCT CONNECTION SIZES INDICATED
T	THERMOSTAT
CO2	CO2 SENSOR
	EXHAUST FAN

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Issue Date: 3-24-20

Job No: 19668

M-1

PACKAGE *SPVU* HIGH EFFICIENCY WALL MOUNT HEAT PUMP – SCHEDULE

								DOAS/ERV/ELECTRICAL ①				DOAS/ERV/ELECTRICAL ②			COOLING CAPACITY ③							HEATING CAPACITY ④				DOAS ENERGY RECOVERY							UNIT ELECT. INFORM.				HEAT STRIPS ELECT. INFORM.							
									LOW VENTILATION MODE			FULL VENTILATION MODE																																
TAG	QTY	BARD MODEL #	TONS	COMP TYPE SCROLL	TOTAL CFM NOM. PART/FULL	BLR. TYPE.	ECON. 100% FREEFLOW	DOAS ERV OSA VENTIL.	V–PH	ERV	ECM BLOWER MOTOR	V–PH	ERV	ECM BLOWER MOTOR	OUTSIDE DB	ENT DB	ENT WB	EER	IPLV	COOL CAP. BTUH PART LOAD	SENS. CAP. BTUH PART LOAD	COOL CAP. BTUH FULL LOAD	SENS. CAP. BTUH FULL LOAD	OUTSIDE DB	COP	HTG CAP. BTUH PART/LOAD	HTG CAP. BTUH FULL/LOAD	SUMMER EFFICIENT	OUTDOOR DB/WB DEG'S	HRS BTUH	HRL BTUH	WINTER EFFICIENT	INDOOR DB	MOP	V–PH	MCA	MOP	CKT	V–PH	MCA	WHR BTUH	CKT	ELEC. HEAT KW	ELEC. HEAT BTUH	OPER. WGT. LBS.	ADDITIONAL REMARKS
HP–1	2	C36HA–A10ZP4XXR	3	2–STAGE	750 / 1100	ECM	NO	388 / 450	230/1	AMPS–1.3 WATTS–296	AMPS–.87 WATTS–95	230/1	AMPS–2.2 WATTS–497	AMPS–1.74 WATTS–192	95	80	67	11.0	14.5	23.4K	18.5K	35K	26.3K	47	3.3	22.7K	31K	65%	95/70	6,318	1,711	80%	1,711	23,328	230/1	27	40	A	240/1	52	60	B	10	34,130	678	1, 2, 3, 4, 5, 6, 7, 8

ADDITIONAL REMARKS;

1 – ENERGY MODEL PLAN APPROVAL #15FBS1700193
2 – INCLUDE BARD WALL CURB #TCURBF3642A–4.
3 – THERMOSTAT, BARD #8403–060, 7–DAY PROGRAMMABLE.
4 – WALL CO2 SENSOR. #8403–067
5 – OCCUPANCY SENSOR, (SUPPLIED BY BLAZER)
6 – GPS (FIELD INSTALLED CONTROL KIT).
7 – 2" FILTER.
8 – ERV (DOAS) ENERGY RECOVERY.
9 – UNIT COLOR IS *BUCKEYE GRAY*
10 – PRE INSTALLED OUTDOOR THERMOSTAT, SET AT 40DEG'S.

** M.C. TO REFER TO INSTALLATION INSTRUCTIONS FOR START UP AND EQUIPMENT SET.
** M.C. TO CHECK SITE VOLTAGE AND SET CORRECT TAP ON TRANSFORMER.
** M.C. TO SET AND PROGRAM THERMOSTAT PER CUSTOMERS REQUIREMENTS.

C36H1			
ERV Watts – Low	296 Watts	Blower Full Load	192 Watts
ERV Amps – Low	1.3 Amps	Blower Full Load	1.74 Amps
ERV CFM – Low	300 CFM	Blower Part Load	95 Watts
ERV Watts – Med	415 Watts	Blower Part Load	0.87 Amps
ERV Amps – Med	1.8 Amps		
ERV CFM – Med	375 CFM	Compressor Full	2588 Watts
ERV Watts – Hi	497 Watts	Compressor Full	11.46 Amps
ERV Amps – Hi	2.2 Amps	Compressor Part	1734 Watts
ERV CFM – Hi	450 CFM	Compressor Part	7.99 Amps
		Outdoor Fan	380 Watts
		Outdoor Fan	1.67 Amps

The sequence of operation for the Integrated DOAS system.

1. Upon a call from the occupancy sensor the (DOAS) ERV and the indoor (ECM) motor will start in low vent mode and ventilate the space continuously as occupied.
   Note: 1 on the HVAC Schedule.
2. Upon a call from the CO2 sensor the (DOAS) ERV and the indoor (ECM) motor will change to full vent mode and ventilate the space until the CO2 sensor is satisfied and then revert back to the low vent mode during the occupied time.
   Note: 2 on the HVAC Schedule.
3. The Heating and Cooling section will only work if there is a Heating or Cooling call from the thermostat. This action works entirely independent of the DOAS ventilation portion.
   Note: 3 & 4 on the HVAC Schedule.
4. This action will keep repeating itself as required by the occupancy sensor, CO2 sensor and Room Thermostat.

MINIMUM VENTILATION RATES PER IMC SECTION 403

room #	name	Az (sf)	sf/1000	Occ. Dens	Pz (calc)	Pz (used)	Rp (cfm/person)	Ra (cfm/sf)	Vbz (cfm)
1	Classroom A	770	0.77	35	27	27	10	0.12	362
2	Classroom B	770	0.77	35	27	27	10	0.12	362
3	Restroom #1	52	0.052	n/a	n/a	n/a	5	0.06	n/a
4	Restroom #2	52	0.052	n/a	n/a	n/a	5	0.06	n/a
									725 cfm

Az = room area (sf)
Occ. Dens = occupant density (from Table 403.3)
Pz (calc) = zone population or occupant quantity (calculated)
Pz (used) = zone population or occupant quantity (user can override the calculation-increase only)
Rp = people outdoor airflow rate in breathing zone (cfm/person)
Ra = area outdoor airflow rate in breathing zone (cfm/sf)
Vbz = Breathing zone outdoor air flow rate per eq. 4-1 (Rp*Pz+Ra*Az)

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Kitsap County Building/ Fire Marshals
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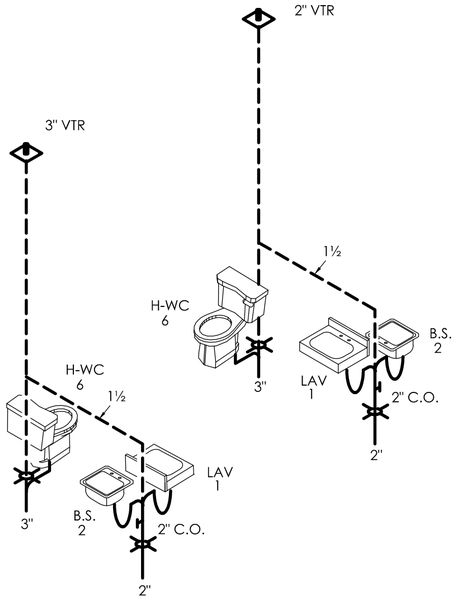
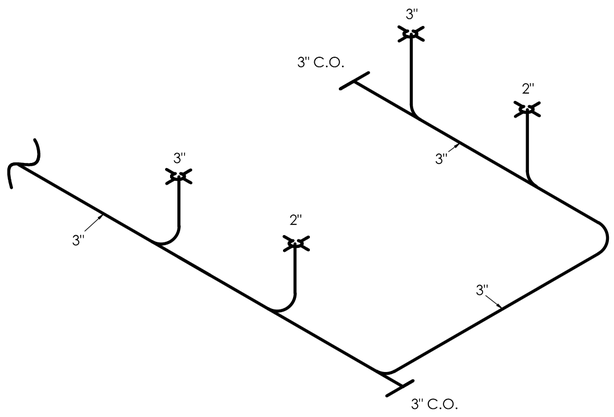
M-2



PLUMBING BELOW FLOOR JOIST NOT INCLUDED.



DRAINAGE AND VENT PIPING:

- FIXTURE UNITS _____ 18
- SIZE OF BUILDING DRAIN _____ 3"
- AGGREGATE AREA _____ 10.21

GENERAL NOTES:

- WASHINGTON: SIZED TO UPC 2015.

- D.W.V. MATERIAL - P.V.C.

- PER 2009 ANSI A117.1 SECTION 606.6. P-TRAPS ON ACCESSIBLE FIXTURES INSULATED.

- CONTINUATION OF WASTE LINE DONE ON SITE BY OTHERS.

- PLUMBING APPLIANCE -

- VENT STUB 10' OFF OF PEAK OF ROOF.

GENERAL NOTES:

- SIZED TO 2015 UPC WAC.

- POTABLE WATER MATERIAL - COPPER AND AQUAPEX.

- CONTINUATION OF WATER MAIN PROVIDED AND INSTALLED ON SITE BY OTHERS.

- HEAT TAPE PROVIDED AND INSTALLED ON SITE BY OTHERS.

- HAMMER ARRESTORS INSTALLED PER 2015 UPC 609.10.

- 2015 UPC WAC PEX TUBING SHALL NOT BE INSTALLED WITHIN THE FIRST 18" OF PIPE CONNECTED TO THE WATER HEATER.

- 2015 UPC 608.3 THERMAL EXPANSION DEVICE IS TO BE PROVIDED AND INSTALLED ON SITE BY OTHERS WHEN REQUIRED.

- 2015 UPC 507.2. WATER HEATERS SHALL BE ANCHORED OR STRAPPED.

-2015 UPC 407.3 PUBLIC LAVATORIES SHALL HAVE TEMPERING VALVES MEETING ASSE 1070.

- 2015 WSEC C404.2 WATER HEATER SHALL MEET THE REQUIREMENTS OF TABLE 404.2.

- 2015 WSEC C404.6 WATER PIPING SHALL BE INSULATED FROM THE WATER HEATER TO THE TERMINATION OF THE HEATED WATER FIXTURE SUPPLY PIPE IN ACCORDANCE WITH TABLE 403.2.9. PER THIS TABLE ALL PIPING LESS THAN 1" NOMINAL SHALL BE INSULATED WITH 1" INSULATION.

- 2009 ANSI/ASHRAE A117.1 606.6 EXPOSED PIPES AND SURFACES. WATER SUPPLY AND DRAIN PIPES UNDER LAVATORIES AND SINKS SHALL BE INSULATED OR OTHERWISE CONFIGURED TO PROTECT AGAINST CONTACT. THERE SHALL BE NO SHARP OR ABRASIVE SURFACES UNDER LAVATORIES AND SINKS.

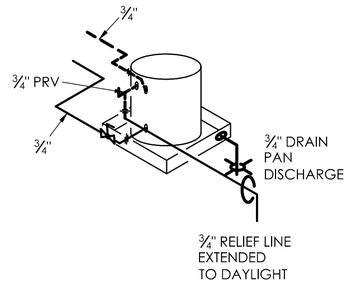
- PUBLIC USE TOILET SEATS SHALL COMPLY WITH 2015 UPC 411.3 AND PLASTIC SEATS WITH IAPMO Z124.5.

- PUBLIC USE WATER CLOSETS SHALL BE ELONGATED AND COMPLY WITH 2015 UPC 411.1.

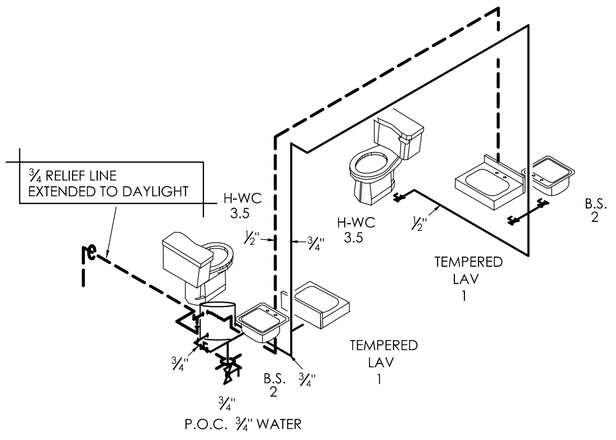
	PLUMBING FIXTURE SCHEDULE	
QTY	FIXTURE	DESCRIPTION
1	HC-PATT FLUSH-Right	GERBER 21-318-R 1.6 GPF Elongated
1	HC-PATT FLUSH-left	GERBER 21-318 1.6 GPF Elongated
2	LAVATORY SINK-wall	GERBER 12-314 W/ OFF SET GRID DRAIN
2	BAR SINK 15 x 15	PROFLO PFSR151562A
2	FAUCET- H-Lav	A/S 7385.004.002 2.2 GPM
2	FAUCET- H-bar	A/S 7500.170.002 2.2 GPM
1	WATER HEATER - 6 GALLON	AO SMITH EJC-6 1650 WATT
2	TEMPERING VALVE	WATTS LFUSG-B-M2

PLUMBING SCHEMATICS & DATA

Job: 19664 Drawn by Paul: 3-18-2020



WATER HEATER PAN DETAIL



WATER PIPING:

- FIXTURE UNITS _____ 13
- DEVELOPED LENGTH _____ 40'
- ELEVATION DIFFERENCE _____ X
- STREET PRESSURE _____ 46 to 60
- METER SIZE _____ 3/4"
- BUILDING SUPPLY SIZE _____ 3/4"

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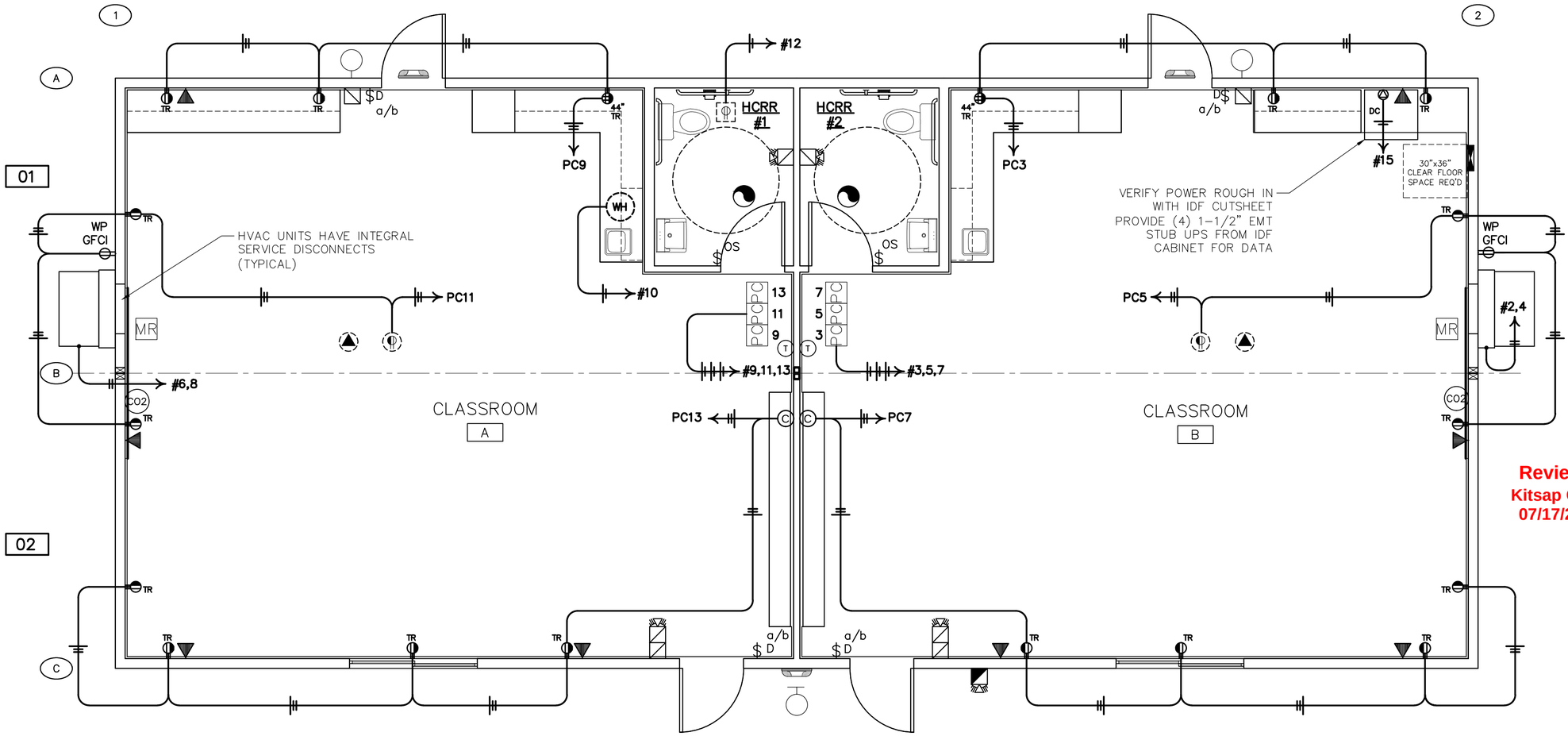
Job No: 19668

P-1



ELECTRICAL POWER PLAN

JF 3/19/20

0 2' 4' 8'

12" SCALE: 1/4" = 1'-0"

	QTY.	SIZE	DESCRIPTION
ELECTRIC PANEL	1	200 AMP	120/240V – SINGLE PHASE – STUB THRU– METALLIC RACEWAY SYSTEM
HVAC	2	3 TON	10 KW BARD WALL HUNG HEAT PUMP w/ERV – 11 EER
THERMOSTAT	2		BARD #8403–060 w/ MICROPROCESSOR– 7 DAY PROGRAMMABLE AUTOMATIC SETBACK– DEADBAND CONTROL
CO2 SENSOR	2		BARD #8403–067
LIGHTING	16	2 x 4	LED VOLUMETRIC TROFFER– nLIGHT ENABLED– 6000 LUMEN– 48 WATTS– 4000K– LITHONIA – 2BLT4 60L ADPT EZ1 LP840 N100 NES7ADCX PWS1836
	2	2 x 4	LED VOLUMETRIC TROFFER – 6000 LUMEN – 48 WATTS – 4000K– LITHONIA – 2BLT4 60L ADPT EZ1 LP840 PWS1836
	3	18 WATT	LED WALL PACK w/ INTEGRAL PHOTOCELL RAB SLIM18/PC
EXHAUST FAN	2	80 cfm	CONTROLLED WITH LIGHTS IN RESTROOMS
WATER HEATER	1	6 GAL	IN CABINET – 120V – 1650W – PROVIDE BREAKER LOCK OUT DEVICE

ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION	AFF TO TOP	REMARKS	SYMBOL	DESCRIPTION	AFF TO TOP	REMARKS
	ELECTRIC PANEL	72"			WALL HUNG HVAC UNIT	AS REQUIRED	SEE MECH SCHEDULE AND CALCS
TR	DUPLEX RECEPTACLE TAMPER RES. – CONTROLLED	20"	180 VA EACH	T	THERMOSTAT	48"	4" SQ BOX SINGLE GANG MR WITH 1/2" CONDUIT STUB UP
TR	DUPLEX RECEPTACLE CEILING MOUNT– CONTROLLED	CEILING	180 VA EACH	CO2	CO2 SENSOR	48"	4" SQ BOX SINGLE GANG MR WITH 1/2" CONDUIT STUB UP
	SINGLE CLOCK HANGER RECEPTACLE	84"	180 VA EACH		80 CFM EXHAUST FAN	CEILING	25 VA EACH
TR	QUADPLEX RECEPTACLE– TAMPER RES. – CONTROLLED	20"	360 VA EACH	WH	6 GALLON WATER HEATER	AS REQUIRED	1650 VA EACH PROVIDE BREAKER LOCK OUT DEVICE
WP GFCI	WEATHERPROOF GFCI RECEPTACLE	AS NOTED	180 VA EACH		nLIGHT ENABLED LED TROFFER w/ INTEGRAL SENSORS	CEILING	48 VA EACH
	DEDICATED WP RECEPTACLE FOR HEAT TRACE	UNDER FLOOR	500 VA EACH –GROUND FAULT EQUIPMENT PROTECTION DEVICE		LED TROFFER	CEILING	48 VA EACH
D XX	nLIGHT DIMMING CONTROL SWITCH CAT5E CONNECTED	48"	DIMMING CONTROL. LOWER CASE LETTERS DESIGNATE ZONING		LED WALL PACK WITH INTEGRAL PHOTOCELL	84"	20 VA EACH
OS	WALL MOUNT OCCUPANCY SENSOR	48"	AUTOMATIC ON / OFF CONTROL		EXT. EMERGENCY LIGHT	ABOVE DOOR	WITH 90 MINUTE BATTERY BACK UP
MR	nLIGHT nAR40 ERV CONTROL RELAY	ABOVE CEILING	CONTROLLED BY nLIGHT ENABLED FIXTURE OCCUPANCY SENSORS		FIRE ALARM EXTERIOR HORN/STROBE SHEET E-4	84"	¾" RACEWAY ONLY STUB UP AND DOWN. PAINT RACEWAY AND BACK BOX SUBSTANTIALLY RED IN COLOR
PC	nLIGHT nPP20PL BP PLUG LOAD CONTROL RELAY	ABOVE CEILING	CONTROLLED BY nLIGHT ENABLED FIXTURE OCCUPANCY SENSORS		PULL STATION	48"	
	PHONE/DATA ROUGH IN 4" SQ BOX w/ SINGLE GANG MR	20"	3/4" FLEX STUBBED UP AND DOWN		FIRE ALARM INTERIOR HORN/STROBE SHEET E-4	84"	
	DATA BOX IN CEILING	CEILING	4" SQ BOX SINGLE GANG MR – NO CONDUIT PROVISIONS BY BLAZER				

Reviewed for Code Compliance
Kitsap County Building/ Fire Marshals
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DATE	REVISION	BY
3-19-20	ELECTRICAL ENGINEERING	JF
3-23-20	ENGINEERING REVIEW	HEM
4-6-20	ADDED IDF CABINET	ARS

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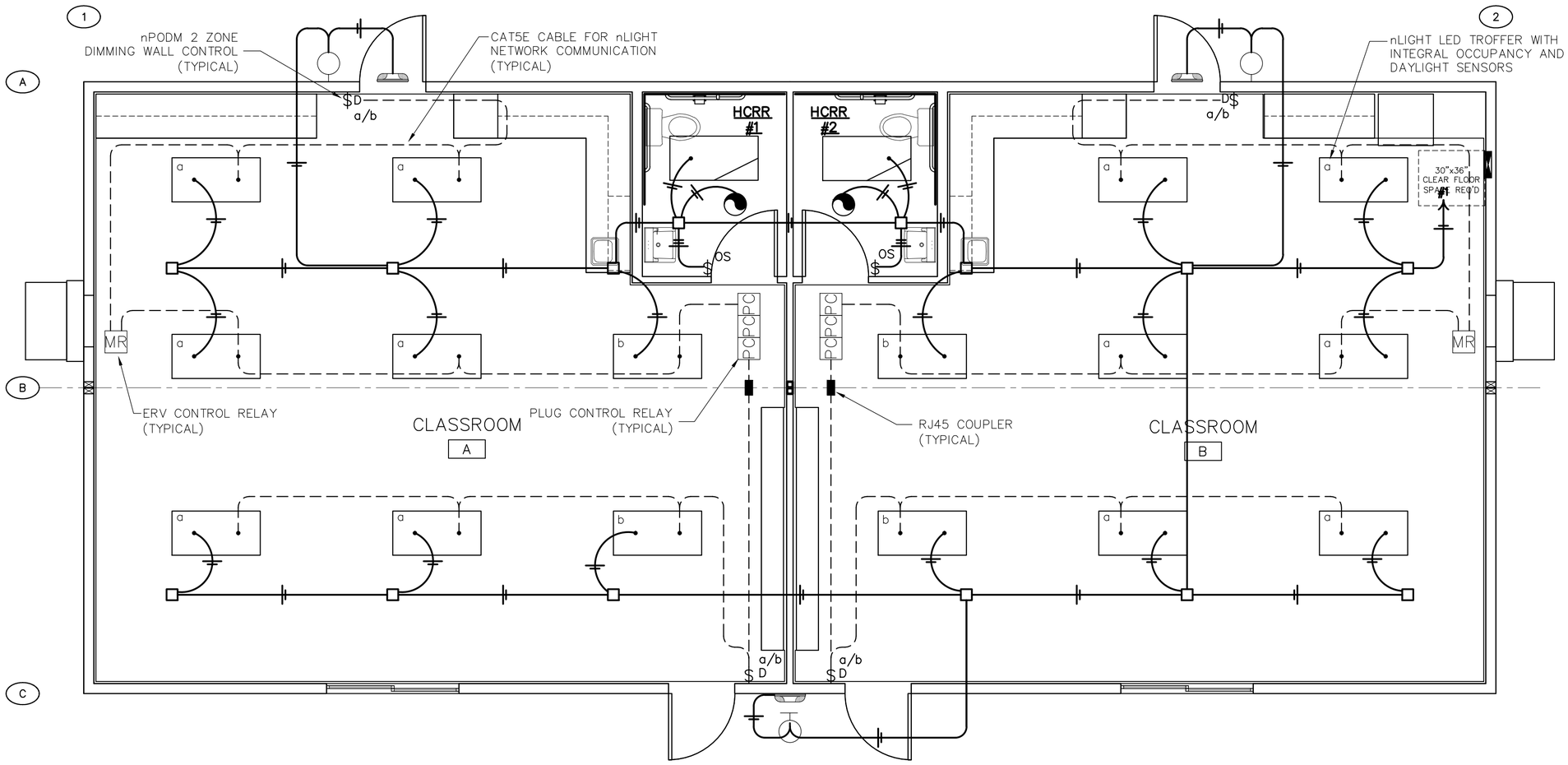
Classroom w/ HCRR for:
North Kitsap School District
Pacific Mobile WA

Approved for Const:	
File Copy:	
Drawn By:	AJB
Issue Date:	3-24-20
Job No:	19668

E-1

Permit Number: 20-02306



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Kitsap County Building/ Fire Marshals
07/17/202012:17:03 PM kwlodarchak

ELECTRICAL LIGHTING PLAN

JF 3/19/20

0 2' 4' 8'

12" SCALE: 1/4" = 1'-0"

	QTY.	SIZE	DESCRIPTION
ELECTRIC PANEL	1	200 AMP	120/240V – SINGLE PHASE – STUB THRU– METALLIC RACEWAY SYSTEM
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LIGHTING	16	2 x 4	LED VOLUMETRIC TROFFER– nLIGHT ENABLED– 6000 LUMEN– 48 WATTS– 4000K– LITHONIA – 2BLT4 60L ADPT EZ1 LP840 N100 NES7ADCX PWS1836
	2	2 x 4	LED VOLUMETRIC TROFFER – 6000 LUMEN – 48 WATTS – 4000K– LITHONIA – 2BLT4 60L ADPT EZ1 LP840 PWS1836
	3	18 WATT	LED WALL PACK w/ INTEGRAL PHOTOCELL RAB SLIM18/PC
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MR	nLIGHT nAR40 ERV CONTROL RELAY	ABOVE CEILING	CONTROLLED BY nLIGHT ENABLED FIXTURE OCCUPANCY SENSORS		FIRE ALARM EXTERIOR HORN/STROBE SHEET E–4	84"	¾" RACEWAY ONLY STUB UP AND DOWN. PAINT RACEWAY AND BACK BOX SUBSTANTIALLY RED IN COLOR
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	DATA BOX IN CEILING	CEILING	4" SQ BOX SINGLE GANG MR – NO CONDUIT PROVISIONS BY BLAZER				

DATE	REVISION	BY
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3-23-20	ENGINEERING REVIEW	HEM

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Classroom w/ HCRR for:
North Kitsap School District
Pacific Mobile WA

Approved for Const:	
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Drawn By:	AJB
Issue Date:	3-24-20

Job No: 19668

E-2

Permit Number: 20-02306

PANEL SCHEDULE

PANEL DESIGNATION: PANEL A | VOLTS: 120/240 | AIC RATING: 22,000
MOUNTING: FLUSH | PHASE: 1 | BUSS RATING: 200 AMP
ENCLOSURE TYPE: NEMA 1 | MCB RATING: 200 AMP

** PROVIDE BREAKER LOCK OUT DEVICE*
*** PROVIDE GFEPD CIRCUIT BREAKER*

CKT	CIRCUIT DESCRIPTION	TRIP	WIRE SIZE	CONNECTED LOAD (VA) A		CONNECTED LOAD (VA) B		WIRE SIZE	TRIP	DESCRIPTION	CKT
1	***LIGHTING***	**20**	**12**	**974**	**7052**			**4**	**80**	***HVAC***	2
3	***RECEPTACLES***	**20**	**12**			**720**	**7052**	**/**	**/**	***/***	4
5	***RECEPTACLES***	**20**	**12**	**720**	**7052**			**4**	**80**	***HVAC***	6
7	***RECEPTACLES***	**20**	**12**			**900**	**7052**	**/**	**/**	***/***	8
9	***RECEPTACLES***	**20**	**12**	**720**	**1650**			**12**	**20**	***WATER HEATER****	10
11	***RECEPTACLES***	**20**	**12**			**720**	**500**	**12**	**20**	***HEAT TRACE****	12
13	***RECEPTACLES***	**20**	**12**	**900**							14
15	***IDF CABINET***	**20**	**12**			**1500**					16
17											18
19											20
CONNECTED LOAD		**TOTAL LOAD:**		**19068.0**		**18444.0**					
		TOTAL AMPS:		**158.9**		**153.7**					

ELECTRICAL PLAN REVIEW LOAD CALCULATION — CALC BY: JOEL FRESHOUR

PROJECT INFO: 19668 KCDA NORTH KITSAP — DATE: 3/19/2020

PANEL: PANEL A — VOLTAGE: **120/240** — PHASE: **1** — AMPACITY: **200**
FED FROM: EXISTING SERVICE — AIC RATING: **22,000**

DESCRIPTION	VA LOAD	DEMAND FACTOR	PHASE A	PHASE B		NEUTRAL A	NEUTRAL B		NOTES
LIGHTING									
EXTERIOR LIGHTING	60	1.25	**75**			***75***			
INTERIOR LIGHTING	864	1.25	**1080**			***1080***			
EXHAUST FANS	50	1.25	**63**			***63***			
RECEPTACLES									
TOTAL	4680	1.00	**2340**	**2340**		***2340***	***2340***		
HVAC (MOTORS)									
TOTAL	8208	1.00	**4104**	**4104**					
LARGEST	2832	0.25	**354**	**354**					
HEATING	20000	1.00	**10000**	**10000**					
WATER HEATER	1650	1.00	**1650**			***1650***			
HEAT TRACE	500	1.00		**500**			***500***		
TOTALS			PHASE A	PHASE B		NEUTRAL A	NEUTRAL B		
		VA	**19666.0**	**17298.0**		***5208.0***	***2840.0***		
		AMPS	**163.9**	**144.2**		***43.4***	***23.7***		

LARGEST POWER PHASE 19666.0 VA / 163.9 AMPS — **LARGEST NEUTRAL PHASE** *5208.0* VA / *43.4* AMPS

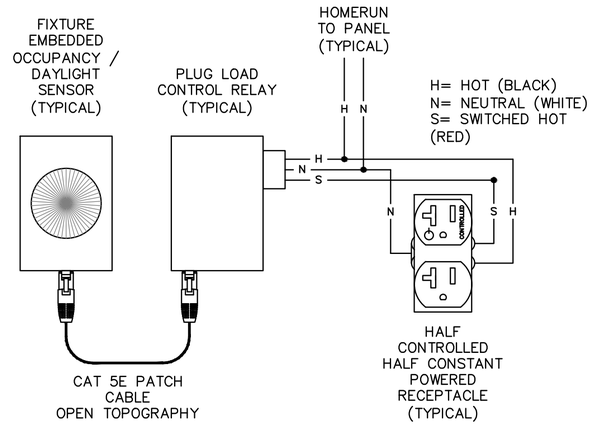
NOTES:

BARD 3 TON - 10KW - 11EER CH UNIT
(TYPICAL OF 2)

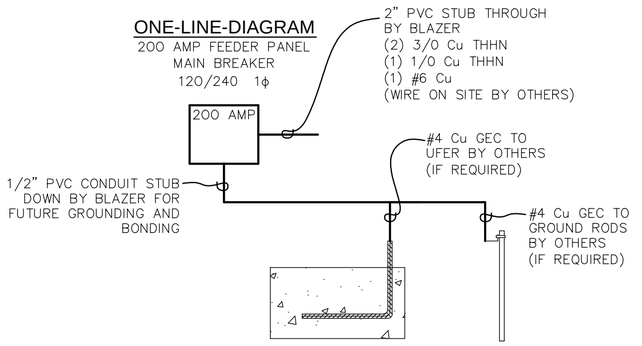
HVAC (MOTOR, COMPRESSOR, HEATER SIZES)		
OPERATION VOLTAGE	197 MIN.	253 MAX.
COMPRESSOR	11.8 RLA	83 LRA
OUTDOOR FAN	2.5 FLA	1/3 HP
INDOOR BLOWER FAN	2.8 FLA	1/2 HP
HEAT STRIP	10 KVA	240 VOLT
MINIMUM CIRCUIT AMPS		**79 AMPS**
MAXIMUM OVERCURRENT PROTECTION		**80 AMPS**

OVERCURRENT PROTECTION SHALL BE DUAL ELEMENT TIME DELAY FUSE OR HACR CIRCUIT BREAKER

INTERNAL SERVICE DISCONNECTS PROVIDED.



TYPICAL CONTROLLED RECEPTACLE ONE-LINE



FORM A COMPLETE GROUNDING ELECTRODE SYSTEM PER 2017 NEC 250.53. PROVIDED AND INSTALLED ON SITE BY OTHERS

GENERAL NOTES:

1. WHEN STRANDED WIRE IS USED, ALL TERMINATIONS ARE MADE BY A PRESSURE TERMINAL, BY TAILING OFF WITH SOLID CONDUCTORS OR OTHER APPROVED MEANS OF TERMINATION.
2. ALL CONDUCTORS ARE COPPER; TYPE THHN / THWN
3. RATING OF STANDARD PANEL IS 22,000 A.I.C.
4. WIRING METHOD IN METALLIC CONDUIT OR M.C. CABLE.
5. HVAC DISCONNECTS SHALL BE LABELED WITH AN IDENTIFICATION PLATE SHOWING CIRCUIT NUMBER AND EQUIPMENT SERVED. WAC 296-46B-110 022
6. EXTERIOR WEATHER PROOF GFCI SHALL HAVE A "HEAVY DUTY" WEATHER PROOF "IN USE" COVER. 2017 NEC 406.9(B)(1)
7. CONTROLLED RECEPTACLES SHALL BE LABELED PER 2017 NEC 406.3(E) WITH THE TEXT "CONTROLLED" AND THIS SYMBOL
8. WATER HEATER BRANCH CIRCUIT BREAKER SHALL BE CAPABLE OF BEING LOCKED OUT IN THE "OFF" POSITION OR HAVE A LOCAL DISCONNECT. 2017 NEC 422.31(B)
9. HEAT TRACE RECEPTACLE SHALL BE PROTECTED BY A GROUND FAULT EQUIPMENT PROTECTION DEVICE SENSING LEAKAGE CURRENT FROM 6mA TO 50mA. 2017 NEC 427.22
10. HVAC UNITS HAVE AN INTEGRAL SERVICE DISCONNECT.
11. THIS PLAN IS NOT AN "AS-BUILT" CIRCUITS MAY BE RUN DIFFERENT THAN SHOWN BASED ON OBSTACLES ENCOUNTERED.

51-11C WAC 2015 WSEC CHAPTER 4 NOTES:

1. ALL LIGHTING SHALL CONFORM TO SECTION C405
2. A MINIMUM OF 90% OF LIGHTING FIXTURES HAVE EMBEDDED OCCUPANCY AND DAYLIGHT SENSORS FOR INCREASED ENERGY SAVINGS, AND ARE INDIVIDUALLY ADDRESSABLE. (C406.4)
3. A MINIMUM OF 90% OF LIGHTING IS SET FOR CONTINUOUS DIMMING AND IS ADJUSTABLE BY OCCUPANTS, FOR OCCUPANT COMFORT, VIA WALL PODS. (C406.4)
4. 50% OF RECEPTACLES IN CLASSROOMS, PRIVATE OFFICES, OPEN OFFICES, CONFERENCE ROOMS, COPY ROOMS, AND INDIVIDUAL WORKSTATIONS, ARE CONTROLLED BY LOCAL OCCUPANCY SENSORS (C405.10)

SPACE BY SPACE LIGHTING POWER DENSITY PER 2015 WSEC C405.4.2.1

SPACE DESIGNATION	SQ. FT.	SPACE TYPE	WATTS SQ. FT.	BASE *	ADDITIONAL REDUCTION **
Classroom A	770	CLASSROOM	1	770	578
Classroom B	770	CLASSROOM	1	770	578
Restroom #1	52	RESTROOM	0.5	26	20
Restroom #2	52	RESTROOM	0.5	26	20
TOTAL SQ. FT.	1644		TOTAL ALLOWED		1194 W
			TOTAL INSTALLED		864 W

* BASE = SQ. FT. x ALLOWED WATTS PER SQ. FT. - TABLE C405.4.2(2)
** ADDITIONAL REDUCTION = BASE x .75 - (C406.3.1)

Reviewed for Code Compliance
Kitsap County Building/ Fire Marshals
07/17/202012:17:06 PM kwlodarchak

DATE	REVISION	BY
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3-23-20	ENGINEERING REVIEW	HEM
4-6-20	ADDED IDF CABINET	ARS

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Drawn By: AJB
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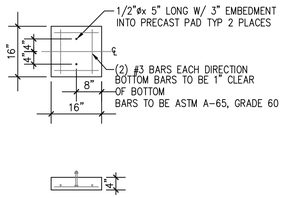
Job No: 19668

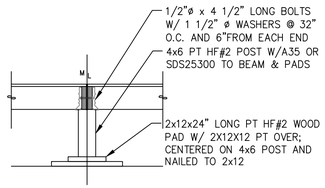
E-3

Permit Number: 20-02306



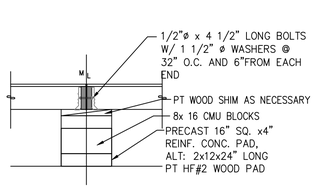
1 F1 PRECAST PAD DETAIL

Scale: 1/2 = 1'-0"



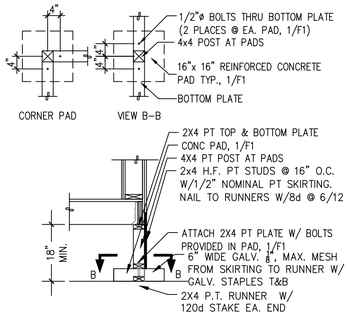
6 F1 M/L SUPPORT, STANDARD

Scale: 1/2 = 1'-0"



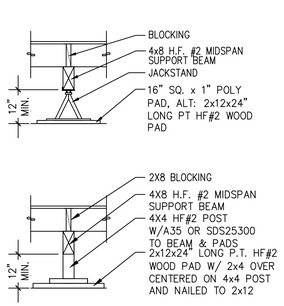
6A F1 M/L SUPPORT, OPTIONAL

Scale: 1/2 = 1'-0"



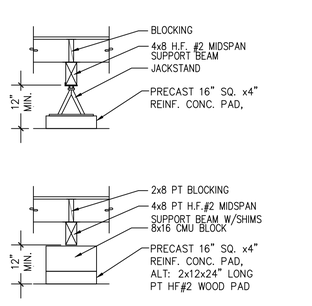
2 F1 EXTERIOR WALL DETAIL

Scale: 1/2 = 1'-0"



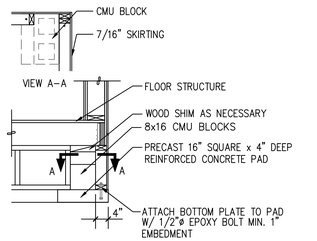
7 F1 MID-SPAN SUPPORT, STANDARD

Scale: 1/2 = 1'-0"



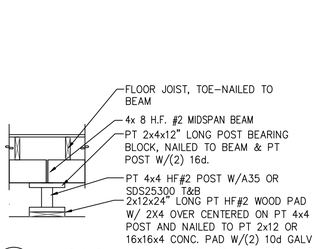
7A F1 MID-SPAN SUPPORT, OPTIONAL

Scale: 1/2 = 1'-0"



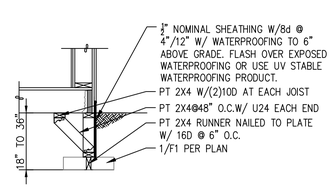
3 F1 OPTIONAL CORNER DETAIL

Scale: 1/2 = 1'-0"



8 F1 MID-SPAN BEAM SPLICE

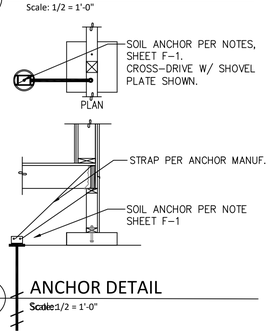
Scale: 1/2" = 1'-0"



NOTES:
1. USE THIS DETAIL WHERE REQUIRED TO MEET GRADE.
2. MAX. SUBGRADE TO GRADE HEIGHT IS 36".

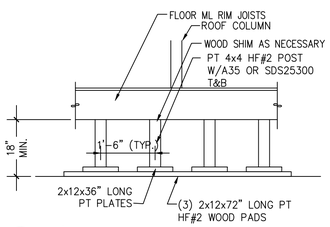
9 F1 BACKFILLED WALL DETAIL

Scale: 1/2 = 1'-0"



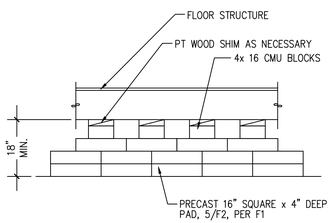
4 F1 ANCHOR DETAIL

Scale: 1/2 = 1'-0"



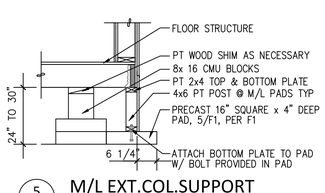
10 F1 M/L POST SUPPORT, STANDARD

Scale: 1/2 = 1'-0"



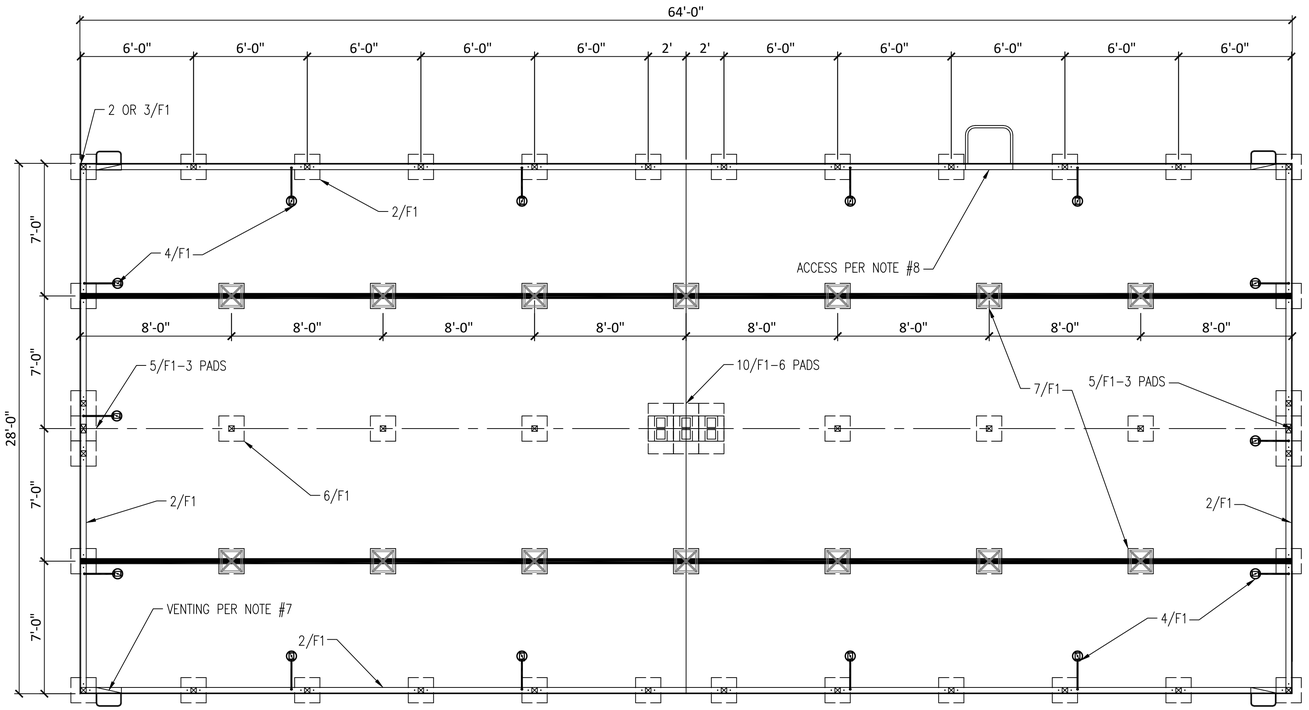
10A F1 M/L POST SUPPORT. OPTIONAL

Scale: 1/2 = 1'-0"



5 F1 M/L EXT.COL.SUPPORT

Scale: 1/2" = 1'-0"



1 F1 FOUNDATION PLAN

Scale: 1/4" = 1'-0"

STRUCTURAL NOTES: CLASSROOM

1. GENERAL:
   - 1.1. MODULAR BUILDING MAY VARY BY MANUFACTURER. VERIFY DIMENSIONS AND OTHER CHARACTERISTICS PRIOR TO BEGIN OF FOUNDATION INSTALLATION. MINOR VARIATIONS OF DIMENSION DO NOT CHANGE THE FOUNDATION DESIGN AND INSTALLATION REQUIREMENTS.
   - 1.2. MODULAR BUILDING DESIGN CRITERIA ARE ESTABLISHED FOR GENERAL WORST CASE IN LARGE REGIONS. THESE FOUNDATION PLANS ARE DESIGNED FOR SMALLER MORE SPECIFIC DESIGN AREAS AND MAY NOT MATCH THE BUILDING DESIGN CRITERIA. MATCH THE FOUNDATION TO THE SPECIFIC SITE. BUILDING DESIGN MAY MATCH OR EXCEED FOUNDATION DESIGN CRITERIA.
2. DESIGN INFORMATION & LOADING:

2.1.	BUILDING CODE	IBC, 2015/2018, OSSC2019
2.2.	RISK CATEGORY	II
2.3.	ROOF LIVE LOAD	25PSF, SNOW
2.4.	FLOOR LIVE LOAD	40 PSF OR 1,000# CONC.
2.5.	WIND CRITERION	110 MPH, EXP B, Kzt=1.0
2.6.	SEISMIC CRITERION	Sds = 0.756, Is=1.0, CATEGORY D
2.7.	SOIL BEARING	1,500 PSF, SITE CLASS D

3. CONCRETE:

3.1.	DESIGN COMP.STRENGTH	2,500 PSI
3.2.	REINFORCING BAR YIELD	60 KSI

4. MASONRY:

4.1.	8X16X8 UNITS	ASTM C-90, GRADE N
4.2.	SET UNITS W/CORES VERTICAL &	NO MORE THAN 3 HIGH, PER PLAN

5. WOOD:
   - 5.1. ALL WOOD MEMBERS OF THE FOUNDATION SYSTEM SHALL BE SPF-STD OR BETTER, UNLESS NOTED OTHERWISE.
   - 5.2. ALL WOOD IN CONTACT OR WITHIN 8-INCHES WITH SOIL SHALL BE PRESERVATIVE TREATED.
   - 5.3. CONNECTORS USED IN PRESERVATIVE TREATED WOOD MEMBERS SHALL BE STAINLESS STEEL OR HOT-DIPPED GALVANIZED TO THE GALVANIZING WEIGHT AS SPECIFIED IN IN ASTM A 153.
   - 5.4. SKIRTING IS NOT INTENDED TO BE A 'SHEAR WALL', RATHER A SKIN FOR ENCLOSURE OF THE CRAWLSPACE.
   - 5.5. PROVIDE 18" MIN. CLEARANCE FROM SOIL TO UNDERSIDE OF ANY UNTREATED WOOD MEMBER.
6. SPECIALTY ITEMS: 'MINUTEMAN' OR EQUAL, www.minutemanproduxcts.com
   - 6.1. METAL PIERS TO BE CAPABLE OF SUPPORTING 6,000#
   - 6.2. SOIL ANCHORS SHALL BE "MINUTEMAN" IN CONFORMANCE WITH THE TYPE SPECIFIED BY THE MANUFACTURER FOR THE SITE SPECIFIC SOILS AND SHALL CONFORM TO THE FOLLOWING:
     - 6.2.1. DESIGN WORKING STRESS LOAD OF 3,150# W/ AN ULTIMATE STRENGTH LOAD OF 4,725#
     - 6.2.2. INSTALL GROUND PORTION OF THE ANCHOR PRIOR TO SETTING THE BUILDING.
     - 6.2.3. CONNECT ANCHOR TIES TO BUILDING ONLY AFTER BUILDING IS FULLY BLOCKED AND LEVELED.
     - 6.2.4. ANCHORS TO BE ONE OF THE FOLLOWING:
       - 6.2.4.1. SOIL CLASS 1 (ROCK): 36-XDH
       - 6.2.4.2. SOIL CLASS 2 (ASPHALT W/GRAVEL BASE OR GRANULAR STRUCTURAL FILL, 24" MIN. DEPTH): (2) 36-XDH W/"MMASD2A' STABILIZER PLATE.
       - 6.2.4.3. SOIL CLASS 3 (LOOSE SANDS & GRAVELS, STIFF SILTS & CLAYS): 4430-DH ¾" AUGAR-ANCHOR SET VERTICAL W/"MMASD2A' STABILIZER PLATE INSTALL.
       - 6.2.4.4. SOIL CLASS 4 (LOOSE SANDS, FIRM CLAYS AND SILTS, ALLUVIAL FILLS): 4636-DH ¾" AUGER ANCHOR SET VERTICAL W/MMASD2 STABILIZER PLATE.
   - 6.3. INSTALL ALL SPECIALTY ITEMS PER THE MANUFACTURER'S RECOMMENDATIONS.
7. VENTING:
   - 7.1. INSTALL A CLASS I VAPOR RETARDER OVER THE CRAWLSPACE AREA TO EXTERIOR OF BUILDING.
   - 7.2. PROVIDE CRAWL SPACE VENTILATION PER IBC CODE AND LOCAL REQUIREMENTS AT 1 NET SF OF VENTILATION PER 1500 SF OF FLOOR AREA.
8. ACCESS:
   - 8.1. PROVIDE ACCESS TO THE UNDER FLOOR AREA PER THE IBC CODE.
   - 8.2. PROVIDE 18" MIN. CLEARANCE UNDER FROM SOIL TO UNDERSIDE OF ALL BUILDING STRUCTURE.
9. SITE CONDITIONS:
   - 9.1. FOUNDATION SUBGRADE TO BE 4-INCHES OF ROAD-MIX GRAVEL, STRUCTURAL FILL OVER UNDISTURBED NATIVE SOILS OR STRUCTURAL FILL,.
   - 9.2. STRUCTURAL FILL TO BE COMPACTED TO 95% OF THE STANDARD PROCTOR DENSITY PER ASTM D-698.
   - 9.3. SLOPE FINISHED GRADE AWAY FROM THE BUILDING FOUNDATION AT A MIN. GRADE OF 2%.
10. SPECIAL STRUCTURAL INSPECTION (IBC CHAPTER 17):
    - 10.1. NO SPECIAL STRUCTURAL INSPECTION IS REQUIRED

Reviewed for Code Compliance
Kitsap County Building/ Fire Marshals
07/17/202012:17:09 PM kwlodarchak

PROFESSIONAL ENGINEER REGISTERED 3997 STATE OF IDAHO DEAN W. BRIGGS — RENEWS: 09/30/2020

DEAN W. BRIGGS 19378 STATE OF WASHINGTON STRUCTURAL ENGINEER PROFESSIONAL ENGINEER — RENEWS: 09/27/2021

REGISTERED PROFESSIONAL ENGINEER 12327 PE OREGON SEPT.23,1982 DEAN W. BRIGGS — EXPIRES: DECEMBER 31, 2019

12.6.19

Pacific Mobile
Mobile & Modular Buildings

BRIGGS ENGINEERING, INC.
ENGINEERS PLANNERS SURVEYORS
PO BOX 140937, GARDEN CITY, ID 83714 - (208) 871-0300

KCDA STYLE BUILDING
28'x64' MODULAR CLASSROOM
25 PSF-RLL, 110C-WLL
SHEARWALL FOUNDATION
PLAN - ELEVATION - NOTES

SCALE: AS SHOWN
DWG NO. 1901.01.01.4-2, 17
DWG DATE: FEBRUARY 2019

REVISION DATE: 12/6/2019

F1

SHEET: 1 OF 1

PM'S:JOSEPH MANGAN

Permit Number: 20-02306

dean@briggs-engineering.com

PRE-FABRICATED BUILDING DESIGN - FOUNDATION CALCULATIONS					IBC-2015, WBC, OSSC	
CLIENT	Pacific Mobile Structures, Inc			OWNER:	Pacific Mobile Structures, Inc	
DATE:	10-Dec-19	EST./PO#	E19246	LOCATION:	KCDA Standards	
PROJECT#	201901	01.01.1		STATE:	ID-OR-WA	PNW

Table of Contents

PREFABRICATED MODULAR BUILDING PAD FOUNDATION DESIGN

DESCRIPTION	WIDTH:	LENGTH:	TYPE:
WEST			
28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall	28	64	25psf-RLL,40psf-FLL,110mph, Exp C, Cat-D, Ss=1.5, Fp=1500 psf
EAST			
28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall	28	64	40psf-RLL,40psf-FLL,115mph, Exp C, Cat-D, Ss=1.5, Fp=1500 psf

Reviewed for Code Compliance
Kitsap County Building/ Fire Marshals
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Permit Number: 20-02306

dean@briggs-engineering.com

MODULAR BUILDING PAD & PIER FOUNDATION DESIGN - FOUNDATION CALCULATIONS — IBC-2015, WBC, OSSC

CLIENT	Pacific Mobile Structures, Inc	**DEALER:**	Pacific Mobile Structures, Inc	**Criteria**	25psf-RLL,40psf-FLL,110mph, Exp C, Cat-D, Ss=1.5, Fp=1500 psf
Date:	10-Dec-19	**PO#**	E19246	**Location:**	KCDA Standards
Project #:	201901	#01.3.03 & 04-1	**28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall**	**State(s):**	ID-OR-WA PNW

I. DESIGN CRITERIA: **28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall**

Dead Load:	Roof, RDL =		10	psf		
	1st Floor Ceiling CDL =		1			
	E&M =		1			
	Floor, FDL =		10	psf		
	Wall, WDL =		9	psf		
Roof Live Load:	Snow Load, RLL =		**25**	psf		
	Load Duration Factor, Cd =		1.15	%		
Floor Load:	Uniform Floor Load, FLL =	Classroom	40	psf		IBC Table 1607.1
	Concentrated Live Load, p =		1000	lbs.		IBC Table 1607.1
	Partion, PDL =		0	psf		
	Building Risk Classification:	Category	II			ASCE 7 Table 1.5-1
	Wind Importance Factor, Iw =		1.00			ASCE 7 Table 1.5-1
	Wind Directional Factor, Kd		0.85			ASCE 7 Table 26.6-1
	"a" Edge Pressure Distance =		3.00	ft		
2	Roof Slope = **2** :12 =		9.46	Degrees		
	Edge Wind Pressure, Wep =		21.6	psf		ASCE 7 Figure 28.6-1
	Interior Wind Pressure, Wip =		14.4	psf		ASCE 7 Figure 28.6-1
	Average Wind Pressure, Wp =		15.94	psf		ASCE 7 Figure 28.6-1
	Exposure Category = **C**	Exposure Factor, λ =	1.21			ASCE 7 Figure 28.6-1
	Wind Topographic Factor, Kz =		1.00			ASCE 7 Section 6.5
	Design Wind Pressure , Pw = Wp*λ*Iw*Kz =		**16.4**	psf		IBC Section 1605.3.1
	Average Uplift Wind Pressure, Wup =		**-19.6**	psf		
Seismic:	Upper Modue Weight =		0.00	psf		
	Base Module Weight =		27.79	psf		
	Total Weight, Wtot =		27.79	psf		
	Snow Load % Used in Seismic Design =		0%			
	Soil Site Class		D			
	Seismic Category =		D	PNW		IBC Table 1613.3(1)
	Mapped Spectral Accelerations, short periods, Ss =		**1.5000**			IBC Figure 1615
	Site Coefficient, Fa =		1.00			IBC Table 1615.1.2(1)
	Max. Spectral Response, S_{MS} = Fa*Ss =		1.50			IBC Equation 16-16
	Design Spectral Response, S_{DS} = 2/3*S_{MS} =		**1.00**			IBC Equation 16-18
	Response Modification Coefficient, R =		4.00			IBC Table 1617.6
	Lateral Load Factor, F = (1, Single Story; 1.1, 2-story; 1.2, 3-story)				1	ASCE 7-05, 12.14.8.1
	*Total Shear, pst = F*SDS*Wtot/R =*		***6.95***	psf		ASCE 7-05 Equation 12.14.11
Dimensions:	Nominal Module Length, ML =				**64**	ft.
	Nominal Module Width, MW =				**14.00**	ft.
	Width, W = # Units =	2			28.00	ft.
	Legnth, L = # Units =	1			64.00	ft.
	!st Floor Wall Ht. =				9.00	ft.
	2nd Flr. Wall Height, Wht =				0.00	ft.
	Roof Height, Rht = 2 :12 Slope				2.33	ft.
	Floor Height above NG, Fht =	30 inches			2.50	ft
	Building Ht Coeff, Htc = Rht+Wht+Fht-10				1.00	
	No. of floor spans per module, nfs =				2	
	Clear Distance between supports, L2a =				84.00	inches

Permit Number: 20-02306

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MODULAR BUILDING PAD & PIER FOUNDATION DESIGN - FOUNDATION CALCULATIONS — IBC-2015, WBC, OSSC

CLIENT	Pacific Mobile Structures, Inc	**DEALER:** Pacific Mobile Structures, Inc		**Criteria**	25psf-RLL,40psf-FLL,110mph, Exp C, Cat-D, Ss=1.5, Fp=1500 psf
Date:	10-Dec-19	**PO#** E19246	**Location:** KCDA Standards		
Project #:	201901	#01.3.03 & 04-1	**28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall**	**State(s):**	ID-OR-WA PNW

II. FOUNDATION DESIGN

A. Foundation Components

Option A	Individual Bearing Pads - Bearing Pads			Column Pads	
	Width, wbp =	16	inches	16	inches
	Length, lbp =	16	inches	16	inches
	Surface Support Depth: Conc, Asph & Base	4	inches, Required		
	Equivalent Bearing Area at Soil, BA =	400	Sq. Inches	384	Sq Inches
IBC-T.18.4.2	Allowable Soil Bearing Pressure, [Class 4] Q =	**1500**	psf.	*To Be Verified By Others*	
Option B	Perimeter Support Width	0	inches		
	Allowable Load, Pbp = (BA)/144*Q =	4167	pounds	4000	pounds

Anchors: ***'Minuteman' MMA-92 Auger Anchor OR Double MMA-35 w/MMA-SD2 Stabilizer Plate in Soil or SD2A in Asphalt or Compated Gravel***

Ultimate Anchor Capacity, Anchc = 4725 lbs. **3341** lbs@45°

B. Exterior Pads (Around Perimeter)

Floor and Roof Loads:

Exterior Pads Required, Epr = 1 pad

Allowable Load, Pfla = 4167 lbs. — From Computer Calculations, max. span

Perimeter Support Bearing Pressure, (Skirting) 0 psf - OK!

Classroom Exterior Uniform Floor Load, 538 plf 7.76 ft. 6.00 ft.

Classroom Use: **Perimeter Pads W/ (12) 16-inch x 16-inch pad @ 6-ft o.c. exterior supports.**

C. Interior Pads (Floor Loads Only - Mateline Supports)

Floor Loads:

Interior Pads Required, Ipr = 1 pad — From Computer Calculations, max. span

Allowable Load, Pfla = 4167 lbs.

Classroom Interior Uniform Floor Load, 350 plf 11.90 ft. 8.00 ft.

Classroom Use: **(9) 16-inch x 16-inch Pads @ 8-ft o.c. interior supports.**

D. Column Pads (Roof Loads Only)

Roof Loads:

Column Pads Required, Cpr = 1 pads

Allowable Load, Prla = 4000 lbs.

Mateline Roof Beams Uniform Roof Load,mbrl = (RLL+RDL)*MW = 518 lb/ft.

Effective Mateline Beam Span, Mps = Pfla/mbrl = 7.72 ft.

Use: **(1) 16-inch x 16-inch pads for every 7.72-ft effective Mateline Beam Span.**

Effective Interior Roof Beam Span =	**32**	**ft**	**5 PADS REQ'D**
Effective Interior Roof Beam Span =	**16**	**ft**	**3 PADS REQ'D**

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MODULAR BUILDING PAD & PIER FOUNDATION DESIGN - FOUNDATION CALCULATIONS						IBC-2015, WBC, OSSC	
CLIENT	Pacific Mobile Structures, Inc	**DEALER:**	Pacific Mobile Structures, Inc		**Criteria**	25psf-RLL,40psf-FLL,110mph, Exp C, Cat-D, Ss=1.5, Fp=1500 psf	
Date:	10-Dec-19	**PO#**	E19246	**Location:**	KCDA Standards		
Project #:	201901	#01.3.03 & 04-1	**28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall**	**State(s):**	ID-OR-WA		PNW

E. Lateral Design

1. Longitudinal Walls (Front & Back, Long Walls)

Unit Wind Load, UWL = (Wht+Rht+Fht/2)*Wp*L=		13205 lbs	Governs
Unit Seismic Load,USL = W*pst =		12454 lbs	
Building Weight =		35840 lbs	
% Building Weight Used for Lateral Sliding		0%	
Transverse Foundation Friction Factor =		0.40	
Gravity Resistance, GR = Building WT * Friction Factor =		0 lbs.	
OTM = Lateral Load*wht/2+Uplift		94610 Ft-lbs	
RM = 0.6*Building Wt*W/2		301056 Ft-lbs	
Factor of Safety = RM/OTM	3	No Uplift Anchors Required	

Use: **(4) 'Minuteman' MMA-92 Auger Anchor OR Double MMA-35 w/MMA-SD2 Stabilizer Plate in Soil or SD2A in Asphalt or Compated Gravel**

2. Lateral Walls (End, Short Walls)

Unit Wind Load, UWL = (Wht+Rht/2+Fht/2)*Wp =		5242 lbs	
Unit Seismic Lateral Load, USLL = L*pst =		12454 lbs	Governs
% Building Weight Used for Longitudinal Sliding		0%	
Longitudinal Foundation Friction Factor =		0.40	
Gravity Resistance, GR = Building WT * Friction Factor =		0 lbs.	
OTM = Lateral Load*wht/2+Uplift		91231 Ft-lbs	
RM = 0.6*Building Wt*W/2		688128 Ft-lbs	
Factor of Safety = RM/OTM	8	No Uplift Anchors Required	

Use: **(3) 'Minuteman' MMA-92 Auger Anchor OR Double MMA-35 w/MMA-SD2 Stabilizer Plate in Soil or SD2A in Asphalt or Compated Gravel**

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MODULAR BUILDING PAD & PIER FOUNDATION DESIGN - FOUNDATION CALCULATIONS — IBC-2015, WBC, OSSC

CLIENT	Pacific Mobile Structures, Inc	**DEALER:**	Pacific Mobile Structures, Inc	**Criteria**	40psf-RLL,40psf-FLL,115mph, Exp C, Cat-D, Ss=1.5, Fp=1500 psf
Date:	10-Dec-19	**PO#**	E19246	**Location:**	KCDA Standards
Project #:	201901	#01.3.05 & 06-1	**28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall**	**State(s):**	ID-OR-WA PNW

I. DESIGN CRITERIA: **28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall**

Dead Load:	Roof, RDL =		10	psf		
	1st Floor Ceiling CDL =		1			
	E&M =		1			
	Floor, FDL =		10	psf		
	Wall, WDL =		9	psf		
Roof Live Load:	Snow Load, RLL =		**40**	psf		
	Load Duration Factor, Cd =		1.15	%		
Floor Load:	Uniform Floor Load, FLL =	Classroom	40	psf		IBC Table 1607.1
	Concentrated Live Load, p =		1000	lbs.		IBC Table 1607.1
	Partion, PDL =		0	psf		
Wind Load:	Basic Wind Speed, V =		**115**	mph		ASCE 7 Figure 26.5-1A
	Building Risk Classification:	Category	II			ASCE 7 Table 1.5-1
	Wind Directional Factor, Kd		0.85			ASCE 7 Table 26.6-1
	"a" Edge Pressure Distance =		3.00	ft		
2	Roof Slope = **2** :12 =		9.46	Degrees		
	Edge Wind Pressure, Wep =		23.7	psf		ASCE 7 Figure 28.6-1
	Interior Wind Pressure, Wip =		15.75	psf		ASCE 7 Figure 28.6-1
	Average Wind Pressure, Wp =		17.45	psf		ASCE 7 Figure 28.6-1
	Exposure Category = **C**	Exposure Factor, λ =	1.21			ASCE 7 Figure 28.6-1
	Wind Topographic Factor, Kz =		1.00			ASCE 7 Section 6.5
	Design Wind Pressure , Pw = Wp*λ*Iw*Kz =		**18.0**	psf		IBC Section 1605.3.1
	Average Uplift Wind Pressure, Wup =		**-21.5**	psf		
Seismic:	Upper Modue Weight =		0.00	psf		
	Base Module Weight =		27.79	psf		
	Total Weight, Wtot =		27.79	psf		
	Snow Load % Used in Seismic Design =		20%			
	Soil Site Class		D			
	Seismic Category =		D	PNW		IBC Table 1613.3(1)
	Mapped Spectral Accelerations, short periods, Ss =		**1.5000**			IBC Figure 1615
	Site Coefficient, Fa =		1.00			IBC Table 1615.1.2(1)
	Max. Spectral Response, S_{MS} = Fa*Ss =		1.50			IBC Equation 16-16
	Design Spectral Response, S_{DS} = 2/3*S_{MS} =		**1.00**			IBC Equation 16-18
	Response Modification Coefficient, R =		4.00			IBC Table 1617.6
	Lateral Load Factor, F = (1, Single Story; 1.1, 2-story; 1.2, 3-story)				1	ASCE 7-05, 12.14.8.1
	*Total Shear, pst = F*SDS*Wtot/R =*		***8.95***	psf		ASCE 7-05 Equation 12.14.11
Dimensions:	Nominal Module Length, ML =				**64**	ft.
	Nominal Module Width, MW =				**14.00**	ft.
	Width, W = # Units =	2			28.00	ft.
	Legnth, L = # Units =	1			64.00	ft.
	!st Floor Wall Ht. =				9.00	ft.
	2nd Flr. Wall Height, Wht =				0.00	ft.
	Roof Height, Rht = 2 :12 Slope				2.33	ft.
	Floor Height above NG, Fht =	30 inches			2.50	ft
	Building Ht Coeff, Htc = Rht+Wht+Fht-10				1.00	
	No. of floor spans per module, nfs =				2	
	Clear Distance between supports, L2a =				84.00	inches

Permit Number: 20-02306

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MODULAR BUILDING PAD & PIER FOUNDATION DESIGN - FOUNDATION CALCULATIONS					IBC-2015, WBC, OSSC
CLIENT	Pacific Mobile Structures, Inc	**DEALER:**	Pacific Mobile Structures, Inc	**Criteria**	40psf-RLL,40psf-FLL,115mph, Exp C, Cat-D, Ss=1.5, Fp=1500 psf
Date:	10-Dec-19	**PO#**	E19246	**Location:**	KCDA Standards
Project #:	201901	#01.3.05 & 06-1	**28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall**	**State(s):**	ID-OR-WA PNW

II. FOUNDATION DESIGN

A. Foundation Components

Option A	Individual Bearing Pads - Bearing Pads				Column Pads	
	Width, wbp =	16	inches		16	inches
	Length, lbp =	16	inches		16	inches
	Surface Support Depth: Conc, Asph & Base	4	inches, Required			
	Equivalent Bearing Area at Soil, BA =	400	Sq. Inches		384	Sq Inches
IBC-T.18.4.2	Allowable Soil Bearing Pressure, [Class 4] Q =	**1500**	psf.		*To Be Verified By Others*	
Option B	Perimeter Support Width	0	inches			
	Allowable Load, Pbp = (BA)/144*Q =	4167	pounds		4000	pounds

Anchors: ***'Minuteman' MMA-92 Auger Anchor OR Double MMA-35 w/MMA-SD2 Stabilizer Plate in Soil or SD2A in Asphalt or Compated Gravel***

	Ultimate Anchor Capacity, Anchc =	4725	lbs.	**3341**	lbs@45°

B. Exterior Pads (Around Perimeter)

Floor and Roof Loads:

	Exterior Pads Required, Epr =			1	pad	
	Allowable Load, Pfla =			4167	lbs.	From Computer Calculations, max. span
	Perimeter Support Bearing Pressure, (Skirting)			0	psf - OK!	
Classroom	Exterior Uniform Floor Load,	643	plf	6.49	ft.	6.00 ft.

Classroom Use: Perimeter Pads W/ (12) 16-inch x 16-inch pad @ 6-ft o.c. exterior supports.

C. Interior Pads (Floor Loads Only - Mateline Supports)

Floor Loads:

	Interior Pads Required, Ipr =			1	pad	From Computer Calculations, max. span
	Allowable Load, Pfla =			4167	lbs.	
Classroom	Interior Uniform Floor Load,	350	plf	11.90	ft.	8.00 ft.

Classroom Use: (9) 16-inch x 16-inch Pads @ 8-ft o.c. interior supports.

D. Column Pads (Roof Loads Only)

Roof Loads:

Column Pads Required, Cpr =		1	pads
Allowable Load, Prla =		4000	lbs.
Mateline Roof Beams Uniform Roof Load,mbrl = (RLL+RDL)*MW =		728	lb/ft.
Effective Mateline Beam Span, Mps = Pfla/mbrl =		5.49	ft.

Use: (1) 16-inch x 16-inch pads for every 5.49-ft effective Mateline Beam Span.

Effective Interior Roof Beam Span =	**32**	**ft**	**6 PADS REQ'D**
Effective Interior Roof Beam Span =	**16**	**ft**	**3 PADS REQ'D**

Permit Number: 20-02306

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MODULAR BUILDING PAD & PIER FOUNDATION DESIGN - FOUNDATION CALCULATIONS						IBC-2015, WBC, OSSC
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Date:	10-Dec-19	**PO#**	E19246	**Location:**	KCDA Standards	
Project #:	201901	#01.3.05 & 06-1	**28x64 MODULAR FDN-Classroom w/(2) Floor Joist Spans /Module, W/ & W/O Firewall**	**State(s):**	ID-OR-WA	PNW

E. Lateral Design

1. Longitudinal Walls (Front & Back, Long Walls)

Unit Wind Load, UWL = (Wht+Rht+Fht/2)*Wp*L=		14457 lbs	
Unit Seismic Load,USL = W*pst =		16040 lbs	Governs
Building Weight =		35840 lbs	
% Building Weight Used for Lateral Sliding		0%	
Transverse Foundation Friction Factor =		0.40	
Gravity Resistance, GR = Building WT * Friction Factor =		0 lbs.	
OTM = Lateral Load*wht/2+Uplift		110642 Ft-lbs	
RM = 0.6*Building Wt*W/2		301056 Ft-lbs	
Factor of Safety = RM/OTM	3	No Uplift Anchors Required	

Use: **(5) 'Minuteman' MMA-92 Auger Anchor OR Double MMA-35 w/MMA-SD2 Stabilizer Plate in Soil or SD2A in Asphalt or Compated Gravel**

2. Lateral Walls (End, Short Walls)

Unit Wind Load, UWL = (Wht+Rht/2+Fht/2)*Wp =		5738 lbs	
Unit Seismic Lateral Load, USLL = L*pst =		16040 lbs	Governs
% Building Weight Used for Longitudinal Sliding		0%	
Longitudinal Foundation Friction Factor =		0.40	
Gravity Resistance, GR = Building WT * Friction Factor =		0 lbs.	
OTM = Lateral Load*wht/2+Uplift		110642 Ft-lbs	
RM = 0.6*Building Wt*W/2		688128 Ft-lbs	
Factor of Safety = RM/OTM	6	No Uplift Anchors Required	

Use: **(4) 'Minuteman' MMA-92 Auger Anchor OR Double MMA-35 w/MMA-SD2 Stabilizer Plate in Soil or SD2A in Asphalt or Compated Gravel**

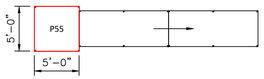
ALUMINUM MODULAR RAMP & STAIR SYSTEM CONFIGURATION OPTIONS

TYPICAL COMPONENT SIZES

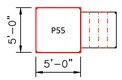
- LANDINGS: PLATFORM UNITS CAN BE BOLTED TOGETHER FOR LARGER PLATFORMS
- RAMPS: 48" WIDE UNITS CAN BE BOLTED TOGETHER TO FORM A MAXIMUM 30' RAMP RUN
- STAIRS: MAX. 6"–7" RISE x 12" TREAD x 48" WIDE

NOTE: WHERE DOOR CLEARANCE ALLOWS, STAIRS CAN BE ADDED TO ANY/ALL OF THE CONFIGURATIONS SHOWN BELOW.

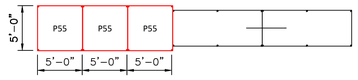
☐ A TYPICAL SINGLE DOOR CONFIGURATION
RAMP LENGTH VARIES; MAX. 30' RUN



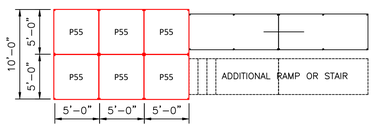
☐ B TYPICAL SINGLE DOOR CONFIGURATION
NUMBER OF RISERS/TREADS VARIES



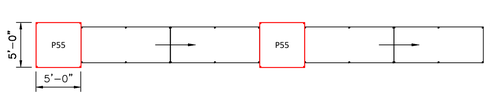
☐ C TYPICAL DOUBLE DOOR CONFIGURATION
RAMP LENGTH VARIES; MAX. 30' RUN



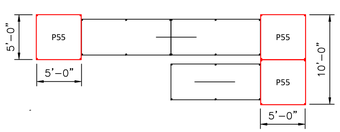
☐ D TYPICAL TWO–BUILDING COMMON LANDING CONFIGURATION
RAMP LENGTH VARIES; MAX. 30' RUN



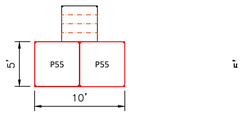
☐ E TYPICAL INTERMEDIATE LANDING CONFIGURATION
RAMP LENGTH VARIES; MAX. 30' RUN



☐ F TYPICAL SWITCHBACK CONFIGURATION
RAMP LENGTH VARIES; MAX. 30' RUN

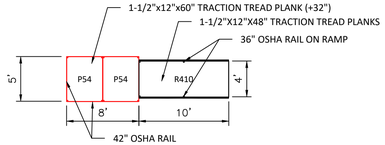


☐ G DOUBLE DOOR EXIT 1/8" = 1'–0"



☐ H ALTERNATE DOUBLE DOOR EXIT 1/8" = 1'–0"

☐ I DUMPSTER RAMP 1/8" = 1'–0"



☐ J CUSTOM CONFIGURATION
1/8" = 1'–0"

Welcome Ramp Systems, Inc.

Component Aluminum Ramp System for
Safe, User-Friendly Building Access.
www.welcomerampsystems.com

CODE COMPLIANCE

1. IBC 2015, CHAPTER 10 COMPLIANT
2. ANSI A117.1–2009 COMPLIANT
3. RAMP SLOPE, MAX.RISE = 1:12 (VERT/HORZ)
4. CROSS SLOPE, MAX. = 2%
5. STAIR RISE = 7" MAX., 4" MIN.
6. DESIGN LOADING:
   - 6.1. DECK/RAMP 100 PSF
   - 6.2. STAIR TREAD 300 LBS./TREAD
   - 6.3. RAILING 50 PLF/200 LBS. CONC.
   - 6.4. LATERAL LOAD 600# PEDESTRIAN DYNAMIC LOADING PER 30–FT RAMP
   - 6.5. WIND LOAD 135 MPH, EXP C, Kzt=2.0
   - 6.6. SEISMIC LOAD Sds=1.0, SEISMIC CAT. 'D'
7. DOOR CLEARANCE AS REQUIRED BY IBC.
8. STANDARD 3 LINE RAIL FOR COMPONENTS 30" OR LESS FROM GRADE TO WALKING SURFACE OF RAMP, LANDING, OR STAIR.
9. 42" VERTICAL PICKET GUARDRAIL FOR COMPONENTS OVER 30" FROM GRADE TO WALKING SURFACE OF RAMP, LANDING, OR STAIR.
10. GRASPABLE CONTINUOUS HANDRAIL AT 36" OFF RAMP, PLATFORM, OR STAIR NOSING. INSTALL BOTH SIDES OF STAIRS AND RAMP.
11. HANDRAILS TO EXTEND 12" HORIZONTALLY OVER WALKING SURFACE AND RETURN TO WALL OR RAIL COLUMN.
12. RAMP AND RAILINGS TO HAVE CURBS WHICH DO NOT ALLOW PASSAGE OF 4" SPHERE WHERE ORIGINAL POSITION OF SPHERE IS WITHIN 4" OF THE WALKING SURFACE.
13. FOOTING INFORMATION:
    12"x12"x1–1/2" P.T. WOOD OR 12"x12" PRE–MANUFACTURED ABS PAD REQUIRED UNDER ALL ADJUSTABLE LEGS.

GENERAL NOTES:

1. THESE PLANS AND SPECIFICATIONS ARE NOT VALID FOR ANY OTHER ASSEMBLY THAN PRODUCTS PRODUCED BY WELCOME RAMP SYSTEMS, INC. PRODUCTS PRODUCED THE STANDARDS SET FORTH IN THESE DRAWINGS AND ACCOMPANYING DESIGN.
2. THE RAMP SYSTEM, STAIRS AND PLATFORM HAVE BEEN DESIGNED TO MEET IBC REQUIREMENTS. THE VERTICAL DESIGN LOADING CRITERIA IS 100 PSF UNIFORM LIVE LOAD AND 300# LIVE OR DEAD CONCENTRATED LOAD. USES FOR LOADS IN EXCESS OF THOSE STATED ABOVE REQUIRE REDESIGN BY WELCOME RAMP SYSTEMS, INC.
3. RAMP DESIGN LIMITS: THE SLOPE SHALL BE 1:12. THE MAXIMUM CROSS SLOPE SHALL BE LESS THAN 2%. THE MAXIMUM RUN SHALL BE 30'. THE MAXIMUM HEIGHT WITHOUT ADDITIONAL ENGINEERING JUSTIFICATION SHALL BE 48" FROM THE PLATFORM TO FINISHED GRADE.
4. WELCOME RAMPS, PLATFORMS, AND STAIRS ARE DESIGNED TO BE FREE STANDING.
5. DETAILS SHOW MOST USED HEIGHTS, OTHER HEIGHTS ARE SIMILAR.

MATERIAL SPECIFICATIONS

PLANKING:
- THIS DESIGN IS LIMITED TO GALVANIZED METAL PLANKING MATERIALS.
- RAMP: ALL PLANKING SHALL BE 13 GA. 12"W x 1 1/2" DEEP.
- PLATFORM: ALL PLANKING SHALL BE 13 GA. 12" W x 1–1/2" D. SEE PLAN FOR LENGTH.
- STAIRS: ALL PLANKING SHALL BE 11 GA. 12"W x 2" DEEP.

LEGS:
- LEVELING FEET ASSUMED TO BE PLACED ON SUITABLE FIRM BEARING GROUND.
- LEG MATERIAL SHALL BE 1–1/2" SQ.X .120" ALTUBING.
- LEG POCKETS SHALL BE 1.781" SQ X .125" AL. TUBING.
- ADJUSTING BOLT – 3/8" X 2–1/4" GRADE 5 CAP SCREW W/NYLON LOCK NUT, ZINC PLATED

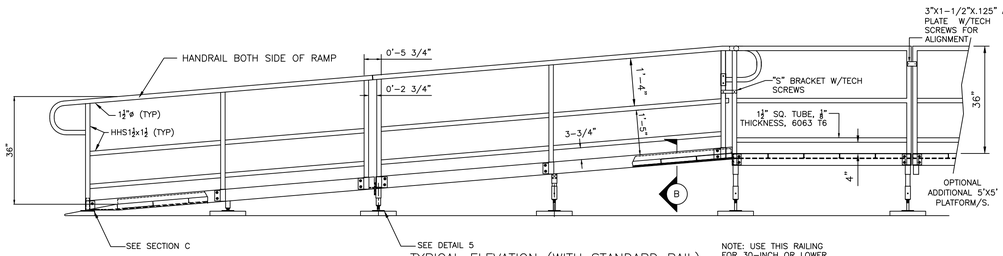
ALUMINUM:
- THE 1–1/2" AL. HANDRAIL SHALL BE 6063–T5 WITH A YIELD STRESS OF 16 KSI.
- ALL OTHER ALUMINUM PARTS SHALL BE 6061–T6 ALUMINUM WITH A YIELD STRESS OF 35 KSI.

HAND RAILS:
- STAIRS AND RAMPS: USE 1–1/2" SQ. X 5/32" THICK WALLED TUBING FOR POSTS AND HORIZONTAL RAILS EXCEPT THE TOP 1–1/2" ROUND HAND RAIL.
- STANDARD HANDRAIL (W/O PICKETS) IS ALLOWED ON FINISHED PLATFORM HEIGHTS OF 30" AND LESS. ALL PLATFORM HEIGHTS ABOVE 30" SHALL USE PICKET STYLE HANDRAILS.
- PLATFORM: USE 1–1/2 SQ. X 5/32" THICK WALLED TUBING FOR POSTS AND ALL HORIZONTAL RAILS.
- HEIGHT: TOP OF GRIPPING SURFACES OF HANDRAILS SHALL BE 36 INCHES VERTICALLY ABOVE WALKING SURFACES.

WELDING:
- ALL REFERENCES TO WELDING ON PLAN SET REFER TO IN–PLANT FABRICATION. NO ON–SITE WELDING IS REQUIRED.
- FABRICATION PLANT WELDING BY WELDERS CERTIFIED BY A THIRD PARTY INSPECTOR AND IN ACCORDANCE WITH ANSI/AWS D1.2 CODE.
- WELD SIZES ARE EQUAL OR LARGER THAN THE ELEMENT BEING WELDED.
- WELDING IS ALL AROUND UNLESS OTHERWISE NOTED. CARE IS TAKEN TO AVOID EXCESS WARPING OF WELDED ELEMENTS.
- FABRICATOR TO CERTIFY ASSEMBLED PART ARE PER THE DRAWINGS PER IBC 1704.2.2.

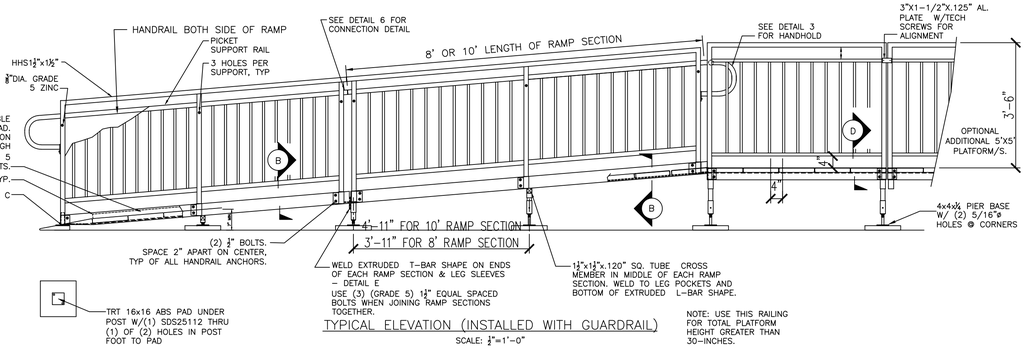
BOLTS:
- ALL BOLTS SHALL BE GRADE 5 ZINC PLATED, UNLESS OTHERWISE SPECIFIED. PROVIDE LOCKING WASHERS UNDER ALL NUTS AND ANCHOR BOLTS UNLESS OTHERWISE SPECIFIED.
- HIGH STRENGTH BOLTS ARE DESIGNED AT LESS THAN 50% CAPACITY FOR ADDITIONAL FACTOR OF SAFETY AND DO NOT REQUIRE SPECIAL INSPECTION.

TECH SCREWS:
- ZINC PLATED #10x1¼", SELF TAPPING.



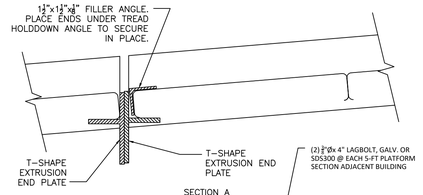
TYPICAL ELEVATION (WITH STANDARD RAIL)
SCALE: ½"=1'–0"

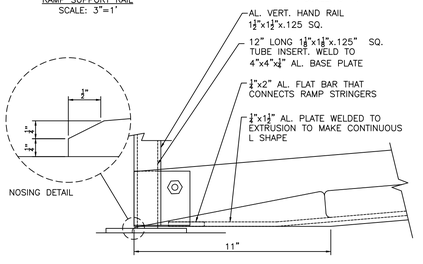
NOTE: USE THIS RAILING FOR 30–INCH OR LOWER TOTAL PLATFORM HEIGHT.

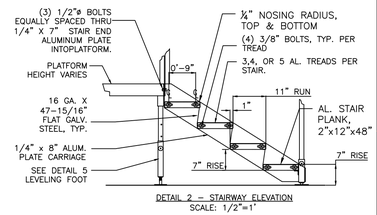


TYPICAL ELEVATION (INSTALLED WITH GUARDRAIL)
SCALE: ½"=1'–0"

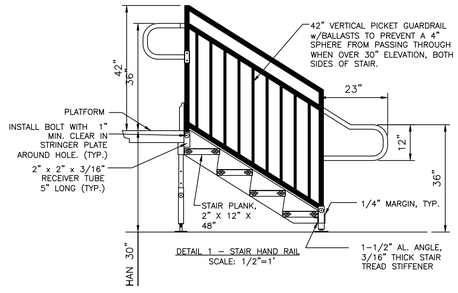
NOTE: USE THIS RAILING FOR TOTAL PLATFORM HEIGHT GREATER THAN 30–INCHES.



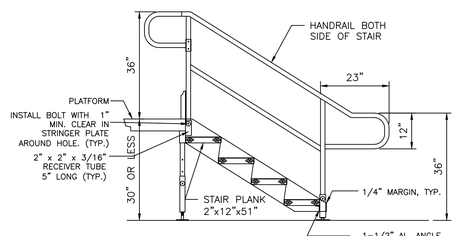




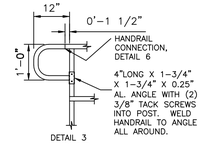
DETAIL 2 – STAIRWAY ELEVATION
SCALE: 1/2"=1'



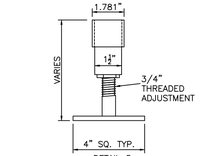
DETAIL 1 – STAIR HAND RAIL
SCALE: 1/2"=1'



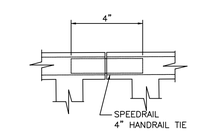
DETAIL 4 – STAIR HAND RAIL
SCALE: 1/2"=1'



DETAIL 3
HANDHOLD
SCALE: 1/2"=1'



DETAIL 5
LEVELING FOOT
SCALE: 3"=1'



DETAIL 6
HANDRAIL CONNECTION
SCALE: 3"=1'

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DEAN W. BRIGGS — STATE OF WASHINGTON — STRUCTURAL ENGINEER — PROFESSIONAL ENGINEER

RENEWS: 09/27/2021

PROJECT NAME:
STANDARD ACCESS PLANS
DECK, RAMP & STAIRS

DATE: 01/22/2019
BY: DB/TC
JOB NUMBER: 20180101.1–1
SHEET 1 OF 1

WELCOME RAMP SYSTEMS INC.
ACCESS RAMPS & STAIRS
STANDARD PLANS/DETAILS/NOTES

Permit Number: 20-02306

WELCOME RAMP, INC.

STRUCTURAL ANALYSIS

TABLE OF CONTENTS

Permit Number: 20-02306

WELCOME RAMP, INC.

STRUCTURAL ANALYSIS

Ramp System Design Criteria and Analysis

1) Reference Design Criteria:
   a) International Building Code, 2012 & 2015 Editions
   b) ANSI A 117.1, 2009 Edition
2) Site Specific Criteria:
   a) Building Occupancy Classifications: II
   b) Vertical Loading: 100 psf for Landings, 300 lbs. concentrated loads for steps
   c) Horizontal Loading:
      i) Wind Loads: 135 mph(ult), Exposure B, Kz=0.85, Kzt=1.0; Design Wind Pressure = 30 psf (At less than 15 feet above grade, IBC 2012, 1609.6.2)
      ii) Seismic Loads: Sds = 1.00, S1=0.50, I=1.0, R=3.25, Ωo=2, Cd=3.25, Cs=0.307
   d) Soil Bearing: 1,500 psf, Unless verified by Geotechnical Report or Building Official
3) Material Specifications:
   a) Aluminum:
      i) Handrail ASTM 6063-T5, 16 ksi, minimum yield strength
      ii) Structural ASTM 6061-T5, 35 ksi, minimum yield strength
   b) Density 170 lbs. per cubic foot
4) Connectors:
   a) Bolts Grade 5 zinc-coated (Design), ASTM A-325 may be substituted.
   b) Screws #10x1.25” zinc plated Self-Tapping Screw (STS)
   c) Welding Per AWS D1.2 and size as shown on the drawings
   d) Sleeves Length of snug-fitting sleeves designed resist moment and shear of sleeved connection.
5) Design Basis:
   a) Each side of the assembly is a framed made rigid by either welding or assembling parts together in sleeves to resist movement. Base connections are a pinned condition.
   b) Each frame is connected together with landing or ramp frames and planking to distribute dead and live loads to the frames. Railing is added to the frame assembly.
   c) Landing Platforms are attached to buildings with Lag-bolts or SDS Screws.
   d) Basic Dead Load is 5 psf for frame, ramp & landing surfaces. 2 psf is added for railing.

e) A 300 lb. lateral load is used in the design to simulate seismic, wind and pedestrian lateral loading for each frame (2 frames per unit, 600# per assembly). This results in an effective Design Cs for a 30-foot ramp and 5x10 platform of 0.5 and a design wind load of 30 psf without consideration for stress duration. Seismic and wind loads do not govern lateral loading for standard configurations. For those configurations having landings attached a building on one side longer than 40', soil anchors shall be installed at the rate of (1) anchor for each length of landing 40' longer than 40'. For those configurations having landings attached to a building on two sides longer than 60', soil anchors shall be installed at the rate of (1) anchor for each length of landing 60' longer than 60'. See Typical Soil Anchor Detail.

WELCOME RAMP, INC.

STRUCTURAL ANALYSIS

Ramp System Design

Member Data

Member Label	I Joint	J Joint	Rotate (degrees)	Shape / Section Set	Material Set	Phys Memb	TOM	End Releases I-End AVM	End Releases J-End AVM	End Offsets I-End (in)	End Offsets J-End (in)	Inactive Code	Length (ft)
M1	N1	N10		SEC1	AL	Y		PIN					4.768
M2	N10	N11		SEC1	AL	Y			PIN				4.768
M3	N11	N9		SEC1	AL	Y							4.768
M4	N9	N6		SEC1	AL	Y			PIN				5.012
M5	N6	N8		SEC2	AL	Y							5
M6	N7	N8		SEC3	AL	Y							1.599
M7	N5	N6		SEC3	AL	Y							1.599
M8	N4	N9		SEC3	AL	Y							1.25
M9	N3	N11		SEC3	AL	Y							.833
M10	N2	N10		SEC3	AL	Y							.417

Sections

Section Label	Database Shape	Material Label	Area (in)^2	SA (0,180)	SA (90,270)	I (90,270) (in^4)	I (0,180) (in^4)	T/C Only
SEC1	Welcome Ramp	AL	1.438	1.2	1.2	.421	2.02	
SEC2	Welcome Deck	AL	1.438	1.2	1.2	.421	1.378	
SEC3	TU2X2X2	AL	.897	1.2	1.2	.513	.513	

Basic Load Case Data

BLC No.	Basic Load Case Description	Category Code	Category Description	Gravity X	Gravity Y	Load Type Totals Joint	Load Type Totals Point	Load Type Totals Direct Dist.
1	w1 - Dead Load	DL	Dead Load		-1			5
2	w2 -Pedestrian Load	LLS	Live Load Special (public as..			1		5

Member Direct Distributed Loads, Category : DL, BLC 1 : w1 - Dead Load

Member Label	Direction	Start Magnitude (k/ft, F)	End Magnitude (k/ft, F)	Start Location (ft or %)	End Location (ft or %)
M1	Y	-.014	-.014	0	0
M2	Y	-.014	-.014	0	0
M3	Y	-.014	-.014	0	0
M4	Y	-.014	-.014	0	0
M5	Y	-.018	-.018	0	0

Member Direct Distributed Loads, Category : LLS, BLC 2 : w2 -Pedestrian Load

Member Label	Direction	Start Magnitude (k/ft, F)	End Magnitude (k/ft, F)	Start Location (ft or %)	End Location (ft or %)
M1	Y	-.2	-.2	0	0
M2	Y	-.2	-.2	0	0
M3	Y	-.2	-.2	0	0
M4	Y	-.2	-.2	0	0
M5	Y	-.25	-.25	0	0

Load Combinations

Num	Description	Env	WS	PD	SRSS	CD	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	DL + Ped. Load	y				1	1	1	2	1				
2	Ped. Load Only	y				1	2	1						

Load Combinations (continued)

Num	Description	Env	WS	PD	SRSS	CD	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
3						1								
4						1								
5						1								

Envelope Member Stresses

Member Label	Section		Axial (ksi)	Lc	Shear (ksi)	Lc	Bending top (ksi)	Lc	Bending bot (ksi)	Lc
M1	1	max	.023	1	.319	1	0	1	0	1
		min	.022	2	.299	2	0	1	0	1
	2	max	.003	1	.036	1	4.933	1	-2.906	2
		min	.003	2	.034	2	4.625	2	-3.1	1
	3	max	-.017	2	-.23	2	2.009	1	-1.197	2
		min	-.018	1	-.247	1	1.906	2	-1.262	1
	4	max	-.036	2	-.494	2	-8.157	2	5.513	1
		min	-.039	1	-.53	1	-8.774	1	5.125	2
M2	1	max	.059	2	.531	1	-8.355	2	5.589	1
		min	.053	1	.497	2	-8.895	1	5.25	2
	2	max	.04	2	.248	1	1.928	1	-1.114	2
		min	.032	1	.232	2	1.773	2	-1.211	1
	3	max	.02	2	-.032	2	4.893	1	-2.864	2
		min	.011	1	-.035	1	4.558	2	-3.074	1
	4	max	.001	2	-.296	2	0	1	0	1
		min	-.009	1	-.318	1	0	1	0	1
M3	1	max	.2	1	.359	1	-2.64	2	1.752	1
		min	.199	2	.337	2	-2.789	1	1.659	2
	2	max	.18	2	.077	1	3.268	1	-1.91	2
		min	.18	1	.072	2	3.039	2	-2.053	1
	3	max	.16	2	-.192	2	1.467	1	-.864	2
		min	.159	1	-.206	1	1.375	2	-.922	1
	4	max	.141	2	-.456	2	-7.633	2	5.147	1
		min	.138	1	-.489	1	-8.192	1	4.796	2
M4	1	max	.029	1	.55	1	-8.455	2	5.68	1
		min	.026	2	.514	2	-9.04	1	5.313	2
	2	max	.012	1	.252	1	2.667	1	-1.564	2
		min	.01	2	.236	2	2.489	2	-1.676	1
	3	max	-.006	1	-.043	2	5.681	1	-3.334	2
		min	-.006	2	-.046	1	5.307	2	-3.569	1
	4	max	-.022	2	-.321	2	0	1	0	1
		min	-.023	1	-.343	1	0	1	0	1
M5	1	max	.152	1	.56	1	-5.456	2	6.538	1
		min	.141	2	.523	2	-5.832	1	6.116	2
	2	max	.152	1	.188	1	6.427	1	-6.715	2
		min	.141	2	.175	2	5.99	2	-7.205	1
	3	max	.152	1	-.173	2	6.464	1	-6.765	2
		min	.141	2	-.185	1	6.035	2	-7.246	1
	4	max	.152	1	-.52	2	-5.322	2	6.414	1
		min	.141	2	-.558	1	-5.721	1	5.966	2
M6	1	max	.745	1	.523	1	0	1	0	1
		min	.695	2	.487	2	0	1	0	1
	2	max	.745	1	.523	1	2.717	1	-2.527	2

Envelope Member Stresses, (continued)

Member Label	Section		Axial (ksi)	Lc	Shear (ksi)	Lc	Bending top (ksi)	Lc	Bending bot (ksi)	Lc
		min	.695	2	.487	2	2.527	2	-2.717	1
	3	max	.745	1	.523	1	5.435	1	-5.055	2
		min	.695	2	.487	2	5.055	2	-5.435	1
	4	max	.745	1	.523	1	8.152	1	-7.582	2
		min	.695	2	.487	2	7.582	2	-8.152	1
M7	1	max	1.208	1	-.499	2	0	1	0	1
		min	1.129	2	-.533	1	0	1	0	1
	2	max	1.208	1	-.499	2	-2.591	2	2.77	1
		min	1.129	2	-.533	1	-2.77	1	2.591	2
	3	max	1.208	1	-.499	2	-5.182	2	5.54	1
		min	1.129	2	-.533	1	-5.54	1	5.182	2
	4	max	1.208	1	-.499	2	-7.774	2	8.31	1
		min	1.129	2	-.533	1	-8.31	1	7.774	2
M8	1	max	1.367	1	-.108	2	0	1	0	1
		min	1.275	2	-.112	1	0	1	0	1
	2	max	1.367	1	-.108	2	-.44	2	.454	1
		min	1.275	2	-.112	1	-.454	1	.44	2
	3	max	1.367	1	-.108	2	-.879	2	.907	1
		min	1.275	2	-.112	1	-.907	1	.879	2
	4	max	1.367	1	-.108	2	-1.319	2	1.361	1
		min	1.275	2	-.112	1	-1.361	1	1.319	2
M9	1	max	.93	1	-.521	2	0	1	0	1
		min	.87	2	-.55	1	0	1	0	1
	2	max	.93	1	-.521	2	-1.411	2	1.49	1
		min	.87	2	-.55	1	-1.49	1	1.411	2
	3	max	.93	1	-.521	2	-2.822	2	2.98	1
		min	.87	2	-.55	1	-2.98	1	2.822	2
	4	max	.93	1	-.521	2	-4.233	2	4.471	1
		min	.87	2	-.55	1	-4.471	1	4.233	2
M10	1	max	1.424	1	-.048	1	0	1	0	1
		min	1.332	2	-.078	2	0	1	0	1
	2	max	1.424	1	-.048	1	-.065	1	.106	2
		min	1.332	2	-.078	2	-.106	2	.065	1
	3	max	1.424	1	-.048	1	-.129	1	.212	2
		min	1.332	2	-.078	2	-.212	2	.129	1
	4	max	1.424	1	-.048	1	-.194	1	.318	2
		min	1.332	2	-.078	2	-.318	2	.194	1

Envelope Member Section Forces

Member Label	Section		Axial (k)	Lc	Shear (k)	Lc	Moment (k)	Lc
M1	1	max	.034	1	.382	1	0	1
		min	.031	2	.358	2	0	1
	2	max	.004	1	.043	1	-.317	2
		min	.004	2	.041	2	-.338	1
	3	max	-.024	2	-.276	2	-.131	2
		min	-.026	1	-.296	1	-.138	1
	4	max	-.052	2	-.592	2	.601	1
		min	-.056	1	-.634	1	.559	2
M2	1	max	.085	2	.636	1	.61	1
		min	.076	1	.595	2	.573	2
	2	max	.057	2	.297	1	-.122	2

Envelope Member Section Forces, (continued)

Member Label	Section		Axial (k)	Lc	Shear (k)	Lc	Moment (k)	Lc
		min	.046	1	.278	2	-.132	1
	3	max	.029	2	-.038	2	-.312	2
		min	.016	1	-.042	1	-.335	1
	4	max	.002	2	-.355	2	0	1
		min	-.013	1	-.38	1	0	1
M3	1	max	.288	1	.431	1	.191	1
		min	.286	2	.403	2	.181	2
	2	max	.258	2	.092	1	-.208	2
		min	.258	1	.087	2	-.224	1
	3	max	.231	2	-.23	2	-.094	2
		min	.229	1	-.247	1	-.101	1
	4	max	.203	2	-.547	2	.561	1
		min	.199	1	-.586	1	.523	2
M4	1	max	.042	1	.659	1	.62	1
		min	.038	2	.616	2	.58	2
	2	max	.017	1	.302	1	-.171	2
		min	.015	2	.282	2	-.183	1
	3	max	-.008	1	-.051	2	-.364	2
		min	-.009	2	-.055	1	-.389	1
	4	max	-.032	2	-.384	2	0	1
		min	-.033	1	-.411	1	0	1
M5	1	max	.218	1	.671	1	.355	1
		min	.203	2	.627	2	.332	2
	2	max	.218	1	.225	1	-.365	2
		min	.203	2	.21	2	-.391	1
	3	max	.218	1	-.207	2	-.368	2
		min	.203	2	-.222	1	-.394	1
	4	max	.218	1	-.623	2	.348	1
		min	.203	2	-.669	1	.324	2
M6	1	max	.669	1	.218	1	0	1
		min	.623	2	.203	2	0	1
	2	max	.669	1	.218	1	-.108	2
		min	.623	2	.203	2	-.116	1
	3	max	.669	1	.218	1	-.216	2
		min	.623	2	.203	2	-.232	1
	4	max	.669	1	.218	1	-.324	2
		min	.623	2	.203	2	-.348	1
M7	1	max	1.084	1	-.208	2	0	1
		min	1.012	2	-.222	1	0	1
	2	max	1.084	1	-.208	2	.118	1
		min	1.012	2	-.222	1	.111	2
	3	max	1.084	1	-.208	2	.237	1
		min	1.012	2	-.222	1	.222	2
	4	max	1.084	1	-.208	2	.355	1
		min	1.012	2	-.222	1	.332	2
M8	1	max	1.226	1	-.045	2	0	1
		min	1.144	2	-.047	1	0	1
	2	max	1.226	1	-.045	2	.019	1
		min	1.144	2	-.047	1	.019	2
	3	max	1.226	1	-.045	2	.039	1
		min	1.144	2	-.047	1	.038	2
	4	max	1.226	1	-.045	2	.058	1
		min	1.144	2	-.047	1	.056	2

Envelope Member Section Forces, (continued)

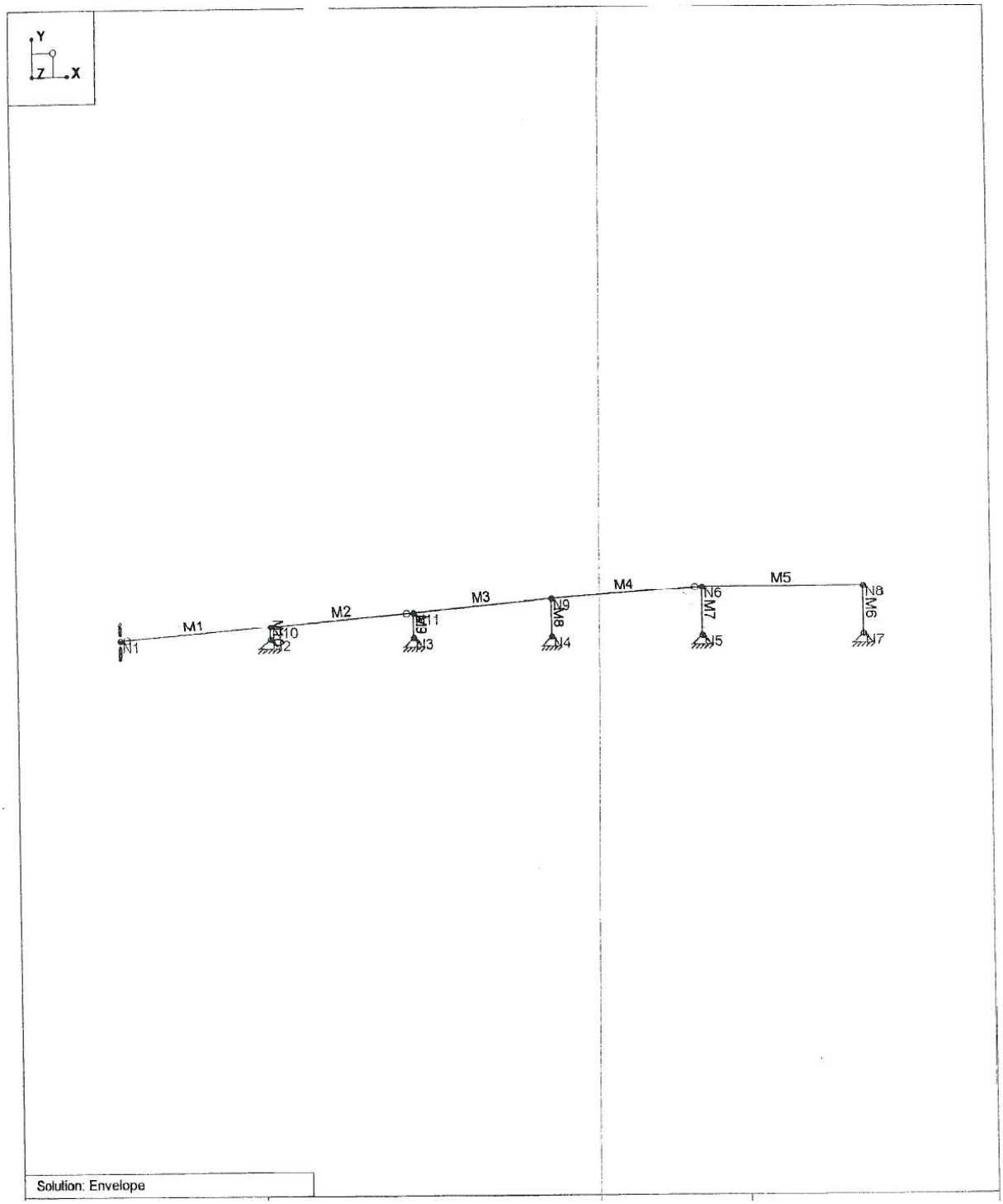
Member Label	Section		Axial (k)	Lc	Shear (k)	Lc	Moment (k)	Lc
M9	1	max	.834	1	-.217	2	0	1
		min	.78	2	-.229	1	0	1
	2	max	.834	1	-.217	2	.064	1
		min	.78	2	-.229	1	.06	2
	3	max	.834	1	-.217	2	.127	1
		min	.78	2	-.229	1	.121	2
	4	max	.834	1	-.217	2	.191	1
		min	.78	2	-.229	1	.181	2
M10	1	max	1.277	1	-.02	1	0	1
		min	1.195	2	-.033	2	0	1
	2	max	1.277	1	-.02	1	.005	2
		min	1.195	2	-.033	2	.003	1
	3	max	1.277	1	-.02	1	.009	2
		min	1.195	2	-.033	2	.006	1
	4	max	1.277	1	-.02	1	.014	2
		min	1.195	2	-.033	2	.008	1

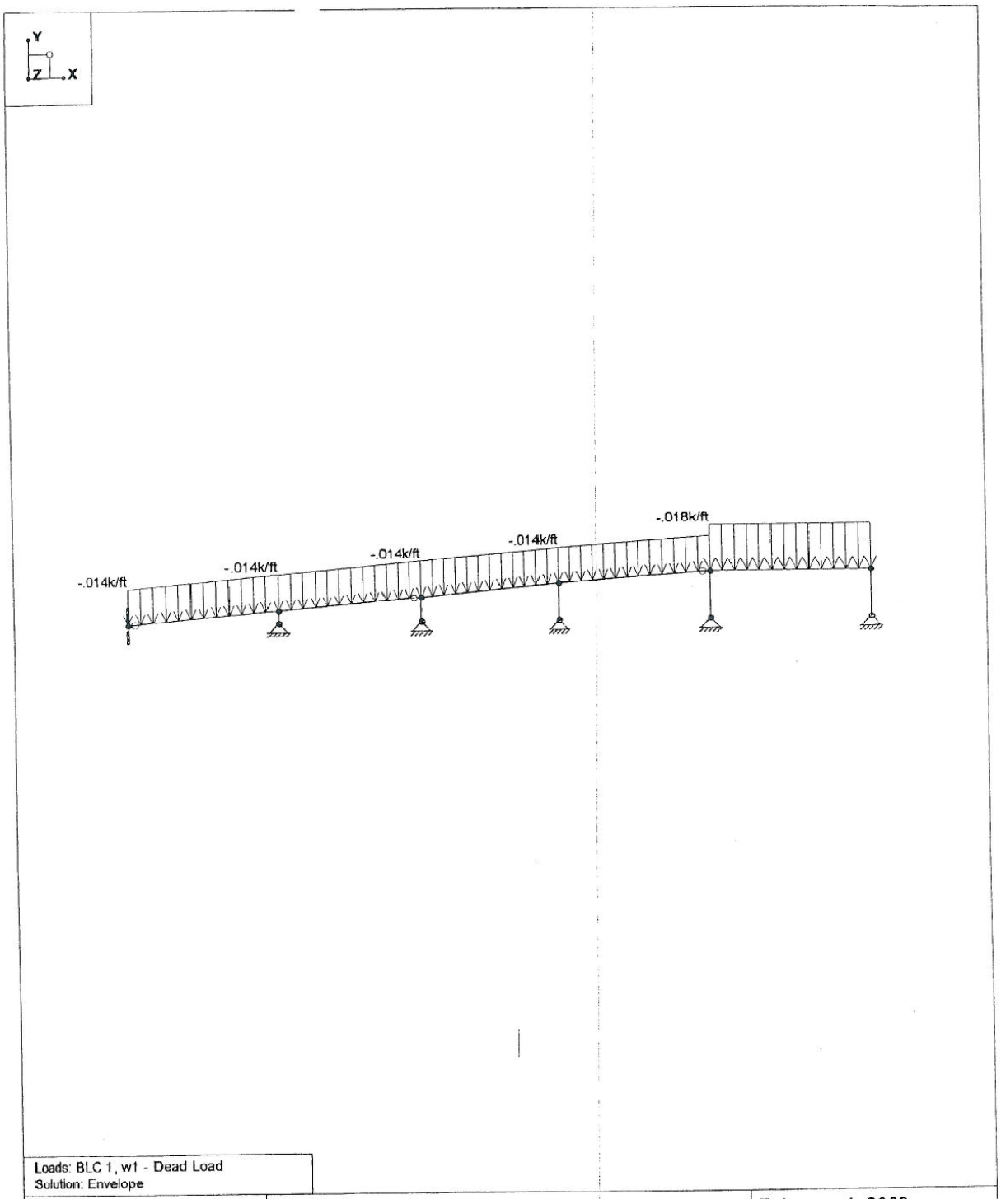
Envelope Member Deflections

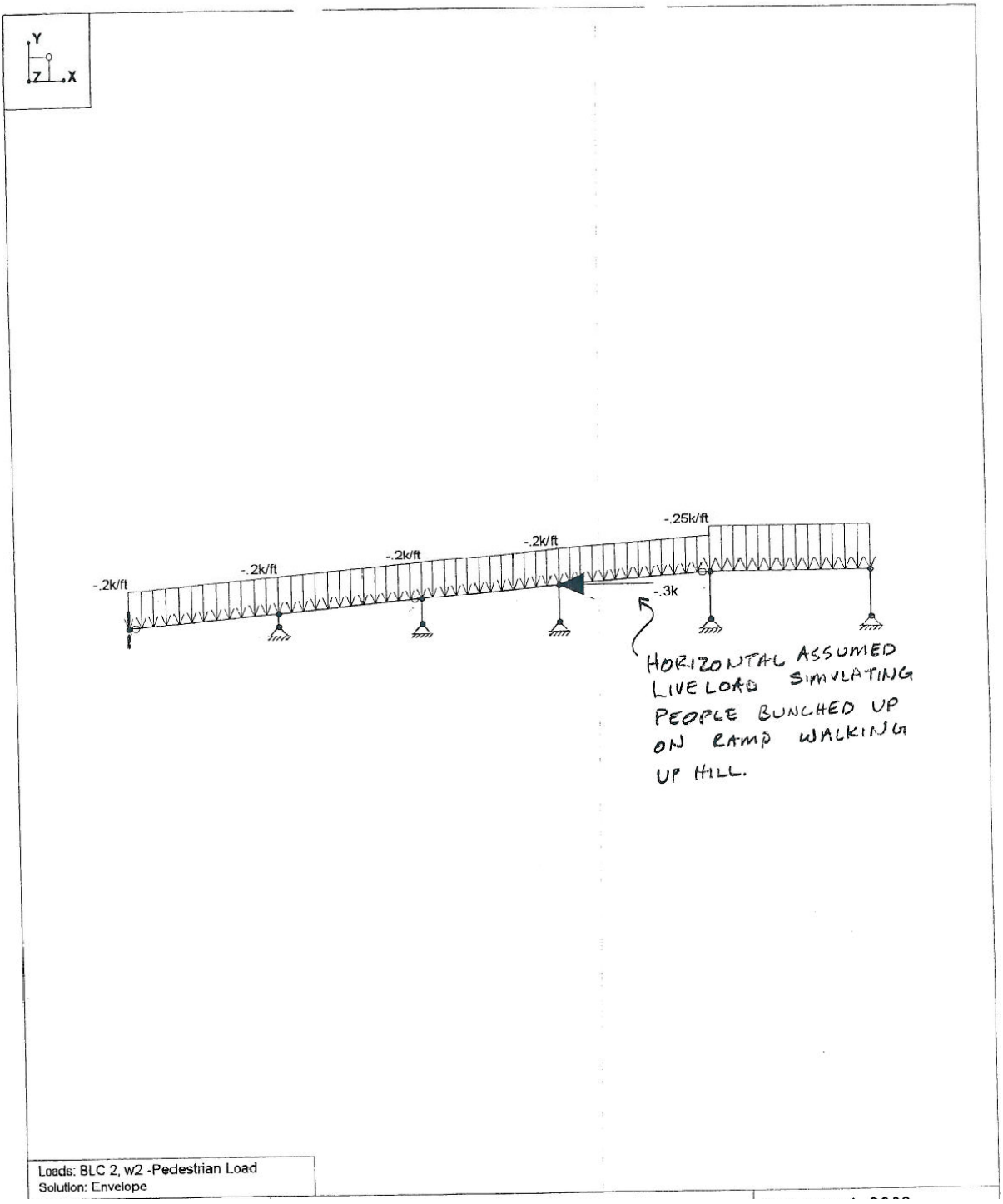
Member Label	Section		x-Translate (in)	Lc	y-Translate (in)	Lc	(n) L/y Ratio	Lc
M1	1	max	0	1	0	2	NC	
		min	0	2	0	1	NC	
	2	max	0	1	-.046	2	1243.875	2
		min	0	2	-.049	1	1169.664	1
	3	max	0	1	-.033	2	1756.299	2
		min	0	2	-.035	1	1659.338	1
	4	max	0	1	0	2	NC	
		min	0	2	0	1	NC	
M2	1	max	0	1	0	2	NC	
		min	0	2	0	1	NC	
	2	max	0	1	-.032	2	1848.986	2
		min	0	2	-.034	1	1708.638	1
	3	max	0	1	-.045	2	1280.237	2
		min	0	2	-.049	1	1189.011	1
	4	max	0	1	0	2	NC	
		min	0	2	0	1	NC	
M3	1	max	0	1	0	2	NC	
		min	0	2	0	1	NC	
	2	max	0	1	-.029	2	2063.401	2
		min	-.001	2	-.031	1	1919.616	1
	3	max	-.001	1	-.021	2	2931.998	2
		min	-.002	2	-.022	1	2735.504	1
	4	max	-.002	1	-.002	2	NC	
		min	-.002	2	-.002	1	NC	
M4	1	max	-.002	1	-.002	2	NC	
		min	-.002	2	-.002	1	NC	
	2	max	-.002	1	-.047	2	1336.222	2
		min	-.002	2	-.05	1	1247.236	1
	3	max	-.002	1	-.062	2	996.057	2
		min	-.002	2	-.067	1	930.197	1
	4	max	-.002	1	-.002	2	NC	
		min	-.002	2	-.002	1	NC	

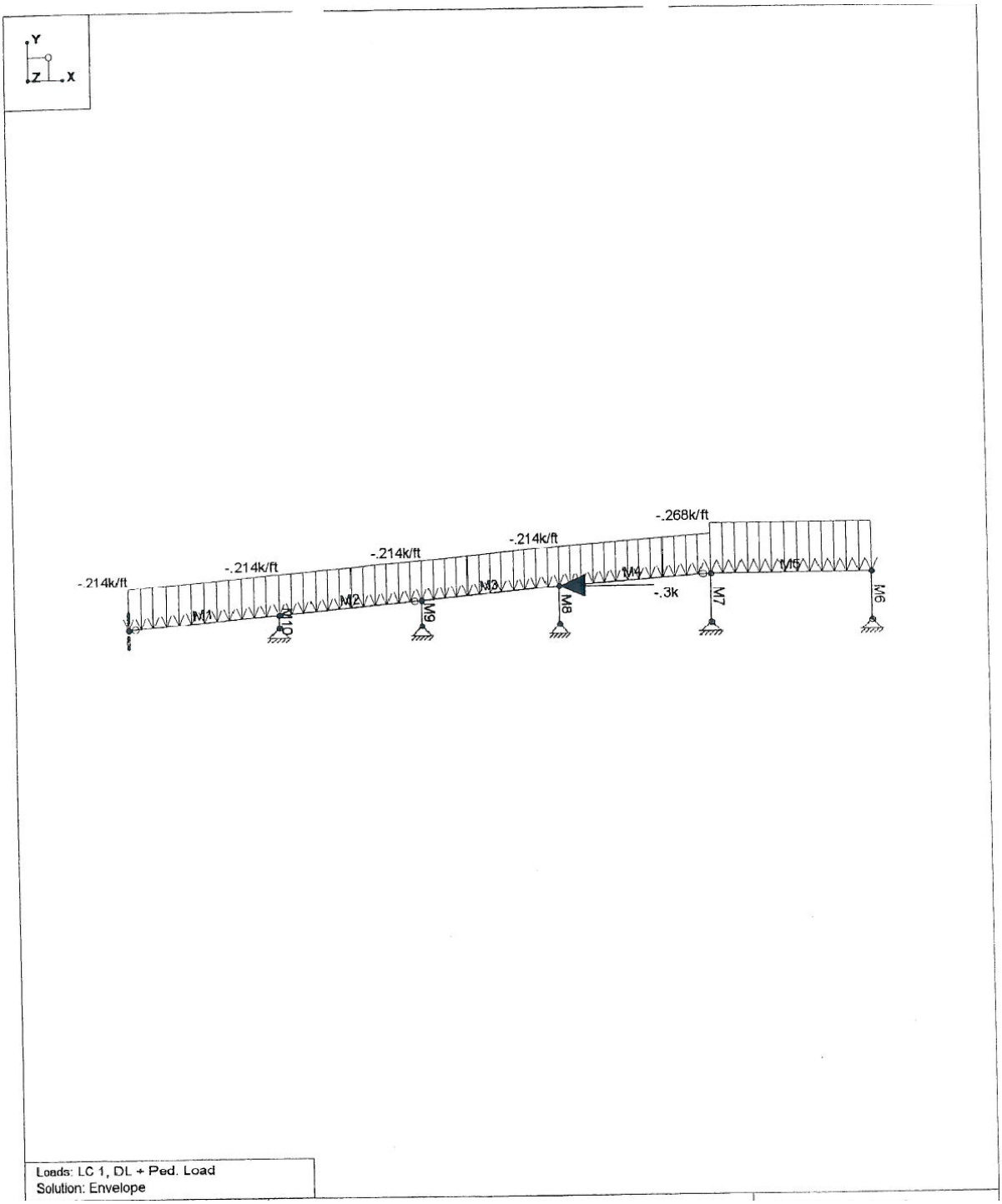
Envelope Member Deflections, (continued)

Member Label	Section		x-Translate (in)	Lc	y-Translate (in)	Lc	(n) L/y Ratio	Lc
M5	1	max	-.001	1	-.002	2	NC	
		min	-.002	2	-.002	1	NC	
	2	max	-.002	1	-.109	2	559.623	2
		min	-.002	2	-.117	1	521.856	1
	3	max	-.002	1	-.109	2	557.976	2
		min	-.002	2	-.117	1	520.674	1
	4	max	-.002	1	-.001	2	NC	
		min	-.003	2	-.001	1	NC	
M6	1	max	0	1	0	1	NC	
		min	0	1	0	1	NC	
	2	max	0	2	-.013	2	1392.207	2
		min	0	1	-.014	1	1294.941	1
	3	max	0	2	-.016	2	1113.766	2
		min	0	1	-.017	1	1035.953	1
	4	max	-.001	2	.003	2	NC	
		min	-.001	1	.002	1	NC	
M7	1	max	0	1	0	1	NC	
		min	0	1	0	1	NC	
	2	max	0	2	.016	1	1270.353	1
		min	0	1	.015	2	1357.948	2
	3	max	-.001	2	.02	1	1016.282	1
		min	-.002	1	.019	2	1086.359	2
	4	max	-.002	2	.002	2	NC	
		min	-.002	1	.001	1	NC	
M8	1	max	0	1	0	1	NC	
		min	0	1	0	1	NC	
	2	max	0	2	.002	2	NC	
		min	0	1	.002	1	9920.451	1
	3	max	-.001	2	.003	2	8189.633	2
		min	-.001	1	.003	1	7936.361	1
	4	max	-.002	2	.002	2	NC	
		min	-.002	1	.001	1	NC	
M9	1	max	0	1	0	1	NC	
		min	0	1	0	1	NC	
	2	max	0	2	.002	1	4529.485	1
		min	0	1	.002	2	4784.344	2
	3	max	0	2	.003	2	3827.475	2
		min	0	1	.003	1	3623.588	1
	4	max	0	2	0	2	NC	
		min	0	1	0	1	NC	
M10	1	max	0	1	0	1	NC	
		min	0	1	0	1	NC	
	2	max	0	2	0	2	NC	
		min	0	1	0	1	NC	
	3	max	0	2	0	2	NC	
		min	0	1	0	1	NC	
	4	max	0	2	0	2	NC	
		min	0	1	0	1	NC	





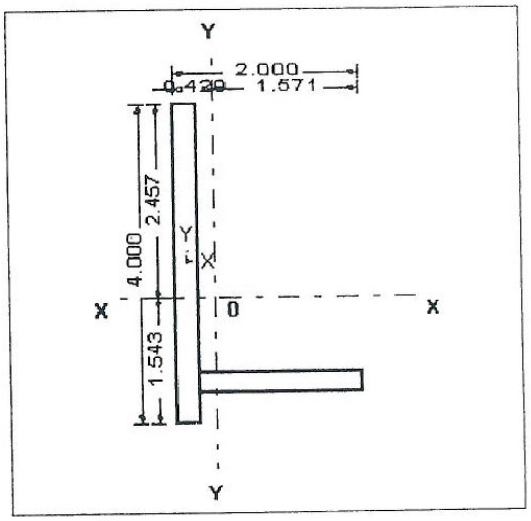




Section:Welcome Ramp

Section Properties:

Number of Shapes	= 2	
Total Width	= 2.00	in
Total Height	= 4.00	in
Center, Xo	= 0.304	in
Center, Yo	= -0.457	in
X-bar (Right)	= 1.571	in
X-bar (Left)	= 0.429	in
Y-bar (Top)	= 2.457	in
Y-bar (Bot)	= 1.543	in
Equivalent Properties:		
Area, Ax	= 1.438	in^2
Inertia, Ixx	= 2.02	in^4
Inertia, Iyy	= 0.4212	in^4
Inertia, Ixy	= -0.4565	in^4
Torsional, J	= 0.0299	in^4
Modulus, Sx(Top)	= 0.8225	in^3
Modulus, Sx(Bot)	= 1.309	in^3
Modulus, Sy(Left)	= 0.981	in^3
Modulus, Sy(Right)	= 0.2682	in^3
Plastic Modulus, Zx	= 1.4921	in^3
Plastic Modulus, Zy	= 0.4852	in^3
Radius, rx	= 1.186	in
Radius, ry	= 0.541	in



Section Diagram

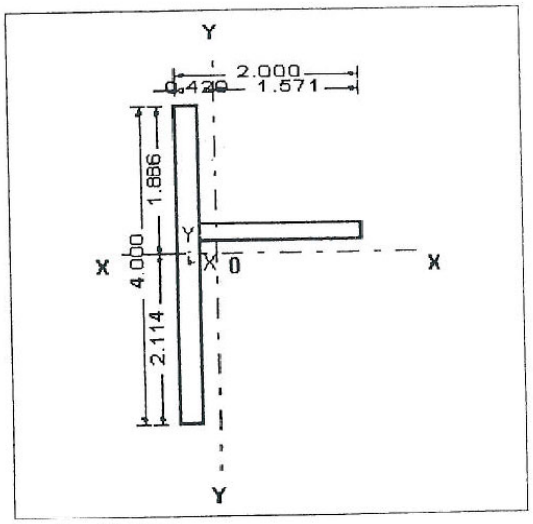
Summary of Section Properties

Sh. No.	Section	Width in	Height in	Xo in	Yo in	Ax in^2	Ixx in^4	Iyy in^4
1	Welcome Ramp	2.00	4.00	0.304	-0.457	1.438	2.02	0.4212

Section:Welcome Deck

Section Properties:

Number of Shapes	= 2	
Total Width	= 2.00	in
Total Height	= 4.00	in
Center, Xo	= 0.304	in
Center, Yo	= 0.114	in
X-bar (Right)	= 1.571	in
X-bar (Left)	= 0.429	in
Y-bar (Top)	= 1.886	in
Y-bar (Bot)	= 2.114	in
Equivalent Properties:		
Area, Ax	= 1.438	in^2
Inertia, Ixx	= 1.378	in^4
Inertia, Iyy	= 0.4212	in^4
Inertia, Ixy	= 0.1141	in^4
Torsional, J	= 0.0299	in^4
Modulus, Sx(Top)	= 0.7309	in^3
Modulus, Sx(Bot)	= 0.652	in^3
Modulus, Sy(Left)	= 0.981	in^3
Modulus, Sy(Right)	= 0.2682	in^3
Plastic Modulus, Zx	= 1.0532	in^3
Plastic Modulus, Zy	= 0.4852	in^3
Radius, rx	= 0.9792	in
Radius, ry	= 0.5413	in



Section Diagram

Summary of Section Properties

Sh. No.	Section	Width in	Height in	Xo in	Yo in	Ax in^2	Ixx in^4	Iyy in^4
1	Welcome Deck	2.00	4.00	0.304	0.114	1.438	1.378	0.4212

Member Stress Results

Access the **Member Section Stresses** spreadsheet by selecting the **Results** menu and then selecting **Members Stresses**.

These are the member stresses calculated along each active member. The number of sections for which stresses are reported is controlled by the **Number Of Sections** specified on the Global window. The actual number of segments is this **Number Of Sections** minus 1. The incremental length of each segment is the same. For example, if you specify 5 sections, the member is divided into 4 equal pieces, and the stresses are reported for each piece.

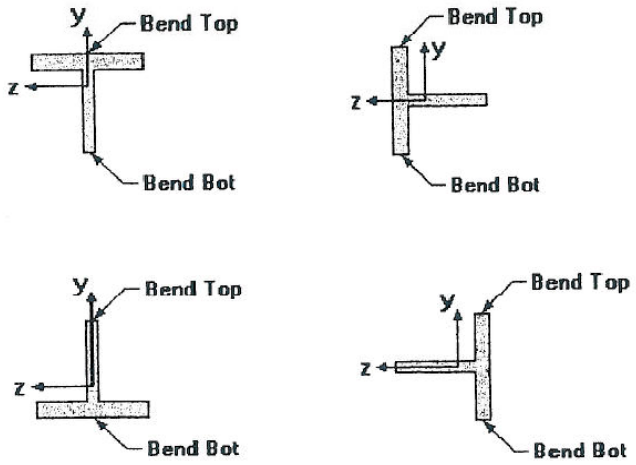
There will be four stress values listed for each section location along the member taking into account any member offsets. The units for the stresses are shown at the top of each column. As for the sign convention, the signs of these results correspond to the signs of the forces. These line up as positive or negative according to the member local axis directions.

The axial stress is the ratio P/A, where P is the section axial force. A positive stress is compressive, since the sign of the stress follows the sign of the force.

The shear stress is calculated as V/S.A., where S.A. is the effective shear area. For members not defined with a section set a value of 1.2 is used for the shear area coefficient S.A.

The bending stresses are calculated using the familiar equation M * c / I, where "M" is the bending moment, "c" is the distance from the neutral axis to the extreme fiber and "I" is the moment of inertia. The stress for the section's extreme edge is listed with respect to the positive and negative directions of the local y and z axes. A positive stress is compressive and a negative stress is tensile.

Some shapes are not symmetrical about both local axes. For example Tee and Channel shapes. Thus the stress at the positive and negative edges may not be the same. The locations for the calculated stresses are illustrated in this diagram:



So, the y-top location is the extreme fiber of the shape in the positive local y direction, y-bot is the extreme fiber in the negative local y direction, etc. The y-top,bot stresses are calculated using Mz.

For enveloped results the maximum and minimum value at each location is listed. The load combination producing the maximum or minimum is also listed, in the "lc" column. To include a particular Load Combination in the envelope analysis, open the **Load Combinations** spreadsheet and check the box in the "Env" column.

Note

- A special case is bending stress calculations for single angles. The bending stresses for single angles are reported for bending about the principal axes.
- To view the results for a particular member, use the Find option. To view the maximums and minimums, use the Sort option.

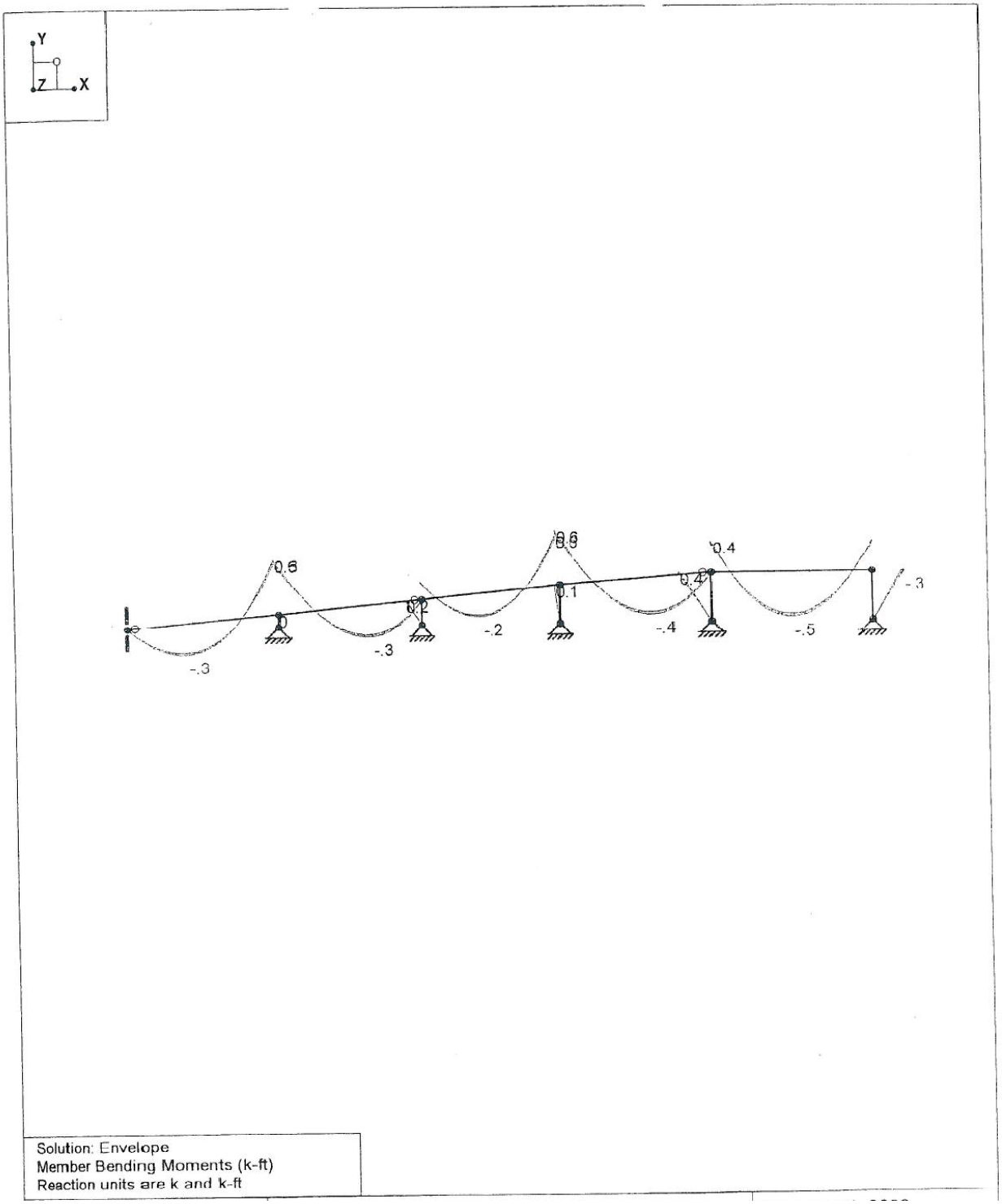


TABLE 20-II-A—MINIMUM MECHANICAL PROPERTIES FOR ALUMINUM ALLOYS—(Continued)
Values Are Given in Units of ksi (1,000 lb/in²)

ALLOY AND TEMPER	PRODUCT[1]	THICKNESS RANGE[1] (inch)	TENSION F_{tu}[2] ksi	TENSION F_{ty}[2] ksi	COMPRESSION F_{cy} ksi	SHEAR F_{su} ksi	SHEAR F_{sy} ksi	BEARING F_{bu} ksi	BEARING F_{by} ksi	COMPRESSIVE MODULUS OF ELASTICITY[3] E ksi
		× 25.4 for mm	× 6.89 for MPa							
5086-H111	Extrusions	up to 0.500	36	21	18	21	12	70	36	10,400
-H111	Extrusions	0.501 and over	36	21	18	21	12	70	34	10,400
-H112	Plate	0.250-0.499	36	18	17	22	10	72	31	10,400
-H112	Plate	0.500-1.000	35	16	16	21	9	70	28	10,400
-H112	Plate	1.001-2.000	35	14	15	21	8	70	28	10,400
-H112	Plate	2.001-3.000	34	14	15	21	8	68	28	10,400
-H32	Sheet and plate	All	40	28	26	24	16	78	48	10,400
-H34	Drawn tube.	All	44	34	32	26	20	84	58	10,400
5154-H38	Sheet	0.006-0.128	45	35	33	24	20	81	56	10,300
5454-H111	Extrusions	up to 0.500	33	19	16	20	11	64	32	10,400
-H111	Extrusions	0.501 and over	33	19	16	19	11	64	30	10,400
-H112	Extrusions	up to 5.000	31	12	13	19	7	62	24	10,400
-H32	Sheet and plate	0.020-2.000	36	26	24	21	15	70	44	10,400
-H34	Sheet and plate	0.020-1.000	39	29	27	23	17	74	49	10,400
5456-H111	Extrusions	up to 0.500	42	26	22	25	15	82	44	10,400
-H111	Extrusions	0.501 and over	42	26	22	24	15	82	42	10,400
-H112	Extrusions	up to 5.000	41	19	20	24	11	82	38	10,400
-H321	Sheet and plate	0.188-1.250	46	33	27	27	19	87	56	10,400
-H321	Plate	1.251-1.500	44	31	25	25	18	84	53	10,400
-H321	Plate	1.501-3.000	41	29	25	25	17	82	49	10,400
-H323	Sheet	0.051-0.249	48	36	34	28	21	94	61	10,400
-H343	Sheet	0.051-0.249	53	41	39	31	24	101	70	10,400
6005-T5	Extrusions	up to 0.500	38	35	35	24	20	80	56	10,100
6061-T6, -T651	Sheet and plate	0.010-4.000	42	35	35	27	20	88	58	10,100
-T6, -T6510[1]	Extrusions	up to 3.000	38	35	35	24	20	80	56	10,100
-T6, -T651	Rolled rod and bar	up to 8.000	42	35	35	27	20	88	56	10,100
-T6	Drawn tube	0.025-0.500	42	35	35	27	20	88	56	10,100
-T6	Pipe	up to 0.999	42	35	35	27	20	88	56	10,100
-T6	Pipe	over 0.999	38	35	35	24	20	80	56	10,100
6063-T5	Extrusions	up to 0.500	22	16	16	13	9	46	26	10,100
-T5	Extrusions	over 0.500	21	15	15	12	8.5	44	24	10,100
-T6	Extrusions	All	30	25	25	19	14	63	40	10,100
	Pipe									
6351-T5	Extrusions	up to 1.00	38	35	35	24	20	80	56	10,100

MAIN RAILS

HAND RAILS

[1]Values also apply to -T6511 temper.
[2]F_{tu} and F_{ty} are minimum specified values (except for Alclad 3004-H14, -H16 and F_{ty} for Alclad 3003-H18). Other strength properties are corresponding minimum expected values.
[3]For deflection calculations an average modulus of elasticity is used; numerically this is 100 ksi (689 MPa) lower than the values in this column.

TABLE 20-II-B—MINIMUM MECHANICAL PROPERTIES FOR WELDED ALUMINUM ALLOYS[1]
(Gas Tungsten Arc or Gas Metal Arc Welding with No Postweld Heat Treatment)

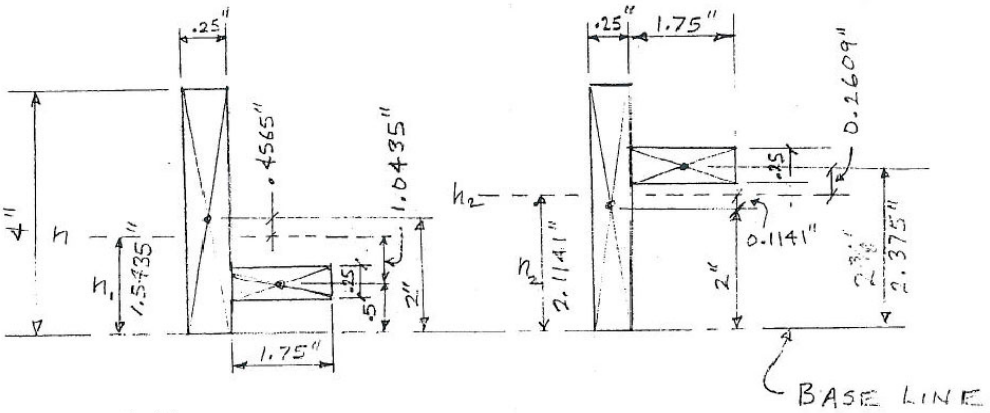
ALLOY AND TEMPER	PRODUCT AND THICKNESS RANGE (inch)	TENSION F_{tuw}[1] ksi	TENSION F_{tyw}[2] ksi	COMPRESSION F_{cyw}[2] ksi	SHEAR F_{suw} ksi	SHEAR F_{syw} ksi	BEARING F_{buw} ksi	BEARING F_{byw} ksi
	× 25.4 for mm	× 6.89 for MPa						
1100-H12, -H14	All	11	4.5	4.5	8	2.5	23	8
3003-H12, -H14, -H16, -H18	All	14	7	7	10	4	30	12
Alclad 3003-H12, -H14, -H16, -H18	All	13	6	6	10	3.5	30	11
3004-H32, -H34, -H36	All	22	11	11	14	6.5	46	20
Alclad 3004-H32, -H34, -H14, -H16	All	21	11	11	13	6.5	44	19
3005-H25	Sheet 0.013-0.050	17	9	9	12	5	36	15
5005-H12, -H14, -H32, -H34	All	14	7	7	9	4	28	10

F_{byw} = bearing yield strength within 1.0 inch (25.4 mm) of a weld, ksi (MPa).
F_c = allowable compressive stress, ksi (MPa).
F_{cy} = compressive yield strength, ksi (MPa).
F_{cyw} = compressive yield strength across a butt weld (0.2 percent offset in 10-inch (254 mm) gage length), ksi (MPa).
F_{ec} = $\pi^2E/[n_u(l/r)^2]$, where l/r is slenderness ratio for member considered as a column tending to fail in the plane of the applied bending moments, ksi (MPa).
F_n = allowable stress for cross section 1.0 inch (25.4 mm) or more from weld, ksi (MPa).
F_{pw} = allowable stress on cross section, part of whose area lies within 1.0 (25.4 mm) inch of a weld, ksi (MPa).
F_s = allowable shear stress for members subjected only to torsion or shear, ksi (MPa).
F_{su} = shear ultimate strength, ksi (MPa).
F_{suw} = shear ultimate strength within 1.0 inch (25.4 mm) of a weld, ksi (MPa).
F_{sy} = shear yield strength, ksi (MPa).
F_{syw} = shear yield strength within 1.0 inch (25.4 mm) of a weld, ksi (MPa).
F_{tu} = tensile ultimate strength, ksi (MPa).
F_{tuw} = tensile ultimate strength across a butt weld, ksi (MPa).
F_{ty} = tensile yield strength, ksi (MPa).
F_{tyw} = tensile yield strength across a butt weld [0.2 percent offset in 10-inch (254 mm) gage length], ksi (MPa).
F_y = either F_{ty} or F_{cy}, whichever is smaller, ksi (MPa).
f = calculated stress, ksi (MPa).
f_a = average compressive stress on cross section of member produced by axial compressive load, ksi (MPa).
f_b = maximum bending stress (compressive) caused by transverse loads or end moments, ksi (MPa).
f_s = shear stress caused by torsion or transverse shear, ksi (MPa).
G = modulus of elasticity in shear, ksi (MPa).
g = spacing of rivet or bolt holes perpendicular to direction of load, inches (mm).
h = clear height of shear web, inches (mm).
I = moment of inertia, inches^4 (mm^4).
I_h = moment of inertia of horizontal stiffener, inches^4 (mm^4).
I_s = moment of inertia of transverse stiffener to resist shear buckling, inches^4 (mm^4).
I_x = moment of inertia of a beam about axis perpendicular to web, inches^4 (mm^4).
I_y = moment of inertia of a beam about axis parallel to web, inches^4 (mm^4).
I_{yc} = moment of inertia of compression element about axis parallel to vertical web, inches^4 (mm^4).
J = torsion constant, inches^4 (mm^4).
k_1 = coefficient for determining slenderness limit S_2 for sections for which the allowable compressive stress is based on crippling strength.
k_2 = coefficient for determining allowable compressive stress in sections with slenderness ratio above S_2 for which the allowable compressive stress is based on crippling strength.
k_c = coefficient for compression members.
k_t = coefficient for tension members.
L = length of compression member between points of lateral support, or twice the length of a cantilever column (except where analysis shows that a shorter length can be used), inches (mm).

L_b = length of beam between points at which the compression flange is sup al movement, or length of cantilever beam from free end to point at sion flange is supported against lateral movement, inches (mm).
L_h = total length of portion of column lying within 1.0 inch (25.4 mm) o welds at ends of columns that are supported at both ends), inches (m
L_w = increased length to be substituted in column formula to determine welded column, inches (mm).
l/r = slenderness ratio for columns.
M = bending moment, inch-kips (kN·m).
M_c = bending moment at center of span resulting from applied bendin (kN·m).
M_m = maximum bending moment in span resulting from applied bendin (kN·m).
M_1, M_2 = bending moments at two ends of a beam, inch-kips (kN·m).
N = length of bearing at reaction or concentrated load, inches (mm).
n_a = factor of safety on appearance of buckling.
n_u = factor of safety on ultimate strength.
n_y = factor of safety on yield strength.
P = local load concentration on bearing stiffener, kips (kN).
P_c = allowable reaction or concentrated load per web, kips (kN).
P_t = allowable tensile load per fastener, sheet to purlin or girt, kips (kN).
R = outside radius of round tube or maximum outside radius for an oval t
R_b = radius of curvature of tubular members, inches (mm).
R_t = transition radius, the radius of an attachment of the weld detail.
r = least radius of gyration of a column, inches (mm).
r_L = radius of gyration of lip or bulb about face of flange from which lip proj
r_y = radius of gyration of a beam (about axis parallel to web), inches (mm). (unsymmetrical about the horizontal axis, r_y should be calculated as th were the same as the compression flange.)
S_c = section modulus of a beam, compression side, inches^3 (mm^3).
SR = stress ratio, the ratio of minimum stress to maximum stress.
S_t = section modulus of a beam, tension side, inches^3 (mm^3).
S_1, S_2 = slenderness limits.
s = spacing of transverse stiffeners (clear distance between stiffeners for sti of a pair of members, one on each side of the web, center-to-center distar eners consisting of a member on one side of the web only), inches (mm or bolt holes parallel to direction of load, inches (mm).
t = thickness of flange, plate, web or tube, inches (mm). (For tapered flange thickness.)
V = shear force on web at stiffener location, kips (kN).
α = a factor equal to unity for a stiffener consisting of equal members on bot and equal to 3.5 for a stiffener consisting of a member on one side onl
θ = angle between plane of web and plane of bearing surface ($\theta \le 90$), deg

2001.4 Identification. Aluminum for structural elements shall at all times be seg wise handled in the fabricator's plant so that the separate alloys and tempers are

(1.) CALC. I_{xx} FOR TWO AL. SECTIONS.



$$h = \frac{\Sigma M}{\Sigma A}$$

$$h_1 = \frac{(2")(.25)(4.0) + (.5)(.25)(1.75)}{(.25)(4.0) + (.25)(1.75)} = \frac{2.2188}{1.4375} = 1.5435"$$

$$h_2 = \frac{(2")(.25)(4.0) + (2.375)(.25)(1.75)}{(.25)(4.0) + (.25)(1.75)} = \frac{3.0391}{1.4375} = 2.1141"$$

$$I_1 = I + Ad^2 + I + Ad_n^2 = \frac{bd^3}{3} + bd(d_n^2) + \ldots.$$

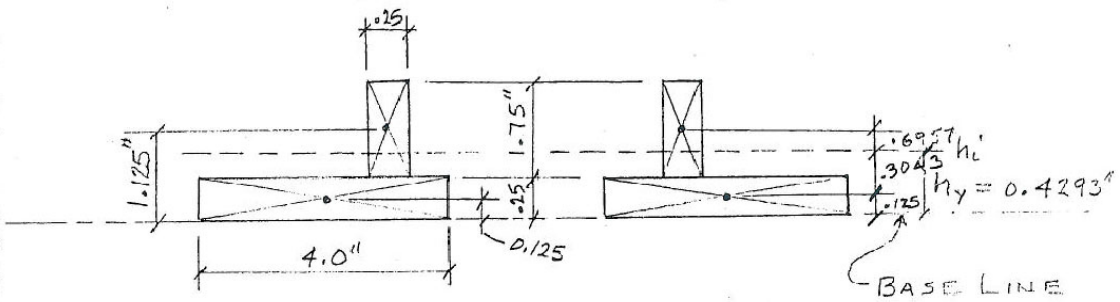
$$I_1 = \frac{.25(4)^3}{12} + .25(4)(.4565)^2 + \frac{1.75(.25)^3}{12} + 1.75(.25)(1.0435)^2$$

$$I_1 = 1.333 + 0.2084 + 0.0023 + 0.4764 = \underline{2.0201 \text{ in}^4}$$

$$I_2 = \frac{.25(4^3)}{12} + .25(4)(0.1141)^2 + \frac{1.75(.25)^3}{12} + 1.75(.25)(0.2609)^2$$

$$I_2 = 1.333 + 0.0130 + 0.0023 + 0.0298 = \underline{1.3784 \text{ in}^4}$$

(2.) CALC. I_{yy} FOR TWO AL. SECTIONS.



$$n = \frac{\Sigma M}{\Sigma A} \qquad I_1 = I_y$$

$$h_y = \frac{(0.125)(0.25)(4.0) + (1.125)(.25)(1.75)}{.25(4.0) + .25(1.75)} = 0.4293"$$

$$I_1 = I + Ad^2 + I + Ad^2 = \frac{bd^3}{3} + bd(d_h^2) + \ldots\ldots$$

$$I_1 = \frac{4.0(.25)^3}{12} + 4.0(.25)(0.3043)^2 + \frac{.25(1.75)^3}{12} + .25(1.75)(.6957)^2$$

$$I_1 = 0.0052 + 0.0926 + 0.1117 + 0.2117 = \underline{\underline{0.4212\ in^4}}$$

(3.) CALC. RAMP: (USING RISA-2D)

$A_{1\&2} = .25(6) + 1.75(.75) = 1.9375 in^2$

$I_1 = 2.0201 in^4$

$I_2 = 1.3784 in^4$

I_1 = RAMP

I_2 = PLATFORM

6061-T6 AL, $F_y = 35^{KSI}$

DEAD LOAD = 7^{PSF}

LIVE LOAD = 100^{PSF}

PEDESTRIAN WALK = (UBC TABLE 16-A)

RAMP BEAM DL = $7(\frac{4}{2}) = 14^{PLF}$

RAMP BEAM LL = $100(\frac{4}{2}) = 200^{PLF}$

PLATFORM DL = $7(\frac{5}{2}) = 17.5^{PLF}$

PLATFORM LL = $100(\frac{5}{2}) = 250^{PLF}$

WELCOME RAMP, INC.

STRUCTURAL ANALYSIS

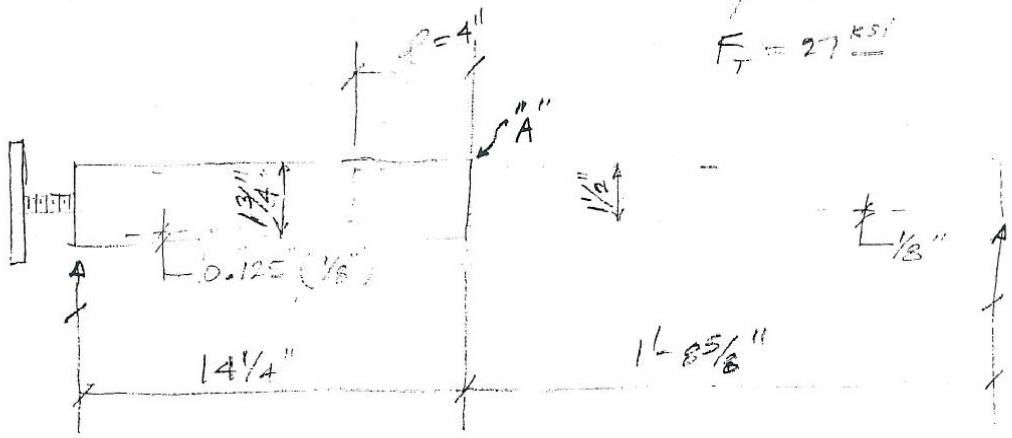
Adjustable Leg Design

425-754-4108
(client)

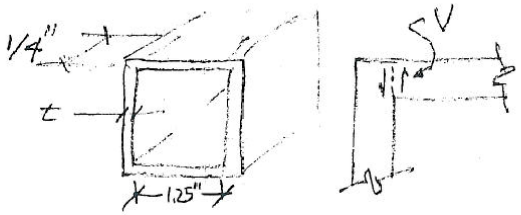
ASSUME:
6063-T5 Al (ASTM B 221)

$F_y = 21^{ksi}$

$F_T = 27^{ksi}$



(1.) Check Point "A" For Max. V of Wall:
Assume 1/4" Bearing
In Shear = V
(Ignore Bending of 1/4" Sect.)
$t = 0.125"$



Assume 1st 1/4" of Shear = V

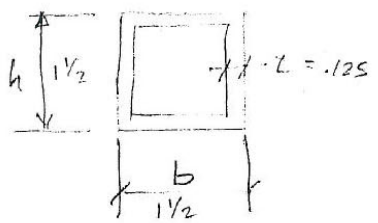
$F_T = 27^{ksi}$ ∴ $V = 3/4\ F_T = 20.25^{ksi}$ (Assumed)

$0.125"(0.25")(2\ sides)(20.25^{ksi}) = 1.2656^{k} = 1,265^{lb}$ Max.

(2.) Check Point "A" For Max. Bending of 1½"□.

$F_b = 2/3\ F_y = 2/3\ (21) = 14^{ksi}$

(2.) CONT.



$$S = \frac{bh^3}{6h} - \frac{bh^3}{6h} = \frac{1.5(1.5)^3 - 1.25(1.25)^3}{6(1.5)}$$

$$S = 0.2912\ in^3$$

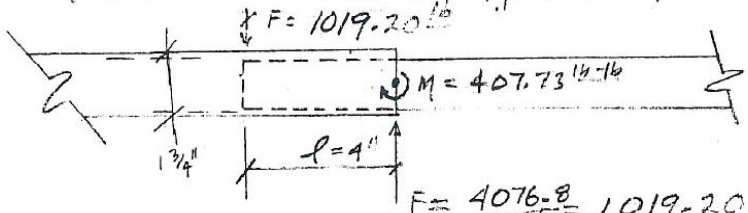
$$S = \frac{M_{MAX}}{F_b}$$

$$M_{MAX} = (.2912\ in^3)(14^{k}/_{in^2})(1000) = 4076.80^{in\text{-}lb}$$

∴ THE MAX. BENDING OF THE 1½" x 1½" = $4076.80^{in\text{-}lb}$

BUT THE ABILITY OF THE 1¾" x 1¾" at POINT "A" TO ACCEPT SHEAR IS 1,265 lb.

(3.) NEXT, CALC. MAX. FORCE APPLIED BY 1½" x 1½" & COMPAIR.



$$F = \frac{4076.8}{4"} = 1019.20^{lb}$$

∴ 1,019.20 lb < 1,265 lb ok !

THEREFOR, THE POST WILL FAIL IN BENDING PRIOR TO FAILING IN SHEAR AT POINT "A." ℓ = 4 IS THE MINIMUM ALLOWABLE LEG OVERLAP FOR ANY LEG OF THE PREVIOUS DESIGNS

WELCOME RAMP, INC.

STRUCTURAL ANALYSIS

Alternate 7-foot Landing Design

- INCLUDED IS THE NEW DESIGN FOR A 7' SECTION PLATFORM.

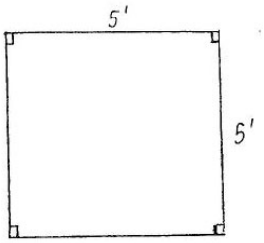
1) FOR A SINGLE POST AND DOUBLE ANGLE BEAM.
2) FOR A DOUBLE POST AND DOUBLE 8.5" BEAM CONFIGURATION.

- THIS CHECKS ONLY WHAT HAS BEEN CHANGED FOR THE 7'-0" PLATFORM. ASSUMES TREADS ARE SUPPORTED ON STAIRS TO SPAN 7'-0".

Summary

use current post IN center.
post will BE placed on a 16'X16' FOOTING.
New Double Angle For Beam section is a 4X2X3/16 Angle placed Back TO Back.

DESIGN OF 7' SECTION USING SINGLE POST IN CENTER OF NEW DOUBLE ANGLE BEAM.



Existing Design

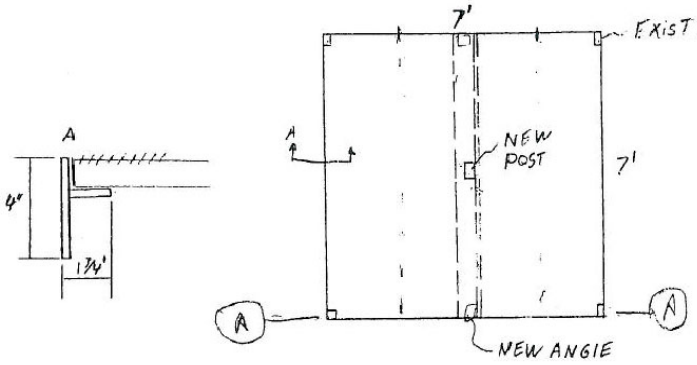
post Load Existing

TA= 2.5x2.5 = 6.25 FT²

100psf LL

7psf DL

service load per post: 669 lb



New Design

Existing POST New load

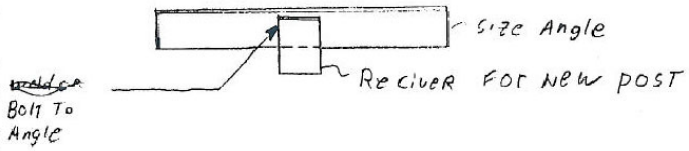
TA= 1.75 x 3.5 = 6.125 FT²

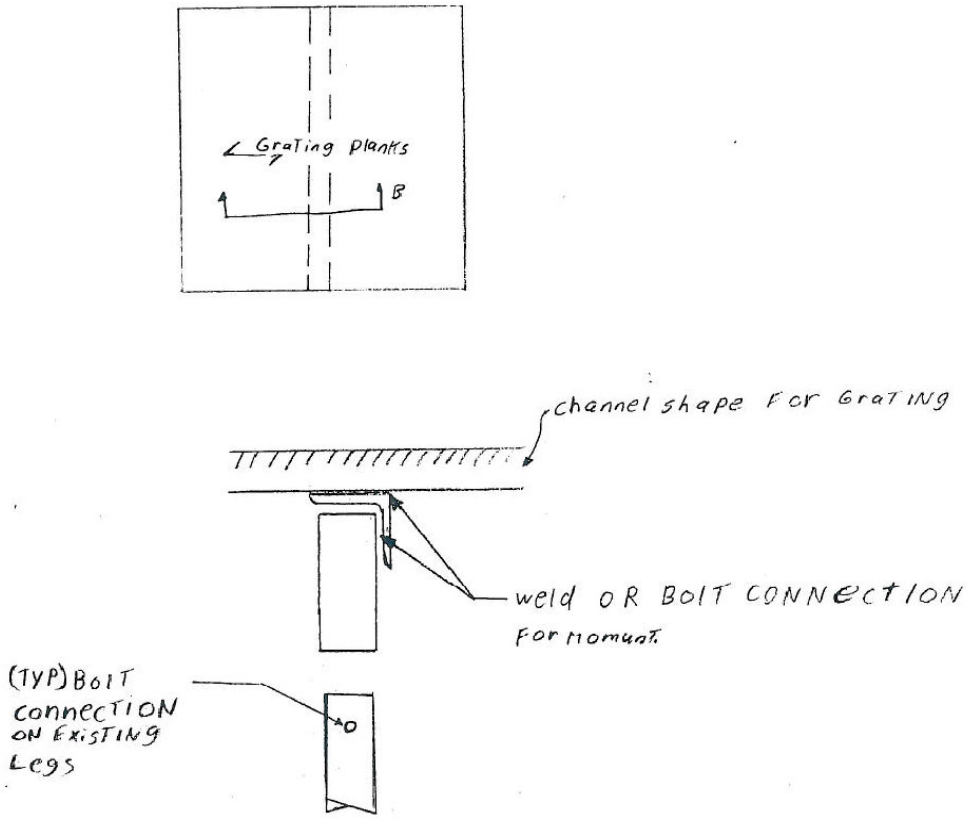
New post Load

TA= 3.5(7') = 24.5 FT²

Service Load: 262216 400% increase

Not Including Angle mbr wt.





Typical Post calculations.

TABLE 20-11-A pg 2-296
piping = 6061 - T6 Extrusions

Tension F_{tu} = 38 ksi F_{ty} = 35 ksi
compression F_{cy} = 35 ksi
shear = F_{su} = 24 ksi F_{sy} = 20 ksi
Bearing = F_{bu} = 80 ksi F_{by} = 56 ksi
E = 10,100 ksi

Square structural tubing pg 111 section 4
Leg material = 1½" sq x .12" AL. Tubing wt per ft = 0.252 lb/ft

ITEM 1. BUCKLING LOAD

For Buckling assuming 48" with NO Eccentricity

$F_{cr} = \frac{\pi^2 E}{(kL/r)^2}$ $r = \sqrt{I/A} = \sqrt{\frac{.2118}{.6624}} = .5655$ $k = 1$

$= \frac{\pi^2 (10,100\ ksi)}{\left(1 \cdot 48"/.5655\right)^2} = 13.84$ kips < 2622 lb service load

ITEM 2. AXIAL LOAD

AXIAL BEARING P/A_g = service Load = $\frac{2622}{.6624} = 3958$ psi

ITEM 3. BEARING.

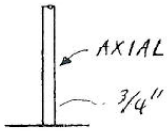
Allow comp = 35 ksi

Bolt Bearing - Alluminum will fail Befor Bolt Bearing

Tube Thickness = .12 in Bolt size = 3/8 = .375 F_{bu} = 80 ksi

$F_b = (.375)(.12)2 \times 80$ ksi = 7.2 kips < 2.6 H

ITEM 4. AXIAL Load on Rod AT BASE



Area = $\pi r^2 = \pi (.375^2) = .4418\ in^2$

$Load = \frac{2622\ lb}{.4418\ in^2} = 5934\ psi < Fcy = 35\ ksi$ OK

ITEM 5. Base PLATE Bering

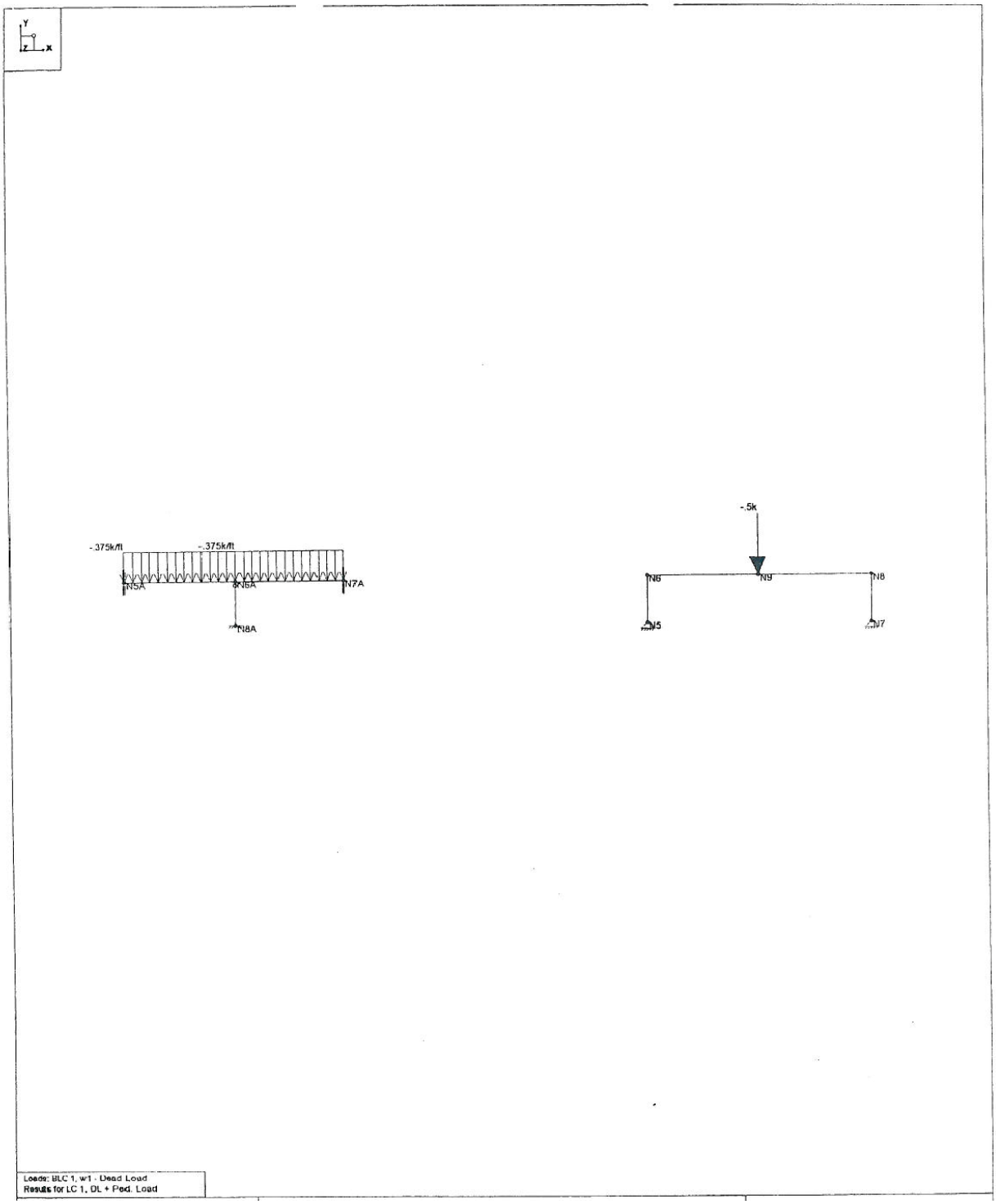
Base plate = 2'x2"

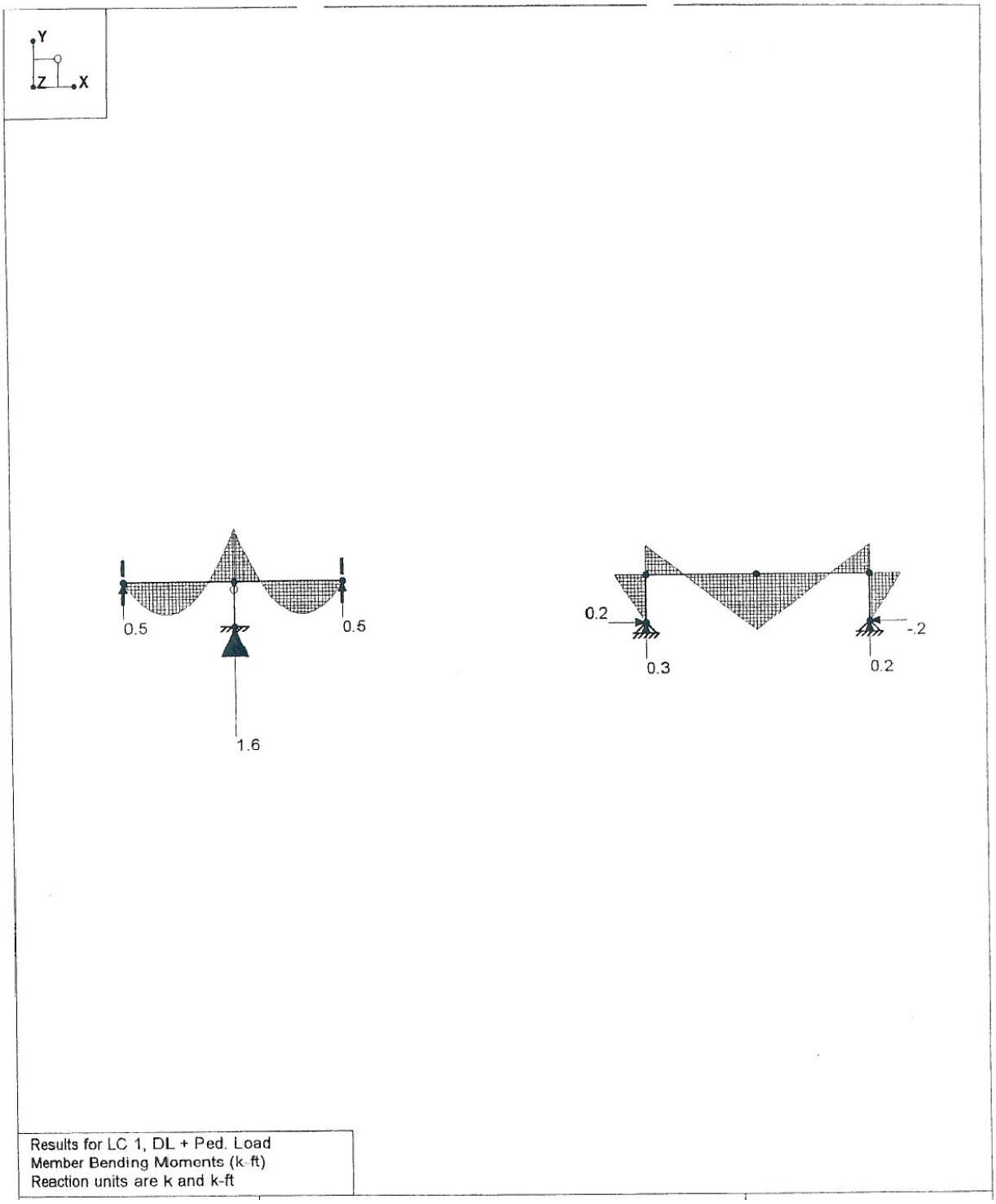
$\frac{2622\ lb}{4\ in^2} = 655\ psi$ NOT OK

allowable load = 4000 psf at FOOT or 27.7 psi

TRy a 16" Block = $1.78\ FT^2$

$4000\ psf\ (1.78\ FT^2) = 7111\ lb > 2622\ lb$ OK!





Member Data

Member Label	I Joint	J Joint	Rotate (degrees)	Shape / Section Set	Material Set	Phys Memb	End Releases		End Offsets		Inactive Code	Length (ft)
						TOM	I-End AVM	J-End AVM	I-End (in)	J-End (in)		
M1	N6	N9		SEC2	AL	Y						3.5
M2	N7	N8		SEC3	AL	Y						1.599
M3	N5	N6		SEC3	AL	Y						1.599
M4	N5A	N6A		SEC4	AL	Y						3.5
M5	N6A	N7A		SEC4	AL	Y						3.5
M6	N8A	N6A		SEC3	AL	Y		PIN				1.5
M7	N9	N8		SEC2	AL	Y						3.5

Sections

Section Label	Database Shape	Material Label	Area (in)^2	SA (0,180)	SA (90,270)	I (90,270) (in^4)	I (0,180) (in^4)	T/C Only
SEC1	Welcome Ramp	AL	1.438	1.2	1.2	.421	2.02	
SEC2	Welcome Deck	AL	1.438	1.2	1.2	.421	1.378	
SEC3	TU2X2X2	AL	.897	1.2	1.2	.513	.513	
SEC4	WT4X10.5	AL	3.08	1.2	1.2	4.89	3.9	

Member Deflections, By Combination

LC	Member Label	Section	x-Translation (in)	y-Translation (in)	(n) L/y Ratio
1	M1	1	0	0	NC
		2	0	-.086	3035.648
		3	0	-.174	1377.517
		4	0	-.214	NC
1	M2	1	0	0	NC
		2	0	-.013	1458.898
		3	0	-.016	1167.118
		4	0	0	NC
1	M3	1	0	0	NC
		2	0	.013	1458.898
		3	0	.016	1167.118
		4	0	0	NC
1	M4	1	0	0	NC
		2	0	-.015	3103.087
		3	0	-.012	4257.729
		4	0	-.003	NC
1	M5	1	0	-.003	NC
		2	0	-.012	4257.729
		3	0	-.015	3103.087
		4	0	0	NC
1	M6	1	0	0	NC
		2	-.001	0	NC
		3	-.002	0	NC
		4	-.003	0	NC
1	M7	1	0	-.214	NC
		2	0	-.174	1377.517
		3	0	-.086	3035.648
		4	0	0	NC

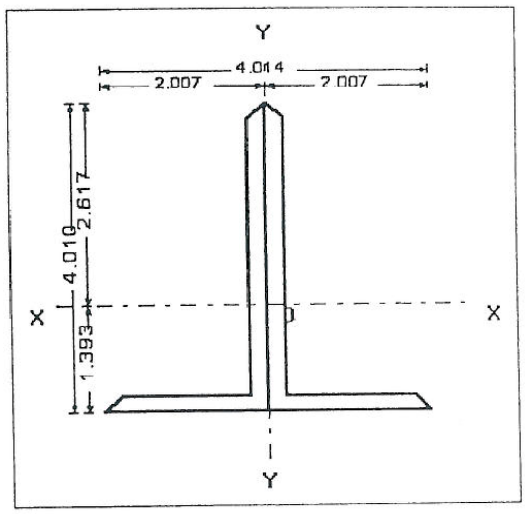
Member Stresses, By Combination

LC	Member Label	Section	Axial (ksi)	Shear (ksi)	Bending top (ksi)	Bending bot (ksi)
1	M1	1	.135	.21	-5.078	5.693
		2	.135	.21	-.271	.304
		3	.135	.21	4.536	-5.085
		4	.135	.21	9.343	-10.474
1	M2	1	.279	.464	0	0
		2	.279	.464	2.412	-2.412
		3	.279	.464	4.824	-4.824
		4	.279	.464	7.236	-7.236
1	M3	1	.279	-.464	0	0
		2	.279	-.464	-2.412	2.412
		3	.279	-.464	-4.824	4.824
		4	.279	-.464	-7.236	7.236
1	M4	1	0	.579	0	0
		2	0	.072	.838	-3.338
		3	0	-.435	.371	-1.479
		4	0	-.942	-1.401	5.577
1	M5	1	0	.942	-1.401	5.577
		2	0	.435	.371	-1.479
		3	0	-.072	.838	-3.338
		4	0	-.579	0	0
1	M6	1	1.812	0	0	0
		2	1.812	0	0	0
		3	1.812	0	0	0
		4	1.812	0	0	0
1	M7	1	.135	-.21	9.343	-10.474
		2	.135	-.21	4.536	-5.085
		3	.135	-.21	-.271	.304
		4	.135	-.21	-5.078	5.693

Section:RShape1

Section Properties:

Number of Shapes	= 2	
Total Width	= 4.014	in
Total Height	= 4.01	in
Center, Xo	= 14.995	in
Center, Yo	= -1.605	in
X-bar (Right)	=2.007in	
X-bar (Left)	=2.007in	
Y-bar (Top)	=2.617in	
Y-bar (Bot)	=1.393in	
Equivalent Properties:		
Area, Ax	= 2.24	in^2
Inertia, Ixx	= 3.607	in^4
Inertia, Iyy	= 0.9487	in^4
Inertia, Ixy	= 0.000	in^4
Torsional, J	= 0.0304	in^4
Modulus, Sx(Top)	= 1.378	in^3
Modulus, Sx(Bot)	= 2.589	in^3
Modulus, Sy(Left)	= 0.473	in^3
Modulus, Sy(Right)	= 0.473	in^3
Plastic Modulus, Zx	= 2.492	in^3
Plastic Modulus, Zy	= 16.794	in^3
Radius, rx	= 1.269	in
Radius, ry	= 0.651	in



Section Diagram

Basic Properties of Shapes in Section:

Sh. No.	Shape	Factor	Width in	Height in	Xo in	Yo in	Ax in^2	Ixx in^4	Iyy in^4
1	Unequal L	1	2.00	4.00	14.60	-1.60	1.12	1.804	0.30
2	Unequal L	1	2.00	4.00	15.39	-1.61	1.12	1.804	0.30

Additional Properties of Shapes in Section:

Sh. No.	Shape	J in^4	Sx in^3	Sy in^3	Zx in^3	Zy in^3	rx in	ry in
1	Unequal L	0.0152	0.6905	0.1859	1.246	0.533	1.269	0.517
2	Unequal L	0.0152	0.6905	0.1859	1.246	0.533	1.269	0.517

Summary of Properties

Sh. No.	Section	Width in	Height in	Xo in	Yo in	Ax in^2	Ixx in^4	Iyy in^4
1	RShape1	4.014	4.01	14.995	-1.605	2.24	3.607	0.949

Calculation Procedure

1) Closed Shapes:
The geometric properties for closed shapes are computed by using the Polygon method. All closed shapes are represented by closed polygons. Curvilinear and circular shapes or edges are represented by several straight line segments. The properties the overall shape are computed by geometric summation of the properties of a trepezoid defined by projection of two consecutive points of the cross-section on to the x and y axis.

2) Open Shapes:
The geometric properties for open (thin walled) shapes are computed by using the Polyline method. All open shapes are represented by polylines. Curvilinear and circular shapes or edges are represented by several straight line segments. The properties the overall shape are computed by geometric summation of the properties of a line defined by projection of two consecutive points of the cross-section on to the x and y axis
For details refer to the User's Manual

FOOTING SIZING CALCULATIONS

1) LOADING

Dead Load=	7	psf
Live Load =	100	psf
Total Load, RAMP_TL =	107	psf

2) FOOTING ON SOIL

Soil Allowable Bearing Pressure =	1500	psf
7' Platform Center Column, Area =	12.25	psf
Max Load =	1311	#
Min. Footing Area =	0.87	sf
Footing Pad w/ minimum Size =	11.22	inch

USE: 12-INCH, MIN. SQUARE PAD UNDER COLUMN ON SOIL

3) FOOTING ON PAVEMENT (Based on 8-inch Depth Pavement+Base)

Allowable Bearing Pressure =	8831	psf
7' Platform Center Column, Area =	12.25	psf
Max Load =	1311	#
Min. Footing Area =	0.15	sf
Footing Pad w/ minimum Size =	4.62	inch

USE: 5-INCH, MIN. SQUARE PAD UNDER COLUMN ON PAVEMENT

D. DEFLECTION CHECK FOR ALUMINUM TUBES

ALLOWABLE $\delta = {}^{9}/_{240} = .175"$

Load = 107 (3.5') = 374.5 PLF

$$\delta = \frac{5 w \ell''}{384 E I} = \frac{5 (374.5/12)(3.5' \times 12)^4}{384 (10{,}100 \times 1000)(2.074\ in^4)}$$

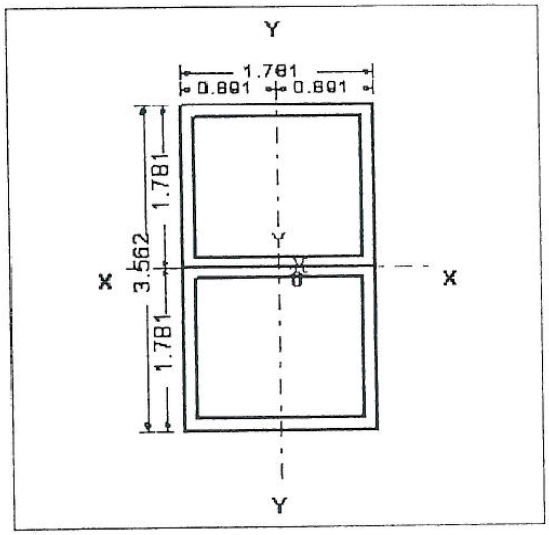
$= .064" < .175$ OK ←

USE 2 - 1.781" TUBES STACKED.

Section:Section1

Section Properties:

Number of Shapes	= 2	
Total Width	= 1.781	in
Total Height	= 3.562	in
Center, Xo	= 0.00	in
Center, Yo	= 0.00	in
X-bar (Right)	= 0.891	in
X-bar (Left)	= 0.891	in
Y-bar (Top)	= 1.781	in
Y-bar (Bot)	= 1.781	in
Equivalent Properties:		
Area, Ax	= 1.656	in^2
Inertia, Ixx	= 2.074	in^4
Inertia, Iyy	= 0.7612	in^4
Inertia, Ixy	= 0.000	in^4
Torsional, J	= 1.2688	in^4
Modulus, Sx(Top)	= 1.164	in^3
Modulus, Sx(Bot)	= 1.164	in^3
Modulus, Sy(Left)	= 0.855	in^3
Modulus, Sy(Right)	= 0.855	in^3
Plastic Modulus, Zx	= 1.568	in^3
Plastic Modulus, Zy	= 1.029	in^3
Radius, rx	= 1.119	in
Radius, ry	= 0.678	in



Section Diagram

Basic Properties of Shapes in Section: (Local Axis, for n=1)

Sh. No.	Shape	Modular Ratio(n)	Width in	Height in	Xo in	Yo in	Ax in^2	Ixx in^4	Iyy in^4
1	Tube	1.00	1.781	1.781	0.00	-0.891	0.828	0.3806	0.3806
2	Tube	1.00	1.781	1.781	0.00	0.89	0.828	0.3806	0.3806

Additional Properties of Shapes in Section: (Local Axis, for n=1)

Sh. No.	Shape	J in^4	Sx-Top in^3	Sy-Right in^3	Zx in^3	Zy in^3	rx in	ry in
1	Tube	0.6344	0.4274	0.4274	0.5144	0.5144	0.678	0.678
2	Tube	0.6344	0.4274	0.4274	0.5144	0.5144	0.678	0.678

Summary of Section Properties

Sh. No.	Section	Width in	Height in	Xo in	Yo in	Ax in^2	Ixx in^4	Iyy in^4
1	Section1	1.781	3.562	0.00	0.00	1.656	2.074	0.7612

Calculation Procedure

1) Closed Shapes:
The geometric properties for closed shapes are computed by using the Polygon method. All closed shapes are represented by closed polygons. Curvilinear and circular shapes or edges are represented by several straight line segments. The properties of the overall shape are computed by geometric summation of the properties of a trapezoid defined by projection of two consecutive points of the cross-section on to the x and y axis.

2) Open Shapes:
The geometric properties for open (thin walled) shapes are computed by using the Polyline method. All open shapes are represented by polylines. Curvilinear and circular shapes or edges are represented by several straight line segments. The properties of the overall shape are computed by geometric summation of the properties of a line defined by projection of two consecutive points of the cross-section on to the x and y axis
For details refer to the User's Manual

WELCOME RAMP, INC.

STRUCTURAL ANALYSIS

Manufacturer Information - Planks

TRACTION TREAD LOAD TABLES

PLANKING

Plank Description
Plank: Traction Tread
Width: 12"
Guage: 13 GA

2" Channel Height

Se:	0.27	in^3
Mmax:	5335	lb-in

1 1/2" Channel Height

Se:	0.174	in^3
Mmax:	3438	lb-in

2" Channel Height

	2'-0	3'-0	4'-0	5'-0	6'-0	7'-0	8'-0	9'-0	10'-0
U	889	395	222	142	99	73	56	44	36
D	0.057	0.129	0.229	0.357	0.514	0.7	0.915	1.158	1.429
C	889	593	445	356	296	254	222	198	178
D	0.046	0.103	0.183	0.286	0.412	0.56	0.732	0.926	1.143

1 1/2" Channel Height

	2'-0	3'-0	4'-0	5'-0	6'-0	7'-0	8'-0	9'-0	10'-0
U	573	255	143	92	64	47	36	28	23
D	0.07	0.157	0.279	0.436	0.627	0.854	1.115	1.411	1.742
C	573	382	287	229	191	164	143	127	115
D	0.056	0.125	0.223	0.348	0.502	0.683	0.892	1.129	1.394

Notes:

@ 4'-8" u = 109 OK!

U = Uniform Load, psf
C = Concentrated Load, psf
D = Deflection, in.

1.) Allowable loads are based on the latest edition of AISI, 1986 Edition w/ 12/11/89 Addendum.
2.) This table is a theoretical calculation of the allowable loads and deflections for the specified spans. There are no test results to verify the actural load carrying capabilities. This table should be used as a reference only.
3.) Loads and deflections are based on side channel deflection only, and does not account for strut loading of the grating surface.

TRACTION TREAD LOAD TABLES

STAIRS

Plank Description
Plank: Traction Tread
Width: 12"
Guage: 11 GA

2" Channel Height

Se:	0.541	in^3
Mmax:	10690	lb-in

1 1/2" Channel Height

Se:	0.331	in^3
Mmax:	6541	lb-in

2" Channel Height

	2'-0	3'-0	4'-0	5'-0	6'-0	7'-0	8'-0	9'-0	10'-0
U	1782	792	445	285	198	145	111	88	71
D	0.028	0.064	0.113	0.177	0.254	0.346	0.452	0.572	0.706
C	1782	1188	891	713	594	509	445	396	356
D	0.023	0.051	0.09	0.141	0.203	0.277	0.362	0.458	0.565

1 1/2" Channel Height

	2'-0	3'-0	4'-0	5'-0	6'-0	7'-0	8'-0	9'-0	10'-0
U	1090	484	273	174	121	89	68	54	44
D	0.035	0.079	0.14	0.219	0.315	0.429	0.561	0.71	0.876
C	1090	727	545	436	363	311	273	242	218
D	0.028	0.063	0.112	0.175	0.252	0.343	0.449	0.568	0.701

Notes:

U = Uniform Load, psf
C = Concentrated Load, psf
D = Deflection, in.

1.) Allowable loads are based on the latest edition of AISI, 1986 Edition w/ 12/11/89 Addendum.
2.) This table is a theoretical calculation of the allowable loads and deflections for the specified spans. There are no test results to verify the actural load carrying capabilities. This table should be used as a reference only.
3.) Loads and deflections are based on side channel deflection only, and does not account for strut loading of the grating surface.