

GENERAL STRUCTURAL NOTES

A. DRAWINGS AND SPECIFICATIONS

- The General Structural Notes apply to existing and additional structural components of the "Pavilion Temporary Fire Station" located in Jackson, Wyoming.
- These notes and drawings were prepared for the site described herein. Use of these documents for construction on any other site requires written permission from the Engineer.
- Contractor shall verify all dimensions and site conditions in the field and coordinate with Architectural drawings prior to construction.

B. GOVERNING CODES AND REFERENCES

- International Building Code (IBC), 2015 Edition.
- Building Code Requirements for Structural Concrete, American Concrete Institute (ACI 318-14).
- Steel Construction Manual, Thirteenth Edition, American Institute of Steel Construction (AISC).
- National Design Specifications (NDS) for Wood Construction, 2015 Edition.
- Minimum Design Loads for Buildings and other structures, (ASCE 7-10)
- Concrete Reinforcing Steel Institute (CRSI), Manual of Standard Practice.

C. DESIGN CRITERIA

- Roof Snow Load: 75 psf (Per the Town of Jackson)
 - Original structure was designed for 75 psf Balanced Snow loading.
 - In association with this design, the original rigid frame was checked for a 75 psf SL with an I=1.1, for potential change in use. Recommended modifications are included in this design.
- Roof Dead Load: 5.7 psf + Collateral: 3 psf (Per original metal building design calcs.)
- Floor Live Load: 100 psf LL: At Day Room and Training Area
32 k Axle (HS20 Truck Loading): At Truck Bay Lanes
- Floor Dead Load: self weight of concrete slab
- Wind: Vult: 115 mph; Exposure C; Risk Category II existing; Risk Category III/V with Vult: 120 mph reviewed for future change of use.
- Seismic Parameters: Lat: 43.471°; Long: -110.7682°; Site Class D "Stiff Soil"; Ss: 1.201; S1: 0.364; Sds: 0.816; Sd1: 0.406; Design Category: D; Risk Category: III; le: 1.5 R: 3.5; Q: 3.0; Rigid Frames
R: 3.25; Q: 2.0; Cross Bracing
Cs=Sds(R/I); V=CsW
- Allowable Soil Bearing Pressure: 2,000 psf (as indicated on original foundation design & drawings).

D. FOUNDATION NOTES

- Excavations for or around foundations shall be inspected by a Geotechnical Engineer to make any additional recommendations, regarding excavations, construction, ground water drainage and other.
- Fill and backfill should be approved by Geotechnical Engineer, be placed in uniform lifts and compacted to at least 95% of maximum dry density as determined by ASTM D698. Fill shall be placed in 8' maximum lifts.
- Soils beneath slabs and footings shall be protected from freezing.
- Drainage shall be provided away from the structure during all phases of construction.
- Backfill against shallow foundations and stem walls; in no case shall the material be greater than 4 inches in diameter and bear directly on or against foundation elements. Placing oversized material against rigid surfaces can damage the structure and interfere with proper compaction.
- Interior slabs shall be founded upon the following section from top to bottom - unless otherwise indicated by a Geotechnical Engineer or Geotechnical Investigation Report: 1) A leveling course mat of 4 inches in thickness composed of 3/4 inch minus free draining material compacted to a minimum of 95% of maximum density as determined by ASTM D1557; 2) The upper 8 inches of native gravel and sand subgrade soils compacted to a minimum of 95% density as determined by ASTM D698. If fill is required under slabs; fill shall consist of Structural Fill, and shall be approved by a Geotechnical Engineer licensed in the state of Wyoming.
- Any excessively loose material or soft soils encountered in the slab subgrade will require over-excavation and backfilling with Structural fill.
- Sidewalks and Exterior Concrete Slabs for foot traffic shall be placed upon the following section from top to bottom - unless otherwise indicated by a Geotechnical Engineer - or Geotechnical Investigation Report: 1) A leveling course mat of 4 inches in thickness composed of a 3/4 inch minus free draining material compacted to a minimum of 95% of maximum density as determined by ASTM D1557; 2) The minimum of 8 inches of native gravel and sand subgrade soils compacted to a minimum of 95% density as determined by ASTM D698. Any fill required to increase the elevation of the slab shall be granular Structural Fill.
- Any fill material within 2 feet of the slabs must be compacted to a minimum of 95% of the maximum density as determined by ASTM D698.

E. CONCRETE

Concrete notes are for new concrete to be placed in association with these drawings and does not include existing foundation system in place.

- Ready-Mixed concrete shall conform to ASTM C 94. Minimum cement content shall be 6.0 bags (564 pounds) per cubic yard. Cement shall be type II. Cement shall conform to ASTM C 150. Aggregates shall conform to ASTM C 33. Mix designs shall be prepared in accordance with ACI 301-10.
- Submit concrete mix designs at least 15 days prior to performing work.
- Maximum water cement ratio:
 - 0.5 - Grade Beams & Slabs
- Maximum Aggregate Size:
 - 1" - Grade Beams & Slabs
- Construction to be in accordance with ACI 318-14 Testing, Materials, and Construction Requirements.
- Tolerances for Concrete Construction and Materials shall conform to ACI 117-90
- Concrete shall conform to ACI 301-10. Concrete shall be air-entrained as follows:
 - 6% "Severe exposure" - Exposed Foundation Walls or Grade Beams and Exterior Slabs
 - 3 1/2% "Mild Exposure" - Interior slabs
- Provide minimum concrete strengths as follows:
 - 4000 psi @ 28 days
- No admixtures without approval. Admixtures containing chlorides shall not be used. Concrete shall not be in contact with aluminum.
- When the mean daily temperature is expected to or has dropped below 40 degrees (F) for three or more successive days, the contractor shall comply with the provisions of ACI 306R-88 "Cold Weather Concreting". Also reference chapter 12 of Portland Cement Association publication "Design and Control of Concrete Mixtures".
- Joint placement not as shown on the drawings shall have prior written approval of the engineer.
- Concrete surfaces shall be finished in accordance with ACI302.1R-Concrete Floor and Slab Construction", as follows:
 - Slab Floors: "Class 1" - uniform steel-troweled finish. Finished concrete floor surfaces shall vary no more than 1/4" per 10 feet.
 - Exterior Slabs: "Class 2 and 3"
- Mechanically vibrate all concrete when placed.
- Wait a minimum of 48 hours between all adjacent concrete castings.
- Minimum strength for removal of bottom forms and shoring shall be 75% of specified strength at 28 days. Wall forms may be removed in 48 hours for minimum 4000 psi concrete.

F. REINFORCING STEEL

- Concrete Reinforcing Steel shall be new billet steel conforming to ASTM A 615, Grade 60 including all #3 through #10 bars, stirrups and ties.
- Concrete welded wire fabric reinforcement shall conform to ASTM A 185. Splice length shall be a minimum 12" unless noted otherwise.
- All reinforcement shall be detailed, fabricated, and placed in accordance with the ACI Detailing Manual (SP-66), the CRSI Manual of Standard Practice, and ACI Standard Tolerances for Concrete Construction and Materials (ACI 117).
- Cold bending of reinforcing bars is to be limited to bars which have not been previously bent. Bars may be bent only once. Any bend is limited to an interior angle of 90 degrees or greater. Bending tools with the following bending diameters should be used:
 - #3 through #8 bars: 6 x bar diameter
 - #9 through #11 bars: 8 x bar diameter
- The minimum Concrete Cover over reinforcement shall be as follows unless noted otherwise on the drawings:
 - Concrete cast against and permanently exposed to earth:
 - 3"..... all bar sizes
 - Concrete exposed to earth or weather:
 - 2"..... #6 thru #18 bars
 - 1-1/2".... #5 bar and smaller
 - 1-1/2".... W31 or D31 wire and smaller
 - Concrete not exposed to weather or in contact with ground:
 - Slabs, walls, joists:
 - 1-1/2".... #14 and #18 bars
 - 3/4"..... #11 bar and smaller
 - Beams, Columns:
 - 1-1/2".... Primary reinforcement, ties, stirrups, and spirals

- All reinforcement shall be continuous unless noted otherwise. Provide bent corner bars (18x18" unless noted otherwise) to match and lap with horizontal bars at corners and intersection of walls, beams, bond beams and footings. Dowel all vertical wall rebar to foundations. Securely tie all rebar, including dowels, in location before placing concrete or grout. "Stabbing" of bars into poured concrete is not permitted.
- All reinforcement splice locations are subject to approval. Provide shop drawings for approval by the Engineer prior to fabrication.
- Development Lengths and Lap Splices shall be in accordance with ACI 318-14. Where splice lengths are not shown on the drawings, the following shall apply:

• #4 bars 25"	#7 bars 54"
• #5 bars 31"	#8 bars 62"
• #6 bars 37"	#9 bars 70"

- Spacings noted for rebar are not to be exceeded. Other tolerances for rebar placement shall conform to ACI 117-90.
- Securely tie reinforcement in place with double annealed 16 gauge tie wire.
- Welding of reinforcement is not permitted without approval of the Structural Engineer. Tack welding of reinforcement is prohibited.
- Precast mortal blocks or ferrous metal chairs, spacers, metal hangers or supporting wires shall be used to securely hold reinforcing bars in position. Metal chairs, bolsters, or other metal that are in contact with the exterior surface of the concrete shall be galvanized. Wood, aluminum or plastic supports shall not be used.
- Walls with openings 1'-0" or greater in either direction, shall have 2-#5 bars at all sides, and bars shall extend 24" beyond the opening at both ends, unless noted otherwise on the drawings.

G. WOOD FRAMING

Unless noted otherwise on the Structural Drawings or Project Specifications, the following wood framing specifications and notes shall apply:

- Dimensional Framing Lumber:
 - #1 Douglas Fir or better (structural members)
 - #2 Douglas Fir or better (light framing & stud framing)
- Laminated Veneer Lumber (by "Boise Engineered Wood Products") as indicated on the drawings:
 - Versa-Lam Grade 2.0 2800
 - Fb=2,800 psi
 - Fv=285 psi
 - E=2,000,000 psi
 - Versa-Lam Grade 2.0 3100
 - Fb=3,100 psi
 - Fv=285 psi
 - E=2,000,000 psi
 - Versa-Lam Grade 1.7 2650 Columns
 - Fb=2,650 psi
 - E=1,700,000 psi
 - Fc₀=3,000 psi

- Plywood Sheathing
 - "Floor Sheathing" (above ceiling joists over interior staff rooms and bathrooms): 23/32" APA rated T&G plywood sheathing conforming to PS 1 with a minimum span rating of 48/24. Install with face grain perpendicular to the joist span with end joints staggered. Glue subflooring to joists and blocking and glue T&G joints with construction adhesive conforming to APA specification AFG-01 and applied according to manufacturer's recommendations. Unless noted otherwise, nail floor sheathing as follows:
 - Use 8d Common nails. Shank Size = 0.134"; Shank Length = 2-1/2"
 - 8d nails @ 6" o.c. at all panel edges and blocking
 - 8d nails @ 10" o.c. at intermediate supports
 - Plywood wall sheathing: 15/32" APA rated sheathing conforming to PS 1 or PS 2. Unless noted otherwise on the drawings, construct exterior walls with 2x blocking along all edges not supported by studs and nail as follows:
 - 8d Common nails. Shank Size = 0.134"; Shank Length = 2-1/2"
 - 8d nails @ 6" o.c. at all panel edges and blocking
 - 8d nails @ 12" o.c. at intermediate supports
 - Unless noted otherwise all nails for attaching plywood shall be unfinished common nails of size shown. Nails for attaching plywood in high humidity, and treated wood locations shall be galvanized by hot-dip or tumbled process and shall not be electro-plated.

- Anchor Bolts shall conform to ASTM A 307.
 - Unless noted otherwise, anchor bolts are to be 5/8" diameter, and are to be spaced no further apart than 48" o.c.. If other sizes and spacings are shown on the drawings those will govern.
 - Cast-in-place anchor bolts shall be embedded at least 8" into the concrete unless noted otherwise or unless slab thickness does not allow (see drawings). There shall be a minimum of 2 bolts per segment of sill plate, with one bolt located not more than 12" or less than 7 bolt diameters from each end of the sill. Plate washers a minimum of 3" x 3" x 0.229" thick shall be used on each bolt.
- Premanufactured metal wood connectors shall be installed according to manufacturer's recommendations for the maximum load capacity, unless noted otherwise on the drawings.
- All wood in contact with concrete shall be preservative pressure treated in conformance with the American Wood Preservers' Association AWPA C-1.

H. STRUCTURAL STEEL: Structural steel notes are for new structural members to be placed in association with these drawings and does not include existing steel framing or members.

- Steel materials:
 - W Shapes: ASTM A 992, Fy=50ksi
 - S Shapes: ASTM A 36, Fy=36ksi
 - Channels, Angles, Plates: ASTM A 36, Fy=36ksi
 - HSS Tubes: ASTM A500, Fy=46ksi
 - Header Studs: ASTM A108, Type B
 - Pipes: ASTM A 53, Grade B
 - Anchor Bolts: ASTM A 307
 - Steel to Steel Connection Bolts: ASTM A 325
 - Steel Nuts: ASTM A 563
 - Steel Washers: ASTM A 436
 - Threaded Rods: ASTM A 307 or A 36
- Structural steel design, fabrication and erection shall conform to the AISC "Code of Standard Practice for Steel Buildings and Bridges" as modified by the structural drawings and/or project specifications.
- Connections may be welded or bolted unless noted on the drawings.
- Bolted Connections:
 - ASTM A 325 Bolts at Steel Connections
 - ASTM A 307 Bolts at Wood to Steel Connections
 - ASTM A 307 Bolts at Wood to Wood Connections
 - ASTM A 307 Embedded Anchor Bolts
- Welded Connections: E70xx
 - All welding shall be performed in accordance with the American Welding Society "Structural Welding Code - Steel" (AWS D1.1).
 - All welding personnel shall be qualified in accordance with AWS D1.1, Section C.
 - Welding shall be performed in accordance with the appropriate welding procedure specification (WPS) for the joint. All WPSs used by the contractor shall be prequalified per AWS D1.1.
 - Groove weld preparation details shall be in accordance with AWS D1.1.
 - Weld tabs shall be in accordance with AWS D1.1, and further, weld tabs shall extend beyond the edge of the joint a distance equal to a minimum of the part thickness, but not less than one inch.
 - Backing bars shall be in accordance with AWS D1.1, and further, all tack welds attaching backing bars to the steel prior the welding of the joint shall be made within the joint.
- Structural members dependent upon concrete or other structural members for support shall be adequately braced until the structure is complete.
- Splicing of steel members is not permitted without approval of the Engineer, unless noted on the drawings.
- Changes in size or position of structural elements are prohibited unless noted as proposed changes on the shop drawings, and accepted by the Engineer.
- Fabricate all beams with mill cambers upward
- Final bolting or welding of the structure shall not be performed until as much of the structure that will be stiffened thereby has been properly aligned.
- Minimum plate size shall be 3/8" and minimum bolt size shall be 3/4", unless noted otherwise.
- All re-entrant corners such as copes and blocks shall be cut and shaped notch-free with a radius of at least 1/2".
- All steel members shall be given one shop coat of primer and approved paint. Surfaces to be field welded or embedded in concrete shall not be painted.

J. MISCELLANEOUS

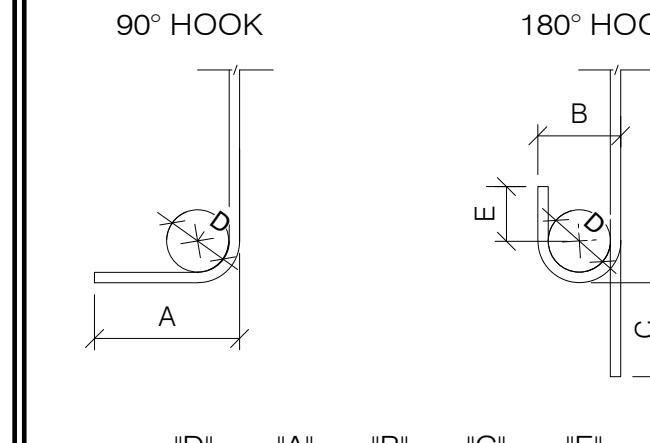
- Changes, omissions or substitutions are not permitted without approval of the Engineer.
- All materials and workmanship shall conform to the 2015 International Building Code (2015 IBC).
- Contractor shall verify all dimensions and coordinate openings and embedded items noted on construction documents with the appropriate trades before starting work.
- It is the sole responsibility of the Contractor to ensure that the structure is temporarily braced in a manner to resist earth, wind, snow, and construction loads or combinations thereof until all supporting structures are in place and concrete is sufficiently cured.
- Existing conditions of the site and structure are to be thoroughly investigated by the contractor. The contractor shall notify the Engineer of any discrepancies between the site investigation and the contract documents before fabrication and/or construction begins.

UNLESS NOTED OTHERWISE, THE REINFORCEMENT DETAILS IN THE FOLLOWING SCHEDULE SHALL APPLY:

MINIMUM REINFORCEMENT LAP SPLICE LENGTHS				
#3 - 19"	#6 - 37"			
#4 - 25"	#7 - 54"			
#5 - 31"	#8 - 62"			

NOTE:
1. WHERE DIFFERENT SIZE BARS ARE LAPPED, USE LARGER BAR LAP LENGTH.

STANDARD HOOK DIMENSIONS

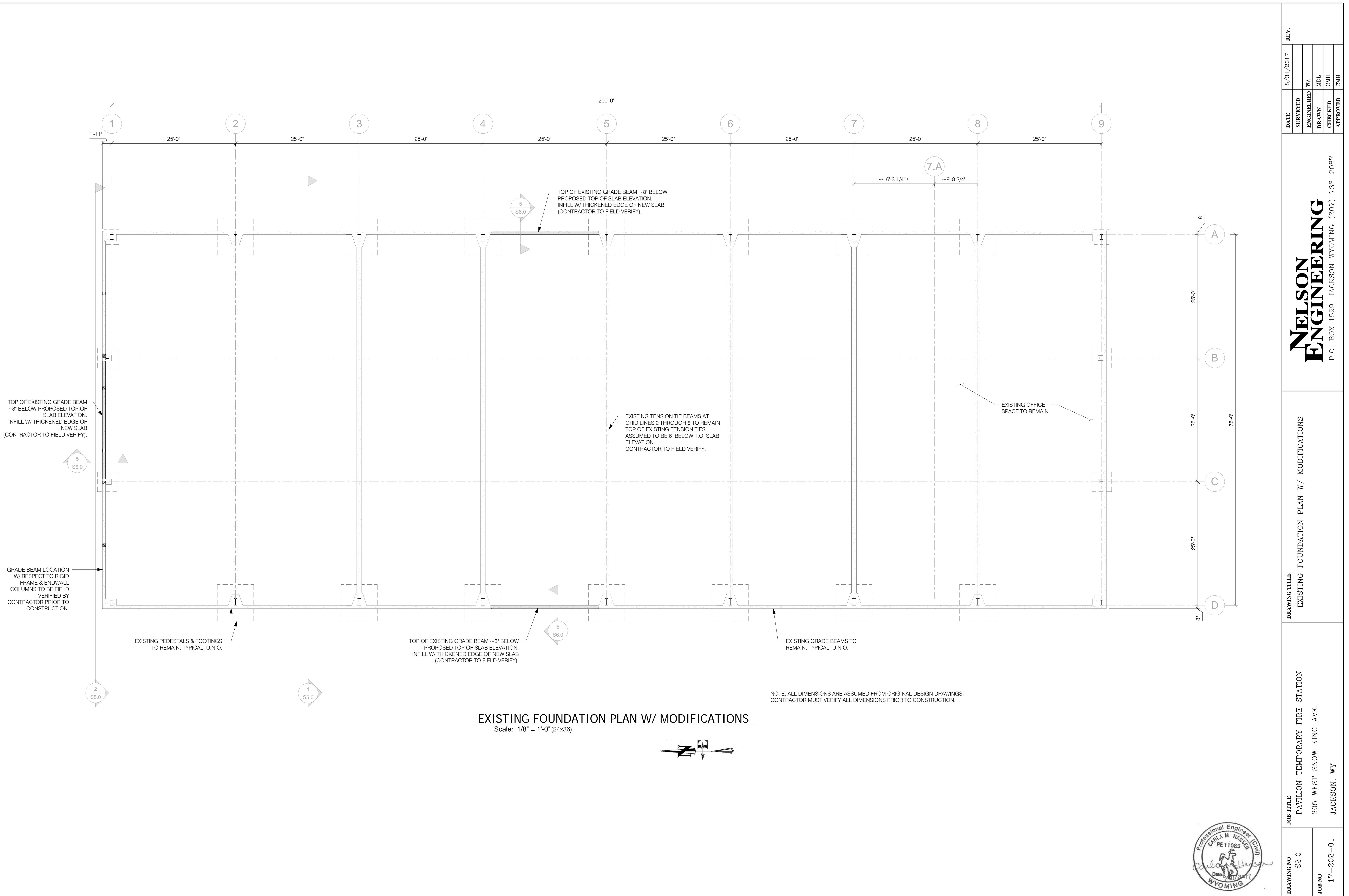


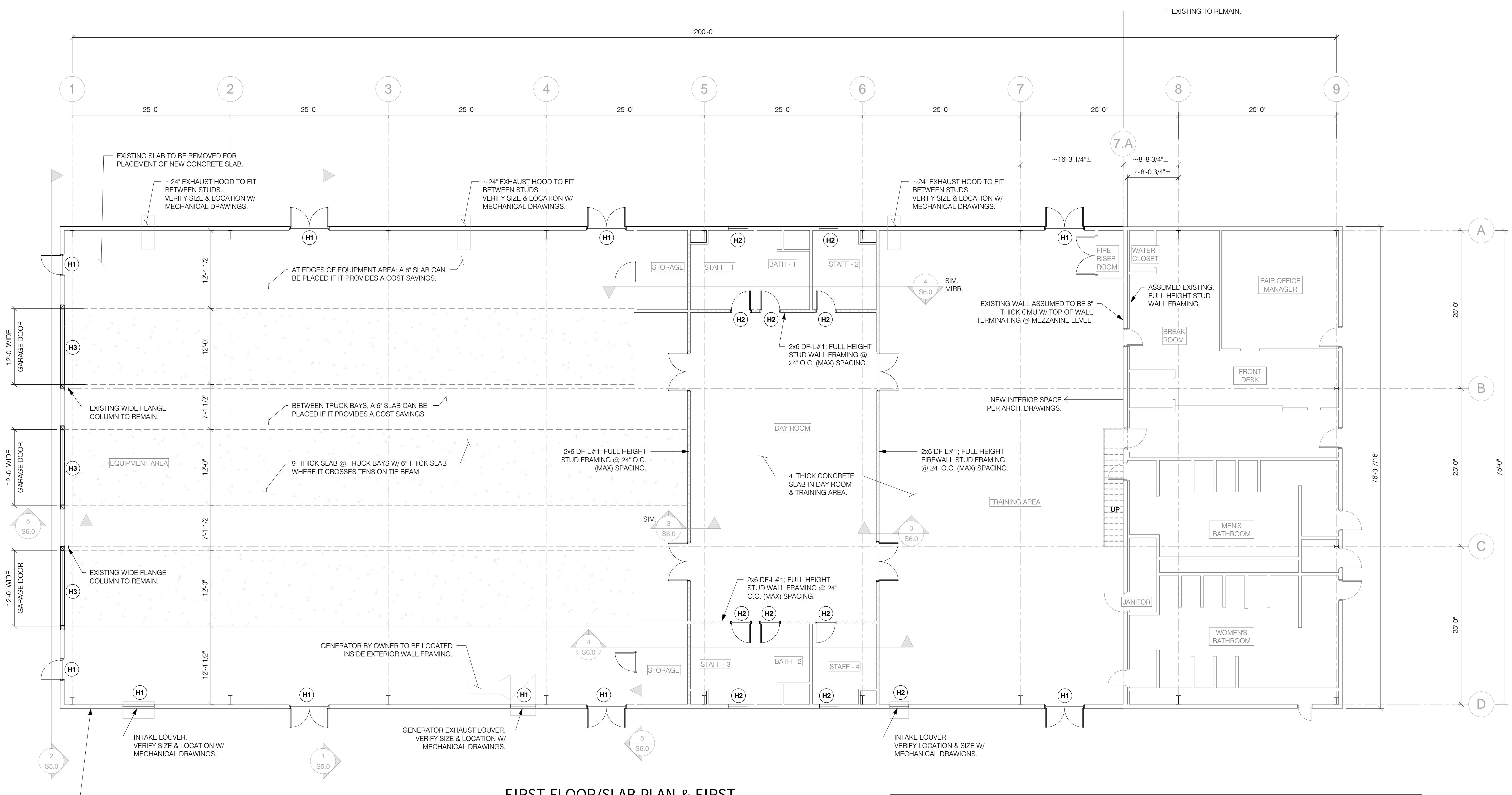
D	A	B	C	E
2-1/4"	6"	3"	5"	2-1/2"
3"	8"	4"	6"	2-1/2"
3-3/4"	10"	5"	7"	2-1/2"
4-1/2"	12"	6"	8"	3"
5-1/4"	14"	7"	10"	3-1/2"
6"	16"	8"	11"	4"

STRUCTURAL NOTATION LEGEND

BTM	BOTTOM	LONG.	LONGITUDINAL
B.O.	BOTTOM OF	O.C.	ON CENTER
B.U.	BUILT UP	O.H.	OVERHANG
CLR	CLEAR	SIM.	SIMILAR
C.L.	CENTERLINE	T.O.	TOP OF
EL	ELEVATION	TYP.	TYPICAL
E.O.R.	ENGINEER OF RECORD	U.N.O.	UNLESS NOTED OTHERWISE
F.D.N.	FOUNDATION	N.T.S.	NOT TO SCALE
FTG	FOOTING	WWF	WELDED WIRE FABRIC
G.L.	GRID LINE		

STRUCTURAL DRAWING INDEX					
S1.0	GENERAL STRUCTURAL NOTES FOR ADDITIONAL BUILDING COMPONENTS</				





FIRST FLOOR/SLAB PLAN & FIRST FLOOR WALL FRAMING PLAN

Scale: 1/8" = 1'-0" (24x3)

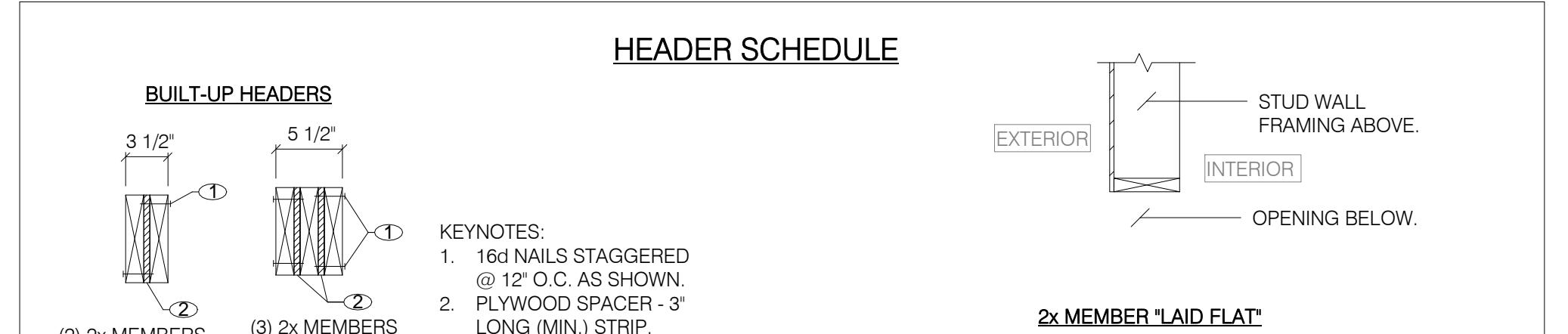
NEW 2x8 DF-L STUD WALL FRAMING @ 24" O.C. SPACING.
PROVIDE C7x14.75 -OR- MC7x19.1 CHANNEL @ OUTSIDE FACE
OF EXISTING MAIN FRAME COLUMN FLANGE.
ATTACH A WOOD PLATE TO BOTTOM OF CHANNEL FOR
ATTACHMENT TO 2x8 STUD WALL SYSTEM.
(TYPICAL @ T.O. ALL NEW 2x8 STUD WALL FRAMING ALONG
G.L. A & G.L. D)
SEE DETAIL 1/S6.0

SLAB REINFORCEMENT TABLE

<u>SLAB REINFORCEMENT TABLE</u>			
THICKNESS	LOCATION	REINFORCEMENT	SAWCUT SPACING
4"	AT DAY ROOM & TRAINING AREA.	#3 BARS @ 12" O.C. SPACING, EACH WAY -OR- 6x6 W4.5xW4.5 WWF @ UPPER 1/3 OF SLAB.	~8'± GRID PATTERN (VERIFY W/ OWNER & ARCHITECTURAL DRAWINGS)
6"	IN EQUIPMENT AREA: BETWEEN TRUCK BAYS AND AT EDGES IF IT PROVIDES A COST SAVINGS.	#4 TRANSVERSE BARS @ 10" O.C. SPACING (CONTINUOUS FROM 9" SLAB SECTIONS) & #4 LONGITUDINAL BARS @ 12" O.C. SPACING IN MIDDLE OF SLAB.	8' - 12' GRID PATTERN (VERIFY W/ OWNER & ARCHITECTURAL DRAWINGS)
9"	IN EQUIPMENT AREA: AT TRUCK BAYS.	#4 BARS @ 10" O.C. SPACING, EACH WAY, PLACED SO THAT BARS ARE IN MIDDLE OF 6" SLAB SECTIONS.	8' - 12' GRID PATTERN (VERIFY W/ OWNER & ARCHITECTURAL DRAWINGS)

NOTE: CONTRACTOR TO VERIFY W/ MECHANICAL PLANS FOR PLUMBING TO BE PLACED IN OR UP THROUGH SL

HEADER SCHEDULE



KEYNOTES:

1. 16d NAILS STAGGERED
@ 12" O.C. AS SHOWN.
2. PLYWOOD SPACER - 3"
LONG (MIN.) STRIP

The diagram shows a vertical wall section. A horizontal line extends from the top of the wall to the right, with the text 'STUD WALL FRAMING ABOVE.' positioned to its right. A horizontal line extends from the bottom of the wall to the right, with the text 'OPENING BELOW' positioned to its right. A rectangular box labeled 'INTERIOR' is located at the bottom of the wall section, below the opening.

MARK	HEADER/BEAM	END SUPPORTS/NOTES
H1	2x8 DF-L#2 MEMBER LAID FLAT -OR- BUILT UP (3) MIN. 2x6 DF-L#2 PACKED OUT TO 2x8 STUD DEPTH FOR ATTACHMENT OF FINISH SYSTEM.	(2) 2x8 DF-L KING STUDS EACH SIDE OF OPENING.
H2	2x8 DF-L#2 MEMBER LAID FLAT -OR- (2) MIN. 2x6 DF-L#2 B.U. PACKED OUT TO STUD WALL DEPTH FOR ATTACHMENT OF FINISH SYSTEM.	(1) 2x8 JACK STUD & (2) 2x8 KING STUDS -OR- (1) 2x6 JACK STUD & (2) 2x6 KING STUDS EACH END.
H3	8x8 DF-L#1 W/ STRONG AXIS TOWARD WIND LOADING ("LAID FLAT") -OR- 7-1/4"x7-1/4" VERSALAM 2650 LVL	SEE 2/S5.0 USE A SIMPSON HUC88 HANGER @ FULL HEIGHT COLUMNS EACH SIDE OF DOORS (OR SIM).
H3*	IF "OPTION 1" IS CHOSEN ON NORTH ENDWALL (SEE 2/S5.0), H3* HEADER CAN BE A (2) 2x8 MEMBER LAID FLAT -OR- (4) 2x8 B.U. MEMBER PACKED OUT FOR 2x8 STUD WALL.	ATTACH TO COLUMNS @ EACH END W/ SIMPSON HGA10 EACH SIDE, EACH END.

NEILSON ENGINEERING

P.O.

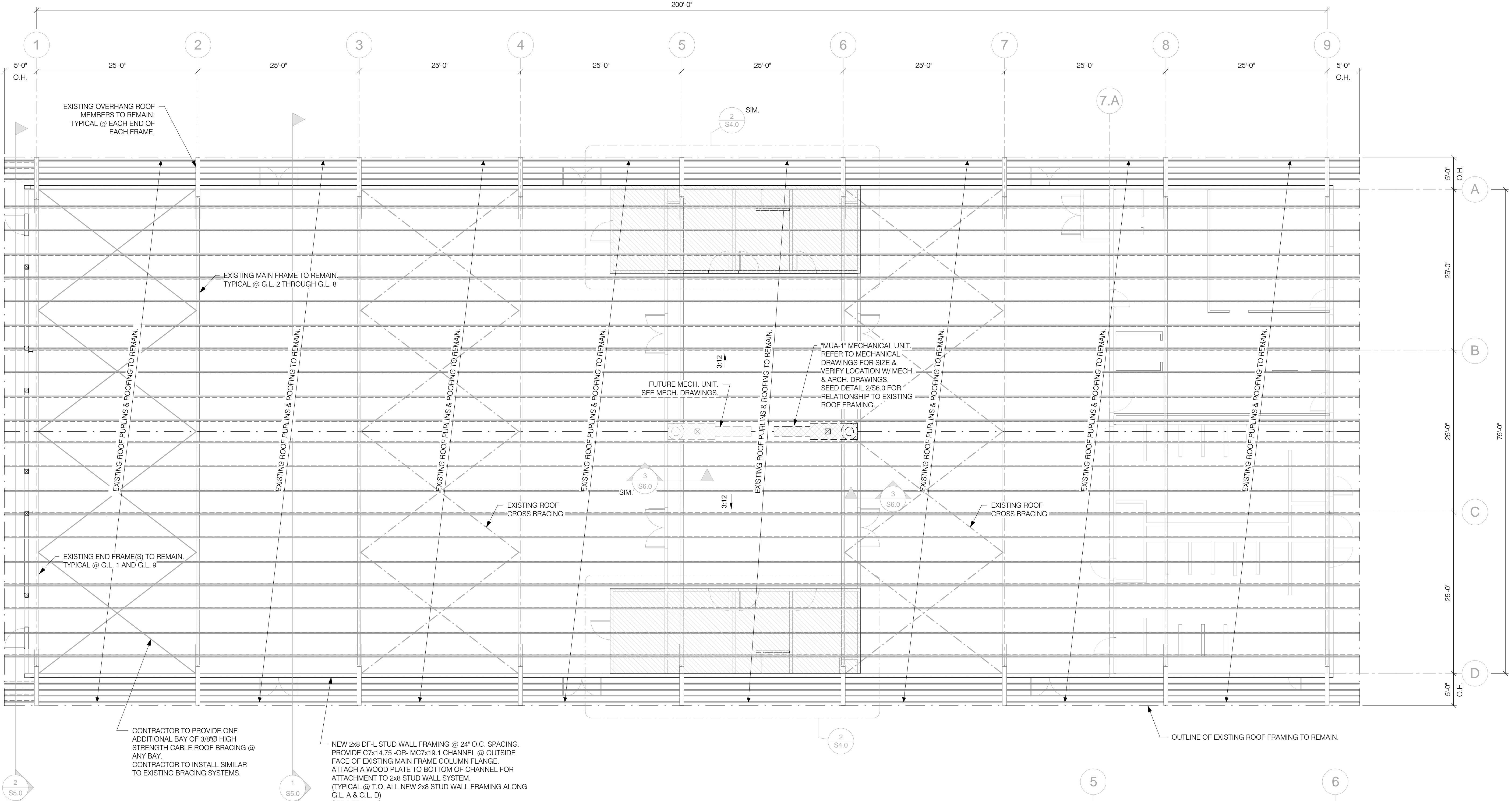
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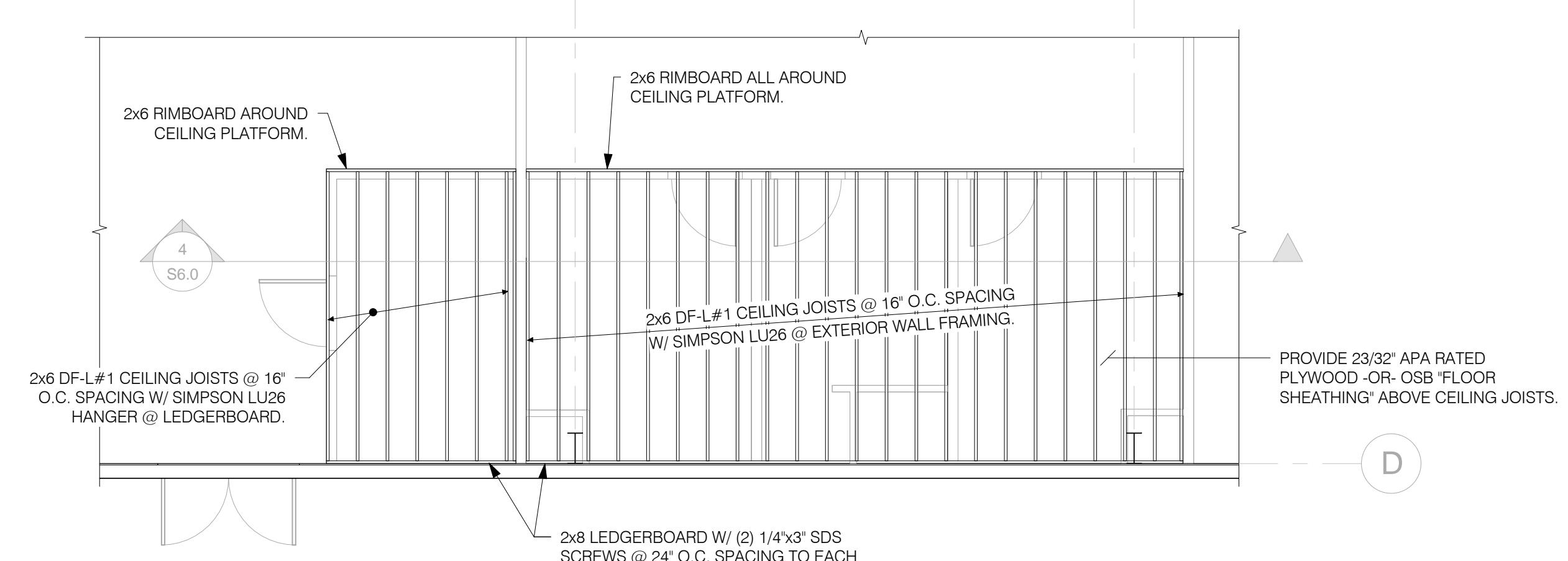
TEMPORARY F SNOW KING

JOB TITLE	PAVILION TH S3.0
JOB NO	305 WEST S 17-202-011



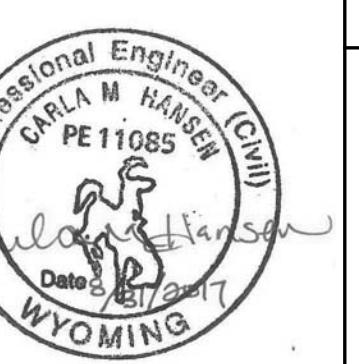
EXISTING ROOF FRAMING PLAN W/ MODIFICATIONS

Scale: 1/8" = 1'-0" (24x36)

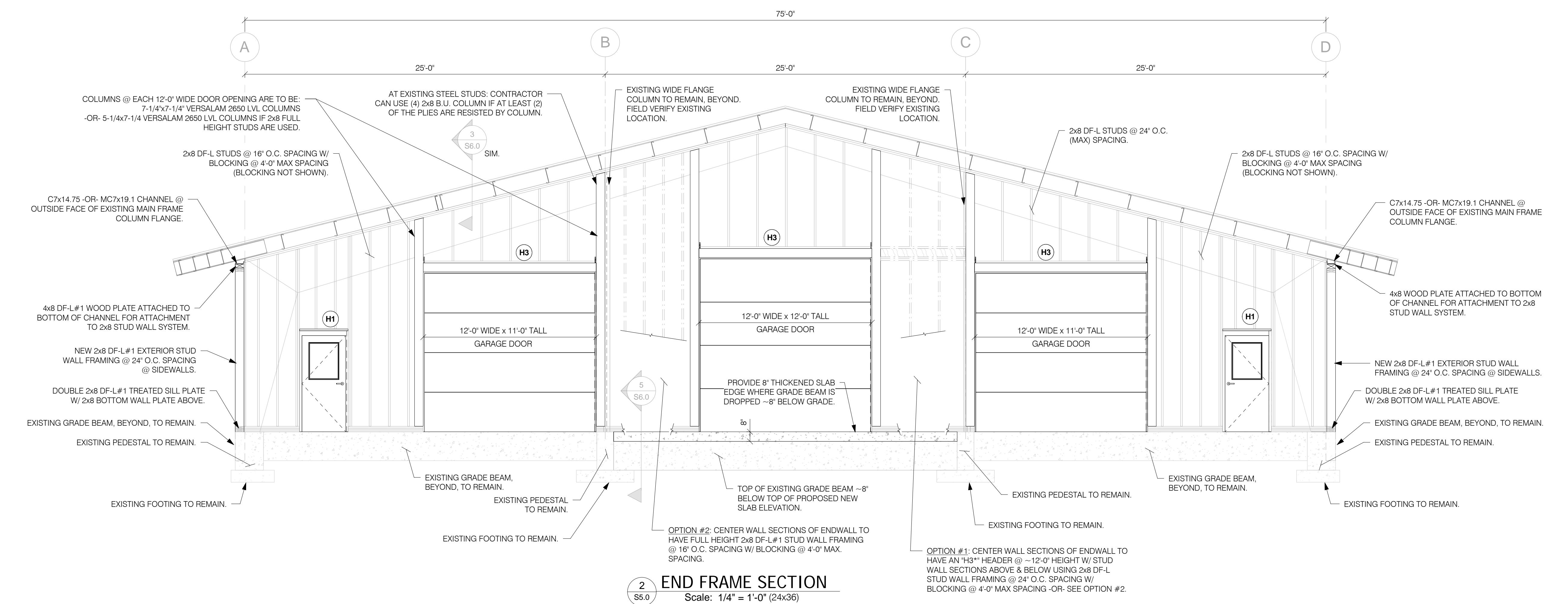
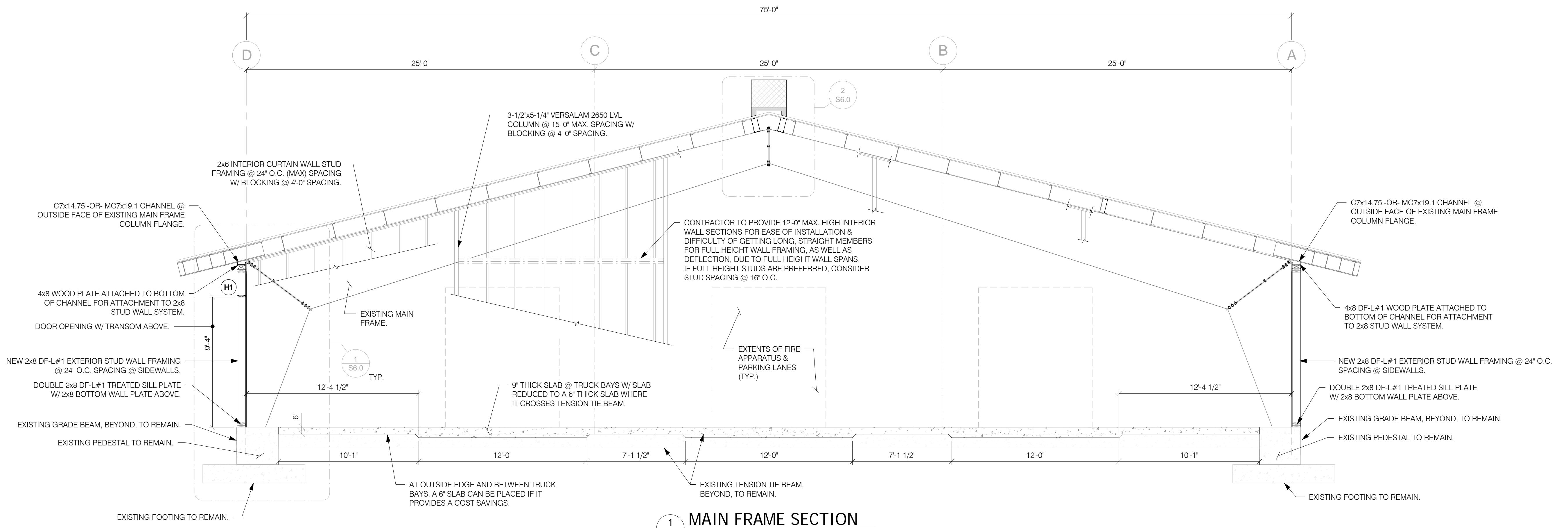


LOW WALL CEILING PLAN

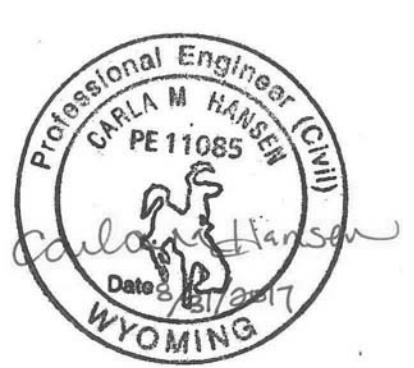
Scale: 3/16" = 1'-0" (24x36)



DRAWING NO		JOB TITLE		DRAWING TITLE	
S4.0		PAVILION TEMPORARY FIRE STATION		EXISTING ROOF FRAMING PLAN & LOW WALL CEILING PLAN	
17-202-01		305 WEST SNOW KING AVE.		NELSON ENGINEERING	
		JACKSON, WY		P.O. BOX 1599, JACKSON WYOMING (307) 733-2087	
				DATE 8/31/2017	REV.
				SURVEYED	
				ENGINEERED WA	
				DRAWN MDL	
				CHECKED CMH	
				APPROVED CMH	



DRAWING NO	JOB TITLE	DRAWING TITLE	STRUCTURAL SECTIONS			
			DATE	REV.	SURVEYED	ENGINEERED
S5.0	PAVILION TEMPORARY FIRE STATION	STRUCTURAL SECTIONS	8/31/2017	WY	MDL	CMH
17-202-01	305 WEST SNOW KING AVE.					
	JACKSON, WY					



**NELSON
ENGINEERING**

P.O. BOX 1599, JACKSON WYOMING (307) 733-2087

NELSON ENGINEERING

P.O. BOX 1599, JACKSON WYOMING (307) 733-2087

DRAWING TITLE
FRAME REPAIR & WALL DETAILS

DATE 8/31/2017
SURVEYED
ENGINEERED WA
DRAWN MDL
CHECKED CMH
APPROVED CMH

