GEBAU Inc.
Consulting Structural Engineers

July 17, 2018 Job #18165

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Re: **St. Peter Catholic Church Monument CO**
Structural Narrative of Proposed Addition Remodel

At your request, a representative of our firm has reviewed the schematic sketches and plans for the two story remodel/ addition to the current historic church structure and 40 year old single story addition to the west. The general purpose for this correspondence is to define the potential structural system intended for the remodel for initial pricing phase of this project.

It is our understanding the current wood framed single story addition to the west will be completely removed including the foundation elements with the exception of the foundation walls common to the church structure. This portion of the structure will be replaced by a two story 11,000 square foot assembly structure creating a library, meeting rooms, small kitchen, and rest rooms on both levels, with a LULA elevator, and two sets of stairs.

The historic church will undergo some modifications to the ceiling structure creating a new vaulted ceiling based on our recent conversations, along with a general remodel removing the bathroom.

General Design Loads will be as follows:

Roof Snow Live Load 40 PSF Elevation > 7000'
Roof Dead Load 15 psf + 15 psf MEP Dead Load
Assembly Live Loads both levels 100 PSF
2nd Floor Dead Load 3.5" Conc Slab + MEP + Structure = 45+15 = 60 PSF

Local Wind loads = 130 MPH Vult.
Seismic Design Category B, based on Soil Site Classification of C

Historic Church Structure:

Based on the our understanding of the remodel plans for the ceiling, along with the removal of the bathroom, we suggest that the current roof structure be shored, and the bathroom walls be removed.

In order to vault the ceiling structure, a new 8 3/4 x 30" deep glu lam ridge beam x 40' running east west will need to be installed below the rafter system along with a new double 14" lvl header on the east end of the wall structure.

The existing 2x6 rafters are structurally inadequate to span from the ridge to the exterior walls without some type of remediation, and a insulation system like sprayed urethane will require more rafter depth to meet energy requirements dictated by MEP. Therefore we suggest that the current rafters be reinforced with new 2x10 Doug Fir #2 @ 24" o.c. maximum with solid 2x4vertical blocking between the existing rafters at the exterior walls with new plumb cut rafters and clips to the blocking.

These new point loads on the west and east end of the structure will require visual verification of the existing rubble foundation elements to ensure that they are capable of safely supporting these new loads. This may require roughly a 2'-6 sq. x 8" deep footing pad underpinned below these new point loads. Re tuck pointing of the rubble walls roughly 4'-0 long may also be required at these point load locations.

The general hump in the floor also needs to be assessed from the crawl space. New additional east west beams and small footing pads may be required to remove the perceived hump or possible sag of the original floor joist.

Meeting Room/ Kitchen/ Library Addition Proposed Structure:

The anticipated roof structure could consist of 1.5" Type B 20 Gauge steel roof deck over 16K3, 18K4, & 22K4 deep steel bar joist spaced 6'-0 o.c based on span lengths, all. supported on three interior 16x36 deep steel beams running north south, and perimeter W 16x26 steel beams on the east walls, all supported on 5" tube steel columns at the perimeter, and one column line on the north wall of the corridor. A C15 channel could be used on the west wall clipped to 6" tube steel columns continuous to the foundation system. This will allow the steel stud system to be continuous to the parapet. The roof beams could slope from the north to the south at 1/4" /ft with the low end on the south side. Minimal tapered insulation counter sloped at 1/4" /ft could be used to direct water to down spouts and scuppers.

There are some asphalt shingled mansard roof elements on the south and east portions of the roof, that in our opinion could be over framed on top of the steel roof deck with

engineered wood trusses @ 24" o.c. with 15/32" OSB roof sheathing, with intermediate beams and or bearing walls uniformly distributing loads down to the steel roof joist and deck below. The intent is to install the steel structure first, then add the mansard roof on top to achieve the general massing. Light gauge 6" steel bearing closure walls could be used on the north and west walls of the mansard roof with dens deck to allow for the roof membrane to run up the walls.

Lateral systems at this level could consist of diagonal 5" tube columns on the north, west and south exterior walls, and on the west wall of the elevator with additional 5" tube steel columns at the ends of the diagonal tubes to create a K brace in the light gauge framed wall system. The K brace will weld off to the deck angles.

Exterior wall systems could be 1/2" dens deck sheathing over 6" x 16 gauge light gauge steel stud framing continuous from the main floor foundation to the parapet with 14 gauge slip clips field welded or ramset to the deck angles. 8" heavy gauge steel studs could also be used at the stair cores to clear span from the foundation to the roof deck angle without any intermediate support.

The 2nd floor framing structure could consist of 3.5" reinforced concrete on 0.6 C x 22 gauge steel deck over 22K4, 22K5, and 22K6 steel joist @ 3'-0 o.c. for various spans. W21x 132 steel beams could be used at three intermediate north south beam locations w/ 6" tube steel columns on each side of the corridor, and 5" tube steel columns at the exterior walls. C15x33.9 channels with double clip angles could be used on the west wall to allow for the wall framing to be continuous. 5" tube columns on the west wall are also anticipated at various locations based on architectural constraints.

The lateral resisting system for the 2nd floor will be similar to the roof framing plan with 5" diagonal tubes and additional columns at the ends continuous to the roof parapet creating a K brace in the wall plane. Steel embed plates with A706 welded rebar will be required at ends of K brace and general lateral system requiring field welds.

C 12x20.7 steel stringers are anticipated at the stairs with 16 gauge steel pans filled with concrete. 1.5" vertical pipes at 4'-0 o.c with infill between columns by others. MC 12x10.6 channel beams at the perimeter with 4" angles @ 36" o.c. could be used at the landing w/ 3.5" minimum concrete w/ # 4@ 16" o.c. each way on 0.6C x 22 Ga. Steel form deck.

The roof over the Library and storage area could be engineered wood trusses @ 24" o.c. w/ 15/32" OSB sheathing bearing on 6" light gauge steel framing, with welded flanges and double wood top plates for bearing and H2.5T hold down connections.

The front entry roof is vaulted and will require a bent steel beam or tube with a welded moment connection at the ridge to create the architectural intent. Wood or light gauge

steel studs could be used as rafters flushed framed to a ridge beam.. The south shed roof could be of matching systems with steel columns and tube steel beams to create the general massing.

Based on the 2000 psf soil bearing capacity published in the soils report, it is anticipated that a 12" x 6'-0 +/- concrete stem wall with 3 #5 top and bottom & @ 16" o.c each way centered in the wall w/ 6" brick ledge bearing on 24" x 8" deep continuous concrete footings could be used at the perimeter of the structure. It is our understanding that a 4'-0 tall brick waincot is anticipated at this time. Isolated footing pads at the interior below roof point loads could be around 8'-0 sq. x 16" deep with #5 @ 8" o.c. each way. Larger footing pads could also be anticipated at the north and south exterior walls based on point load conditions at columns from above.

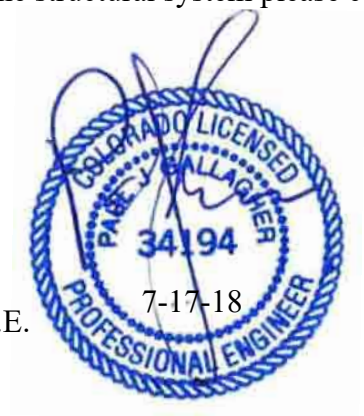
An additional 8" x 4'-0 deep stem wall and 12" deep x 10'-0 sq. continuous footing pad will be required at the elevator pit, and also facilitate as welded connection points and general ballast for the lateral resisting systems on the west wall of the elevator pit.

8" concrete stem walls and nominal 8" deep x 16" wide footings are suggested at the perimeter of the west and south exterior concrete landings and at the perimeter of the ramp. 6" reinforced concrete slabs with #4 @ 12" o.c. each way bearing on top of the concrete walls is suggested for these exterior entries.

A 5" concrete slab with #4 @ 20" o.c. founded on tested and approved structural fill could be used at the main floor elevation. Care must be exercised by the general contractor to properly compact the fill materials prior to placing the slab.

In conclusion, the aforementioned structural systems are suggested to safely support the intended loads and general use of the structure. If there are any questions regarding the general intent of the structural system please contact us directly.

Sincerely,
GEBAU, INC.



Paul Gallagher, P.E.

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