

December 29, 2025

Town of Palmer Lake  
Mr. Glen Smith – Interim Town Administrator  
42 Valley Crescent St.  
Palmer Lake, CO 80133

RE: Palmer Lake Fire Station  
Structural Condition Survey  
12 Valley Crescent St., Palmer Lake, CO 80133

Dear Mr. Smith,

At your request, we visited the site on the afternoon of October 21 to examine the building that is currently housing fire department operations for the town of Palmer Lake. You had related concerns about the structural viability of the building due to its age and condition. You also related that you have no access to any documentation regarding building construction and building history is almost entirely anecdotal. You noted you don't believe the building is on the Colorado Historic Registry.

The building is a single-story unreinforced masonry and wood framed structure built circa 1920 with an overall width of approximately 41.5 feet and an approximate overall length of 34 feet for vehicle storage and an additional approximate 24 feet of length for the bunkhouse (see attached Floor Plan). Bay #1 of the vehicle storage area and the bunkhouse were believed to have been constructed circa 1964. The demising walls between Bay #1 and Bay #2 and the bunk house is 8" CMU. The roof between Bay #2 and Bay #3 is supported by a (wood most likely) beam with two 4" diameter steel posts at approximately 3<sup>rd</sup> points of the full span. Bays #2 & #3 have a new ~14" concrete floor slab poured within the last several years. The overhead doors for each bay appear to be approximately 10 feet x 10 feet. The height of the exterior concrete masonry unit (CMU) walls varies but appear to average approximately 12'-8". The site surrounding the building is relatively flat but water run-off from heavy rainfall does flow from the west across the site causing minor flooding issues at times per the staff.

**Observations:**

The roof framing appears to be flat wood rafters. The roof in the vehicle bays appears to be 2x12's at 16" o.c. spanning north/south across the bays. This could not be directly seen because the ceiling is covered in a heavy coat of cement plaster. However, thermal imaging was used so that we could clearly see the joists in each bay. The center beam between Bays #2 and #3 is also covered in a thick coat of plaster. It is believed to be wood but could not be verified without some demolition. The bunkhouse roof framing also appears to be wood rafters spanning north/south. There are wood beams at approximately third points spanning east/west across the bunkhouse. The beams have been supplemented with full length steel rods on each side of the beams to help strengthen them and are generally used to take sag out of a roof. This condition was seen by several photos provided by the fire department staff. However, the exact repair, when or why it occurred, is unknown. The adequacy of the retrofit is also unknown as member sizes, material species and

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grades, and attachments could not be determined from the photos. It is also likely that there is not a positive connection between the roof framing and the exterior CMU walls based on the building vintage.

The exterior walls of the building and the demising walls between the vehicle storage bays and the bunkhouse and between Bay #1 and Bay #2 are 8" CMU. Cracks can be seen reflecting through the exterior plaster that clearly indicate 8" x 16" CMU blocks in a running bond pattern. The plaster coating did not allow us to fully evaluate the condition of the CMU and mortar joints. We did note significant cracks in the plaster and likely the CMU mostly at the parapet wall where it meets the roof, near the base on the west wall and near the northeast corner buttress. We would suggest that removing the plaster would indicate the CMU is in a very poor condition and likely failing in some areas. Using thermal imaging gun provided by the Fire Department, we were able to see that the CMU is not reinforced. A reinforced cell of CMU would have a different thermal image than unreinforced cells.

Building floors were concrete slab-on-grade in the vehicle storage bays and in the bunkhouse. Slabs appeared to be in fair condition with no noticeable cracking or evidence of settlement or heave. The slab in Bays #2 and #3 is fairly new as noted above.

#### **Findings/Recommendations:**

Per the 2021 International Building Code (IBC), fire stations are considered Essential Facilities and are categorized as the highest Risk Category IV (RC IV). IBC Table 1604.5 defines Risk Category IV as facilities essential to post-event response, including hospitals, fire and police stations, emergency operations centers, designated shelters, critical utilities, and structures containing hazardous materials. As such, the design and evaluation of RC IV structures utilize higher transient loads from snow, wind and seismic forces. ASCE 7 requires an increased seismic demand of 50% for RC IV structures. This is to ensure these particular structures have continuous load paths, exhibit ductile (elastic not brittle) behavior and are will not be prone to significant damage or collapse after a significant event. The intent is that these structures continue to operate to allow first responders to assist others after a significant event occurs.

Again, per the 2021 IBC, using the site-specific seismic accelerations and the 50% increase in seismic demand for being a RC IV Structure, the fire station is considered Seismic Design Category C (see attached ASCE Hazard Report). With the absence of reinforcing in the CMU walls, the building is considered an Unreinforced Masonry (URM) structure. IBC section 2101.2 prohibits lateral force resisting systems to be unreinforced masonry (URM) in Seismic Design Categories C, D, E and F. **Based on the above code provisions, the existing URM structure for RC IV occupancy must be retrofitted, strengthened, or replaced to comply with modern seismic and performance requirements.**

Retrofitting the existing building is possible and the most likely scheme would be to build a redundant structure either inside or outside the existing one. This could be wood framed shear walls, steel frames or adding a concrete reinforced shotcrete wall over the existing CMU. We don't know exactly what the roof framing is or how it is sheathed. Our speculation is that some or all of the roof framing is likely insufficient for higher RC IV loading also and would require retrofitting or replacement as well. Even though the foundations are unseen and unknown, it is likely they are

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shallow (3' or less in depth) concrete foundations and will need new spread footings added or supplementing the existing ones or a combination of both.

The cost of retrofitting is unknown without designing more detailed construction schemes that could be priced but our experience with similar structures is that these schemes are close to or even exceed the cost of a new facility. It is also highly probable that the existing facility has many operational and energy shortfalls that retrofitting would not correct but would be addressed by a new facility.

Per the 2021 Existing International Building Code, the building is “grandfathered” in for a lesser occupancy though without doing any repairs or retrofitting. It could certainly be used for such functions as a storage building. However, we would still suggest that some repairs get done. Some destructive demolition should be performed on the roof to determine the roof framing and its adequacy for current code loading as a Risk Category II (normal use) building. Plaster should be removed in some areas to determine if the CMU can be repaired with epoxy injection or repointing the mortar joints. A reroof would likely require that the roof sheathing/diaphragm be evaluated for its connection to the supporting CMU walls below to provide a positive connection.

This structural condition survey has been carried out based on a visual, non-invasive inspection of the accessible portions of the building structure. No destructive, intrusive, or hidden-condition investigations were performed unless explicitly stated. Observations and assessments are therefore limited to what was visible at the time of the inspection.

This report is intended solely to provide an opinion on the apparent condition and general structural performance of the building structure based on the visible evidence available. It is **not** a guarantee of structural adequacy, nor does it establish any warranty—express or implied—regarding the long-term performance of the structure. If significant structural concerns, active movement, or concealed defects are suspected, the owner is strongly advised to obtain further assessment, which may include geotechnical investigation, monitoring, excavation, probing, or destructive testing to further evaluate internal conditions and stability.

This survey and report are prepared exclusively for the use of the client identified herein. No third party may rely on its contents without the express written consent of the preparer. Please feel free to contact us regarding this report and if we can be of any further assistance.

Respectfully,

Jon A. Dietrich, P.E.  
MGA Structural Engineers, Inc.



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**Photos:**



Photo 1: Front east elevation of fire station with 3 bays. Note cracks in the plaster along the parapet.

Photo 2: South wall looking northeast under the fire truck roof structure. Notice cracking in plaster defining the 8"x16" CMU blocks. Lots of plaster patches were presents.



Photo 3: West elevation looking north.  
Note overhead door infill. Note lots of  
plaster cracks especially near grade.



Photo 4: North elevation.

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Photo 5: North elevation near the east end with significant cracking in the plaster and lots of patches. Most the cracking appear to be at the interface of the roof and parapet.



Photo 6: Northeast corner buttress. Lots of significant cracking in the plaster and patching that has occurred.

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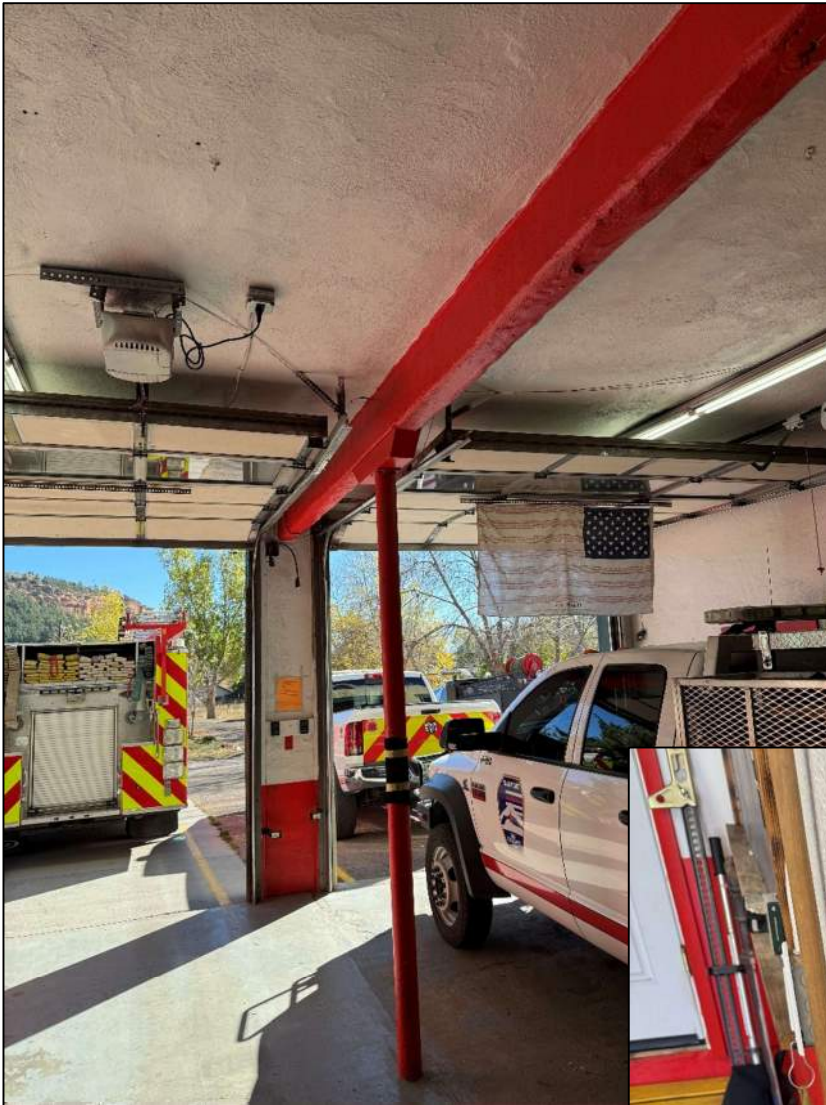


Photo 7: Inside Bays #2 and #3 looking east. Note red beam bisecting the bays and steel post. Plaster is on the ceiling and all wall surfaces.



Photo 8: Demising wall between Bays #1 and #2. Likely 8" CMU that was the original exterior wall. Note concrete slab-on-grade floors.

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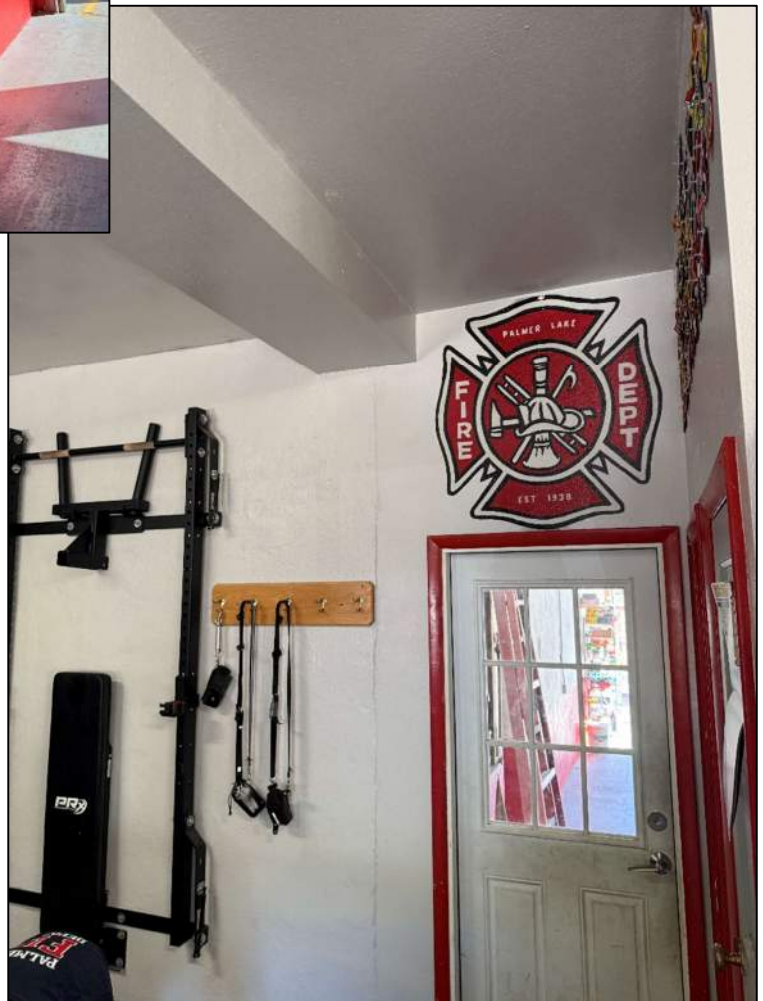
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Photo 9: Interior north wall looking northeast. Note some minor cracking in the plaster mostly near a window infill.

Photo 10: Beam and bearing location inside bunkhouse looking east.



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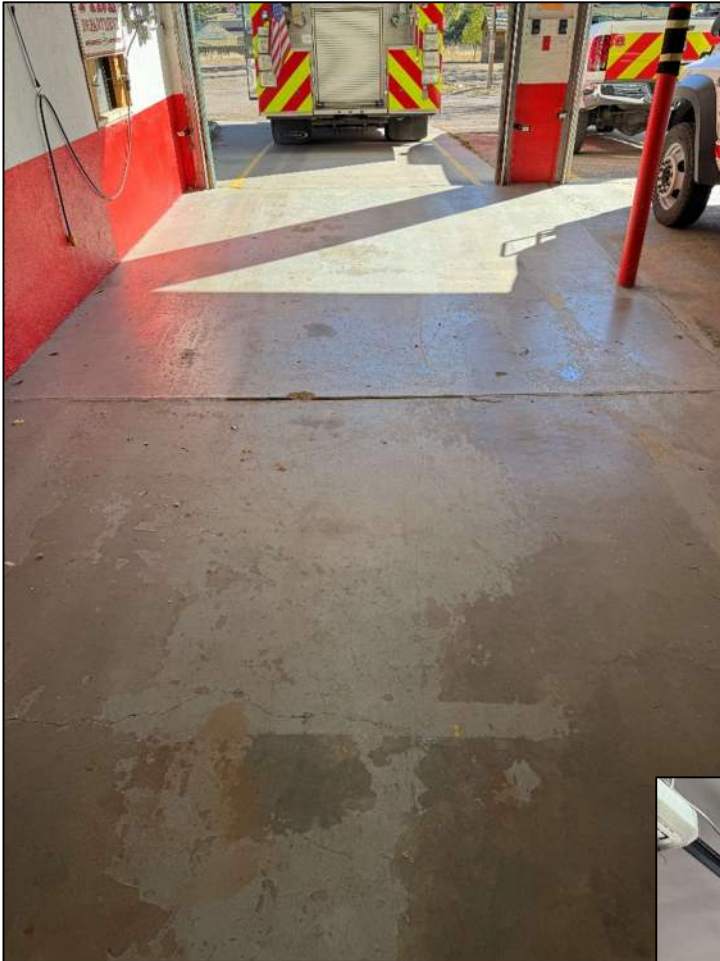
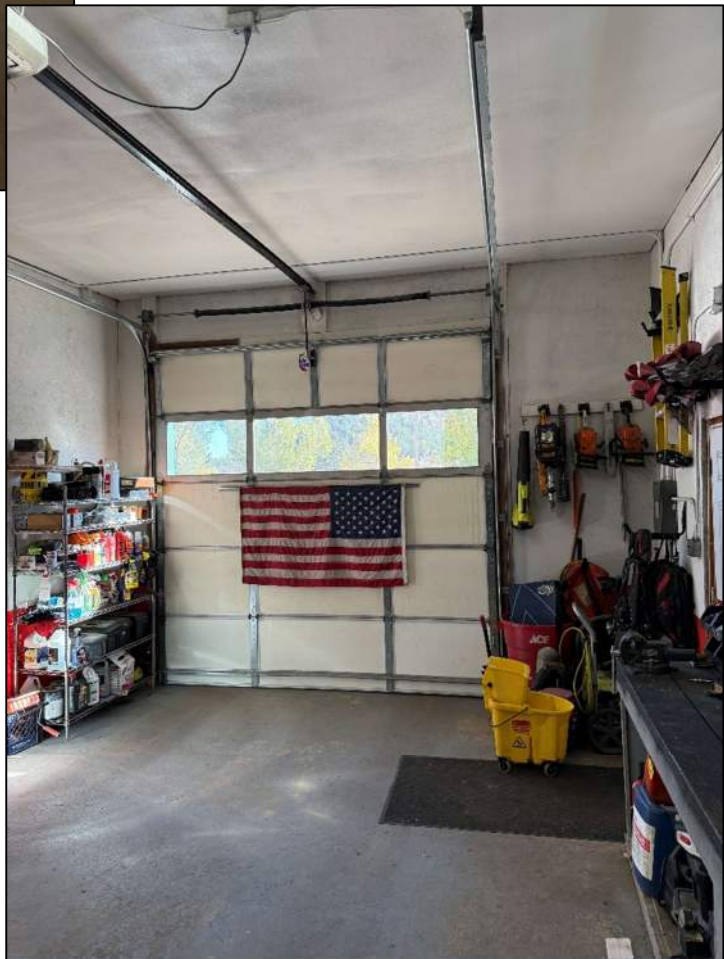
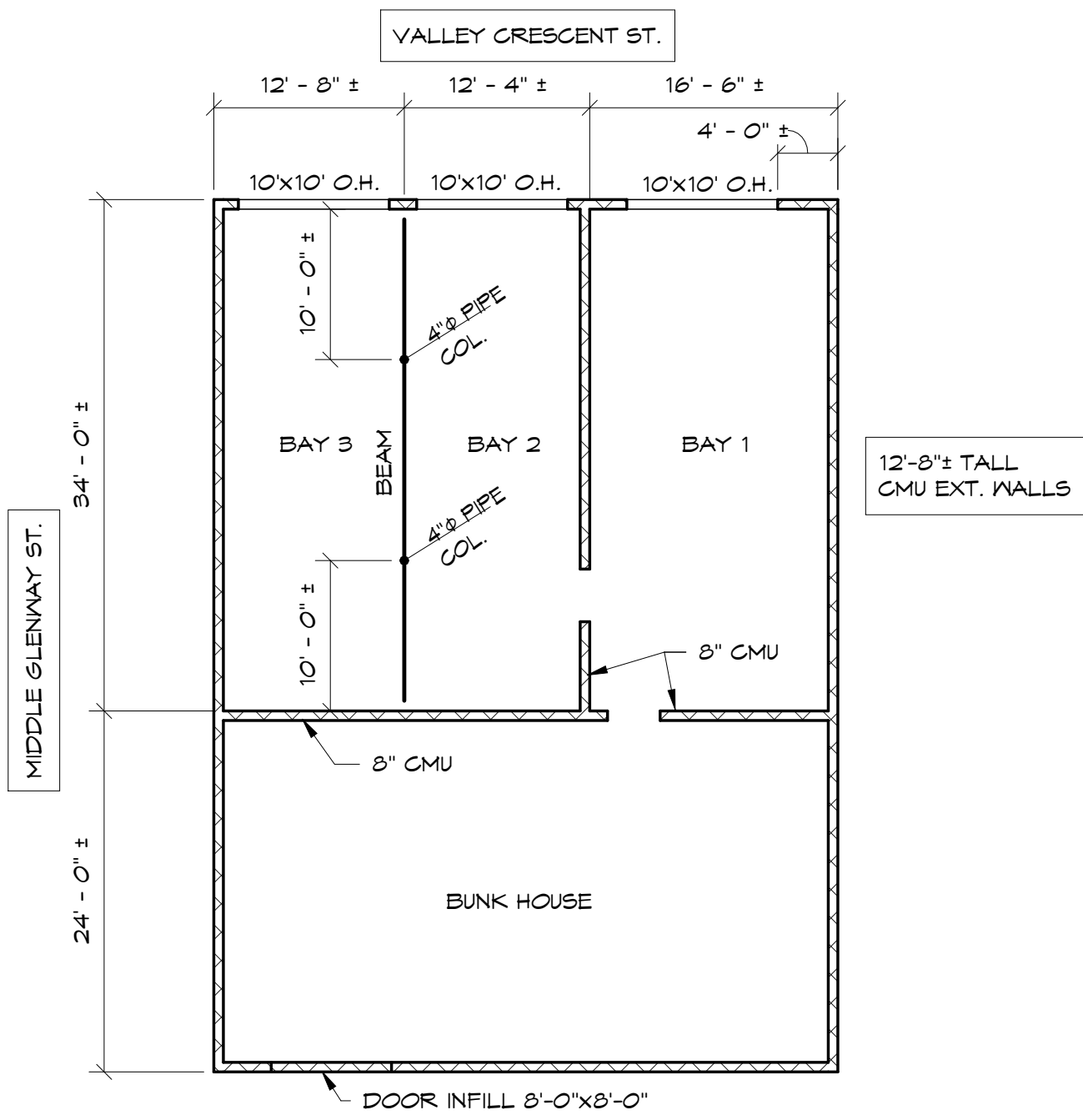


Photo 11: Slab-on-grade floor in Bay #3 looking east. Slab is in fair condition with some minor spalls. Slab is supposedly 14" thick and fairly new per staff.

Photo 12: Slab-on-grade floor in Bay #1 looking east. Slab is in fair condition with some minor spalls and cracking. Slab is supposedly original construction circa 1960's.






**FLOOR PLAN**  
 3/32" = 1'-0"

  
**STRUCTURAL ENGINEERS**  
 115 SOUTH WEBER STREET, SUITE 101  
 COLORADO SPRINGS, CO 80903-1900  
 (719) 635-4473      www.mgase.com

**PALMER LAKE FIRE STATION**  
 12 VALLEY CRESCENT ST.  
 PALMER LAKE, CO  
 PROJECT NUMBER: 25106

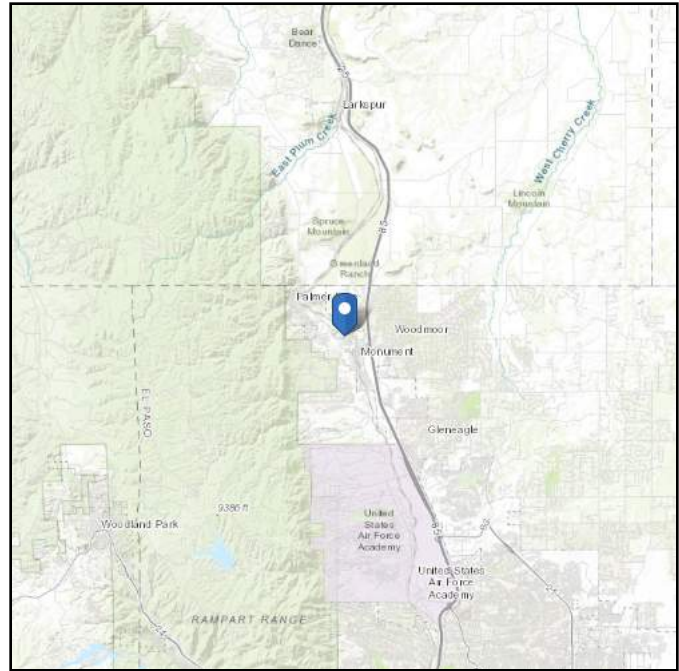
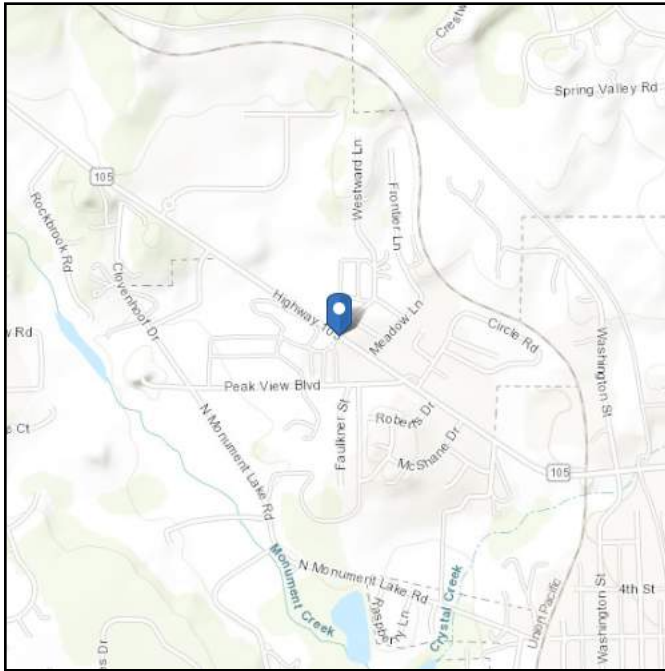
DATE: 12/23/25  
 DESIGNED: JAD  
 DRAWN: KG  
 CHECKED: JAD  
**S1.1**  
**FLOOR PLAN**

# ASCE Hazards Report

**Address:**  
Palmer Lake  
Colorado,

**Standard:** ASCE/SEI 7-16  
**Risk Category:** IV  
**Soil Class:** D - Default (see Section 11.4.3)

**Latitude:** 39.101463  
**Longitude:** -104.882056  
**Elevation:** 7005.784466668691 ft (NAVD 88)



## Wind

### Results:

Wind Speed	117 Vmph
10-year MRI	77 Vmph
25-year MRI	84 Vmph
50-year MRI	88 Vmph
100-year MRI	93 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1D and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Mon Dec 08 2025

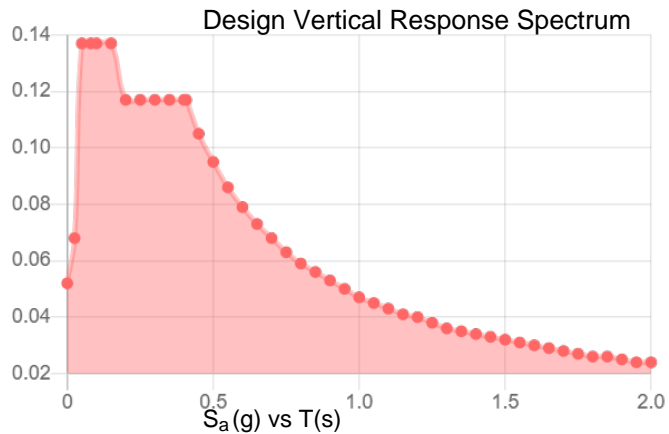
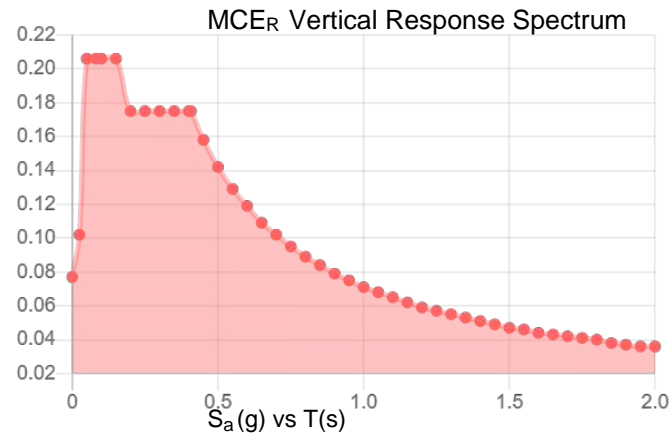
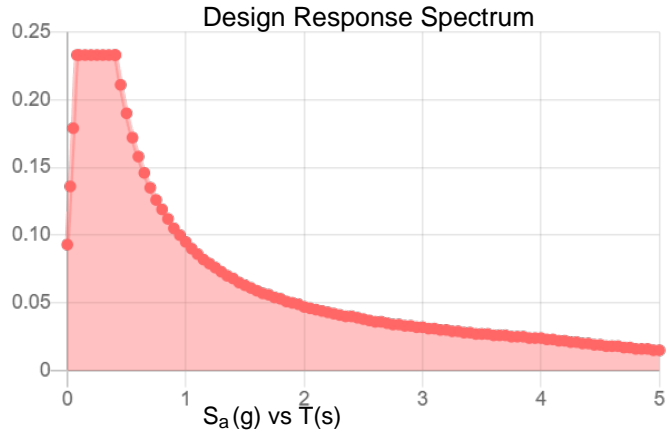
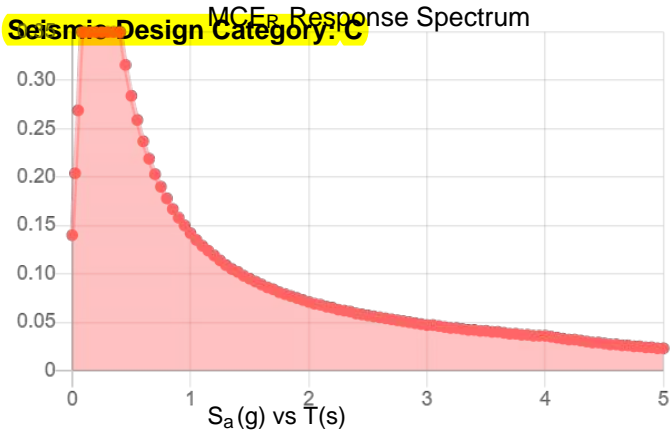
Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 1.6% probability of exceedance in 50 years (annual exceedance probability = 0.00033, MRI = 3,000 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

**Site Soil Class:** D - Default (see Section 11.4.3)

**Results:**

$S_s$ :	0.218	$S_{D1}$ :	0.095
$S_1$ :	0.059	$T_L$ :	4
$F_a$ :	1.6	PGA :	0.122
$F_v$ :	2.4	PGA <sub>M</sub> :	0.19
$S_{MS}$ :	0.35	$F_{PGA}$ :	1.556
$S_{M1}$ :	0.142	$I_e$ :	1.5
$S_{DS}$ :	0.233	$C_v$ :	0.737



**Data Accessed:** Mon Dec 08 2025

**Date Source:**  
 USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.