5 July 2024

Mr. Steven Jones, PE
Dewberry
990 S. Broadway, Suite 400
Denver, CO 80209

Voice: 303.951.0618

RE: Noise Assessment and Mitigation Design Recommendations
Lower Skyway Pump Station, Update #1
EDI Job # C-4459

Dear Mr. Jones:

Engineering Dynamics, Inc. has completed a noise impact analysis for the planned Lower Skyway Pump Station, located at the southwest corner of Broadmoor Valley Rd. and Star Ranch Rd. in Colorado Springs, Colorado. See Figures 1 and 2.

1.0 Background

1.1 Site Layout

The site is located on a currently vacant parcel with existing residential on the north side of Broadmoor Valley Rd. and east side of Star Ranch Rd., see Figure 1. There is no topographic relief between the building location and the nearest residences that would provide any attenuation of pump station noise. Therefore, all noise mitigation must be contained within the building structure.

Figure 2 shows the building on the site layout and distances from the building to the nearest residential neighbors, with the nearest residential property lines ~80 feet from edges of the building.

1.2 Building Construction

Figure 1.2.1 shows the proposed interior layout of the Lower Skyway Pump Station. Exterior wall construction as shown in Lower Skyway Pump Station 30% Design Submittal drawings dated Ape-24,

Exterior Walls – 8” CMU walls fully grouted with normal weight concrete grout, with cement board siding and trim on continuous nail base insulation.
Roof – Wood truss roof with R-49 fiberglass batt insulation, OSB and shingles on outer side and 5/8-inch gypsum in inner side.
Windows – no exterior windows in the pump room. Other windows false windows as shown in Figure 3.1.3.
Exterior entry Door – steel or solid core wood doors
Maintenance Doors – Typical insulated roll up commercial door.

1.3 Noise Levels Inside Existing Building

The Lower Skyway pump station will have three pumps of similar size to the existing Roxbury Pump Station. Measured sound levels inside the Roxbury Pump Station were made on 18-Apr-24. Results of these measurements with all three pumps operating are shown in Figure 1.3.1. The overall sound level inside the building was 84 dBA. These measured noise levels have been used to calculate predicted sound levels at the nearest residences.

Note: This sound level is high enough that operators / maintenance people working inside the pump rooms should wear hearing protection.

1.4 Existing Background Noise Levels, Exterior to Building

Existing background sound levels were measured at the nearest residences to the pump station. These measurements show, the following sound levels when no vehicle traffic is present on Broadmoor Valley Rd. and Star Ranch Rd.

Daytime – 40 to 55 dBA
Nighttime – 30 to 45 dBA

1.5 Applicable Noise Ordinance / Law

The City of Colorado Springs and El Paso County ordinances on noise levels have the same noise limits,

Residential Noise Limits		
	Daytime 7am to 7pm	Nighttime 7pm to 7am
City of Colorado Springs Section 9.8.104 Permissible Noise Levels	55 dBA	50 dBA
El Paso 02-1, Maximum Permissible Noise Levels	55 dBA	50 dBA

The noise limits listed above are for stationary noise sources from one property onto another property. In this case from the pump station property onto nearby residential properties.

2.0 Predicted Noise Levels

Using the design information and measured sound levels the predicted sound levels at the nearest residential neighbors are,

2.1 Residences to the North (North Side of Broadmoor Valley Rd.)

Table 2.1 shows predicted sound levels at the residential property lines to the north of the facility with and without the Vestibule (Room 104). While the predicted sound levels are still below the City of Colorado Springs and El Paso County noise ordinance levels for residential properties, the 3-pump operating mode may be audible at residential property line during nighttime hours. EDI recommends that the vestibule be retained in the design.

Table 2.1: Predicted Sound Levels at Residences on North side of Broadmoor Valley Rd., dBA

	Exterior Side of Residence		Interior of Residence with Windows Closed	
	With Vestibule 104	Without Vestibule 104	With Vestibule 104	Without Vestibule 104
One Pump Operating	25	28	<10	<15
Three Pumps Operating	30	34	<10	<15

2.2 Residences to the Southeast (Southeast side of Star Ranch Rd.)

Table 2.2 shows predicted sound levels at the residential property lines to the southeast of the facility with and without the Vestibule (Room 105) and for various door configurations. While the predicted sound levels are still below the City of Colorado Springs and El Paso County noise ordinance levels for residential properties, eliminating the vestibule or the inner door will result in both the 1 and 3-pump operating modes being audible at residential property lines, during nighttime hours. EDI recommends that the vestibule be retained in the design and that the two-door design also be retained. Any of the two door configurations below is acceptable.

Table 2.2: Predicted Sound Levels at Residences to Southeast side of Broadmoor Valley Rd., dBA

		Vestibule 105 Configuration	One Pump Operating	Three Pumps Operating
Exterior Side of Residence	Current Design	With Vestibule 105	25	30
		Without Vestibule 105	35	40
	Replace Exterior Barn Door with Overhead Door (insulated)	With Vestibule 105	22	27
	Remove Inner Door and Wall on Vestibule 105	With Vestibule 105	35	40
	Replace inner Vestibule 105 Inner Door with Segmented Acoustical Partition	With Vestibule 105	20	25
Interior of Residence	Current Design	With Vestibule 105	<10	<10
		Without Vestibule 105	<15	<15
	Replace Exterior Barn Door with Overhead Door (insulated)	With Vestibule 105	<10	<10
	Remove Inner Door and Wall on Vestibule 105	With Vestibule 105	<15	<15
	Replace inner Vestibule 105 Inner Door with Segmented Acoustical Partition	With Vestibule 105	<10	<10

2.3 False Window Construction

With the current design and the current size of the false windows, the difference between using 4-inch CMU and 6-inch CMU in the window construction will result in predicted sound levels at the residences to the north and southeast of less than 1 dBA.

2.4 Acoustical Analysis Summary

Predicted noise levels at the nearest residences to the Lower Skyway Pump Station are,'

a. Well below the City of Colorado Springs and El paso County Daytime and Nighttime noise limits.

b. With the Vestibule 104 built sound from pump operations will be inaudible for the residents to the North for both 1-pump and 3-pump operations.

c. With Vestibule 105 built and any of the two-door configurations sound from pump operations will be inaudible for the residences to the Southeast for both 1-pump and 3-pump operations.

d. Inside nearby residences noise from pump operations will be inaudible.

3.0 Noise Mitigation Recommendations

Below are design recommendations to minimize noise emissions from the building,

3.1 Building Exterior Façade Element Recommendations

3.1.1 Entry (Room 104)

Keep proposed vestibule at main entry access door as shown in Figure 3.1.1. Vestibule construction shall be

a. Walls as shown on 30% design drawings.

b. Roof as shown on 30% design drawings.

c. Entry Doors shall be steel door with jamb smoke seals and door bottom sweep or automatic door bottom.

d. False window construction as shown in Figure 3.1.3.

3.1.2 Vestibule (Room 105)

Keep proposed vestibule at maintenance access door as shown in Figure 3.1.2. Vestibule construction shall be

a. Walls as shown on 30% design drawings.

b. Roof as shown on 30% design drawings.

c. Entry Doors shall be steel door with jamb smoke seals and door bottom sweep or automatic door bottom.

d. False window construction as shown in Figure 3.1.3.

e. Proposed maintenance doors are acceptable, however, carriage doors must have
   1. jamb seals around sides and top of door,
   2. Astragal seals,
   3. Door bottom seal / sweep,
   4. Door thickness must be minimum of 3 inches solid wood, and
   5. Glazing in door must have a minimum STC rating of 28.

f. Install a minimum of 80 sq. ft. of absorptive panel onto the ceiling and uppers walls of the vestibule. The acoustic panel shall have a minimum Noise Reduction Coefficient (NRC) of 0.75 as installed. This will absorb some of the noise transmitting through the inner roll-up door, before transmitting through the outer door.

If you have any questions, please contact me at our Englewood office.

Sincerely,
ENGINEERING DYNAMICS, INC.

Stuart D McGregor

Stuart D. McGregor, P.E.
President

Figure 1: Lower Skyway Pump Station Site

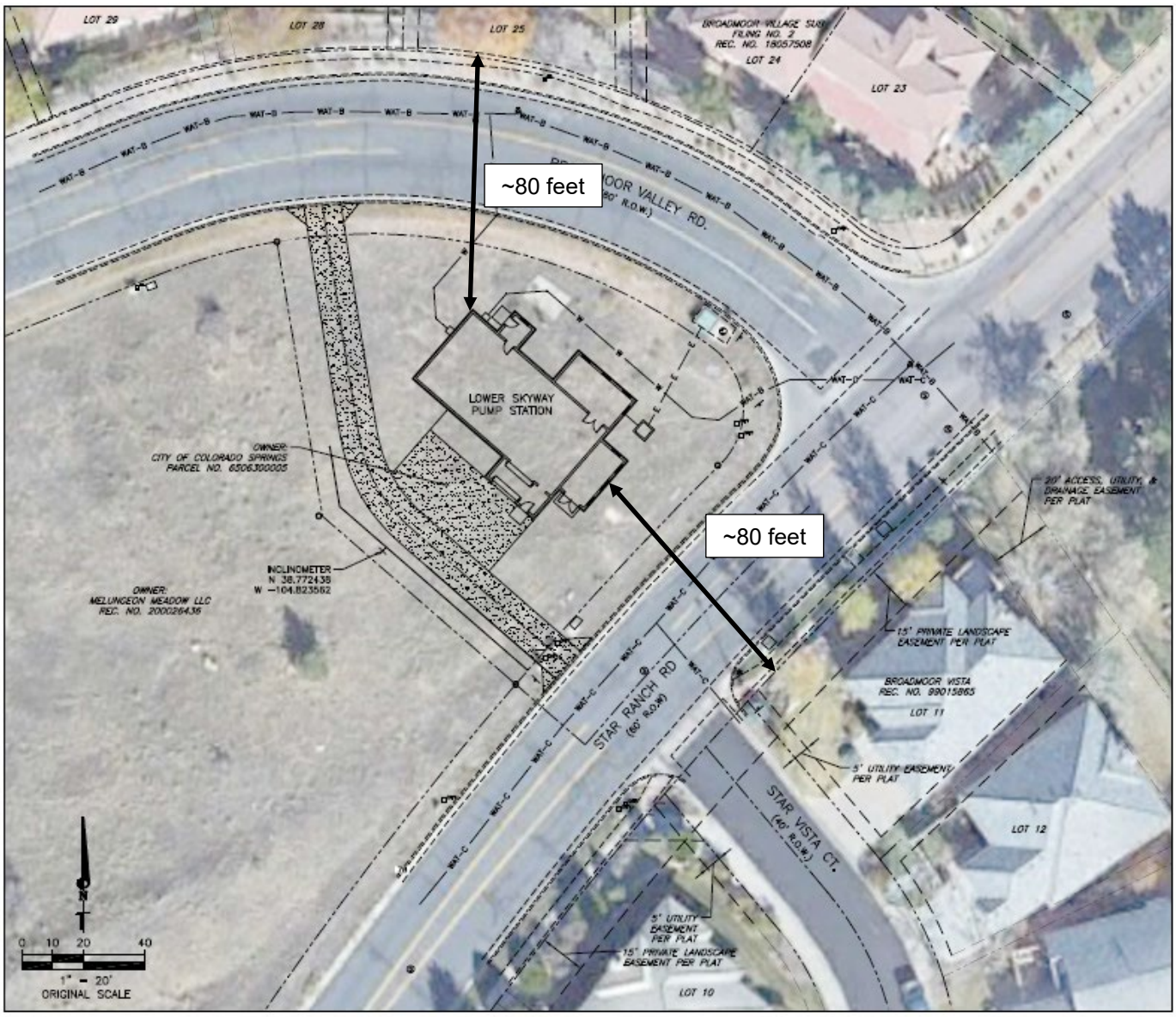

Figure 2: Approximate Site Layout

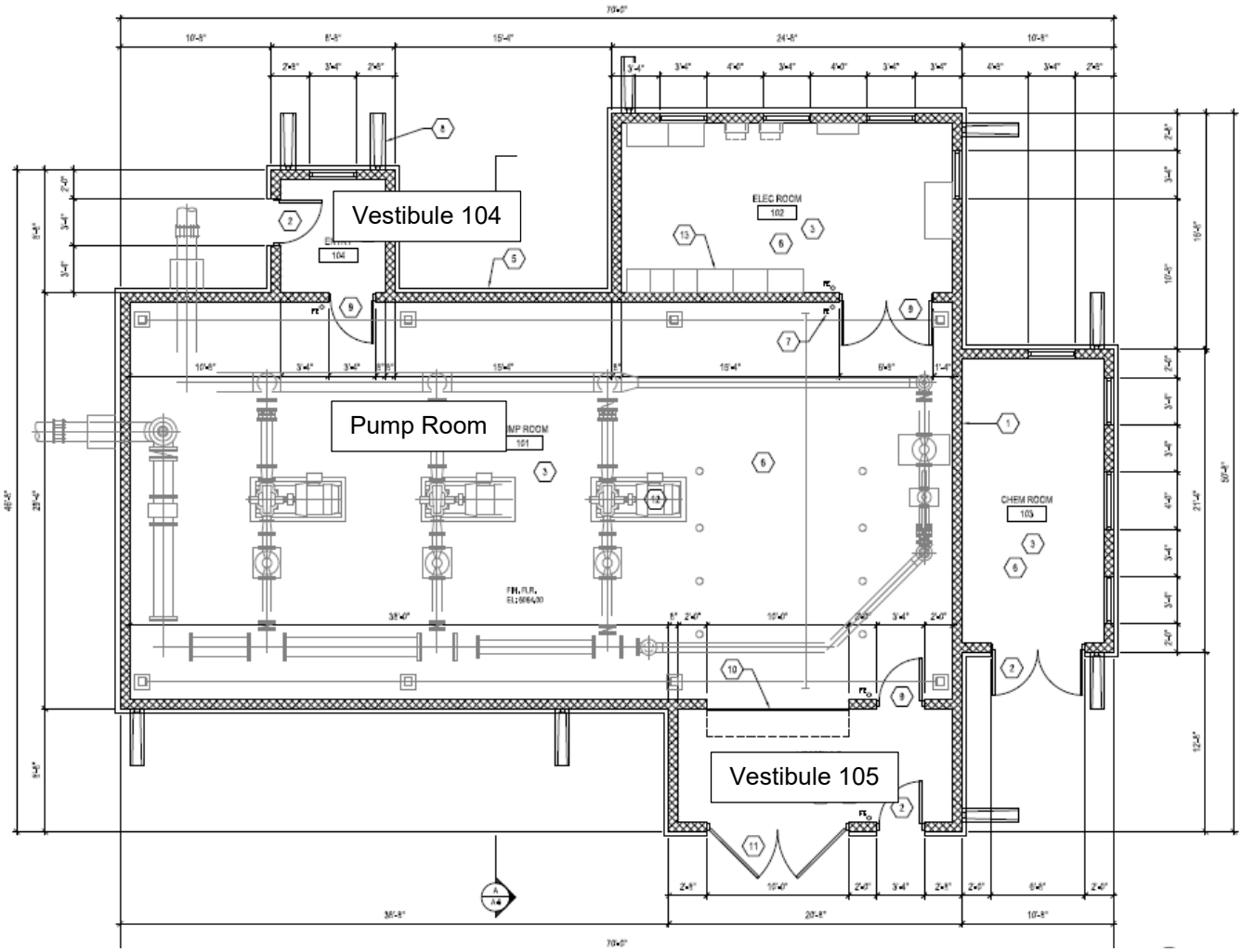

Figure 1.2.1: Proposed Inside Layout of the Lower Skyway Pump Station

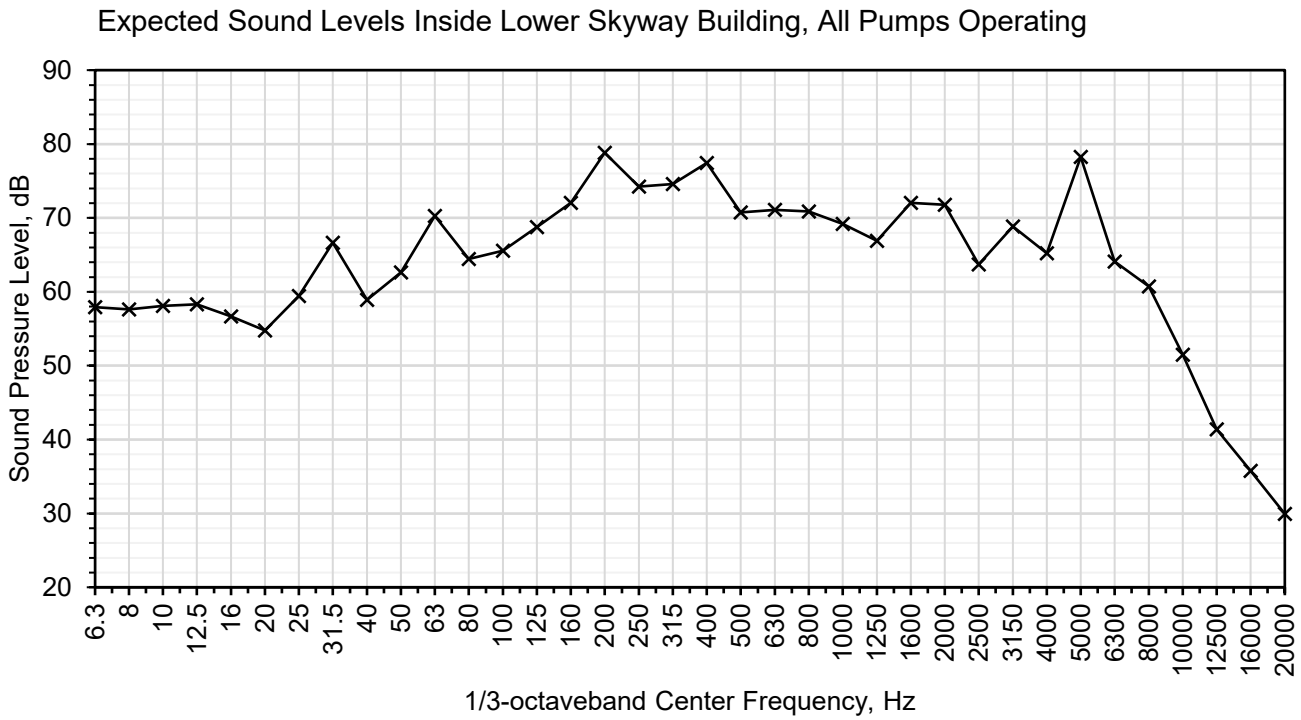

Figure 1.3.1: Expected Sound Levels Inside Lower Skyway Pump Station, All Pumps Operating

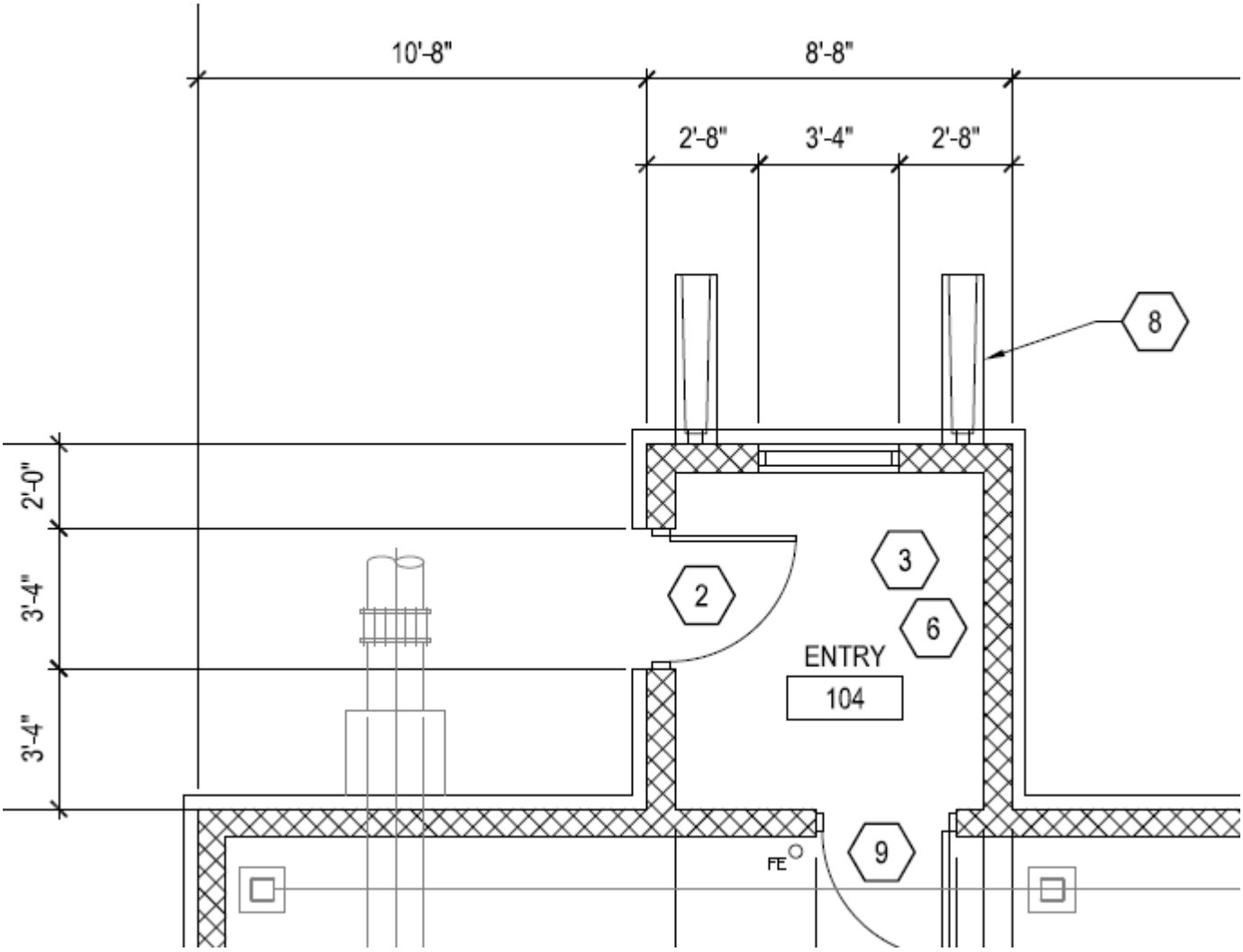

Figure 3.1.1: Main Access Entry Door

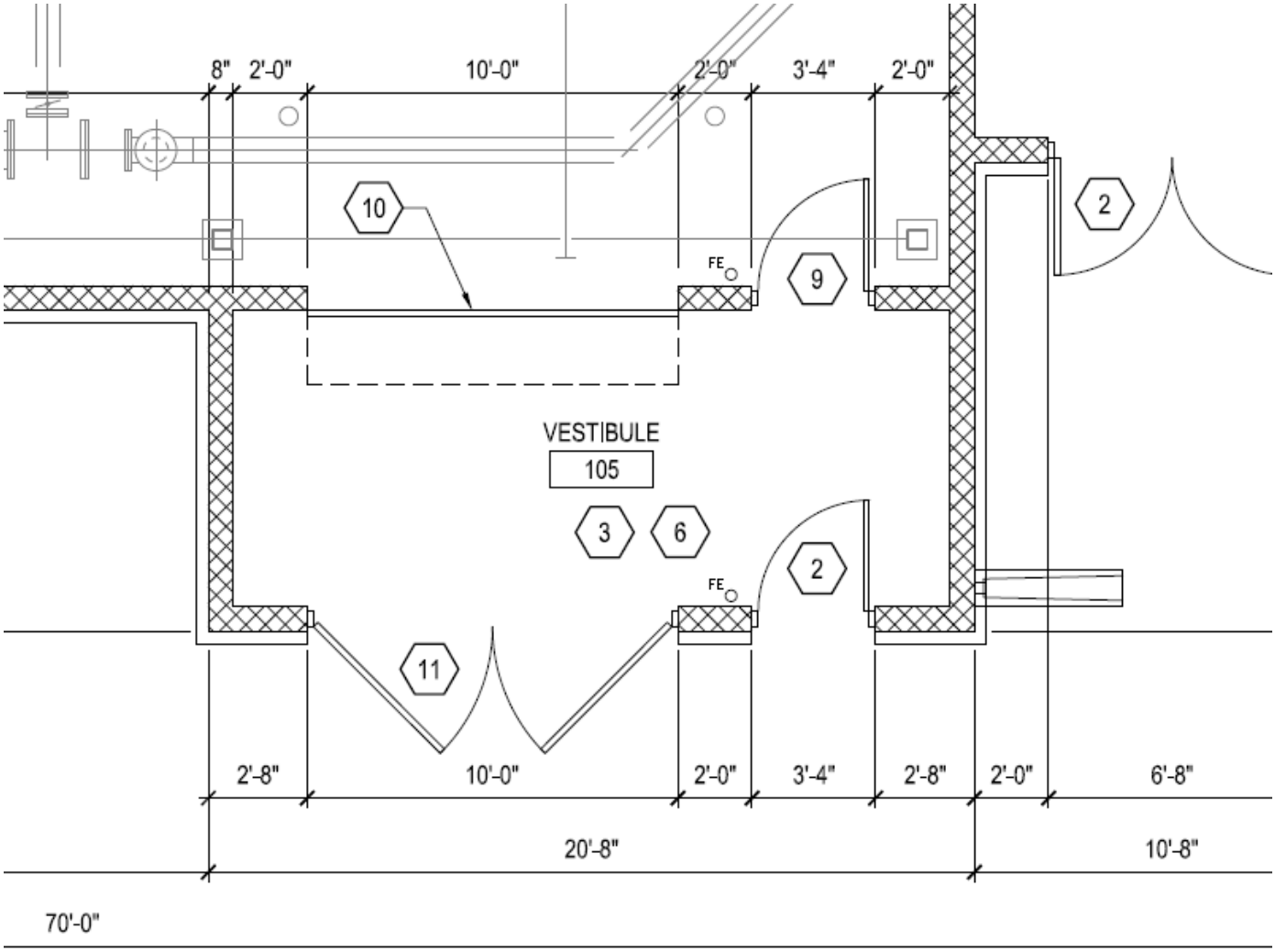

Figure 3.1.2: Maintenance Access Vestibule

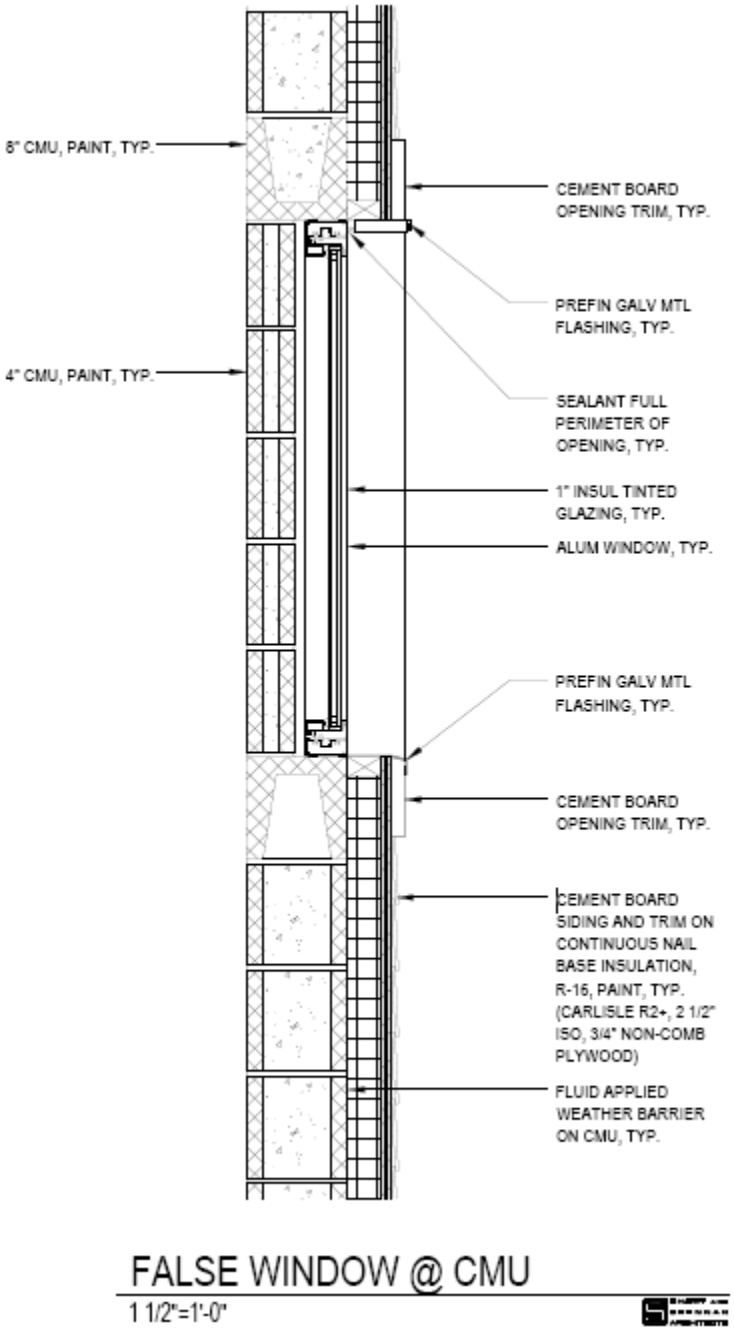

Figure 3.1.3: False Window Construction