



Designing Structures for Elevators

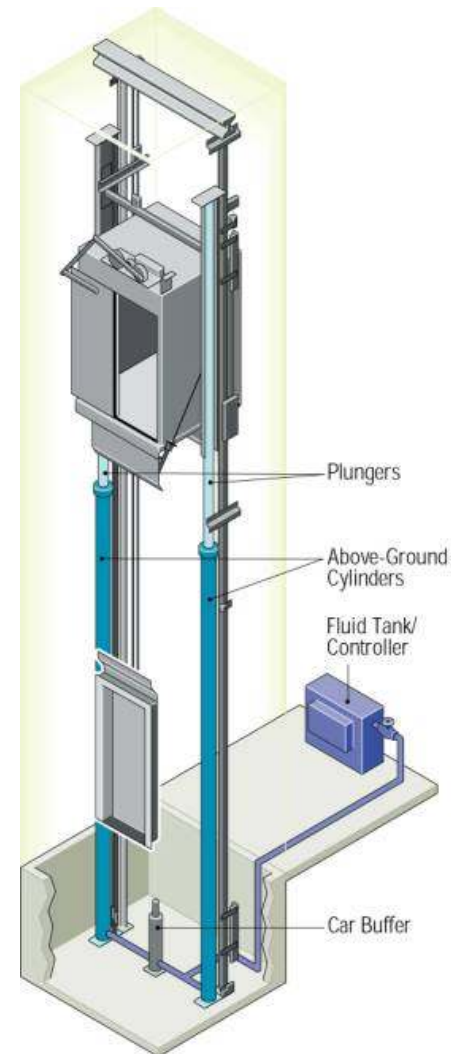
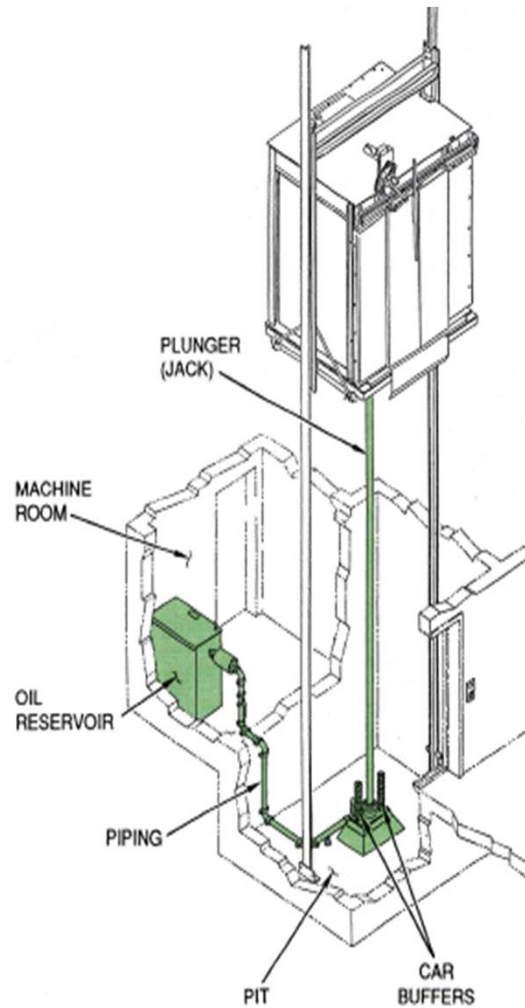
Mike Liebing
Otis Elevator Company
Manager , Alaska
(907) 227-2575 , mike.liebing@otis.com

Agenda

- Elevators 101 : Hydraulic – VS - Traditional Traction - VS - MRL
- Forces on the Structure – Pit, Rails and Overhead
- Forces on the pit, sump location
- Rail forces – Attachments, Spacing
- Forces at the top of the shaft, Overhead clearances
- Coordinating with architectural drawings – Dimensioning, Fire rating, rough Openings, Slab at the front wall.

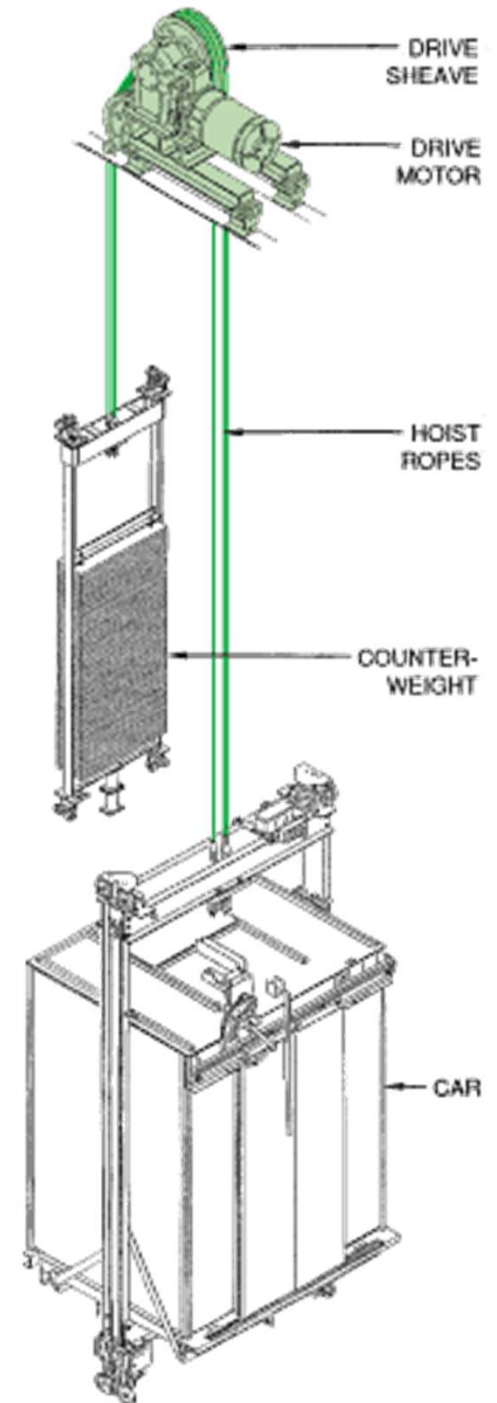
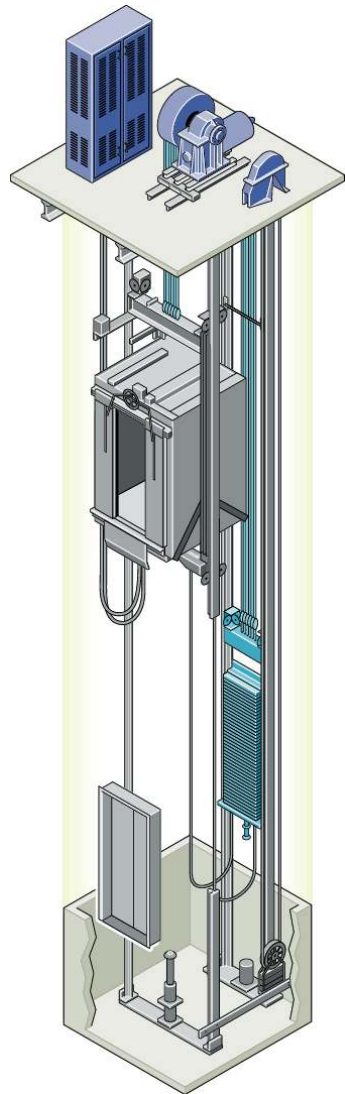
Elevator 101

- Type of Elevator - **Hydraulic**
- Low rise < 30' Travel , < 150 FPM (most are 100-125)



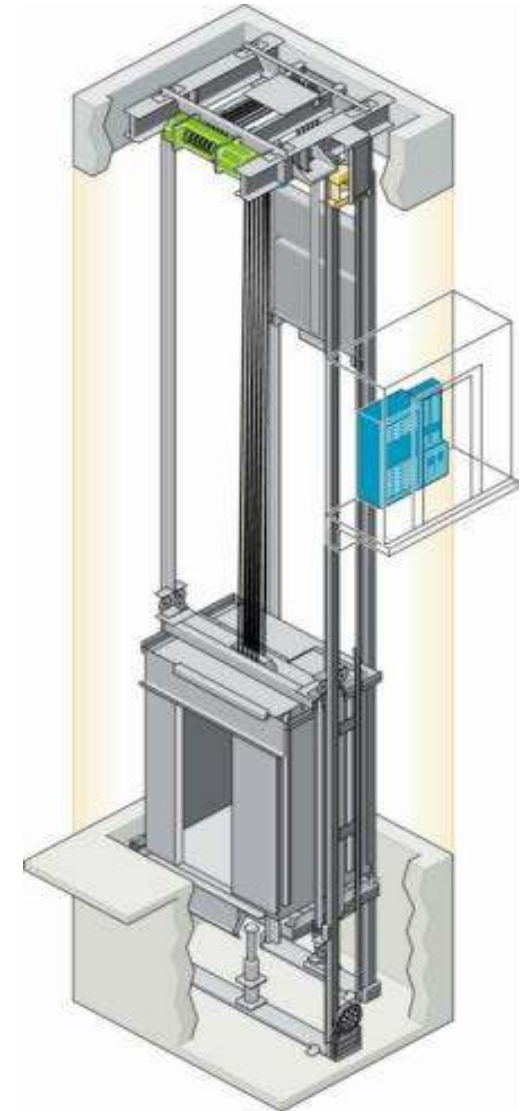
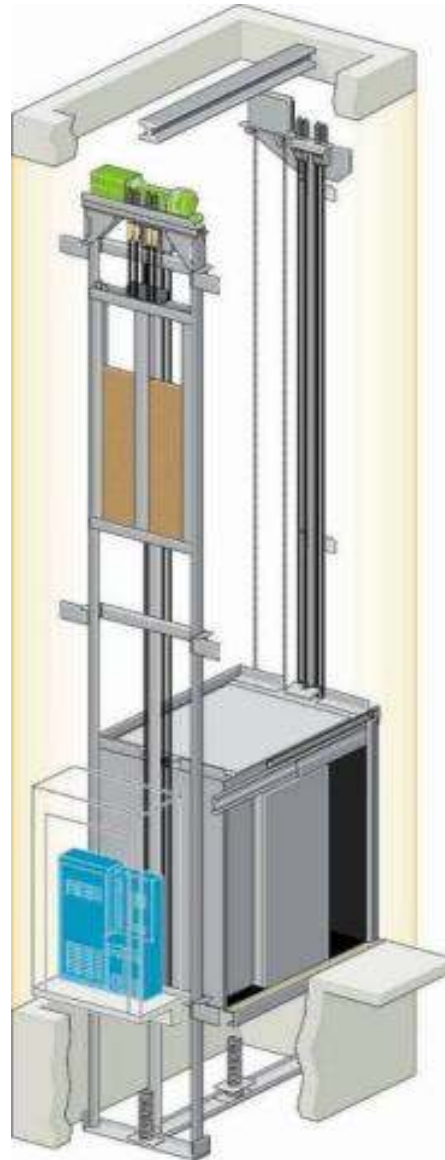
Elevator 101

- Type of Elevator – Traditional Traction
 - Speeds from 150- 2200 FPM
 - From 3 stories to the tallest buildings in the world.



Elevator 101

- Type of Elevator MRL – Traction
- Rail mounted Machine–
 - 3 to 15 Floors
 - Speeds 150-350 FPM
- Structural Steel Mounted
 - 8 to 60 Stories
 - 350 – 500 FPM



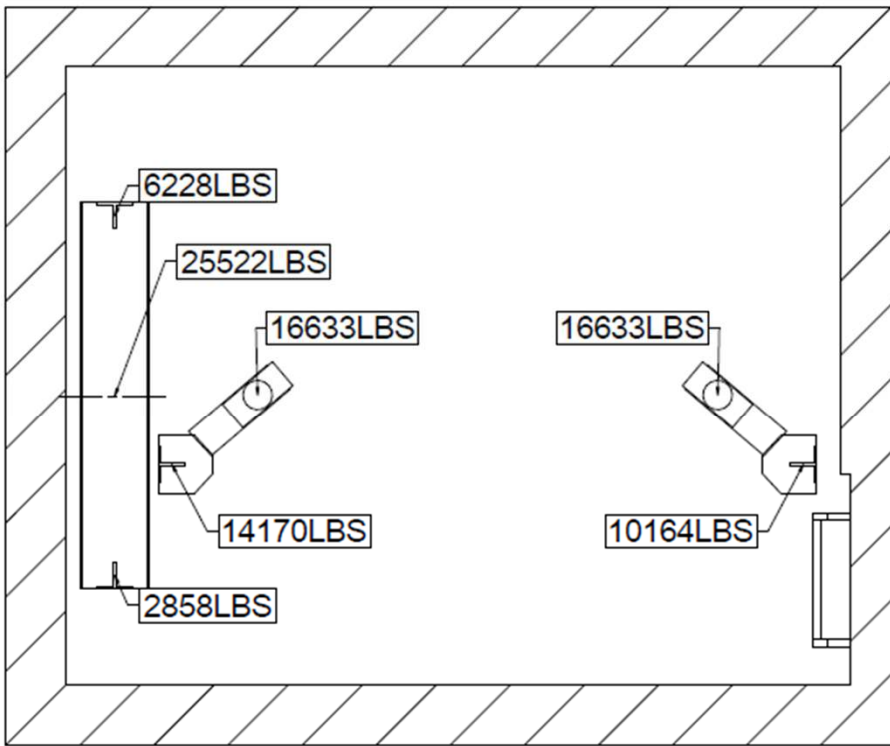
Forces Imposed on the Structure

- Forces on the pit
 - Car Buffer loads
 - Counterweight Buffer Loads
 - Rail Impact



ELEV. NO. 1	SEISMIC APPLICATION	VX	2160 lb6
		VY	1080 lb6
	R1	279 lb6	
	R2	144 lb6	
EACH BUFFER IMPACT LOAD			10027 lb6
EACH CYLINDER IMPACT LOAD			7800 lb6
CAR MAXIMUM BRACKET SPACING			14'-0"
PLUNGER MAXIMUM BRACKET SPACING			14'-0"

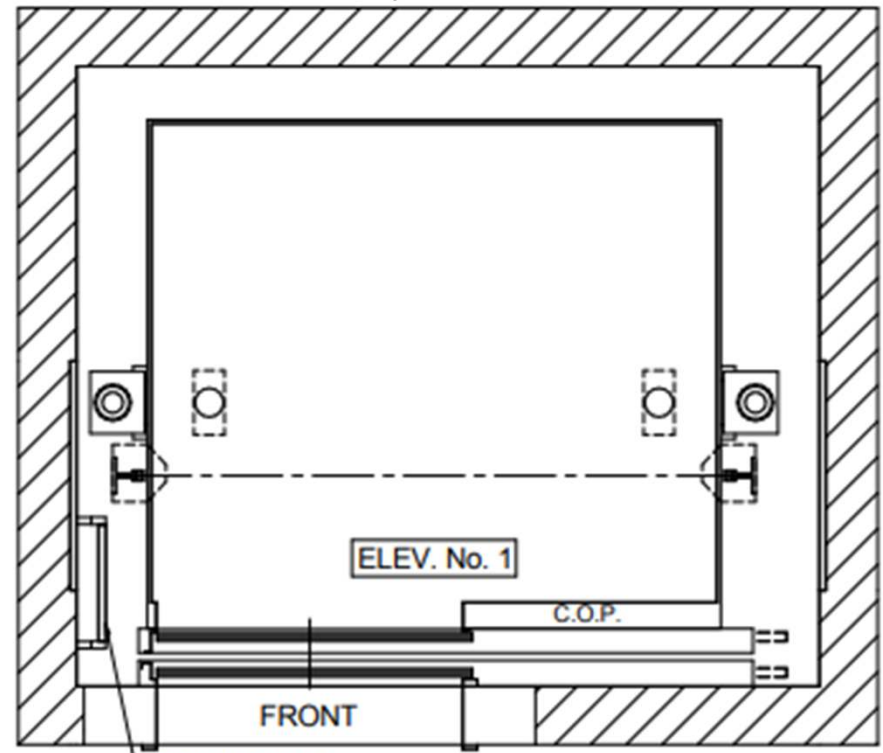
MRL Traction



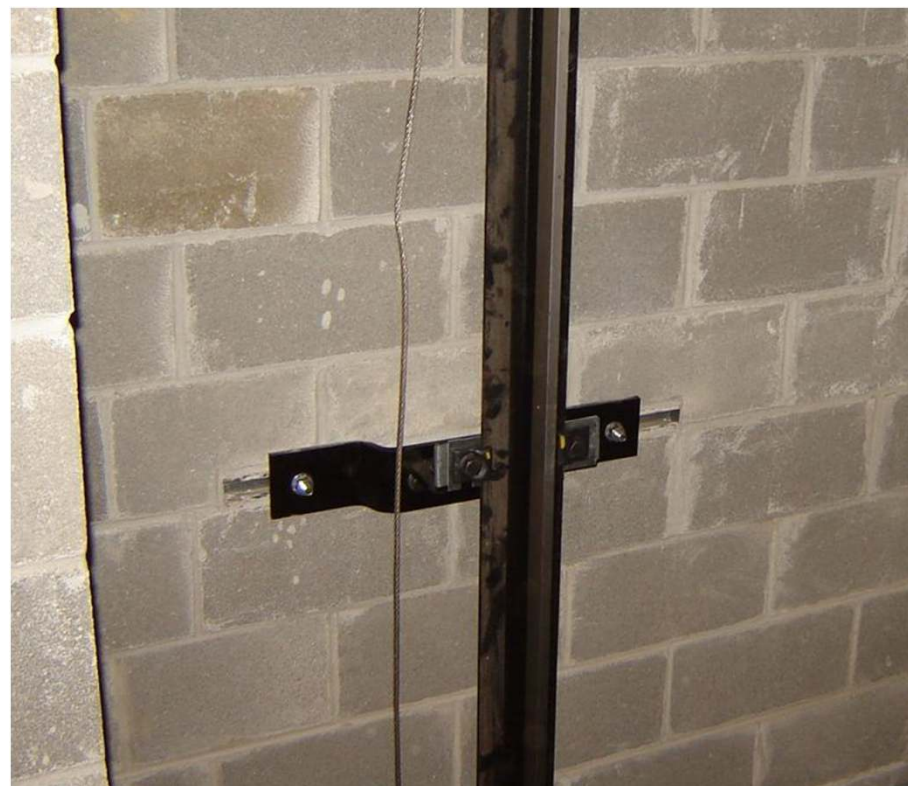
PIT PLAN VIEW

FORCE SHOWN INCLUDES DOUBLING FOR IMPACT

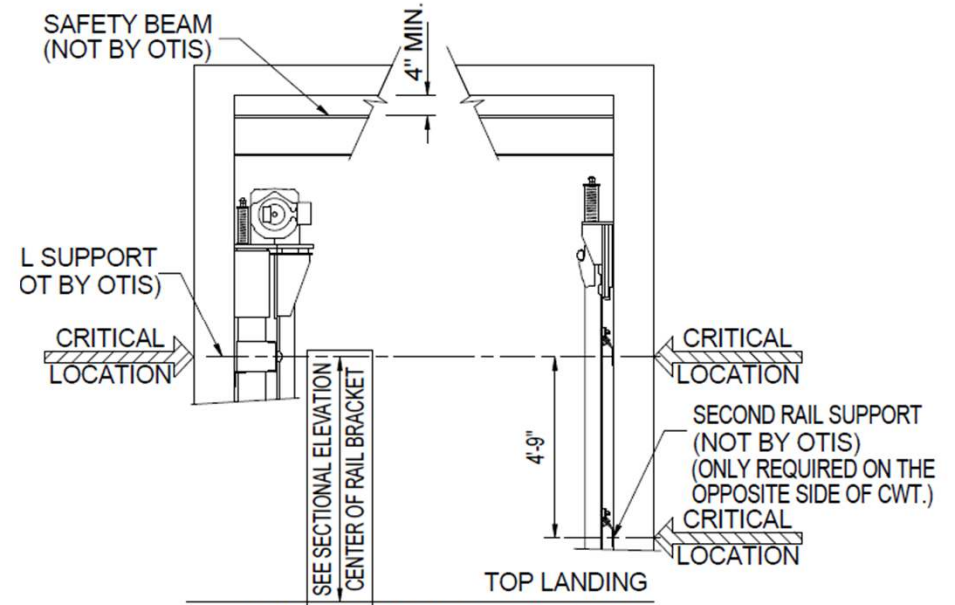
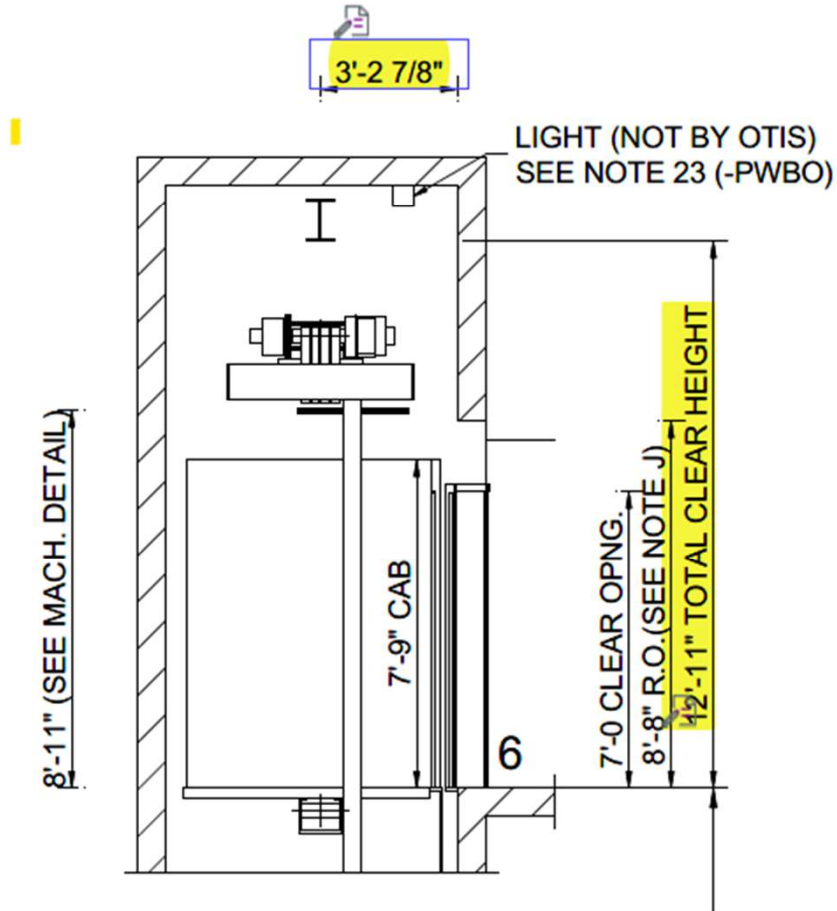
Hydraulic



Elevator Guide Rails and Brackets



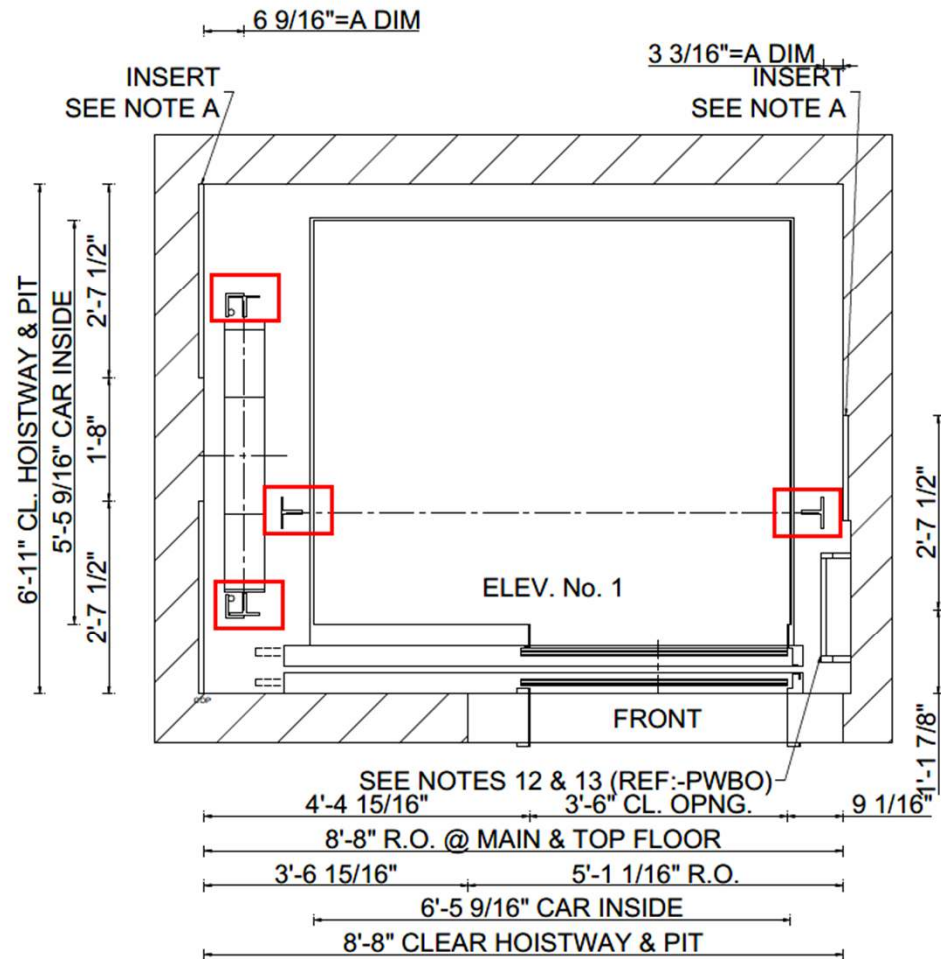
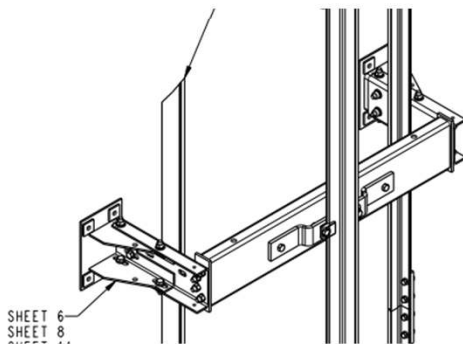
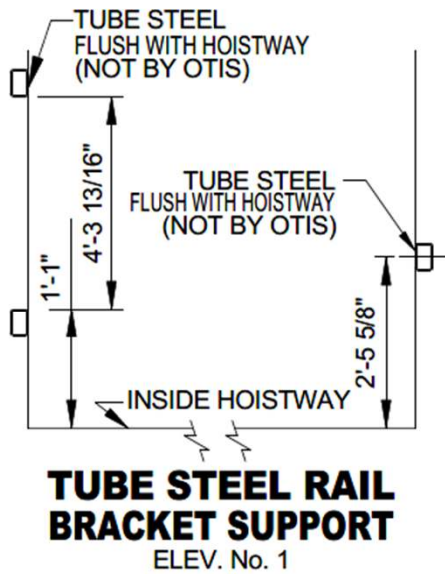
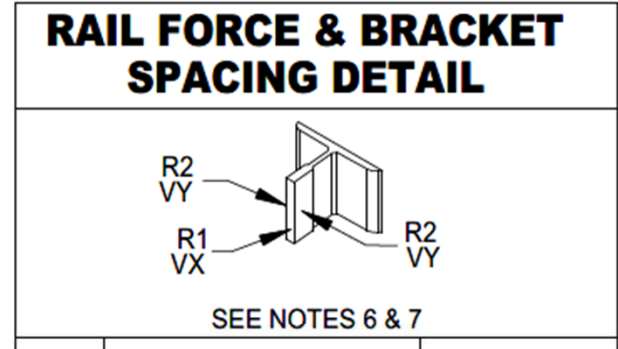
Top of Shaft



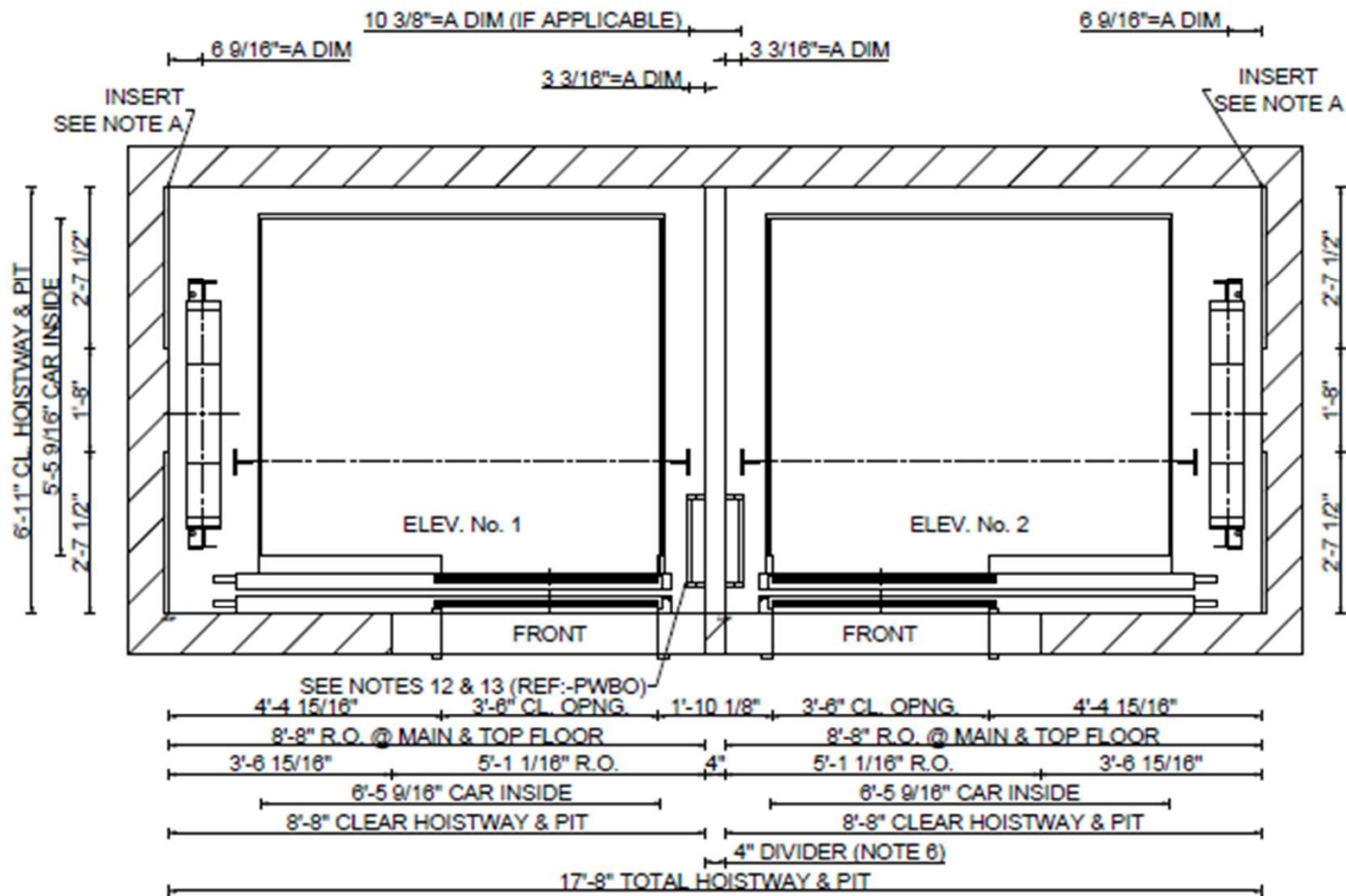
MACHINE DETAIL

**ALL LOCATION DIMENSIONS TO FOLLOW A TOLERANCE OF +/- 1"

Rail Forces – Plan Location



Multi-car Hoistways



Architectural Coordination

- Minimum HW dimensions are taken from the “tightest point” which means the support plates or GWB not framing.
- Slab edge in the front should be flush with the front of the shaft. The other three walls can be held back for rating issues
- If support columns are contained within framed walls, then plates can be added at appropriate elevations. Column dimension need to account for this.
- Steel members such as spreader beams, vertical columns and safety beams that are not part of the actual building structure do not require fireproofing.
- Meetings with Elevator Contractor, GC, architect and structural engineer during design can eliminate many problems in the field.