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## August, 2012 Hydraulic Elevators for Mayan Tunnel - Southwest Museum : Conceptual Design Phase

## General Overview:

The conceptual designs prepared by Plum Architects call for a new high-rise hydraulic elevator to carry museum patrons from the Mayan Tunnel up to a new 2<sup>nd</sup> Floor Lobby (the existing traction elevator stops at the 1<sup>st</sup> floor lobby).

The 2014 Levin Report indicated that adding a stop would not be possible with a traction elevator because a large mechanical penthouse would be required at the top of the existing elevator tower on the south side of the building, presenting a distinct preservation design challenge. However, if a high rise hydraulic elevator was used instead of a traction, a stop could be added without increasing the overall height of the existing elevator tower. High Rise Hydraulic Elevators are being used more and more in rehab projects in major US Cities. There are four different types of high rise hydraulic elevators that are good candidates for the Southwest Museum Project.

Note that the existing hoistway is currently oversized and would be suitable for a range of additional high rise hydraulic equipment.

## **Cantilevered Rope Hydraulic**

100 foot travel distance Front and side entries okay No extensive pit or overhead clearance required More space is required because rail and jack are located on the side or rear

## Twin Jack Roped Hydraulic

This application is a holeless design where wire ropes are utilized in conjunction with two hydraulic jacks. The elevator car is lifted with a 2:1 ratio which means that for every foot that the hydraulic jack rises, the elevator car rises two feet. The use of two jacks, one on each side of the elevator, provides maximum structural stability.

- Advantages
  - No jack hole drilling is required which eliminates cost and the possibility of ground contamination
  - Travel can be as great as 100 feet without drilling for a hydraulic jack
  - Accommodates front and side openings
  - No extensive pit or overhead clearance is required
  - o Large platform designs and higher capacities can be accommodated
- Disadvantages
  - Because the rail and hydraulic jack equipment is located on the side or rear of the elevator additional hoistway space is required
  - o Greater installation time than a conventional installation

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## **Traction Low Rise Geared**

This application utilizes a geared machine, ropes, and a counterweight. The main guide rails are mounted on the side of the elevator car and two additional guide rails are mounted on one side or the rear for the counterweight. The geared machine is generally located above the hoistway. In a non-typical application the geared machine can be located at a lower landing next to the hoistway.

- Advantages
  - No risk of oil contamination
  - Accommodates front and side openings
  - Nearly unlimited floor travel
  - Has a greater energy efficiency than hydraulic applications
  - Allows for significantly greater car speeds than a hydraulic application
  - Superior performance to that of a hydraulic application
- Disadvantages
  - o Substantially higher material cost than hydraulic applications
  - Greater structural considerations because the elevator is supported at the top of the hoistway

## Machine Roomless

This application utilizes a gearless machine, ropes, and a counterweight. The main guide rails are mounted on the side of the elevator car and two additional guide rails are mounted on one side or the rear for the counterweight. The gearless machine is mounted inside the hoistway. Machine roomless elevators are an economical and intelligent alternative to typical traction elevator systems.

- Advantages
  - No risk of oil contamination
  - Has a greater efficiency than a typical geared traction application
  - Superior performance to that of a typical geared traction application
  - Flexible elevator location and layout
  - Superior building efficiency
  - No machine room which allows more productive & rentable building space
- Disadvantages
  - o Substantially higher material cost than hydraulic applications
  - o Elevator maintenance costs are generally higher
  - Newest of all elevator technologies
  - Depending on the authority having jurisdiction code issues may arise