

Tim,

I am pleased to respond to your email message, which asked for my opinion on condition assessment of archaic industrial and commercial buildings.

I am a SUNY Distinguished Professor at the University at Buffalo, and a registered civil and structural engineer in the State of California. I have been involved in the development of codes and standards since the early 1990s, including the FEMA-funded guidance on the seismic assessment and rehabilitation of buildings that was first published as FEMA 273 and 274 in 1997, and subsequently as FEMA 356 (2000) and ASCE 41 (2006, 2013, 2017).

Condition assessment of archaic buildings is generally used to support decision making, including development of rehabilitation or repair options. In my opinion, a formal condition assessment of an archaic building should involve the following tasks:

1. Review of as-built drawings and calculations, and construction photographs, if available.
2. Walkdown of the building to document the as-built construction, including the elements of the gravity- and lateral-load-resisting systems (i.e., for wind and earthquake loadings), and non-structural elements.
3. Survey of the building to confirm physical geometry (e.g., floor elevations, envelope shape), reinforcement of concrete elements, etc.
4. Testing of in-situ material properties (e.g., steel framing, masonry and grouting, timber, concrete and reinforcement) sufficient in scope to inform mathematical modeling of the gravity- and lateral-force-resisting systems.
5. Documentation of foundations and condition, if as-built drawings are not available.
6. Development of a 3D mathematical model of the building, using information from the above steps, sufficient for analysis of the building for gravity and lateral loads.
7. Analysis of the 3D model for gravity and lateral loadings.
8. Performance evaluation of elements of the gravity- and lateral-load-resisting systems, and non-structural elements (e.g., cladding, interior masonry walls).

Archaic buildings, such as those identified in your message (i.e., constructed between 1860 and 1920), will not comply with modern standards for design and construction, which are updated regularly on a 5-year to 7-year cycle. Accordingly, their lateral-load resistance and construction detailing will likely not conform with modern requirements, and alternate component-based acceptance criteria, such as those first implemented in FEMA 273 and later in ASCE 41-17 for earthquake applications, must be used instead.

An engineering report on the condition of an archaic building, including recommendations for future action, would include information from tasks 1 through 8.

I hope these personal opinions are helpful to you and colleagues.

Regards,

Andrew

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