Environmental
Resources
Management

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October 17, 2012

Mr. Roberto Puga
Trustee
Texas Custodial Trust
One Pointe Drive, Suite 320
Brea, California 92821 Project No. 0118148

Subject: Former ASARCO Smelter Powerhouse Building, Limited Structural Assessment

Dear Mr. Puga:

This letter summarizes a limited structural assessment of the Powerhouse building located at the former ASARCO Smelter in El Paso, Texas. As part of this assessment, a site visit was conducted on September 21, 2012. The purpose of the assessment is to provide:

- A brief, qualitative assessment of the existing structure;
- An opinion on the possibility of modifying the existing structure for another proposed use; and
- An estimate of the major component costs to upgrade the building.

Observations made during the site visit and subsequent reviews of photographs taken during the visit are provided below. No drawings were available for review of the original or existing structure design; however, field measurements were taken to develop the attached figures. For a detailed structural assessment, building framing information will need to be developed in detail and reviewed by a structural engineer.

Existing Structure Description

The building consists of three, 46-foot wide bays (Buildings 1, 2 and 3) joined together (see aerial view, Figure 1). The three bays are open to one another forming a single building with a clear open width of 138 feet (Figure 2) and an overall length of a little over 169 feet in Buildings 1 and 2 and about 116 feet in Building 3. Buildings 1 and 2 were constructed around 1917 to 1925; Building 3 was constructed in the late 1930s. Building 3 is offset along its north-south axis from Buildings 1 and 2. Plan dimensions and a typical section are shown in Figure 2.

The early steel frame was constructed of fabricated columns made of steel plate and angles riveted into the desired dimensions to shape the equivalent of a wide-flange section. No information was available at the time of the assessment regarding the type of steel or its strength. Later construction was hot-rolled steel, typically galvanized and with bolted connections.

Roof

Roofing materials appear to be a mix of corrugated and galvanized metal sheets. In some cases, the materials are translucent, letting some lighting into the building interior. Each building is equipped with a ridge structure that provides light as well as ventilation and runs the length of the building. The roof materials appeared to be in fair to poor condition.

Steel Frame

The three building superstructures are steel frames with brick shear walls between each exterior bay wall (see Figure 2). The roof structure is a double-fink truss with chords constructed of double angles and webs constructed of single angles.

Horizontal X-bracing at each end bay transfers longitudinal wind load to the edge of the building and to brick shear walls. Longitudinal knee bracing is used in the original two buildings along the joining column line.

Transverse wind loading appears to be carried by the steel frame with fabricated moment connections at the top and base of the columns. The base connections are formed either by embedding the steel column into concrete or by providing anchor plates and bolts. Typical column section dimensions are shown in Figure 2.

In Building 3 there is a large traveling crane spanning across the building and running essentially the entire length of the building. The crane is supported on columns independent of the rest of the structure.

Walls

The buildings' exterior is primarily a double wythe brick wall with bricks of varying vintage, color, and condition. The newer building (Building 3) has some walls constructed of concrete masonry units (CMUs). Window openings are supported by brick arches and have sandstone sills. Some window openings are closed off with bricks or plywood. Bricks are missing in several areas which allowed observation of the interior wall. Assessment of the interior wall at these locations revealed that there was no steel reinforcement present in the walls.

Evidence of reconstruction activities over the years was observed and included:

- Closing window openings with brick or plywood;
- Penetrating walls with piping or structural components;
- Modifying and/or adding to brick walls; and
- Covering first floor openings with plywood to deter trespassers and vandals.

On the building interior, a number of low, non-structural partition walls have been built to create spaces for offices and other similar functions.

Flooring

The total floor area for all three buildings is approximately 21,500 square feet (sf) on the main level. Approximately 15,500 sf is divided equally between the two original buildings (Buildings 1 and 2); the remaining 6,000 sf is in the newer addition (Building 3).

For the most part, the mezzanine floor of the building interior is a single level concrete floor with a considerable amount of mechanical and electrical equipment still in place. Below this level are between five and eight additional levels of concrete flooring with a variety of equipment, piping, and electrical systems. Access to the lower levels is through a series of metal and wooden stairways that extend down from the mezzanine level to the basement levels. The lower levels do not encompass the same square footage as the upper levels and headroom is limited in some locations. Some of the flooring is compacted earth or perhaps concrete flooring that was removed over time, leaving behind an exposed earth floor.

Foundation

The general location of the building is assumed to be founded on a stiff, well-compacted soil, conducive to providing a firm base for the structure's foundation. During the time of the assessment, no foundation issues were visually observed.

Structural Evaluation

Although a rigorous structural analysis was not completed, there are several points to consider, should the planning continue for rehabilitation of the building.

The Powerhouse shows evidence of numerous modifications, additions, and repairs over the last 70 to 90 years. The steel roof framing and the main steel frame appear to be reasonably sound. Except for a few locations, there is no apparent excessive deflection or corrosion. El Paso's dry climate has kept most of the structural steel from deteriorating except in areas where concentrated moisture or chemicals may have been used or allowed to pool adjacent to the columns.

The brick walls are in need of repair, modification or replacement. They are cracked, spalled and contain deteriorated bricks and grout with many damaged or missing bricks in several locations. There is a lack of obvious steel reinforcement in the brick walls, thus making them more prone to being damaged in the future. In addition, there are several diagonal cracks in the masonry of the walls that carry the transverse wind shear along the north side of the structure.

Concrete flooring is uneven and missing in some places, but there is little cracking, spalling or other significant deterioration in most of the concrete, with the exception of some areas outside the building that have damaged loading docks and concrete stairways. The main floor area in the Powerhouse is elevated above the surrounding grade and appears to be built on a well-compacted fill.

The primary concern about continued structural soundness of the building system relates to seismic design issues. At the time the buildings were constructed knowledge of the area's seismic potential and seismic design requirements were not as well developed as it is today. Consequently, the building frame, while apparently sufficient to resist live loads, dead loads and wind loads, may not be adequate to resist earthquake loads.

This is particularly true regarding the brick walls. Should a strong earthquake occur, the brick walls may collapse because there is no steel reinforcement, the grout strength is unknown, and the brick is in generally poor condition. Such a collapse would then remove the edge wall longitudinal column bracing, thus making the steel frame susceptible to collapse or significant damage.

More than likely, a complete dismantling and reconstruction of the brick walls would be required. Structural framing would have to be modified to meet current seismic codes.

Concept Level Cost Evaluation

There are a number of costs to consider when making the decision to renovate the building. The major costs will involve modifications or new construction to the structure as well as various civil, mechanical and architectural components. For purposes of this evaluation, ERM has focused only on the anticipated major systems.

From a structural standpoint, the major costs include:

1. Upgrades to meet current building codes, including seismic requirements:
    a. Removal and reconstruction of the exterior brick shear walls;
    b. Additional steel framing and bracing;
2. Replacement of the roof material; and
3. Construction of a 4-inch thick concrete floor overlay as a leveling course.

Major architectural and mechanical needs include:

1. General public access;
2. Americans with Disabilities Act (ADA) access;
3. Restroom facilities;
4. Fire prevention/suppression;
5. Floor reconstruction (tile on overlay or hardened, stained concrete);
6. Handrails and stairways;
7. Heating, Ventilation and Air Conditioning (HVAC) systems;
8. Plumbing systems; and
9. Electrical systems.

The total estimated construction cost, with a 30% contingency, is approximately $3,500,000. Of the total estimate, about $1,500,000 is for major structural upgrades and another $2,000,000 is for major architectural and mechanical components.

A considerable amount of other construction activity, as listed below, would be required to bring the Powerhouse into a serviceable condition. Those items, however, are beyond the scope of this evaluation and cost estimate but are listed below for evaluation purposes. Such work would include, but not be limited to:

- Removal of existing surplus equipment;
- Thorough cleaning of the remaining structure and equipment;
- Construction of:
    a. Access roads;
    b. Parking areas; and
    c. Sidewalks
- Installation of water and wastewater utilities including:
    a. Potable water supply;
    b. Irrigation water supply (if needed);
    c. Sanitary wastewater disposal; and
    d. Stormwater drainage
- Installation of area lighting
- Installation of fencing

A detailed investigation and structural analysis of the Powerhouse framing system must be done before proceeding with removal of select equipment associated with the structure of the Powerhouse, modifying the structure, or proceeding with the architectural improvements.

Limitations of this Assessment

This evaluation was meant to be an initial, brief, qualitative assessment of the possibility of modifying the existing structures to meet another proposed use. A limited number of measurements were made at areas of concern, but no detailed structural calculations or analyses were performed on the building frames, bracing, roof, masonry walls, foundations, or other components. In addition, no material strength and condition assessments were made other than the points of concern mentioned above, and no materials were removed to permit a more thorough investigation of the condition of hidden components.

We appreciate the opportunity to participate in this important evaluation. If you have questions, please do not hesitate to call.

Sincerely,

Environmental Resources Management

Ronald T. Grimes, P.E.

RTG/hmh
Attachments

cc: Jeffery L. Bauguss, Environmental Resources Management
Scott Brown, ARCADIS U.S., Inc.

Figures

October 17, 2012
Project No. 0118148

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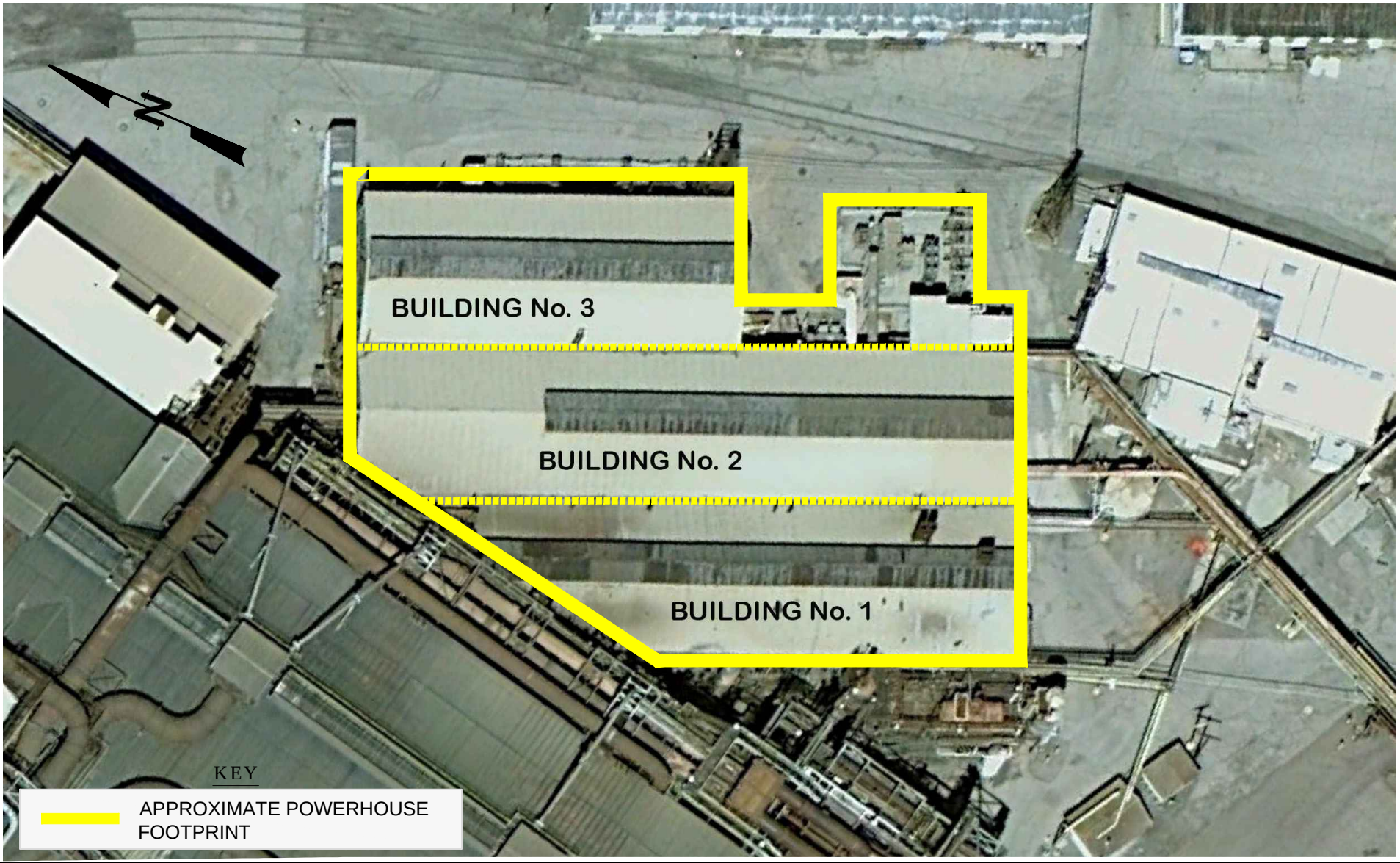

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FIGURE 1
STRUCTURAL ASSESSMENT
POWERHOUSE BUILDING
AREA PLAN
Asarco
El Paso, Texas

ERM

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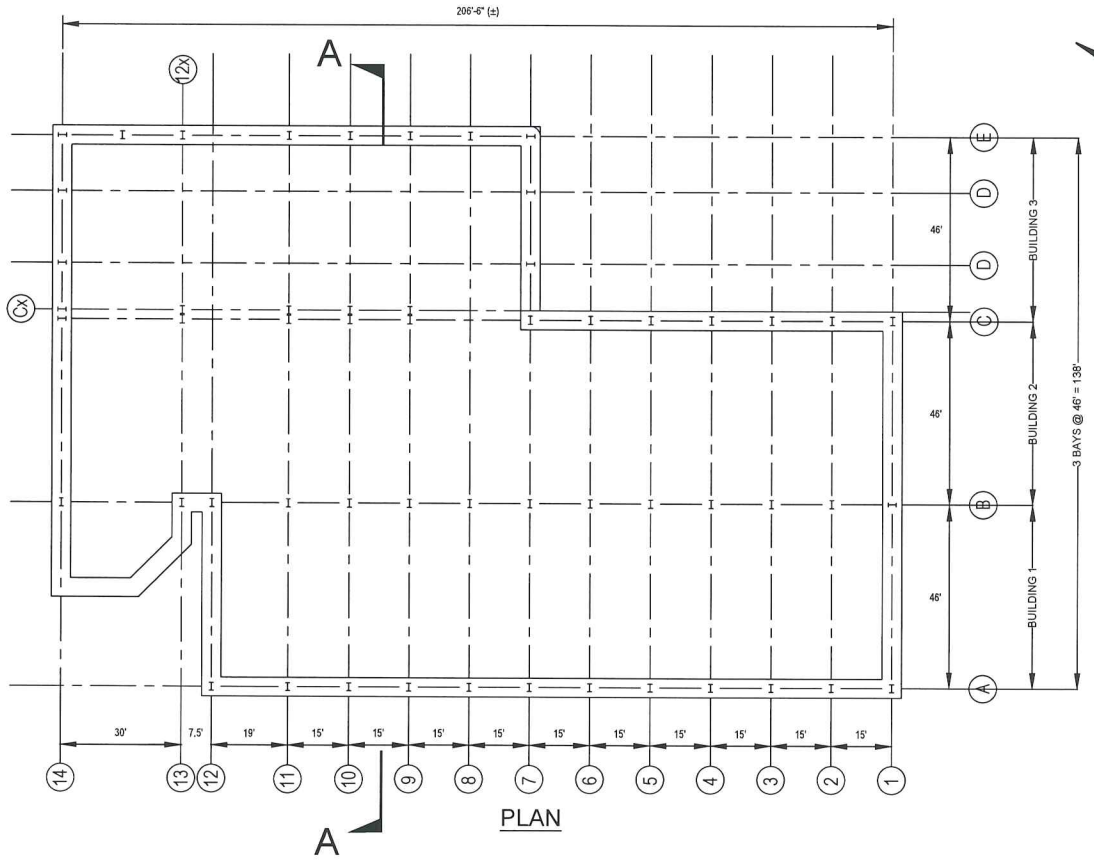
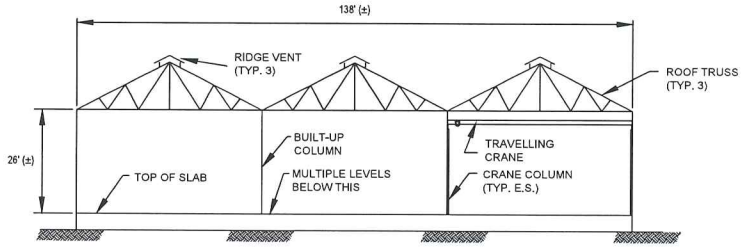


PLAN



SECTION A-A

STATE OF TEXAS
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FIGURE 2
STRUCTURAL ASSESSMENT
POWERHOUSE BUILDING
PLAN AND SECTION
Asarco
El Paso, Texas

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