

## STRUCTURAL ASSESSMENT – Carruth Administration Center Parking Structure (BLDG-941P)

Building Purpose	Parking Garage
Inspection Date	Regular Site Visits since March 2010
Inspection Conditions	Hot/cold, wet/dry

### Building Description / Reported Structural Concern

**Brief Description of Existing Structure:** The CAC complex was constructed in the mid-1980's by an independent developer as retail/office/apartment leasing space, and the property was purchased by AISD and converted into administrative office space in the early 1990's. The parking structure has three levels: a ground level and two subgrade levels. One multistory building (Building A) is elevated above the parking garage and is supported by the parking garage columns.

The parking structure is composed of precast concrete framing consisting of precast columns, inverted-tee beams, spandrel beams and double-tee joist panels. The precast structure is supported on drilled shaft foundations. The double-tee joist panels are topped with a 2-inch thick cast-in-place concrete topping. At Level P2, the basement slab is cast-in-place and grade supported. The two subgrade parking levels are enclosed by perimeter cast-in-place concrete retaining walls. An east wing extends eastward from the primary body of the parking garage; the east wing is isolated from the rest of the garage structure with an expansion joint and has only one sub-level, with precast construction at ground level and slab-on-grade at Level P1.

**Reported Structural Concern:** Beginning in March 2010, P.E. Structural Consultants has investigated the garage repeatedly at the request of AISD in response to reported damage and concerns of users. Issues at the garage include: concrete cracking and spalling, water infiltration, rebar and embed corrosion, differential movement of precast elements, excessive double-tee deflection and vibration. Refer to our original comprehension investigation report "2010-04-23\_PESC REPORT\_AISD Parking Structure" and related Attachments for comprehensive observations of the damage and recommended repairs. Since then on many different occasions we have been asked to investigate new or recurring damage to the parking structure. Copies of several of our previous reports are attached.

### Structural Assessment Site Observations

Over the years we have made the following observations:

1. Widespread reflective cracking in concrete floor topping over precast double-tee flange-to-flange joints and over faces of inverted-T beam stems. Cracks are due to improperly chaired topping reinforcement and overstressed double-tee connectors. Water infiltration has exasperated the damage to concrete elements and caused corrosion in rebar and embedded steel connectors.
2. Structural deficiencies at select members (shear and flexural).
3. Structural distress in double-tee floor system due to speed bump impact loads.
4. Structural distress at double-tee dapped ends.

5. Damaged/failing corbels.
6. Displaced/rotated spandrel beams.
7. Overstressed and failing steel frame at Sayers Street garage entrance.
8. Noticeable deflection of precast double-tees. Noticeable vibration of parking deck under traffic loads.
9. Failing/degraded expansion joints. Water infiltration through expansion joints.
10. Damaged and distressed perimeter retaining walls. Water filtration at perimeter retaining walls.
11. Spalling and corrosion at double-tee flange-to-flange connectors.
12. Spalling and corrosion at double-tee end connections to perpendicular beams and walls.
13. Water infiltration and cracking at basement CMU walls.
14. Damaged median and lack of concrete reinforcement in median.
15. Standing water at all garage levels.

### **Conclusions**

Repair measures implemented to date have addressed many of the listed deficiencies, yet new and progressive deterioration continues throughout the garage due to continued water infiltration, inadequate deck reinforcing and substandard connections of precast elements. Recurring damage such as concrete spalling at precast double-tee connectors will continue to pose a danger to persons and vehicles passing below. Ongoing evaluation, maintenance, and repair measures will likely be needed for the remaining life of the structure.

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## STRUCTURAL ASSESSMENT – Carruth Administration Center – Parking Structure (BLDG-941P) – Summary of Structural Repair Recommendations

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This document is based on current conditions observed during fieldwork and provides recommendations for corrective actions.

### **Carruth Administration Center – Parking Structure Structural Repair Recommendations**

1. Waterproofing membrane should be extended to cover entire area of upper deck.
2. Ongoing evaluation, maintenance, and repair measures will likely be needed on a regular basis for the remaining life of the structure.

*Note: This report is based on and limited to the observations and information noted above. This is not a guarantee. Additional deficiencies may exist which were not observed and which may require additional remedial work which is not listed here.*