CORPUS CHRISTI

INTERNATIONAL AIRPORT

#

East General Aviation Hangars

Structural Condition Assessment

Prepared by:

PGAL

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Structural Condition Assessment for CCIA East General Aviation Hangars

EXECUTIVE SUMMARY

The existing East General Aviation Hangars located at 506 International Drive at Corpus Christi International Airport were inspected with regard to establishing structural condition and serviceability. The original drawings for these structures were not available at the time of inspection. The East General Aviation Hangars 1, 2 and 3 are currently in use for Fixed Base Operations (Signature Flight Support) serving the general aviation community. Visual field inspections were performed to assess the structural adequacy of these buildings. No destructive testing, invasive inspections or capacity analysis was performed as it was beyond the scope of the investigation. Based on the observations made during the visual inspections, Hangars 1 and 2 have adequate structural integrity to support the original intended design loads although buildings have building envelope issues that will require certain repairs to remain in serviceable condition. The Signature Flight Support office building is in generally good condition needing only minor maintenance work. Hangar 3 is in need of immediate repairs and will not support its full intended design load in its current condition. All of the East GA Hangar recommendations for such repairs are provided and a conceptual cost estimate for those repairs is included in this report.

INTRODUCTION

The East GA Hangar buildings are typically of commercial metal building type construction with the exception of Hangar 1 which is a hyperbolic paraboloid concrete shell structure. On December 5th, 2010 a site visit was undertaken for the purpose of establishing the general structural condition of the existing CCIA East General Aviation Hangars. The structural condition assessment performed is intended to address the serviceability of the existing buildings for general aviation hanger type use and generally conforms to the guidelines of ASCE Standard 11-99, "Guideline for the Structural Condition Assessment of Existing Buildings." The assessment and report provided are NOT intended to be a "Property Condition Assessment" per ASTM E2018-08 although similar items are discussed. The inspection was limited to visual methods only and no destructive examinations were performed. The assessment provided is based solely on those items that could be observed directly and may not include all existing structural deficiencies, if any are present. While the primary focus of this report is the structural adequacy of the hangar buildings there is also discussion of the building envelope integrity as it relates to structural issues and certain recommendations are offered. Please note that the hangar numbers and building names used in this report are based on input from Signature Flight Services and may not correspond to the hangar numbers as commonly used by CCIA.

FIELD OBSERVATIONS

East GA Hangar 1

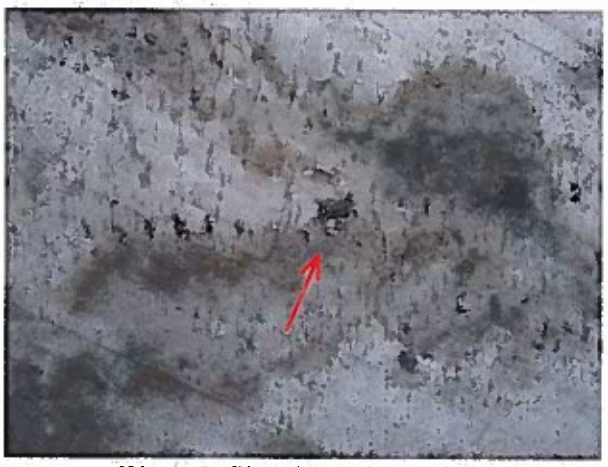
The first portion of the structural condition assessment consisted of inspection of the hyperbolic paraboloid concrete shell structure designated as Hangar 1. Structures of this type are interesting in that bending forces within the shell are very low and only a minimal amount of reinforcing is needed. Structures such as this can support large loads for a given mass of concrete.

East GA Hangar 1 – Aircraft Bay

East GA Hangar 1 – SWA Office Area

In general it was noted that concrete spalling has occurred in some of areas the structure and pop-outs are evident. Cracking has occurred in limited areas. All of the fiberglass infill panels and wood support framing are not weather tight and are in need of replacement. There is evidence of water infiltration through the concrete shell. The water infiltration has caused numerous areas to receive water damage to walls, ceilings and floor finishes. Secondary framing for metal wall panels is also corroded.

Fiberglass Infill w/ Rotted Framing



Water Infiltration w/ Spalling

Cracking in Concrete Shell

Water Infiltration w/ Spalling

Water Damage to Walls and Wood Framing

Water Damage to Ceilings

No signs of significant foundation movement or distress were noted for Hangar 1. However there has been movement of the floor slab causing water to run towards an office area. This situation can be addressed with the installation of in floor drains if conditions warrant. Several locations on the exterior of the shell have experienced corrosion of the reinforcing and are spalling. Water infiltration has also damaged electrical conduits. In general there is poor drainage between Hangar 1 and the adjacent Signature offices. This has allowed water to build up and damage a portion of the wall panels.

Floor Slab Cracking

Exterior Spalls – Previously Patched

Water Damaged Electrical Conduit

Steps added due to poor drainage

It is recommended that the roof of this building be treated by application of a white elastomeric coating system to prevent further water infiltration. Any required concrete repairs should be performed in conjunction with the roof repairs as well as replacement of the translucent infill panels and support framing. Concrete repairs should include chipping out deteriorated concrete and blast cleaning the substrate. The repair material should be a high strength mixture containing a corrosion inhibitor such as "SikaTop 123 Plus" or equivalent. Once the shell is weather tight, repairs to the interior can be undertaken. Interior repairs should include demolition and replacement of all water damaged framing and finished surfaces. The storefront at the Southwest Airlines Cargo office has broken glazing panels which need to be replaced. It should be noted that most of the observed damage is due to water infiltration and lack of continuous maintenance of the roof coating is the primary cause.

Damaged Glazing @ SWA Cargo

Poor Drainage @ SWA Storefront

A complete structural analysis of the building to determine compliance with current building codes is beyond the scope of this report. However, with the exception of those areas specifically noted, Hangar 1 appears to have adequate structural integrity to carry the original intended design loads. There are building envelope and maintenance issues that need to be addressed and which affect the general serviceability of the building.

East GA Signature Offices

The East General Aviation Signature Office Building is a commercial metal building type structure approximately 55 feet wide by 85 feet deep with a metal panel roof.

Signature Office Building – Air Side

Signature Office Building – Land Side

The exterior of the structure was inspected first. The overall condition of this building is good and no damage was noted on wall cladding panels. The building envelope appears to be intact with no deficiencies noted at the windows and doors. However, several maintenance items need to be addressed for this building. The gutters are filled with debris and should be cleaned to prevent corrosion. In

addition, the gutter downspouts place water directly adjacent to the building foundation. Gutter extensions and splash blocks should be provided. If not corrected, this condition will cause damage to the foundation due to heaving of the underlying soils. General improvements to grading adjacent to the building should be performed to prevent the buildup of water adjacent to the foundation.

Plants Growing in Gutter @ Signature Offices

Downspout @ Signature Offices

An inspection of the remainder of the interior of the Signature Offices revealed the interior structure to be in good condition. No heaving of the floor slab was noted and no evidence of roof leaks was found.

A complete structural analysis of the building to determine compliance with current building codes is beyond the scope of this report. However, the Signature Offices Building appears to have adequate structural integrity to carry the original intended design loads.

East GA Hangar 2 –Ocean Air Center

The East General Aviation Hangar #2 is a commercial metal building type structure approximately 205 feet wide by 130 feet deep with lean-to structures attached to the both sides of the hangar. The south side structure is an administrative office area and is separated from the hangar space by a CMU partition wall. The building is framed in steel and has corrugated steel wall and roof panels.

East GA Hangar 2 – Ocean Air Center – Air Side

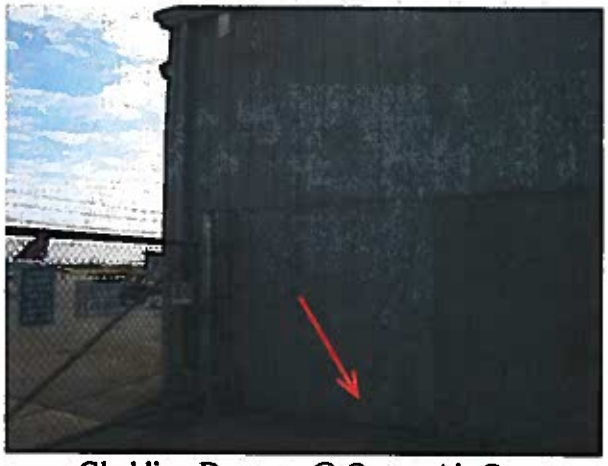
East GA Hangar 2 – Ocean Air Center – Land Side

An inspection of the exterior portions of the building revealed some damage to the corrugated steel wall panels although this damage is not extensive. No other structural distress was noted from the outside of the building in this area at the time of inspection although building envelope issues are apparent. The eave trim and gutters are corroded and should be replaced. Downspouts were missing as well.

Cladding Damage @ Ocean Air Center

Missing Downspout @ Ocean Air Center

Downspout Damage @ Ocean Air Center



Cladding Damage @ Ocean Air Center

A few of the building cladding panels are perforated due to corrosion and the base angle is also corroded. There is generally poor drainage in some areas around the building. An inspection of the interior of Hangar 2 revealed the interior structure to be in fair condition. The primary structural members appeared to be in fair condition. There are several locations where the main baseplates have moderate to severe corrosion and which exhibit moderate section loss. These locations should be cleaned and repaired as needed. Secondary framing members adjacent to the doors are severely corroded with an estimated 50% section loss and should be repaired as soon as possible. The protective coating on these secondary members has reached it service life limit and painting should be considered. It is anticipated that the rate of corrosion will increase since the existing protective coatings are no longer fully functional. An inspection of the hangar doors revealed corrosion to the secondary door framing members. The hangar door tracks, both upper and lower, are corroded. There is minor mechanical damage to the hangar door frames and bumpers. All of the interior framing is in need of cleaning and painting to prevent further damage and this work should be integrated into an ongoing maintenance program. Failure to address these issues now will likely result in higher repair costs later.

Corroded Door Tracks @ OAC

Panel and Base Angle Corrosion @ OAC

Primary Member Corrosion @ OAC

Baseplate Corrosion @ OAC

Door Damage @ OAC

Severe Corrosion Damage @ OAC Doors

The floor slab of the Ocean Air Center Hangar appears to be in fair condition. There is minor to moderate cracking but the floor is generally serviceable at this time. There is poor drainage between the Ocean Air Center Hangar and the adjacent building although area drains are located here. These drains should be kept clean to prevent accumulation of water adjacent to the building foundations.

Partially Blocked Drain @ OAC

Drain in Good Condition @ OAC

A complete structural analysis of the building to determine compliance with current building codes is beyond the scope of this report. However, with the exception of the items specifically listed above, the Ocean Air Center Hangar appears to have adequate structural integrity to carry the original intended design loads.

East GA Hangar 3 – Signature Flight Services, Dodd Aviation and Corpus Christi Flight School

The East General Aviation Hangar #3 is a commercial metal building type structure approximately 260 feet wide by 130 feet deep with a lean-to structure attached to the south side of the hangar. The south side structure is an administrative office area and separated from the hangar space by a metal partition wall. The building is framed in steel and has corrugated steel wall and roof panels.

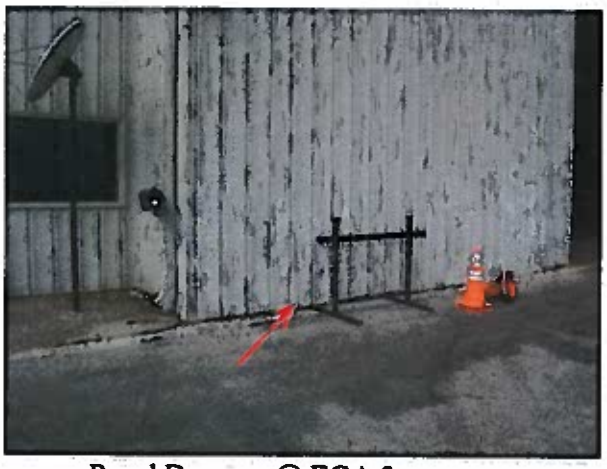
East GA Hangar 3 – Air Side (East)

East GA Hangar 3 – Air Side (North)

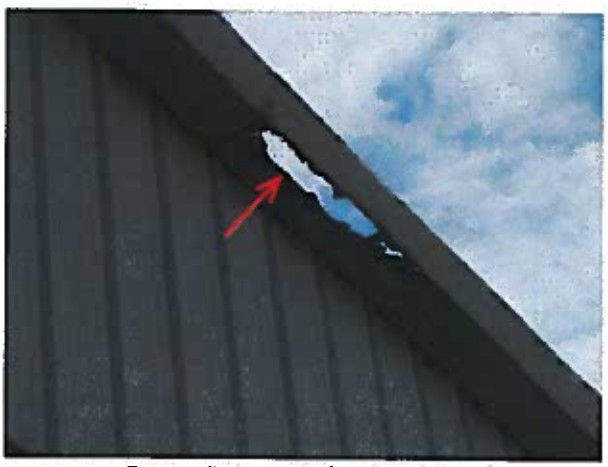
The exterior inspection of Hangar 3 revealed mechanical damage to wall panels although this damage is not extensive. There is moderate to severe damage to the gutters and downspouts and some downspouts are missing. There is inadequate caulking around the windows. All of the fan louvers are in need of replacement and it appears that the fans are inoperable as well. There is some evidence of water infiltration in the area where Dodd Aviation is located as indicated by staining of the ceiling tiles in the restroom areas. It could not be determined if this staining was caused by rainwater infiltration or other moisture sources.

Stained Ceiling Tiles @ Dodd Aviation - 1

Stained Ceiling Tiles @ Dodd Aviation - 2



Panel Damage @ EGA 3

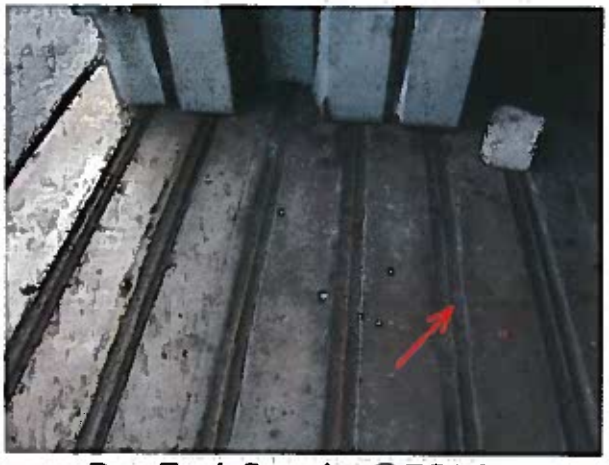


Gutter Damage @ EGA 3

Fan Louver Damage @ EGA 3

Caulking Around Windows is Missing

The hangar door system is in moderate to poor condition. The doors cannot be operated normally and require the use of an aircraft tug to open and close them. There is minor mechanical damage to the hangar door frames and bumpers and corrosion damage to the doors and door pockets as well as corrosion of the door tracks and running gear. The secondary door framing is corroded although with minimal section loss observed. The protective coating on these secondary members has reached it service life limit and painting should be considered. It is anticipated that the rate of corrosion will increase since the existing protective coatings are no longer fully functional. The problems with the hangar door system do not appear to affect the overall structural integrity of the building but do present a serious serviceability issue.

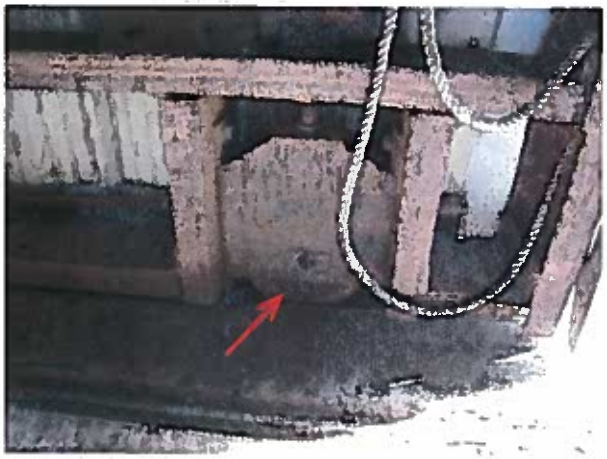


Door Track Corrosion @ EGA 3

Door Pocket Corrosion @ EGA 3

Door Pocket Corrosion @ EGA 3

Upper Door Track Corrosion @ EGA 3



Running Gear Corrosion @ EGA 3 Doors

Lower Door Track Corrosion @ EGA 3

An inspection of the interior portion of the building showed the structural steel framing to be in generally good condition with the exception of the column baseplates. All of the primary and secondary framing is experiencing corrosion and the original coating system has failed. Only minor section loss has occurred so far. All of the interior framing is in need of cleaning and painting as well as replacement to the corroded items to prevent further damage and this work should be integrated into an ongoing maintenance program. Failure to address these issues now will likely result in higher repair costs later. The floor slab for this hangar is in fair condition. There are cracks in the floor slab but heaving is minimal and the floors are serviceable in their current condition.

The baseplate and column base corrosion is the most serious issue observed during the structural condition assessment. There are three out of six baseplates on the south wall that have more than 50% section loss and two of six baseplates along the west wall which have more than 50% section loss. A full structural load and capacity analysis is beyond the scope of this report. However, based on the observed condition of these baseplates and due to their location in proximity to one another, **it is our opinion that the building in its current condition will not be able to withstand its full original intended design loads.** These baseplates should be repaired as soon as possible. Failure of one of the column locations would likely cause damage to propagate further into the structure potentially leading to costly repairs.

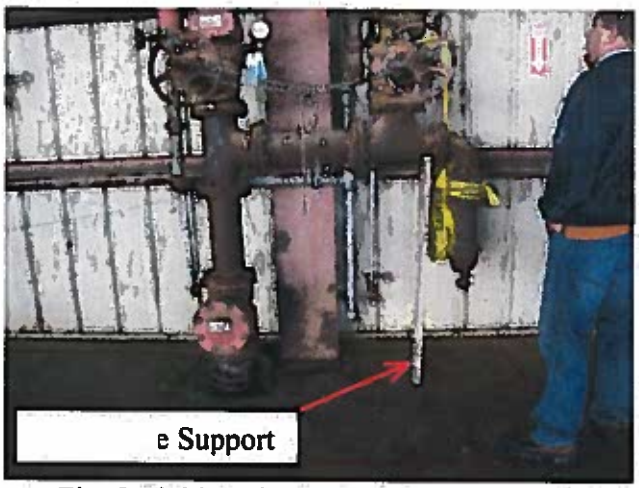
Severe Corrosion Damage @ EGA 3 South Wall

Severe Corrosion Damage @ EGA 3 South Wall

Severe Corrosion Damage @ EGA 3 South Wall

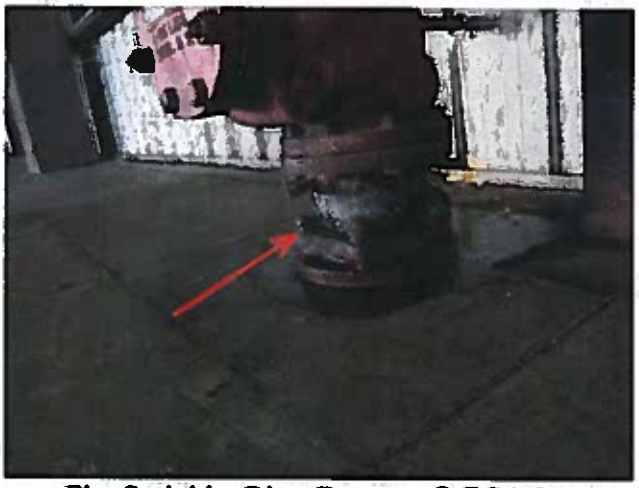
Severe Corrosion Damage @ EGA 3 West Wall

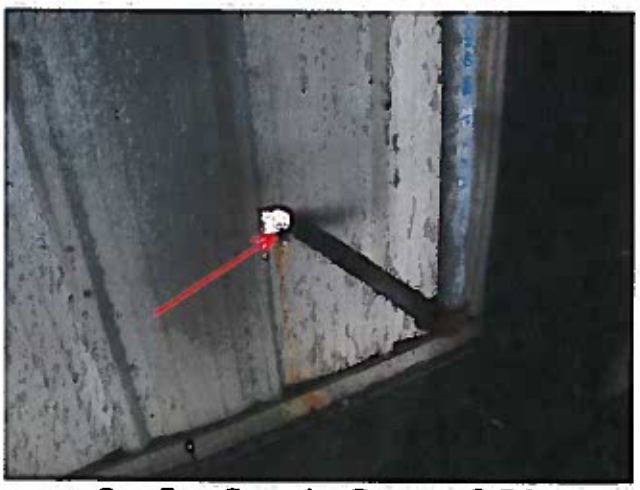
The interior inspection also revealed corrosion damage to the fire sprinkler riser pipe. The lower portion of this 6 inch line is corroded and is currently leaking. The supports for the remaining riser piping are also inadequate. This riser supplies all of the sprinkler piping and is under constant pressure. An accidental bump from a tug or other equipment could cause this line to fail. Such a failure could lead to damage to the structure or to the aircraft stored within the structure in addition to leaving the building and its contents unprotected from fire. It is also possible that this corrosion damage extends below the floor slab as well and failure there could undermine the floor slab leading to costly repairs. It is recommended that this fire sprinkler riser be thoroughly inspected and then repaired as soon as possible due to the potential consequences of a failure of this system.



Fire Sprinkler Riser Damage @ EGA 3


Fire Sprinkler Riser Damage @ EGA 3


Fire Sprinkler Riser Damage @ EGA 3


Overflow Corrosion Damage @ EGA

As stated above, there repairs to the column bases and fire sprinkler riser should be completed as soon as possible to prevent further and more costly damage. Failure of these components has the potential to cause injury or property damage.

RECOMMENDATIONS

East GA Hangar 1

For repairs and updates to the East GA Hangars 1, focus should be given to maintenance of the building envelope. Leaks through the concrete shell as well as repairs to the shell should take priority. The building shell needs to be water tight prior to any interior renovations. The existing interior partitions and ceilings on the north side should be completely demolished. A decision on future build out in this area can be made after this demolition work is completed. General re-grading of the area between Hangar 1 and the Signature Office will help improve drainage. A **conceptual** cost estimate is included below. A 20% contingency has been included. No additional costs such as design fees or permitting have been included. It is possible that quantities or unit costs could vary as repairs plans are developed.

East GA Hangar 1 Renovation Estimate

Recommended items 1-7					
#	ITEM	QUANTITY	UNITS	COST	TOTAL
1	Elastomeric Roof Coating	32250	SF	$2	$64,500
2	Patch Concrete	400	SF	$50	$20,000
3	Repair Girts / Purlins as needed	1	LS	$5,500	$5,500
4	Demo Exsiting Walls & Ceilings	1	LS	$7,500	$7,500
5	Haul out load & haul off demo materials	100	CY	$35	$3,500
6	Replace exterior windows	150	SF	$85	$12,750
7	Skylight panels and framing	1	LS	$3,500	$3,500
				Subtotal	**$117,250**
				20% Contingency	$23,450
Optional Items 8-9					
8	Reconstruct Interior walls & Ceilings	1	LS	$12,000	$12,000
9	Electrical rough in	1	LS	$7,500	$7,500
				Subtotal	**$19,500**
				20% Contingency	$3,900
				TOTAL	**$164,100**

East GA Hangar 2 (Ocean Air Center)

For repairs and updates to the East GA Hangar 2, focus should be given to cleaning and painting the building's steel framing, repair of gutters and downspouts and repair of the doors and door tracks. These items will continue to deteriorate unless maintenance is performed and future repair costs will likely be higher. A **conceptual** cost estimate is included below. A 20% contingency has been included. No additional costs such as design fees or permitting have been included. It is possible that quantities or unit costs could vary as repairs plans are developed.

East GA Hangar 2 (OAC) Renovation Estimate

Recommended items 1-7					
#	ITEM	QUANTITY	UNITS	COST	TOTAL
1	Replace all gutter and trim	830	LF	$15	$12,450
2	Replace Base Angle	150	LF	$8	$1,200
3	Repair/Replace Bottom Wall Panels	300	SF	$12	$3,600
4	Replace Rolling Door Tracks	1	LS	$8,000	$8,000
5	Repair Rolling Doors	1	LS	$9,000	$9,000
6	Clean and Paint Structural Framing	1	LS	$15,000	$15,000
7	Structural Framing Repairs	1	LS	$4,000	$4,000
				Subtotal	**$53,250**
				20% Contingency	$10,650
				TOTAL	**$63,900**

East GA Hangar 3

For repairs and updates to the East GA Hangar 3, focus should be given to the immediate structural deficiencies with the column bases and base plates and also the fire line riser. These are serious deficiencies which, if not addressed, could result in further damage to the structure and subsequently higher future repair costs. After the immediate structural issues are taken care of, attention can be given to cleaning and painting the building's steel framing, repair of gutters and downspouts and repair of the doors and door tracks. These items will continue to deteriorate unless maintenance is performed and future repair costs will likely be higher. A **conceptual** cost estimate is included below. A 20% contingency has been included. No additional costs such as design fees or permitting have been included. It is possible that quantities or unit costs could vary as repairs plans are developed.

East GA Hangar 3 (Signature) Renovation Estimate

Recommended items 1-8					
#	ITEM	QUANTITY	UNITS	COST	TOTAL
1	Replace all gutter and trim	1260	LF	$15	$18,900
2	Replace Base Angle	200	LF	$8	$1,600
3	Repair/Replace Bottom Wall Panels	200	SF	$12	$2,400
4	Replace Rolling Door Tracks	1	LS	$12,000	$12,000
5	Repair Rolling Doors	1	LS	$12,000	$12,000
6	Clean and Paint Structural Framing	1	LS	$19,000	$19,000
7	Structural Framing Repairs	1	LS	$12,000	$12,000
8	Fire line riser repairs	1	LS	$8,000	$8,000
				Subtotal	**$85,900**
				20% Contingency	$17,180
				TOTAL	**$103,080**

Limitations and Closing

The observations and recommendations provided herein are based on limited visual inspections and no destructive testing or invasive inspections were performed. These observations and recommendations are therefore limited to those features which could be directly observed through such techniques and all deficiencies (if present) may not be noted.

PGAL appreciates the continued opportunity to serve the needs of Corpus Christi International Airport and we look forward to working with you in the future.

Sincerely,

Jeffrey A. Talbott
Director of Structural Design