May 18, 2009

BMA Construction

ATTN: Bayo Abina

SUBJECT: Canopy Replacement, Fort Lauderdale International Airport

Site inspection of the Membrane Componentry, Tuesday May 5th – Thursday May 7th, 2009

Final Comments by Ross Bond, SKYShades Principal National & International Design Specialist:

From my inspection of the Componentry, Wednesday 05-06-09, I advise strongly against it being reused with the new membrane. Most of it has been structurally compromised due to Rust.

Note that Bill Lutric from Tetra Tech joined me in Orlando to view the materials, and overall agreed with our recommendations.

There is considerable rust to parts of all components, and severe rust to approximately 50%.

Note:
SkyShades cannot warrant any part of this replacement if the existing Componentry is reused.

For the client's evaluation I have detailed each component below and indicated what will be needed to make it reusable and/or why it cannot be reused:

All nuts and washers to the threaded swaged cable ends must be replaced. These to be GALV.

All nuts, bolts and washers to the clamping plates must be replaced. Stainless steel should be used here.

All the Jaw swage terminals, and where the cable enters the swaged body, rusted to some degree. I would advise not using these.

All the threaded terminals of the cables are rusted severely. To remove the rust from the thread will reduce the service of the thread by app 50%.
To remove the rust from the main body will reduce the dia by 1/8" to 3/16".
App ½ of these cables still have the nut and locking nut attached. They are completely seized due to severe rust.
On site a 2' spanner with a 4' pipe extension was unable to move them. So these would need to be cut off.

Where the cable enters the swaged body of the threaded terminal there is rust. It's impossible to know just how far this rust has penetrated here. This is of great concern as the structural integrity of the cable is now unknown. What is known is that the structural integrity of the cables at this point has been compromised.
The plastic coated cables themselves appear to be in good condition, but can't be reused as they will be to short if the rusted ends are cut off.
The complete swaged cable unit must be replaced.

Clamping plates:
All have surface rust to some degree.
The inside of the cable termination tubes are rusted severely. These will have to be reamed app 1/8" rad. So this will reduce the dia by ¼" which will greatly reducing the structural integrity of this component.
These will then need to be sand blasted and hot dipped galvanized
Replace all the neoprene / rubber spacers between the membrane and the plates.

All the threaded rods from the clamping plates to the point fixing location of the supporting structure must be replaced. These are cut off after installation so they don't protrude.

The top bail rings are in very poor condition due again to rust.
These will all need to be removed, sandblasted and hot dipped galvanized.
All bolts, nuts and washers will need to be replaced. These are to be stainless steel.

All the tapped bolt holes for the clamping plates are completely rusted. These will all need to be drilled out to clear the rust and re tapped.
The tapped holes and new bolts will all be oversized to suit.

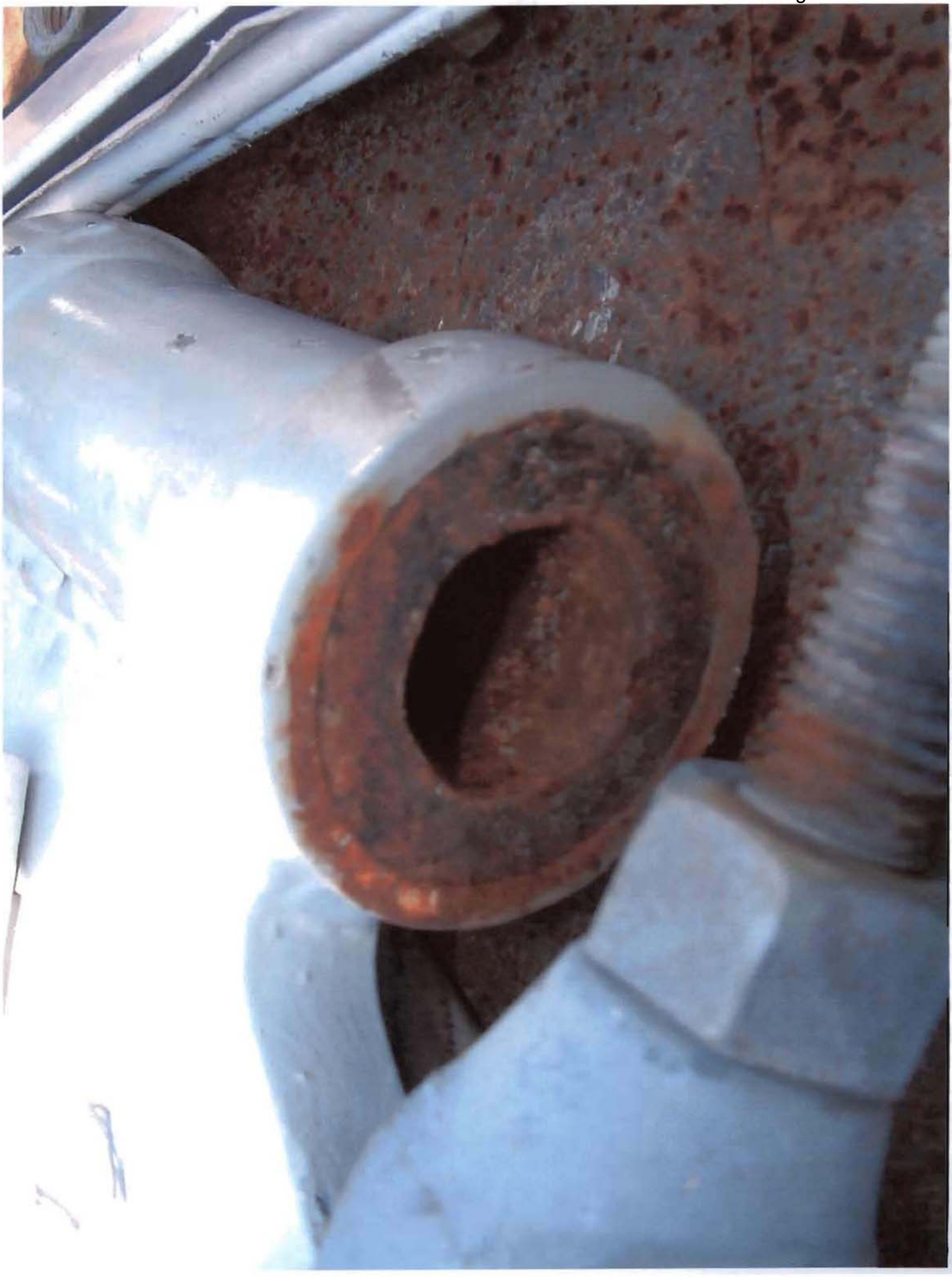
The holes in the top clamping plates will need to be drilled oversize to suit the replacement bolts.
These top mounting plates will need to be sand blasted and re coated.

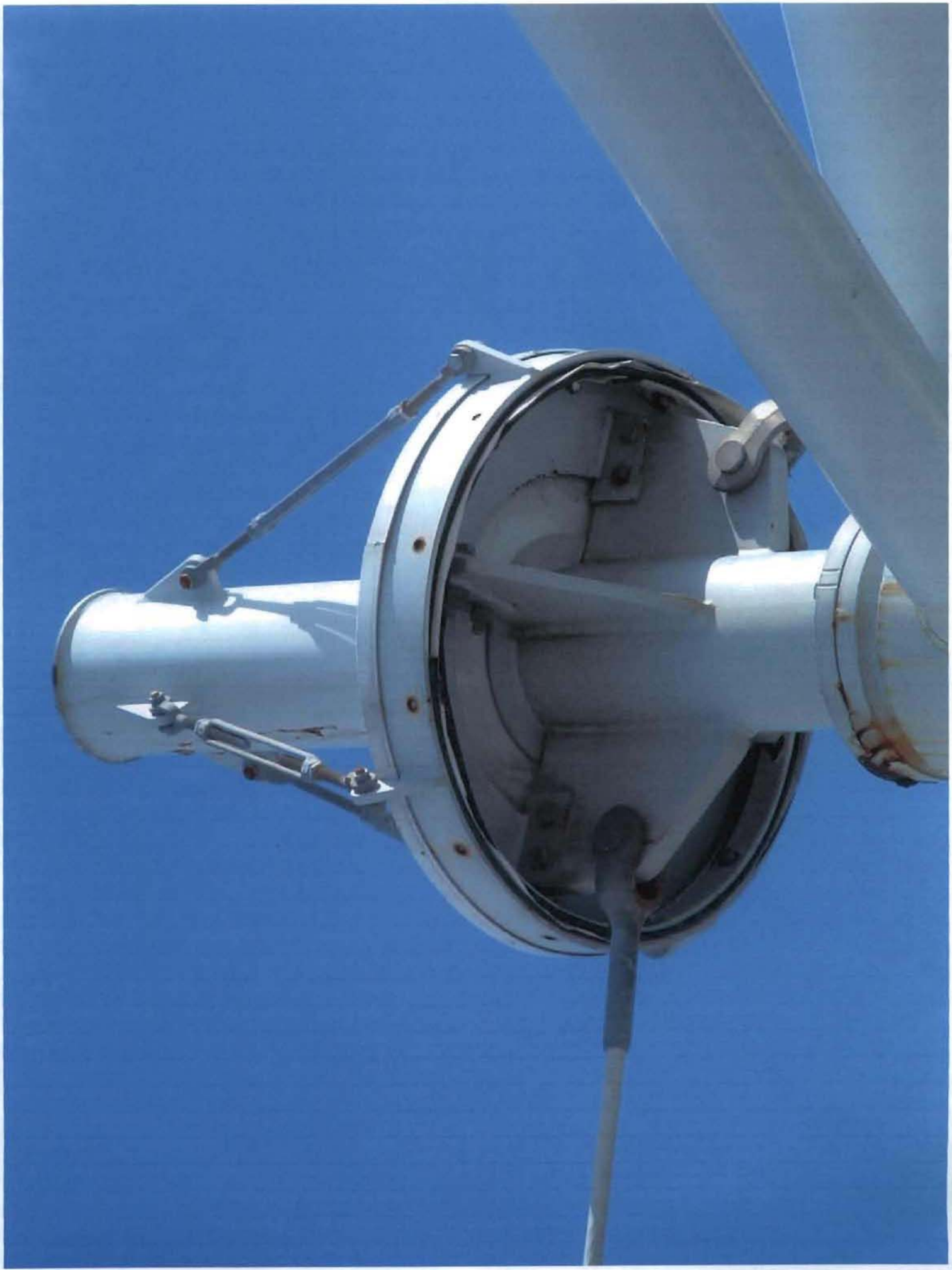
The membrane fixing location to the existing buildings all need work.

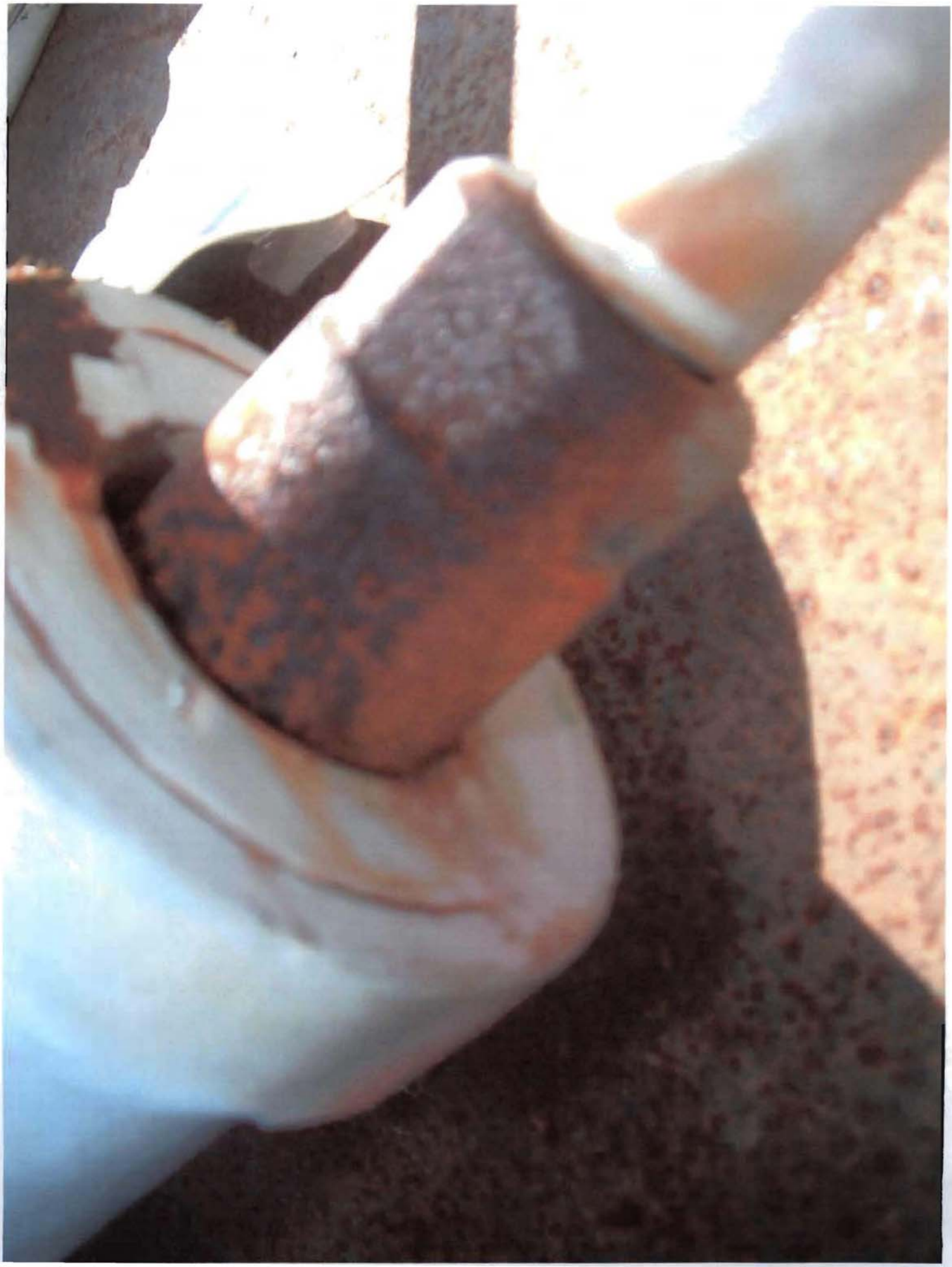
The tapped holes here are all rusted and will have to be drilled out and re tapped.
Oversized bolts, nuts and washers will need to be used. These are to be stainless steel.

The membrane intermediate joining strips:
6 of the 8 are missing, not on site.
The two that were on site appeared to be reusable.

Note:
The existing structure is in need of maintenance.







FORT LAUDERDALE AIRPORT CANOPIES

HARDWARE EVALUATION RECOMMENDATIONS

1. Replace nuts, washers, and bolts, with stainless, when approved by Designer, as necessary (these items are relatively inexpensive). Replace the allthread rods with galvanized rod of the strength specified by the Designer.

2. Remove rust, clean, and touch-up paint all the items that are designated below to be re-used. Use exterior paint on exposed steel items, use galvanizing repair paint on galvanized items, and use no paint on stainless.

3. Re-use the ridge cable assemblies (approximately 29 cable assemblies).

4. Re-use all the clamp plates (ream the rusty tapped fabric holes and install stainless thru bolts). Reuse the welded yokes with the cable barrels. Clean and paint. Reuse the clevises. Clean and paint with galvanized repair paint.

5. Replace all cable assemblies that attach to the clamp plate yokes, in kind. Possible "local" suppliers (for costing) are Florida Wire & Rigging, Orlando, (407) 422-6218, and Orlando Rigging Supply, Orlando, (407) 521-8600. A possible "alternative" would be to reuse the cables with new fittings that had longer shanks (for restoring assembly length after swaged fittings are removed). We do not now know if these fittings are available, and a disadvantage is that the raised cable end of the new longer shank may abrade the fabric.

6. Protect the new cable assemblies at the connections to the barrels of the clamp plate yoke from rust by use of high grade marine sealant.

1. BACKGROUND:

I met with Kelly Rubino, Hanson Professional Services, on 27 May 2009, and was asked to inspect and evaluate some hardware that was supposed to be reused for the pedestrian walkway fabric canopies at Fort Lauderdale Airport. The contractor, BMA, Inc. and sub-contractor, Sky Shades, had questioned if the hardware was structurally adequate for that purpose. See Enclosure.

I went to Orlando on 29 May 2009, to inspect the hardware. I met with Bill Lutric, Tetra Tech, the prime professional firm, Ross Bond, Sky Shades, and Doug Aagaard, A&W Specialty Contracting, Inc. (both are sub-contractors involved in the fabric structures construction). The hardware was located in a trailer. See Photos 1 and 2.

The three persons that met with me were informative about the project and tried to help me understand the function of the various hardware items. I spent about three hours discussing and inspecting the hardware. The two major components contained in the trailer were the ridge cable assemblies, and the perimeter cable assemblies which include the fabric clamp plates. I did not see a completed fabric structure.

2. RIDGE CABLE ASSEMBLIES:

The ridge cable assemblies consisted of ¾'plastic coated cable about 20'-25' long with galvanized jaws swaged on both ends. The cables appeared in good condition. The jaws were in fairly good condition. There was some tight rust areas. I believe the galvanized jaw fittings should be cleaned of rust, and treated with a good quality galvanized repair paint and the assemblies should be reused. There are about 29 such assemblies. I was told that the reason these were in relatively good condition is that they are mostly protected from the weather in the finished structure.

3. PERIMETER CABLE ASSEMBLIES & CLAMP PLATES:

The perimeter cable assemblies are shown on photos 3, 4, 5, and 6. Some of the cables have swaged threaded studs at the ends and some have swaged jaws. See Photo 5 and 6. The threaded studs attach to the yokes containing the clamp plates thru barrels welded to the yokes. Photos 5 & 6. Within the barrels is where the worst corrosion has occurred . The moisture tends to accumulate there and stays longer at that location. The inside of the barrel is difficult to protect. The threaded stud has rust flakes and pitting and the threads exposed beyond the nuts are in some cases severely damaged by rust.

The threaded cable ends are damaged. There is probably decent thread at the bolt locations only where the bolts have reduced the amount of air and water getting to the threads. The remainder of the threads are in poor condition. These threaded ends, in my judgment should not be reused. Most of the threaded studs are "frozen" in the barrels by rust and will probably be hard to extract. The nuts are going to be hard to remove also.

Possible local suppliers for the new cables are Florida Wire & Rigging, Orlando, and Orlando Rigging Supply.

A possible "alternative " would be to reuse the cables with new threaded stud fittings that had longer shanks (for restoring assembly length after swaged fittings are removed). We do not now know if these fittings are available, and a disadvantage is that the raised cable end of the new longer shank may abrade the fabric.

The clamp plates for the fabric can be cleaned and reused. The clamp plate bolts were tapped into the plate and have rusted . The threads should be drilled out and new stainless thru bolts should be installed (some of those shown in the photos have already been replaced). A different grade stainless nut (than the bolt grade) should be used, if possible, to reduce seizing.

I believe the yoke barrels can be cleaned out (maybe by minor reaming) and can be painted, and will be structurally sound. The new swaged threaded studs will be a loose fit but the nuts, with washers, will span this. Most holes for structural bolts are made oversized.

The clevises (Photo 6) are in decent condition and should be cleaned and painted. The allthread anchor rod should be replaced with the strength specified by the Designer. From my observation, this is a critical item. The strength of the other component parts appear stronger then the rod anchor. It appears to be the weak link and its strength is important.

4. GENERAL COMMENT:

It would be a good idea to protect the barrels from rust as best we can. I believe a good marine sealant should be used at both ends of the barrels and around the washer at the nut.

Call the undersigned with any questions at (941) 383-2613.

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6/1/09