The Orange Show – A Conservation Update

Prepared for **The Orange Show Center for Visionary Art**
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Contents

2012 photos from Conservation Report and Recommendations for *The Orange Show*, 2012, by SWCA et al
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2021 LiDAR images by Briscoe Architectural Conservation, Dylan Rollo Roth

In the autumn of 2020, Briscoe Architectural Conservation (BAC) was asked by the Orange Show Center for Visionary Art (OSCVA) board of directors to provide a LiDAR, 3D model of the Orange Show monument, and to update the 2012 "Conservation Report and Recommendations for *The Orange Show*, Houston, Harris County, Texas" produced by SWCA Environmental Consultants, Sparks Engineering, Inc. and Conservation Solutions, Inc. We find the 2012 study to be thorough, thoughtful, and accurate, and much of this report might be seen as building on their recommendations. BAC appreciates the opportunity to look closely at the conservation issues and history of this extraordinary resource.

Goals

The following goals for the study were established:

to provide new baseline documentation for the monument, including photographic and digital 3D images;

to review the recommendations made in the 2012 conservation report, assess the efficacy of previous interventions, and note changes in conditions;

based on information obtained from the above and on additional observations, to provide an updated, prioritized list of recommended actions;

and finally, to add to what is contained in the 2012 report in framing what "best practices" in cultural resource conservation might include at The Orange Show.

Methodology

The methodology we have followed in the preparation of this report includes:

three site visits between mid-January and mid-March, 2021, including seven days on-site, mapping, scanning, photographing and monitoring conditions;

LiDAR (Light Detection and Ranging) scanning of the monument with a FARO X330 instrument, in order to establish new baseline documentation of existing conditions, create a detailed topographical survey, identify drainage challenges, and for mapping improved drain paths;

close review of the June 2012 report prepared by SWCA, Sparks Engineering, and Conservation Solutions entitled "Conservation Report and Recommendations for *The Orange Show*, Houston, Harris County, Texas";

following on contributions to the 2012 report by Sparks Engineering, looking at soil characteristics of Lake Charles-Urban land soil complexes, as indicated by Sparks and in the Harris County Soil Survey;

review of National Oceanographic and Atmospheric Administration (NOAA) historical weather data for Houston Hobby airport as a means of understanding the range of conditions and duration of weather events that impact the monument;

correspondence with authors of – and contributors to – previous reports;

and speaking with board members and others who have had a long association with the Orange Show about changing conditions, and first-hand accounts of the effects of events like Hurricanes Ike and Harvey.

Limitations: This report is based on observations of areas available for view without destructive investigation. BAC is not an engineering or design firm, and drawings that accompany this report are intended to be schematic in nature.

LiDAR Scanning and Mapping

A key component in updating the 2012 conservation plan, and an action item recommended in that report, has been building a 3D model of the monument using laser scanning. Laser scanners use pulses of light to measure distances between the location of the instrument and surrounding surfaces. LiDAR, as it is known, can provide a level of detail and accuracy that is not currently possible with any other method of documentation, and has become the preferred method of recording cultural resources.

LiDAR instruments collect a set of measurements -- called a “point cloud” -- from each scanning location. Depending on the resolution settings and the capabilities of the instrument, points on surfaces millimeters apart might be recorded. By setting up the scanner at additional nearby locations, various applications can join the point clouds into a single 3D model. From such a model it is possible to extract very accurate floor plans, sections, elevations, topographical maps, “fly-throughs”, and perform a variety of analyses.

Figure 1. Museum and Steam Engine – south elevation.

BAC scanned the entire Orange Show monument over a period of 4 days, recording 70 scans, using a resolution setting of approximately 1/4 and quality setting of 6x. This 3D model can be used by OSCVA to create floor plans, topographical studies, and sections at any area using a number of free applications. The setting used when BAC scanned the Orange Show causes the

scanner to take a 360 degree relatively high-resolution color photograph from each scan location. These have proven to be very valuable documentation tools because they allow review of almost all objects and surfaces at the monument from several angles.

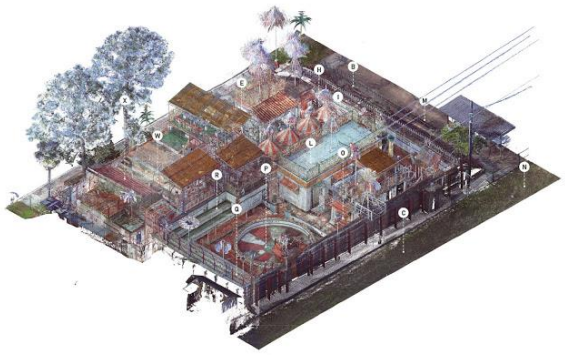

Figure 2. Perspective view of 3D model of *The Orange Show* (feature labels from SWCA plan).

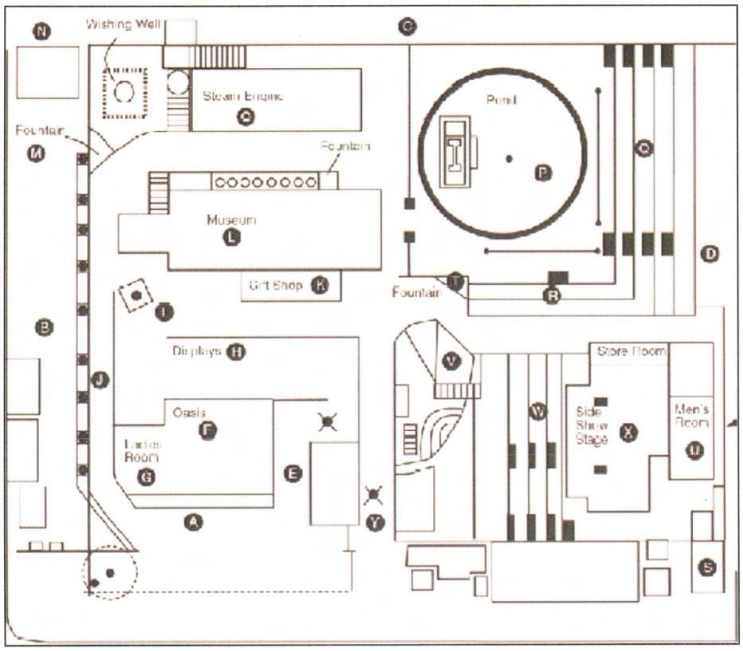

Figure 3. Site Plan of The Orange Show. (from SWCA 2012 report)

Weather Data

NOAA weather data from Houston Hobby Airport – one of the closest and most robust data sets available – shed interesting light on weather patterns affecting the Orange Show site in the past, and point to what future weather norms might look like for the area (https://www.weather.gov/hgx/climate_hou). Five of the ten wettest years since 1889 have occurred in the past 30 years. All ten of the warmest years in that time period have occurred in the past 25 years, while only two of the driest years have been recorded in that time.

In September 2008 the eye of Hurricane Ike brushed The Orange Show on the east, subjecting the monument to the "dirty" side of the storm and sustained winds of over 90 miles per hour *for a period of several hours* (https://www.weather.gov/hgx/hurricanes_climatology_2000s#Ike2008). Nine years later, Hurricane Harvey poured at least 37.5" of rain on the neighborhood in a period of five days.

The trend for southeast Texas and especially for this area of the Gulf Coast is strongly in the direction of warmer and wetter weather, with an increased frequency of major rain and wind events. These atmospheric, above-ground factors are enormously consequential, but what makes them part of the defining challenge for the stewards of The Orange Show is their combination with the soils of this site.

Figure 4. Tall features vulnerable to lightning strikes and high winds.

Soils

As pointed out in the Sparks report, the soils around and beneath the Orange Show are Lake Charles-Urban land. From the U.S. Department of Agriculture / Natural Resource Conservation Service (USDA/NRCS) website https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx: “The Lake Charles series consists of very deep, moderately well drained, very slowly permeable soils that formed in clayey sediments. These soils are on broad coastal prairies. Slopes are mainly less than 1 percent, but range from 0 to 8 percent.” This deep clay soil extends at least 85 inches below the surface before obstacles/bearing strata are encountered.

The "Urban land" designation is not a soil series but a description of paved or similar material that begins at the surface. The soil beneath the paving has similar qualities to adjacent soil – in this case, the Lake Charles series. The soil map location that includes The Orange Show is designated TX201, which includes Harris County. Although the website map is drawn at a scale too large to precisely differentiate soil types within an area the size of The Orange Show, the warehouse and office of OSCVA are generally Urban land, and most of the Orange Show site is considered Lake Charles series.

Clay is among the smallest particles of soil, and generally has the shape of tiny plates. When moderately dry, the plate-like particles line up in a more or less orderly fashion. When wetted, they draw molecules of water between them, and are pushed at all angles against each other, sometimes expanding dramatically. With the impermeable, paved covering at the Orange Show, the soil likely has a near-permanent elevated moisture content, except during prolonged periods of drought-like conditions. To our knowledge, there are no effective ways to "de-water" heavy clay soils. The primary solution is to manage runoff by providing drainage paths that allow the water to flow quickly off the site.

Findings of the 2012 Report

Structural

The Sparks structural assessment divides the complex into: masonry walls; concrete-covered steel framed observation decks; steel framed canopies on top of the pavilions, over the observation decks; steel stairs; and concrete amphitheater seating built on soil fill. Their report describes structural vulnerabilities as falling into two general categories: soil-induced foundation movement and corrosion of steel elements. This succinctly describes the structural dynamics and major conservation issues at the monument.

The Sparks recommendations range from various forms of stabilization and reinforcement to, in cases of serious structural concern, disassembly and reconstruction. Sparks says that since underpinning is difficult at the site, the primary approach to controlling soil movement will be managing drainage/maintaining moderate soil moisture content. They recommend addressing the second, and more insidious issue – treating corrosion of embedded steel elements – on a case-by-case basis.

The following actions were recommended to be taken immediately for structural concerns: reconstruct parapet over side show stage; stabilize or reconstruct the parapet and canopy over the rear door; and repair or restore severely corroded steel stairs throughout the site.

Additional actions recommended by Sparks include: improve site drainage; establish perimeter landscaping; replace all below-ground plumbing; underpinning of threatened structures; and restoration of the Steam Engine Pavilion.

Artwork Conservation

Observations by Conservation Solutions remind us of the variety and expression of materials McKissack incorporated into the Orange Show. We also see the complex issue of stewardship when otherwise ordinary materials and objects such as steel tractor seats and rebar ***are*** the resource rather than ancillary features. There is a democracy and unity of significance to the Orange Show that is its impact and at the same time one of the biggest challenges to conserving it authentically.

Figure 5. Mosaic at Amphitheater seating.

The recommendations by Conservation Solutions include: correct life safety/structural issues; correct drainage issues; conduct a site survey; laser scanning; conduct a paint and finishes analysis for documentation purposes, including tests for hazardous materials; test for salts causing paint failure; build mock-ups for budgeting purposes; conduct hands-on training for staff and engineers for familiarity with methods and materials to be used in on-going maintenance.

Figure 6. Entrance and artwork within The Orange Show museum.

Comparison of Conditions – 2012 and 2021

In general, the following photos show images from the 2012 report on the left, and images from the same location on the right, taken in 2021. In some cases, additional 2021 photos follow beneath these.

Figure 7. "A high level of foundation distress was observed at the northwest corner and is associated with the restroom plumbing." Sparks Engineering 2012 (left 2012, right 2021)

Figure 8. Walkways have heaved and settled throughout the facility, creating poor drainage and difficult walking conditions. (left 2012, right 2021)

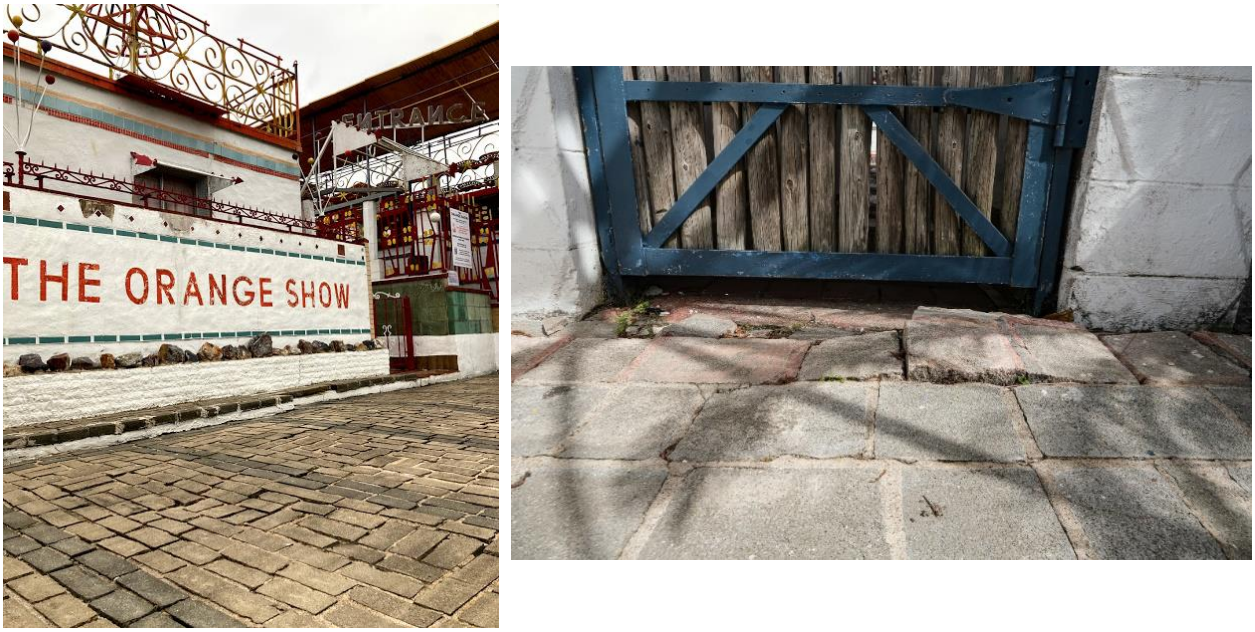

Figure 9. Additional examples of disrupted walkway surfaces.

Figure 10. "The Steam Engine pavilion is leaning significantly to the south due to soil-induced movement." Sparks 2012 (left 2012, right 2021)

Figure 11. “The northeast [northwest] corner wall was braced in a previous repair campaign. Reconstruction with a new footing will be required." Sparks 2012 (left 2012, right 2021)

Figure 12. "A break in a single-wythe solid masonry wall without lateral reinforcement. Note that there is no bonding of the masonry courses across this joint." Sparks 2012 (left 2012, right 2021)

Figure 13. Additional break in an unreinforced single-wythe solid masonry wall.

Figure 14. "Damage to an area of the perimeter wall," at the west side. "The wall next to this door frame …is broken due to foundation movement." Sparks (left 2012, right 2021)

Figure 15. "Extensive cracking and missing masonry. Reconstruction is an option, but also installing vertical reinforcement and grouting would be an appropriate way to strengthen this area." Sparks 2012 (left 2012, right 2021)

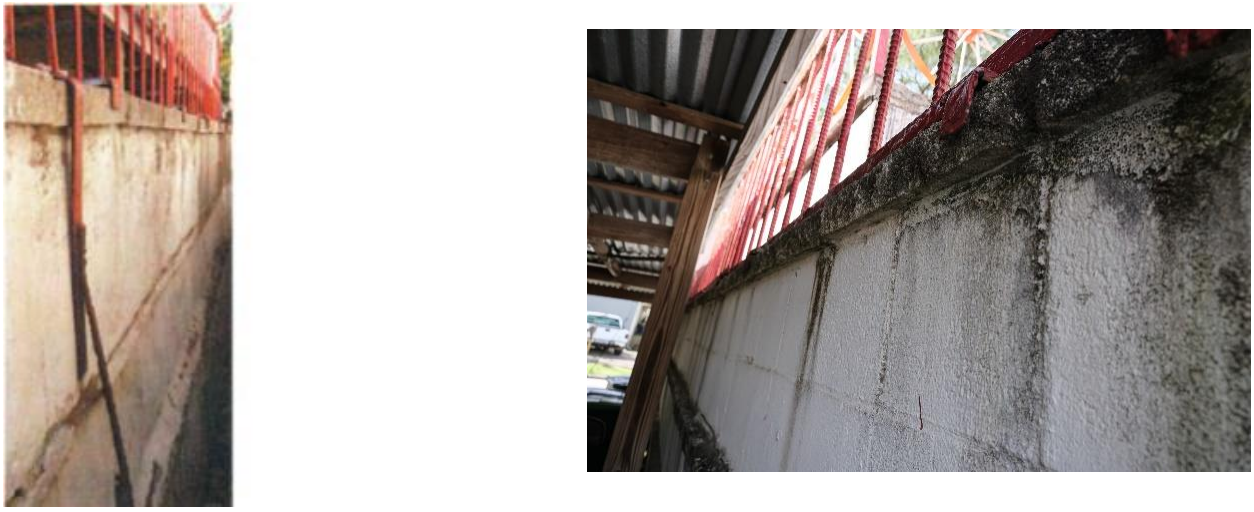

Figure 16. "This exposed tie rod functions to stabilize the wall laterally. It is likely that similar rods were embedded elsewhere inside some of the walls." Sparks 2012 (left 2012, right 2021)

Figure 17. “A steel frame was added during the 1980 repair campaign to help stabilize the south wall. However, the timber lagging has completely decayed." Sparks 2012 (left 2012, right 2021)

Figure 18. “The east wall has been stabilized laterally by the recent addition (2011) of this steel frame embedded in a concrete strip. This work did not include underpinning. Also, the wall is not tied to the new steel frame." Sparks 2012 (left:2012, right: 2021)

Figure 19. “The north wall exhibits distress like the other walls, but is buttressed somewhat by these planters." Sparks 2012 (left:2012, right: 2021)

Figure 20. These tie rod anchors are embedded elements that need review on a case-by-case basis. (left:2012, right: 2021)

Figure 21. The condition of the parapet over the Side Show stage is an important life safety issue, but does not seem to have moved much since 2012. (left 2012, right 2021)

Figure 22. "The Amphitheater seating shows visible sagging and associated cracking, possibly due in part to consolidation of the fill." (left 2012, right 2021)


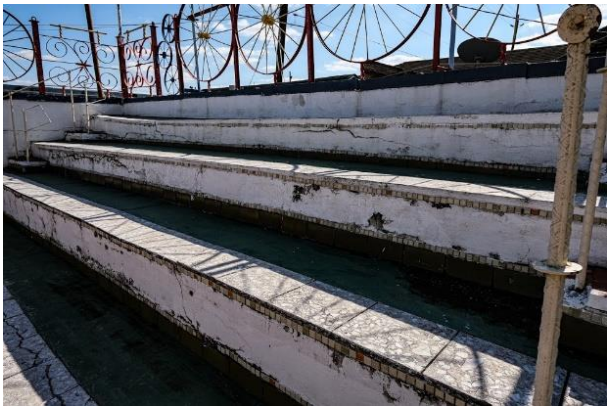

Figure 23. Additional images of the Amphitheater seating.


Figure 24. The Pond, featuring the Steamboat. (left 2012, right 2021)


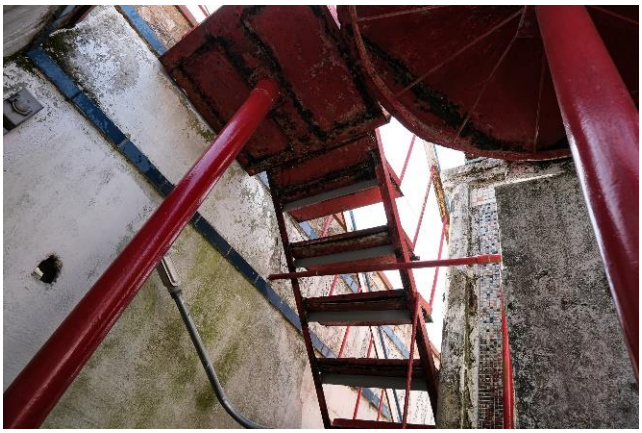

Figure 25. Corrosion at steel stairs (left:2012, right: 2021)

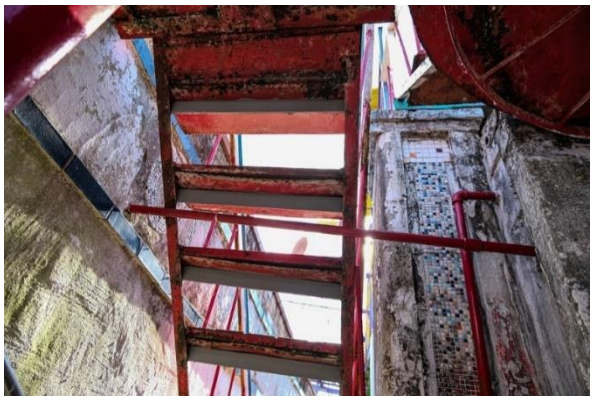

Figure 26. Additional examples of corrosion. These treads will probably have to be removed and recast.

Figure 27. Common conditions at roof decks. (left 2012, right 2021)

Figure 28. Supplemental steel framing added during in 1980 to improve the safety of the flat roof decks above a passage leading to the men's restroom. Sparks (left:2012, right: 2021)

Figure 29. “A probe of one of the observation decks showed the need for an edge flashing to prevent further deterioration.” Sparks 2012 (left: 2012, right: 2021)

Figure 30. Corrosion example. Embedded tie rod has completely corroded and cracking of the masonry has begun. (left: 2012, right: 2021)

Figure 31. Perimeter framing angle is sandwiched between layers of masonry, promoting corrosion (left:2012, right: 2021).

Figure 32. Corrosion expansion cracking a characteristic post-base made of hollow tile and filled with mortar. (left:2012, right: 2021)

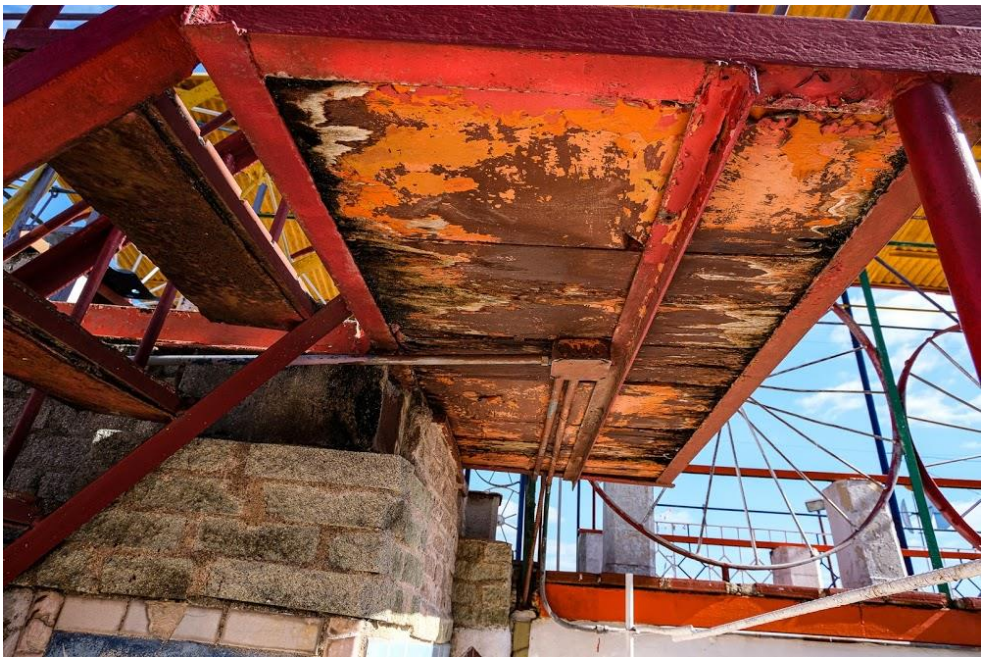

Figure 33. Wood decay and corrosion at the underside of stairs.

Figure 34. Crack on the observation deck.

Figure 35. Crack along north exterior wall.

Figure 36. Crack on second floor observation deck behind side stage.

Figure 37. Crack along east wall of Amphitheater seating.

Figure 38. Wood decay at Side Show stage ceiling.

Figure 39. Observation deck showing corrosion in steel at perimeter.