2011

Lakeview Family Aquatic Center Waterslide Structural Assessment Report



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OBJECTIVES AND FORMAT

The objective of this report is to document the visual observation performed by ATSE Consultants, LLC., of the timber stair and fiberglass flume support frames at the Lakeview Family Aquatic Center located in Peoria, Illinois. This report has been prepared at the request of Mrs. Rebecca Fredrickson, the Superintendent of Planning, Design, and Construction with the Peoria Park District.

In this report, the discussion section will initially describe the methods used during the visual observation performed on the structure. Then the areas believed to have structural deficiencies will be identified, including photographs illustrating the issues.

In the conclusion and recommendation section, an overall structural assessment of the stair and slide structures will be prescribed. Then the identified areas will be addressed in regards to our opinions of cause along with repair and replacement options.

Please note, that the report is based on visual observation methods only. There were no physical, destructive, nor non-destructive testing procedures employed and or calculations performed regarding the original design or potentially reduced capacities.

DISCUSSION

Stair and Flume Structure

According to a previous report performed on January 14, 2000 by Avanti Technologies, the slide was originally constructed in 1981 for Group VI ltd. Additionally, it was noted that the timbers used had been pressure treated but, the type of treatment used and timber specifications were unknown and are no longer available.

The Stair assembly has five intermediate landings leading up to the upper deck area that serves as the slide loading station. Spanning between the five landings are five sets of stairs, each with a pair of timber stringers supported by a timber post beam frame. Each of the timber posts are then supported at grade by a steel base plate anchored to a concrete foundation. Also, when reviewing the Avanti Technologies report, it appears that the decking used for the stairs and landings have since then been replaced with a more weather resistant composite type material.

The flume support system is independent of the stair structure with the only exception at the upper deck, where this serves as a common support for both. The fiberglass flume is supported by a series of timber A-frames of varied heights dictated by the flume elevation. Each of the A-frames has a right and left 4"x8" timber post with three 4"x8" horizontal timber webs and steel rod cross bracing. Similar to that of the stair structure, these frames are also supported by a concrete foundation. In both cases it was noticed that the tops of the concrete foundations had originally been embossed with identification markers (for example A-1, A-2... & B-1, B-2.... etc) as a means to map the frame locations. Therefore, as you will see later in the report, these markers were utilized as a tool to brand and provide an addressing system for the elements that we recommend need attention.

Observation

On Tuesday April 12, 2011 personnel from ATSE Consultants, LLC, performed a site visit at approximately 9:00 am to visually inspect the noted structures.

During this visit, only the stair and flume structural elements were evaluated and considered in our assessment. Therefore, excluded from this observation were any adjacent buildings, pools, miscellaneous structures, and the actual fiberglass flume slide.

As previously noted, the site-visit was limited to visual methods with limited use of small hand tools that were used to probe local areas of the timber structure. For all practical purposes no physical and/or destructive testing procedures were implemented. The intent of this visit was to identify areas of structural concern and the extent of decay of the timber members, which may have a negative impact on the overall structural integrity and potentially put public safety in jeopardy.

Existing Conditions and Probable Causes

Based on our visual observation, there appear to be no structural elements that exhibit signs of excessive deflection, movement or settlement. However, there are several areas where timber elements on both the stair and flume structures have decayed or been damaged to undesirable levels.

This type of decay and damage is quite typical of wood structures exposed to the elements. Such decay occurs as a result of repetitious wet/dry cycles over the life of the structure, in addition to the extended exposure to ultraviolet rays. Since this is a waterslide structure, inherently there is greater exposure to water and foot traffic, along with the potential adverse affects due to chemical infiltration from chlorinated water.

Please note that even though treated wood has a much higher resistance to rot and decay than traditional unpreserved wood, the depth of the preservative is typically limited to only the top 1/2" to 1" depth of the member. Therefore, once the outside layer of wood becomes damaged and begins to open up with checks and splits, the inner core or "heartwood" becomes exposed and more vulnerable to decay and insect infestation. Once this occurs, the member's lifespan is significantly reduced.

Conclusion and Recommendations

Based on the visual observation and the age of the structure, the overall condition of the stair and flume structure "as a whole" can be defined as fair to good condition. However, as noted previously there are a few locations that exhibit signs of decay that if not corrected will only worsen and thus adversely affect the integrity of the structures. As for the areas identified, there were three (3) locations affiliated with the stairs, five (5) locations affiliated with the flume "A-frames" and two (2) general observations relating to the foundation pads. In order to extend the life of the facility, these areas need to be corrected. For your reference, images associated with these issues have been provided in Appendix A of this report. The following items have been tabulated according to location, structural deficiency, and recommended action:

Stair Structure

Location	Deficiency	Action	Image
Landing #1	Last composite deck plank on landing is very bouncy.	Reinforce the	Image #1
		underside of deck plank	
Landing #3	The North, South, East and West ends of 4x12 platform	Replace 4x12 the two	Images
	timbers have moderate to severe decay with exposed	(2) members	#2,3,4,&5
	end grain.		
Landing #3@	2x10 beam under the landing has a large split on the	Replace the 2x10	Image #6
Pier B-19	bottom of the beam just below the last bolt.		

Flume Structure

Location	Deficiency	Action	Image
A-13 Post	West support post has moderate to severe decay	Replace post	Image #7
B-9 Post	Top of North post has severe decay with exposed heartwood	Replace post	Image #8
B-18 Post	Top of South post has severe decay and splitting.	Replace post	Image #9
B-20 Post	Top of North post has severe decay and checking with exposed heartwood	Replace post	Image #10
A-27	Bottom horizontal wood brace has severe decay and splitting, with heartwood exposed	Replace member	Image #11

Foundations

Location	Deficiency	Action	Image
Foundation	A few of the foundations pads have experienced some	Backfill undermined	Images
Pads	undermining as a result of poor drainage.	locations with granular	#12,13,&14
		fill and correct drainage	
		issues.	
Timber Post	Many of the steel base anchorage plates that attach to	Clean off the dirt and	Image #15
Steel Base	the foundations are covered in dirt and debris. This	debris and prevent	
Anchorage	type of exposure accelerates corrosion to both the	reoccurrence.	
	plate and the ends of the post		

Summary

This report has noted three (3) locations on the stair structure, five (5) locations on the flume structure and two (2) issues affiliated with the base anchorage and foundations. It is our recommendation that all of these issues be corrected prior to the 2012 season. Additionally, due to the age, type and function of this structure, we highly recommend that this type of structural assessment be performed at a minimum every 5 years. Lastly, it is advisable that an in-house monitoring program be established to annually inspect the slide for safety issues and or any other warning signs prior to opening each year.

APPENDIX A



Image #1 (Decking Very Bouncy)



Image #2 (Landing #3 4x12 Beams Need Replaced)



Image #3 (Landing #3 4x12 Beams Need Replaced)



Image #4 (Landing #3 4x12 Beams Need Replaced)



Image #5 (Landing #3 4x12 Beams Need Replaced)



Image #6 (Landing #3 2x12 Beams Needs Replaced)



Image #7 (Post @ A-13 West Leg Needs Replaced)



Image #8 (Post @ B-9 North Leg Needs Replaced)



Image #9 (Post @ B-18 South Leg Needs Replaced)



Image #10 (Post @ B-20 North Leg Needs Replaced)



Image #11 (Horizontal Brace @ A-27 Needs Replaced)



Image #12 (Foundation Undermined)



Image #13 (Foundation Undermined)



Image #14 (Foundation Undermined)



Image #15 (Burring Steel Base Anchorage, Remove Debris)