City of Birmingham
A Walkable Community

MEMORANDUM

Department of Public Services

DATE: **August 15, 2014**

TO: **Joseph A. Valentine, City Manager**

FROM: **Lauren A. Wood, Director of Public Services**

SUBJECT: **Staff Report – Holiday Tree**

As you are aware, over the last two holiday seasons City staff has been monitoring and researching various items with regard to the holiday tree which is displayed in Shain Park during the winter months. The issue we are faced with is the public observes portions of the lights on the tree which sporadically shut off when the weather conditions become wet. This is the result of the requirement to plug the tree into a ground vault circuit interrupter (GFCI) outlet. These outlets reduce accidental electrocution, and code requires them in baths, kitchens, laundry rooms, garages and outdoor locations.

According to the *Simple English Wikipedia*:

A **ground fault circuit interrupter (GFCI)** or **Residual Current Device (RCD)** is a device that shuts off an electric circuit when it detects that current is flowing along an unintended path, possibly through water or through a person. It is used to reduce the risk of electric shock. It works by measuring the current leaving the hot side of the power source and comparing it to the current returning to the neutral side. If they are not equal, this means that some of the current is flowing along an unintended path, and the GFCI shuts the power off. When the problem is corrected, the GFCI can manually be reset by pushing the reset button. There is also a test button that can be used to verify that the GFCI works. It is recommended to test GFCIs at least once a month. GFCIs are required in kitchens, bathrooms, unfinished basements, garages, outdoors, and anywhere near a sink. GFCIs are available in two types for permanent installation, the circuit breaker type that installs in the panel, and the receptacle type that installs in a normal electrical box. GFCIs that attach to appliance cords are also available. These are often found on hair dryers. Although GFCIs are designed primarily to protect from electric shock, they can also prevent some fires, in particular fires that result from a live wire touching metal conduit.

Attached you will find a memorandum prepared by Carrie Laird, Parks and Recreation Manager detailing all undertakings to date and describing the most current information about the holiday tree. According to Carrie's thorough assessment, we are faced with a scenario of possible outages of the tree based on the weather conditions. This is certainly an industry wide occurrence as the tree is intended for outdoor use. We will continue to monitor this actively throughout the season and take necessary steps to have the tree function as intended, either be on or be off.

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MEMORANDUM

Department of Public Services

DATE: **August 14, 2014**

TO: **Lauren Wood, Director of Public Services**

FROM: **Carrie Laird, Parks and Recreation Manager**

SUBJECT: **Holiday Tree Update**

In 2012, the DPS in cooperation with the PSD purchased a "Giant Everest" tree from Wintergreen Corporation. Much consideration was given to the fact that this would be an artificial tree, however, the look and feel of the selected tree is very natural and the most realistic looking on the market. In order to make this tree so realistic looking, the frame is built in such a way that it holds "branches". The frame consists of 12 rings stacked on top of one another and branches are attached to the rings at an angle to achieve the desired look. Each branch has its own set of lights, having a male plug that is inserted into a female housing attached to the ring frame. Each ring then has one or more cords that hang down though the inside of the entire frame to be plugged into an outlet at the base. The tree has 22,260 LED lights on it, spread over approximately 300 branches. This means there are 300 connection points into the wiring harness of the frame and additional connection points into the outlets.

Because we had issues with portions of the tree or the entire tree going dark over this past season, contact was made with the supplier and also a reliable electrical contractor to trouble shoot the issues and determine the best course of action. The connection points of the wiring harness referred to above and also the amount of cording connections needed to achieve a 35 foot tree were determined to be the cause of the GFCI outlet tripping. If a small amount of water is allowed into any of these points, whether it is the branch connection to the female housing on the frame, or the cord connection to the outlet, the GFCI outlet trips, causing one or several dark areas in the tree. We have used 3 GFCI outlets on separate circuits to accommodate the tree due to the amount of cording needed to plug into. That is why a portion of the tree at times would go out. It all depended on where the water was able to make its way in. As you know, the weather this past season was extraordinary which contributed to the numerous outages as well.

After the holiday season, we had an electrician try several different configurations on what sections of the tree were plugged into what outlet and it did not make a difference, there was not a certain outlet or cord or section of frame that was the culprit of the outages. Basically, the GFCI outlets are doing what they are supposed to do; they are designed to stop the interference of water with the electrical to prevent electrical shock. Another contributor to the

GFCI popping or tripping is the fact that the tree has LED lights. While there are many benefits of LED lights, they do not warm up like incandescent lights. This is important because the difference is the moisture affecting the tripping will cause it to happen quicker. If the wires are warmer, the water or moisture evaporates and may not cause the tripping. The electrician also found that some of the connection points on the frame where the branch plugs into were corroded, which could contribute to tripping. These parts are under warranty and have been replaced. Approximately 10 branches had light strands that had wearing of the wires at the connection points which could have caused tripping. The supplier also replaced these light strands, again under warranty. There is a 5 year warranty on all parts and materials. No issues or concerns were found during making contacts with distributors and manufacturers of this tree with regard to faulty or defective items.

To summarize what work has been done so far: 1) Electrician tested all sections of tree to try to find source of nuisance tripping. 2) Worn wires and corroded socket fixtures have been replaced under warranty. 3) Recommendations from the electrician have been provided for installation for the upcoming season. Recommendations are as follows: Replace all corroded fixtures (received all parts and replacement in progress), seal all connection points with approved electrical caulk (in progress), create weatherproof boots for tree cords at outlet plug (in progress), spray electric grease to disperse water at each branch location at time of install (will be part of installation work) and lastly condense all cording so that only one GFCI outlet is used (in progress).

The Giant Everest tree has been sold throughout the Country and is on display outdoors in many areas, including the Memphis Zoo and Cincinnati Zoo, Macy's, Sea World, Six Flags, and other municipalities and town squares. GFCI outlet usage has caused nuisance tripping in other communities as well. We will continue to monitor and make modifications as needed to the set up process with the guidance of an electrician. The modifications that are in progress will help to contribute to less tripping of the GFCI outlet, but will not guarantee the tree remain on all the time.