



LANDSCAPE PERFORMANCE SERIES

Ravinia Festival South Parking Lot – Highland Park, IL Methodology for Landscape Performance Benefits

Environmental

- ***Eliminated surface flooding, which previously occurred an average of 25 days per year, reducing the capacity of the lot for parking. After receiving over 8 inches of rain in 48 hours on July 22-23, 2011, the lot remained free from standing water.***

The parking area prior to construction was primarily compacted gravel, an impervious surface that infiltrates very little stormwater. The runoff coefficient used by the city of Highland Park for a compacted gravel parking lot is 0.90 (Joe Pasquasi, Highland Park engineering office, 7/8/2011), suggesting that even small rain events on gravel can result in flooding. It is assumed that rainfall events with 0.5" of rain or more in 24 hours led to flooding problems in the preexisting Ravinia lot, reducing the number of Ravinia patrons able to park. Rainfall records from the National Climatic Data Center between 2005 and 2010 were used to determine the average number of days per year it rains more than .5" within 24 hours (www.ncdc.noaa.gov/, accessed on 6/28/11 by Sarah Alward). For the weather station nearest to Ravinia (station 111497 at the Chicago Botanical Gardens), an average of 25 days each year had rainfall of .5" or more.

During an extremely heavy rain event from July 22 to July 23, more than 8" of rain fell in Chicago (<http://www.weather.gov/climate/index.php?wfo=ilx>, accessed 7/26 by Robin L. Burke). Rainfall information is recorded below:

Station: Chicago-O'Hare Illinois
Year: 2011
Latitude: 41 58 N
Longitude: 87 54 W
July 22, 2011: 1.55" rain
July 23, 2011: 6.86" rain

- ***Ensured the continued sequestration of 21,500 pounds of carbon per year by preserving 49 oaks that were threatened by root-zone compaction and inundation, saving over \$25,000 in tree replacement costs.***

The existing parking area was a compacted gravel lot surrounded by a 3'-high embankment with an overflow outlet. Storm events would cause water to pond in the parking area so that any trees at or below the elevation of the outlet structure were susceptible to stress from inundation. Forty-nine (49) trees exist along the inside edge of the embankment and were susceptible to damage from root-zone compaction by parked cars.

Twenty-five (25) tree boles stand completely within the detention basin. The other twenty-four (24) tree boles stand within 11 feet of the detention basin. Based on a US Forest Service document (Lamson, 1987) that correlates the size of the crown with the diameter of the trunk, an oak with a diameter at breast height (DBH) of 6" has a crown of approximately 22'. Therefore, any 6" DBH or greater tree bole that fell within 11' of the detention area was assumed to have up to 50% of its roots in the detention area and at risk of inundation.

Carbon sequestration for these 49 at-risk trees was calculated using the National Tree Benefits Calculator (treebenefits.com, accessed on 7/5/2011) and entering the tree diameters given in the construction documents provided by JJR. The estimation of the number of cars removed from the

road was based on the National Tree Benefits Calculator, which assumes the average mid-sized sedan drives 12,000 miles per year and emits 11,000 pounds of carbon.

According to the Highland Park tree preservation ordinance, any removed oak tree between 8"-30" DBH must be replaced with three new trees or saplings, 3" caliper or greater. Eight of the 49 trees would require 24 replacement saplings.

Removal of any "heritage tree," such as an oak with 30" DBH or greater requires four new trees or saplings, 3" caliper or greater. Two of the 49 trees are heritage trees and would require eight replacement saplings.

Assuming Ravinia would want to maintain the park-like character of the site and replace all other trees that are not specifically protected under the Highland Park tree preservation ordinance, an additional 32 saplings would likely be needed to replace the 32 trees 8" DBH or smaller.

The cost of replacing the 49 at-risk trees with 64 new saplings was based on the RSMean Costworks online estimator (<http://meanscostworks.com/>, requires registration). All replacement trees were specified as 3-3.5" caliper *Quercus palustris* with a root ball of 36". The cost of purchasing and installing these trees was estimated to be **\$25,792**.

References

Lamson, Neil I. 1987. D.b.h./Crown Diameter Relationships in Mixed Appalachian Hardwood Stands. U.S

Department of Agriculture, Forest Service.

http://www.fs.fed.us/ne/newtown_square/publications/research_papers/pdfs/scanned/OCR/ne_rp_610.pdf, accessed 7/11/11 by Sarah Alward.

Social

- ***Reduced complaints related to parking lot inaccessibility and flooded yards and basements in nearby residences from several hundred per year to zero.***

During a personal conversation with James Schmitz, Ravinia's Director of Facilities (6/7/11), he reported that he typically received "several hundred" complaints each year from donors who use the south parking lot during festival events as well as from members of the surrounding neighborhood. He did not keep track of the exact number of complaints. Ravinia patrons complained that the lot was inaccessible due to flooding, or muddy surfaces during and after rain. Adjacent residences reported flooded yards and basements near the south parking lot. Since construction finished, Mr. Schmitz reports that he no longer receives any complaints about flooding from patrons or neighbors. In general, the lot has been very well received.

Mr. Schmitz wrote: "The renovation of the South Parking Lot has been a great success for us. Maintenance and labor costs have been reduced and the threat of standing water after heavy rainfall has disappeared. Patron complaints about flooding have turned into compliments about the beauty and convenience of the new parking surface. Not having to worry about how much space we might lose after a rainfall or how our patrons are going to retrieve their cars from a giant puddle is a great relief. I would even argue that adjacent residents have benefited from the work due to the amount of runoff and ground water now being taken into the Storm Trap system installed in our lot. I have firsthand knowledge about one neighbor whose basement was dry this spring for the first time in 20 years. All things considered, we couldn't be more satisfied with the results we've seen thus far."

Cost Comparison Methodology

- ***Installing 27,000 sf of permeable concrete unit pavers instead of traditional poured concrete saved over \$35,000 in construction costs.***

The parking area consists primarily of unit pavers, with a poured concrete driving lane through the middle. In total there were 27,717 square feet of permeable paving installed at an estimated cost of \$147,000, or \$5.30 per square foot (147,000 / 27,717). Additionally, there was 5,648 square feet of concrete roadway installed at a total cost of \$37,220 or \$6.59 per square foot (37,220/5,648). The surface areas for the permeable pavers and concrete are reported in the table below, which was provided by JJR. The cost for the pavers and concrete came from the bid by W.B. Olson, the project's general contractor.

Estimated cost from JJR on September 25, 2009	Area (sf)	Unit Cost	Total Cost
Permeable Paving (colored concrete, drain lines)	27,717	\$7.50	\$207,877
Concrete Roadway Jointed	5,648	\$8.00	\$45,184

Bid by WB Olson	Total Cost
Concrete Paving (Section 321313)	\$37,220
Unit Porous Paving (Furnish, Bedding, Installation, Joint Material, Section 321443)	\$147,000

To pave the entire parking area with concrete instead of permeable pavers, the cost would have been \$182,655.

$$\$6.59 \text{ per square foot} \times 27,717 \text{ square feet} = \$182,655$$

$$\text{Subtracting the cost of permeable pavers: } \$182,655 - 147,000 = \mathbf{\$35,655}$$

Permeable unit pavers saved \$35,655 in initial construction costs alone.

After consulting with Thomas Petermann, the project's civil engineer, it is important to note that the prices for pavers and concrete are project-specific and vary from job to job. According to Mr. Petermann, concrete pavement usually costs approximately \$6 per square foot while pavers cost approximately \$8 per square foot. (Personal communication, 7-25-2011).

- ***Using detention vaults installed under the parking lot avoided the need to purchase three adjacent lots at a cost of \$1.8 million to accommodate above-ground stormwater detention.***

The pre-existing parking lot contained a detention area of nearly 21,000 square feet (or .48 acres), which made parking after a storm event limited or impossible. To provide year-round access to the south parking lot at Ravinia, the stormwater detention area would need to be moved to a separate location either underground or off-site. To store the same amount of water

as the existing detention area above ground and separate from the parking area, 21,000 sf (or 0.48 acres) would need to be purchased.

The Lake County Illinois Property Tax Application (<http://gis2.co.lake.il.us/maps/> accessed on 7/6/2011) was used to determine the value of three residential lots adjacent to the south parking lot that total approximately the same acreage as the detention area (.53 acres, or 23,290 sf). The fair market estimated cost for these three properties totals \$1,847,934 (three times the total state equalized value). Therefore, if above-ground water detention was relocated from the parking area to these three parcels of land, Ravinia would have had to purchase these properties for more than \$1.8 million.

Address	State Equalized Value (SEV)	Fair Market Value (SEV x 3)
424 Delta Rd Highland Park, ILL 60035	\$241,465	\$724,395
394 Delta Rd Highland Park, ILL 60035	\$200,989	\$602,967
425 Carol Ct Highland Park, ILL 60035	\$173,524	\$520,572
Total	\$615,978	\$1,847,934