LANDSCAPE PERFORMANCE SERIES

Palmisano Park / Stearns Quarry – Chicago, IL
Methodology for Landscape Performance Benefits

Environmental

1. **Manages all rainfall for a 100-year, 24-hour storm (5.56 million gallons) onsite, through bioswales, wetland cells and a retention pond.**

Due to a mandate for previous landfill sites by the Illinois Environmental Protection Agency (IEPA),[1] Palmisano Park's stormwater management features must not cause erosion, scour drainage routes or release uncontrolled water off-site during a 100 year/24-hour storm.[2] To meet this requirement, site engineering capped the landfill, thus preventing water infiltration beneath the membrane. The site design manages stormwater through overland flow to bioswales that flow into and through cascading wetland cells. Both the swales and wetland cells function to slow and filter water before entering the pond. An emergency overflow to the City of Chicago sewer can only be utilized when pond levels get too high. An alarm alerts the Chicago Park District to manually turn on a pump that discharges water to a sewer located on Halsted Street. According to the Chicago Department of Water Management, the pump may not be turned on sooner than 24 hours after a rainstorm.[3] This emergency overflow is a mandatory requirement of the City of Chicago. Figure 1.1 shows water flow at Palmisano Park.

Methodology:
Weston Solutions, Inc. modeled the stormwater system for Palmisano Park with StormNET Version 4.18.7 by Boss International and the Natural Resource Conservation Service's Technical Release 55 method.[4] After calculating the peak flow for each swale, FlowMaster version 5.15 by Haested Methods helped measure peak flow velocity and depth. Overflow rates from the wetland cells were determined using wet well inflow data. Researchers reviewed this data and stormwater management was further examined by calculating total site holding capacity for a 100-year/24-hour storm.

According to the Table 1.1, "Rainfall Frequency Atlas of the Midwest, Table 1 (Bulletin 71)" a 100-year/24-hour storm event in Cook County, Illinois would produce 7.58 inches of rainfall.[5] Over Palmisano Park's 27 acres, this storm event would accumulate 742,916-cf of water, which is equivalent to 5,557,397 gallons.

Palmisano Park 100-yr/24-hr Rainfall Calculations
1 acre = 43,560 square feet
27 acres = 1,176,120 square feet
7.58 inches = 0.63 feet
0.63 feet x 1,176,120 square feet = 742,915.8 cubic feet
1 cubic foot = 7.48052 gallons
742,915.8 cubic feet x 7.48052 gallons = 5,557,396.5 gallons

[1] http://www.epa.state.il.us/land/site-remediation/landfill-info.html
[2] WESTON Solutions, Inc. William F. Karlovitz, P.E. Letter to Hana Ishikawa. Site Design Group. Re: Stormwater Modeling Stearn's Quarry Park Development, Chicago Park District. 9 October 2009.
[3] City of Chicago. Department of Water Management. Blocking Rainwater and Preventing Sewer Backup. http://www.cityofchicago.org/city/en/depts/water/provdrs/engineer/svcs/blocking_rainwaterandpreventingsewerbackup.html. Accessed 9 June 2014.
[4] Natural Resource Conservation Service. Urban Hydrology for Small Watersheds,TR-55. http://www.hydrocad.net/pdf/TR-55%20Manual.pdf. June 1986.
[5] Huff, Floyd A. and James R. Angel. Rainfall Frequency Atlas of the Midwest. Midwest Climate Center, Climate Analysis Center, National Weather Service, National Oceanic and Atmospheric Administration, and Illinois State Water Survey: Division of the Illinois Department of Energy and Natural Resources. Page 114. 1992. http://www.isws.illinois.edu/pubdoc/b/iswsb-71.pdf. Accessed 9 June 2014.

Limitations of research:
Bulletin 71 containing a table of rainfall data was used to calculate gallon savings. The data within Bulletin 71 dates from 1992, and stormwater calculations for Chicago continue to use these rainfall numbers because up to date numbers are not published. Storm events have been changing in the last two decades, but the Illinois State Water Survey has not published current data. The need for more accurate rainfall information is critical for landscape architects and allied professionals to understand and guide stormwater design, particularly in the context of climate change.

Table 1. Sectional Mean Frequency Distributions for Storm Periods of 5 Minutes to 10 Days and Recurrence Intervals of 2 Months to 100 Years in Illinois

Sectional code (see figure 1 on page 4)

01 - Northwest	*06 - West Southwest*
02 - Northeast	*07 - East Southeast*
03 - West	*08 - Southwest*
04 - Central	*09 - Southeast*
05 - East	*10 – South*

Rainfall (inches) for given recurrence interval

Section	*Duration*	*2-month*	*3-month*	*4-month*	*6-month*	*9-month*	*1-year*	*2-year*	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
02	10-day	2.02	2.48	2.80	3.30	3.79	4.12	4.95	6.04	6.89	8.18	9.38	11.14
02	5-day	1.66	1.98	2.24	2.60	2.99	3.25	3.93	4.91	5.70	6.93	8.04	9.96
02	72-hr	1.53	1.83	2.02	2.34	2.70	2.93	3.55	4.44	5.18	6.32	7.41	8.78
02	48-hr	1.44	1.70	1.90	2.18	2.49	2.70	3.30	4.09	4.81	5.88	6.84	8.16
02	24-hr	1.38	1.61	1.76	2.03	2.31	2.51	3.04	3.80	4.47	5.51	6.46	7.58
02	18-hr	1.26	1.47	1.61	1.86	2.12	2.30	2.79	3.50	4.11	5.06	5.95	6.97
02	12-hr	1.20	1.40	1.53	1.77	2.01	2.18	2.64	3.31	3.89	4.79	5.62	6.59
02	6-hr	1.03	1.21	1.32	1.52	1.74	1.88	2.28	2.85	3.35	4.13	4.85	5.68
02	3-hr	0.88	1.02	1.13	1.30	1.47	1.60	1.94	2.43	2.86	3.53	4.14	4.85
02	2-hr	0.81	0.95	1.05	1.20	1.36	1.48	1.79	2.24	2.64	3.25	3.82	4.47
02	1-hr	0.65	0.76	0.84	0.96	1.09	1.18	1.43	1.79	2.10	2.59	3.04	3.56

Table 1.1. Rainfall for the Chicago region, courtesy of *Rainfall Frequency Atlas of the Midwest*

Figure 1.1, Water Flow at Palmisano Park

2. **Saves 10.5 million gallons of potable water and $34,700 by using native prairie plants, which require no irrigation, compared to irrigating an equivalent turf area.**

A typical neighborhood park in the City of Chicago consists of ball fields and grass lawns. In contrast, the warm season prairie planting of Palmisano Park does not require irrigation once established.

Methodology:
Computing irrigation costs from the "Sourcebook on Natural Landscaping for Local Officials" provides cost comparisons of turf grass lawns versus native prairie planting.[6] The numbers provided in Table C1.1 are based on an example from Applied Ecological Services (AES) found on page 92 of the "Sourcebook." However, because the "Sourcebook" was published in 2004, cost of water had increased at the time of completion of Palmisano Park in 2010 and has since increased further, with additional raises forthcoming. To understand the impact of water rate increases, the AES example from the "Sourcebook" has been compared against the rising cost of water.

Based on Table C1.1, an average of $522.73 would be spent annually on irrigation of one acre of lawn in 2003. Of Palmisano Park's 27 acres, 22.02 are planted with native prairie that does not require irrigation once established, therefore, annually saving over $11,510. Table C1.2 shows that this park saves 10,478,767.5 gallons of potable water each year as a result of planting native species. This number is determined based on the suggestion from the University of Georgia's College of Agricultural and Environmental Sciences[7] that a typical one-acre lawn requires one inch of water per week over the course of the growing season or 27,000 gallons of water per acre for

[6] Chicago Wilderness. Sourcebook on Natural Landscaping for Local Officials. http://www.chicagowilderness.org/files/4413/3087/4878/natural_landscaping_sourcebook.pdf

[7] Keith Mickler. *How to Water Our Lawn Correctly.* University of Georgia College of Agricultural and Environmental Sciences.. No date provided.

irrigation purposes. In Chicago, lawns require slightly less, between 0.5" to 1" per week, therefore, an average of 0.75" has been used for calculations. For Chicago, the growing season is approximately 23 to 24 weeks long, averaged at 23.5 weeks.

Located along Lake Michigan, fresh water is often taken for granted and low water rates historically reflected this readily available resource. Yet, beginning in 2003 the City of Chicago started increasing water rates to pay for infrastructural upgrades to over 100-year-old piping, water treatment facilities and water pumping stations.[8] By 2008, the City began aggressively raising the cost of water 15% over the previous year, and continued to do so until 2010. In 2012, water prices rose 25%, and have or will be raised 15% each year until 2015.[9] From 2003 to 2014, water rates have increased from $1.25 to $3.31 per 1000 gallons. These numbers reflect a 265% increase in price. The current water rate has been factored into the cost of irrigation for a park and the savings are calculated in Table C1.3, showing that $34,685 would more accurately describe the irrigation cost savings in 2014 and predicts over $39,920 savings in 2015.

Native Plants vs. Turf Irrigation & Potable Water Calculations

2003 Cost of Water, based on "Sourcebook on Natural Landscaping for Local Officials"

Average annual cost to irrigate one acre = $522.73

Native planted area of Palmisano Park = 22.02 acres

Total Irrigation Savings = $522.73 x 22.02 ac = $11,510.51

Estimated Potable Water Savings

Water needed to irrigate one acre of lawn = 0.5" to 1" per week for 23.5 week growing season, average irrigation = 0.75" per week

Gallons needed to irrigate one acre of lawn with 0.75" of water = 20,250

Annual water needed to irrigate one acre of lawn = 20,250 gal x 23.5 wks = 475,875 gallons

Native Planted Area of Palmisano Park = 22.02 acres

Annual irrigation savings at Palmisano Park = 475,875 gal x 22.02 ac = 10,478,767.5 gallons

Estimated Water Savings Over Time

2003: Cost of 1,000 gallons of water = $1.25

2003: Annual cost to irrigate one acre of lawn = (475,875 gal / 1,000 gal) x $1.25 = $594.84

2003: Water savings at Palmisano Park = $594.84 x 22.02 ac = $13,098.38

2010 (Year of Park Completion): Cost of 1,000 gallons of water = $2.01

2010: Annual cost to irrigate one acre of lawn = (475,875 gal / 1,000 gal) x $2.01 = $956.51

2010: Water savings at Palmisano Park = $956.51 x 22.02 ac = $21,062.35

2014: Cost of 1,000 gallons of water = $3.31

2014: Annual cost to irrigate one acre of lawn = (475,875 gal / 1,000 gal) x $3.31 = $1,575.15

2014: Water savings at Palmisano Park = $1,575.15 x 22.02 ac = $34,684.80

Difference: 2003 to 2014 Water Rate Increase = $3.31 - $1.25 = $2.06 = $3.31 / $1.25 = 2.648 = 265% increase

Difference: 2003 to 2014 Water savings at Palmisano Park = $34,684.80 - $13,098.38 = $21,586.42

Difference: 2003 to 2014 Water savings at Palmisano Park, using AES numbers = $34,684.80 - $11,510.51 = $23,174.29

Average Difference: 2003 to 2014 Water savings at Palmisano Park = ($21,586.42 + $23,174.29) / 2 = $22,380.36

Difference: 2010 to 2014 Water Rate Increase = $3.31 - $2.01 = $1.30 = $3.31 / $2.01 = 1.647 = 165% increase

Difference: 2010 to 2014 Water savings at Palmisano Park = $34,684.80 - $21,062.35 = $13,622.48

[8] City of Chicago. Department of Water Management. Report: lmo2-2011. 2011 Annual Water Use Audit Form. Illinois Department of Natural Resources. Page 6. http://www.cityofchicago.org/content/dam/city/depts/water/general/Engineering/LMO-2_2011.pdf.

[9] City of Chicago. Department of Water Management. Water Sewer Rates. http://www.cityofchicago.org/city/en/depts/water/provdrs/cust_serv/svcs/know_my_water_sewerrates.html. Accessed 2 June 2014.

Table C1.1, Estimated Irrigation Savings adapted from 'Sourcebook on Natural Landscaping for Local Officials'

Native Planted Area (Acres)	Irrigation Cost Per Acre for Turf Lawn (Annual Avg, 2004)	Total Irrigation Savings (Annual, 2004)
22.02	522.73	11,510.51

Table C1.2, Estimated Potable Water Savings

Native Planted Area (Acres)	Gallons Per Acre Needed for Irrigation (Weekly)	Gallons Per Acre Needed for Irrigation (Annual)	Total Gallons Saved (Annual)
22.02	20,250	475,875	10,478,767.5

Table C1.3, Estimated Water Savings Per City of Chicago Cost of Water

Native Planted Area (Acres)	Year	Cost of 1000 Gallons of Water	Cost of Total Gallons of Water Per Acre (475,875 Annual/Acre)	Potable Water Cost Total Savings (Annual, 2014)
22.02	2003	1.25	$594.84	$13,098.38
22.02	2004	1.29	$613.88	$13,517.64
22.02	2010	2.01	$956.51	$21,062.35
22.02	2014	3.31	$1,575.15	$34,684.80
22.02	2015	3.81	$1,813.08	$39,924.02

Limitations of research:
This method compares Palmisano Park against a baseline condition of a typical park on a national level. In an email mentioned in the following Cost Comparison, Kal Moy, the Chicago Park District (CPD) McGuane Park Supervisor, states that CPD parks are not regularly irrigated other than by rainfall. However, in extreme instances, certain staffed parks include emergency watering systems. McGuane Park includes this buffalo box watering capability, and the park is located adjacent to Palmisano Park but does not have the capability to reach Palmisano Park for irrigation purposes. Additionally, the Chicago Park District requires more information on how well native plants have adapted to fully understand the benefits; however, the success of the warm season prairie at Palmisano Park could be an indication for CPD to begin replacing turf with this mix, or other drought tolerant planting.

3. Diverted over 4,280 cf of material from landfills by reusing 78 boulders found on-site and repurposing sidewalk and foundation debris from the City.

The Chicago Park District was able to save city sidewalk and foundation debris materials from the landfill by reusing it within Palmisano Park for the wetland terraces and steps down to the pond. The contractor, Clauss Brothers, Inc., used skill to place these materials within the site so as to look like limestone, the material specified in the original design.

Methodology:
A decision was made during construction to reuse more existing material as well as material from other city projects than initially planned. As a result, two categories of material saving are calculated: the materials planned for reuse during the design phase, and materials reused to replace the limestone. Site Design Group's construction document detail drawings and notes have been used to determine the size of boulders salvaged from and reused on-site and the size of sidewalk and foundation concrete pieces used for the wetland cell splash pads and waterfalls.[10] Photographs of wetland splash pads and waterfalls have also been referenced to verify number of levels per splash pad or waterfall. An aerial image from Google Earth was used to measure the size of the stairs to pond. See Figure 2.1, Sheet L209 Paving Details II for detail drawings. See Figure 2.2 for site

[10] Chicago Park District. Site Design Group, Ltd. Stearns Quarry (Park 531) Park Development Construction Documents. 30 August 2005.

locations of each component calculated.

Palmisano Park Material Reuse Calculations

PLANNED FOR - SALVAGED BOULDERS & FENCE POST FOUNDATIONS

Salvaged Boulders > 2' x 2' x 2' = 8-cf x 43 quantity = **344 total cf**

Salvaged Boulders 1' x 1' x 1' < 2' x 2' x 2' = 105 cf to 280 cf = ((105-cf + 280-cf) / 2) x 35 quantity = **192.5 total cf avg**

Total Salvaged Boulders = 43 + 35 = 78

Salvaged Boulders = 344 cf + 192.5 cf = 536.5 total cf

Salvaged Concrete Fence Post Foundations (1 of 4 possible dimensions) = 1' x 3' x 1' = 3 cf x 27 quantity = 81 cf

Salvaged Concrete Fence Post Foundations (2 of 4 possible dimensions) = 1.3' x 3' x 1' = 3.9 cf x 27 quantity = 105.3 cf

Salvaged Concrete Fence Post Foundations (3 of 4 possible dimensions) = 1.3' x 4.5' x 1' = 5.85 cf x 27 quantity = 157.95 cf

Salvaged Concrete Fence Post Foundations (4 of 4 possible dimensions) = 1.3' x 6' x 1' = 7.8 cf x 27 quantity = 210.6 cf

Salvaged Concrete Fence Post Foundations average = (81 + 105.3 + 157.95 + 210.6) / 4 = 138.7 total cf avg

NEW - WETLAND CELL SPLASH PAD & WATERFALLS

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 1 = 26' across = (smallest dimensions of individual pieces) = 2' x 3' x 4" = 2 cf

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 1 = 26' across = (medium dimensions of individual pieces) = 2' x 3' x 6" = 3 cf

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 1 = 26' across = (largest dimensions of individual pieces) = 2' x 3' x 8" = 4 cf

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 1 (average dimension) = (2 + 3 + 4) / 3 = 3 cf avg

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 1 (1 of 2 possible amounts per level) = 3 cf x 8 quantity = 24 total cf

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 1 (2 of 2 possible amounts per level) = 3 cf x 13 quantity = 39 total cf

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 1 (24 + 39) / 2 = 31.5 total cf avg for one level

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 1 = 31.5 cf avg x 4 levels = 126 total cf

Salvaged Limestone/Concrete Sidewalk, Splash Pad 2 = 31.9' across = (average dimension of individual pieces) = (2 + 3 + 4)/3 = 3 cf avg

Salvaged Limestone/Concrete Sidewalk, Splash Pad 2 (1 of 2 possible amounts per level) = 3 cf x 10 quantity = 30 total cf

Salvaged Limestone/Concrete Sidewalk, Splash Pad 2 (2 of 2 possible amounts per level) = 3 cf x 16 quantity = 48 total cf

Salvaged Limestone/Concrete Sidewalk, Splash Pad 2 (30 + 48) / 2 = 39 total cf avg for one level

Salvaged Limestone/Concrete Sidewalk, Wetland Cell 2 Splash Pad 2 = 39 cf avg x 4 levels = 156 total cf

Salvaged Limestone/Concrete Sidewalk, Splash Pad 3 = 41' across = (average dimension of individual pieces) = (2 + 3 + 4) / 3 = 3 cf avg

Salvaged Limestone/Concrete Sidewalk, Splash Pad 3 (1 of 2 possible amounts per level) = 3 cf x 13 quantity = 39 total cf

Salvaged Limestone/Concrete Sidewalk, Splash Pad 3 (2 of 2 possible amounts per level) = 3 cf x 20 quantity = 60 total cf

Salvaged Limestone/Concrete Sidewalk, Splash Pad 3 (39 + 60) / 2 = 49.5 total cf avg for one level

Salvaged Limestone/Concrete Sidewalk, Wetland Cell Splash Pad 3 = 49.5 cf avg x 4 levels = 198 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 1 = 63' across = (average dimension of capstone pieces) = 5' x 3' x 9" = 11.25 cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 1 = 63' across = (amount of capstone pieces) = 11.25 cf x 12 = 135 cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 1 = 63' across = (average dimension of individual pieces) = (2 + 3 + 4) / 3 = 3 cf avg

Salvaged Limestone/Concrete Sidewalk, Waterfall 1 = (1 of 2 possible amounts per level) = 3 cf x 16 quantity = 48 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 1= (2 of 2 possible amounts per level) = 3 cf x 32 quantity = 96 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 1 = (48 + 96) / 2 = 72 total cf avg for one level

Salvaged Limestone/Concrete Sidewalk, Waterfall 1 = (72 cf avg x 6 levels) + 135 cf capstone level = 567 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 2 = 57' across = (average dimension of individual pieces) = (2 + 3 + 4) / 3 = 3 cf avg

Salvaged Limestone/Concrete Sidewalk, Waterfall 2 = (1 of 2 possible amounts per level) = 3 cf x 14 quantity = 42 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 2= (2 of 2 possible amounts per level) = 3 cf x 28 quantity = 84 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 2 = (42 + 84) / 2 = 63 total cf avg for one level

Salvaged Limestone/Concrete Sidewalk, Waterfall 2 = 63 cf avg x 6 levels = 378 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 3 = 54' across = (average dimension of individual pieces) = (2 + 3 + 4) / 3 = 3 cf avg

Salvaged Limestone/Concrete Sidewalk, Waterfall 3 = (1 of 2 possible amounts per level) = 3 cf x 13 quantity = 39 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 3= (2 of 2 possible amounts per level) = 3 cf x 27 quantity = 81 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 3 = (39 + 81) / 2 = 60 total cf avg for one level

Salvaged Limestone/Concrete Sidewalk, Waterfall 3 = 60 cf avg x 6 levels = 360 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 4 = 61' across = (average dimension of individual pieces) = (2 + 3 + 4) / 3 = 3 cf avg

Salvaged Limestone/Concrete Sidewalk, Waterfall 4 = (1 of 2 possible amounts per level) = 3 cf x 15 quantity = 45 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 4= (2 of 2 possible amounts per level) = 3 cf x 31 quantity = 93 total cf

Salvaged Limestone/Concrete Sidewalk, Waterfall 4 = (45 + 93) / 2 = 69 total cf avg for one level

Salvaged Limestone/Concrete Sidewalk, Waterfall 4 = 69 cf avg x 7 levels = 483 total cf

Salvaged Limestone/Concrete Sidewalk, Steps to Pond = 13.71' long x 3' wide x 6" deep = average dimension of stairs = 20.57 cf avg

Salvaged Limestone/Concrete Sidewalk, Steps to Pond = 20.57 cf avg x 25 steps = 514.25 total cf

Salvaged Limestone/Concrete Sidewalk, Descending Terrace to Pond = 32.3' long x 3' wide x 6" deep = 48.47 average cf

Salvaged Limestone/Concrete Sidewalk, Descending Terrace to Pond = 48.47 cf avg x 17 steps = 823.99 total cf

Total Salvaged Material

823.99 + 514.25 + 483 + 360 + 378 + 567 + 198 + 156 + 126 + 138.71 + 536.5 = 4,281.45 cf

Limitations of research:

The calculations are based off the construction document set issued for contractor bidding upon which construction decisions replacing limestone with sidewalk debris in the wetland terraces were made. As-built drawings were not available for study.

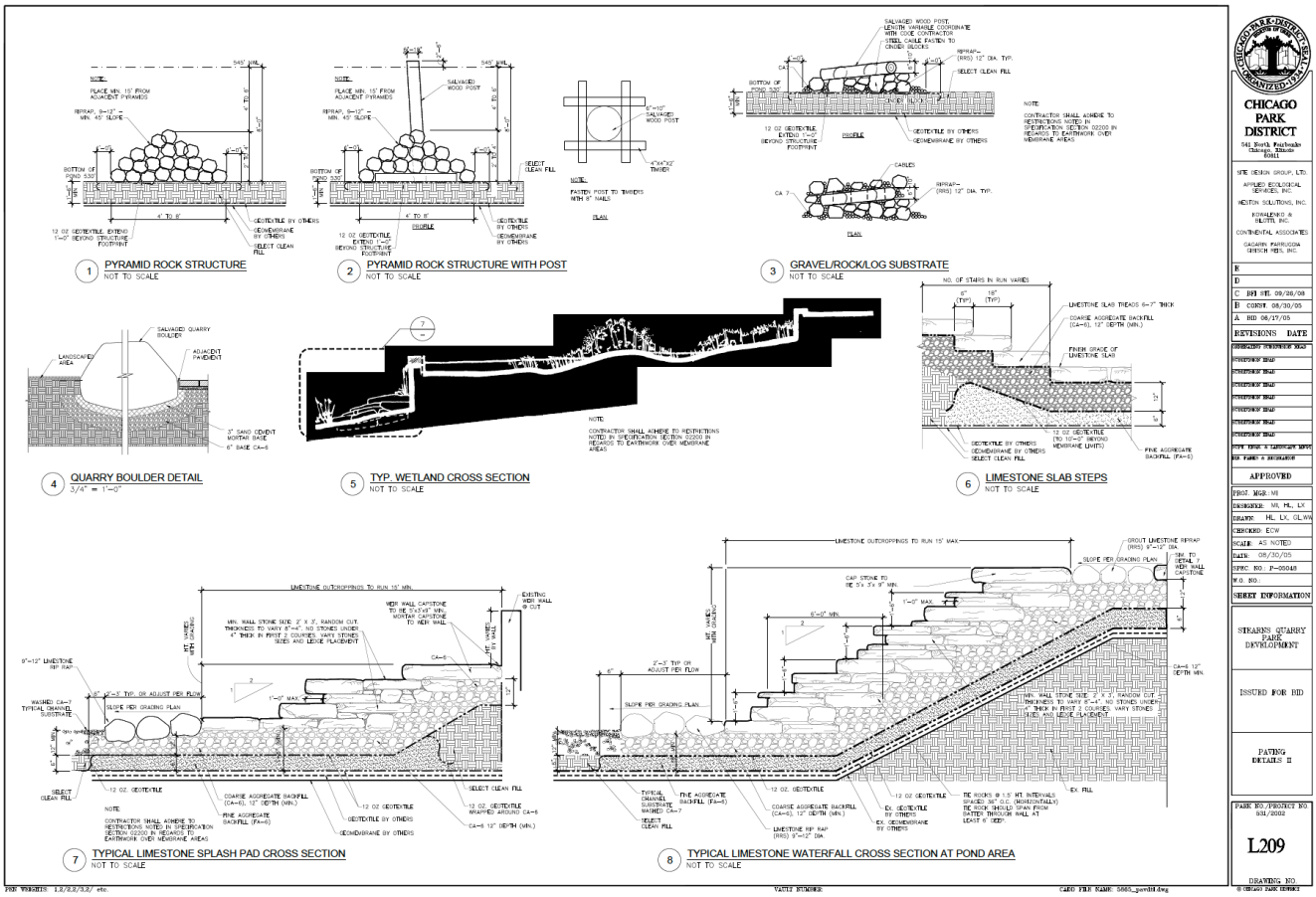

Figure 2.1, Sheet L209, Paving Details II / Landscape Details for Stone/Concrete Outcroppings in W etland at Palmisano Park

Figure 2.2, Reused materials at Palmisano Park

Social

4. **Doubles park space in the Bridgeport community to 54 acres, which is 4% of the land area. This is still lower than the 9% park space average for the City of Chicago.**

The Trust for Public Land's ParkScore indexes 60 of the largest cities' park space in the United States and provides a score for each city. While TPL does not provide a recommended amount of park space per city, it calculated the national median park space as percent of city land area of the 60 cities surveyed to be 9.3%. Chicago's total percentage of park space is 9.1%. Bridgeport community area's 4% park space is lower than the city average, and the national median. Chicago received a score of 62.5 from the ParkScore index.[11] Chicago ranks 16th, tying with Kansas City, MO. Chicago's median park size of 2.2 acres is much smaller than Palmisano Park. While Bridgeport may have less overall park space than other Chicago communities, Palmisano Park is significantly larger (27 acres) than an average neighborhood park and therefore provides a variety of different activities.

Methodology:
The community area of Bridgeport was chosen as the boundary to calculate park space. Bridgeport's boundaries were verified using a map available on the City of Chicago Department of Innovation and Technology's GIS webpage.[12] Figure 3.1 is a Google Map search result for "Parks in Bridgeport," accessed on 4 June 2014.[13] The community area of Bridgeport is outlined with a dashed red line. Figure 3.2 is the Chicago Park District search result for "Find a Park by Community: Bridgeport."[14] The two images indicate that Pixel Park and Park No. 571 are not included in the Chicago Park District's search. Pixel Park is a sculpture garden connected to the Bridgeport

[11] Trust for Public Land. ParkScore Index: City Profiles for Chicago, Kansas City. http://parkscore.tpl.org/city.php. & http://parkscore.tpl.org/ReportImages/Chicago_IL.pdf.

[12] City of Chicago Community Area Map of Bridgeport. June 2010. http://www.cityofchicago.org/content/dam/city/depts/doit/general/GIS/Chicago_Maps/Community_Areas/CA_BRIDGEPORT.pdf. Accessed 5 June 2014.

[13] Google Maps. Parks in Bridgeport, Chicago, IL. https://www.google.com/maps/search/parks+in+bridgeport,+Chicago,+IL/@41.8360257,-87.6485223,15z. Accessed 4 June 2014.

[14] Chicago Park District. Find a Park by Community: Bridgeport. http://www.chicagoparkdistrict.com/parks/search/?c=53#.U5Y6mZSwIdE. Accessed 3 June 2014.

Art Center that provides a small outdoor space and therefore is included in Table 3.1; however, Park No. 571 has yet to be developed nor is it currently accessible to the public so it is left out of Table 3.1.[15]

Table 3.1, Parks in Bridgeport Community Area

Park Name	Size in Acres	% Park Space	% Community Area Space
Humbert Park - 1	< 1	< 1%	< 1%
Florian S. Jacolik Park - 2	< 1	< 1%	< 1%
McKeon Playlot Park - 3	< 1	< 1%	< 1%
Pixel Park - 4	< 1	< 1%	< 1%
Sintic Playlot Park - 5	< 1	< 1%	< 1%
Wilson Community Center Park - 6	0.14	0.26%	< 1%
Wilson John P. Park - 7	1.6	2.97%	< 1%
Bosley Playground Park - 8	2.38	4.42%	0.18%
Donovan Playground Park - 9	2.68	4.98%	0.20%
McGuane Park - 10	20	37.17%	1.52%
Palmisano Park - 11	27	50.19%	2.05%
Total Park Space Before Palmisano Park	**26.8**	100%	1.9%
Total Park Space After Palmisano Park	**53.8**	100%	3.95%
Total Community Area of Bridgeport	1,318.43		
Total Park Space in Chicago	**12,485**	**9.1%**	
Total Land in Chicago	136,796		

Park Space Calculations

Total park space before Palmisano Park = 26.8 acres

Total park space after Palmisano Park = 53.8 acres

Park space increase after Palmisano Park = 53.8 - 26.8 = 27 acres or 100% increase

[15] Chicago Park District. Journal of Proceedings. 11 January 2012. http://www.chicagoparkdistrict.com/assets/1/23/B_%E2%80%93_Journal_of_Proceedings_20120111_January_11,_20121.pdf. Accessed 9 June 2014.

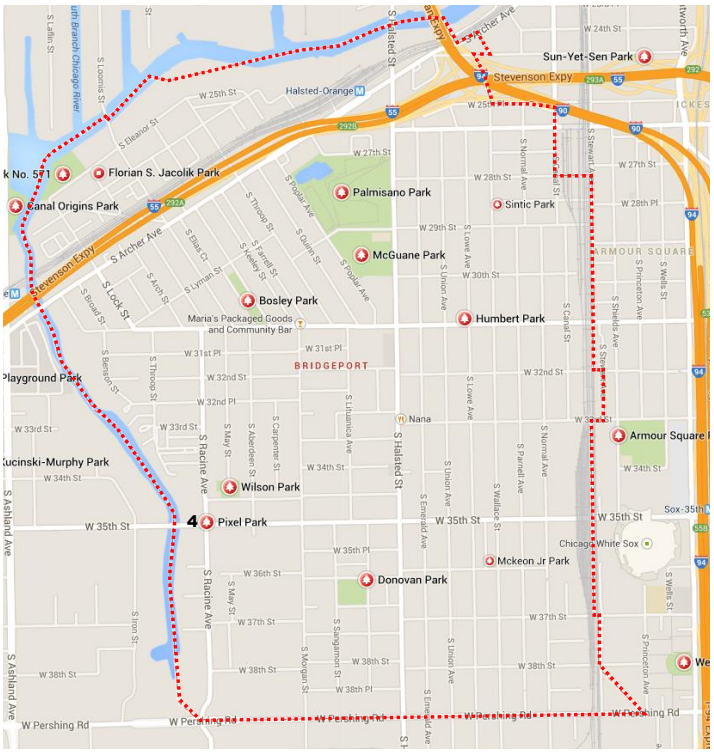

Figure 3.1, Parks in Bridgeport, Google Maps Search

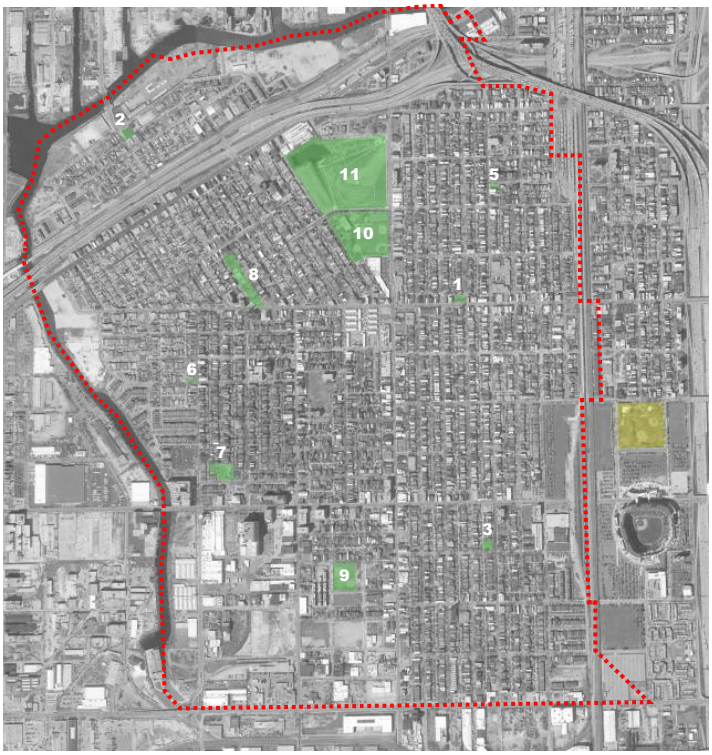

Figure 3.2, Parks in Bridgeport, Chicago Park District Search

Limitations of research:
The Bridgeport community area boundary as defined as one of the 77 community areas by the City of Chicago may not be the local residents' choice of region to use for evaluation because parks located just outside the boundary are often considered part of the neighborhood. Yet, this clearly defined boundary makes research evaluation more clear because it provides a distinct line, whereas neighborhood boundaries can be subject to interpretation.

5. **Has had a positive impact on the Bridgeport community for 94% of 122 survey respondents through reported stronger community relations, aesthetic improvements, and opportunities for nature exploration.**

Based on performance benefit 5, it is known that park space in Bridgeport increased by 100% but to better understand how this park has contributed to the community in social ways since opening, we surveyed park users. An anonymous questionnaire-based survey, distributed online via Survey Monkey was posted on the Palmisano Park Advisory Council Facebook page,[16] on Bridgeport's Nextdoor and EveryBlock webpages.[17] The question formats included multiple choice, multiple selection, single selection, and short answer. A total of 87 surveys were completed using this method during the open survey period of June 30 to July 19, 2014. Visitors voluntarily completed hard copies of the online survey on July 19, 2014 at the park during the Chicago Park District's Night Out in the Park blues concert. This event yielded 41 completed surveys, totaling 128 between the two methods of distribution.

When questioned, *"Has the opening of Palmisano Park had a positive impact on the Bridgeport neighborhood?"* 80 online survey respondents and 35 in person visitors answered yes. Not a single in person visitor answered no to this question (6 did not answer), only 7 online respondents did (100% online response rate). Yes replies equate to

[16] Palmisano Park Advisory Council Facebook. https://www.facebook.com/pages/Henry-C-Palmisano-Nature-Center-Advisory-Council/293651830688424

[17] EveryBlock. Palmisano Survey. http://chicago.everyblock.com/talk/jun30-have-you-visited-palmisano-stearns-quarry-park-bridgeport-6227771/

94.26% or 115 of the total 122 responses for this question.

Comments regarding positive impacts of the park on the neighborhood highlight aspects of building stronger community relationships, aesthetic improvements of the urban environment, and exploration and education of nature. Despite a majority of positive responses, community members have concerns regarding the park's negative impacts on the neighborhood including trash accumulation and safety. A selection of comments is provided.

Community Relationships / Graffiti & Garbage Accumulation

"It has opened up the neighborhood to a new array of people coming together as a community."

"Increased green space, more interactions between and among neighbors, draws visitors to the neighborhood."

"It's wonderful to be able to go experience nature in an urban environment. I see many people of all ethnicities utilizing the park for a multitude of reasons - exercise, sports, relaxation, fishing. Lots of families are always at the park, and people are friendly with one another. I have been at the park at all times of day and have not witnessed thugs, gang-bangers, or drug dealers. I feel very safe there. With so many people appreciating the park it is sad to see the amount of trash left there, and over the past winter there seemed to be an exorbitant amount of graffiti. I would be interested in volunteering to help keep the park clean but cannot easily find information online."

Aesthetic Improvement

"Gives a nice landscape to an otherwise concrete/urban Halsted St."

"It's beautiful and gives us a nature preserve right here in the city. It turned an ugly eyesore into beauty."

"Who else turned an eyesore into beauty? Plus the history of the quarry is unique - much of Chicago was built by stone that came from there. Then it was a big garbage pit. Now it's beautiful again."

Nature Exploration & Education

"It gives families a safe place to take children to explore nature."

"It is a great space for walking in a more natural landscape in the middle of the city."

"It is a great space for walking in a more natural landscape in the middle of the city. It is especially nice to watch the plantings change through each season. It is also nice to watch all of the different groups of people from the neighborhood enjoy the same space (different ethnicities, all ages)."

Safety Concerns / Graffiti & Garbage Accumulation

"I do not consider Palmisano Park safe for seniors to enjoy or exercise in. Too many gang bangers hanging around at all hours along with other criminal elements. It is a beautiful park but no park employees are around to ensure user's safety."

"I would love to see it maintained on a frequent basis. Graffiti doesn't appear to be removed and I would love to feel like it is relatively safe to let my young kids explore (supervised of course) without worrying what they may pick up or cut themselves on."

"I have seen it show up in different articles that cater to the entire city of Chicago, showing the north side that we [south side] have something to offer....However, the gang graffiti and presence in certain areas of the park (by the quarry and at the top of the hill) is unsightly and causes uneasiness, especially as the day goes on…the amount of trash that is found on the top of the hill is also unpleasant...broken glass, tiny plastic bags, graffiti etc. I feel unable to allow my young children out of their stroller to explore the natural surroundings."

Limitations of research:

The online survey was limited to users of Facebook, Everyblock, and Nextdoor websites and cannot account for the opinions of all park users. The hard-copy survey was conducted during a limited time frame of one event from the hours of 5:30pm to 7pm within a limited area of the park, near the 27th and Halsted Streets entrance, and the majority of visitors were in attendance for the Night Out in the Park music. The views expressed from these park users cannot account for the views of all other park users.

6. **Demonstrates prairie as a landscape aesthetic with 46% of survey respondents saying they would use prairie plantings at home. 39% like the prairie in the park but would not use it at home.**

Through the use of native and adaptive prairie species in the park, a new planting typology was introduced to the community. The surveys conducted sought to understand how visitors perceive the planting and whether or not residents of the neighborhood and City of Chicago would consider native planting for their own residential landscapes.

Visitors and online respondents answered the question, *"How do you perceive the native and adapted prairie plantings of the hill in the park?"* in one of three ways: respondents like the planting at Palmisano and would use native/adapted prairie planting at home; respondents like the planting at Palmisano but would not use native/adapted prairie planting at home; or respondents do not like the look of the prairie planting at Palmisano. The online survey produced more results liking the planting and choosing it for use at home (56.5%), whereas, fewer in person visitors selected this answer (24.4%). When combining surveys, the total number of respondents selecting this answer was 58 out of 126 answers or 46%. An additional 40% (34) of online respondents said they liked the planting at Palmisano but would not choose it for their home, while 36.59% (15) of in person respondents agreed with this statement. When the two survey methods are combined, 38.89% (49 of 126) liked the planting but would not select it for their homes. In total, over 84% of survey respondents like the native/adaptive planting at Palmisano Park.

Comments regarding the planting were provided in the surveys throughout several questions. The quotations provided are a selection of opinions shared; they reflect views on the planting changes throughout the year, its focus on ecological design and sustainability, plant education, and ability to transform urban life into something else. Based on the first comment, we know at least one person was influenced by the planting at Palmisano enough to change their own space to native species. While comments were overwhelmingly positive regarding the planting two respondents provided negative feedback on the planting, they are included at the end of the quotations.

"I was inspired by the native plantings and ended up transforming my parkway to all native plantings."

Ecological Design & Sustainability

"The park is unique because of its size and its efforts to be green, sustainable (the rainwater collection), and the thoughtfulness with regard to native habitats. It is a great re-purposing of an ugly space. The fishing pond with the quarry walls behind it gives one the illusion that they are not in the city at all while the view of downtown from the top of the hill is one of the best panoramas available."

"This park reflects its era - I've only rarely seen this park's type of high-tech ecological systems design, and I think this park is a very attractive example of the type."

Plant Education

"It created a place for everyone to enjoy a bit of nature, and educate others on the plants."

"It's an open air educational museum of native plants and wildlife that used to dominate the Chicagoland area."

Seasonal Changes

"It is especially nice to watch the plantings change through each season."

"It's a beautiful place to go at any time of year."

Urban Transformation & Planting Design

"I love the plant life and I think it is a great oasis for the neighborhood and the city."

"The fact that it has such a large natural habitat is not like any other park I've been to in the city. Some other parts of the park along the lake have natural plantings, but you cannot be as surrounded by them."

"I love that it has more "wild" spaces than most Chicago parks. Though the quarry isn't natural exactly, it's beautiful and unique. I like taking my son to get a feel for other sorts of environments he doesn't normally see in the city."

"Not many parks are allowed to grow such expanses of natural landscape, and most do not have hills that provide additional exercise and views. The combination of lawn and prairie plantings allows for the natural experience and places to recreate without damaging that natural landscape."

"It was intentionally designed to be recreational and functional. Natural plants used at Millennium Park, for

example, feel very curated. The bird sanctuary near the lakefront trail is great, but it's segregated from the main flow of the trail. The experience at Palmisano is more immersive."

Dislike of the Planting

"…Looks like a bunch of weeds. Do not enjoy the landscape."

"Not very attractive at this time. Maybe in a few years it'll be better."

Limitations of research:

The online survey was limited to users of Facebook, Everyblock, and Nextdoor websites and cannot account for the opinions of all park users. The hard-copy survey was conducted during a limited time frame of one event from the hours of 5:30pm to 7pm within a limited area of the park, near the 27th and Halsted Streets entrance, and the majority of visitors were in attendance for the Night Out in the Park music. The views expressed from these park users cannot account for the views of all other park users.

Economic

7. Contributed to an average $34,000 increase in sales price for homes within two blocks of the park, as compared to similar homes 5-8 blocks from the park.

Chicago's Southside neighborhood of Bridgeport is a vibrant community with extensive history. It is one of the first neighborhoods settled in the City of Chicago. Today, *Chicago* magazine lists Bridgeport as one of Chicago's best neighborhoods.[18] A team from the magazine determined the twelve best neighborhoods in the city based on statistics from the US Census Bureau, Midwest Real Estate Data, the Illinois State Board of Education, the police department of Chicago, and from all community areas in Chicago (77 in total). Additionally, *Chicago* magazine lists Bridgeport neighborhood single-family homes 2013 median sales price as $300,000. This reflects a 34 percent decrease from 2006; however, from 2012 to 2013 property values increased by 16 percent in the neighborhood.[19] In 2012, 72 homes sold in Bridgeport. Lastly, *Chicago* magazine listed Palmisano Park in its neighborhood guide, "A Guide to Bridgeport: Where to Eat, Shop, and Play." It is the only outdoor space included in the Bridgeport list.[20]

Methodology:

Property tax information, new construction and home sales are analyzed to understand any increase in market value surrounding Palmisano Park. The Senior Suites of Bridgeport, a housing complex for adults' age 62 and older, property tax information is presented in Table 4.1.[21] Despite one year of decrease, an overall increase in this building's property tax is evident. Additionally, the Senior Suites of Bridgeport contributes to new building projects on Halsted Street across from the park. Completed in 2009, the senior apartment complex opened around the same time as Palmisano Park; however, development for the park was underway for years prior to completion. The senior housing project was developed with the understanding that a park would be sited adjacent to the property. Currently, there is a three-story building under construction on Halsted Street across from the park that includes at least three housing units (potential 1 level condos could double the number of housing units) with retail space on ground level.

[18] Chicago magazine. Best Neighborhoods of Chicago: Bridgeport. April 2014. http://www.chicagomag.com/Chicago-Magazine/April-2014/chicago-neighborhoods/Bridgeport/. Accessed 3 June 2014.

[19] Chicago magazine. Bridgeport Home Prices. http://www.chicagomag.com/Chicago-Magazine/April-2013/Home-Condo-Prices/. Accessed 3 June 2014.

[20] Chicago magazine. A Guide to Bridgeport: Where to Eat, Shop and Play. January 2012. http://www.chicagomag.com/Chicago-Magazine/January-2012/A-Guide-to-Bridgeport-Where-to-Eat-Shop-and-Play/. Accessed 3 June 2014.

[21] Cook County, Illinois Property Tax Portal. http://www.cookcountypropertyinfo.com/Pages/PIN-Results.aspx?PIN=17283090020000&hnum=2825&sname=halsted&city=chicago&zip=&unit=&dir=S. Accessed 2 June 2014.

Table 6.1, Property Tax Information for Senior Suites of Bridgeport, Adjacent to Palmisano Park

Property Tax Year	Property Tax	Percent Change from Previous Year
2013	$4504.26 (1st installment only) x 2 = $9,008.52	10%
2012	$8,189.57	-6%
2011	$8,681.47	15%
2010	$7,548.23	3.1%
2009	$7,233.34	n/a

Homes sold within a 2-block radius of Palmisano Park are analyzed using Zillow for increase in price that may relate to the addition of the park to the neighborhood.[22] This list of homes is compared to a list of properties within Bridgeport but farther from the park, 5 blocks to 8 blocks west. Averaging the home prices of the two areas in relation to the park, it was determined that properties closer to the park have a market value of $34,000 greater than those farther from the park. Figures 4.1 and 4.2 show the radii of homes included in this comparison. The average size of homes within the 2-block radius of the park is compared with the average size of homes 5 to 8 blocks west of the park. The homes closer to the park on average are approximately 135-sf larger than those farther from the park. Of the 17 closer homes analyzed, 3 do not provide square footages, while one of the 15 farther homes analyzed provided no square footage.

Properties Sold Within 2 Blocks of Palmisano Park

2014, May	2920 S. Quinn St.	SFH, 960-sf, 3bd/2 bth	$135,000
2013, December	2922 S. Poplar Ave	SFH, 987-sf, 1 bth	$140,000
2013, December	2876 S. Throop St.	SFH, 5bd/3 bth	$171,500
2013, November	2933 S. Quinn St.	SFH, 1,120-sf, 3 bth	$100,000
2013, September	2868 S. Poplar Ave	SFH, 2000-sf, 5bd/4 bth	$438,000
2013, September	2808 S. Union Ave	SFH, 672-sf, 1 bth	$185,000
2013, March	755 W. 29th Street	Condo, 1296-sf, 2 bth	$296,500
2012, November	806 W. 27th Street	SFH, 814-sf, 1.5 bth	$250,000
2012, September	2907 S. Quinn St.	SFH, 988-sf, 1 bth	$265,000
2012, September	2938 S. Quinn St	SFH, 1,100-sf, 4bd/2 bth	$165,000
2012, August	936 W. 29th Street	SFH, size unknown	$140,000
2012, July	2949 S. Quinn St.	SFH, 672-sf, 1 bth	$125,000
2012, April	2722 S. Quinn St	SFH, 988-sf, 1 bth	$263,000
2012, March	2715 S. Quinn St, Apt C	Condo, 1806-sf, 2 bth	$236,000
2012, March	2615 S. Emerald St, Apt 2F	Condo, 750-sf, 2bd/1 bth	$66,000
2011, December	2949 S. Throop St.	SFH, 1,260-sf, 2.5 bth	$335,000
2011, October	2812 S. Emerald St	SFH, 4 bd/2 bth	$175,000
		Average home price = $205,059	
		Average home size = 1,153.3 sf	

Properties Sold 5 Blocks to 8 blocks West of Palmisano Park (all south of the Stevenson Expressway)

2014, April	2946 S. Bonfield St.	SFH, 680-sf, 2bd/2 bth	$126,000
2013, December	2915 S. Arch St.	SFH, 756-sf, 1 bth	$140,000
2013, November	2969 S. Arch St.	SFH, 560-sf, 2bd/1 bth	$85,000
2013, October	2969 S. Bonfield St.	SFH, 1050-sf, 1 bth	$170,000
2013, August	2968 S. Bonfield St, #2	Condo, 877-sf, 2bd/1 bth	$136,000
2013, April	2949 S. Bonfield St.	SFH, 1064-sf, 1 bth	$232,000

[22] Zillow. Chicago Recently Sold Homes. http://www.zillow.com/homes/recently_sold/Chicago-IL/17426_rid/days_sort/41.853468,-87.639281,41.834973,-87.655889_rect/15_zm/. Accessed 6 June 2014.

2013, April	2971 S. Haynes Ct.	SFH, 1,140-sf, 1.5 bth	$110,000
2013, February	2940 S. Haynes Ct.	SFH, 672-sf, 1 bth	$140,000
2012, October	2924 S. Haynes Ct.	SFH, 2,200-sf, 4bd/3 bth	$345,000
2012, August	2933 S. Loomis St.	SFH & size unknown	$205,000
2012, July	3020 S. Gratten Ave	SFH, 1,152-sf, 3bd/1 bth	$189,000
2012, May	2964 S. Loomis St.	SFH, 840-sf, 1 bth	$165,000
2012, February	3028 S. Lyman St.	SFH, 1,100-sf, 5 bd/2 bth	$175,000
2011, October	3042 S. Gratten Ave	SFH, 1,092-sf, 3bd/2 bth	$94,500
2011, September	2964 S. Haynes Ct.	SFH, 1,060-sf, 2.5 bth	$246,000

Average home price = $170,567

Average home size = 1,017.4 sf

Average home price difference of properties near Palmisano to those farther away = $205,059 - $170,567 = $34,492

Average home size difference of properties near Palmisano to those farther away = 1,153.3 sf - 1,017.4 sf = 135.9 sf

Figure 6.1, Properties within 2 blocks of Palmisano Park

Figure 6.2, Properties 5 to 8 blocks from Palmisano Park

Limitations of research:

This methodology does not take into account all homes within the Bridgeport community area to understand on a broader scale the overall market value of the neighborhood. Nor does this methodology attribute for additional factors as to why homes near Palmisano Park may have higher market value than those farther from it. The home information does not provide square footage for each property listed, so the average home size comparison is limited to what is available.

8. Saves over $87,000 in annual maintenance costs by using native prairie plants instead of turf grass.

One of the often unaccounted for costs of growing and cutting turf grass is use of chemicals and fossil fuels along with the human capital to fertilize and mow. The "Sourcebook on Natural Landscaping for Local Officials" provides a breakdown of the inputs and labor costs for natural landscape installation and maintenance costs versus traditional turf.[23] An example from Applied Ecological Services is used to understand the savings generated by using native/adapted prairie planting instead of turf at Palmisano Park.

Methodology:

Table C2.1 estimates that a per acre annual maintenance expense after a 5-year establishment period for traditional lawn is $5,655. Table C2.2 is provided as a reference for Tables C2.3 and C2.4 to determine native planted maintenance expenses. Table 3.3 accounts for Palmisano's native prairie weeding activities. Table C2.4 accounts for maintenance of Palmisano Park's native planted area that is mowed. Although burning is not

[23] Sourcebook on Natural Landscaping for Local Officials.
http://www.chicagowilderness.org/files/4413/3087/4878/natural_landscaping_sourcebook.pdf

practiced at this time, it is included in the tables because it could be used in the future. Each of these native prairie maintenance practices are accounted for in Figure C2.1 and acreage of each type of maintenance is calculated. Of the 22.02 native planted acres in the park, weeding happens on 14.04 acres of the native planting, mowing on 4.42 acres, and 3.56 acres in the wetland are unmaintained. Using these estimates from Tables C2.1, C2.3 and C2.4, Palmisano Park's 22.02 acres of native planted area saves $87,369.10 in annual maintenance costs. Savings calculations are provided.

Palmisano Park Maintenance Calculations, *see Figure C2.1 for areas of maintenance*

27 acres = total park area, all SF area takeoffs from Sheet L301 [24]

14.04 acres = weeded native prairie area

4.42 acres = mowed native prairie area

3.56 acres = unmaintained native prairie area

22.02 acres = native prairie area, *based on totals from weeded, mowed & unmaintained prairie areas*

$47,104.20 + $20,133.10 + $20,131.80 = $87,369.10 total annual savings for native prairie vs. turf

14.04 acres = native prairie planted area that IS WEEDED, *based on Table C2.3*

$5,655 = annual expense per acre for turf

$5,655 x 14.04 ac = $79,396.20 annual expense for turf

$2,300 = annual expense per acre for native prairie with weeding

$2,300 x 14.04 ac = $32,292 annual expense for native prairie with weeding

$79,396.20 - $32,292 = $47,104.20 total annual savings for native prairie with weeding

4.42 acres = native planted area that IS MOWED, *based on Table C2.4*

$5,655 = annual expense per acre for turf

$5,655 x 4.42 ac = $24,995.10 annual expense for turf

$1,100 = annual expense per acre for native prairie with mowing

$1,100 x 4.42 ac = $4,862 annual expense for native prairie with mowing

$24,995.10 - $4,862 = $20,133.10 total annual savings for native prairie with mowing

3.56 acres = unmaintained native planted area, *based on Table C2.1*

$5,655 = annual expense per acre for turf

$5,655 x 3.56 ac = $20,131.80 = total annual savings for unmaintained native planting

[24] Chicago Park District. Site Design Group, Ltd. Stearns Quarry (Park 531) Park Development Construction Documents. 30 August 2005.

Table C2.1 Example Maintenance Costs for Traditional Turf Lawn with Irrigation
Estimated Annual Cost Per Acre - Adapted from 'Sourcebook on Natural Landscaping for Local Officials' Applied Ecological Services example

Turf Lawn Typical Maintenance	Year One	Year Two	Year Three	Year Four	Year Five	Annual Expense After 5 Years
Installing Seed, Mulch & Fertilizer	$2770					
Mowing	$2400	$2500	$2600	$2750	$2900	$3000
Fertilizer Application		$750	$765	$770	$780	$790
Irrigation System	$4000	$400	$500	$500	$600	$750
Aerating / Dethatching		$850		$875		$1115
ANNUAL EXPENSE	$9,170	$4500	$3,865	$4,845	$4,280	$5,655
TOTAL COST AFTER 5 YEARS	$26,660					

Table C2.2 Example Maintenance Costs for Native Prairie from Seed
Estimated Annual Cost Per Acre - Redrawn from 'Sourcebook on Natural Landscaping for Local Officials' Applied Ecological Services example

Native Prairie Typical Maintenance	Year One	Year Two	Year Three	Year Four	Year Five	Annual Expense After 5 Years
Installing Seed & 2.5" Plugs	$4300					
Mulching	$675					
Mowing	$800	$400				
Spot Herbicide Treatment	$200	$500	$500	$330	$200	$150
Prescribed Burn		$2,125	$2,150		$2,200	$550
ANNUAL EXPENSE	$5,975	$900	$500	$330	$2,400	$700
TOTAL COST AFTER 5 YEARS	$14,380					

Table C2.3 Example Maintenance Costs for Palmisano Park's Native Prairie with Weeding (14.04 acres)
Estimated Annual Cost Per Acre - Adapted from 'Sourcebook on Natural Landscaping for Local Officials' Applied Ecological Services example

Native Prairie Typical Maintenance	Year One	Year Two	Year Three	Year Four	Year Five	Annual Expense After 5 Years
Installing Seed & 2.5" Plugs	$4300					
Mulching	$675					
Mowing	$800	$400				
Spot Herbicide Treatment	$200	$500	$500	$330	$200	$150
Prescribed Burn		$2,125	$2,150		$2,200	$550
Weed Control	$1600	$1600	$1600	$1600	$1600	$1600
ANNUAL EXPENSE	$3,275	$4,625	$4,250	$1,930	$4,000	$2,300
TOTAL COST AFTER 5 YEARS	$15,755					

Table C2.4 Example Maintenance Costs for Palmisano Park's Native Prairie with Mowing (4.42 acres)
Estimated Annual Cost Per Acre - Adapted from 'Sourcebook on Natural Landscaping for Local Officials' Applied Ecological Services example

Native Prairie Typical Maintenance	Year One	Year Two	Year Three	Year Four	Year Five	Annual Expense After 5 Years
Installing Seed & 2.5" Plugs	$4300					
Mulching	$675					
Mowing - 1x weekly	$800	$400	$400	$400	$400	$400
Spot Herbicide Treatment	$200	$500	$500	$330	$200	$150
Prescribed Burn		$2,125	$2,150		$2,200	$550
ANNUAL EXPENSE	$5,975	$3,025	$3,050	$730	$2,800	$1,100
TOTAL COST AFTER 5 YEARS	$16,680					

Description of maintenance practices:
Maintenance practices for Palmisano Park and a typical Chicago Park District park have been outlined by Kal Moy, the McGuane Park Supervisor. Adjacent to Palmisano Park, McGuane Park is located just south of W.

29th Street. In an email response from June 9, 2014,[25] he discussed a major difference of Palmisano Park versus a typical neighborhood park with field house stating that Palmisano is unstaffed because it does not have a building on-site. Another difference between the parks is that McGuane features a buffalo box watering system that can be hooked up to the City's main water line in extreme drought conditions. Moy stated that CPD rarely uses this system and that it does not reach the neighboring park; therefore cannot be used at Palmisano. Maintenance of Palmisano Park includes weekly mowing of the multipurpose field and the sledding hill (5.2 acres total of the 27-acre park). Additionally, stewardship days, discussed in more detail in Performance Benefit 10, provide volunteer assistance to remove invasive species and clean debris and trash from the park.

Annual volunteer stewardship maintenance hours

May 2013: 10 volunteers x 3 hrs = 30 hrs
June 2013: 5 volunteers x 3 hrs = 15 hrs
July 2013: 4 volunteers x 2 hrs = 8 hrs
August 2013: 7 volunteers x 3 hrs = 21 hrs
October 2013: 7 volunteers x 3 hrs = 21 hrs
Total hours = 95 hrs

The Chicago Park District does not manage the park on its own, and has contracted Pizzo & Associates to maintain the native plantings of Palmisano. During a phone interview on June 18, 2014 with Jacob Hagelow, Northern Territory Sales Manager & General Manager for Pizzo & Associates maintenance costs were outlined. Pizzo budgets $60,000 annually for hardscape repair including crushed limestone path refilling and natural areas management, which includes weeding, cutting back plants that line paths and spot treatment. They currently do not burn the prairie plants nor does Pizzo provide aquatic management.[26] On two separate site visits in July 2014, researchers saw maintenance crews from Pizzo present. One occasion, a crew of 6-7 members worked on weeding, weed-whacking of plants lining paths, and repair of erosion to the hill, the second visit only one Pizzo employee provided spot treatment around the site. Speaking with the crews, it was determined they visit Palmisano Park approximately every two to three weeks.

[25] Email reply from Kal Moy, Chicago Park District McGuane Park Supervisor, to Sarah Hanson. Re: Palmisano Maintenance. 9 June 2014.

[26] Phone Interview. Jacob Hagelow. Northern Territory Sales Manager & General Manager for Pizzo & Associates. 18 June 2014.

Figure C2.1, Maintenance & Planting Areas at Palmisano Park

Research on break-even analysis / long-term restoration studies:
Although not utilized to evaluate Palmisano Park, Applied Ecological Services provided us with additional documentation stating native prairie planting has the ability to break-even with traditional turf planting as early as year 2 for low diversity prairie species mixes, or between years 4 and 9 for higher diversity planting mixes. Figure C2.2, from AES, shows the average break-even point for native restoration versus turf maintenance.[27]

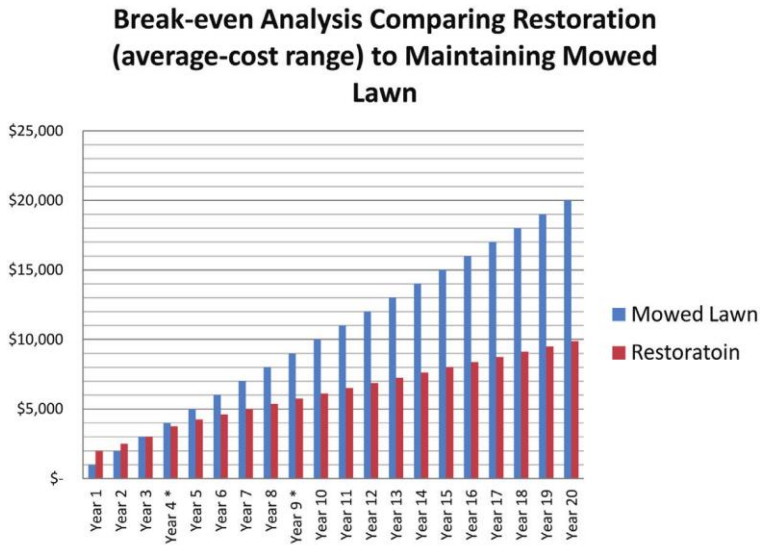

Figure C2.2, Graph of Break-Even Analysis, courtesy of Applied Ecological Services

[27] Applied Ecological Services. Break-even Analysis Comparing Restoration to Maintaining Mowed Lawn. Provided by Cole Clayton. 17 June 2014.

Limitations of research:
The Chicago Park District's maintenance expenses for Palmisano Park are not available. The savings reflected in this benefit may be slightly different provided CPD's expenses were available. Additionally, the maintenance costs from the "Sourcebook" are 10 years old.

Line of Inquiry - No Performance Benefit Produced

- **Promotes water quality through native prairie planting, bioswales, and wetland treatment cells that flow into the pond.**

The park's native planting, bioswales, and wetland treatment cells enhance water quality through infiltration and absorption of total suspended solids or additional pollutants. Plant mixes in the wetlands and bioswales also help to improve water quality. There are eight mixes throughout the park including wet prairie, emergent planting, submergent planting, mesic prairie, short grass prairie, tall grass prairie, prairie forb, and native swale. Of these mixes, the wet prairie, mesic prairie, tall grass prairie, native swale, and short grass prairie contribute to water quality because they are planted within the wetland cells and bioswales.

Based on the 2009 letter from Weston Solutions to Site Design Group, water does not flow into the City of Chicago sewers, therefore, Palmisano Park does not contaminate Chicago's water supply.[28] Only in storm events beyond holding capacity (100yr / 24hr storms), an emergency water overflow to the City sewer may be opened manually when water rises beyond a certain level in the pond.

Weston Solutions engineer, Bill Karlovitz, informed us that water quality modeling or testing was not conducted during design or construction phases.[29] Karlovitz provided consultation on ways to test the water within the wetland and pond for this case study performance benefit. Further assistance on water quality testing occurred by partnering with IIT's environmental engineering department. Professor Krishna Pagilla suggested conducting dissolved oxygen testing on-site and sampling water for TSS (total suspended solids) testing in the IIT lab. Dissolved oxygen levels and total suspended solids in water correlate to the health of an ecosystem and species living in the water.[30] These two studies took place on July 10 and 11, 2014 with the assistance of IIT environmental engineering Ph.D. candidate Lin Li. Using four testing locations within the wetland cells and pond, seen in Figure I.1, the research team gathered water samples for lab TSS testing and tested dissolved oxygen (DO) on-site using a YSI 5010 BOD probe.[31]

For DO sampling, we used a control water source brought with in a bottle from Mary Pat Mattson's Bridgeport apartment tap to format the probe and then conducted tests in two ways. In the first method, we placed the probe directly into the water source while waiting for the reading to register. In the second method, we filled a BOD bottle with a sample of water from each location. At location 1, we sampled water from a pooled area, an actively flowing inlet, and from runoff flowing from the fountain plaza into the cell. Locations 2 and 3 included flowing water from the previous wetland cell, and one test from each location sampled water flowing directly into the cell from the previous cell, while the other test at these locations sampled water approximately 10 feet from the cell transition. Location 4 tested water in the pond from the fishing platform.

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[28] WESTON Solutions, Inc. William F. Karlovitz, P.E. Letter to Hana Ishikawa. Site Design Group. Re: Stormwater Modeling Stearn's Quarry Park Development, Chicago Park District. 9 October 2009.

[29] Phone interview. William Karlovitz, WESTON Solutions. 10 June 2014.

[30] USGS Water Science School. Water Properties: Dissolved Oxygen. http://water.usgs.gov/edu/dissolvedoxygen.html & US EPA. Water: Monitoring & Assessment, 5.8 Total Solids. http://water.epa.gov/type/rsl/monitoring/vms58.cfm. Accessed 22 July 2014.

[31] YSI Environmental. YSI 5905 and 5010 BOD Probes Specifications. http://www.ysi.com/media/pdfs/W6-5905-5010-BOD-Probes.pdf. Accessed 22 July 2014.

The results from the DO tests show improvement in water quality from locations 2 to 4; however, the first testing site presents an aberration. Location 1 tests from the inlet showed DO levels at 0.75 mg/L, while water from the pool area averaged 1.76 mg/L, and water from the fountain runoff sampled was 10.76 mg/L. The inlet water temperature read 72.32°F, the pool temperature averaged 72.5°F, and runoff 87.98°F. Water from location 2 presented an average dissolved oxygen content of 6.55 mg/L, whereas the average from location 3 samples was slightly higher at 7.03 mg/L. In addition, the water at each site varied in temperature by an average of 0.18°F (L2 73.76°F vs. L3 73.58°F). Water from the pond tested significantly higher in dissolved oxygen content at 12.81 mg/L. The pond water was also an average of 5.98°F warmer than location 3 (L3 73.58°F vs. L4 79.52°F). See Table I.1 for test results.

For TSS sampling, approximately 4 liters of water was gathered from each location. Samples from locations 1 to 3 were taken from flowing areas approximately 10 feet away from the beginning (L1) or wetland cell transition walls (L2 and L3). The pond sample (L4) was taken from the same site used for DO testing at the fishing platform. Improvement from the first testing site to the third site was detected but the fourth site had a significantly higher average reading. Location 4, in the pond, may have higher TSS due in part to presence of fish and waterfowl. The following are TSS averages for each location: L1 - 4.18 mg/L, L2 - 0.41 mg/L, L3 - 0.33 mg/L, and L4 - 14.47 mg/L. See Table I.2 for test results.

Table I.1, Dissolved Oxygen Levels in Palmisano Park Wetland Cells and Pond

Testing Site	Sample Location	Dissolved Oxygen Level (mg/L)	Water Temperature (°F)
Wetland Cell 1, L1	Pool, at wall, in source	1.85	71.24
	Stream, 10’ from wall, bottle	1.67	73.76
	Inlet, bottle	0.75	72.32
	Fountain Runoff, bottle	10.76	87.98
Average, L1		**3.76**	**76.33**
Wetland Cell 2, L2	Stream, 10’ from wall, in source	6.76	73.4
	Spout Flow from cell transition, bottle	6.34	74.12
Average, L2		**6.55**	**73.76**
Wetland Cell 3, L3	Stream, 10’ from wall, in source	6.97	72.68
	Stream, 10’ from wall, bottle	7.65	74.12
	Spout Flow from cell transition, bottle	6.48	73.94
Average, L3		**7.03**	**73.58**
Pond, L4	Fishing platform, in source	12.81	79.34
	Fishing platform, bottle	12.81	79.7
Average, L4		**12.81**	**70.52**

Table I.2, Total Suspended Solids in Palmisano Park Wetland Cells and Pond, Redrawn from Lin Li's Record

Testing Site	Sample Name	Sample Size (ml)	Dry time (hrs)	Empty dish + filter weight (mg)	Dry Weight (TSS + dish + filter) (mg)	TSS (mg/L)	Average TSS (mg/L)
Wetland Cell 1, L1	1.1	1300	1	1.5303	1.5356	4.08	
	1.2	1300	1	1.5343	1.5403	4.62	4.18
	1.3	1300	1	1.5200	1.5250	3.85	
Wetland Cell 2, L2	2.1	1300	1	1.5241	1.5246	0.38	
	2.2	1300	1	1.5174	1.5180	0.46	0.41
	2.3	1300	1	1.5242	1.5247	0.38	
Wetland Cell 3, L3	3.1	1300	1	1.5305	1.5312	0.54	
	3.2	1300	1	1.5155	1.5159	0.31	0.33
	3.3	1300	1	1.5252	1.5254	0.15	
Pond, L4	4.1	500	1	1.5285	1.5368	16.60	
	4.2	500	1	1.5293	1.5365	14.40	14.47
	4.3	500	1	1.5292	1.5354	12.40	

Figure I.1, Water Quality Testing Locations at Palmisano Park

Conclusion & limitations of research:

While testing both dissolved oxygen and total suspended solids yielded results showing slight improvement throughout the wetland cells, mostly from locations 2 to 3, we are unable to conclusively state an improvement throughout the entire water system. This is in part due to two water sources present at location one and to unknown inputs into the pond (L4).

Additionally, limitations of this method include the focused, single event testing does not reflect overall water quality improvement or trends in water quality over a period of time.

Cost Comparison

Saves 10.5 million gallons of potable water and $34,700 by using native prairie plants, which require no irrigation, compared to irrigating an equivalent turf area.

See explanation above in Environmental Performance Benefit #2.

Saves over $87,000 in annual maintenance costs by using native prairie plants instead of turf grass.

See explanation above in Environmental Performance Benefit #8.

Sustainable Features

Introduced 22 acres of native wetland and prairie ecosystems provide habitat for resident and migratory birds, such as downy woodpeckers, crows, cardinals, sparrows, blue jays, and finches. Occasional coyotes and foxes have been sighted in the park.

This park provides habitat to numerous species by featuring a pond, wetland and native prairie plants not found in many other Chicago parks. In order to observe and document the presence of various species in the Park, we contacted the Urban Wildlife Institute, based out of the Lincoln Park Zoo.[32] "The Urban Wildlife Institute studies the interaction between urban development and the natural ecosystem to develop scientific standards for minimizing conflict between these overlapping areas."[33] The group frequently places cameras in Chicagoland parks and open space, and was not aware of Palmisano Park prior to our interaction. After an initial discussion with Liza Lehrer, a Research Coordinator for the Urban Wildlife Institute, her team determined it would be feasible and mutually beneficial to our LAF case study and to UWI to place a camera on-site at Palmisano Park because of its landscape features and the anecdotal sightings shared with Lehrer. UWI and the LAF research assistant selected an installation area for the camera within the wetland based on their expertise of wildlife patterns and the LAF research assistant's knowledge of park users for monitoring from June 23 to July 23, 2014. The wildlife camera captured images of two opossum and numerous raccoon during the month of monitoring.

The pond is stocked for catch and release fishing by the Palmisano Family Foundation and includes different species such as bluegill, largemouth bass, crappie, and channel catfish. The Palmisano Park Audio Tour produced by the Chicago Park District and the Parkways Foundation lists these species as some of the different fish visitors may catch during an outing at the park.[34]

Anecdotal sightings of wildlife:
Ernie Wong, local landscape architect for the park, mentioned seeing both a red fox and coyote onsite throughout development of the park around 2005.[35] While in attendance at the Palmisano Park Advisory Council meeting on June 2, 2014, president Maureen Sullivan recounted witnessing an owl (unsure of species) sitting on the park's fence alongside Halsted Street.[36] Another Advisory Council member, Jim Peters, sighted a

[32] Urban Wildlife Institute. Lincoln Park Zoo. Urban Wildlife Biodiversity Monitoring. http://www.lpzoo.org/conservation-science/projects/urban-wildlife-biodiversity-monitoring. Accessed 21 May 2014.
[33] Urban Wildlife Institute. Lincoln Park Zoo. http://www.lpzoo.org/conservation-science/science-centers/urban-wildlife-institute. Accessed 21 May 2014.
[34] Chicago Park District. Palmisano Park Audio Tour. Chicago Park District and Parkways Foundation. http://www.chicagoparkdistrict.com/about-us/audio-tours/palmisano-park/#.U49GbJRdVxA
[35] Interview. 11 April 2014. Ernest Wong. Landscape Architect and Principal of Site Design Group.
[36] Interview. 29 May 2014. Maureen Sullivan. Palmisano Park Advisory Council President and Bridgeport resident.

sand hill crane near the pond only a few weeks prior to the June 2014 meeting.[37]

A survey developed in Survey Monkey for park users was disseminated using these websites: Facebook, Every Block, and Next Door. The survey included a question asking respondents to list wildlife they have seen throughout the park. Many of the responses received include typical animals that would be found throughout Chicago city streets and parks such as rabbits and squirrels. In addition general categories of species are listed such as birds, ducks, insects, turtles, and fish; however a few provide specific species. These wildlife sightings include garter snake, praying mantis, goldfinches, American kestrel, cardinals, redwing blackbirds (listed twice), a skunk and fox.

According to the Urban Wildlife Institute's diagram *The Wildlife Next Door*, skunk and red foxes are rarely seen in urban conditions of Chicago. The image diagrams typical urban wildlife species proximity to downtown Chicago. Two opossum were captured on the monitoring camera within Palmisano Park, which is congruent with the opossum buffer on the map. Palmisano Park lies at the opossum's border, and have been sighted all over the Bridgeport neighborhood on a regular basis by local residents, including Palmisano Park Advisory Council President Maureen Sullivan.[38]

Figure S.1, The Wildlife Next Door, courtesy of Urban Wildlife Institute

Limitations of research:
UWI mentioned that they typically keep cameras in place for a couple seasons to allow animals to acclimatize to the camera. The short monitoring period limits the time animals have to adjust to the camera and may not reflect actual wildlife present within the site. Discussion of moving the camera to another location was posed but UWI stated that keeping the camera in place helps animals become accustomed to it, so it was determined

[37] Interview. 2 June 2014. Jim Peters, Palmisano Park Advisory Council Secretary and Bridgeport resident.

[38] Email correspondence. 7 July 2014. Maureen Sullivan. Palmisano Park Advisory Council President and Bridgeport resident.

not to move it to another location that perhaps would yield better results. Additionally, the camera used to monitor is generally meant to capture mammals on the ground and does not capture clear images of birds.

Provides a broad range of outdoor activities in an urban environment through seasonal stewardship days, ecological learning, overnight camping, catch and release fishing, fossil hunting, music, passive recreation, and an air and water show that attracted over 1,000 visitors in 2013. Fossils found on-site are part of the Field Museum of Natural History's collection.

Various activities take place within Palmisano Park that may not occur within other neighborhood parks because the design includes topographical change, a pond, and native prairie. Some of the events are one time organized occasions, while others happen annually, monthly, weekly, or daily. Part of the success of this park is its proximity to McGuane Park. Palmisano Park, along with its neighbor, offer opportunities to engage in unique outdoor activities. Lacking Chicago Park District staff and traditional amenities such as a Fieldhouse and bathrooms, the park is supported by its more traditional neighbor, McGuane Park. Palmisano users have access to the field house and open space of the adjacent park. Additionally, events take place within McGuane's field house and open space that relate to the design of Palmisano. For example, a children's learning garden is being constructed at McGuane during the summer of 2014 that will contain native plants used throughout Palmisano Park's prairie. Park District employees and volunteers plan to host educational events in the children's garden to teach youth about the plants located there. Another partnership event planned for summer 2014 hopes to bring a watershed model to the McGuane Park field house to help demonstrate how water is contained on-site at Palmisano.

Stewardship days for Palmisano Park are important community building and environmental events. Even though they are relatively new activities beginning in 2011, monthly stewardship days and the biannual Clean & Green Days have brought together various groups of people from throughout Bridgeport who normally do not interact.[39] Dr. Melissa Naiman, professor of public health at the University of Illinois at Chicago and resident of Bridgeport, stated that the April 2014 Clean & Green Day in Palmisano Park brought together more people to pick up trash than any other park or neighborhood landmark she knows of.[40] About 100 participants registered for the April 2014 event according to Bridgeport Business Association records[41] and Naiman stated that numerous others joined in the efforts to clean up the park once they saw an organized group doing so. Based on positive turn out for the April 2014 Clean and Green Day, the Palmisano Park Advisory Council projects more participation for future stewardship events going forward.

The following list is a sample of events from 2013 -2014 that take place within the park. Many of these are recorded events with listings available on websites through the Chicago Park District, Chicago Tribune, City of Chicago Department of Streets and Sanitation, and the Palmisano Park Advisory Council Facebook page.

Palmisano Park Events

2014, May 5	Fishing Education by Tom Palmisano for Bridgeport Catholic Academy students [42]
2014, June 5	Birds in My Neighborhood, Openlands, Sheridan Elementary students ID birds [43]
2014, June - August - once monthly	Night Out: Concerts in the Park [44]
2013, August 17-18	The North Face Explore Your Parks & Chicago Park District Outdoor City Camping [45]

[39] Interview. 29 May 2014. Maureen Sullivan. Palmisano Park Advisory Council President.

[40] Interview. 3 June 2014. Dr. Melissa Naiman. Professor of Public Health, University of Illinois at Chicago.

[41] Bridgeport Business Association. Clean and Green Wrap Up. http://bridgeportbusiness.org/clean-green-wrapup/. Accessed 30 May 2014.

[42] Chicago Tribune. Catch Fish at Palmisano Park. 5 May 2014. http://galleries.apps.chicagotribune.com/chi-catch-fish-at-palmisano-park-photos-20140505/#chi-fish05overall-20140505. Accessed 8 June 2014.

[43] Henry C. Palmisano Nature Center Advisory Council Facebook Page. https://www.facebook.com/pages/Henry-C-Palmisano-Nature-Center-Advisory-Council/293651830688424. Accessed 29 June 2014.

[44] Chicago Park District. Palmisano Park Events. http://www.chicagoparkdistrict.com/parks/Palmisano-Park/#.U5eSLZSwIdF. Accessed 1 June 2014.

[45] Chicago Park District. Chicago Park District Teams Up with The North Face Explore Your Parks Program to Get Families Outdoors This Summer. 20 May 2013. http://www.chicagoparkdistrict.com/chicago-park-district-teams-up-with-the-north-face-explore-your-parks-program-to-get-families-outdoors-this-summer/#.U5eN0ZSwIdE. Accessed 28 May 2014.

2013, July 13 / 2014, Aug 16	Veterans Family Fest at McGuane Park & Air and Water Show at Palmisano Park, 1,000 attendees [46]
Annual, April & October	Citywide Clean and Green Day, Palmisano and McGuane Parks are the focus for Bridgeport - Beginning in 2011, over 100 participants at each event held once in April & once in October volunteer to clean the community parks. [47]
Monthly, April - October	Volunteer Stewardship Days at Palmisano Park [48]
Daily	Yoga, Tai Chi, Running, Walking, etc.

Volunteer Stewardship Event Records for 2013 [49]

May	10 volunteers - 3 hours	weeded dandelions, picked up litter throughout park, noted fence on northwest corner needs improvement, graffiti & garbage overflow reported to CPD
June	5 volunteers - 3 hours	pulled 40 lbs peppergrass on north end of prairie & southwest corner by workout equipment, collected trash, reported significant overflow of park garbage cans
July	4 volunteers - 2 hours	pulled 2 full 55-gallon bags of Queen Anne's Lace
August	7 volunteers - 3 hours	pulled Queen Anne's Lace, graffiti reported to CPD
October	7 volunteers - 3 hours	spread seed throughout prairie, collected side-oats gramma for CPD, picked up trash, reported garbage bins in good condition but graffiti still an issue

[46] Chicago Park District. Veterans Family Fest at McGuane. http://www.chicagoparkdistrict.com/parks/Palmisano-Park/events/Veterans-Family-Fest-at-McGuane/#.U5eQUZSwIdE. Accessed 10 June 2014.

[47] Chicago Department of Streets and Sanitation. http://www.cityofchicago.org/content/dam/city/depts/streets/supp_info/Sanitation/Sanitation%202014/FINALCleanandGreenFlyer.pdf. Accessed 1 June 2010.

[48] Henry C. Palmisano Nature Center Advisory Council Facebook Page. https://www.facebook.com/pages/Henry-C-Palmisano-Nature-Center-Advisory-Council/293651830688424. Accessed 9 June 2014.

[49] Email reports to Chicago Park District employee Jason Steger. Samantha Mattone. Volunteer Stewardship Coordinator. Palmisano Park. May - October 2013. Accessed 11 June 2014.