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**Project Title:** Lowertown Ballpark (CHS Field) Solar Arrays

**Contract Number:** EP4-34 **Milestone Number:** 1 **Report Date:** June 21, 2016

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**Congressional District: (Corporate office)** Minnesota Congressional District 4

**Congressional District: (Project location)** Minnesota Congressional District 4

## MILESTONE REPORT

**Executive Summary:** Construction of a solar installation of 103.5 kW<sub>DC</sub> photovoltaic (PV) capacity was completed at CHS Field in St. Paul, home of the Saint Paul Saints (Saints) baseball club. The facility consists of two arrays: a PV shade pavilion over a spectator terrace and a structured array at the northeast corner of the site. This highly visible project is part of a larger sustainability initiative of the Saints and the City of Saint Paul and complies with the City of Saint Paul Sustainable Building Policy by meeting the guidelines of the Minnesota “Buildings, Benchmarks & Beyond” (B3) sustainability goals. The B3 policy for energy use requires that 2% of the overall energy demand is met with on-site solar or wind. Estimates indicate that approximately twelve percent of the ballpark’s energy will be produced by the solar arrays. Energy generated by the solar arrays will be used on site. As the arrays produce electricity, they will decrease the ballpark’s demands on the solar grid, and provide a hedge against increasing electric costs.

Due to adverse soil conditions and careful considerations of new legal agreements between Xcel Energy, the Saint Paul Saints, and the City of Saint Paul, completion of Milestone I was slowed, although it is still on pace to meet project estimates. This solar array project, with a prominent presence at CHS Field and through interactive kiosks in the stadium concourse, achieved significant positive exposure to park visitors. The Saints set an attendance record for the team, and the American Association Independent Baseball League, with over 404,000 spectators over 50 games in their first season. The exposure to solar technology, and engagement of social and educational initiatives at the ballpark, met key goals and are successes of the project.

**Technical Progress:** Construction on the arrays began on June 11<sup>th</sup>, 2015. After completion of detailed soil composition studies, it was determined that the structural foundations of the ground-mounted solar arrays, as originally designed, would not withstand the anticipated lateral loads caused by winds and shifting soils. Many alternative options were explored that would ensure the structural integrity of the arrays. Some were not feasible for construction reasons, others for

economic reasons. A newly designed, 42 inch wide and 16 foot deep, “poured-in-place” concrete foundation was determined to be the appropriate solution. Construction on both arrays commenced in coordination with the baseball team’s schedule. It was necessary for safety and security reasons that crews worked while the team played games away from home. Following completion of the foundations, the steel structures to support the arrays were erected, and subsequently the PV panels were set in place and wired.

Construction on the northeast and pavilion arrays was completed by September, 2015. The northeast array includes 144 SunPower X-Series X21-327-Com 327W modules oriented 20 degrees. The pavilion array includes 153 modules of the same type, oriented at 5 degrees. The array capacities are 44.16kW<sub>DC</sub> and 58.30 kW<sub>DC</sub> respectively. The differences in the two array structure designs are a result of their locations at the ballpark site and their proximity to visitors.

Of the two arrays, the northeast array is positioned at a more optimal angle for capturing the sun’s energy at this latitude. This was feasible because it sits at the edge of the ballpark property above a slight hill. It is surrounded by fencing and landscaping and is in a space inaccessible to the public.

Although the pavilion array is located only thirty feet to the southwest, the site conditions are quite different and required a very different design solution. As the name suggests, the pavilion array is designed to be a place for the public to gather for social activities before and during baseball games. As a result, the PV panel array is mounted high above a concrete slab with black steel structural supports that are designed to relate to the steel structure of the rest of the ballpark. The height of the array allows it to provide shelter from the sun and rain. It also makes the panels out of the reach of visitors to the ballpark and those towering Saint Paul Saints home runs! The arrays were commissioned per the manufacturer’s recommendations and requirements on November 12, 2015 and became operational on May 18, 2016 following completion of all necessary three-party agreements. The energy generated by the arrays will be used on site.

As previously mentioned, an important characteristic of this project is educating ballpark visitors about the value of sustainable technologies and renewable energy. This is accomplished in part by two interactive, educational kiosks in the stadium concourse. The kiosks are linked to the internet and feature a website dedicated to the sustainable practices at CHS Field, <http://sustainability.chsfield.com/>. The website shows a plan of the ballpark, and offers more information about the solar arrays by selecting number 5, “Renewable Energy,” from the list of sustainable design strategies at the bottom of the page. The anticipated total direct current capacity of the arrays is 103.5 kilowatts; more information about the impact of this amount of energy is available on the website.

**Additional Milestones:** According to estimates by the electrical engineers, achievement of Milestone II, total production of 45,000 kWh, can be expected four or five months following the start of service, likely late summer of 2016.

**Project Status:** After some delays due to soil conditions, the installation of the arrays was very successful. They are providing an excellent educational opportunity and will reduce the power demands at the ballpark. Because these arrays are owned by the City of Saint Paul but maintained and operated by the St. Paul Saints baseball club, progress on development of a three-party Interconnection Agreement, Net-Metering Agreement, and Standby Service Agreement was slower than development of a two-party agreement. These three-party agreements are unique for Xcel Energy, the City, and the Saints. As a result, preparation of legal documents by Xcel Energy and the subsequent reviews by the City and Saints extended the

activation date of the solar arrays. Photographs of the arrays under construction and following completion can be found in the appendix beginning on page 4.

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**Appendix:** Construction and Completion Images of the Solar Arrays.



**Image 1.** Northeast array foundations; June 18, 2015





**Image 2.** Pavilion array steel construction; June 18, 2015



**Image 3.** Northeast array framework; June 26, 2015





**Image 4.** Pavilion array framework; June 26, 2015

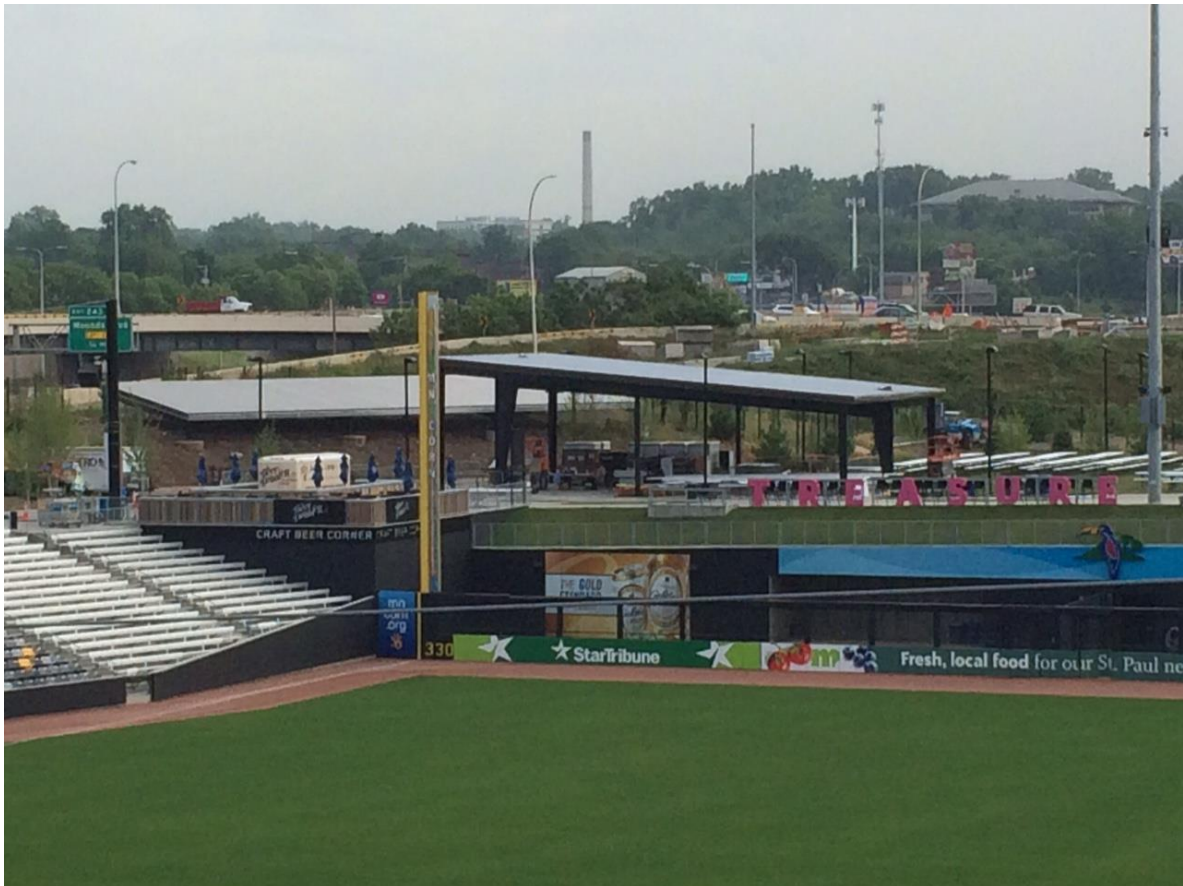


**Image 5.** Northeast array construction progress; July 2, 2015





**Image 6.** Pavilion array construction progress; July 2, 2015



**Image 7.** Northeast and Pavilion array progress; July 15, 2015





**Image 8.** Northeast array solar panel installation; August 10, 2015



**Image 9.** Pavilion array solar panel installation; August 10, 2015





**Image 10.** Completed northeast solar array; September 9, 2015



**Image 11.** Completed pavilion solar array with interactive kiosk in the foreground; September 9, 2015