Renewable Development Fund (RDF)
Solar Demonstration Grant
Completion Presentation

Project funding provided by
customers of Xcel Energy through
a grant from the Renewable Development Fund

October 10, 2017

RDF Grant Project Scope and Goals

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1. Install a demonstration scale 150 kW solar electric system and up to five approximately 10 kW solar electric systems.

2. Utilize Minnesota Made solar panels at the selected sites throughout the Minneapolis Park system.

3. Demonstrate the effectiveness of alternative solar designs such as carports and outdoor restaurant seating canopies where roof mounted solar systems are not feasible due to structural, historical or other barriers to traditional solar installations.

4. Promote the use of solar through education and interpretive programs thereby increasing the awareness of and demand for solar throughout the state.

RDF Site Selection Summary Overview

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I. Site Selection Criteria

II. Evaluation of Sites

III. MPRB Approved Sites

I. Site Selection Criteria:

A. Technical Criteria

1. No shading
2. South facing
3. Meter
4. Onsite electricity consumption
5. Roof: contiguous area
6. Roof: expected lifespan of 15+ years
7. Roof: structural capacity
8. Awning: structural capacity
9. Canopy: close to meter
10. MPRB property
11. Outside downtown core
12. Difficult to implement

I. Site Selection Criteria:
B. Value-Based Criteria

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1. Highly visible to park visitors
2. Substantial or significant level of visitation
3. Potential for unique public education opportunity
4. Innovative approach to solar energy production

1. Site Selection Criteria:
C. Other Considerations

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1. Balance across park districts, regional and neighborhood
2. Landmark or historic status
3. Zoning limitations
4. Security issues
5. Linkage with current capital projects or plans
6. No reflective glare
7. Diverse use

II. Evaluation of Sites

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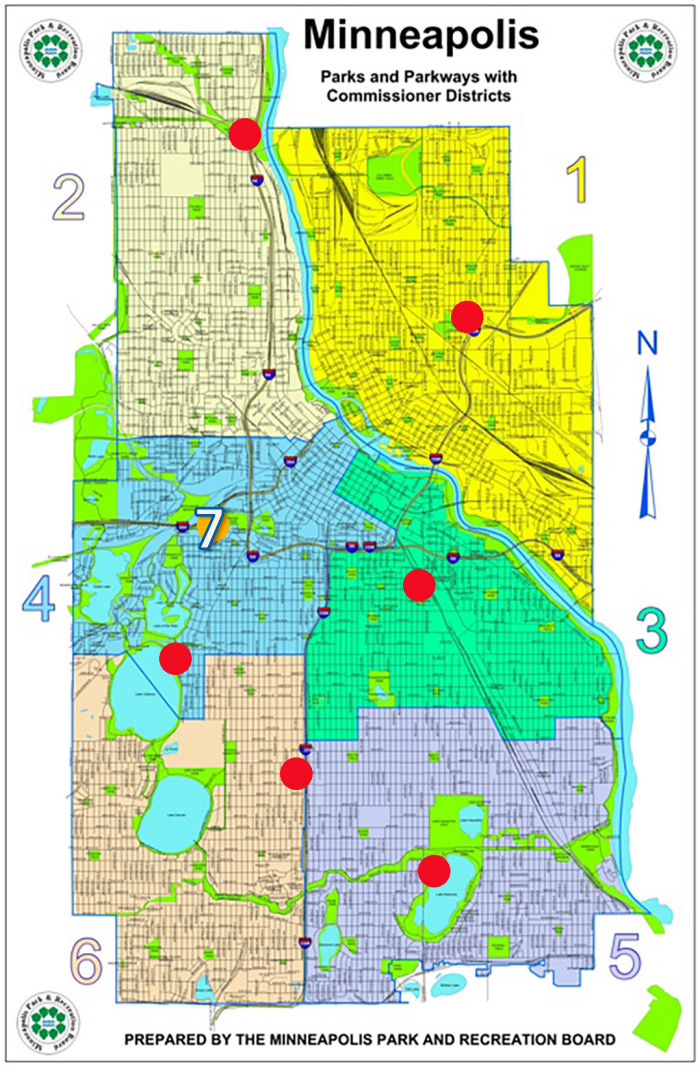
1. Public Open House (Fall 2013)

2. Evaluation of 52 possible locations:
   a. Criteria matrix
   b. MPRB staff feedback
   c. Onsite analysis

3. Top 3 reasons for elimination:
   a. Shading
   b. Not south facing
   c. No meter

III. MPRB Approved Demonstration Sites



1. NE Park Rec Center (District 1)*
2. Webber Park (District 2)
3. East Phillips (District 3)
4. Lake Calhoun 'Tin Fish' (District 4)**
5. Lake Nokomis Beach (District 5)
6. Dr. Rev. MLK Jr. Park (District 6)
7. Parade Ice Garden

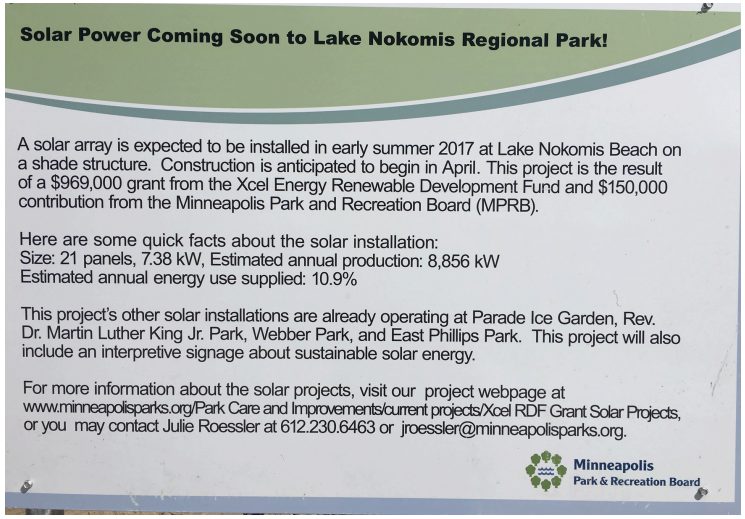
*tabled to 2018 due to construction schedule, became non-RDF funded project.

** issue with structural capacity + site redevelopment timing

Stakeholder Involvement

MPRB staff, Commissioners, and members of the general public were engaged in the design development and feasibility study process:

- A Technical Advisory Committee comprised of MPRB staff from various departments on November 13, 2015, along with subsequent updates.
- Site visits with MPRB staff.
- Informal Commissioner updates in 2015.
- Presentation boards to get feedback at two Calhoun-Harriet Master Plan Open Houses in 2015.
- Commenced updates with neighborhood organizations and community groups in 2016.
- Communication about project installation 2016-2017.



Overview of Parade Ice Garden Demonstration Project

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In Summer 2015, Parade Ice Garden had a 153-kilowatt solar array installed on the roof of its north rink.

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The panels were manufactured
in Bloomington, Minnesota by tenKsolar.

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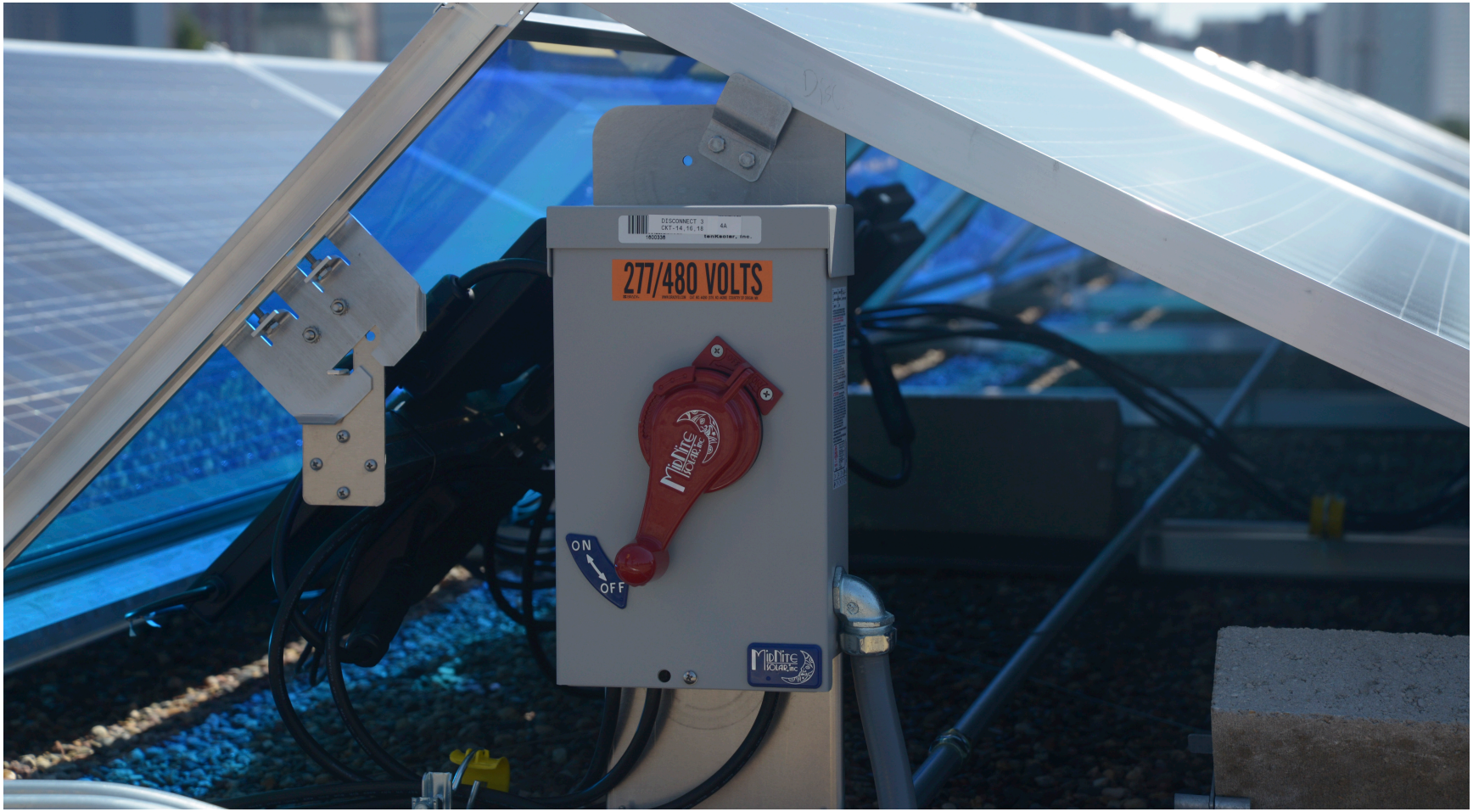

The solar array is expected to produce about 184,000 kilowatt hours (kWh) of electricity, or 15% of the facility's total electricity usage.

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That's a savings of about $20,000 per year and is equivalent to powering 20 homes' electricity.

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Previous energy efficiency improvements reduced annual greenhouse gas (GHG) emissions equivalent to 515 metric tons of CO_2—equivalent to taking 109 cars off the road.

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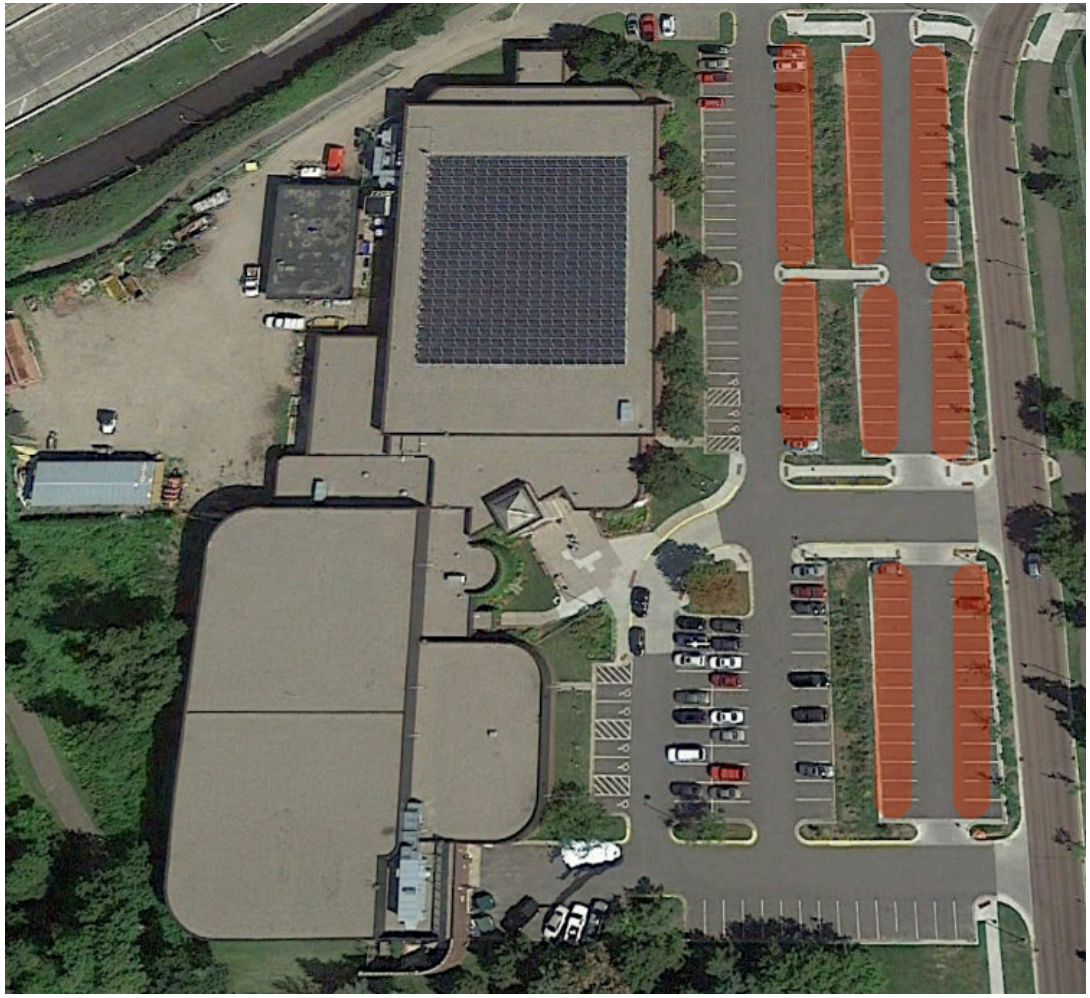

The new solar array offsets an additional 127 metric tons of CO_2 annually—equivalent to taking 27 cars off the road.

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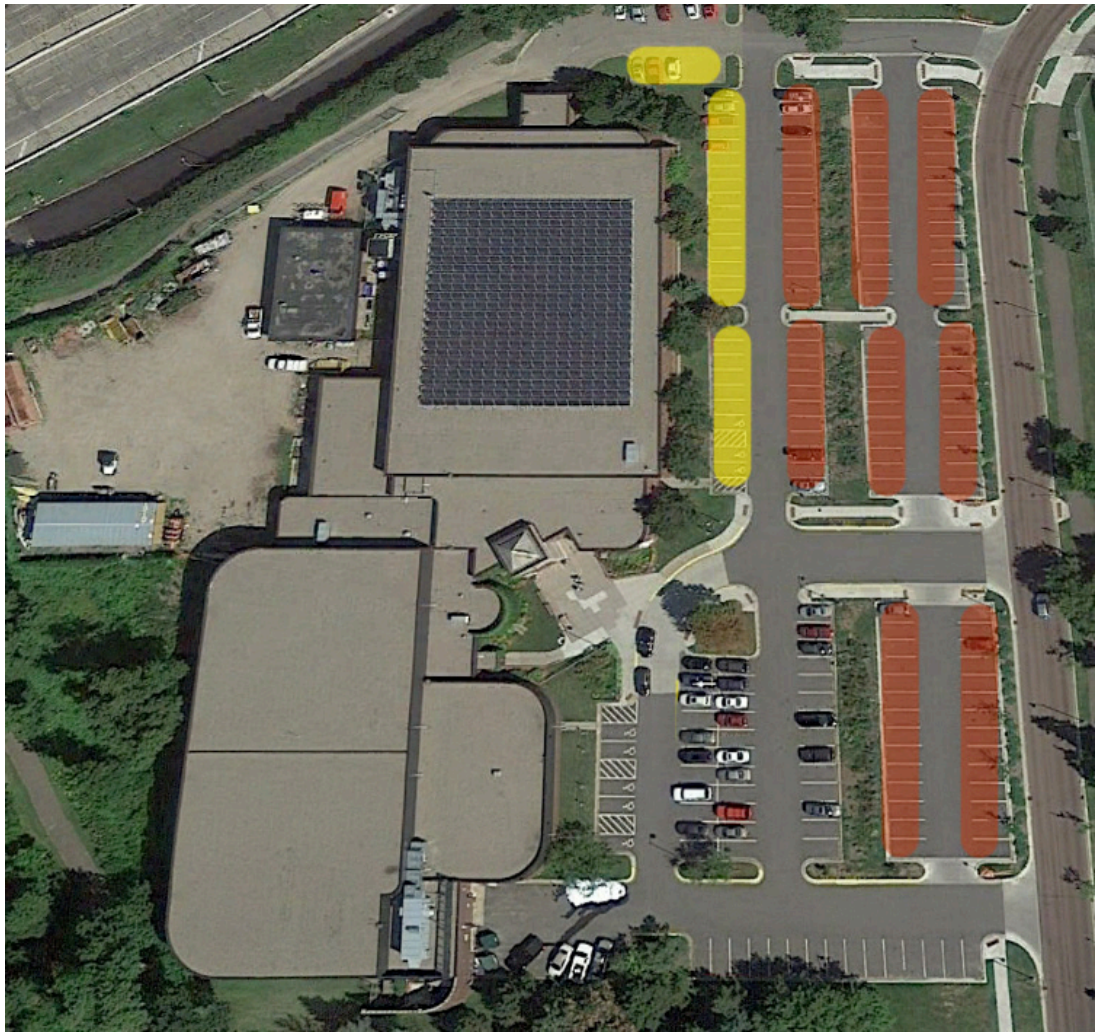

Review of Proposed Plans for Other Demonstration Projects

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- Dr. Rev. MLK Jr. Park
- East Phillips
- Webber Park
- Lake Nokomis Beach

Dr. Rev. MLK Jr. Park – context

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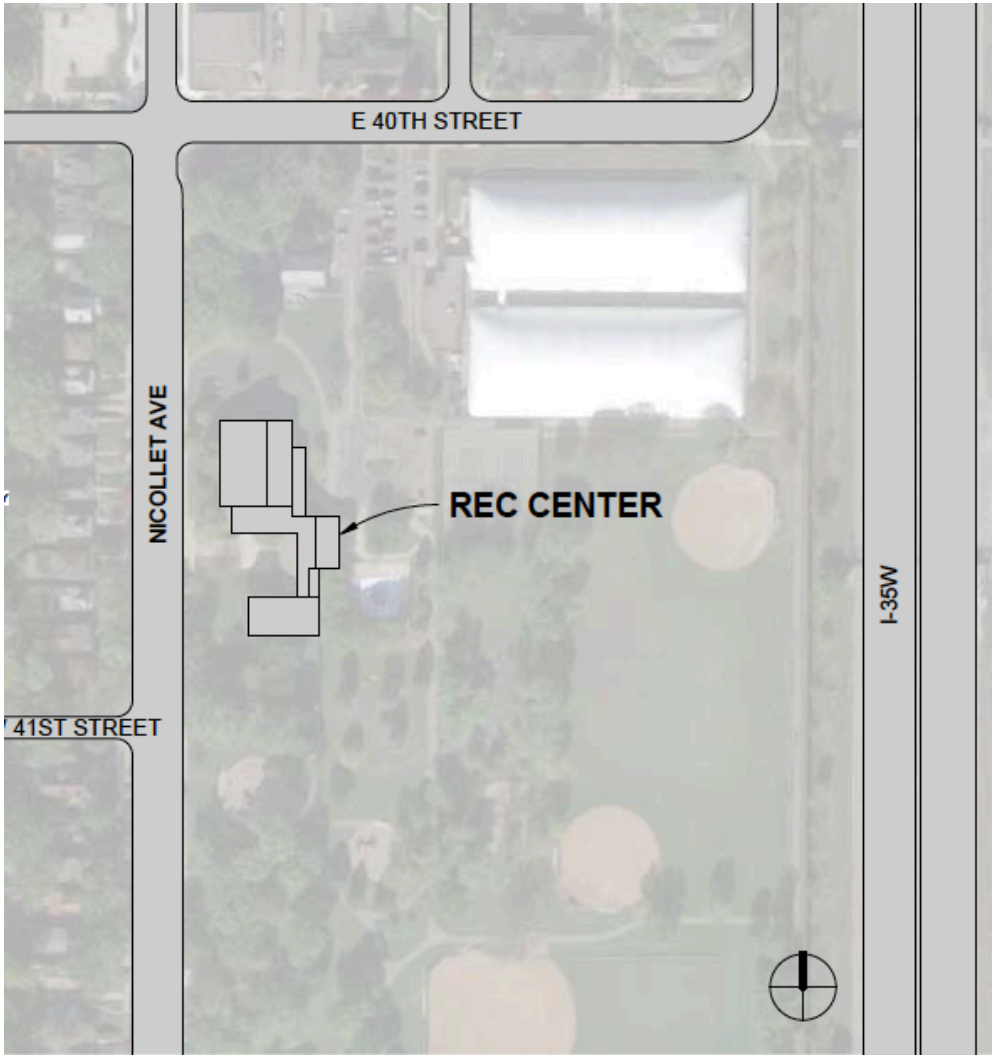

Dr. Rev. MLK Jr. Park – 3D view + highlights

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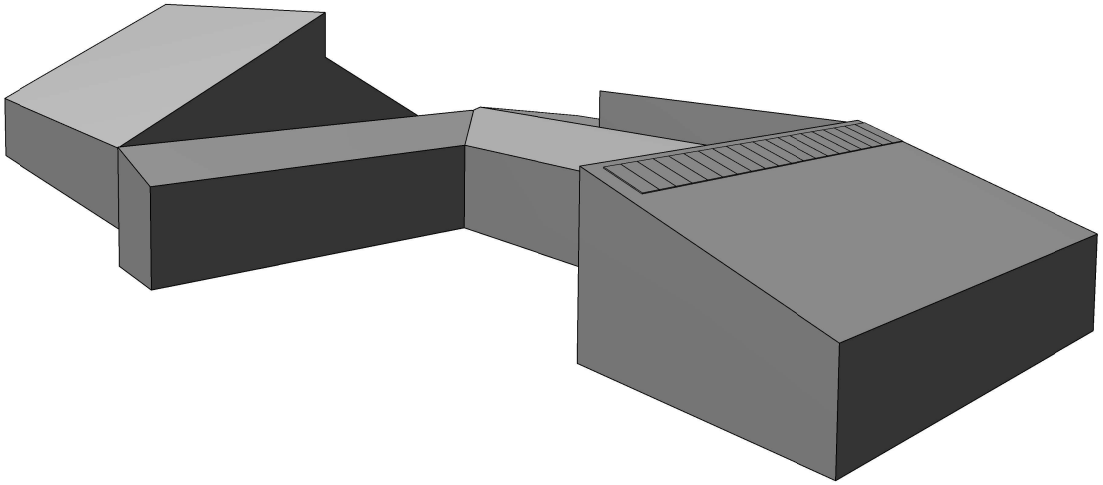

The solar installation at Rev. Dr. Martin Luther King Junior Park is located on the site's Multi-Purpose Room. Here are some facts regarding the installation:

- 20 proposed panels, approx. 39" x 65"
- Size (kW): 6.2kw

East Phillips – context

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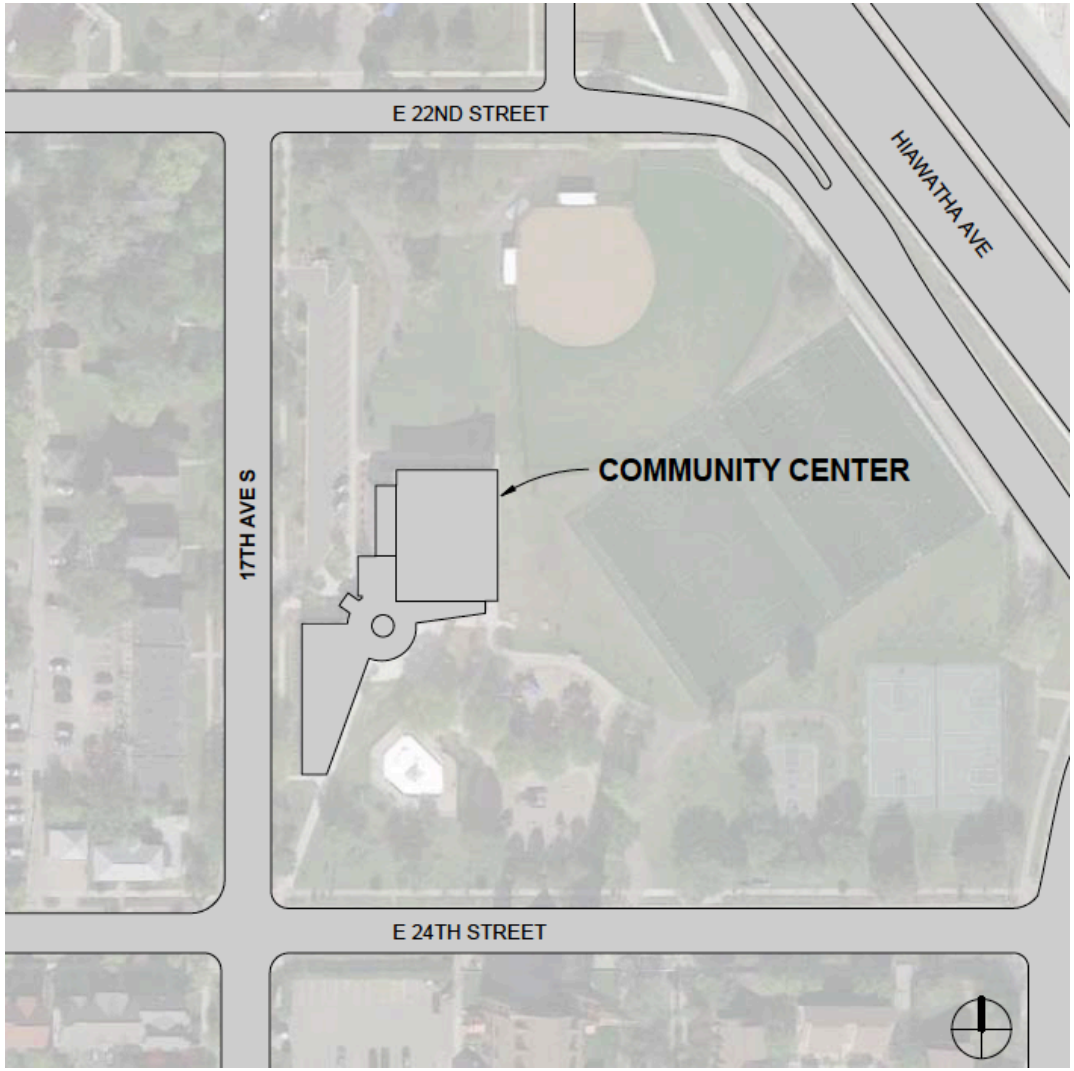

East Phillips – 3D view + highlights

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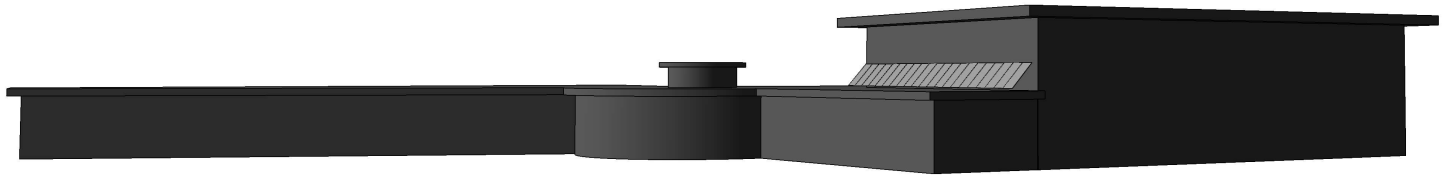

The solar installation at East Phillips Park is located on the south facing wall of the gymnasium, on the Community Center. Here are some facts regarding the proposed installation:

- 21 proposed panels, approx. 42” x 60”
- Size (kW): 6.510kw

Webber Park – context

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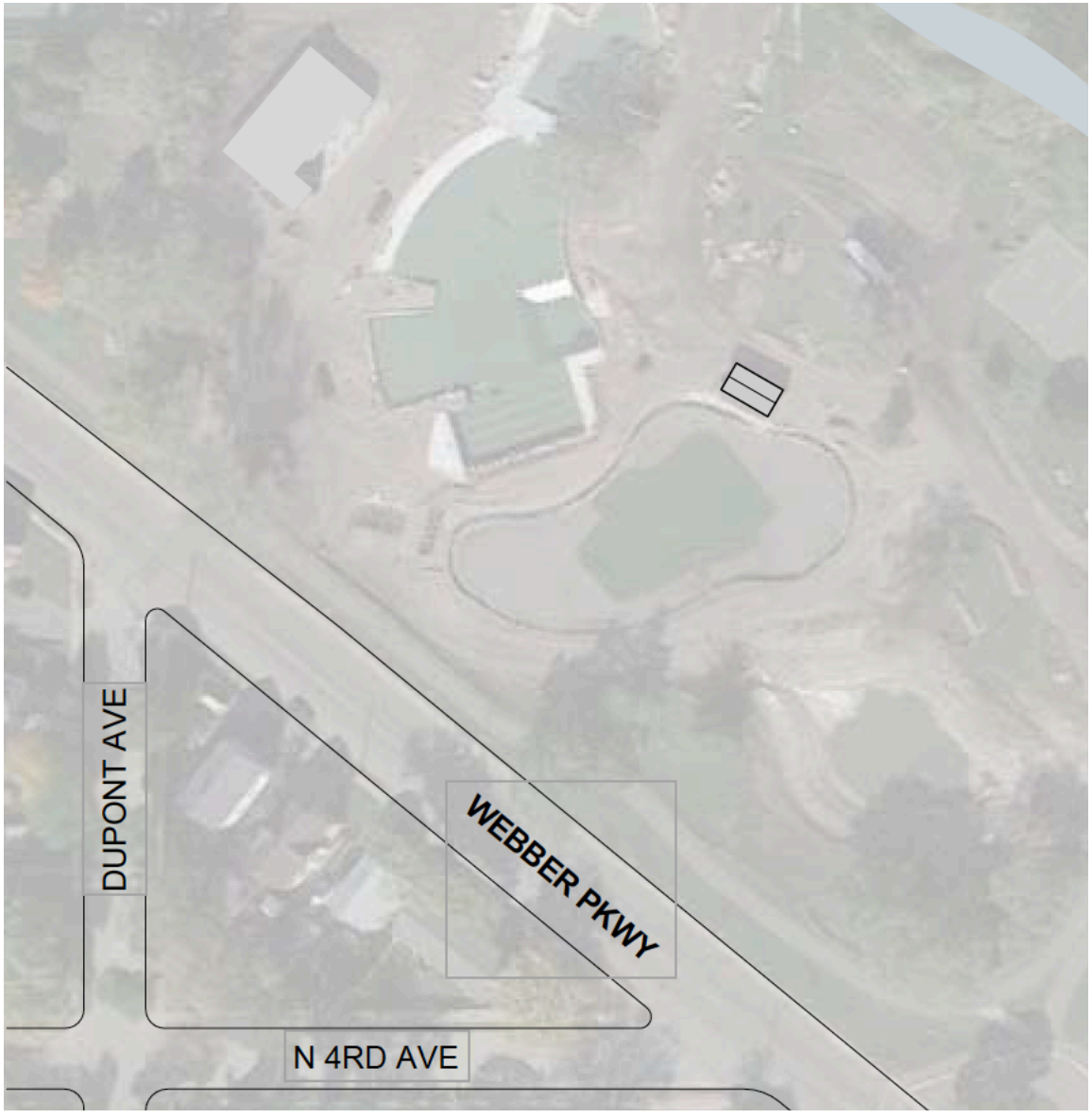

Webber Park – 3D view + highlights

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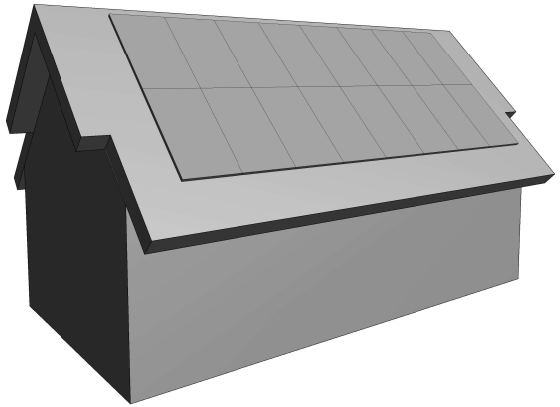

The solar installation at Webber Park is located on the pool pump house. Here are some facts regarding the proposed installation:

- 16 proposed panels, approx. 38” x 66”
- Size (kW): 4.560kw

Nokomis Beach – context

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Nokomis Beach – context

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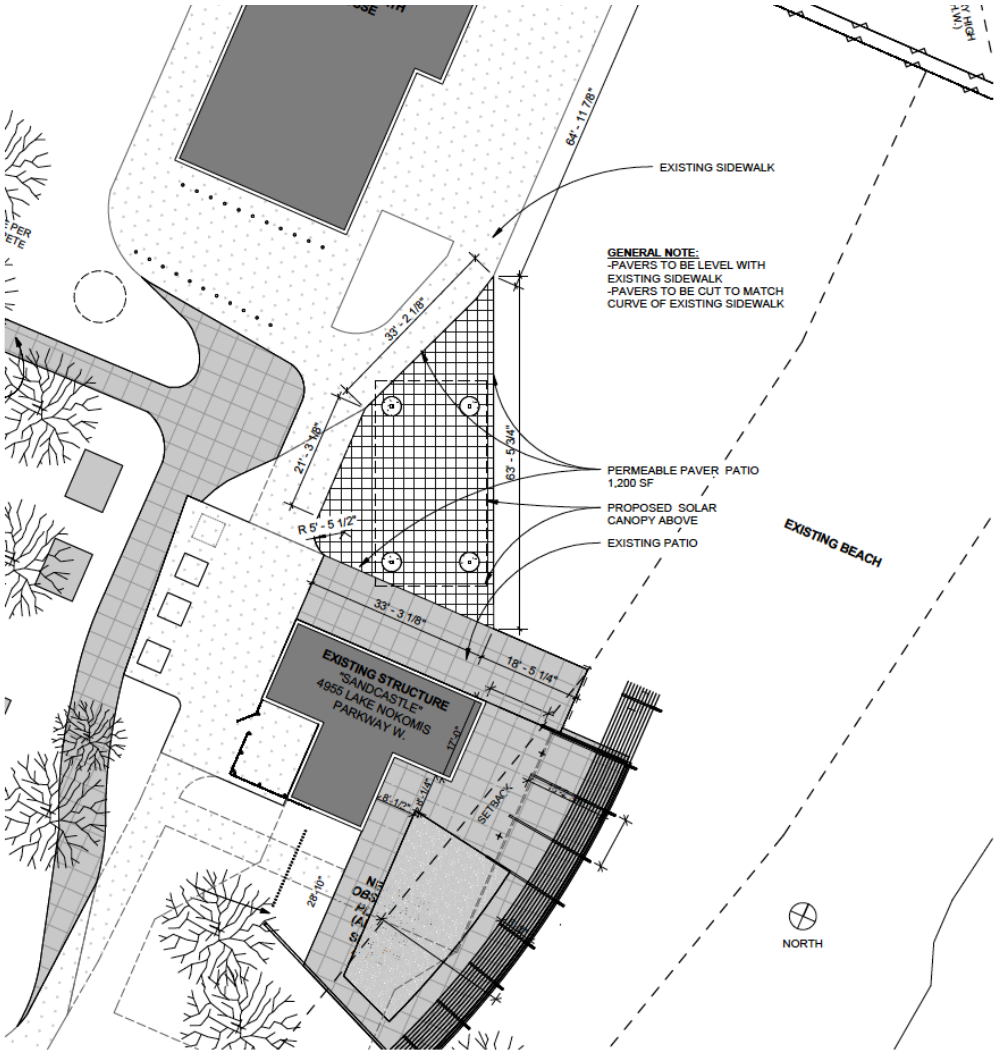

1 Roof Plan
1/16" = 1'-0"

Nokomis Beach – 3D view + highlights

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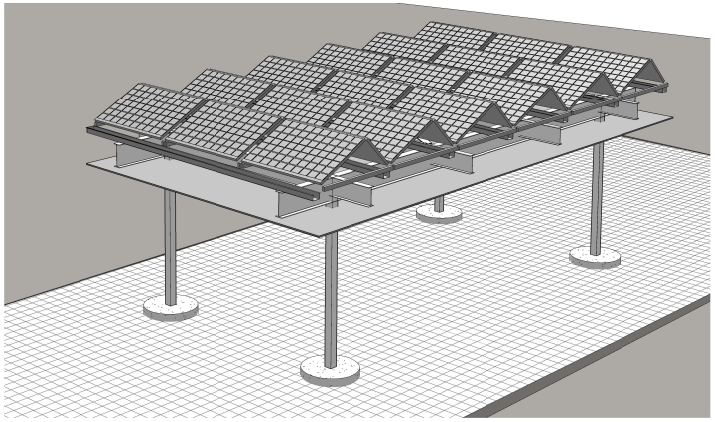

The solar installation is a shade structure at Lake Nokomis Beach. The masterplan for Lake Nokomis identified the need for additional shade at the beach area, so the structure is a fitting addition to the beach area.

Here are some facts regarding the proposed installation:

- 18 proposed panels, 5 rows with 3 panels each
- Size (kW): 7.380kw

Education + Outreach

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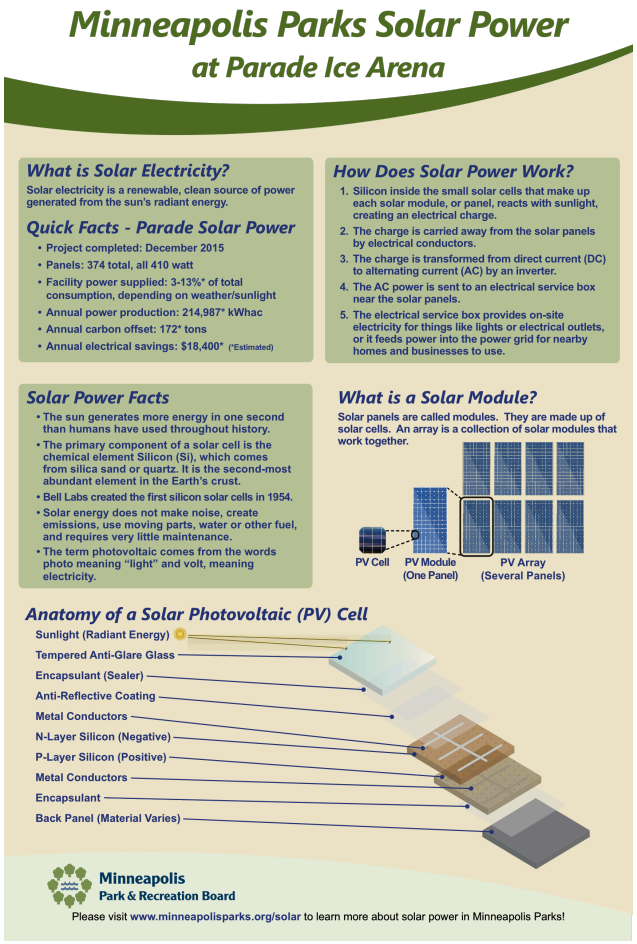
- “Solar in Minneapolis Parks” video
- Parade video kiosk
- Signage
- MPRB website



Project Benefits

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MN statute, section 116C.779

Increasing g the market penetration within the state of renewable electric energy resources at reasonable costs. The additional nearly 200 kW of solar installed in Minneapolis parks is a significant increase in the total amount of solar power generated in the state at a reasonable cost.

Promoting the start-up, expansion, and attraction of renewable electric energy projects and companies within the state. By utilizing Minnesota Made panels, the MPRB helped to support and expand Minnesota-based renewable energy companies in the state.

Developing near-commercial and demonstration scale renewable electric projects. Because the development of a solar project over 100 kW is defined as a commercial scale project, the 153.34 kW system at Parade Ice Arena meets the definition of commercial scale demonstration project.

Project Benefits

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NSP-Minnesota electrical ratepayers:

Reduction of additional infrastructure - all the electricity created by the solar arrays at MPRB RDF facilities are self generating and consumed onsite, freeing up existing energy for other uses within the city of Minneapolis. This reduces the need for additional infrastructure, such as high voltage transmission lines and transfer stations, from having to be built in Minneapolis–saving ratepayers millions of dollars.

Reduction in peak demand - Parade Ice Arena has an average daily peak demand of 500 kW. With the peak demand hitting its highest point in July and August, the solar panels produce peak output during peak demand. Thus, the installation is freeing up power at the ideal time and in the ideal location to reduce peak demand near downtown Minneapolis, a major energy user regionally.

Project Benefits

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Project Benefits

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Local economy and electrical industry in Minnesota:

Two (2) **Minnesota-based solar installation firms** were hired to install 5 project sites.

Minnesota-based electrical, structural and civil engineering firms, an architectural firm and a sustainability consulting firm that all specialize in solar were hired for project consulting.

All of the solar panels being **manufactured in Minnesota**.

Project Benefits

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The **environment** benefited from:

Reduction in pollutants from conventional energy sources, such as:

- Carbon Dioxide
- Methane
- Nitrous Oxide
- Sulfur Dioxide
- Mercury
- Nuclear Waste
- Thermal Pollution

Additionally:

- No harmful impact to existing eco systems
- Greenhouse gas emission free
- Noise free
- Use of an existing, empty roof rather than at grade development on raw land or urban infill
- Low maintenance
- As sunlight exists in near infinite quantities, the utilization of sunlight today will not reduce solar resources for future generations

Project Benefits

Usefulness of Project Findings:

- Minneapolis Park System, ranked the #1 Urban Park System in the United States by the Trust for Public Land for the past five years
- Among most visited locations in Minnesota with approximately 23 million visitors annually.
- RDF project was a unique opportunity to provide park visitors and stakeholders with highly visible sites that put Minnesotans directly in contact with solar while meeting RDF grant goals.
- MPRB commissioners, staff and the general public have overwhelmingly supported the project.
- The significant finding is that the general public is extremely supportive of, and curious about, solar in Minnesota.
- This educational opportunity has proven to be highly successful and has made the project very useful in the promotion of solar in Minnesota.

Next Steps

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- All projects have been installed and are live
- Final report presentation to RDF Committee on Oct 10th
- Final presentation to MPRB Commissioners on Nov 1st
- Reimbursement from RDF
- Close out 2017

Q + A

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