



**2014 APPA Effective & Innovative Practices Award Submission
Xavier University of Louisiana
New Orleans, Louisiana**

Pervious Pavement and Solar PV Panel Parking Lots: Storm Water Management and an Alternative Energy Resource

Statement of Practice

The Xavier of Louisiana West Development project implemented solar PV panels to introduce an alternative to electrical costs and pervious paving to control water runoff for two new parking lots. The two new parking lots (Lot 1 and Lot 2), with over 300 parking spaces, provide support to the expansion of the West Campus of Xavier University of Louisiana.

The project entails two banks of solar PV panels that are attached to parking canopies in each parking lot. These parking canopies provide shade to premier parking spots as well as produce electricity for the lighting to offset electrical costs.

The project also includes pervious paving to control water runoff. The paving of parking circulation is typical Portland cement concrete paving and the paving at the parking areas are pervious concrete pavement. The pervious concrete pavement is porous which allows stormwater to seep through the concrete, and into the ground, which reduces water runoff.

The solar PV panels and pervious paving also illustrates Xavier University's commitment to "green building" while lowering maintenance and operational costs.

West Campus Development Parking Lots

Prior to installation, the lots were occupied by a few Hurricane Katrina damaged facilities including a health center, child care center, swimming pool, and blighted housing. The pictures below show the progression of the lots. In addition to these pictures, there is a second document attached with this submission showing the timeline of demolished areas for these lots.



Aerial view of the parking lot project. See additional attachment of timeline of areas demolished.



Bolden Memorial Child Care Center



Detiege Health Center



Gert Town Swimming Pool



Blighted Housing



Lot 1 and 2 land prior to pavement and solar panel installation.



Lot 1 is located on the west campus of Xavier University, adjacent to the university's Convocation Center.



Lot 2 is also located on the west campus side of Xavier University's main campus, adjacent to Lot 1 and the university's Tennis Center.

West Campus Development Solar Panels



Lot 2 - Solar PV Panels

Institutional Benefits

Xavier University of Louisiana is offsetting their electricity use with the use of solar PV panels at the Xavier West Development project. Each bank of Solar PV panels is rated to provide a capacity of 9,750 kWh of annual energy generated. By including this in the original construction scope of work, we avoided the retrofit and renovation costs. Additionally, we simply added the solar panels to the shade panels that were included in the original design. Although this created a minor increase in the design and construction costs, it decreased the overall maintenance and electrical costs.

The university was also faced with the ever-growing demand for more parking. There are many benefits to having pervious concrete pavement including stormwater management, low maintenance, and better appearance. The pervious paving at the Xavier West Development project reduces the water runoff from the site and thus reduces the storm load on the municipal sewer system. Each pervious area of the parking lot stores 41,700 and 66,800 gallons respectively. The pervious concrete paving drains quickly and allows 3 to 8 gallons of water per minute to pass through each square foot

of surface. A majority of water that flows onto pervious paving is absorbed directly into the soil through the pervious paving in lieu of flowing into the municipal storm drain system.

Characteristics That Make Pervious Concrete Innovative

The Xavier West Development project implements innovative strategies. In lieu of standard electricity use, Solar PV panels produce a portion of the electrical load of the parking loads. By coordinating with the local utility company, the Solar PV panels feed the electrical grid via net metering.

The project also uses pervious paving to control and reduce water runoff compared to typical concrete paving. Typical concrete parking lot paving increases stormwater runoff and increases the burden on the city's sewage system. Being located in a city that is below sea level, it was pertinent that we developed a practice that would greatly improve the stormwater drainage on our campus. Pervious paving is a special type of concrete with a high porosity, which reduces the amount of runoff and decreases the burden on the sewer system.



Image (left) shows the high porosity of pervious paving, which allows water to filter slowly back into the ground, reducing the amount of runoff and drainage into the sewer system.

How This Practice Can be Used by Others

Other schools and universities can implement the innovative practice of pervious pavement and solar PV panels on their campus. Solar PV panels can be placed in parking lots as canopies and on university buildings. Primarily, pervious pavement is used for parking lots; however, the practice can also be utilized for other projects such as sidewalks, streets, and walkways. Pervious pavement can also assist in an irrigation system. For instance, a pervious paved outdoor ball field can drain stormwater directly into the field underneath or filter water into gardens via pervious walking path.

Ultimately, the practice of using solar PV panels and pervious paving for a parking lot project can be implemented by others with an institution that is committed to environmentally friendly construction. There must be a method to estimate savings and benefits to the campus prior to design or construction. The institution must have a commitment to being “green” and be willing to partner with a design team to pursue these innovative practices for their short and long-term benefit.

Management Involvement and Employee Commitment

The Vice President of Facility Planning and Management oversees and supports the practice of solar PV panels and pervious paved lots, ensuring the most efficient and cost-effective methods are being met.

The Board of Trustees and the Senior Administration at Xavier University enthusiastically endorsed this project. First, the total project addressed the need for more campus parking without the cost of constructing a parking facility. This will allow future development if the need or funding occurs.

Secondly, with a number of board members working and residing in other parts of the country, they had been previously introduced to the solar panel concept as a method of addressing environmental concerns, a concept which is just catching on in this region. Additionally, the pervious paving concept came about as a result of thinking beyond local and regional common practices when addressing municipal drainage concerns in a city that is below sea level and prone to flooding. Ultimately, we have introduced a concept that addresses the environment, is economical, and has more functionality.

Since our initial investment in the pervious concrete process, the City of New Orleans has incorporated this concept in the Citywide Master Plan as a viable option when addressing drainage for new construction projects.

As part of employee commitment, The Office of Facility Planning and Management (FP&M) follows a maintenance plan. The commitment of Xavier’s employees to these lots includes preventative maintenance and inspection. The trees placed around the lot provide shade, but are minimal so they can be maintained easily and not create a mass of litter. Landscape maintenance includes removing clippings them so they do not clog the pervious pores. Flow rate greatly depends on routine maintenance and ensuring pores are free from silt. The mass can hold at least the first inch of rainfall that falls on its surface area before starting to contribute to excess runoff that goes into adjacent drain inlet. Routinely or as needed, the Xavier grounds crew manages the appearance and prevents the potential clogging of the pervious concrete pores.

| Maintenance Task | Recurrence |
|-----------------------------------|------------|
| Inspection | 3-4 months |
| Litter and debris Removal | As needed |
| Vacuum or Dry Weather Broom Sweep | As needed |
| Low Pressure Washing | If clogged |

The table above shows Xavier University’s maintenance task plan for the pervious concrete, solar PV panel lots.

There will be regular inspection of the lots, held once every three to four months by the grounds supervisor. Routine litter and debris removal will be conducted every month or as needed. Periodic vacuum sweeping or dry weather broom sweeping will be performed as needed. Depending on the effectiveness of preventative maintenance, there may be a possible need for low pressure washing conducted once a year.



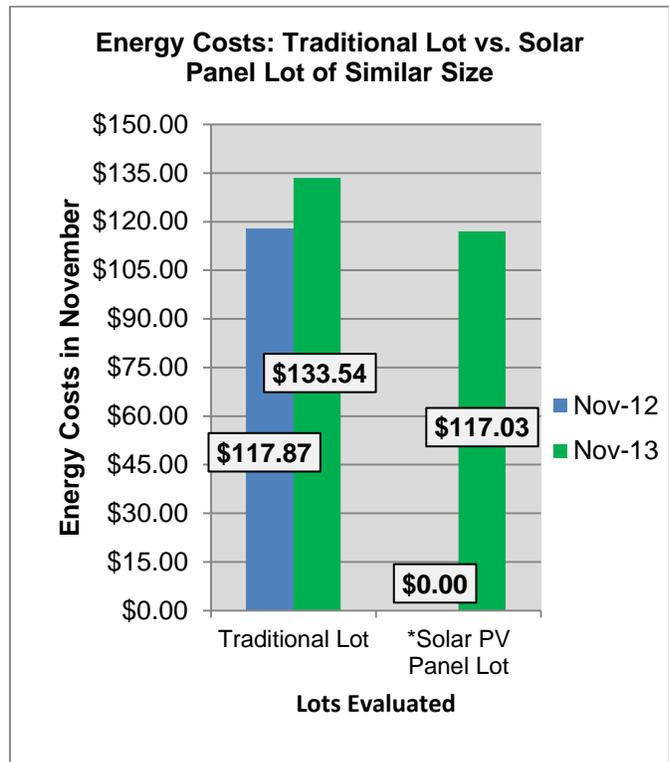
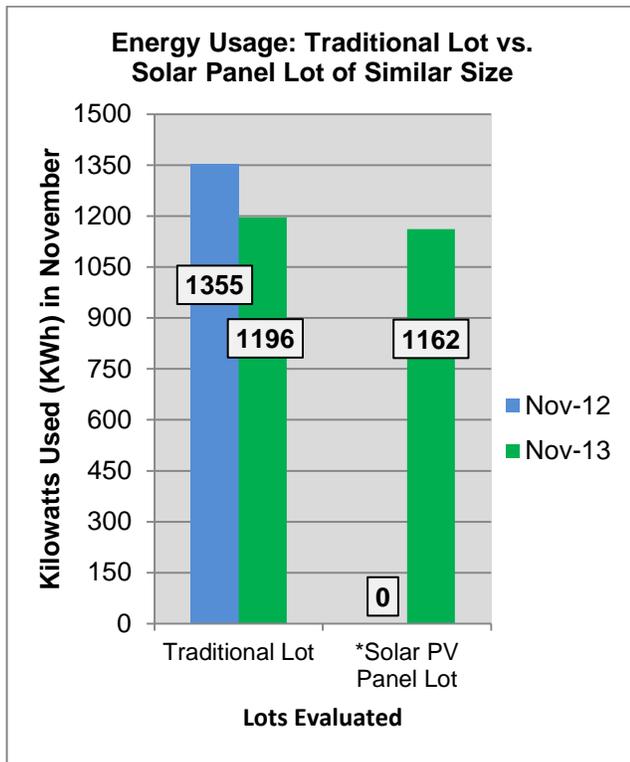
The employee commitment to the solar PV panel and pervious pavement lots include routine maintenance such as litter removal and landscape maintenance to prevent clogged pores and decreased stormwater runoff.

Results, Analysis, Customer Feedback, and Resulting Benchmarks

As discussed previously, Lot 1 can store about 41,700 gallons and allows an estimated additional 40,000 gallons to be absorbed into supporting soil. While pervious concrete in Lot 2 can store about 66,800 gallons and allows an estimated additional 60,000 gallons to be absorbed into supporting soil.

Because we simply added PV panels to the existing design, the labor installation cost was marginal. The local utility company appreciated the opportunity to partner with us on this forward-thinking concept.

Since the lots are a new addition to the campus, there is no prior basis that can be used to denote the amount of electricity used prior to the panel installation. However, the FP&M office evaluated another campus lot of similar size, and although not significant, the solar lot uses less electricity. Even so, the implementation of these lots is still a sustainable decision. This method is energy efficient, sustainable, provides lower maintenance and has a longer lifespan than lots without solar panels. Simply, it was the right thing to do.



**Note that the panels did not have a prior basis to denote the amount of electricity used prior to panel installation, which was November 2012.*

Overall, the university has implemented a campus-wide energy performance contract, which started two years ago. Therefore, Xavier is constantly evaluating the amount of energy savings not only for the lots, but also for the entire campus. Xavier projects savings to continue over time, providing a long-term benefit to the university.

Customer Feedback

Xavier’s most important objective when they implemented this project was ensuring that the students, faculty, and staff were satisfied with the new lots. The university received an overwhelming amount of support from current members of the Xavier community, as well as alumni who have returned for various campus visits and homecoming events. The lots are typically filled to capacity and have

caused less parking congestion on the streets surrounding the lots, resulting in better traffic flow in this area.

Although not our direct customer, New Orleans, Louisiana has shown its appreciation for our effort by creating this as a viable option in its Master Plan for design and construction in a city that has a history of flooding.

Resulting Benchmarks

As it stands, Xavier is the first university in Louisiana, maybe in the south or southeast, to implement the practice of combining pervious pavement and solar power panels on its campus in the same project. There is indeed room for improvement and growth. Xavier is looking to expand the use of pervious concrete pavement for other projects on campus, including a pedestrian art mall (PAM) to be completed in 2015. There will be continuous review in the maintenance of these lots to ensure premium effectiveness. Xavier has not implemented this practice in every parking lot; however, the university is making progress in every sustainable area that it can and will continue to incorporate the “green” alternative in future capital projects if possible.