

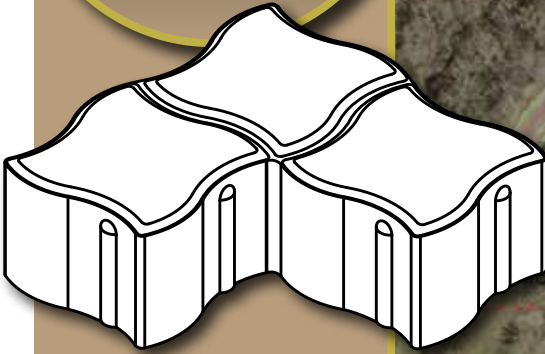
Case Studies for Permeable Paver Systems



Featured Case Studies:

- *Madison, WI Permeable Paver Test Plot*
- *Keshena, WI Residence*
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- *Isanti, MN Residence*
- *Dubuque, IA Green Alley Ways*
- *Menasha, WI Residence*
- *Delafield, WI Residence*

Madison, Wisconsin Permeable Paver Test Plot Project



Mechanical installation, one pallet layer at a time, is an option for setting Renewable Pavers.

- Permeable Pavers are ideal for reducing total suspended solid levels in storm water
- The Test Plot will measure the quality and amount of storm water entering and exiting the system
- Data collected will help to set standards across the country for storm water management options



County Materials' Renewable Pavers were utilized in the permeable paver section of this project.

County Materials Collaborates in Permeable Paver Test Plot Project

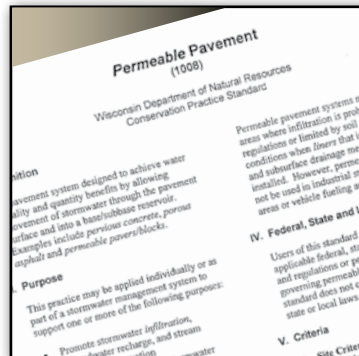
Wisconsin engineers will have another arrow in their quivers when it comes to designing storm water control projects that qualify for environmental credit, thanks to a permeable paver test plot project supported by County Materials Corporation.

The permeable paver project at the Sycamore Dog Park, Madison, WI., was completed in September 2014. The plot will enable researchers to accurately assess the effectiveness of permeable pavers in diverting and filtering storm water runoff. While not the first permeable paver research facility, this one is unique in its comprehensiveness. By request from the WDNR and WDOT the plot includes three cells, one for permeable pavers, one for permeable concrete and one for permeable asphalt. In addition, it is lined on the bottom, and includes separate equipment for measuring influx, outflow, and overflow. The design will enable researchers to measure the quality and amount of all water entering and exiting the system.

Permeable pavers are widely recognized as an effective solution for reducing total suspended solids (TSS) levels in storm water to EPA-mandated standards. Permeable pavers

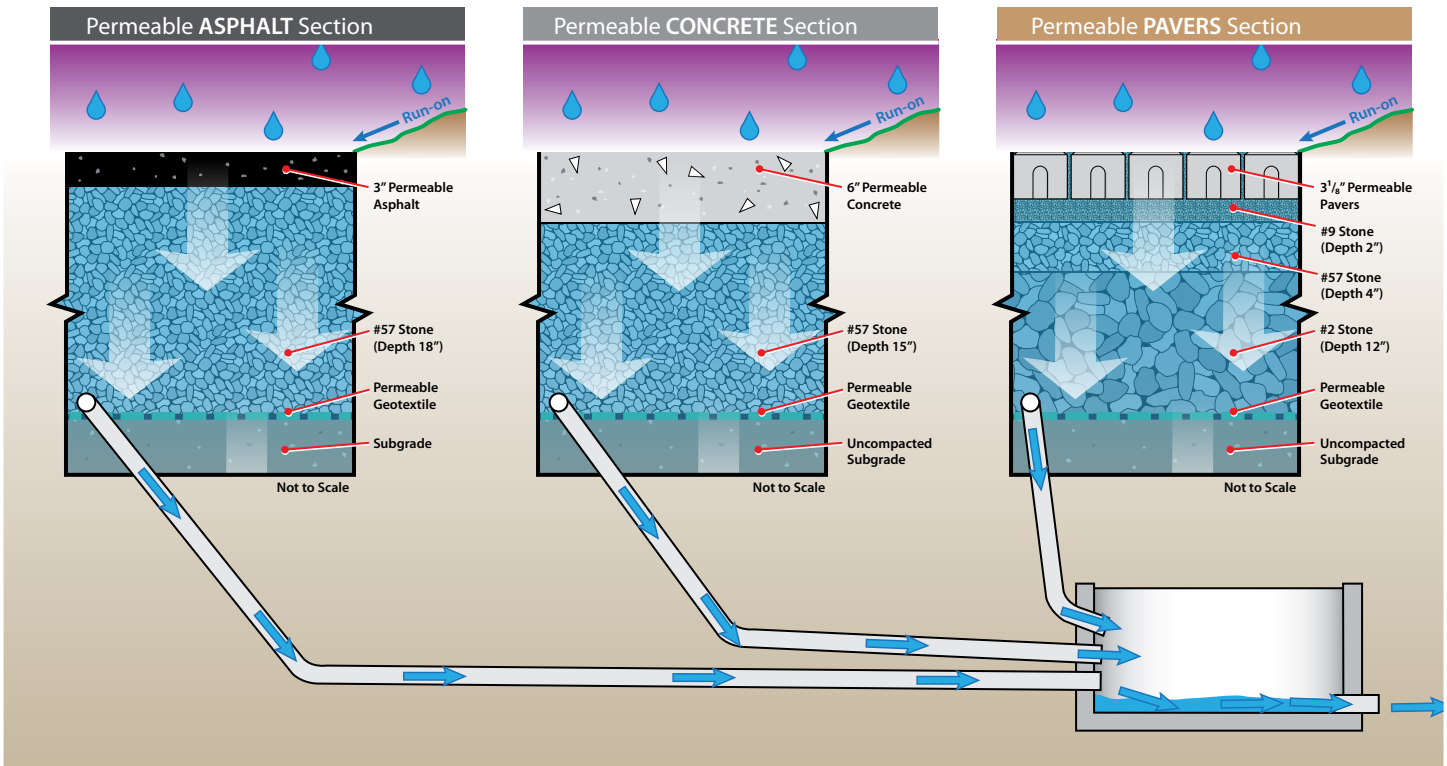
are often the preferred system where space is at a premium; they can also help avoid potential liability associated with retention and detention ponds that are open bodies of water in areas where children and adults may be present. The Wisconsin DNR has developed technical standards for permeable pavers and will continually update the standard as test information from the test plot gains data to support the technology's performance.

"Without technical standards in place, engineers often hesitate to specify permeable pavers, even in cases when they may otherwise be the best option for a particular project," comments Bob Roehrig, an architectural sales representative at County Materials and one of the driving forces behind the project.



New permeable pavement standards for the state have been established by the Wisconsin Department of Natural Resources.

Madison, Wisconsin
Permeable Paver Test Plot Project



The test plot includes three cells, one for **permeable pavers**, one for **permeable concrete** and one for **permeable asphalt**. Data from the test plot will evaluate the presence of total suspended solids in storm water runoff, removal of phosphorous, water temperatures and salt use requirements.

(Continued from previous page)

Roehrig also serves on the Wisconsin DNR’s Standards Oversight Council to represent permeable pavers. He notes the importance of obtaining data from the test plot to ensure engineers have up-to-date standards for viable storm water management options.

Data from the test plot will help alleviate this problem. “One of the keys to doing these technical standards is having good data,” says Roger Bannerman, an environmental specialist with the Wisconsin DNR and member of the Standards Committee for permeable pavers. Road salt has become a serious issue for Wisconsin’s environmental quality, Bannerman adds. “Permeable pavers can significantly reduce the amount of salt that ends up in the water supply – some say by up to 70%. (Having standards in place) will make it easier for people to use permeable pavers.”

Bannerman says the results gained will prove invaluable in the future. “A standard like this is a living document. New research will often change our recommendations. Every time we improve them it makes them easier to implement. The bottom line is to do the most cost effective thing possible and make sure we spend our money wisely in Wisconsin.” The data is also likely to affect best practice recommendations in other areas of the country and the world, says Bannerman.

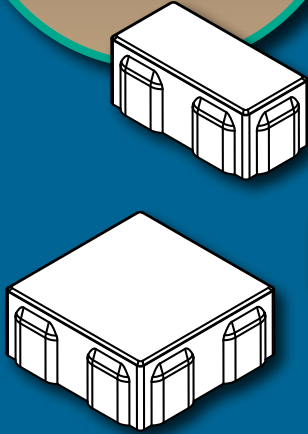
County Materials has been instrumental in identifying additional supporting partners, including manufacturers, engineers and contractors. The overall cost of the test plot for the first two years was approximately \$640,000. Funding sources include the Wisconsin DNR, Wisconsin DOT, US Geological Survey, Oldcastle, Unilock and County Materials.

The test plot is processing rain events, with initial results coming in by late summer. Per project requirements, test data will be collected for up to two years, or approximately 18-21 storms, to validate information studied by the USGS and WDNR.



For more information call (800) 242-7733
www.countymaterials.com

Keshena, Wisconsin Residence Permeable Paver Project



- *Permeable Pavers can make for an easier permitting process in areas that limit impermeable surfaces by preventing erosion*
- *Base materials in a permeable paver system act as natural filters by capturing many harmful pollutants in runoff*
- *Permeable pavers withstand northern freeze/thaw climates and are easy to maintain*

Natural Filtration and Stability for Keshena, Wisconsin Lakeshore Property

When Walter and Cathy Ratschan asked Angie Schneider, co-owner of Schneider & Sons Landscaping in Cecil, Wisconsin, to install a durable, level surface near their garage to use as a basketball court and parking area, Schneider knew right away that Menominee County officials would not allow traditional asphalt or concrete for this improvement. Lakeshore zoning regulations limit the amount of impermeable surface on lakeshore lots, and the Ratschan's lake home on Blacksmith Lake, near Keshena, had already met its quota.

As a result, Schneider proposed a new idea: permeable concrete pavers. Her crew, consisting of her husband and business partner John, son Johnathan, and crew members, had successfully installed permeable concrete pavers on smaller projects. They wanted to bolster their expertise with a bigger project. "The Ratschan's were initially skeptical," Schneider says, "but they were very happy with our previous work on their property, so they trusted my judgment."

Navigating the Permitting Process

The Ratschan's asked Schneider to guide the project through the permitting process, which was even easier than Schneider expected. "Menominee County officials loved the idea," says Schneider, "(Concrete

permeable pavers were) a shoe-in right away. They wanted a larger low-impact improvement project to help educate and demonstrate success to potential permittees, and the Ratschan's permeable paver project fit the bill perfectly."

Schneider handled all of the correspondence with Menominee County and easily obtained the permits to begin work. With a plan for the 1,200-square-foot driveway and basketball court started and permits in place, Schneider then had to iron out all of the details. One challenge that required a creative solution was to accommodate the considerable elevation changes on the site.

"Initially, my crew was a little leery about using the pavers on such a challenging grading plan," Schneider says, "but once they started laying it all out and fine-tuning the base material, they knew it was definitely doable."

Reducing Runoff

Normally, building permits from zoning departments in lakeshore areas are not so easily obtained. But Menominee County was quick to give the green light on the Ratschan's project because permeable pavers keep much of the storm water runoff on-site. When storm water leaves quickly – as it does on projects with lots of impermeable surface area – it carries sediment and other harmful pollutants into the receiving waterway.

Keshena, Wisconsin Residence Permeable Paver Project

It also greatly increases the chances of this waterway flooding.

Schneider and her crew received supporting data and installation information from County Materials, the manufacturer of the H₂O Pro Pavers® used on the Ratschan's new driveway. H₂O Pro Pavers allow storm water to seep through the open-graded aggregate placed between the pavers. These pavers are set on a non-compacted bedding course, then compacted into it. These are on top of two layers of open-graded base materials with no silts, clays, or other "fine" materials. The void spaces in the open-graded aggregate allow storm water to flow into the base, where it seeps safely into the sub-grade soil.

The base and sub-grade layers act as natural filters by capturing many harmful pollutants contained in storm water runoff. In order to ensure that the filtrated storm water did not build up in the sub-grade adjacent to the Ratschan's residence, Schneider installed drain tile to carry any excess water to a nearby vegetated area.

This lake-friendly construction technology reduces the peak storm water runoff flow rate to the lake and improves the quality of the storm water. It also drastically reduces unsightly ponding on the property. The base below permeable pavers acts as a temporary storage area that gives the runoff ample time to seep into the ground out of sight.

Erosion Control

In addition to her reputable work at lakeshore residences, Schneider and her crew also helped the Department of Natural Resources complete many erosion control projects along northern Wisconsin waterways. Her crew has installed several shoreline stabilization products, ranging from the older, basic riprap projects to newer, vegetated matting and geogrid products.

Schneider says she enjoys working on permeable pavers systems because they accomplish a similar goal: preventing soil from eroding into waterways. "When runoff is allowed to soak into the subgrade at low velocities, it greatly reduces the potential for gullies and washouts on people's lawns and landscaped areas," says Schneider. "Once people start to realize how much yard maintenance and work permeable paver systems can help avoid, the popularity of this technology is going to skyrocket."

As the popularity of permeable paver systems on lakeshore properties increases, the need for government-funded shoreline stabilization measures will likely decrease, due to the decreased volume and velocity of runoff from these waterfront lots. Therefore, permeable improvements can not only benefit individual property owners, but taxpayers in general.

Long-Term Solution

Despite the significant elevation changes at the Ratschan's lake home, Schneider says that with a little bit of planning, the permeable pavers were a good fit for this challenging terrain. Once all the pavers were installed, the Ratschan's were "absolutely satisfied" with the finished product, especially how County Materials' H₂O Pro Pavers fulfilled three important requirements. Now, their driveway surface is durable enough to handle typical car traffic, level enough to play basketball on, and permeable enough to obtain lakeshore improvement permits from Menominee County.

Permeable concrete pavers also withstand harsh northern Wisconsin winters, and have been in service for years in freezing climates, including Canada and northern United States. Schneider says that permeable paver systems are actually easier to maintain than asphalt or other surfaces, because if needed, individual pavers can be very easily replaced or reset.



For more information call (800) 242-7733
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Village of Egg Harbor, Wisconsin Parking Lot Permeable Paver Project



- *Permeable Pavers help to prevent animal waste and other contaminants from running into the lake*
- *Government backed programs help to fund projects that restore and protect fragile shorelines and aquatic ecosystems*
- *Recreational use has increased due to the enhanced aesthetics and functionality of the area since permeable pavers were installed*

Beach Park: Beach & Boat Trailer Parking Lot Improvement Project

Beaches typically attract families and people of all ages looking to relax or enjoy water activities. However, Beach Park in the Village of Egg Harbor, Wisconsin, was challenged by a different group of visitors – the feathered variety. As geese and seagulls flocked to the beach’s sandy shoreline, the sensitive bay was threatened by E. coli contamination.

The Village of Egg Harbor is a small resort community located in Northeast Wisconsin on the Door Peninsula between the waters of Green Bay and Lake Michigan. In 2008, the village undertook a major improvement project at Beach Park and its adjoining boat trailer parking lot.

“We worked with Door County to construct detention basins that would intercept storm water runoff carrying bird feces or other pollutants before it reached the lake,” said Josh VanLieshout, Village Administrator for Egg Harbor.

As this solution worked to protect their water resource and clean up the beach, the number of visitors increased. However, the available asphalt parking areas could not accommodate increased beach activity. With

its location on a bluff, the site also presented topographical issues for additional parking. Purchasing additional land was not feasible because costs were close to \$10,000 per sq. ft.

“The only way for us to meet our site constraints, real estate limitations and reduce runoff, was to use permeable pavers,” said VanLieshout.

The existing asphalt parking area was replaced by 55,250 concrete H₂O Pro Pavers® from County Materials. More than 13,000 sq. ft. was installed in a herringbone pattern in slightly under two months, from April through May 2011.

Edgewater Landscaping, contractor for the project, followed typical permeable paver installation guidelines recommended by County Materials. Sub-base materials consist of a 6” layer of 2-3” aggregate.

Another 4” layer of washed ¾-1” open-graded aggregate was applied. Bedding course material is comprised of washed ⅜” open-graded aggregate installed 2” deep. No geotextile fabric was utilized in the project.

Village of Egg Harbor, Wisconsin Parking Lot Permeable Paver Project



Not only do the permeable pavers offer an aesthetically pleasing alternative, they afforded more parking and accommodate slow moving park traffic and pedestrians. They also effectively slow stormwater runoff from the bluff and filter it before it reaches the Bay.

“We expanded our parking lot by 20 stalls, which nearly doubled our capacity from before,” according to VanLieshout. “It has been a very cost effective option for us and it’s well received by the community.”

To help fund the project, the Village of Egg Harbor applied for and received a \$138,000 grant through the U.S. Fish & Wildlife Service’s Great Lakes Restoration Initiative. The grant, which covered nearly 81 percent of the project’s cost, is a federal basin-wide effort to restore and protect the Great Lakes ecosystem.



According to Tom Kispert, civil engineer with McMahon Associates in Neenah, Wis., and village engineer for Egg Harbor, project members had considered alternative design approaches, such as pervious concrete, asphalt and grass pavers, prior to beginning.

“As we thought about how the area would be used and the volume of traffic that could result, permeable pavers were the best option for this project,” explained Kispert, who added that he is pleased with their look and texture.

“They are also working just fine,” he said.

Despite frequent and heavy spring rainfalls that loosened only small amounts of surface jointing aggregates, the permeable pavers are performing as expected. Kispert said the project’s performance will continue to be monitored, and the Village will periodically observe the area to determine maintenance requirements.



“We have had no puddling or problems with wheel tracking. The advantage of this system, should there ever be a cracked or damaged paver, is that you just pull it out and replace it,” Kispert said.

Beach attendance has grown since the project was completed. Visitors have commented on how attractive the parking area is, likening it to a beach patio.

Because of this successful project, VanLieshout says that additional applications for H₂O Pro Pavers® are being incorporated in terrace installations and other areas throughout the Village.



As a result of their stewardship and engaged efforts to promote water quality, the Village of Egg Harbor was awarded a Water Star Community designation by the UW-Extension in the spring of 2011. The award recognizes efforts to improve surface, ground and recreational waters.



For more information call (800) 242-7733
www.countymaterials.com



H₂O Pro Pavers®

PERMEABLE PAVING UNITS

- Permeable Pavers make it possible to comply with zoning regulations that limit impervious surface areas on lake developments
- Because of their inherent durability, concrete permeable pavers provide a structurally sound, reliable and low-maintenance surface for patios and driveways
- Permeable pavers eliminate surface puddling and runoff into adjoining water bodies, while enhancing natural filtration of storm water into the soil

Isanti, Minnesota Residence Permeable Paver Project



Lakeshore Improvements: Permeable Pavers Offer Storm Water Management, Beautify MN Lake House

An Opportunity in Foreclosure

Jason and Shelly Dailey knew that it was the perfect time to make their dream come true: a weekend getaway home on one of Minnesota's 10,000+ beautiful lakes. They found an opportunity in a small existing lake house under foreclosure on Long Lake in Isanti County, about an hour north of the Twin Cities. The Daileys saw great potential in the property, but discovered the Developer's Paradox: plenty of improvements to be made without any room for making them.

"We knew that we could raze the existing structure and build a new one within the footprint of the old one," Shelly says, "and we wanted to give this lake house everything it needs for it to be a home away from home." Their new lake house would expand up, not out, with two stories that would contain everything they wanted. The catch was Isanti County Zoning Department's regulation of allowing no more than 25 percent impervious surface areas on any lake development. The existing structure on the Dailey's property alone covered 25 percent of the property, and they would still need a driveway and a patio.

The Daileys knew the intent of Isanti County's regulation is to reduce the amount of stormwater runoff from hard surfaces flowing

straight into the lake. "One of the reasons that Long Lake appealed to us was Isanti County's obvious concern for water quality on their lakes," Shelly notes. "We knew there must be a way for us to build the lake house we wanted while helping Isanti County achieve its goals."

Two Problems: One Solution

Jason and Shelly consulted a seasoned veteran for advice. Jim Wanserski, the Dailey's landscaping contractor—and Shelly's father—proposed a solution to the 25 percent impervious area conundrum: install permeable pavers for the driveway and patio that allow stormwater to flow between their joints and into the soil, rather than run off directly into the lake or form a pool in the yard. Jason and Shelly approached Isanti County with this idea very early—before the purchase of the property was finalized in fact—in order to ensure that everyone was open to the idea of a permeable paver driveway and patio. Isanti County officials were intrigued by the idea, but needed evidence that this plan would meet their goal of reducing the amount of stormwater runoff from lakeshore lots.

Fortunately, Wanserski, who is also the developer of the Vistas at Greenwood Hills in Wausau, WI, worked closely with a reputable permeable paver supplier, County Materials, headquartered in Marathon, WI.



Isanti, Minnesota Residence Permeable Paver Project

Green by Design

Wanserski and County Materials formulated a design that achieved two goals: (1) infiltrate stormwater through the paver system and (2) provide a structurally sound, reliable, low-maintenance durable surface for the Dailey's new lake house patio and driveway. The concept seems simple enough: allow rainwater to flow between the pavers through permeable material and into the ground. The execution of this idea, though, takes more forethought and planning.

County Materials suggested that Wanserski use H₂O Pro Pavers®, concrete paving units that have extended tabs around the perimeter of each paver creating proper spacing necessary to allow for permeable joint material ($\frac{3}{8}$ " open-graded aggregate) between them. Utilizing construction details provided by County Materials, Wanserski finalized the design for the proposed permeable driveway and patio and went with Jason and Shelly to meet with Isanti County's zoning personnel prior to starting the project.

Jason and Shelly went into the permitting process armed with the knowledge and experience of Wanserski and County Materials, which proved to be essential in assuring Isanti County that the design would meet their requirements and the permeable paver system would function as designed.

Wanserski and County Materials designed the permeable pavement with a sub-base course layer of 2-3" open-graded aggregate (with no fines) under a 4" thick base course layer of smaller open-graded aggregate ($\frac{3}{4}$ -1" stone). A 2" thick bedding layer of $\frac{3}{8}$ " open-graded aggregate was the last step before the pavers were put into place. Wanserski ensured that all of these layers were leveled and compacted to minimize the potential for settling. The pavers form an aesthetically-pleasing geometric pattern on top of the bedding with additional bedding material dispersed and swept into the paver perimeter joints. The Dailey's also chose to install drintile in the sub-base course layer, which carries the water away from the pavement, preventing potential ponding in the yard or driveway.

"Isanti County was very happy to allow us to make improvements to our lakefront property while minimizing the adverse effects of development on the lake," says Shelly. "The permitting process went about as smoothly as it can go because the County knew we sincerely valued the water quality of the lake."

By sending the stormwater runoff through the various layers of base course, the permeable paver system acts as a natural filter for the runoff, effectively reducing the amount of pollutants in the water and reducing the negative impact that stormwater has on the lake water and groundwater. This system also reduces the peak flow rate of runoff from the site. The paver system allows the water to infiltrate into the ground and provides a storage system in the layers of open-

graded aggregate below the pavers where it is detained during and after the rainstorm, to be released at a slower flow rate into the ground and through the drintile.

Wanserski's experience with installing permeable pavers on previous projects, and his close working relationship with County Materials, helped ensure that the permitting process was followed by a smooth installation schedule. Wanserski and his landscaping crew installed all of the drintile, base material and 1,400 square feet of H₂O Pro Pavers® for the

driveway and patio in approximately 2 days.

Maintenance-Free Beauty and Value

The natural earth tone colors of the pavers are a welcoming feature of the lake home. "We never really thought that a driveway could be something we would enjoy looking at, but we love the eye-catching layout and natural colors," Shelly said. "We feel that the simple patterns of pavers give our lake house a unique charm, adding value to the property."

The pavers were installed in 2010 and have survived Midwest winters with very little maintenance. When asked what advice they would offer to other lakeshore landowners considering installing permeable paver systems, Shelly said, "Bringing someone on board who knows exactly what they're doing is absolutely essential."

For more information about permeable pavers, including residential, commercial and municipal applications, contact County Materials at (800) 289-2569 or www.countymaterials.com.



For more information call (800) 242-7733
www.countymaterials.com



PERMEABLE PAVING UNITS

City of Dubuque, Iowa Green Alley Ways Permeable Paver Project

- Permeable paver systems installed in green alley ways are expected to reduce storm water runoff by 80%.
- Concrete permeable pavers were selected over alternative options because of their durability, performance and natural beauty.
- Mechanical installation costs for these permeable paver projects in Dubuque are under \$4 per square foot.



Permeable Pavers “Best Bang for the Buck” in Green Alley Reconstruction

The City of Dubuque’s Green Alley Project is an infrastructure improvement project focusing on storm water runoff reduction. Between 1999 and 2011, Dubuque, IA was the site of six flood-related Presidential Disaster Declarations with total damages nearing the \$70 million mark. In response to these repeated disasters, funding was secured to resurface approximately 240 alleys in the Bee Branch watershed with permeable pavement. The project is expected to reduce runoff in the watershed by 80% and help protect water quality in the Mississippi River. The Green Alleys project is phase 6 of a 12-phase flood mitigation effort currently under way in the watershed.

Because of their superior durability and aesthetic appeal, concrete permeable pavers were chosen over alternative pervious pavement options for the alley renovation. County Materials Corporation is supplying the majority of the pavers for the project. “We like the durability, and we like the look of them,” comments city engineer Jon Dienst of the 4” x 8” H₂O Pro Pavers®, adding that the uniformity of the units also makes them ideal for mechanical installation.

On a project of this scope, that is no small concern. Three local contractors are involved in the installation, each typically laying well over 3,000 units per day. The pavers can be laid one layer at a time, with a typical pallet of 8 layers taking just 6-7 minutes to install. This helps the project progress at an optimum rate. County Materials has stepped up to the challenge of keeping ahead of the contractors’ needs by maintaining careful communication between dispatchers, plant foremen and contractors. “They are installing a significant amount of pavers to meet project goals,” says County Materials’ sales representative Jon Schroetke. “It’s our job to make sure we are delivering what they need within a realistic, quick time frame.”

The base materials used for the project are larger gravel size than typical sandset paver applications. The larger sized stone is less labor intensive to vibrate in, and easier to maintain. It is also far more cost effective for the city. Instead of paying for 1/4” granite chip at \$200-300 per ton, the City of Dubuque is able to use 3/8” clean limestone gravel at just \$18-20 per ton. This results in a mechanical installed price of under \$4 per square foot. “(The pavers) are the best bang for the

**City of Dubuque, Iowa Green Alley Ways
Permeable Paver Project**



buck. They're consistent. It's easier to remove debris out of these paver joints," says Dienst. "And they're cost effective, so we're not overly burdening the citizens of Dubuque," he adds, referring to the property assessment that is supplementing funding for the project.

As an added bonus to citizens, the pavers help extend seasonal access to the alleys. Like most Midwestern cities, Dubuque does not plow its alleys. The pavers eliminate water puddles and freezing in winter. Therefore they keep the alleys far more clear of snow than traditional paving, and minimize water accumulation in the spring.

At first, the City's engineering department fielded some pushback about the assessment for alley reconstruction. However, as residents watched the transformation happening in their alleys, the nature of the phone calls changed. Now, people are calling up and asking whether their alleys are next. The City is using the popularity of the alleys to help educate the public about watershed best practices.

Despite the speed at which the work is progressing, the Green Alleys project is a long-term endeavor. Twenty-three alleys were completed in 2014 with another 50 scheduled for 2015 and 2016. Reconstruction of the remaining alleys in the Bee Branch Watershed is scheduled to take place between 2024 and 2038. However, the City of Dubuque may not stop there. "At some point," says Dienst, "we'd like to extend to areas outside the Bee Branch watershed. We expect other areas of city will also want their alleys redone."



For more information call (800) 242-7733
www.countymaterials.com



Menasha, Wisconsin Residence Permeable Paver Project

- This homeowner complied with DNR regulations governing waterfront development by installing a permeable paver driveway.
- Permeable pavers easily withstand pedestrian and light vehicular traffic.
- Snow and ice removal are reduced because permeable pavers speed up the melting process in winter conditions.



Permeable Pavers Earn National Acclaim in Residential Driveway Project

Permeable pavers are increasingly gaining the attention of media, builders and property owners alike because of growing efforts to effectively manage storm water in municipalities and watershed districts across the country. Permeable pavers not only help reduce runoff and maintain water quality through their functionality, but – as one residential project demonstrates – they prove that aesthetic appeal need not be sacrificed to achieve environmental responsibility.

Set back 90 feet from Lake Winnebago, one of Wisconsin's largest inland lakes, the residential site on Firelane Rd. in Menasha, WI offered its owners the opportunity to build their dream retirement home in an ideal setting. However, its proximity to the lake also presented challenges in meeting DNR regulations governing waterfront development. There was not enough square footage left after the home was built to create a typical impervious concrete or asphalt driveway long or wide enough to meet the occupants' needs, without violating DNR regulations.

Determined to keep their driveway the desired size, the owners set out to find a landscape contractor experienced in working with permeable paver surfaces. A friend of the couple recommended Stumpf Creative

Landscapes of Menasha, a local landscaping company that had completed a few similar projects. Wise selection and creative use of materials resulted in a nationally recognized, award-winning permeable paver driveway that meets environmental requirements while delivering exceptional aesthetic value.

A winning combination of beauty and function

Proper drainage installation was a primary concern to minimize storm water runoff into the adjacent lake and maintain water quality. Together, the contractor and homeowners chose County Materials' H₂O Pro Pavers® for the driveway project. At 3¹/₈" thick, the durable permeable concrete units are manufactured to withstand pedestrian and light vehicular traffic, while their installation system allows rainwater to percolate into the ground. The system also reduces snow and ice removal by speeding up the melting process in winter conditions.

The crew excavated a deep base to create a stone reservoir without fines to effectively filter storm water. The base layers were made with 12" of 2-3" clear stone on the bottom, topped with 12" of ¾" clear stone, and an additional 1-2" of smaller stone on top. The crew also installed a drain tile system to prevent backup. During rain or snow melt, the area under

Menasha, Wisconsin Residence Permeable Paver Project

the drive will fill with water, then disperse slowly through the tile system. In the process, the stone removes impurities and sediments that could compromise lake water quality.

All three sizes of H₂O Pro Pavers were used for the main field of the driveway in a 75/25 percent blend of buff and solid cream colors. Combining the two different colors on site required careful consideration of placement to create a harmonious, uniform effect. The 4" x 8" size of H₂O Pro Paver was used to create an eye-catching double border that consists of dark brown sailor course on the inside, edged with a soldier course of the same cream color used in the drive. The paver colors blend beautifully with the home's siding, brick and trim.

A matching walkway curves gracefully from the drive to the front door, ending in a decorative partial circle to define the entryway. The job took the two-man crew one day's worth of cutting during the single week spent installing the project in order to be sure everything lined up square and even. Landscaping beds were also added as part of the project. Limestone boulders provide a decorative accent that helps transition the hardscape with the surrounding areas.

Award-winning results

The Firelane Rd. driveway project successfully meets permeability standards, while at the same time delighting the homeowner with its function and beauty. The project has captured national attention as well.

The driveway was recognized as a winning project in a number of regional and national hardscape award competitions, including: the 2015 WMA EIH Awards, the 2015 HNA Awards, and the 2016 NCMA/ICPI Concrete Masonry Design Awards of Excellence. It also appeared as the subject of a full length feature in the national trade magazine Turf Design Build, along with numerous other media mentions.



For more information call (800) 242-7733
www.countymaterials.com



PERMEABLE PAVING UNITS

Delafield, Wisconsin Residence Permeable Paver Project

- Permeable pavers offer a reliable, low maintenance solution for onsite storm water management.
- Proper installation of base materials is important to ensure the performance of a permeable paver system.
- Sediment and impurities found in storm water runoff are naturally filtered through aggregates in a permeable paver system to help preserve ground and lake water quality.



Permeable Pavers Offer Attractive Driveway Solution for Lakeshore Home

An extensive home remodel is a significant investment. After purchasing a home on the south shore of Lake Nagawicka in Delafield, WI, the owners remodeled it to their liking. After investing in the home renovation, the owners worried their driveway design increased the potential for water damage. The original drive was constructed as a 400 ft. long, 4,000 sq. ft. asphalt driveway with a significant slope towards the house. Not wanting to risk water damage to the home in the event of heavy runoff, the owners chose to replace it with a more pervious surface.

The homeowners were advised that permeable pavers would be the most reliable, low maintenance solution to achieve their goal of storm water runoff management. Permeable pavers also offered onsite storm water filtration, which satisfied DNR requirements for lakeside permeable surfaces. Enhanced aesthetic appeal was an added benefit that impressed the homeowners.

County Materials' H₂O Pro Pavers® in 4" x 8" units were chosen for the project.

The blended gray color of Timeless was perfect for the setting. Pavers were laid in an attractive herringbone pattern, with a border of matching 8" x 8" square pavers.

The natural topography of the driveway proved a challenge because it included several different slopes and angles. "There wasn't one spot where the driveway leveled out," reported landscape designer and installer Josh Tarantino, President of Wendland Landscape Services Inc. While the permeable paver system will alleviate a majority of the runoff, it was important to direct any additional runoff that might occur during a heavy rain away from the house to prevent flooding.

Much care was given to prepare the base materials. Proper foundation design on which the permeable paver system sits is vital. Typical installation guidelines recommend a minimum 6" sub base made up of 2-3" open-graded aggregate topped with a 4" base course of ¾-1" open-graded aggregate. The paving units were installed on the last layer constructed of a 2" bedding

***Delafield, Wisconsin Residence
Permeable Paver Project***

course of $\frac{3}{8}$ " open-graded aggregate. This project called for added attention to the base. Adequate compaction was necessary to withstand vehicle traffic and still be able to let high volumes of water pass through the aggregate.

The finished expansive driveway creates a beautiful look, matching the surrounding area and reminiscent of natural stone. The owners are very pleased with the final result and consider the permeable pavers well worth the investment because of the runoff protection the system provides their home.



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