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FALL 2016

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C O N T E N T S

Everyone uses aggregate. Every day.

Before I joined OSSGA a few months ago, I did not give this industry much thought. Nor did I have any appreciation of just how extensive an impact aggregate has on everyone's daily life. Generally speaking, unless you happen to live near a gravel pit or a quarry, our industry does not occupy a lot of "mindshare" among the general public.

But regardless of where we work, live or play, every one of us is a consumer of our industry's output. Aggregate is used to build the roads we drive on, the houses and buildings we live in, and the hospitals where we care for our sick and injured.

Secondly, just like food, where we choose to source the aggregate that builds our communities has consequences. Trucking gravel from long distances is expensive – both in terms of money and greenhouse gas emissions as well as wear and tear on roadways. Every extra kilometre of transportation is a cost to the end user and also to society. Although senior levels of government generally concur with this idea, our challenge is to ensure that the close-to-market principle is upheld in policy, legislation and the regulations that follow.

Thirdly, demand for high-quality aggregate is growing, and new sources will be needed. This is particularly true in the southern part of the province. We are in the middle of an era of infrastructure renewal. At the same time, we are seeing a huge increase in the construction of *new* infrastructure to meet the needs of a growing population.

To meet this demand, and to pursue the principle of close-to-market sourcing, local aggregate pits and quarries are the responsible answer. Supply needs to be close-to-market, so it is vital that producers and communities work together to ensure a balanced approach to meeting the aggregate needs of Ontarians.

Fourthly, because of misleading information, we often take a bad rap for a lot of things that are unwarranted. The evidence is indisputable: the aggregate industry is safe, clean and environmentally responsible. We should not step back from stating that in plain language. Pits and quarries do not harm water quality or quantity. No chemicals are used in processing aggregate. Operators work hard to protect wildlife and species at risk, and they are subject to a number of approvals before a site is even licensed to operate – a process that can take several years.

Finally, we work with the communities where we do business to be good corporate citizens. Operators work diligently with local communities to minimize dust, noise and visual distractions on-site. Progressive and final rehabilitation is the law, and producers are committed to enhancing biodiversity and innovative after-uses of aggregate sites.

The aggregate industry works together with government and the public to build strong communities from the ground up. And we need to keep shouting that message from the rooftops.

Norman Cheesman, OSSGA

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Creating the perfect field

By Sarah B. Hood

An ambitious agricultural rehabilitation project explores just how far the industry can go in reclaiming fertile soil

In *A Sand County Almanac*, a pioneering 1949 book about land conservation, author Aldo Leopold wrote of returning the land to the "healing care of the grasses." It is a phrase that resonated with landscape architect Glenn Harrington, president of Harrington McAvan Ltd., and has stayed with him over the years.

It is also a credo demonstrated in an ambitious, multi-year agricultural rehabilitation research project that Harrington is currently involved in: the rehabilitation of CBM Aggregates' Lakefield Pit site in Smith Township, Peterborough County, near Lakefield, Ontario.

Given earlier work on the site, the project has been a challenging endeavour. "This is a very old site (and) in the old days, the saying was that, 'You make your first dollar selling your topsoil,'" says Harrington. "There are a lot of these sites around the province that have no topsoil, and that's a problem for everyone."

This is what had taken place at the 190-acre (77 hectare) Lakefield site after it opened in 1950, followed by extensive extraction. "When we took over the gravel pit (in 2005), the area of our 22-acre agricultural project had been extracted fully to the bedrock. There was nothing there but the exposed bedrock and overburden piles," says Mike Le Breton, land and resource manager for CBM Aggregates (Eastern Region).

Rehabilitating a site for wildlife habitat normally requires a relatively short process of applying new topsoil and then sowing it with cover crops. But building up a level of soil nutrition adequate for profitable agricultural use is a much longer-term proposition. On the Lakefield site – parts of which are still active – the goal is to produce fertile agricultural soil at an accelerated rate.

It's a bold rehabilitation project, and the process is being recorded at every step to offer a case study for the rest of the industry. "When we started the project, it was something we wanted to document," notes Le Breton. "It's important to us to have this process documented because we want to take those lessons learned and develop best management practices that we can use when we complete agricultural rehabilitation in other places."

While the area had already been restored to a level that could accommodate recreational use in 2006-2007, the current aim is to take things much further. "That was fine – we met the site plan requirements," says Le Breton of the initial rehabilitation. "Then our president John Moroz went for a drive back into the area where we had done the rehabilitation, and he challenged us. We were dealing with extremely poor soil conditions, and he said, 'I'd like you to take the area you rehabilitated and make it as productive a farm field as the field beside it that has never been extracted."

As testing revealed, the soil on the site was still poor in nutrients and showed a high pH level. "John challenged us (to convert) the worst-case site conditions… into something stellar," Le Breton says.

TAKING ACTION

Le Breton was tasked with managing the project, and he began by creating a team that included Harrington, who contributes an extensive knowledge of soil chemistry, and tenant farmer Mel Thomas, who brings practical knowledge in farming field crops like corn, soy and hay. "We had full support from senior management to bring in people with expertise in doing this work," says Le Breton. "The partnership is key to this. They provided ideas and we helped guide the process."

In the fall of 2012, the team held initial discussions and site meetings, and they collected soil samples in order to plan the action to be taken. "When we got our initial results, we found that the soil had just above zero organic matter. We knew we had to increase the organic matter and bring down the pH, and the fastest way to do that is to apply manure," says Le Breton.

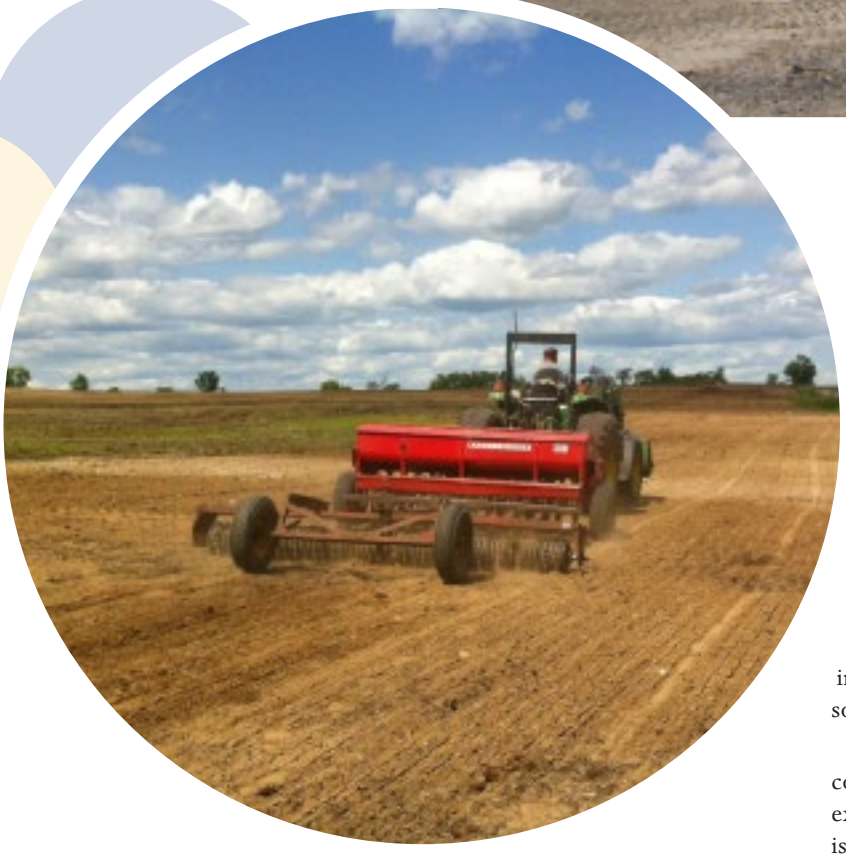
In June 2013, the first 100 tonnes of manure were ploughed

into the field, followed by planting a cover crop of buckwheat. Soil sampling that September showed improvement, so an additional 500 tonnes of manure were applied in May 2014. A vertical tillage technique was used to distribute manure to the top four inches of soil, and in some parts where test strips were used for comparison the area was seeded over with oats and red clover.

Each cover crop was chosen for its particular strengths in enhancing the soil. For instance, clover can be used to adjust nitrogen concentrations. The crops were not harvested at the end of each year, but instead ploughed back into the ground to return nutrients and organic matter to the soil. "When the pH is at a better level, then nutrients in the soil are more available to the plants, and the solution to that is the organic matter," says Harrington.

BEFORE

The goal of the current Lakefield rehabilitation project is to take an already rehabilitated field with poor soil and turn it into a field as fertile and productive as a farm field that has never been extracted



Continual soil enhancement and measurement techniques were employed throughout the project. In 2015, a test crop of soybeans was planted in both the site being rehabilitated and the neighbouring farm field. "We planted the same soybeans at the same rate and used the same amount of fertilizer," says Le Breton. "In November, after two years of soil management, we had a 70 per cent yield compared to the control field."

"To get 70 per cent of what the next field yields in two years – that's amazing," Harrington says. "In some areas of the site, the yields were the same."

Most rehabilitation projects are generally completed throughout the course of a single extraction season. The Lakefield project, however, is long-term, allowing participants to actually experience the change in soil quality, which has been gratifying for everyone involved. "We've done agricultural rehabilitation in the past, and it's been successful. But to be able to really dig into it, to see the science and change over time – to me it's been very rewarding," says Le Breton.

Harrington believes that aggregate companies can play an important role in creating arable farmland, even so far as engineering a perfectly shaped field. "One of the advantages that the aggregate

The Lakefield project is long-term, allowing participants to actually experience the change in soil quality, which has been gratifying for everyone involved

companies have is the ability to change the shape of the land, and a really good farmer who wants a very good farm does that on their own," he says, noting that Mennonite communities will even "move hills, because they need the land to be more gentle."

Moving forward, the cycle of soil management and measurement will continue. At the end of this year, the plan is to take more soil samples, assess results, and put together the next stage of the soil management plan. Despite the process lasting longer than the norm, it has not cost the company significantly more than other types of rehabilitation, says Le Breton.

For CBM, staying at the forefront of site rehabilitation remains a critical part of its work. "CBM wants to be leaders, we don't want to be followers," says Le Breton. "Projects such as the one at our Lakefield Pit give us the knowledge to be able to meet or exceed the evolving rules and regulations that govern our industry."

With the bar being raised each year for the industry, rehabilitation projects like the one at Lakefield will help keep aggregate producers ahead of the curve.

A rare partnership

By Jay Millington

OSSGA teams up with *rare* Eco Centre and other partners to make the centre more accessible to local residents

"Alone we can do so little;
together we can do so much."
-Helen Keller

The best partnerships unite the strengths of all the partners and build upon them in a way that achieves a common, mutually beneficial goal.

That's what happened when *rare* Charitable Research Reserve partnered earlier this year with the Ontario Stone, Sand & Gravel Association (OSSGA), Conestoga College and others. The aim was to expand and enhance its *rare* ECO Centre in Cambridge, Ontario, and thanks to the joint effort, this goal was reached. The *rare* lands are now more accessible to a much larger group of people in the community.

Since 2001, the *rare* Charitable Research Reserve has put its energy into preserving the landscape of the area for its ecological value. The *rare* ECO Centre provides an opportunity for graduate students to conduct environmental research and for children and their families to experience nature.

A lack of parking space, however, limited the number of school groups that could visit the Reserve and explore the lands on both sides of Blair Road.

The collaborative project included adding 42 new parking spots, providing more accessibility to the centre for local residents

Now, with the recent expansion of the centre, 42 new parking spots have been added as well as a space for school buses to safely turn around, making it much easier to accommodate visits by school children.

The project wasn't all about parking, however. The greater purpose of the centre is to help people experience and learn about nature by making nature accessible to everyone. So in addition to expanding one of the parking lots and building another one on the opposite side of the road, a new trail was also added, while another trail was improved.

rare's River Trail was widened and levelled with limestone screenings to make it fully accessible, and a new trail called the Springbank Trail was blazed through the forest across the road. The Springbank Trail is approximately 400 metres long and runs from the new parking lot to North House, a solar-powered home at the Springbank agricultural facility. It is a great new addition to the eight kilometres of trails on the 913 acres that *rare* manages. All of the trails on the property are open to the public from dawn until dusk at no charge.

GETTING STARTED

How does a joint project like this get off the ground? Well, since *rare* is a not-for-profit organization, their funding model made it nearly impossible for them to tackle a project of this scope on their own. As a result, Stephanie Sobek-Swant, the executive director of *rare,* approached the OSSGA Waterloo-Wellington-Brant Regional Committee to ask their members if they would be willing to help out in any way.

Minister of Natural Resources and Forestry, Hon. Kathryn McGarry, and Sure Foxton, Mayor of the Township of North Dumfries, participated in the ribbon cutting ceremony for the new Springbank Trail

OSSGA members donated all the aggregate material needed for the project, which included adding a new trail and improving an existing one

Discussions led to a number of OSSGA members agreeing to donate all of the aggregate material needed for the project. Knowing that labour costs could get expensive, the idea was then hatched to extend the partnership and create a greater mutual benefit in the process.

Nearby, Conestoga College runs a Heavy Equipment Operator program, and it was determined that working on the project could provide valuable practical experience for its students. Faculty and students agreed. "It's amazing that we can all come together and do a project like this," says Anita Hodder, a student in the program. "It's awesome because it's realistic. When we're done, it's going to be amazing because we can drive by and say, 'I was a part of that.'"

"They're getting an education on what the real world is like, rather than a classroom or a controlled situation," adds Paul Pacheco, coordinator and lead faculty for Conestoga College's Heavy Equipment Operator Program. "It's a great benefit for them to be experiencing this."

OSSGA members donated approximately 1,500 tonnes of material for the construction of the trails and parking lots, in an area that happens to be well known for its quality aggregate. Between 23,000 and 10,000 years ago, masses of ice advancing out of the Great Lakes joined to cover southern Ontario. As the ice advanced and retreated, it left different deposits in each region of the province. Along the Speed and Grand River valleys, and in the western half of the Township of North Dumfries, the ice left high quality deposits of sand and gravel. Today, this locally sourced, non-renewable material is used to build roads, schools, and yes, even the new trail and parking lot.

OSSGA members donated approximately 1,500 tonnes of material for the construction of the trails and parking lots

"It's a great partnership between corporate industry, education and not-for-profit," says Roger Oei, senior operating officer for *rare*. "Everyone has been more than willing to help and has given more than I could ever imagine. The individual partners have even gone out and solicited new partners to contribute. It's been phenomenal."

This wonderful project has been a big win for everyone involved. The aggregate industry embraced the opportunity to continue to give back to the community; the students gained valuable real-world experience and created something they can be proud of; *rare* was able to better accommodate and educate visitors; and the local community gained more suitable access to nature.

"It was a unique experience to watch students work on a real-life construction project utilizing the skills they learned at Conestoga College's Heavy Equipment Operator Program. Many of these students may end up working for OSSGA member companies and it was a chance for them to show off what they learned," says George Lourenco, resource manager for Capital Paving. "The *rare* Charitable Research Reserve has done outstanding work in scientific research, education and preservation, and we, as OSSGA member companies, are proud to have been a part of enhancing their facility to expand the number of people who can benefit from their work."

The best partnerships unite the strengths of all the partners and build upon them in a way that achieves a common goal benefitting all involved. That's what happened here.

MY JOB R-O-C-K-S!

The Ontario Stone, Sand & Gravel Association boasts nearly 300 member companies, employing more than 7,000 people whose roles are directly related to the aggregate industry. Each of these people has a unique and interesting story to tell about how they came to work in aggregate! While we can't interview them all, this regular feature highlights the diverse and interesting careers available within the industry, and showcases the people who make a difference to their companies and their communities. Want to learn even more? Visit ossga.com/my_job_rocks

Walker Industries' Shea Gordon does his bit supporting Niagara's exciting building boom

A good neighbour

Q: What is your job title?

A: I am a sales manager for the Niagara Region/West GTA at Walker Aggregates Inc. I'm responsible for aggregate and asphalt sales out of the four Walker quarries and two hot mix asphalt plants in Niagara.

Q: What is it about your job that other people wish they got to do?

A: I work on an excellent team, with great customers, on meaningful projects that make a difference in the community. There is nothing sexy about infrastructure projects, however the citizens of Niagara-on-the-Lake and Welland will benefit from their new waste water treatment facilities, and every municipality in Niagara has undergone some road reconstruction which improves mobility and makes getting around more enjoyable. Material from our quarries has helped facilitate Niagara's housing boom by supporting developments in Grimsby, Beamsville, Vineland, St. Catharines, Niagara Falls and Fort Erie. I am fortunate to be able to travel around the peninsula visiting job sites, our quarries and asphalt plants, as well as customers' offices to ensure everything is running as it should be.

Q: Describe your typical day on the job and how your work contributes to your company.

A: No two days are the same, which is great. My typical duties include talking with customers, ranging from homeowners to homebuilders and road builders about their needs. Those needs can range from one truckload for landscaping to 100,000 tonnes of stone to build a new subdivision in Chippawa or road reconstruction in Niagara Falls, a hospital in St. Catharines, a school in Vineland or a shopping mall in Niagara-on-the-Lake. Relaying sales information to my production team is critical to ensure we are always on top of demand. Walker's commitment to the environment through the Earth 1st Program is always on my mind – making me consider how I can efficiently operate and reduce my impacts. My commitment to safety shines through in communication, team cohesion and planning. Lastly, being a good neighbour and corporate citizen gives me the pride to go about my day with my head high knowing that we are doing our part in growing our communities through education, culture and health via donations and key partnerships.

Q: How did you get interested in this work?

A: I saw a job posting in the newspaper and applied. I had very basic knowledge of what aggregates were and no idea how they were produced. In 2010, I left the tourism industry to work as a customer service representative for Walker Aggregates. I was responsible to look after the "Specialty Product" portfolio of bunker sand, armour stone and agricultural lime, as well as all of our landscape contractors and smaller-sized excavating and paving contractors. I was recently promoted to sales manager Niagara/West GTA.

Q: What sort of education do you have that is relevant to your job?

A: I studied economics at Brock University for two years and received a diploma from Niagara College in sales and marketing. I would say that each institution helped prepare me for the position I am in today. I am continually learning about the products we produce, different production methods and soliciting customer feedback for continued improvement.

SAFETY FIRST

Dee Golnitz of Votorantim Cimentos focuses on keeping everyone safe and sound

Q: What is your job title?

A: My job title is health and safety representative at Votorantim Cimentos – CBM Aggregates division. My job is to manage the health and safety program for the entire CBM Aggregate division. We have approximately 15 active sites. I work with the operations team to ensure that the health and safety policies and procedures are up to date and reviewed on an annual basis. I research current information on safety best practices for the industry and deliver it to our group through various methods such as Tailgate Talks and Safety Meetings. I am on the road travelling from site to site on a regular basis to stay in touch with employees on a face-to-face level, maintaining communication with managers, supervisors and hourly employees to ensure all safety needs are being met at every site.

Q: What is it about your job that other people wish they got to do?

A: I have the opportunity to travel around to different locations throughout east and west Ontario, interacting with many different people and learning something new from all of them. Working with such a dynamic team allows me to complete initiatives within the company. A great example is our e-SLAM program. Originally SLAM (Stop Look Analyze Manage) was a paper job-risk analysis program designed to "identify the hazards existing in workplace activities through a careful observation of the environment around the job task, the equipment involved and required steps of the job task." We have taken it to an entirely new level and gone electronic. Now all our employees don't just SLAM – they e-SLAM! Employees out in the plant can identify risks associated with the jobs they are doing, and the data is tracked and compared site to site. It's an awesome initiative.

Achieving personal goals is also rewarding, for example participating in committees inside and outside of CBM. Becoming engaged one on one with the employees I work with allows me to contribute to the aggregate industry in the field of safety in very different ways, giving me a true feeling of accomplishment. Who wouldn't want to have all that? Going home from work every day feeling pride in what you do, who you do it for, and enjoying being with the people you work with is an amazing feeling. I think this is probably something everyone wishes they had, and I can say I have it.

Q: Describe your typical day on the job and how the work you do contributes to your company.

A: I don't really have a "typical" day on the job – every day is different. Some days might be administrative days where I work on my computer all day, researching, preparing Tailgate Talks or safety meetings, answering emails, making phone calls, reviewing policies, data entry, going to meetings, etc. Other days I might be out

at a site, doing an incident investigation or assisting in a workplace inspection as part of an eye exchange, and no, this is not a medical procedure. It is an opportunity for employees from different sites to go to other sites within CBM and participate in inspections. Having another set of eyes look for hazards at the workplace helps avoid complacency and is a great way to share best practices between sites. At times I may just be doing a site tour, talking with employees, listening to concerns or just engaging in conversation. Anytime I have the opportunity to talk with employees, we can learn from each other and then share our knowledge throughout the company. Sharing knowledge allows us all to contribute to the company in so many different ways. In my opinion, this is the most important contribution I can make to the company.

Q: How did you get interested in this work?

A: During my time spent at Fanshawe College working towards the Human Resources Management Certificate, I took a course in safety. This is what originally sparked my interest in the field. At the time I was working in transportation in the administrative department. Upon completion of my HR certificate, a job in safety was offered to me and I jumped at the opportunity for something new. Once I started, I never looked back. Safety became more than just my job, it became an important part of my life. I took it home with me. It wasn't just about keeping my co-workers safe anymore; it became more about keeping everyone around me safe, especially my family.

Q: Detail your education as it is relevant to your job.

A: I earned a Bachelor of Arts from the University of Western Ontario where I majored in sociology. I have always enjoyed being around people. When my kids were a bit younger, I was working full-time, and I made a decision to continue my education at Fanshawe College through night courses, completing a three-year Human Resources Management Certificate program. Shortly before joining CBM I earned my Certified Registered Safety Professional (CRSP) designation. Now, in order to stay current with whatever changes may come up in safety, I regularly participate in training courses relevant to job tasks that either I or CBM employees are encountering. For example, Working at Heights, Qualitative Fit Test Workshop, Joint Health and Safety Committee (JHSC) Certification, Ministry of Training Colleges and Universities (MTCU) Train-the-Trainer, etc.

SENDING THE RIGHT MESSAGE

By Sharon Armstrong, OSSGA

OSSGA rolls out a targeted ad campaign to tackle some of the misconceptions about the aggregate industry in Wellington County

It's a fact. OSSGA members provide the stone, sand and gravel needed to build Ontario communities. We are surrounded by aggregate – it is literally the foundation of our lives. Yet many of us are unaware of how essential it is.

Aggregate is needed to build our homes, hospitals, schools, roads and playgrounds. It is also used in manufacturing many everyday products like glass, lipstick and toothpaste. Every year, Ontario uses an average of 164 million tonnes of aggregate – that's about 12 tonnes for every person in the province.

GRAVELFACT

92 to 98% of the water handled at an operation is returned to the local watershed

Where does aggregate come from? The vast majority of aggregate comes from either bedrock quarries or sand and gravel pits. Quarries are located in areas where rock capable of producing high quality crushed aggregate occurs, either at or near the ground surface. The sand and gravel deposits were created as a result of glacial activity that took place thousands of years ago. As the ice advanced and retreated, it left different kinds of deposits in each region of the province. The result in both cases is that stone, sand and gravel exists where nature put it.

GRAVELFACT

52% of stone, sand and gravel is used for the base of roads and highways

Because aggregate is heavy, and we need so much of it to build our communities, where it comes from is important. The closer we can get it to where we need it, the better it is economically, environmentally and socially.

If every load of aggregate used in Ontario had to travel just one extra kilometre to reach its destination job site, an extra 2.5 million litres of fossil fuel would be

CAN YOU GUESS HOW MUCH AGGREGATE WE USE?

How many tonnes of aggregate are used to build:

1) A house?

2) A school?

3) One kilometre of a six-lane highway?

4) One kilometre of a subway track?

Over the next 25 years, the Greater Toronto Area is expected to need 2.5 billion tonnes of aggregate.

Answers: 1) 250 tonnes/12 trucks
2) 13,000 tonnes/650 trucks 3) 51,800 tonnes/2,590 trucks
4) 91,200 tonnes/4,560 trucks

consumed each year, and annual greenhouse gas emissions would increase by nearly 7,000 tonnes

Think of it the same way you think about locally sourced food. Local supply reduces transportation costs, greenhouse gas emissions and fuel consumption, while at the same time supporting local economies through job creation.

THE CHALLENGE

We all need aggregate, and we all want to source aggregate in the most responsible way. So what's the problem?

The challenge we face in the aggregate business is that there is a lot of misinformation out there. Yet whether it's water usage, the protection of wildlife, working with communities to mitigate noise, dust and traffic, or the final rehabilitation of aggregate sites, industry members are working diligently to be good neighbours. Producers consistently go above and beyond the requirements in the more than 25 pieces of legislation that regulate the industry. Yet still, the public often has a negative view of it.

If every load of aggregate used in Ontario had to travel just one extra kilometre to reach its destination job site, an extra 2.5 million litres of fossil fuel would be consumed annually, and annual greenhouse gas emissions would increase by nearly 7,000 tonnes

To help separate fact from fiction, OSSGA has piloted a new advertising campaign in the Wellington County area. The campaign focuses on some of the common misconceptions that the public has about the aggregate industry. Ads were placed in newspapers, transit shelters, movie theatres and websites. Readers were asked to visit GravelFacts.ca to get the real goods on the industry.

The campaign is the first in a series of public outreach programs that OSSGA has in the works to begin conversations and create a deeper understanding of how we can all work together. More programs will be rolled out in the future. ●

Sharon Armstrong is vice president, communications and operations, at the Ontario Stone, Sand & Gravel Association (OSSGA).

GRAVELFACT

Christie Pits and Evergreen Brick Works in Toronto are both award-winning former aggregate sites

"PITS AND QUARRIES PERMANENTLY SCAR THE LANDSCAPE."

FACT OR FICTION?

FICTION.

GET THE FACTS.
GravelFacts.ca

OSSGA
ONTARIO STONE, SAND & GRAVEL ASSOCIATION

Hitting a home run in St. Marys

Canada's Baseball Hall of Fame draws tourists to an aggregate stronghold in Ontario

By Michael Scott

In June of this year, the Canadian Baseball Hall of Fame welcomed six new members, including former Blue Jay and Cy Young Award winner Pat Hentgen, along with former Montreal Expo Dennis Martinez. The induction ceremony and fanfare took place in the town of St. Marys, Ontario, home to the Canadian Baseball Hall of Fame and an important centre for aggregate production in the province.

The Canadian Baseball Hall of fame sits on land that once belonged to CBM Aggregates/St Marys Cement. Tucked away just off of quiet Quarry Road, the Hall of Fame site consists of four

The main diamond on the grounds of the Hall is named in honour of St Marys Cement

The Canadian Baseball Hall of Fame is housed in a historic 19th century farmhouse

baseball fields and the museum, located in a historic farmhouse built in 1868.

Adjacent to the Hall of Fame is "the Quarry" – a local swimming hole once made famous by Pierre Trudeau during an impromptu visit in 1968. Just past the right field fence of the southernmost diamond you can see the St Marys Cement Plant.

In an article that appeared in the *Toronto Star*, acclaimed baseball writer Richard Griffith described the scene as you approach the hall: "The initial view of the pristine baseball diamond far down in an old limestone quarry is right out of a Kevin Costner feel-good movie. You stroll from the parking lot past a quaint white building that houses the museum at the Canadian Baseball Hall of Fame, then crest a hill suddenly gazing down at the wonderful field of Canadian baseball dreams."

PERMANENT HOME

In St. Marys, the Baseball Hall of Fame has finally found a permanent home. Founded in 1983 by Bruce Prentice, the museum was originally located at Exhibition Place in Toronto, and then moved to Ontario Place before closing its doors in the city in 1989.

After its closure, its contents were moved to a warehouse where they were stored as the process for finding a new site began. In 1991, the Blue Jays won their division and hosted the Major League Baseball All-Star Game, and in 1992 and 1993 respectively the Jays won back-to-back World Series. This success helped fuel the popularity of baseball in Canada and expedited the need to find a home for the country's Baseball Hall of Fame.

Initially, 12 cities expressed interest in hosting the facility, with Guelph and St. Marys emerging as the top two contenders. During the 1992 season, which would see the first Canadian World Series champions, negotiations were underway to bring the Hall to St. Marys. On August 25, 1994, it was official, the Canadian Baseball Hall of fame would move to St. Marys, Ontario.

The reasons for moving to St. Marys were numerous. According to the Canadian Baseball Hall of Fame's website (baseballhalloffame.ca): "The Hall of Fame is located in St. Marys for two main reasons. The first being the historic

reference to the first recorded game of baseball in North America. It took place in Beachville, Ontario (30 minutes south of St. Marys) on June 4, 1838 and was written about by St. Marys native Adam Ford in the 1886 *Sporting Life* magazine. Adam was also the Mayor of St. Marys and a doctor in St. Marys. The other main reason is the donation of 32 acres of land by the St Marys Cement Company."

LONG RELATIONSHIP

The inclusion of land from CBM/St Marys Cement, now Votorantim, was a crucial aspect of the successful bid. With the land available and a building already on hand, St. Marys did not have to incur any costs or ask for financing as part of the bid.

Votorantim has had a long and prosperous relationship with the town. St. Marys Mayor Al Strathdee has noted that Votorantim plays "a huge role in our community" and called the company's level of involvement in the Baseball Hall of Fame "tremendous." He has commended Votorantim's commitment to St. Marys and noted the cement plant's importance to the town.

This solid relationship between St. Marys and Votorantim has fostered a productive partnership that helped bring a vital piece of Canadian history to the town. The main diamond on the grounds of the Hall is named the St Marys Cement Diamond in honour of the company's contribution.

The Hall of Fame officially opened in St. Marys on June 4, 1998, and with time it has evolved and grown. Induction ceremonies now consist of a weekend of celebrations, with a special ceremony and party in the town that bring out baseball fans and families alike. "The Hall of Fame will continue to grow and is an important part of the community," says Strathdee.

The inclusion of land from CBM/St Marys Cement, now Votorantim, was a crucial aspect of the successful bid. With the land available and a building already on hand, St. Marys did not have to incur any costs or ask for financing as part of the bid

The Hall itself contains important Canadian baseball relics and memorabilia, along with the plaques of all the inductees. To date, inductees include Fergie Jenkins, Robert Alomar, Tip O'Neil, Gary Carter, Andre Dawson, Larry Walker and George Bell, among others.

Visitors are always welcome, and during the summer months they can also take in a swim at the historic quarry next door.

The Canadian Baseball Hall of Fame and Museum is located at 386 Church St. South in St. Marys, Ontario.

CANADIAN BASEBALL HALL OF FAME

Admission:
Family (2 adults, 2 kids): $15.00
Adult: $7.50
Senior: $6.00
Child (6-16): $3.75

May – Weekends only
Saturday: 10:30 am - 4:00 pm
Sunday: 12:00 pm - 4:00 pm

June 1 to August 31 – Open daily
Monday to Saturday:
10:30 am - 4:00 pm
Sunday: 12:00 pm - 4:00 pm

September 1 to October 8 – Open 4 days a week
Thursday to Saturday:
10:30 am - 4:00 pm
and Sunday 12:00 pm - 4:00 pm

October 11 to April 30:
Open by pre-booked group tours only.
Minimum 6 people or $30
for a one-hour tour.

For more information, please contact the Baseball Hall of Fame at 519-284-1838 or 519-284-0777, or email at baseball@baseballhalloffame.ca.

Cutting down on noise pollution

Can you hear me now? How to effectively tackle noise pollution at pits and quarries

By Ben Coulson & Aaron Haniff

The aggregate extracted in pits and quarries is a key building material used in the construction industry, and where extraction happens, there exists the possibility of occasional noise. Aggregate producers, through site design and the use of berms, are generally able to effectively mitigate the noise to acceptable levels. But some designs and locations make it necessary to look for enhanced ways to diminish noise.

Controlling the potential for noise and the impact it can have on surrounding residences is a key aspect of good aggregate operations. With the right plan in place, the potential for noise complaints can be greatly reduced.

As with many industries, there are some pieces of equipment used in the extraction process that may cause noise vibration. There are also loud sounds created during blasting operations, but the noise levels and nuisance of blasting noise are mitigated in a number of ways, from the timing and frequency of the blasts to scheduling blasts to coincide with appropriate weather conditions.

Pits and quarries that operate within the province of Ontario are regulated under two key pieces of legislation with respect to noise and vibrations. The first is the *Environmental Protection Act*, administered by the Ministry of the Environment and Climate Change (MOECC formerly MOE). The second is the *Aggregate Resource Act*, administered by the Ministry of Natural Resources and Forestry (MNRF formerly MNR). The MOECC's regulations and guidelines control potential environmental impacts, including noise and vibration, while the MNRF grants licences to aggregate producers.

In order for pits and quarries to operate in Ontario, they must meet the noise limits set by the MOECC, and they are some of the most stringent in the world. The more relevant MOECC guidelines deal with sound level limits at receptors, sound and vibration limits relating to blasting activities, and sound levels that specific noisy equipment at sites need to meet.

GUIDELINES

The most applicable guideline for normal operations of the pit or quarry is MOECC's Publication NPC-300. Released in August 2013, the document consolidates several formal documents.

There are numerous ways to mitigate the loud sounds and noise produced by large scale machinery, such as those pictured above, that are regularly used in quarry and pit operations

It outlines sound limits a facility must meet at surrounding receptors and represents one of the few major changes in MOECC's documentation dealing with noise and vibration in recent years.

The update includes several major changes. Most notably, it looks at the way receptors and their respective limits are assessed. The sound level limits at receptors change depending on the time of day, with the strictest limits set for the night-time hours when people are trying to sleep, and the most lenient set for the day when people are most active. The limits also depend on the local environment. The lowest limits are designated for rural environments at night, where they can be as quiet as a library, to urban areas during the day where they can be set to levels approximating an average home or the side of a lightly travelled roadway.

For assessment purposes, the worst-case combined sound levels emitted from equipment are examined. Some examples of major sound-generating equipment include: rock drilling, diesel generators, on-site haul trucks, loaders and dozers, crushers, screening plants, conveyor systems and stackers. The sound emissions from each can be determined either by manufacturer sound levels or by measurements taken by acoustic personnel. Depending on the complexity of the facility, basic calculations or a complex sound model can then be used to estimate sound levels from the entire aggregate operation at nearby receptors. The combined operations must meet the applicable sound level limits at all surrounding residences.

THE RIGHT SOLUTION

If the facility cannot meet the designated sound level limits, a mitigation strategy needs to be designed and implemented. The main techniques for mitigation include: changing or limiting the operational times of equipment; adding or upgrading silencers on equipment (e.g., generator sets, etc.); relocating on-site equipment further from receptors or moving it behind barriers (e.g., buildings, berms, quarry face, etc.); selecting quieter equipment; creating higher perimeter berms or adding (portable) on-site barriers (including permanent stockpiles); and adding a noise monitoring program within the property line with notifications when sound levels reach a set threshold.

> Monitoring aggregate sites for noise and vibration helps producers develop a good understanding of how sound levels change throughout the day and identify any problem areas

Different mitigation concepts work better in different cases, but the simplest plan is planning itself. A good site plan and appropriate berms can dampen or even block potentially disruptive noise.

As well, limiting the operational time for equipment can greatly reduce the facility sound level at the surrounding receptor, especially if nighttime operations can be scaled back or removed entirely. Silencers are a great way to reduce stack or wall opening sounds as they are relatively inexpensive and usually last for the life cycle of the equipment. Noise barriers, walls or on-site structures all work to reduce sound levels by blocking the line of sight between the equipment and the receptor. Unfortunately, long or tall barriers are relatively costly and need to be installed close to the source of noise or to the residence.

If a single source of sound at a facility is dominant, it may be easy to identify and mitigate it with a silencer or barrier. In complex situations where many sources cause compliance issues, a qualified acoustical consultant may be needed to identify and select the appropriate mitigation measures.

Monitoring aggregate sites for noise and vibration helps producers develop a good understanding of how sound levels change throughout the day and identify any problem areas. The original application and permit should look at worst-case scenarios, but it generally fails to address the transient nature of the operations. This can, however, be achieved by deploying long-term sound and vibration meters at strategic points throughout the site. Some meter deployments have the ability to log various parameters and, combined with a cell signal, can give warnings when sound and vibration levels approach the site-specified limits or when complaints from neighbours occur. This near real-time communication allows operators to identify and modify site operations immediately and proactively, rather than hours or even days later.

A real-time monitoring station will also allow the data collected to be plotted for real-time viewing. The logged data provides an effective way to demonstrate continuous compliance with the applicable limits or to justify corrective actions on-site. If neighbours have concerns about the sound or vibration levels, the data can be shared via the Internet with the public, or in a password-protected way with regulators or other stakeholders. This type of action can go a long way in building trust with neighbouring residences, and in reducing complaints.

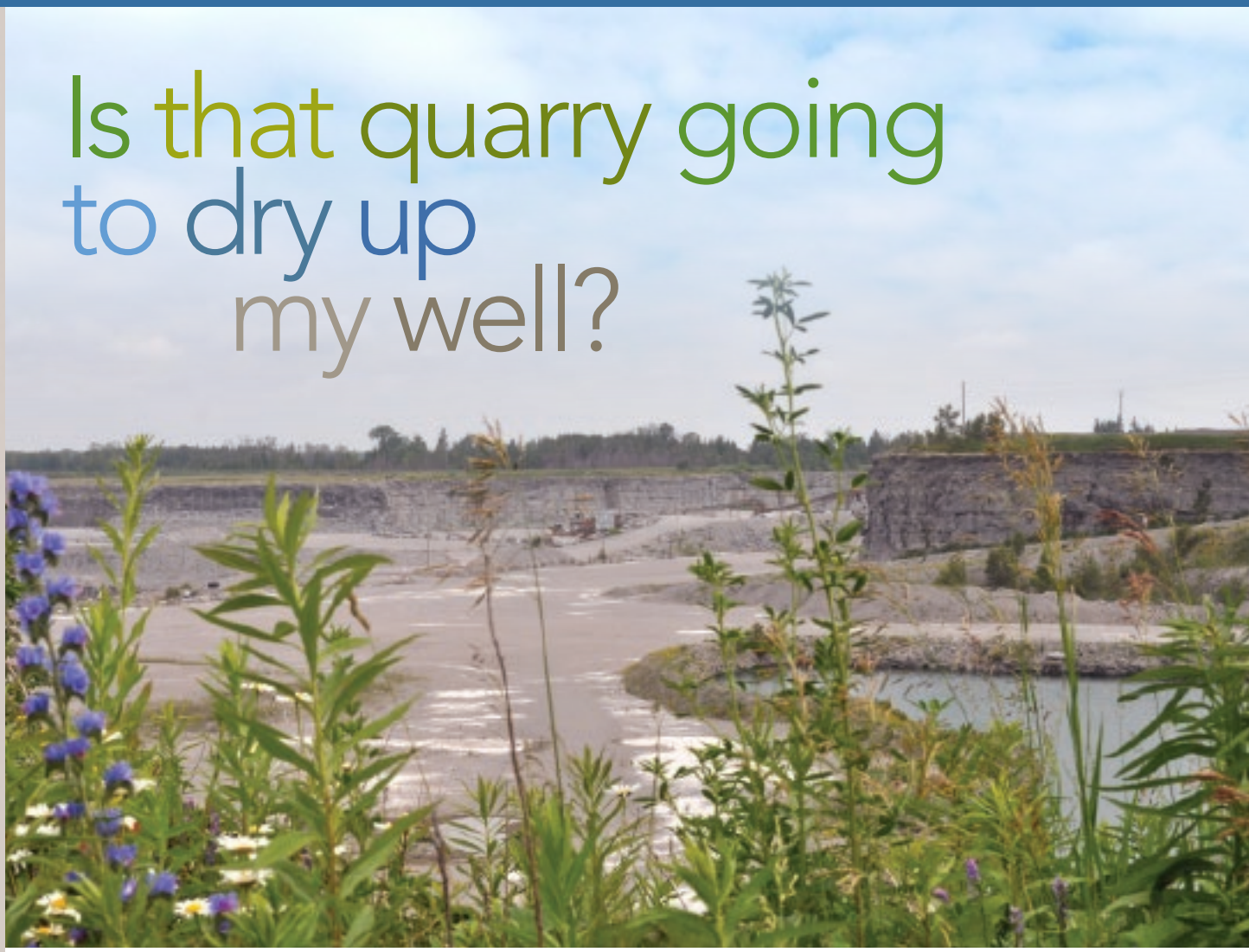
In summary, the operations of pits and quarries have the potential to create noise and vibration concerns at surrounding sensitive receptors. Proactive planning can reduce many of those potential issues, and a monitoring system is one tool that can help identify concerns before they arise and allow corrective action to be taken proactively.

By taking the correct mitigation measures, OSSGA member producers are able to meet the strict Ontario sound and vibration limits, and greatly reduce the potential for complaints from nearby residents. The result is a quieter operation overall, with everyone able to enjoy the natural sounds of the nature all around.

Ben Coulson is a senior consultant, noise, acoustics & vibration, at RWDI. Aaron Haniff is a senior engineer, noise, acoustics & vibration, at RWDI.

A real-time monitoring station allows operators to modify site operations proactively to reduce noise

Is that quarry going to dry up my well?



The short answer is no. Water well users located near pits and quarries are often concerned that extraction operations will impact their water supply. These users need to know that their water supply is protected under existing legislation. Scientific research and decades of monitoring quarry operations have shown that the "extent of influence" a quarry has on the groundwater flow regime is quite limited. Aggregate producers handle water as part of their day-to-day operations but the majority of water handled during aggregate operations is re-circulated. Excess water is returned to the watershed. Very little water is actually consumed or lost.

Quarries commonly extend below the groundwater table in order to extract rock. These below water quarries pump small amounts of groundwater out of the quarry to maintain a dry quarry floor for their operations.

Water management programs are developed to ensure the responsible use of water at the site and comply with the many legal requirements governing its use.

REGULATIONS AND LEGISLATION

In order to use water at a quarry the aggregate operator must apply for a Permit to Take Water from the Ministry of the Environment and Climate Change (MOECC). This is a legal requirement regulated under Section 34 of the *Ontario Water Resources Act* (OWRA). To discharge naturally occurring water from the quarry, the aggregate operator must apply for an Environmental Compliance Approval under Section 53 of the OWRA. The Ministry of Natural Resources and Forestry, local municipalities, conservation authorities and Fisheries and Oceans Canada may also place requirements and restrictions on water handling and on the release of water from a quarry.

How much water does a quarry really use?

A Permit to Take Water sets the maximum amount of water a permittee is allowed to take on a daily basis. This number can be very large. A common misconception is that the volume on the permit is the amount of water a quarry actually takes on a daily basis throughout the year. The truth is, the actual amount of water taken daily is very small compared with the amount allowed on the permit. However, from time to time, the quarry does need to pump larger volumes of water. This can happen when water accumulates from large rain storms or, more frequently, when snow melts in the spring. At these times, quarries typically pump out the water to ensure a dry quarry floor, and release the water back into the local watershed. These seasonal and weather variations are why the permits allow for large volumes of water. The actual amount of water that seeps into the quarry each day is small, and is really just being moved out of the quarry and back into the watershed.

Water management activities

Because very little water is actually consumed at a quarry, it is more accurate to say that water is handled or managed. This is done in three primary ways: dewatering the quarry, dust suppression and washing aggregates.

QUARRY DEWATERING

Typically, dewatering occurs in quarries but not necessarily in sand and gravel pits. Water in quarry excavations collects from precipitation or from groundwater seeping through fractures in quarry walls. Quarry operators pump this water out of the excavation to allow for extraction (blasting and recovering the bedrock) on a dry quarry floor. Groundwater seeping into the excavation from water-bearing breaks (fractures) in the bedrock lowers the water table to the depth of the fracture break, releasing the water into the quarry. This does affect groundwater flow patterns around the quarry, but only locally. Except for the fractures, the bedrock itself prevents the movement of water.

Before the quarry can begin operations, extensive studies are carried out to assess the local influence on groundwater flow systems. The area around the quarry affected by the proposed extraction is referred to as the drawdown cone or the cone of depression. These studies determine whether private wells will be affected by the proposed drawdown cone. If it is determined that a well may be affected, a mitigation strategy must be developed for approval by regulatory agencies before the quarry will be authorized for operation. In short, a quarry is not permitted to impact an existing water well.

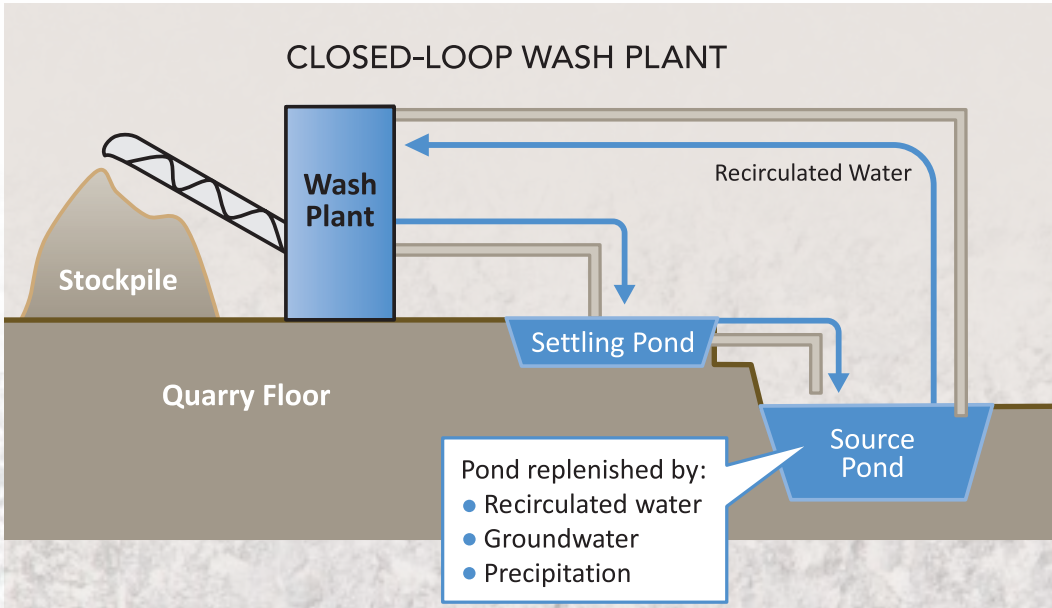
DUST SUPPRESSION: WATER TRUCK

Suppressing dust at a pit or quarry is the law. To minimize dust (a by-product of extracting and crushing rock) water is sprayed on internal haul roads, processing equipment, stockpiles and trucks exiting the site. Quarries have developed best management practices for water conservation that are designed to use only the amount of water that is needed to control dust.

AGGREGATE WASHING FACILITIES

Water may also be used to rinse fine sediments from the crushed rock (i.e., washing). Washing facilities use a closed-loop system design, where the rinse water is collected in a settling pond to be clarified and then recirculated back to the source pond to be re-used in the wash plant.

It is estimated that 92% to 98% of the water handled at an operation is returned to the local watershed. Only 2% to 8% of water used during the washing process is consumed (i.e. not returned to the watershed (Golder, 2006)). The industry responsibly reuses and recycles water extensively, and this means the quantity of water available in the watershed is not significantly impacted.



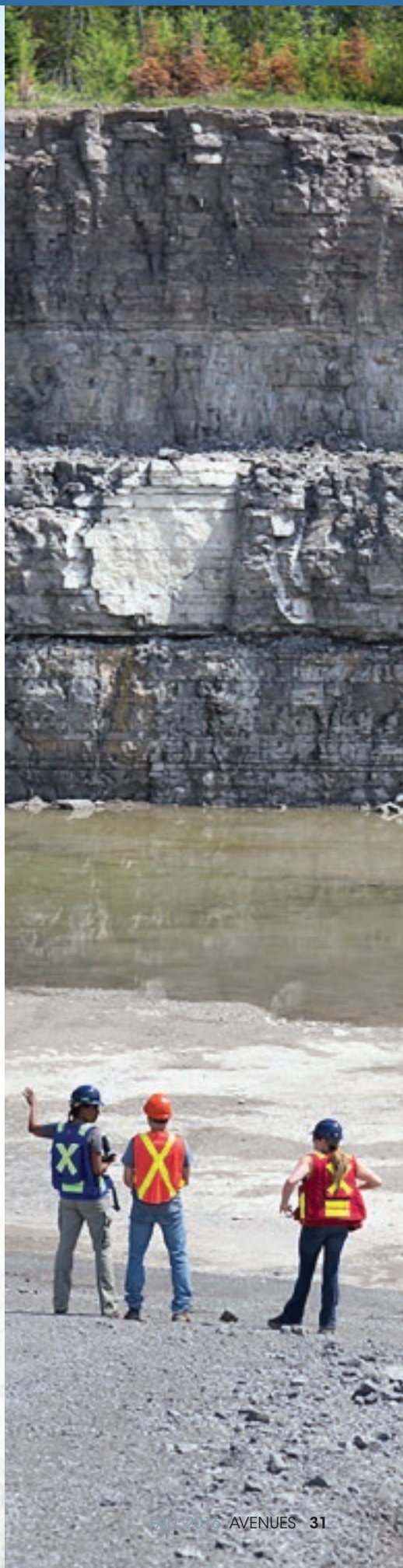
Water monitoring programs

Before a licence for a new quarry or gravel pit can be issued under the *Aggregate Resources Act,* extensive studies are required to determine the potential effects from the proposed aggregate operations on nearby wells, streams, wetlands or other sensitive environmental features. If concerns exist then mitigation measures are developed to eliminate those concerns to the satisfaction of regulatory agencies (Ministry of Natural Resources, 1997).

Groundwater and surface water monitoring programs are developed to predict potential effects and evaluate actual effects of operations on local water quantity and quality. Where granted by local water well users, this can include the monitoring of their private wells. Aggregate producers are mandated to implement comprehensive water monitoring programs, which are regulated and carried out under the direction of both the Ministry of Natural Resources and Forestry and the Ministry of the Environment and Climate Change, and are based on proven approaches and methodologies. This keeps aggregate producers accountable to the public and the government, and ensures water quantity and quality are protected in private wells and the surrounding environment.

Protecting the water supply

If there is a sudden adverse change in water quantity or quality in a domestic supply well that is attributed to an aggregate operation, the aggregate operator is legally required to provide a temporary supply of water equivalent in quantity and quality to the normal well takings, while the operator completes an assessment as to what caused the impact. If permanent interference is determined to have been caused by the quarry, the aggregate operator is required to restore the water supplies to the affected party. The need to restore water supplies happens occasionally in Ontario, but it is rare.



Cumulative impacts

A cumulative impact, which may result from multiple operations extracting in the same area at the same time, is defined as the additive effect of multiple quarry dewatering operations on groundwater, surface water and ecological features. In Ontario, the director of the Permit to Take Water program initiates cumulative impact assessments (CIAs) to ensure there are no adverse effects where multiple operations are extracting below the water table. In one of the largest CIA studies to date in Ontario, which was independently validated by the MOECC involving twelve quarries on the Carden Plain, the model showed the cumulative effects of the quarries on groundwater drawdown, drinking water wells, wetland function, low flows in creeks and rivers, flooding and erosion in creeks and rivers, and most water quality parameters were expected to be negligible over the study period (Golder, 2012). Ongoing monitoring programs help to ensure study results are accurate.

Climate change implications

While impacts to water resources are required to be minimized during the operation of quarries, the after use of these operations can contribute to creating resilient communities in the face of a changing climate. **Rehabilitated quarries provide opportunities for water storage and diverse wetland habitats,** which can address water quantity issues and minimize flooding in flood-prone areas. These are just two examples of the interim nature of extraction and accommodating subsequent land uses based on local needs. The Wainfleet Wetlands Conservation Area (1) and Kerncliff Park (2) in Burlington are examples of quarries that have been rehabilitated to biologically diverse wetland ecosystems, attracting wildlife for the enjoyment of the public long after aggregate extraction has ceased. Rehabilitated quarries can enhance the natural environment and create water assets that may offset the impacts of climate change.

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GravelFacts.ca

Essential materials for building a strong Ontario

This Water Management in Quarries Fact Sheet was prepared by the OSSGA Environment Committee as part of a special communications initiative and is available in brochure format. For more information on aggregates and water, please visit GravelFacts.ca.

Summary

The aggregate industry is sophisticated, accountable and deeply committed to environmental stewardship. Aggregate producers are primarily water handlers and not consumers. The actual amount of water consumed at an aggregate operation is relatively small. Well over 90% of the water handled is returned to the local watershed. The handling and use of water in an aggregate operation is regulated by multiple legislative requirements which require, among other things, the submission of detailed scientific studies prior to any approval being granted. Therefore private well users are fully protected under legislative authority. Once extraction at a quarry is completed, the site is rehabilitated creating water assets and enhancing the natural environment in ways that help mitigate the local impacts of climate change.

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(1) https://npca.ca/conservation-areas/wainfleet-wetlands

(2) http://www.ontariotrails.on.ca/trails/view/kerncliff-park---ian-reid-side-trail

ACKNOWLEDGMENTS

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Complex shapes: 3D concrete printing is expected to achieve a level of quality and efficiency never before seen before in construction

Concrete

By Patrick Smith

Highly flexible and adaptive

The versatility of concrete, the most widely used man-made material measured by tonnage

Ancient Romans made wide use of concrete, the incredibly flexible and adaptive blend of water, aggregates, sand and cement, and today it is still being developed.

For example, outside the more traditional uses, such as highways, bridges and buildings, global cement company Cemex is installing ecological concrete cookstoves to improve the quality of life of thousands of people, while Swedish construction group Skanska and Loughborough University, county Leicestershire, England, have signed a collaboration agreement to develop the use of 3D printing in construction.

The aim of the agreement is to allow Skanska to use (under licence) 3D concrete printing technology developed through research at Loughborough University, applying it to real applications. A team in the School of Civil and Building Engineering at Loughborough, led by Dr. Richard Buswell and Professor Simon Austin, has worked on the development of 3D printing technology for the construction industry since 2007.

The project was started under the Engineering and Physical Sciences Research Council's (EPSRC) Innovative Manufacturing and Construction Research Centre (IMCRC), and the team has developed 3D concrete printers fitted to a gantry and a robotic arm, which is now in its second-generation form. The printer deposits a high–performance concrete precisely under computer control. It works by laying down successive layers of concrete until the entire object is created. The printer can make things that cannot be manufactured by conventional processes such as complex structural components, curved cladding panels and architectural features.

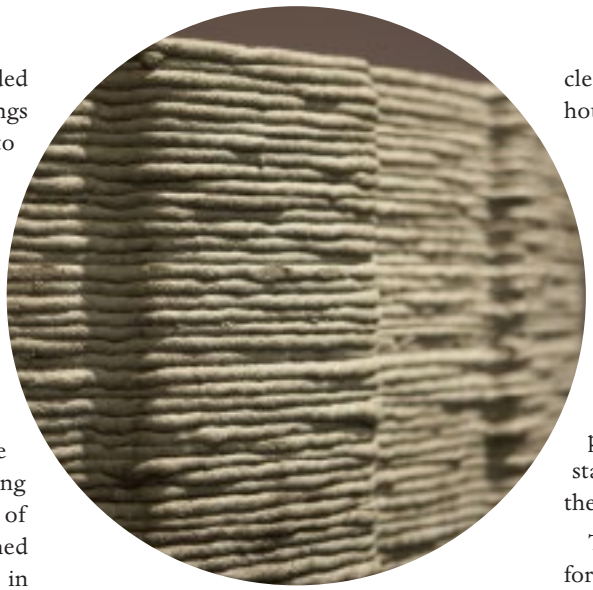
The aim of the initial 18-month development program is to develop the world's first commercial concrete printing robot. Working with Skanska are a number of influential collaborators including Foster and Partners, Buchan Concrete, ABB and Lafarge Tarmac. As a result of this program, Skanska aims to explore opportunities opened up by the new technology and help develop a 3D printing supply chain. The agreement puts Skanska in a good position to capitalize on an emerging technology with the potential to revolutionize the design and construction process.

"3D concrete printing, when combined with a type of mobile prefabrication centre,

has the potential to reduce the time needed to create complex elements of buildings from weeks to hours. We expect to achieve a level of quality and efficiency which has never been seen before in construction," says Rob Francis, Skanska's director of innovation and business improvement.

INCREASED DEMANDS

Dr. Richard Buswell from the Building Energy Research Group at Loughborough University says: "The modern construction industry is becoming more and more demanding in terms of design and construction. We have reached a point where new developments in construction manufacturing are required to meet the new challenges, and our research has sought to respond to that challenge…. We are pleased and excited by the opportunity to develop the world's first commercial 3D concrete printing robot with Skanska and its consortium. We have been convinced of its viability in the lab, but it now needs industry to adapt the technology to service real applications in construction and architecture."



With an investment of approximately US$2 million (€1.6 million), Cemex says that the start of sales and installation of the 100,000 ecological concrete cookstoves to improve the quality of life of approximately half a million people in Mexico and Guatemala by 2017 is an action it performs as part of the Global Alliance for Clean Cookstoves, an initiative that seeks to foster the adoption of clean cookstoves and fuels in 100 million households globally by 2020.

Meanwhile, Keyline has supplied a range of materials, including concrete products, for a new, safer design of a roundabout that has been completed in Bedford, England, and is the first of its type in the U.K. The roundabout was previously one of the worst accident blackspots in the area, and the new turbo roundabout features plastic lane dividers that make drivers stay in their lane once they have entered the roundabout.

The council chose Manit Contractors for the project, and all of the concrete products used to construct the roundabout were supplied by Keyline, which counts Manit among its biggest customers. The project features conservation curbs, which are shot-blasted to provide the look of granite, to fit with the council's increasing aesthetic preference for municipal schemes across Bedford. ●

This is an amended version of an article first published in Aggregates Business Europe & International *in January/February 2015.*

Photo courtesy of Sprout Studios

Rethinking rammed earth construction

By Matthew Bradford

Aggregate suppliers find a small niche market in the construction of modern-day rammed earth dwellings

The origins of rammed earth construction may date back to the early days of man, but the technique is now enjoying a newfound popularity among modern developers.

Perfected over thousands of years, rammed earth construction is a process in which the foundations, walls and floors of buildings are constructed with raw materials from the earth, including, clay, chalk, sand, gravel, silt and other aggregates. Recycled aggregates have also been used. The materials are dampened and compressed into frames or moulds of specific building components. Once the mixture has cured, and before its surfaces become too hard to manipulate, it is removed from its frames and embellished with surface designs using texturing tools.

Where additives such as lime and animal blood were used in the past to stabilize the frames, today's developers have adopted alternatives to achieve the same goal, and they include cement and asphalt. Additionally, rammed earth builders are incorporating coloured oxides and other modern materials to create unique looks and design elements.

Among the modern practitioners building these structures is Southern Ontario's Aerecura Rammed Earth Builders. The company's owner, Sylvia Cook, is a strong proponent of the earth-building technique and its long-lasting advantages. "It's not an exaggeration to say the lifespans of rammed earth buildings can be counted in centuries," she says. "Modern rammed earth buildings, when stabilized with rebar and a small percentage of cement, can easily last hundreds of years, eliminating the stream of waste as houses need repair and replacement."

Cook adds that the technique contributes greatly to the resiliency of a structure, making it virtually impervious to fire and extreme weather conditions. As such, these structures can be built in almost any climate, provided they are constructed with the right designs and protective elements.

Durability and resiliency aside, however, rammed earth can also be more energy-efficient than traditional builds. For one, the materials used to help build the walls can typically be sourced from local aggregate suppliers. In Aerecura's case, the company sources its aggregates locally, including road base or A-gravel plus sand and a small percentage of portland cement to enhance the structure's water-proofing and weather resistance attributes.

GROWING INTEREST

To the north, Tapial Homes is another builder of cement-stabilized, reinforced and insulated rammed earth structures. Like Aerecura, its team is keen to extoll the virtues of rammed earth homes, and also sources materials locally. Specifically, Tapial's co-owner James Blackman explains that its rammed earth mix is comprised of 90 per cent aggregates sourced from a quarry close to the project, as well as a small percentage of portland cement and Metapor by Poraver, a recycled byproduct used to replace some of the portland cement. "We also use a silicone based, integral water-repelling admixture, colour, as specified by the design team and client, and six to eight per cent water. This helps us engineer the wall to be fully structural with typical compressive strengths ranging from 15 to 30MPa, based on design requirements," explains Blackman.

These energy-saving benefits extend to homeowners as well. A standard build includes thick-walled components and airtight components with no thermal bridges. These enhance insulation and reduce the amount of energy required to heat and cool the interior. "A typical 2,000-square-foot rammed earth home might have 100 tons of interior exposed rammed earth walls. This thermal mass is very effective at moderating and maintaining temperature and humidity levels in the home," explains Blackman, adding that occupant comfort is often higher in homes of this nature than typical buildings thanks to high thermal mass and the continuous thermal insulation. "When looking at the design of a rammed earth home, we can vary the amount of mass and insulation in order to achieve any level of performance the client desires."

Industry builders aren't the only ones dusting off this ancient technique. At Fleming College, for example, students had the opportunity to build a rammed earth wall from scratch as part of their Sustainable Building Design and Construction program. "We had wanted to bring rammed earth into the program for a while and were happy to have an appropriate project to do in 2015," notes Patrick Marcotte, co-founder of HavenCraft Design and coordinator and co-instructor with the college's program in Haliburton. "Being largely comprised of site sourced materials, rammed earth fits in well with the program's goals, ethics and aesthetics."

An example of a rammed earth wall used for practical and decorative effect inside a dwelling. Photo courtesy of Aerecura

Marcotte says the project was successful in giving students the opportunity to work hands-on with the process, and it demonstrated the resiliency and eco-friendly nature of rammed earth builds. "The aggregate itself does not provide any insulation, but it does provides the structural component with great strength and durability," notes Marcotte of the project. "The six-inch layer of rammed earth on the exterior provides a continuous, durable skin to the building that blocks the elements, while the six-inch insulation layer in the centre provides the energy efficiency. Meanwhile, the six-inch rammed earth layer on the interior provides a durable and beautiful interior surface that contributes to the energy efficiency by storing and releasing heat throughout the day by means of its thermal mass."

APPEARANCE

The colour of rammed earth walls is determined by the earth and aggregate used. The ramming process proceeds layer by layer and can introduce the appearance of horizontal stratification to the walls, which can enhance the overall appearance. It can be controlled as a feature or eliminated.

Aggregates can also be exposed and special effects created by the addition of different coloured material in some layers. Elements such as feature stones or objects, alcoves or relief mouldings can be incorporated into rammed earth walls, at a price.

Unusual finishes can also be achieved by including shapes in the formwork that can be released after the wall has been rammed.

Source: www.yourhome.gov.au.com.

Photo courtesy of Emily Blackman

RAMMED EARTH HISTORY

No one knows for certain when rammed earth construction was first developed, but evidence of this earth-building technique has been found in monuments and cities dating as far back as 10,000 years. It has been linked to development in ancient cities such as Babylon in Iraq, Akhlet-Aton in Egypt, and Catal in Turkey. It has also been connected to the development of historic structures such as the Tower of Babel, the Great Wall of China, and – closer to home – the St. Thomas Anglican Church in Shanty Bay, Ontario.

Known by many regional names – tapial in Spanish, pisé de terre in French, and hantu in Chinese – rammed earth construction gained considerable interest in North America in the decades leading to World War II. After the war, however, it faded into the background as the costs of modern building materials fell and interest in the technique dissipated. Today, rammed earth construction is experiencing a comeback thanks to its low environment impact, unique look and construction benefits.

With one successful build under its belt, Fleming College is now in talks with Tapial Homes to share their rammed earth knowledge and experience to earn it greater recognition within the trades. Speaking to the outcome of its student project, Fleming College training officer Ted Brandon adds, "The students loved constructing the rammed earth wall. We will definitely consider using it in future projects."

RAISING AWARENESS

Tapial, Aerecura and Fleming are among the growing number of industry players working to raise the profile of rammed earth among their colleagues and the general public. One of the biggest roadblocks to doing so has been simply making people aware they have options. "Typically, we plan to do a few rounds of education on each project, and these are focused on getting the design and engineering team up to speed with our standards, process and details," explains Blackman. "Then, before permit application, we will meet with the building officials and our engineer to present our Alternative Solutions Proposal and explain how our rammed earth walls meet the objective and functional statements in the building code."

The cost of a rammed earth home compared with a traditional build can also create misconceptions. According to Cook, the comparisons aren't necessarily fair: "You have to ask: how much would it cost to build stick-frame that didn't need a furnace or air conditioner, was maintenance-free, and as beautiful as rammed earth? Even then, with appropriate design, we have built rammed earth structures with a normal custom home budget."

"Part of our mission to change the built environment includes shifting costs from expensive, energy-intensive, often toxic building materials to paying a fair wage to workers while allowing them to have pride in building both better houses and a carbon-free future for all of us," adds Cook.

Rammed earth construction evidently delivers a number of unique advantages to both builders and homeowners. The trick, says Cook, is getting people to take notice: "Everyone who has ever visited our home has left asking, 'Why doesn't everyone build this way?'"

Why, indeed.

Tapial Homes uses a rammed earth mix comprised of 90 per cent locally sourced aggregates for its homes. Photo courtesy of Sprout Studios.

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