Cold planers key to asphalt milling projects

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Asphalt milling is a cost-effective means for addressing asphalt deficiencies on roads, highways and parking lots. When asphalt reveals cracks and potholes that aren’t deep — and the base and sub-base are intact, scraping away just the asphalt is both cost-effective and quick compared to replacing the entire road.

“Milling of pavement surfaces can be for several different reasons. Main reasons are for removal of worn or degraded asphalt layers, to improve ride-ability, re-shape the road or improve traction/grip,” says Matt White, North American Sales Manager-Milling & Recycling/Stabilizing, Bomag Americas.

“Preparation of the milling machine as well as the job site are crucial pieces to the milling process. Preparation of tracking (how many trucks are needed, how long turn-around times are and logistics) is crucial,” says White. “Communication between crew onsite and milling operators is key as well.”

Asphalt milling is achieved through the use of a cold planer. Also known as a planer, asphalt grinder, asphalt milling machine, cold milling machine, a cold planer cuts the asphalt with a rotating drum equipped with teeth and then vacuums the milled pieces and places them on a conveyor, which transported the pieces to a truck positioned immediately in front of the planer.

The grinded asphalt is known as reclaimed asphalt pavement (RAP); it is processed into engineered aggregates and then gets used in asphalt mixes.

“Asphalt ‘cold’ milling with self-propelled cold mills prepares a road driving course for asphalt surface are eliminated; existing crown and slope are restored or altered; low clearance under bridges due to multiple overlays is corrected; and curbs are revealed that were covered up by multiple overlays,” Chastain continues. “Asphalt milling is not to be confused with cold in-place or hot in-place recycling, in which a single machine or an equipment train removes, recycles and replaces the surface in one pass. Nor should it be confused with full-depth recycling or recla-
mation, in which a failed pavement is pulver-
ized in-place and mixed with the layers below and compacted as the base for a new asphalt overlay.”

Machine control has been part of a cold planer’s DNA for a long time. For nearly two decades, these machines have come equipped with grade control, which senses the height of the material to be cut and automatically makes drum height changes according to the specifications input into the machine by the operator.

“Proper setup of grade controls, combined with drum maintenance and machine main-
tenance will ensure the machine is capable of producing at 100 per cent,” says White.

Then, manufacturers developed slope control, which senses the side-to-side angle of the machine and automatically makes adjust-
ments according to specification.

More recently, manufacturers have develop-

ed a way to change the drum speed from the operator’s station, instead of getting under the machine to change a belt, an operator simply pushes a button on the control panel.

A cold planer operator has to maintain two speeds — the speed of the drum’s rotation and the forward speed of the machine. The drum’s rotation speed has to correspond to the machine’s forward speed, otherwise you can end up with choppy asphalt and damaged cut-
ing teeth.

“Milling speed is critical. Typically, a steady, consistent speed will produce better results and less wear/tear on a machine, than running as fast as possible,” says White.

Another important feature of a cold planer is its ability for quick and easy drum changes.

Finally, an efficient dust suppression system (water) on a cold planer protects the opera-
tor and workers from inhaling it, as well as cools down the drum. This is called “water on the fly,” because the water is used while the machine continues to work.
Climate change floods leading to bridge, culvert and road upgrades

Hundres of millions of dollars in culvert, roads and bridges construction are needed in B.C. to fix rural flood damages and help prevent the loss of valuable agricultural land. As climate change brings rising water levels, the work is preparing for what a new B.C. government report on severe event flooding and wildfires is calling the "new normal." Addressing the New Normal: 21st Century Disaster Management in British Columbia sets out the problems facing communities and makes wide-ranging recommendations including the need for better infrastructure and new technologies.

In flood-struck areas such as Grand Forks, Peace River, and the Okanagan, work has already started. Contracts are not billion dollar deals, but smaller contracts, as governments look at replacing bridges, culverts, and roads to accommodate increased water flows.

In the Peace River, the Ministry of Trans- portation and Infrastructure (MoTI) has embarked upon a multi-year plan to replace culverts and constructing new bridges following the 2016 flood. To-date, $82 million has been spent, a MoTI email said. Thirteen new structures have been either built, are in construction, or planned. Construction companies working on projects include Brogeco Corporation Ltd. (Rolla Road bridge), Surespan Construction ($12.4 million for Tippy Corner, Willow Flats and Stone Creek bridges) and Formula Contractors ($7.1 million Bowl der Creek bridge). Bridges are constructed to a 200-year flood level.

Five more projects will be constructed over the next two years. They include the $25 million 8th Street Bridge in Dawson Creek being designed by Associated Engineering. The project, according to MoTI information, is expected to go to tender in the spring 2019 and will take two years to complete as it replaces culverts.

Other projects are the Fur Thief Bridge (construction starting in summer 2019 with Parsons Engineering acting as consultants), Parnell Road bridge (construction starting in summer 2019 with Klohn Crippen Berger as the engineering consultants), Gladys Bridge (construction starting in late 2019 or early 2020 with Parsons Engineering as consultants), and the Gibbons multi-plate structure construction (construction slated for late 2019 or early 2020 with Parsons Engineering acting as consultant).

The Boundary Flood Recovery (BFR) team, which includes hard-hat Grand Forks, is looking for flood recovery funds to begin its flood upgrade project. In May 2018, parts of the Granby, West Kettle and Kettle River exceeded the 200-year flow level causing $38 million in damages to agricultural operations and buildings ranging from residential to industrial.

Grand Forks has a five-year $60 million flood recovery plan in place and is seeking funding from different levels of government. In January, the city applied to Infrastructure Canada, through the BFR, for $49.9 million in funding for flood mitigation projects that will pay for re-establishing wetlands, building dikes, raising roads, installing pumps for storm water drainage, and bank stabilization. The total time to implement all stages of the proposed plan is five years after receiving funding approval. Funds are also being sought under the National Disaster Mitigation Program for further works.

"Some of the infrastructure is very old and designed at a time when we didn't have a lot of water and flow data," Des Goold, Northwest Hydraulic Consultants.

In the Okanagan where flooding has occurred for the past two years, Don Dobson, chief engineer of Dobson Engineering, has already issued an alert for the South Okanagan area it has reached saturation levels of groundwater "creating an increased potential for flooding during fresher in 2019."

The Regional District of Central Okanagan, one of three regional districts, has recently completed mop-up damage from the 2017 flood in one of its regional parks where bridge, trail, park- ing lot or boat launch damage was incurred by flooding and contracts let to repair damages ranged from $100,000 to $500,000. Kelowna is looking to repair damaged culverts and a longer range plan, pending ministry approval, is to replace the culverts with a larger open bottom arch culvert. The project is in the design stage.

The shift to upgrade grass-roots infrastruc- ture is tied to increased level of precipitation more often.

"Climate change has always happened," said Dobson, "But, what we are seeing is that things are changing more rapidly."

There are also more extreme events occurring. He said that engineers have used the best available data when designing dykes, roads, bridge and culverts. Culverts have a 50-100 year life while bridges up to 75-100 years. Engineers have in the past designed to a 50, 100 or 200 year flood level. In the Okanagan area have all banded together to provide gain greater flood mitigation solu- tions and determine what needs to be done to infrastructure.

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The B.C. government, the Engineers and Geoscientists BC, the Association of Consulting Engineering Companies B.C. plus other organizations have produced guidelines or best practices for accommodating climate change in structures. "Generally, the design of bridges haven't changed a lot," Goold said, aside from the piers may be dug deeper, larger-sized rip- rap used to stave off scouring or erosion, and structures may be more elevated.

But, preventative design solutions are being explored. The BC MoTI in rural areas, many of which service access roads needed forest access or fighting fires, are dealing with rock and timber from debris flows or landslides leading to blockages and road washouts. At Grizzly Creek, near Chetwyn, in north- ern B.C. a 900 mm culvert was overwhelmed creating flooding and washing out parts of Highway 97 in 2016. McElhanney Consult- ing Services Ltd. reviewed cross section re- placement options and with Atlantic Industries Ltd. selected to build a bolt-a-plate horizontal ellipse structure.

As a further deterrent for debris, NHIC also recommended and provided preliminary design of a V-shaped steel trash rack which deflects debris to the sides of the culvert and prevents jams. McElhanney completed the detailed design of the trash rack.

Mark Woods, community services man- ager for the Regional District of Okanagan- Similkameen said the regional districts within the Okanagan area have all banded together to provide gain greater flood mitigation solu- tions and determine what needs to be done to infrastructure.
Calculating accurate spot elevations critical for estimators

DON PROCTER

I dentifying and accurately calculating spot elevations — high or low areas on an excavation site — on earthworks drawings can be a tricky job for an estimator.

“There is so much going on with a set of drawings that to only find the spot elevations actually means training it (software) to disregard all of the irrelevant stuff on a set of plans,” says Jeff Graham, CEO of Construction AI, a young tech company which is planning to launch software soon that will solve the problem.

It is important information for estimators, particularly on extensive excavation sites such as subdivisions, schools, commercial and industrial malls, pipelines and road projects, says Graham who co-founded Construction AI with Max Klein and Jason Heard.

Calling an estimator’s time “unbelievably precious”, Graham says the software allows them to prepare a bid quickly and accurately.

Filtering out irrelevant information is the trick, he says, noting that to accurately calculate spot elevations includes determining the cost of fill removal and the type and quantity of replacement materials.

While optical character recognition software has been used by some companies to scan drawings, it does not focus on spot elevations, says Graham whose company is based in Mississauga, Ontario and Alberta.

“Estimators need to figure out the areas of new asphalt, concrete, storm, sanitary, water, it’s complicated.”

Construction AI’s software has been in development since the company was founded about three years ago.

“It’s been a brutally hard problem to solve,” he says, noting that his is not the first company to do it.

“Our use case is where the engineer does a site model in CAD and then renders it in a PDF drawing and posts it on a tender site for bidding earthworks contractors. “Each one of those contractors turns that PDF back into their own 3D model or they calculate it by hand using cross sections.”

He says Construction AI can process the PDF quickly to get the information to contractors to accurately bid the job.

“The problem we are solving is in the timing process where the engineer doesn’t share the CAD file, which in my experience is most of the time.”

The idea of developing the software came to Graham while he was working for his father’s excavating business, describing the estimating work as ‘drudgery’, he says it involved entering spot elevations, identifying buildings and other data entry tasks from drawings to extract the quantities for a bid submission.

Construction AI was a recent winner of the Young Entrepreneur Spirit Competition for early stage software-based technology companies in Nova Scotia. The company received $25,000 and guidance from seasoned business professionals to help get the product to market.

Graham says in the near future the software will do much more accurately estimate contours (spot elevations). “We’re very confident we will be able to do roadworks, sidewalks…”

Over the longer term, Graham says the goal is to provide software to do repetitive tasks for other construction trades as well.

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Currently, LIDAR technology is being used. LIDAR is an aircraft born radar system that maps elevation.

“We are trying to determine where the water will flow when there is a substantial run-off and where the low-lying areas are and how that changes the landscape,” he said. That information can translate into information which can form wetlands, how to engineer roads, bridges, culverts and residential areas within the region.

“There is no doubt that we are looking at new standards and new concepts of how we do things and we need the consulting engineers to read the latest article and design accordingly”, he said.

One recent study has come from Korea on flood fragility analysis for bridges with multiple failure modes is currently one of the few studies looking at bridge failures caused by floods rather than seismic failure. The study, by researchers at the Ulsan National Institute of Science and Technology uses a new method to calculate the potential risk to a bridge in rapid flowing flood waters on pier or pile ductility, pier rapture, pier rupture, and deck loss.

Bringing together all the information on new solutions, historical flood data, potential for debris flows, climate change impact on rising oceans, and the impact on surrounding forest cover and wildfires is without challenges.

It is an enormous task,” said Grand Forks mayor Brian Taylor when he speaks about redesigning a city infrastructure to improve flood-proof in the changing environment and trying to do it with the best information possible and in a way the public can understand.

Taylor said the city enacted new bylaws that raised building heights and that saved some buildings, but many still remain in flood plains which are now restricted from new construction.

No bridges were washed away but a rising river carrying a tree stump dented a utility pipe carried by a bridge.

As well, the city’s public works yard was cut off from downtown, when the connecting road flooded and a dyke road had to be constructed.

Taylor said that cities hire the best professional to provide guidelines, based upon the best available data, but despite all these measures, there is still an element of uncertainty facing many B.C. rural cities.

Over harvesting is occurring in many parts of B.C. as the province attempts to remove salvaged pine beetle-killed trees, which leaves less living forest with roots to absorb ground moisture and hold the ground intact. The growing prevalence of wildfires has also caused rural cities to remove forest cover around them.

“There is a confluence of factors that lead into this,” he said as the issue goes beyond high snow pack and rainfall.

Grand Forks, he said, is taking the lead in devising a plan to mitigate flood damage in the future, and is fortunate to have the support of the provincial government to help both with funding and planning. He doesn’t believe Grand Forks will be the only community that will need to upgrade and change as water levels rise.

“We are really writing the flood plan for disaster areas in the future,” he said.