

UAS COMPLIANCE



- 26 A CROWNING ACHIEVEMENT**
How can Nepal improve and sustain agribusiness without a clear picture of the environment itself?

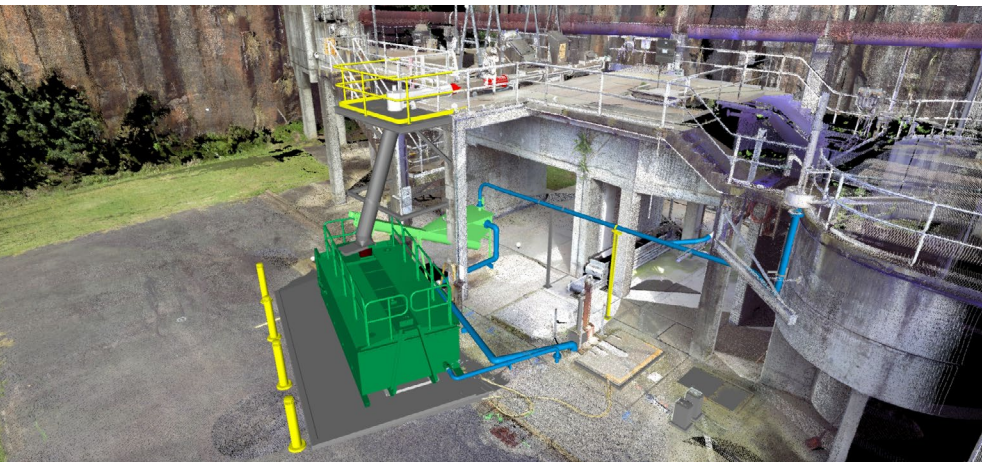
- 33 YOU GOTTA BE A SURVEYOR!**
To practice photogrammetry in Florida one must be designated a Professional Surveyor Mapper (PSM)

- 36 SCANNING DISCOVERY HUT**
Documenting an important part of early Antarctic exploration presents crew with unique challenges



POINTS & PIXELS

» Project comprehension, stakeholder engagement and safety outcomes have all improved as a consequence.



Atlas Engineering Group is an internationally accredited engineering design firm, delivering value throughout the design, construction and asset ownership phases of projects. Core capabilities are in brownfield design engineering, 3D scanning, building information model (BIM) modelling and long term asset strategies. Atlas Engineering's Water Group have partnered with John Holland, Lendlease and Sydney Water to provide engineering design and advisory services on an extensive program of upgrades, modifications and new works across Australia's largest water

and waste water networks, treatment plants, reservoirs and pumping stations.

Technology Used

FARO Focus3D X 330 camera

- Over 60 complete scanned projects, larger projects consisting of 50+ laser scans.
- Each of these projects were processed using Autodesk Recap 360 Pro and shared with our team using Recap360.

Our point cloud uses vary from project to project.

- For reference and visualization, including clash detection using Navisworks

“Autodesk ReCap combined with other Autodesk 3D CAD packages have allowed us to work accurately in brownfield sites where existing information was out of date or not available. Project comprehension, stakeholder engagement and safety outcomes have all improved as a consequence. That saves everyone time and money.”

— Scott Rudram, Director, Atlas Engineering Group

- Creation of Scan to As-Built 3D models and 2D drawings
- Design review tool and to collaborate with the team and our clients
- Used to augment our Safety in Design processes

Modelling tools

- Plant 3D to manage and create any equipment, pipework and steel structures, including P&IDs
- Civil 3D to manage and create any surfaces, roads, pavements, storm water and rising/gravity main designs.

Deliverables: Range from conceptual analysis and optioneering reports to Issued for Construction and As-Built engineering documentation.

Results

- Increased stakeholder buy-in through the use of visualization and fly-throughs created from point clouds and 3D models; operations and maintenance staff understand the proposed projects and provide valuable input to design decisions
- Increased design efficiency: using point clouds saved time for our engineers on site and reduces multiple site visits.
- Elimination of reliance upon inaccurate information: RECAP helps us create accurate as-built information where existing legacy information is poor quality, out of date or unavailable.
- Reduction of emergent work and cost to our clients': RECAP's ability to eliminate reliance on legacy information means less nasty surprises on site!

For more information, contact:
Atlas Engineering Group
Sydney, Australia
atlasengineeringgroup.com.au



An example of ROBIN drive.



An example of ROBIN walk.

» 3D Laser Mapping Launches New Multiplatform Mapping System

3D Laser Mapping has launched an innovative multi-platform mapping system at GeoBusiness 2016.

The new platform, named ROBIN, is the first of its kind on the market and provides three alternative mapping options rolled into one solution. The versatile system allows users to benefit from the ability to map areas via walking, driving or flying.

ROBIN provides a multi-purpose all round system, integrating a 12 MP camera (for drive) and 18MP (for walk and fly), two GNSS antennas, GIS grade IMU navigation system, touch screen control unit, three mounting systems, capture software, a post-processing software package and has a field of view

of 330 degrees. Long-range and precision versions are also available.

Graham Hunter, executive chairman at 3D Laser Mapping, explains further:

“ROBIN is an extremely exciting product for the industry and is the first on the market to offer a three-in-one system. Covering a wide range of terrain, ROBIN allows high quality data capture from areas such as footpaths, forests and coastlines that are only accessible by foot. Our customers are looking for flexible solutions that can support a high return on investment—and this product offers a unique value proposition.

“GeoBusiness is recognized as one of the leading trade shows in our sector and we’ve

been in attendance for the past three years. It’s an event where we’ve made some quality new business leads, as well as strengthening relationships with current clients, so we decided this would be the perfect place to showcase ROBIN for the very first time.”

The team at 3D Laser Mapping officially launched ROBIN at stand number N1.

Mark Hudson, managing director of consulting geospatial engineers and chartered land surveyors, Geoterra, is also looking forward to seeing ROBIN enter the market after receiving an advanced preview:

“Geoterra is very excited about the launch of the new ROBIN multi-platform mapping system. It’s become evident that there’s a gap in the sector for this kind of product and we’re sure it’ll prove to be an extremely popular addition to the marketplace.

3D Laser Mapping also has plans in place to launch an exciting indoor mapping SLAM upgrade for ROBIN later in the year.



An example of ROBIN fly.

For more details on 3D Laser Mapping and ROBIN visit www.3dlasermapping.com/robin and for more information on GeoBusiness 2016 see www.geobusinessshow.com.

» scan 3D—3D Scanning and Reverse Engineering

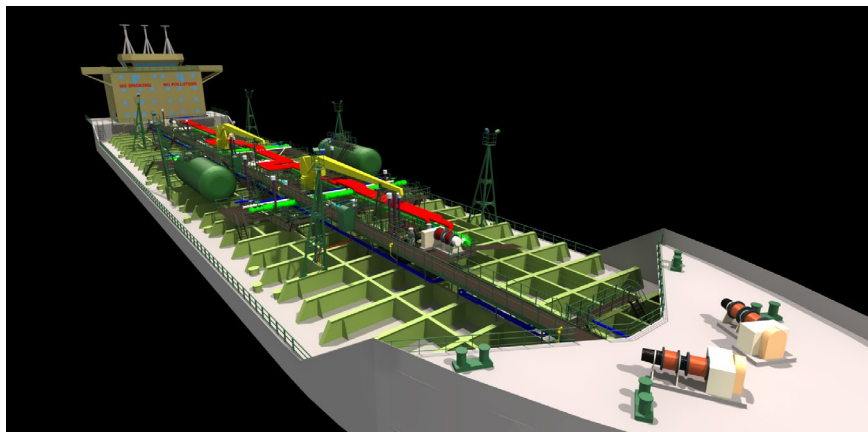
scan 3D, Gdynia, Poland, offers comprehensive, versatile and innovative measurement solutions in 3D technology around the world. We use the latest measuring systems, specialized software, knowledge and experience of our engineers. We cooperate with research centers in Poland, companies in the USA and Norway, to develop new and improved measurement systems and modern intelligent software.

Scan 3D offers 3D scanning optical scanners SMARTTECH with an accuracy of 20 .mu.m for the purpose of reverse engineering and quality control. 3D scanning scanner Faro Focus x130 to perform an inventory of industrial, architectural and historic sites and 3D scanning in the maritime industry for the design or creation of smart 3D models.

With the knowledge, experience, specialized software company Autodesk, and Geomagic, we specialize in quality control in the industry, including the preparation of technical reports with 3D PDF. Scan 3D provides reverse engineering, the scanned detail develop a 3D model MESH, 3D model AutoSurface and parametric model and intelligent 3D modeling of industrial facilities, ship design engineering, 3D modeling in BIM, development of 2D documentation from an 3D inventory of the architectural and visualization and animation of 3D models.

Inventory 3D of ship—BIM

Nowadays more often ship owners receive detail 3d-models of new construction or renovation, which is very valuable as an as-built



documentation element. Previous realizations unfortunately usually did not have such type of interactive model documentation. 3D laser scanning technology is the best way to make up this situation and proceed fully functionality to prepare 3d model consisting inventoried elements like pipelines or structures. Our services help design new systems, machinery spaces modifications etc.

Time 3D scanning: 1 day scanned and 2 day for registration and export point cloud

Time 3D modeling: 1 month

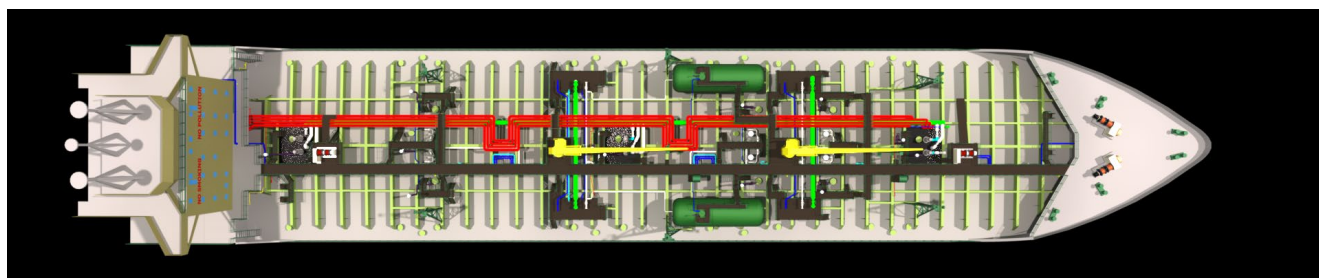
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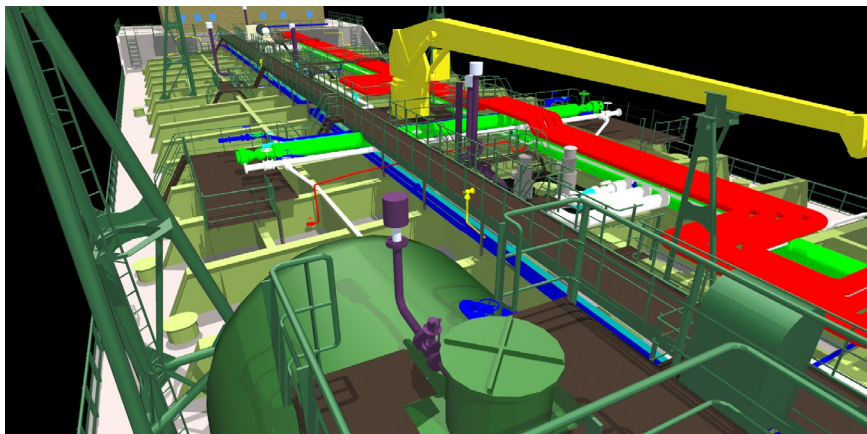
- Obtained Point Cloud—55 scan stations, registration of point cloud in Faro Scene, export to Recap Project
- Intelligent 3D models of Pipelines in AutoCAD Plant 3D 2016, intelligent 3D models equipment and structural objects in Inventor 2016
- All 3D models present show in Navisworks Manage 2016

3D scanning is a very useful measuring instrument that registers the geometry of the space in a very short time. In order to perform an intelligent 3D model deck of chemical tanker, in cooperation with Metrotech Krzysztof Votka, we used for 3D scanning the scanner Faro Focus 3D x130. During one day we made 55 measurement stations, covering approx. 150 m length and approx 30 m width of main deck. Was scanned a total of 4,500 m². Obtained point cloud allowed the development of intelligent 3D model piping systems and structural elements of the ship's deck. As a result, the owner has full knowledge about existing systems, which for many years have been modernized and repaired. When designing new systems, designers can avoid any collisions, adjusting the course of the situation on the ship. This translates into significant savings in design, waste materials and above all the costs associated with downtime ship in a shipyard.

Benefits

3D scanning made in one day—an incomparable time with traditional methods without





need to suspend ongoing modernization and repair works.

Implementation of intelligent 3D model—information about properties of the individual materials used, available documentation 2D with accuracy +/- 5mm

Based on the model piping can be obtained documentation allowing them prefabrication

Actual 3D documentation, resulting in shorter repair time, often without the need to visit the shipyard Possibility to make 2D documentation ship plans. Eliminating collisions at the stage of later modernization pipelines or installing new systems. WebShare—High resolution panoramic 3D scene 3D model available in Navisworks Manage.

Objective

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stations, covering approx. 150 m long main deck. Obtained point cloud allowed the development of intelligent 3D model piping systems and structural elements of the ship's deck. As a result, the owner has full knowledge about existing systems, which for many years have been modernized and repaired. When designing new systems, designers can avoid any collisions, adjusting the course of the situation on the ship. This translates into significant savings in design, waste materials and above all the costs associated with the downtime the ship is in a shipyard.

Benefits

Actual 3D documentation, resulting in shorter repair time, often without the need to visit the shipyard. 3D scanning was accomplished in one day—an incomparable time savings compared to traditional methods without the need to suspend ongoing maintenance, modernization and repair work. Implementation of intelligent 3D model providing accuracy of +/- 5mm which includes information about properties of individual materials used, available documentation in 2D.

Based on the model, piping can be obtained

allowing prefabrication and the possibility to make 2D documentation ship plans eliminating clashes later in the modernization of pipelines or installing new systems. 3D models are available in Navisworks Manage and WebShare—High resolution panoramic 3D scene.

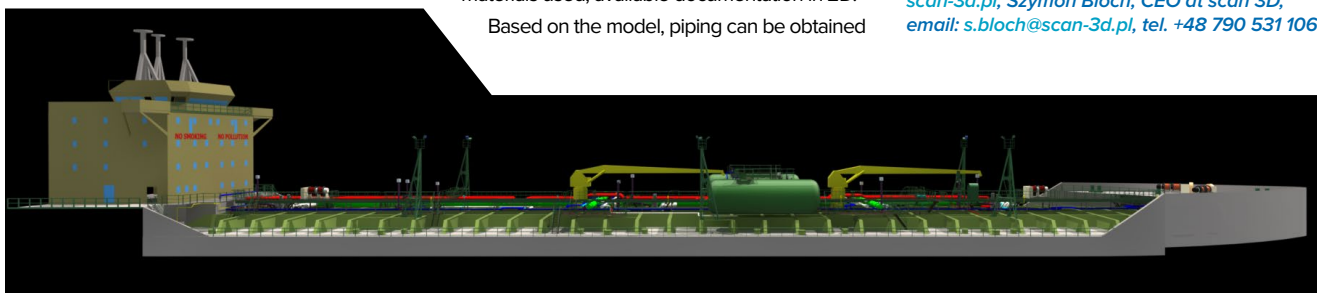
Scan 3D is an authorized 3D measurements in Pomerania, a Polish manufacturer of optical scanners SMARTTECH. We provide comprehensive technical support in choosing the right 3D scanners and software Geomagic, technical assistance, installation and maintenance as well as training adapted to the specifics of your work. 3D scan focuses on innovation and constant professional development of our engineers. As a result, we can provide services 3D scanning at the highest level.

About scan 3D

Our team consists of experienced and skilled engineers. Using the latest 3D scanners, special software and most of all knowledge, we provide services at the highest level. We offer:

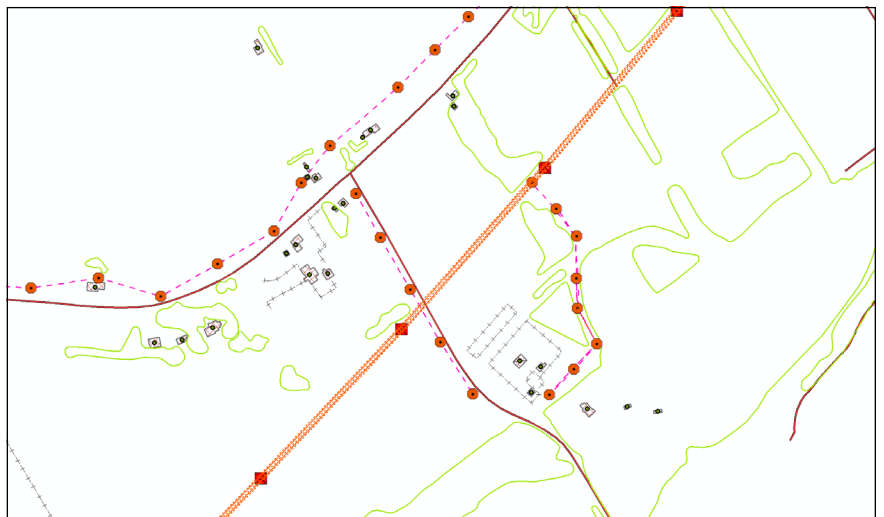
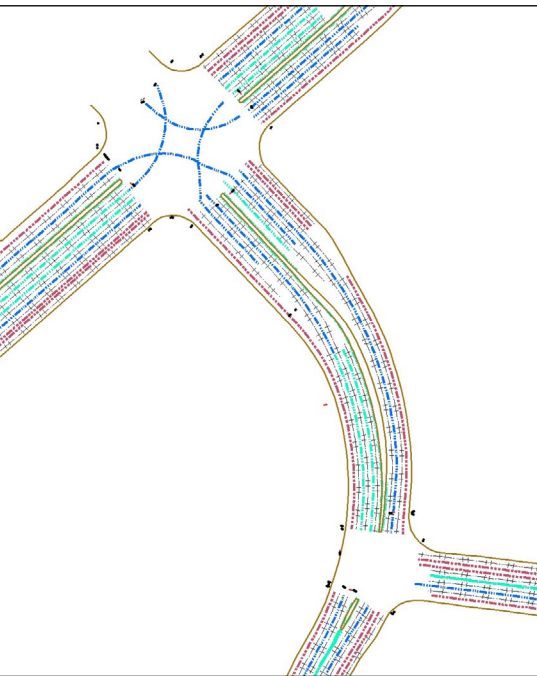
3D scanning used in quality control, reverse engineering and digitization of museum objects and archaeological sites, 3D scanning cubic objects, i.e. engineering objects, industrial facilities, refineries, ships, and other architectural objects, 3D modeling, 3D modeling according to the BIM standards in architectural objects, industrial and marine, with the necessary documentation 3D and 2D engineering design systems in the maritime industry visualization and animation implementation of 3D optical scanners and Geomagic software training 3D scanning and Geomagic software

For more information, please visit: www.scan-3d.pl, Szymon Bloch, CEO at scan 3D, email: s.bloch@scan-3d.pl, tel. +48 790 531 106



»» Top Civil Maps Projects

For the past few years Civil Maps has been perfecting its automated feature extraction technology for the autonomous vehicle industry. Based on parallel computing and artificial intelligence, their feature extraction technology is on the verge of changing how the world is building and maintaining infrastructure databases.



Recently, Civil Maps has begun to commercialize their technology stack in engineering, environment and infrastructure industry. As seen in this recent pipeline project example, certain above ground features were extracted and processed using specialized tools and techniques. This allowed Civil Maps to create geodatabase of selected above ground features or a large geographic area in a matter of days.

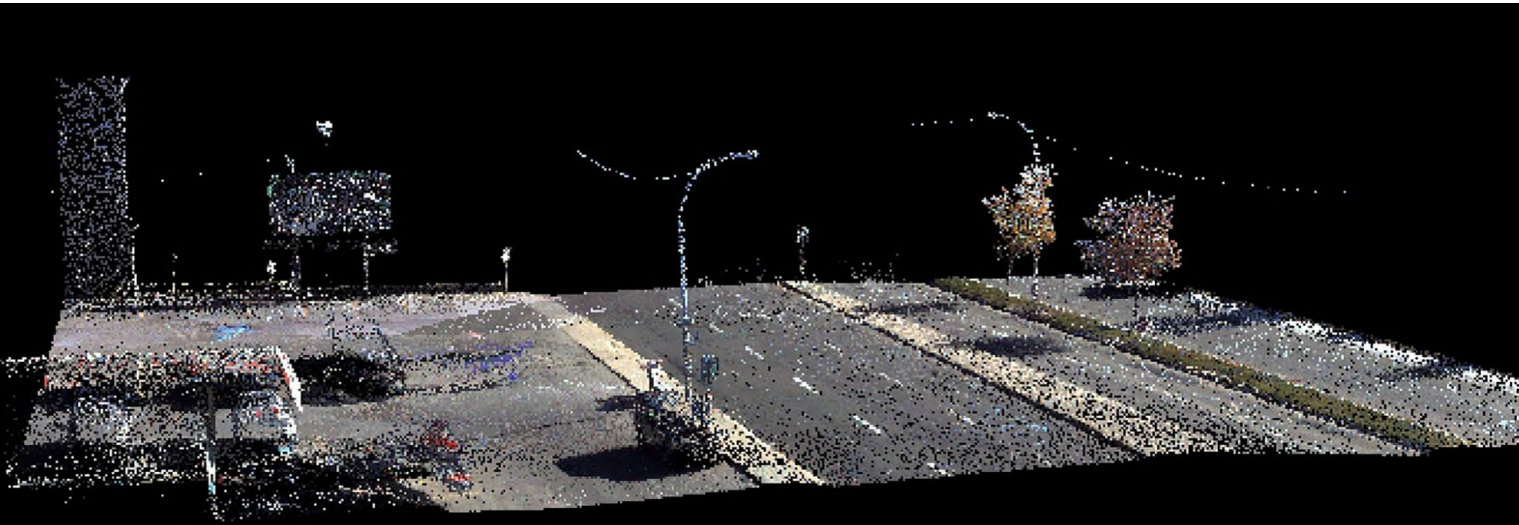


The data provide by Civil Maps is a geoJSON, which is easily converted to any commercial geospatial data or CAD format. As part of the delivery process, Civil Maps packages the final dataset in a format prescribed by the customer, usually an ArcGIS geodatabase. This allows for its immediate use in a customer GIS or web mapping service.

About Civil Maps:

At Civil Maps, we believe that efficient, safe mobility can revolutionize the way we live and change how we interact with the world around us. To reach this future, we are building artificial intelligence that allows automobiles to perceive and respond to the physical world. Our first milestone is generating continental-scale HD 3D maps and real-time, centimeter level localization. Our process of questioning established methods and our artificial intelligence expertise allow us to define the mobility solutions of the future.

For more information, contact: Joseph Hlady, Head of Sales, Engineering, Environment and Infrastructure, (403) 890-4979, CivilMaps.com, 724, 435 4th Ave SW, Calgary Alberta T2P 3A8



Civil Maps has also begun manufacturing and distributing their own low-cost commercial off the shelf mobile collection platform. Targeted at firms who desire to leverage mobile LiDAR collection for data capture and creation, but who are resistant to purchasing and maintaining a high cost survey grade system, the Civil Maps platform, Scout, is able to provide clients with all the LiDAR and imagery collection and processing tools.

Scout helps round out Civil Maps' offering to the engineering, environment and infrastructure industry. When combined with their technology stack for registration and feature extraction, Civil Maps' clients have all the tools they require to rapidly and inexpensively produce large regional datasets of high precision and accuracy.



»» Luxury and History in 3D

Major projects such as the \$29B navy ship building contract and \$2B offshore oil exploration are driving growth in Halifax. Forward-thinking developers like Killam Apartment REIT are seizing the opportunity and breaking ground on new projects.

Killam is developing The Alexander, a vibrant new building located in the heart of Halifax's historic downtown. The \$60 million-plus development includes 6,500 square feet of commercial space and 240 luxury apartments with high ceilings, an indoor link to the historic Brewery Market, and commanding views of the waterfront.

Despite The Alexander building's prime location, the 35,000 square foot site was a challenge to develop. Killam brought in Servant Dunbrack McKenzie and MacDonald Ltd. (SDMM) to use its 3D laser scanning technology to capture the sharp elevation changes of the multi-tiered lot, as well as the granite and iron stone façade of the adjacent Brewery Market.

"The elevation starts at Lower Water Street and goes up 60 feet to Bishop Street," explained James Bugden, project manager of new developments at Killam. "A 2D drawing could never visually communicate the impact of such a dramatic grade or the elevations that we need to consider before tying into such a historic building."

Among developers, the move from 2D drawings to 3D models is well underway and Killam is leading the charge. The Alexander is Killam's first development where all the project consultants, engineers, architects, and the construction manager are all working in 3D using building information modelling (BIM). "We have compressed schedules so being able to work in 3D means we are able to coordinate our drawings as we go," said Heather Brown, lead architect at Michael Napier Architecture.



Adding to the design complexity is the adjacent 200-year-old Brewery Market that is neither square nor plumb. "Doing field measurements by hand is an exhaustive procedure and it lacks the accuracy," said Geoff Axell, principal and senior structural engineer at CBCL Ltd. "With SDMM's 3D model, we didn't have to start from scratch. It aided in our ability to complete the structural design that included an extensive 3-story foundation system and matching up the new floor levels to the existing Brewery Market."

Mr. Axell explained how the 3D scan created a point cloud model that the consultants explore and query directly, allowing them to



see, more clearly, the connections between the new 3D model of The Alexander and the existing site. "It was very convenient to use the 3D model in meetings to address issues. For example, we showed the owners a suggested placement for the propane tanks and the model allowed them to make a quick and informed decision," he said.

To further streamline workflow, CBCL Ltd., Michael Napier Architecture and Pomerleau Inc. are using SDMM's 3D site plans to identify conflicts earlier in the development process so that less problems come up on site. "The 3D site plan was great to virtually show how

the building is connecting at various levels and how we will need to bring up the grade at the back so the new and existing sites match," said Ms. Brown.

Jamie Mills, project manager at Pomerleau Inc. couldn't agree more, "Catching conflicts early on means better cost management for the developer." In addition to using SDMM's 3D site model to plan the blasting and excavation of the site, Mills will be virtually walking through the 3D building model and comparing it to what's actually being constructed, so if an electrical outlet is behind a door, he'll flag it as a conflict before the electrician shows up.

Killam is also maximizing the potential of this amazing location, using the 3D site plan to enhance the commercial elements on the ground floor of the new building. "We used SDMM's 3D scans to identify set-backs and locations for ductwork that would accommodate equipment requirements for a large restaurant," said Mr. Bugden.

This means that even on the stormiest days, tenants from The Alexander's 240 units will be able to pop down for fine dining or into the Brewery's Historic Farmers' Market for fresh tomatoes without ever having to go outside.

"The Alexander's mix of residential and commercial really adds to the fabric of Halifax," remarked Mr. Bugden. "With living, dining, entertaining and office space, we're proud to be helping to build the community downtown."

Looking ahead, Killam plans to use SDMM's 3D scan technology to capture the full interior of the Brewery Market that it also owns.

"Having a 3D model of the Brewery Market's many floor levels, vaulted ceilings, ramps and even intricate rot iron railings will be useful for future renovations," said Mr. Bugden. The 3D scan will provide Killam with an accurate and complete understanding of architectural, structural, mechanical, and electrical considerations should a commercial tenant wish to relocate.



For more information contact: SDMM at
www.sdmm.ca
T: 902-455-1537
E: info@sdmm.ca



» UAV Mapping for Construction Site Analysis

Development of a construction site from start to finish demands a bit more than sound design, engineering, and planning. When assessing a new project site it can sometimes be hard to envision what the final product will look like or how to do it efficiently. Determining where features start and end, how it will conform and use the natural landscape to its advantage, or where areas of issue may arise if not properly accounted for, are all necessary questions an engineer must answer.

Any veteran contractor knows it is always better to work with what you have than to push for an unrealistic vision of perfection. High Eye Aerial Imaging Inc. recently surveyed a site for a future industrial park in Aurora, Ontario. The original plans had a very sound design, everything accounted for and to code. The only issue was it was very costly, as it worked against the natural terrain. High Eye Aerial Imaging were called in to perform a new survey as previous data sets being used were several years old, although the site had been relatively changed since. The engineering firm received their newly updated D.E.M. within a couple days, as well as an orthographic mosaic of the location from the aerial imagery collected.



Prior to the UAV data, they only had the older survey and outdated google earth imagery to help them understand the topography of the work site and surrounding area. By combining the new visual imagery within the provided CAD data, the engineers were able to better understand the natural landscape and get a much better understanding of the ambient topography (brush, water, or low areas vs piles, junk heaps, forested areas). With this information, they determined that by shifting where the main road entered and navigated throughout the site, they could utilize the natural slopes and green space more efficiently, and thus save themselves millions of dollars in now unnecessary earth work, all while maintaining the proper code and design criteria needed for approval.

Sometimes a small coax in the right place can get the same result as a big one in the wrong. UAV data collection is not only fast, reliable, and more complete; it also serves as a big picture mechanism.

High Eye Aerial Imaging Inc. specializes in low altitude, high definition aerial imaging services, including aerial photography and

aerial videography. They operate two state of the art Unmanned Aerial Vehicle Systems: a multi rotor VTOL system for video and HD photography, and a fixed wing, long endurance UAV for larger mapping and surveying projects. They offer a cost effective alternative to manned aircraft for a variety of applications in the fields of engineering, construction, aggregates and mining, environmental planning and monitoring, agriculture, forestry, and archeology.

High Eye Aerial Imaging provides a number of advantages over ground-based data gathering techniques in the field of mining and aggregates, including safety, production, and flexibility. Services can be utilized for a number of aggregate and mining applications such as land management uses, operations, and marketing and promotion.

For more information as to how to improve the data of your next site plan without incurring additional costs, please contact:

Johnathan Smeh

UAV Mission Control and GIS Technician

www.higheye.ca • info@higheye.ca