BLUNT BELL BULLETIN

THE IMPORTANCE OF TEAM & EQUIPMENT

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SEPT 2016 Vol. 2 Issue 3

engineers surveyors bell

Uncovering the focus of BELL

Well, we knew it would be tough, but it's getting tougher. Twenty-seven years of steady economic growth in the City of Anchorage came to an end in 2015.

In the annual 3-Year Outlook Luncheon hosted by Anchorage Economic Development Corp. (AEDC) Bill Popp delivered some dim information to the Anchorage Community.

"There is no doubt, we are going to feel some significant pain in the next couple of years. But by no means is the Anchorage economy headed for a disastrous time like the 1980s," said Popp, speaking of the worst recession in Alaska's post-oil history. "Think of the downturn we face as more of a pinch than a punch to the economy. It's going to hurt and it's going to leave a mark. But it's not going to be a knockout blow."

We talked about it last Newsletter, about how the significant decline in oil prices have heavily impacted design and construction of all major projects throughout the State of Alaska.

"When manufactures call you to ask you if work is coming…" David G. Calderone interjected in a Manager's Meeting, "then you know work is slow. I know a mechanical engineer guy who is selling t-shirts out of his garage because there is no work."

The Architectural/ Engineering/Construction (A/E/C) industry isn't the only one feeling the hardships in the economy—not even Anchorage alone.

Some membership based organizations that first saw drops in smaller-scale company memberships are now seeing drops in larger-scale corporations. Others, like AEDC, are actually seeing an increase in numbers.

We haven't seen many companies go out of business, but some are sure struggling to stay afloat.

BELL has seen some large changes as well. Our Point Thomson Office shut down until further notice, and the gas pipeline was put on hold again. Our Anchorage office has seen almost a complete halt in Civil and Mechanical Engineering work out there.

Most recently, BELL put on a Company Strategy Meeting to help refocus our services and better strategize efforts regarding where we are as a company.

We are currently working on adjusting our vision and our goals here at BELL to the changing economy. We are taking advantage of the slow time to focus on other important things for the company. So sit back, and sit tight because we are in this for the long run.

The Power of Drones: A BELL Experiment

Venturing into the latest technologies, keeping up with industry projected trends

By Pearl-Grace Pantaleone in Collaboration with Greg Bae & Kevin Chiasson

"We could have something delivered by the end of the day," is not something you hear often in the A/E/C industry. But BELL Intern, Greg Bae, says this is possible with a little bit of creativity and a little bit of new technology. Okay, a lot of technology.

If you haven't heard yet, we bought a drone. After three years of talking about getting one, we finally followed through on the purchase.

"We got a simple drone at a reasonable cost," explains Greg. To start out, we wanted to practice on a model that wasn't too expensive (Trimble's $30k+), but not too limited in surveying abilities (GoPro). We wanted "a drone that has the necessities to perform, but the bare minimum capabilities." Back in July BELL purchased a DJI Phantom 4, a model allowing the operator to control the system with a small tablet.

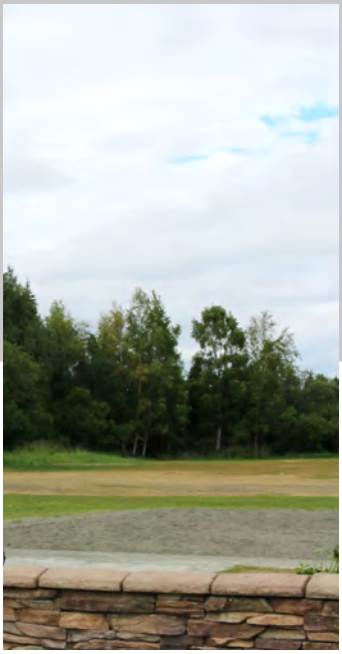
ALASKA AND TECHNOLOGY

During the past 50 years, surveying and engineering measurement technology has made five quantum leaps: the electronic distance meter, total station, GPS, robotic total station and laser scanner. Unmanned aircraft systems (UASs) or drones (also known as unmanned aerial vehicles or UAVs) will be the sixth quantum leap in technology.

Drones are no new thing. Major motion pictures and TV shows have been using drones for years to show the vast aerial perspective of the sets.

All Alaskans know that our state is at least two years behind in trends. However, surprisingly enough, we have started to play around with drones more than any other state. Alaska actually made headlines in March of 2014, as the University of Alaska Fairbanks was made the first of six designated Federal Aviation Administration test sites to deploy unmanned aerial systems, also known as drones. Alaska was also home to the nation's first commercial drone flight, conducted over the Arctic Ocean last summer by ConocoPhillips. BELL was proudly involved with this effort. Our crew set Ground Control Monuments (GCMs) for the project as well as conducted height measurement of the Powerlines and towers in the area.

A documentary about brown bears in the McNeil River was filmed using drones in a collaboration with several professors from the University of Alaska Anchorage including Paula Banchero and Dr. Travis Rector. Because the filmmakers did not obtain a commercial license, the film that was shown in the Planetarium's AudioDome



was shown for free, rather than the $5 a pop they had advertised for.

A law signed by President Barack Obama in February 2012 directed the FAA to throw American airspace wide open to drones by September 30, 2015. And back in April of 2015, the FAA started to approve commercial uses of drones for private businesses. Alaska Aerial Media was Alaska's first business to be commercially certified under the FAA in the state of Alaska.

BELL CAPABILITIES

Surveying and drones come hand and hand. "It's a cost effective way to perform surveys and deliver to customers, reduce time, and it's only a one man crew!" Greg exclaims. He says this will reduce project completion time significantly—maybe by half when compared to conventional surveying. "As long as your project is pre-planned, set properly, and you know how to control the flight—it will easily cut the time in half."

To translate that into a current project of ours, Greg talks about volume analysis. BELL recently was awarded a project to survey around 20 gravel pits along the Glenn and Parks Highways. We proposed to use conventional surveying and 3D laser scanning. But once we had a drone in our hands, there was no way we would let it sit on a desk while this project was underway.

Greg tells me that this is a great project to start with when it comes to using our drone. "The project doesn't require a high level of accuracy." A single surveyor can fly the drone over each gravel pit for up to a 20 min flight per battery (and we plan to get 4), and import the photo scan and data into our software. The photos are then stitched together using a program called Agisoft Photoscan to create mosaics and digital terrain models (DTM). It takes the relative coordinate in the air and further expands it and ties it to the controls set on the ground. The surveyor can then have that gravel pit information set to AHTNA from their remote laptop while a battery is charging as he is driving to survey the next gravel pit.

Our GDT on the North Slope, Kevin Chiasson, is no novice to drone technology. He tells me that UAV's can be used for a number of other survey related reasons. A few include, "off shooting [our] drone into data capture management (much like the AHTNA project), mapping farm land, health facilities in Alaska, forestry inventory of national parks, 3D modeling archaeological sites in the North, performing route mapping services, and quantitative surveys of erosion areas of river shores, riparian areas, etc. It's endless!

TWO BIRDS WITH ONE STONE

So why Greg? It's a more cost-effective way for BELL to test it out before we go out and recruit a professional drone surveyor. We wanted to see the capabilities first hand before investing large sums of money. Also, in order for BELL to obtain a commercial drone license a couple of things need to be accomplished. The pilot needs to be up to date with the latest knowledge of ground control, basics of flight, emergency situations, and tower protocol. Greg, coming from three years at the Alaska Airmen Association, seemed like the right fit.

Plus, he is also in the process of completing his senior project for the Geomatics Program at UAA: ***A Comparative Analysis to Drone Data versus Ground Data: Determining Accuracy of Photogrammetry.*** His goal is to figure out if it's feasibly transferable to the commercial industry.

ALL ABOUT THAT DATA

"Another thing I would note is that the drone is a vehicle to transport the data." Kevin continues. "The camera and programs are what really do the work. A few years ago I could find 7-8 software packages to create a DTM from photos, I think now there are at least 30 different ones and I even found two new ones in the past week…"

Alaska is a model state when it comes to embracing and integrating UAS/drones into its state's economy. With this technology in our hands, who other than us can really make this data service thrive?

Projects, People!

Here is a list of all BELL's active projects:

Surveying

Sag River & West Dock Bridge 2016 PM
G&I MTS Pits Oily Waste Management
Vehicle Bridge Overload Permits
CCP CGF Facility Siting Construction
FS2 Maintenance Scan Processing
FS2 Maintenance Scanning
GC1 Flare Line 1713J-3" Overbend Level 1 Survey
DS1-35 Conductor Installation Survey
PBOC Wing C & E Subsidence Study
CCP Fin Fan Floor Civil QA Support
DS7 Lateral 10/32 VSM Repair
GC2 Hazard Alert Drawing Updates
N Pad Hazard Alert Drawing Updates
Fire water tank and pump house subsidence
Mukluk Pad Underground Hazard Drawings
HWP U/G Hazard Drawing Updates
East Check Point Guard Shack Hazard Drawing Updates
V and L Pads Mods 516 & 516A Quarterly Subsidence Surveys
COTU U/G Hazard Drawing Updates
DS12 SWI Line Replacement Wells 02 and 30
2016 Phase 1 VRS Implementation
2016 Wellbore for R, S, W and Z Pads
GPO Annual Underground Scan Training
VRS Early Works Technician
GPO Annual Underground Scan Training
VRS Early Works Technician
DS11 Hazard Drawing Updates
PSI Containment Pit Design and Installation Support
CC2A Solid Waste Containment
2016 Road Upgrade GC2-M Pad Construction
DS14 GDP Support
NGI Pipeline Monitoring
GC1 Road Crossing (C1070) Backfill Staking
2016 Aerial Flight LiDAR Support
PBOC F/W Tank Utilidor Excavation GDP
2016 Tuboscope Monitor Wells
V-Pad Stress Analysis Mod 514 Piping (various)
GC1 Culvert Installation and GDP
S Pad Well 18 HSM Elevations
X-Pad/B-Pad/DS5 pipe, HSM & ground Elevations

Surveying cont...

DS18 Wells 30,31,32,33 New Anchor Installation
L-200 BFE As-Built
West Dock Causeway Transects
DS14 Prod Sust Rd X-Ing GDP and Pad Expansion
H-Pad Well 25 & 36 PL Elevation
Pad 3 New Stairs GDP
GDP (4) Support for Cut & Abandon Pipe Casings
BOC & GC1 GDP Analysis for Utiliway
COTU South Monitoring Wells
Z Pad Gravel Infill and Expansion Volumes Research
PMT FS1 2C Make Inspect-able
MCC Outside Storage Docks - UG Locates
B Pad Well 14 Lateral Line TOS Elevations
PM2 Well 36 GDP for Gravel Removal
Pad 13 Remediation EM61 & GPR Scanning
DS5 Lateral 15 Subsidence
GPB Lake Survey for Firefighting
Ben Boeke Ice Rink Upgrades
West Mountain Gold
Various Residential As-builts & surveys
many more...

Civil Engineering

ASRC Barrow Garages
RCW Shops
Blessed Sacrament
AWCC Water Treatment BLD
FS1 to CCP Thermosiphon
Kodiak Daycare

3D Scanning

GC3 Wet Gas 3D Scanning
GC1 Wet Gas 3D Scan
GC1 Wet Gas 3D Scan (Skid 22 Additional) Complete
FS3 Wet Gas

Mechanical Engineering

Barrow Garages

Scanning: The Cliff Hanger

Conventional surveying could have been done here, but given the multiple land slides in this area it proved dangerous.

Imagine. You are driving up the George Parks Highway, it's a clear sunny day and you are entering this canyon also known as the entrance to Denali National Park. As you glance to the East you see some rocks dance and tumble down the rock face and settle on the ditch beside the road. You make your way past this for another mile or so and are now exposed to the plethora of lodges if you choose to pull an all-nighter in this gorgeous landscape.

Now, the Alaska Department of Transportation and Public Facilities aren't sure a passive rock slide will always end in this peaceful way. So they hired a local Valley contractor to help prevent the hazard of potential road blockage or, god forbid, fatalities, upon entering one of the world's most beautiful Parks.

Advanced Blasting Services, LLC (ABS) is a woman-owned heavy civil contractor specializing in explosives engineering, drilling, blasting, material production, rock excavation, and slope stabilization. BELL has done a number of survey projects for ABS, including the Whittier Tunnel earlier this year. We had talked about using our 3D scanning capabilities on that project, but because of access and schedule, it was not followed through. Another opportunity was presented when ABS called us up to help with the famous entrance to Denali Park—also known as Glitter Gulch. Their task was to shape the canyon walls to eliminate the hazard areas along a mile of the road where landslides are prevalent, vegetation is not stable, and where danger is a concern.

Since ABS and BELL have some of the same qualities, i.e. sterling safety records and experience working in remote locations, it was a no brainer to team up for this project. And what better chance to use our TX-8 3D Laser Scanner for a unique and interesting application?

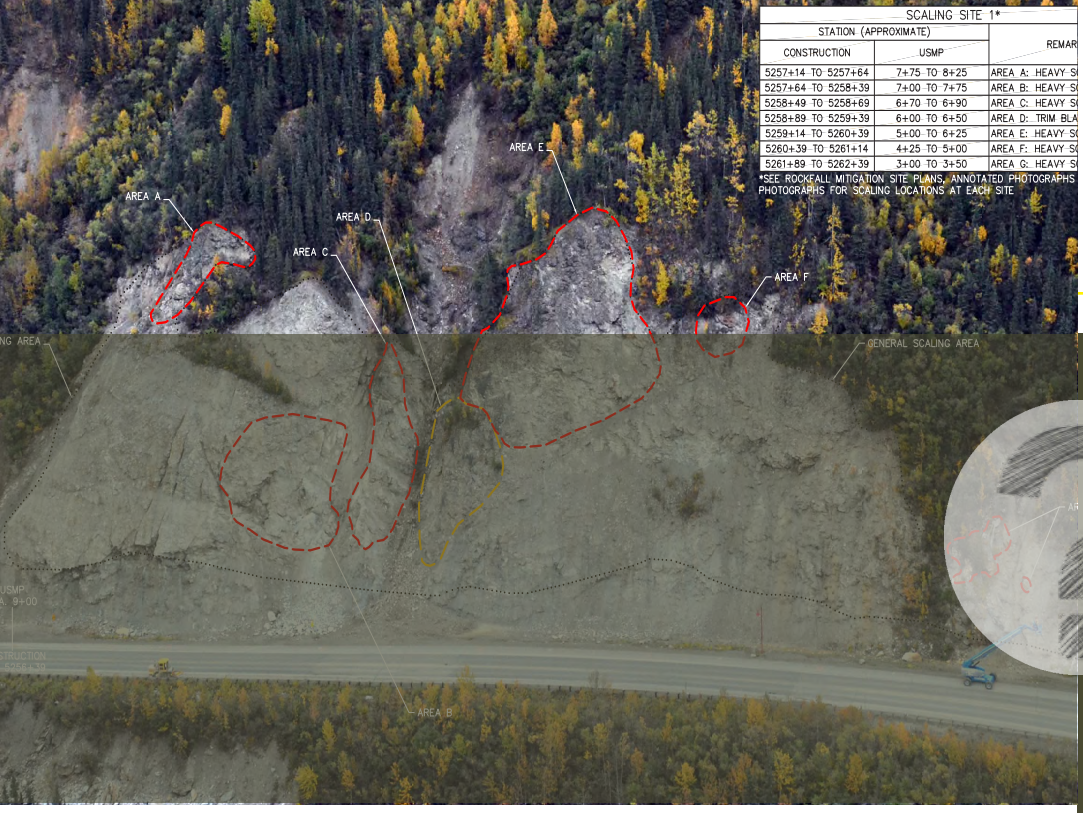
Completing this project using 100% conventional surveying was simply not an option. The crew would most likely have to use a grid system to survey the cliff faces, which in some cases were up to 240 vertical feet. Performing a conventional survey this way would still not create an accurate surface mesh of the area. Not to mention, it would take days to do one section of the road, and ABS is requesting five different sections.

Since there was absolutely no existing as-builts or records for the project areas Scanning Guru, Chris Burt, pulled our Assistant Field Crew Manager, Werner Macedo, out on a 4-hour drive to Glitter Gulch to both find some local control and see what we could get with our laser scanner.

The 2-man crew headed up to Denali the first week of June, which translates into peak tourism season. The traffic was pretty heavy, typical for the beginning of Alaska's summer season. Standing on the shoulders of the busy highway, this project called for a more logistic-based strategy. Chris placed the scans in a zig-zag formation to cover a lot of ground—pun intended—and to link up all the stations, making sure the ditch was covered, and scanning as much of the cliff as possible. Every time a scan was complete he was making his way across the road to a safer vantage point for the next station set up. Each scan was complete with a ¼ inch accuracy.

"If conventional surveying was used, the 'grid' surface would [have] resembled something cartoony," Chris adds. "It would have produced a less accurate perception of the existing conditions rather than being a true 3-dimensional representation of what was there."

"This would have been almost impossible to survey conventionally, but scanning got it done very efficiently. And it got it done quickly."



A scale slope with call outs shown to the right. The red and yellow areas are were blasting was taken place to remove the cliff and tree hazard from the road.

Total coverage: 53 scans, at five locations, ranging 800-2000 foot long and varying 80-240 feet vertically of cliff face in only 12 hours of field time. All scan data was tied to local highway control using our robotic total station, so that it could directly relate to road design drawings for the area. The scans were then registered together to form a cohesive point-cloud for each area, and then surface meshes were extracted from the cliff faces for the client to review and help finalize their blasting plans.

Chris says he was very impressed with the final product. It turned out to be a good marketing opportunity for our laser scanning services as it was a new and unique application for BELL's 3D scanning capabilities. "When we got back and registered the scans together I was surprised at the amount of ground we covered in such a short amount of time....I mean that was around 4600 feet of cliff face in total, almost a mile of road..."

Once back in the office, the surveying, imagery, and scan data were meshed together to create the final product. The goal was to safely provide ABS a fast, accurate product of the existing conditions, while not interfering with the highway traffic in the areas. The reasoning for scanning the cliff face was also to create an existing record of what the site looked like pre-blasting. Chris says this would be helpful with any disputes that might arise with ADOT because we could then scan the site again and compare a before and after surfaces to determine the exact amount of blasting that took place at the sites. Since we took many scans from varying vantage points, we isolated the information we needed after the scans were registered. Chris explains we can remove all the miscellaneous data created while scanning to just look at what is desired. This includes removing all the vehicles on the road, vegetation that would distort the cliff face mesh, and places where you can see pedestrians/bikers along the road shoulders, including Werner and Chris running across the highway performing the work.

"It was a good mark for us," exclaims Chris! "It was a different application. We are always talking about massive facilities that are so complex that scanning becomes the only means of survey. But this gives us more of a civil application where scanning was used to make a difficult situation much easier and with a better final product. This would have been almost impossible to survey conventionally, but scanning got it done very efficiently. And it got it done quickly."

by> pearl-grace pantaleone

Did you know?

The entrance for Denali Park was rather bare to begin with. It only started out with a few hotels and a couple of restaurants. Within the past two decades it's popularity has brought incredible growth and attractiveness or unattractiveness (depending on who you ask).

Now, the rather small area is filled with eateries, hotels, shops, etc. The Denali Princess Wilderness Lodge has expanded six times since it was built in 1987 – with 656 rooms, the hotel alone qualifies as a small city. It is also a small canyon-type area, so hence the name "Glitter Gulch."