McNEIL ENGINEERING
Economic and Sustainable Designs, Professionals You Know and Trust

EPICENTER Autumn 2014

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Welcome to Our Electronic Newsletter

Epicenter is perhaps not what might be expected as the name of an engineering consultant's newsletter. But we believe that it is appropriate, because epicenter highlights the focal point of activity. And our record of achievement with our clients, particularly during the recent economic downturn, testifies to the fact that we have what it takes to deliver first-class results in extenuating circumstances. On that subject, we wish to thank our many clients who stuck with us during difficult times—we appreciate your commitment to us.

In The News

For those of us who regularly drive by the side of Fashion Place Mall, 2014 has been a year of major change for the mall. First we saw part of the original mall, the Sears building, fall to the forces of a demolition crew.

The New Dillard's Under Construction at Fashion Place

In its place a much grander structure has been growing: a new Dillard's, which will replace their existing operations on the North East corner of the complex. Accommodating this major mall makeover required significant renovations to the mall's infrastructure, both surface and subsurface. McNeil's Civil Engineering Group has prepared the infrastructure modification designs for this most recent expansion of Fashion Place Mall. These efforts are part of our continuing service to the mall's owners; we have handled all of the mall's infrastructure design projects for the past decade, or so.

Another mall replacement and renovation project for which McNeil Engineering provided all the civil engineering design services is that of the currently re-emerging Cottonwood Mall. With the upturn in the economy, reports of this mall's resurgence are being increasingly featured in the news media.

Best regards, Ted Didas

Cottonwood Mall as originally approved
A Forward-Looking Mixed Use Project

Do You Really Like Getting Less, But Paying More?

Of Course Not! Choose High Definition Survey, Instead of Conventional Surveying

High Definition Survey (HDS) Technology is an efficient and powerful alternative to conventional surveying for virtually all topographic or structural situations. Manually surveying sites for ground surface or structure details can require hundreds of hours, sometimes over months, and sometimes involving potentially hazardous locations. Conversely, HDS technology makes it possible to capture data from literally millions of survey points, with densities and accuracies less than 0.1-inch in a matter of hours in-stead of days or weeks.

HDS technology is based on an imaging laser that collects up to 1-million survey shots per second, making it easy to provide data that can be used for 2D line work or 3D models. HDS systems also feature an external camera that collects photographic images that are fused to the data set to provide precise 3D images. The composite data are then used for site mapping or engineering design, as data are easily converted into formats such as AutoCAD, which is a McNeil Engineering standard design tool.

Efficiencies That Lead To Savings - A national consulting firm recently undertook the renovation of a hydroelectric power plant here in Utah. "We needed to evaluate some existing structures, including a power-house that is about 100 years old," the Project Manager explained. "I knew about HDS type of scanning, and thought it would be a good application for the project. So, we engaged McNeil Engineering's HDS team to do that for us. This service captured all of the information about the building in a very quick and efficient manner, enabling us to plan around the existing structure with very accurate detail."

Photo of a Scan Location (a mineral processing facility)

Eliminating Errors - Many design and engineering firms turn to HDS technology because the accuracy of the scans virtually removes the need to work from records that are frequently inaccurate, thus eliminating the need for rework. Another McNeil Engineering client used the HDS scanning service for a major retrofit project at an open air equestrian center and events arena in Arizona. The extreme summertime heat was limiting the facilities use, so the owners decided to enclose and air condition the arena. "This was a large retrofit project," the engineering firm reported. "We scanned the interior because there were no plans available. The HDS technology enabled us to precisely pin-point the [resultant] As-Builts for design purposes, including retrofitting the new HVAC system." It took one day to complete the scanning, which is estimated could have taken several weeks with a conventional survey team.

Measure of Safety, plus Accuracy and Precision - HDS technology improves on the safety of personnel because they spend significantly less field time in potentially dangerous environments. This is the case, particularly in the refinery industry, where there may be thousands of miles of infrastructure. In the case of retrofits, an HDS team can provide laser scans, and the point cloud information gives a lot more detail, accuracy and precision than would ever be possible with conventional surveying methods.(See graphic example below)

3D LiDAR Scan Model Image. Note the precise facility detail in the LiDAR Scan Data image.

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Phenomenal Example of HDS Technology – The image shown below was produced from Laser Scanning field work at a local refinery. Total field time to capture all this 3D information was about 4 hours!

Watching the World of Engineering - "Super Tower" to be Tallest in Thailand

SuGRAND CANAL LAND (G-Land) yesterday announced a project to build a "Super Tower", which will be Thailand's tallest building and one of the world's top 10 skyscrapers when it is completed in six years.

Despite Thailand falling under another military controlled government after the coup on May 22, G-Land said its board of directors had approved going ahead with the skyscraper, which will stand 615 meters (2017 feet) tall and have a total of 125 floors. It will be part of the BHT100-billion ($3.1-billion) Grand Rama 9 project, situated on a 11.7-hectare (29-acres) plot in Bangkok's new Rama IX-Ratchadaphisek business district.

"This skyscraper is going to be the new landmark of Thailand, a world-class attraction that everyone must visit at least once in his or her lifetime," said Yotin Boondicharern, chairman of G Land.

"A skyscraper is at the same time a triumph of the machine and a tremendous emotional experience, almost breath-taking. Not merely its height but its mass and proportions are the result of an emotion, as well as of calculation."
George Gershwin (the composer)

About Our People

In service of our country- Carl E. Greene, Sr. Project Manager with our Consulting Group, is serving a 6-Month Tour of Duty with the Military Reserve in SW Asia.

Our New Staff Members…...

Civil Engineering-
Jeff A. Hawks, PE - Project Engineer
Consulting-
Jacob Hendrickson - Landscape Designer
Structural Engineering-
Michael Ekenstam - Jr. Engineer (EIT)
Surveying & Laser Scanning-
Noel Enriquez - Technician
Troy Taylor - Marketing

Complying with Utah Rules and Regulations on the Practice of Professional Engineering

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Matt Roblez, PE, SEI, Manager of our Structural Engineering Group, will be presenting at the upcoming workshop on Utah Engineering Law, hosted by Half Moon Education, Inc. on December 4, 2014.

Specific topics will include:

- Powers and duties of the Utah Division of Occupational and Professional Licensing
- Requirements for licensing and renewal
- Grounds for disciplinary action
- Procedure for investigation and hearing
- Defining the practice of professional engineering
- Reviewing the types of disciplinary actions

More information can be found at:
https://www.halfmoonseminars.org/seminars/128656/utah-engineering-law/salt-lake-city-ut

BIM – What Is It, and How Is It Used?

BIM is an acronym that stands for Building Information Modeling. BIM is very much talked about these days in the building industry, but when asked you will receive more or less different definitions from different people.

Some say BIM is a type of software. Some say BIM is the 3D virtual model of buildings. Others say BIM is a process or BIM is nothing more than the collection of all building data organized into a structure database easy to query both in a "visual" and a "numerical" way. It is safe to say that BIM is all the above, and some more…

Now let's see BIM explained in layman's terms. When it comes to BIM everything starts with a 3D digital model of the building. (McNeil Engineering routinely uses 3D digital models in surveying, analysis and design). The model, however, is way more than pure geometry and some nice textures cast over it for visualization.

A true BIM model consists of the virtual equivalents of the actual building parts and pieces used to build the structure. These elements have all the characteristics - both physical and logical of their real counterparts. These intelligent elements are the digital prototype of the physical building elements such as walls, columns, windows, doors, stairs etc. that allow us to simulate the building and understand its behavior in a computer environment way before the actual construc- tion starts.

What is BIM good for? While there can be several different goals to fulfil by the creation of a purpose-built BIM model, these may differ both in their focus, scope, complexity, level of details and the depth of information added to the 3D model. Of course the most trivial use of a BIM model is for making nice visualizations of the structure to be built. This is good for both helping your design decision by comparing different design alternatives and for "selling" your design to the local community that might have a veto about the entire building project.

Design Change Management - Since data is stored in a central place in a BIM model, any modification to the building design will automatically replicate in each view, such as floor plans, sections and elevation. This not only helps in creating the documentation faster but also provides stringent quality assurance by automatic coordination to the different views.

Building Simulation - BIM models not only contain architectural data but the full depth of the building information including data related to the different engineering disciplines such as the load-bearing structures, all the ducts and pipes of the different building systems and even sustainability information as well, with which all the characteristics of a building can easily be simulated well in advance.

Data Management - BIM contains information that is not visually representable at all. Scheduling information, for example clarifies the necessary manpower, and anything that might affect the outcome of the project schedule. Cost is also part of BIM that allows us to see what the budget or estimated cost of a project might be at any given point in the time during the project.

Building Operation - It is needless to say that all these data put in a BIM model is not only useful during the design and construction phase of a building project but can be used throughout the entire building lifecycle helping to reduce the operation and management costs of buildings, which are at least equivalent to the entire cost of construction.

Bridges - BIM is also being used by engineers to better monitor the heath of vital pieces of infrastructure such as bridges. Zhigang Shen, a professor at the University of Nebraska's School of Architectural Engineering and Construction, has developed a BIM-style software program for the express purpose of monitoring the condition of bridges.

The program creates a 3D model of real life bridge structures in exacting detail based on data amassed via on-site inspections. The use of BIM enables the huge welter of data concerning the myriad components and aspects of a bridge to be incorporated into single, easy-to-access simulation, vastly expediting the monitoring process for transportation officials, inspectors and maintenance personnel.

BIM holds great promise for the future of Civil Engineering, Construction and Management. Creation of BIM Models for existing buildings is also being employed as a means to facilitate future maintenance. An example, The Capitol Hill Ward is described on p. 5.

Recent News of Changing Futures

Denmark - Surpassing coal and natural gas, wind power is now the cheapest form of electricity in the country.

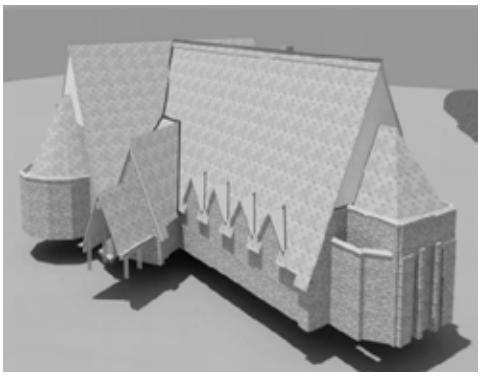
England - Starting in January 2015, public roads will be open to driverless cars.

USA - An industry survey found that interest in obtaining Leadership in Energy and Environmental Design certification remains strong.

London - Researchers are looking to bring new technology out of the lab and into the marketplace. One is a compact q-bot that could install underfloor insulation so that floorboards wouldn't need to be pulled up.

Capitol Hill Ward - Technologically Advanced Renovation

In our earthquake-prone state, improving seismic safety is an important part of almost every major historic building renovation. The renovation of Salt Lake City's Historic Capitol Hill Ward introduced an exciting new seismic upgrade technology to Utah. The center core technique allows walls to be reinforced without the disruption of historic interior finishes common to other seismic upgrade strategies. Center core technology has the potential for reducing the cost of retrofitting many historic Utah buildings.



High Density Scan Model of the Capitol Hill Ward Building

In addition to this innovative approach to seismic safety, the Capitol Hill Ward project included careful restoration of the building's original finishes. On the exterior, the building's distinctive multi-colored shingle roof was badly leaking and had faded with time. McNeil Engineering's Consulting Group specified new composite shingles, which were custom designed to match the originals both in size and appearance.

This innovative project not only insures the future of a Capitol Hill landmark but also represents a successful model for addressing the seismic and aesthetic issues which face many of Utah's treasured historic buildings.

Additionally, our staff initiated the creation of a "retrofitted" BIM system (see p. 4) for the Capitol Hill Ward building. This undertaking required the creation of a 3-D model through the use of High Density Scanning (see p. 2). it was made possible in part by the existence of well-preserved and accurate architectural drawings. Thus, future maintenance and repair can be initiated with a much greater degree of confidence.

Drinking water drips away as pipes and mains break down
Researchers say degraded water mains and pipes in the U.S. cause about 2.1 trillion gallons of potable water to be lost each year. The problem is widespread and will be expensive to fix; many of the leaking pipes are decades old and need to be replaced entirely. The American Water Works Association estimates that repairs, replacement and new development will cost $1 trillion.

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Desalination could help California's water future - A $1 billion desalination plant is taking shape in Carlsbad, Calif., that some claim is drought resistant because it draws water from the ocean. Privately owned Poseidon Water is building the plant and has agreed to sell water to San Diego County at $2,257 per acre-foot, more than twice the current cost.

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