

Overcoming Old Habits

Contractors are getting past decades-old process models and bringing construction tech in-house

Beyond a set of project drawings created by the design team, there is a second set of construction designs that are rapidly changing the way commercial building projects are being managed — and it may surprise some to learn that these complementary plans are coming from contractors' in-house tech experts.

Virtual design construction (VDC) departments are the modern builder's not-so-secret weapon in the war on construction inefficiencies, and partner roles are beginning to react to the addition of this modern tech.

Historically speaking, roles were kept in completely separate lanes — it were architects and engineers who designed and contractors who built. However, with development opportunities and construction pressures at an all-time high, a 2019 survey from the Associated General Contractors of America (AGC) and the FMI Corp. shows an accelerating trend toward contractors handling and overseeing certain design elements in response to the speed and complexity needed to meet developers' expectations. In fact, survey numbers reveal that more than 43 percent of contractors are ramping up to perform design work in-house — a 5 percent increase from 2018 — with another 25 percent stating they are considering making this change “soon.”

Adding Value

The risk-mitigation value of VDC technology is proving to be a golden opportunity — aiding contractors in expediting development and fabrication, just as our industry struggles to adapt to tighter schedules, smaller budgets, higher-tolerance building systems and a shrinking labor force. More is being done by fewer people, and at a faster pace than ever before — which without VDC, can result in reduced quality of work.

There are enormous benefits associated with VDC's high-tech tools. VDC's predictive infrastructure clash-detection consistently produces a higher-quality result with impressively

fewer change orders. And because of this, opportunities abound for those who hold an evolved vision of design coordination, including contractors and architects already poised to provide integrated VDC services to their clients.

Addressing a Problem

Because contractor technology has rapidly advanced over the past several years, it has outpaced a decades-old process model. At issue are veteran decision-makers that tend to hold on to long-standing

practices and an employment market that is beginning to fill with tech-savvy VDC practitioners.

Complicating matters even further, contracts and fee structures are not yet routinely adapted to fully real-

revealing the significant upward trend of in-house construction design, the market will soon demand widespread adoption. Contractors with solid VDC experience under their belts are well-positioned to deliver higher-quality projects with record speeds.

How We Got Here

In the early 2000s, early versions of design software were introduced which — for the first time — allowed buildings to be designed in a true 1:1 scale in three dimensions. As design workflows evolved, better visibility of design intent and spatial layout became available and coordination issues began to become obvious. Because the software was first used to replicate the same workflows and management practices of the past, it created system-specific, scaled drawings from the model

creasingly, pressure was placed on the construction team for cost and schedule overrun. As a result, construction teams began to use models to coordinate and lay out projects so that building systems were constructible before fabricating any systems. Eventually, top contractors began providing coordination services to efficiently manage the process and act as a liaison between the construction team and the design team of record (architects and engineers), creating some responsibility tensions.

By 2012, model usage was normalized and efficiencies were made that allowed contractors to use the design team's model to fabricate the building system. But even with a more streamlined process, inherent problems arise when contracts, developed from decades-old practices, still separate design from construction.

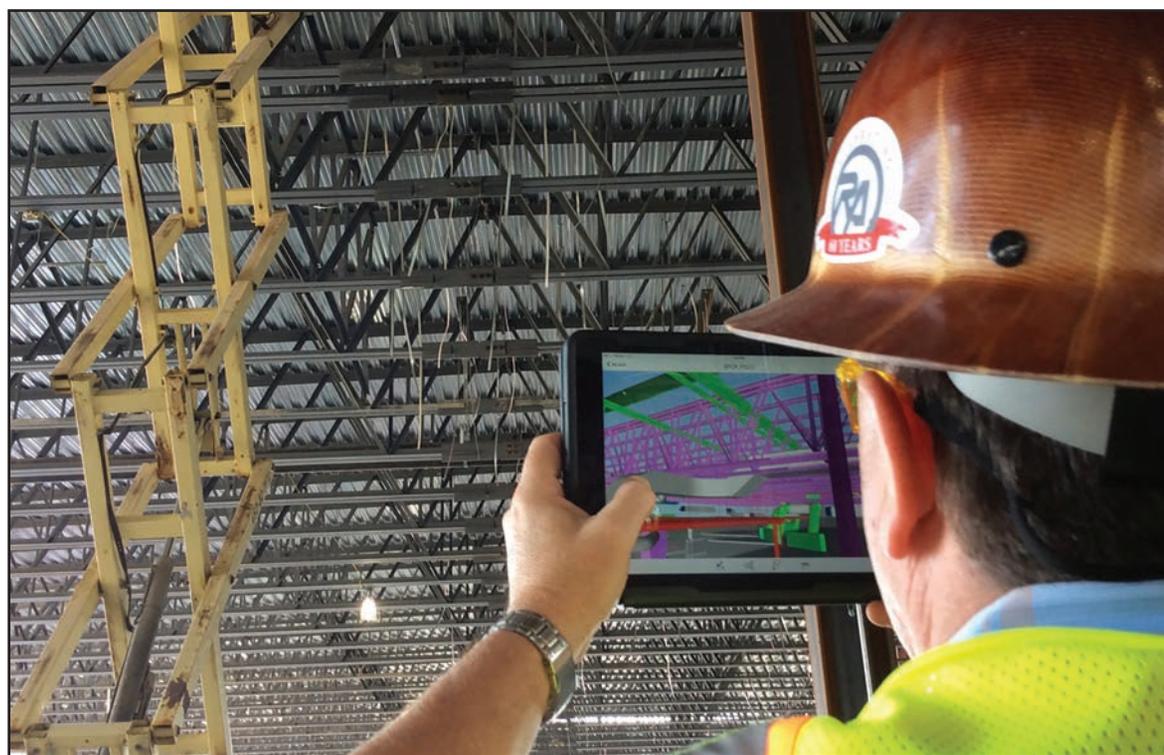
Going 3D in a 2D World

Currently, contractors are still seeing mechanical engineering plans and subcontractor shop drawings submitted in 2D. To solve this issue with minimal budget increase, tech-savvy contractors are leaning on software that provides layered markups and custom-column features to integrate the varying levels of information modeling used across a construction project. In addition to harnessing the power of software to handle complex integration and communication between multiple stakeholders in real time, contractors are using tech to leverage their own 3D VDC data with the 2D data provided by their subcontractors.

This coordination effort allows subcontractors to confidently prefabricate building systems off-site, resulting in quicker installation and safer, less-congested construction sites and more on-time deliveries. Additionally, by uploading documents to 2D-3D coordination software, construction teams are able to speed up concrete work and start rough-ins earlier.



MARK DECKER

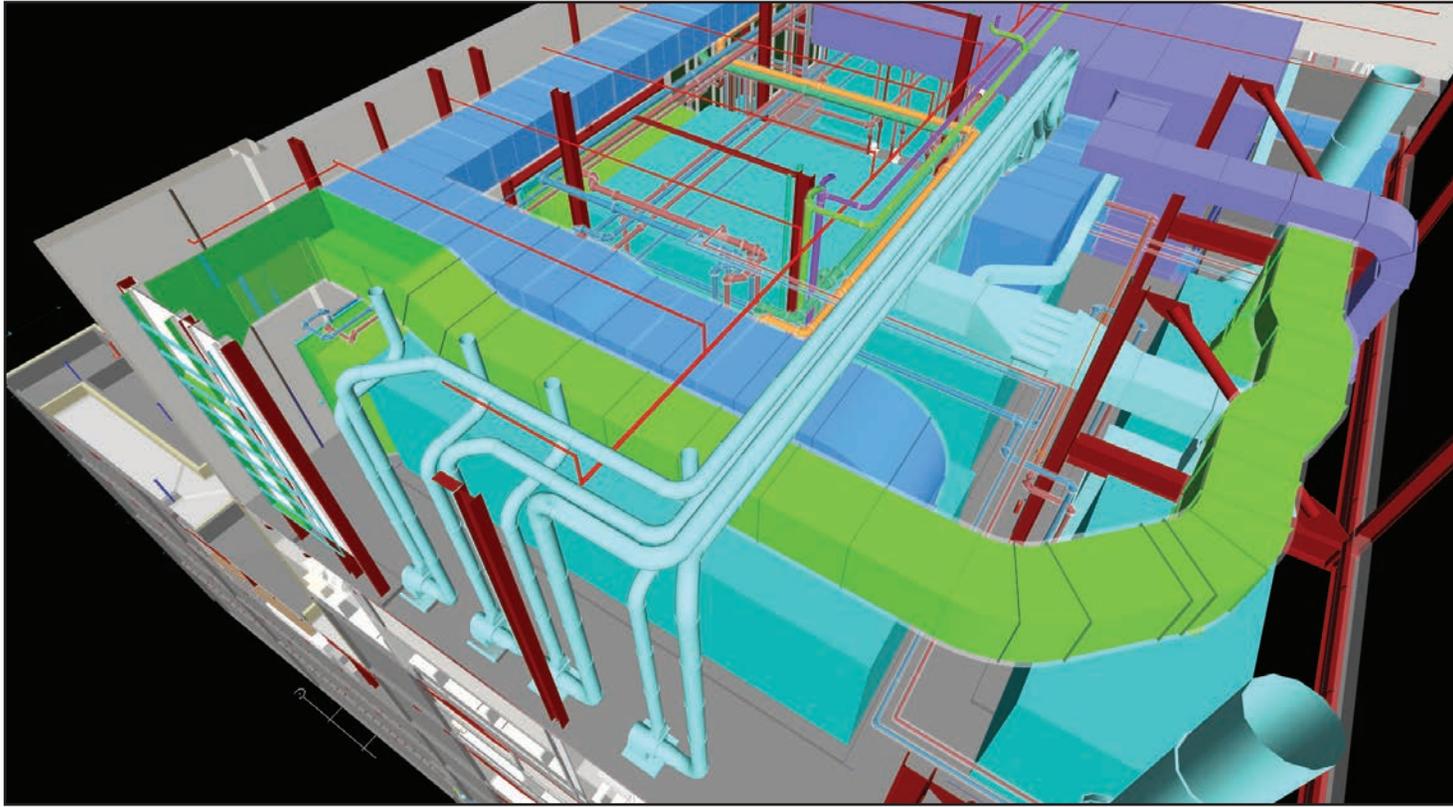


ize VDC's advantages while managing its costs. Currently, design teams who don't account for modern realities can hide behind contracts that have not included design-conflict resolution. This can give a temporary, false sense of comfort to owners and pushes the responsibility of unintended design conflicts downstream to contractors to resolve later.

With owners and builders catching on to the disadvantages of building without VDC coordination, such issues are likely to be less well-hidden in the future. And with survey numbers

but referenced other building systems as simple 2D overlays. No effort was placed on using the tool to better collaborate and lay out building systems which needed to be routed to fit within the building's 3D space. Instead, traditional and uncoordinated 2D drawings were produced and the coordination responsibility was passed on to the construction team as “means and methods.”

What followed were change orders, needed to resolve many of the problems inherent to the design — changes that cost the owner time and money. In-



HIGH TECH

from page F25

The Future: Design-Build

More and more, knowledgeable developers and owners are turning to a modern construction solution for efficiencies and quality known as “design-build.” It’s a process that starts with an updated contract structure which favors the idea that design coordination responsibilities are best managed, for the benefit of all, by the construction team. This better allows for the construction budget and schedule to manage the complete building process, while experts from both the design and construction worlds are better utilized at the correct time, and coordination issues are addressed when most efficient for owners.

While some contractors may feel like design-build is a forced marriage between the designer and contractor, corporate risk directors believe today’s contractors have little choice but to embrace it. Design-build is here to stay, they say, because owners like it. While acknowledging that fact, experts advise owners to look for contractors with high-tech, integrated design experience.

“A contractor needs to be a strong leader, and learning that role takes time,” said Kristin Hill, director of educational programs for the Lean Construction Institute. She notes that leading an integrated construction design process demands a culture of commitment and trust that isn’t developed overnight.

Additionally, other experts agree that builders should expect their in-house design capabilities to evolve to keep pace with the changing construction environment, and that design-build is an iterative process that will spin unless contractors have the right information that best comes from VDC knowledge and planning.

Outlook

Because collaboration is fundamental to the design-build delivery model, it’s not a surprise that the 2019 AGC/FMI survey found communication and oversight to be the prime motivators for contractors adding in-house design.

As construction continues to heat up this year, it will become increasingly obvious that builders who are prepared to lead with integrated tech tools will consistently outperform those still trying to catch the construction tech wave sweeping our industry.

Mark Decker is a 12-year design and construction veteran who leads Jacobsen Construction Co.’s VDC department. His latest area of focus is holistic software that documents best workflow coordination.



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Company Name Address	Phone Web	No. UT Licensed Engineers	No. Graduate Engineers	No. of Utah Employees	Services Offered	Notable Utah Projects 2018	Owner/Top Executive
1 Ensign Engineering & Land Surveying 10000 S. 45 W., Ste. 500 Sandy, UT 84070	801-255-0529 ensignutah.com	40	10	102	Civil, structural, surveying, water, municipal, aerial technologies	UVU Performing Arts, Pluralsight Office, Rome LDS Temple, Torry Pipeline, SLC Airport specialty structural, Provo High School	SCorporation
2 Van Boerum & Frank Associates Inc. 330 S. 300 E. SLC UT 84111	801-530-3148 vbfa.com	34	36	123	Mechanical, electrical, fire protection, commissioning	Intermountain Gardner Transformation Center, Salt Lake City Fire Station #14 & NET ZERO, Intermountain Alta View Hospital Campus Reconfiguration, One Empire Pass, DSD Farmington High School, S.L. County District Attorney Office Building, Ken Garff Volkswagen	100% Employee- Owned
3 Spectrum Engineers 324 S. State St., Ste. 400 SLC, UT 84111	801-328-5151 spectrum- engineers.com	27	12	99	MEP & fire protection engineering, technology, lighting & theater design	Salt Lake Community College Westpointe Workforce & Training Center, Intermountain Healthcare Kem C. Gardner Transformation Center, Provo 4th District Courthouse, Intermountain Layton Hospital, Mountain America Credit Union Tenant Improvement, Intermountain Healthcare Dixie Regional Medical Center	Dave Weseman President
4 Reaveley Engineers & Associates 675 E. 500 S., Ste. 400 SLC, UT 84102	801-486-3883 reaveley.com	24	4	43	Client-driven structural engineering solutions	Huntsman Cancer Institute, Primary Children's & Families' Cancer Research Center, Snow College Robert M. & Joyce S. Graham Science Building, Cedar City LDS Temple	100% Employee- owned
5 ARW Engineers 1594 W. Park Circle Ogden, UT 84404	801-782-6008 arwengineers .com	19	5	33	Structural engineers	USU Life Sciences Building, Weber State University Lindquist Hall Renovation, Real Salt Lake Training Facility	Brent L. White President
6 BHB Consulting Engineers PC 2766 S. Main St. SLC, UT 84115	801-355-5656 bhbenigneers .com	18	14	51	Structural engineering/ design & seismic analysis	Sugarhouse University of Utah Health Center, University of Utah South Campus Housing & Dining, Granite School District Cyprus High School Replacement, Granite School District Skyline High School Replacement	Chris Hofheins President
7 Carollo Engineers 7090 S. Union Park Ave., Ste. 600 Midvale, UT 84047	801-233-2529 carollo.com	11	5	22	Water & wastewater treatment planning, design, CM	Jordan Valley WCD-Finished WW Improvements, South Valley WRF Grit & Phosphorus Removal Design, SLCPU Parleys Master Site Plan & Electrical & SCADA assessment, Central Weber Nutrient Upgrade Design Phase 1, Logan Wastewater Construction Management ESDC, Washington County WCD Sand Hollow Arsenic Treatment Plant, St. George Gunlock Water Treatment Facility Design	Alan Domonoske Office Manager
7 Dunn Associates Inc. 380 W. 800 S., Ste. 100 SLC, UT 84101	801-575-8877 dunn-se.com	11	9	25	Structural engineering	One Empire Pass, Mountain View Village Phase 1, Summit Vista Retirement Community, Brigham Young University Ira A. Fulton College of Engineering & Technology Building	Ronald H. Dunn
9 Precision Systems Engineering Inc. 9805 S. 500 W. Sandy, UT 84070	801-943-5555 pseutah.com	9	8	49	Project & construction management, mechanical, structural, electrical, controls	Innophos, RB, Thatcher expansions BWO, Marathon, & Holly Frontier retrofits and expansions, Orbital ATK & Timet modifications	Brent Maxwell Roger Rich Mike McMullin Noe Casalino
10 Calder Richards Consulting Structural Engineers 634 S. 400 W., Ste. 100 SLC, UT 84101	801-466-1699 crceng.com	8	5	21	Evaluation, design & renovation for building structures	Provo High School, Canyons Center Parking Structure, Empire Pass Multifamily, Sandy East Village Mixed-Use	Jonathan Richards Managing Partner
11 Envision Engineering 240 E. Morris Ave., Ste. 200 SLC, UT 84115	801-534-1130 envisioneng .com	7	6	32	Electrical power, lighting, A/V, acoustics, telecom, security	SLCTRIP Airport, Utah State Prison, Granite School District, Davis School District	Jeff Owen Dave Whitton
12 Reeve & Associates 5160 S. 1500 W. Riverdale, UT 84405	801-621-3100 reeve-assoc.com	6	2	35	Civil, structural, traffic, land planning, survey	*	Nate Reeve
13 Meridian Engineering Inc. 1628 W. 11010 S., Ste. 102 South Jordan, UT 84095	801-569-1315 meiamerica.com	5	2	38	Transportation, civil design, right-of-way	Brigham Young University Engineering Building, Salt Lake Community College Westpointe Workforce Training & Education Center, University of Utah Guesthouse Expansion, built to meet high performance building standards on a very steep hillside, Sprague Library in Sugarhouse, Kearns & Daybreak Libraries & Draper Recreation Center, Redwood Road, Bangerter Highway to 12600 S.	Randall Vickers Steve Johnson Darryl Fenn
14 Case Lowe & Hart Inc. 2484 Washington Blvd., Ste. 510 Ogden, UT 84401	801-399-5821 clhae.com	3	0	10	Mechanical engineering, electrical engineering, building commissioning	Autoliv, Boeing, Gossner Foods, KIHOMAC, Parker Hannifin, Nutraceutical, Schreiber Foods	*
14 Silverpeak Engineering 177 E. Antelope Drive, Ste. B Layton, UT 84041	801-499-5054 silverpeakeng. com	3	1	11	Civil & structural	Stadler Rail U.S. headquarters and manufacturing facility, Downtown SLC/West Temple microapartment complexes, Horizon Credit Union corporate office building, Advantage Arts Academy Charter School - Herriman, Ascent Academy Charter School - West Valley, Excelsior Academy Charter School - Erda	Joshua Jensen
16 Dominion Engineering Associates LLC 5684 S. Green St. Murray, UT 84123	801-713-3000 dominioneng.net	*	*	18	Civil engineering, survey, land planning, landscape architecture	Amazon Distribution, UPS Hub, Post Cereal, McDonald's, Ninigret Industrial Park, Herriman Town Center	Corbin Bennion Farley Eskelson Fred Moss

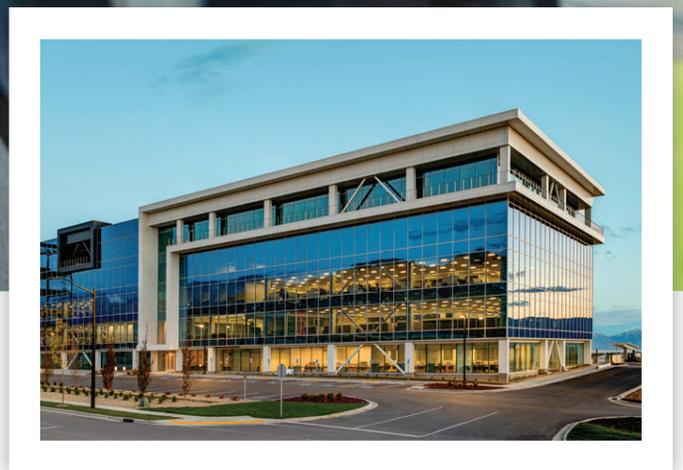
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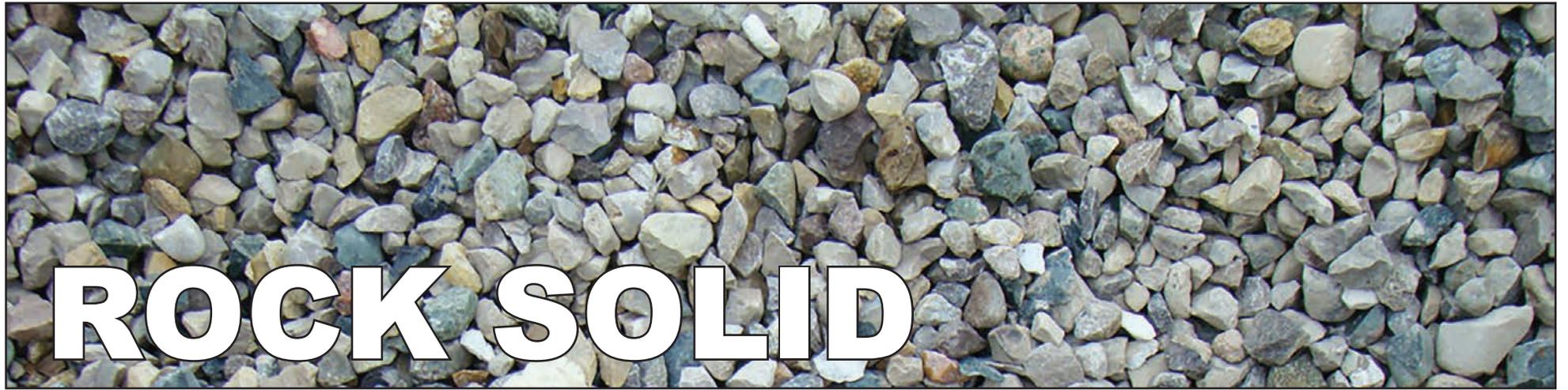
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Aggregates industry adds \$680 million to Utah's economy

New Utah Foundation research report points to economic impact

industry often get little attention, but the work they do provides the basic materials necessary for modern civilization," said Utah Foundation's Peter Reichard. "In conducting this study,

we learned much about the significant impact those jobs and related sales have on Utah's economy and tax base."

The research report was com-

missioned by Clyde Companies, Kilgore Companies and Staker Parson Materials and Construction. It is available on the Utah Foundation website at www.utahfoundation.org.

Aggregates — sand, gravel and crushed stone — account for \$331 million dollars in annual sales across Utah and the industry directly employs 1,620. So says a new research report from Utah Foundation. The study found the industry and its associated jobs have an indirect impact of \$680 million a year and support 3,410 jobs.

Key findings of the report "The Bedrock of Civilization: The Economic Impact of the Aggregates Industry in Utah" include:

- Most (90 percent) of aggregates are consumed within 50 miles of mining and production and shipping costs rise sharply with distance.

- The aggregates industry is present in 26 of Utah's 29 counties and has a moderate or larger impact in 14.

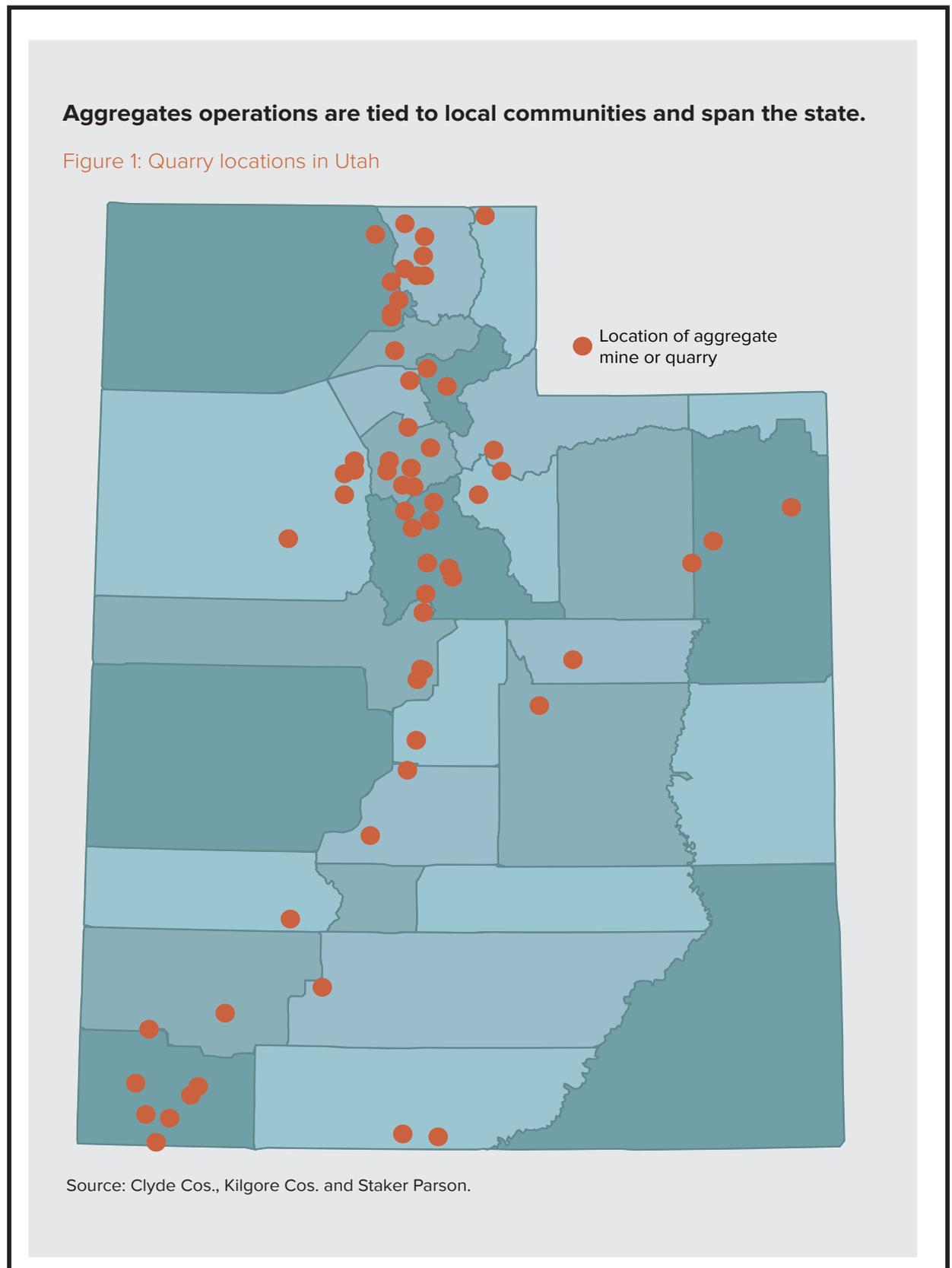
- Unlike many other industries where borders are fluid and companies can choose where to expand and contract, the aggregates industry is dependent on the location of the natural resources which are mined. The aggregates industry is strongly tied to local communities. In Utah, there are aggregate quarries in at least 23 of 29 counties.

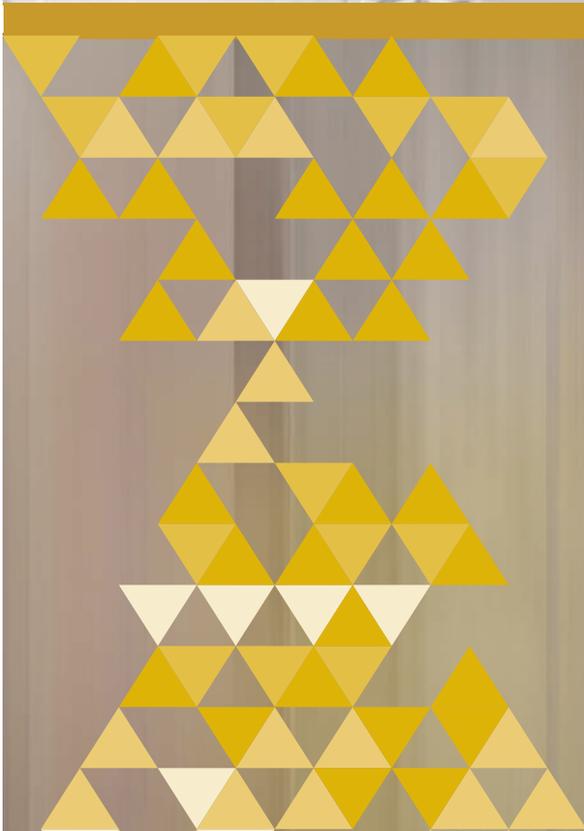
- Earnings for Utahns within the industry and from all jobs supporting the industry results in up to \$9.1 million in revenue for Utah through state income taxes.

- Sales within the industry and from all sales supporting the industry may generate up to \$31 million in sales taxes for the state and another \$10 million for local governments.

- The value of aggregates industry output has rebounded in recent years but has not yet returned to its pre-recession peak, when adjusted for inflation. This reflects national and regional trends.

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Rescuers work through rubble following an earthquake in Christchurch, New Zealand, in 2011. A Utah company is developing construction beams designed to help large buildings better survive earthquakes.

Steel beam technology working toward reducing earthquake hazard

Natural forces, over time, have moved and shifted Utah's landscape into majestic mountains and scenic valleys. Yet, they are also the source of serious seismic activity, hazards and risks. The western edge of Utah's Rocky Mountains is home to the 240-mile Wasatch Fault, the state's urban corridor and more than 2.5 million inhabitants.

Over the past 17 million years, the land displaced close to 7 miles of slip and gave rise to towering mountains with the last big earthquake striking in 1934 (6.6 magnitude), according to University of Utah seismograph stations. This fault line has distinct segments which move independently and have separate earthquake events — each with its own unique story to tell. Historically, one of the central segments emits a major earthquake (6.5-7.5 magnitude) every 300 to 350 years and underlies the most highly concentrated populations in



PATTY JOHNSON

Utah. Roughly 700 earthquakes and aftershocks shake the Utah population every year with the most recent major event (7 magnitude and 10 feet of ground surface displacement) occurring 500 years ago and may lead to a tectonic itch that must be scratched.

Not helping matters, the Salt Lake Valley is an ancient sea bed, meaning softer sediments comprise the soil and amplify seismic waves much like a meta-chronal rhythmic wave in a football stadium or concert arena — fun only if you are a willing participant.

And not widely known, more than 200 large fault lines reside in Utah, traversing across the state from north to south and heavily concentrated in the western half. Since we haven't recently experienced a large event, developers, builders and

see **QUAKES** page F44



Liquifaction, a condition in which certain soils turn to liquid during an earthquake, swallowed this car during a massive shake in 2011 in Christchurch, New Zealand. Liquifaction is a concern in some areas along the Wasatch Front.

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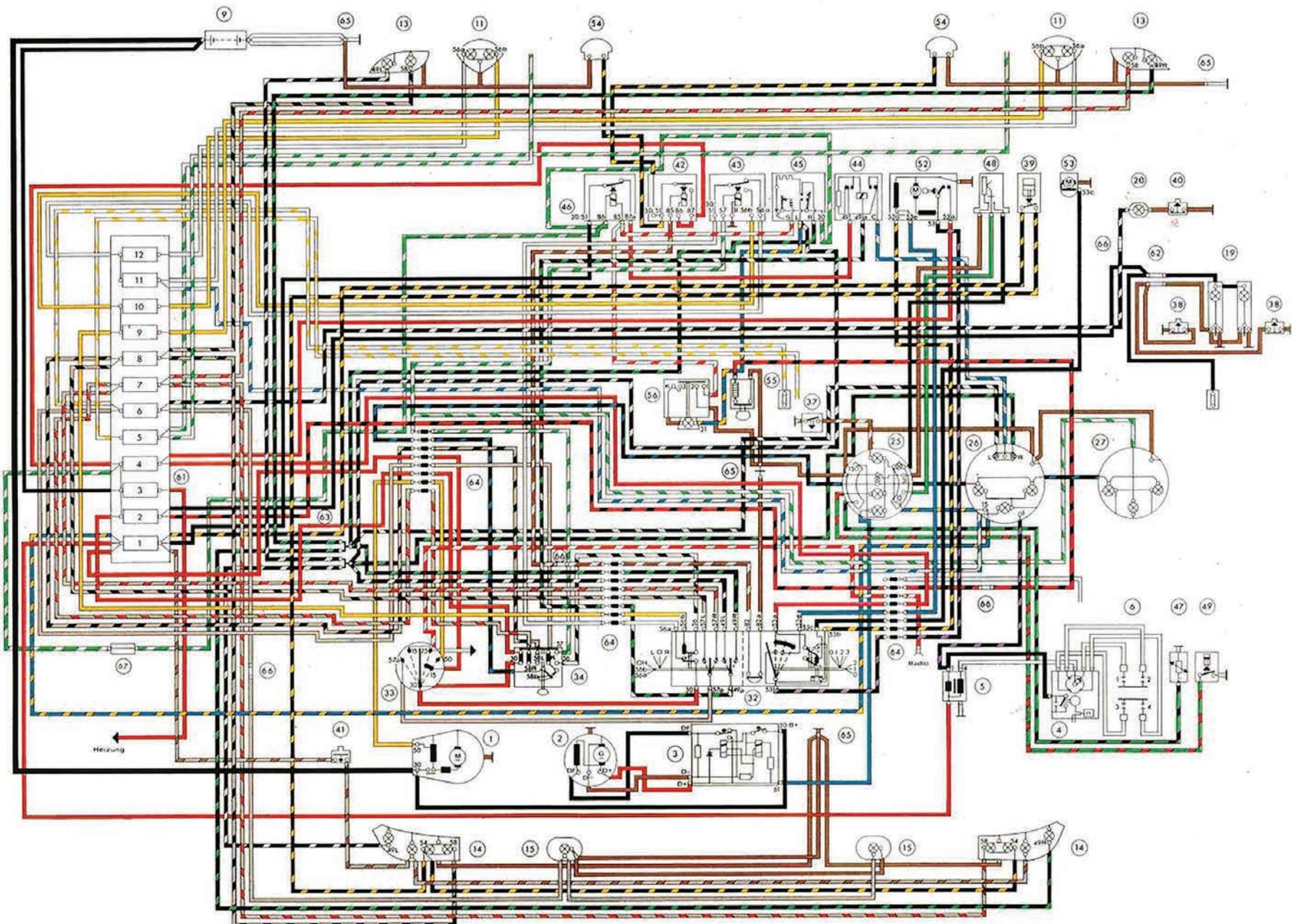


List Development Laneace Gregersen | laneace@slenterprise.com

	Company Name Address	Phone Web	Total Sales 2018	Number of Utah Employees	Bonding Capacity	Experience Modification Rate	Services Offered	President/CEO
1	Cache Valley Electric Co. 875 N. 1000 W. Logan, UT 84321	435-752-6405 cve.com	\$277M	890	\$500M	.79	Contractor, electrical, voice, data, security, technology	James Laub
2	Taylor Electric Inc. 2650 S.1030 W. SLC, UT 84119	801-413-1300 taylor-electric.com	\$63.7	321	\$130M	.57	All needs for commercial & industrial construction	Ryan J. Taylor
3	Rydalch Electric Inc. 250 W. Plymouth Ave. SLC, UT 84115	801-265-1813 rydalchelectric.com	\$30M	120	\$35M	.64	Electrical construction & maintenance services	Frank Rydalch
4	Wilson Electric Services Corp. 208 W. Lucy Ave. SLC, UT 84101	801-908-6660 wilsonelectric.net	\$10.9M	68	\$175M	.54	Commercial & industrial electrical contractor, design-build and service	Wes McClure President
5	Eagle Electric Inc. 7000 S. Commerce Park Drive Midvale, UT 84047	801-255-8089 eagle-electric-inc.com	\$2.8M	24	\$5M	.85	Commercial service, repair, new & remodel electrical	Trent Lovendahl
6	Central Electric Co. Inc. P.O. Box 17897 SLC, UT 84117	801-467-5479 central-electric.com	*	14	*	*	Full-service electrical contractor	Peter L. Robbins
7	Hunt Electric Inc. 1863 W. Alexander St. SLC, UT 84119	801-975-8844 hunteelectric.com	*	500+	\$400M	.58	Electrical, technology, design-build, infrastructure, high-voltage	Troy Gregory Richard Hunt



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Someone wakes up one day, throws a bunch of tools in the back of their pickup and sets out to explore the mountains, rivers and valleys that comprise our public lands. They look for signs many may miss on a casual adventure through the wilderness: places where the river bends just so, dimensional outcroppings of rock, speckles in stone.

When they see something that looks promising, the explorer does a little digging (or panning, if searching in a body of water). Just like an astute shopper will spray samples of perfume to smell, not relying on the packaging to sell them the product, a prospective miner will pull up a piece of earth and take samples. They mark the spot on a map and continue the quest (or go home, if it's getting too dark to work.

Let's be realistic here).

In regard to stone, these samples are tested for strength, hardness, porosity, endurance through freezing and thawing out again a lot of times, density, and a range of other attributes. The goal is to discern whether the stone is durable enough to withstand centuries of the sort of abuse characteristic of life on the surface of Earth, like freezing temperatures, rain water, earthquakes, UV rays — you name it. Not all stone has an equal level of quality and no one wants to place a mining claim on stone that is liable to fall apart in 20 years.

If the stone is acceptable, the explorer puts some markers on that ground and files for a mining claim with the Bureau of Land Management (BLM). Involved in this process is proving to the BLM that the material is "locatable," which means it is dis-



ELIZABETH THOMAS

tinct and unique and can be sold commercially for a profit above what other stone commands in the market.

Now that the prospector has a claim, they have to complete a Notice of Intention to Commence Mining Operations, a Reclamation Plan and a mining plan — all of which are filed with the BLM and a state agency. In Utah, this is the Department of Oil, Gas and Mining. Putting these plans together takes months of work and includes everything from a soil analysis to an engineer determining how to shape the area that is going to support the waste rock dug up during the mining process. After the original is completed and submitted, the company must work through a series of revisions as requested by the BLM and the state agency, a process that may take years. The resulting plans are often hundreds of pages long and include not only how much is going to be mined from where, but also how everything is going to be put back once the miner closes the claim. Money for this putting-it-back operation, called "reclamation," is set aside in a surety bond so that the government and the American people can know that when the mining company is finished with the land, it will restore it to its natural habitat, with a slope similar to the land around it.

With these plans approved, the company needs to address the safety of its miners. Employees are trained — and retrained annually — on mining how-to and safety. While most workplaces are watched over by OSHA, mines fall under the jurisdiction of MSHA — the Mine Safety and Health Administration. This organization monitors operations to ensure safety protocol is observed.

Once all of these plans in place, the mining can finally begin.

Stone quarries are open-pit mines and quarriers use excavators combined with drilling and blasting to loosen and pull out the rock. Explosives are only handled by those who have been specifically trained and licensed in their use and they are loaded so that the result is more "pop" than "kaboom." Anything too big would not only be dangerous, but destroy the stone they are trying to extract.

Once stone is pulled out of the ground, it is sorted, chiseled, sawn, split and otherwise worked into an end product that gets passed on to the consumer.

Natural building stone is used in

exterior and interior facades, water features, walkways and patios and a variety of landscaping applications. Aggregates are used in a lot of behind-the-scenes construction work, such as backfill or in concrete.

When a quarry or mine has run its course, the area is reclaimed. The holes are filled in, the slope is conformed to the land around it and seeds are planted to restore the natural habitat. Before too long, local species venture back into the area and the circle of life continues. Backpackers, bicyclists, horseback riders and anyone else passing through the area later will have no idea there was once a quarry on that land.

The quarrier's goal is to dig up as much usable rock as possible while ultimately returning the land to a similar or improved post-mining use. This means that in most cases, the land is better contoured, has better drainage and is less prone to erosion from runoff.

This next part may seem obvious, but once that stone has been dug up, it doesn't need to be quarried again. It's not like anyone's ever had to rebuild Stonehenge; the stone is here to stay. It might need some polishing now and again, but when a stone building is renovated, most of that stone is re-used. It does not end up in a landfill. Many stone businesses will even purchase used stone and sell it again to a new user. The bottom line is that natural stone is quarried once and used forever.

With new technological advances, stone quarriers are also learning how to do more with less. The best example of this is thin stone veneer: Since the stone is thinner, less of it is needed to cover the same square footage. The end-user gets all the benefits of natural stone, including its durability and insulative properties, while the quarrier is able to make one quarry's worth of stone stretch further.

It can be said that the life cycle of every quarry is bookended with a love for the mountains, rivers and valleys that surround us. Miners see beauty and utility in nature and deliver it to the public — a process that takes a lot of hard work, government cooperation and ingenuity. The result, though, is always worth it.

Elizabeth Thomas is a third-generation member of a mining family and is a principal at American Stone, a retail company in Salt Lake City.



Part of any mining project — in this case, quarrying for decorative stone — is the rehabilitation of the land. When the salable product runs out, the site is recontoured and returned to as near its natural state as possible. In the lower photo, the quarry has been graded and is ready for reseeding.



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Fax: 435-586-2362

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Clifton, CO 81520
Phone: 970-434-7363
Fax: 970-434-7367

DURANGO

1097 Hwy 3
Durango, CO 81301
Phone: 970-247-0522
Fax: 970-247-9721

WYOMING

ROCK SPRINGS

2030 Sunset Drive
Rock Springs, WY 82901
Phone: 307-382-6570
Fax: 307-382-6574

HEAVY EQUIPMENT DEALERS

Ranked by Number of Utah Employees



List Development Laneace Gregersen | laneace@slenterprise.com

	Company Name Address	Phone Web	Number of Utah Employees	Year Est.	Equipment Rental, Sales & Services	Equipment Offered	Area Served	Local Executive
1	Wheeler Machinery Co. 4901 W. 2100 S. SLC, UT 84120	800-662-8650 wheelercat.com	750	1951	Sales, rentals, parts, repair & maintenance services, technology solutions	Cat machines, engines & generators	Utah & parts of Nevada & Wyoming	Bryan Campbell President
2	H&E Equipment Services 5052 W. 2400 S. SLC, UT 84120	801-974-0388 he-equipment.com	125	1961	Full-service rentals, sales, parts & service operation	Aerial lifts, forklifts, cranes, earthmoving, general construction equipment	Utah, Idaho, Nevada, Wyoming & nationwide	Lee Anderson, Salt Lake Branch Manager
3	Honnen Equipment Co. 1380 S. Distribution Drive SLC, UT 84104	801-262-7441 honnen.com	70	1963	Equipment, rentals, sales & service, parts, shop & field service	John Deere construction & light equipment, Wirtgen road- building equipment	Utah & Rocky Mountain region	Cameron Preston, Utah Senior Sales Manager
4	Century Equipment Co. Inc. 4343 Century Drive SLC, UT 84123	801-262-5761 centuryeq.com	60	1969	New, used, rentals, parts, service	Backhoes, loaders, excavators, skids, minis, dozers, forklifts	Utah, Colorado, Wyoming, New Mexico, Tennessee	Ryan May President
5	Rasmussen Equipment Co. 3333 W. 2100 S. SLC, UT 84119	801-972-5588 raseq.com	45	1947	Sales, service, parts, rental, supplies	Light equipment, earth-moving heavy equipment, demolition, material handling, wire rope & chain	Intermountain area	Robert Rasmussen
6	Howe Rental and Sales 4235 S. 500 W. SLC, UT 84123	801-463-7997 howerentals.com	25	1953	Rental & sales of construction equipment & supplies	Construction equipment high reach, dirt, generators	Intermountain area	Rafael Garzarelli CEO
7	Peak JCB 2424 S. 5370 W. West Valley City, UT 84120	877-881-2718 peakjcb.com	14	2015	JCB heavy equipment sales, service & rentals	JCB compact, mid-range, heavy equipment	Utah & Idaho	Rod Miller



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PROJECT MANAGER FIRMS

Ranked by Number of Utah Projects 2018



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Company Name Address	Phone Web	Number of Utah Projects 2019	Number of Employees	No. of Certified UT Construction Managers	Year Est.	Services Offered	Owner
1 JLL 111 S. Main St., Ste. 300 SLC, UT 84111	801-456-9513 us.jll.com	26	5	0	2014	Development management, design & construction management, capital & cost management, multi-site, multi-market delivery, relocation management, program and portfolio management, feasibility advisory services	Steve Borup
2 Construction Management Consultants 406 W. South Jordan Parkway., Ste. 440 South Jordan, UT 84095	801-201-0119 cmcut.com	12	7	1	2004	Project management; construction management; owners' representative services; property development; furniture, fixtures, equipment	Jeff Davis
3 Project Control Inc. 2150 S. 1300 E., Ste. 500 SLC, UT 84106	801-262-9315 projectcontrol-inc.com	10	12	4	1980	Construction management, troubled, project turnaround, staff augmentation, facility management, cost estimating, scheduling, energy & life cycle management, constructability reviews	Ryan Johnson
4 Construction Control Corp. 307 W. 200 S., Ste. 4006 SLC, UT 84101	801-578-1201 cccutah.com	6	6	*	1984	Construction management/owner's representative services, cost consulting & estimating, scheduling, value engineering, cost segregation studies, construction cost auditing, program management, pre-construction services	Kris A. Larson



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Ranked by Number of Utah Employees

List Development Laneace Gregersen | laneace@slenterprise.com

	Company Name Address	Phone Web	No. of Utah Employees	Number of Dump Trucks	Number of Concrete Mixers	Number of Belly-Dump Trucks	Types of Products & Services	Owner/Top Official
1	Staker Parson Companies 2350 S. 1900 W. Ogden, UT 84401	801-731-1111 stakerparson.com	2,078	196	357	76	Sand, gravel, concrete, asphalt, paving services	Scott Parson President & CEO
2	Clyde Companies 730 N. 1500 W. Orem, UT 84057	801-802-6900 clydeinc.com	2,425	250	450	120	Earthwork, aggregates, asphalt, concrete, paving & preservation	Clyde Companies Inc.
3	Kilgore Companies 7057 W. 2100 S. SLC, UT 84128	801-250-0132 kilgorecompanies.com	1,011	83	227	49	Heavy-sided construction services, site/ infrastructure work, asphalt materials & paving, concrete ready-mix, sand & gravel, asphalt maintenance	Jason Kilgore Summit Materials
4	American Stone 4040 S. 300 W. Murray, UT 84107	801-262-4300 american-stone.com	55	5	0	0	Landscape rock, thin stone veneer, full-bed stone	Lon Thomas
5	Lakeview Rock Products Inc. P.O. Box 540700 North Salt Lake, UT 84054	801-292-7161 lakeviewrock.com	45	7	0	4	Sand, gravel, hot-mix asphalt	Scott Hughes Todd Hughes



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Get ready - Here comes construction tech

It is no secret that technology is not taking any steps backward. It is continuously improving. There is no industry that has been immune to the affect technology is having. This influence may be positive or negative, depending on how it affects it, but nonetheless it is there and the construction industry is not an exception to this trend.

Throughout the years, technology has become prevalent in every aspect of construction. Construction companies are utilizing technology well before they even break ground on a project. Everything from drones to 3D rendering software is being used to make the process more accurate and cost-efficient. Since technology is so ingrained in construction, I will be highlighting only the more recent advances.

Drones

The use of drones is a relatively new and popular tool for the construction industry. Drones can be used to fly over and survey land, evaluate the extent of a restoration project or demo and even help create the layout for solar paneling. There is no limit to how you can use a drone and thanks to the advances in technology, this helpful tool has become affordable to any-sized company.

Solar panel installers find drones exceptionally helpful. Thanks to this tool they can survey the potential installation site immediately and give the feedback needed to secure a sale. They can also snap images or videos of the area and draft the panel layout accordingly.

Roofers are also benefiting from drones for similar reasons. While it is

always best they see it with their own eyes, an immediate on-spot evaluation can be done without any other equipment or effort — not to mention the risk of a drone evaluation is far less than the risk of human evaluation. The drone may crash and need new propellers, but if you or an employee falls off the roof, you'll be out a lot more than that.



BAHAR
FERGUSON

Virtual and Augmented Reality

“Dangerous” and “construction” are two words that have long been used in the same sentence. While the frequency of injuries has been reduced throughout the years, the severity of an injury for a construction worker still remains higher when compared to an average employee’s injury at work. This risk of serious injury is why VR (virtual reality) and AR (augmented reality) are going to play an increasingly big role for construction companies.

Utilizing VR technology means construction companies can not only train an employee how to use a dangerous piece of equipment, they can do it in a setting that will result in zero injuries. This training allows an employee to make an infinite number of mistakes with no consequences, so when they leave training they are experienced and ready for the real thing.

AR technology is also expected to see a large increase with building construction. One piece of AR technology in particular is the Microsoft HoloLens. This tool is a self-contained holographic computer that allows you to interact with digital content displayed around you. This means you can wear this device and interact with

the designed building and its elements. You can view a building level-by-level and actually walk through the building-to-be, letting you see what the space will feel like well before it is constructed.

3D Printing

One problem that the construction industry is facing is labor shortage. With our strong economy and record-low unemployment, finding a consistent and reliable workforce has become difficult. To make this problem even worse, the strong economy means more incoming jobs to bid on (if you can staff it). Technology has a solution to this — 3D printers. And no, it can’t print a workforce, but it can print a building.

When you think of 3D printers, you may have a limited view. If all you see are rectangle boxes and a slow-moving plastic stream shooting side-to-side, it’s time to think again. 3D printers are becoming huge. Literally. There are now printers that span over 100 feet long. These new machines can actually print buildings in a variety of materials. They can print in concrete, steel, plastic and custom mixtures.

Not only are these new printers able to produce buildings in structurally sound material, they can do it quicker and cheaper than people can. Because 3D printing is an additive process rather than subtractive, you are not left paying for any wasted materials. It is an environmentally friendly way of construction.

Combining this technology with the increasingly popular modular building trend means construction companies can survive a labor shortage by building off-site without any workers and assembling later. Both methods of

construction are becoming hot trends and will only become more popular as the cost for a large-scale 3D printer decreases.

Like many other industries, the construction industry is utilizing group message boards and task-oriented programs. Websites and mobile applications like Basecamp, SharePoint, Teams and Slack are designed to help a project come to fruition quickly. While this technology is not unique to the construction industry, it is a huge asset and worth mentioning.

Construction companies typically have a large number of employees and job sites that be hundreds of miles apart, so keeping everyone connected and on task can be hard. A task orientation application helps everyone stay focused and communicate in real time. This real-time communication is ideal for solving problems quickly.

Instead of having to send a question or problem to each party individually, employees are able to post the problem to the group message board and have it analyzed by every party involved. The result is a conversation full of possible solutions and the ability to choose the best answer to your problem.

Technology changes everything. Even the basics of construction have completely changed because of the advances discussed in this article. The construction industry showcases how at the core of any technological advancement there are cost- and time-saving benefits.

Bahar Ferguson is president of Wasatch I.T., a Utah provider of outsourced IT services for small and medium-sized businesses.

STRUCTURAL STEEL COMPANIES

Ranked by Gross Sales 2018



List Development Laneace Gregersen | laneace@slenterprise.com

	Company Name Address	Phone Web	Gross Sales 2018	Notable Projects 2018	Services Offered	Owner/Top Executive
1	SME Steel Contractors Inc. 5801 W. Wells Park Road West Jordan, UT 84081	801-280-0711 smsteel.com	\$475M	Chase Center, LASED, LAFC, Facebook Campus, NVIDIA Triangle	Structural steel fabrication & erection, full division 5	Craig Moyes CEO Dieter Klohn President
2	Petersen Inc. 1527 N. 2000 W. Ogden, UT 84404	801-732-2000 peterseninc.com	\$99M	Nuclear steam dryer, roller coaster columns, pipe racks	Manufacturing, fabrication, machining, engineering, field services & warehousing	Employee-Owned
3	Tech-Steel Inc. Building D2, Freeport Center Clearfield, UT 84016	801-328-2543 tech-steel.com	\$18M	Fairbourne Station Office Tower, West Valley City	Steel fabrication, joist & deck supply, coatings	Tad Rasmussen Scott Rosenlof
4	Blue Star Steel 3692 W. 500 S. SLC, UT 84104	801-908-8302 bluestarsteel.com	\$15M	Atlas Sand-Frac Sand Tunnels, Kermit Texas, Jacobsen-Empire Pass, Deer Valley Utah	Industrial & commercial fabrication	Jeff Wright Dante Fratto
5	Structural Steel & Plate Fabrication 125 W. 500 N. North Salt Lake, UT 84054	801-292-8484 ssandpf.com	\$14.2M	Bulk handling plant for Morton Salt, rock fall protection shield at Kennecott, SO2 drying tower for Newmont, thiocon reactor platform at Chevron refinery	Heavy & complex industrial fabrications	Ronald Dean
6	Innova Global Inc. St. George Steel Division 1301 E. 700 N. St. George, UT 84770	435-673-4856 stgeorgesteel.com	\$9M	Huntington Beach acoustical wall structure, Collahuasi shiploader conveyor galleries	Heavy industrial plate & structural fabrication	Innova Global Inc.



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QUAKES

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master planners look across the globe to see the consequences of sacrificing structural elements to these serious forces of nature.

In 2011, Christchurch, New Zealand, experienced a magnitude 6.3 quake killing 185 people, injuring several thousand and damaging one-third of its buildings. While few structures collapsed, many code-compliant buildings were damaged beyond repair.

People living along the Wasatch Front or other high-seismic areas of the world get excited about — and truly appreciate — innovation and improvements in structural stability, repairability, resiliency and simplicity.

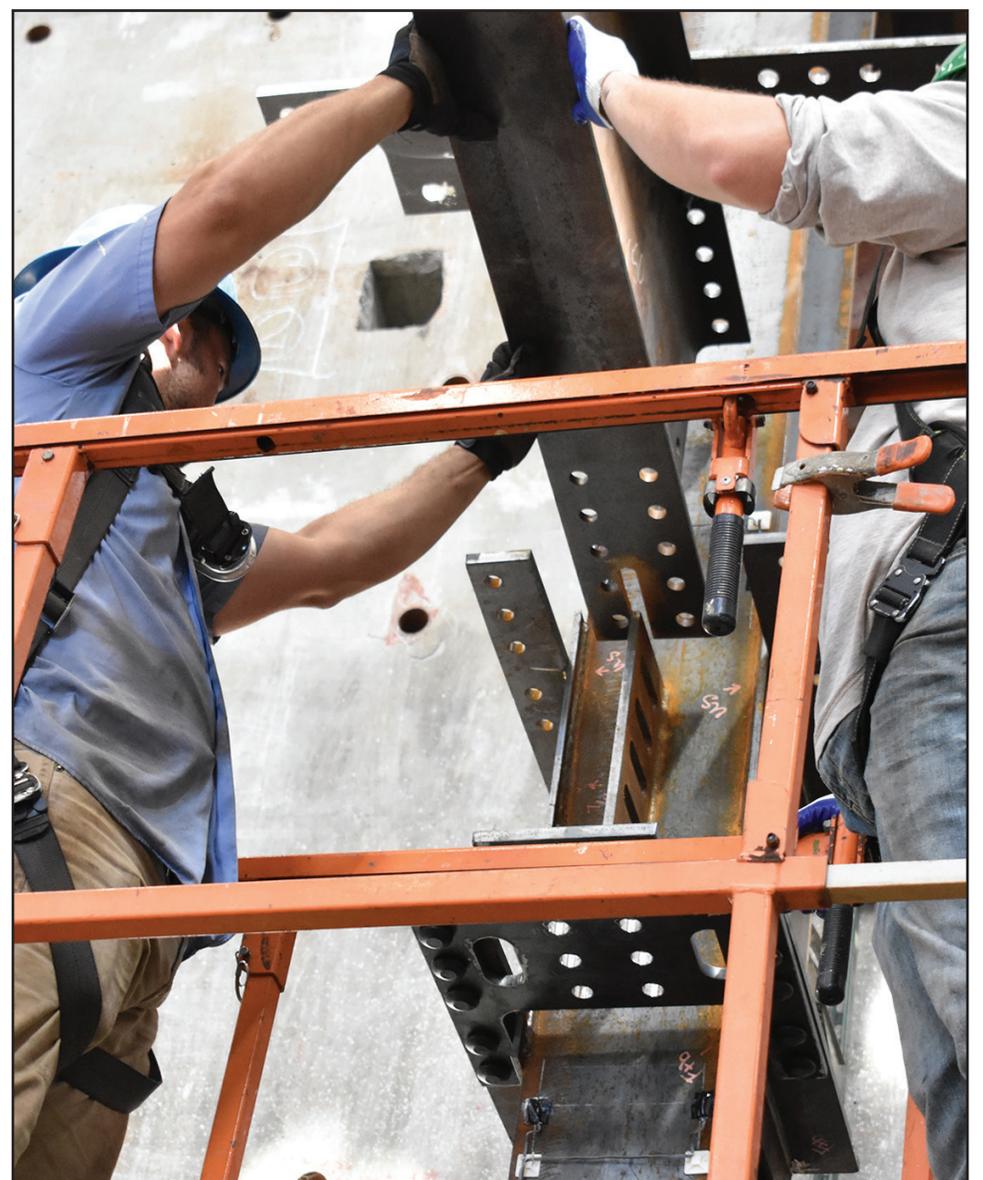
While building projects continue to pop up all over Utah, there is a higher concentration along the Wasatch fault line. Luckily, Utah is also home to several high-tech companies with some of the brightest minds on the planet.

An innovative Utah company, established in 2018, is taking steps to solve the seismic resiliency dilemma. Working from research and testing developed by Brigham Young

University faculty member Dr. Paul Richards, DuraFuse Frames has introduced an innovative moment frame system which allows for large span layouts (popular among architects), fast construction (popular among owners and developers), braced-free steel frames (popular among occupants) and prevents beam and column damage during severe earthquakes (popular among everyone who wants to survive). Research and development beginning in 2014 and culminating with full-scale earthquake simulation and vibration testing at the University of California San Diego, confirms this patented technology creates structures with higher resiliency. Resilient buildings mean resilient businesses, resilient communities, and peace of mind.

DuraFuse Frames have a shear-yielding fuse plate connection system that is simple to incorporate, fast to install and commercially competitive. With code approvals obtained in March and building projects underway, DuraFuse is working toward making high earthquake hazard a thing of the past.

Patty Johnson is the marketing director for SME Industries Inc. in West Jordan. She holds a triple major BS degree in organizational communications, political science and English.



Workers install a prototype of a new seismic-resilient steel beam developed by BYU faculty member Paul Richards at his company, DuraFuse Frames.

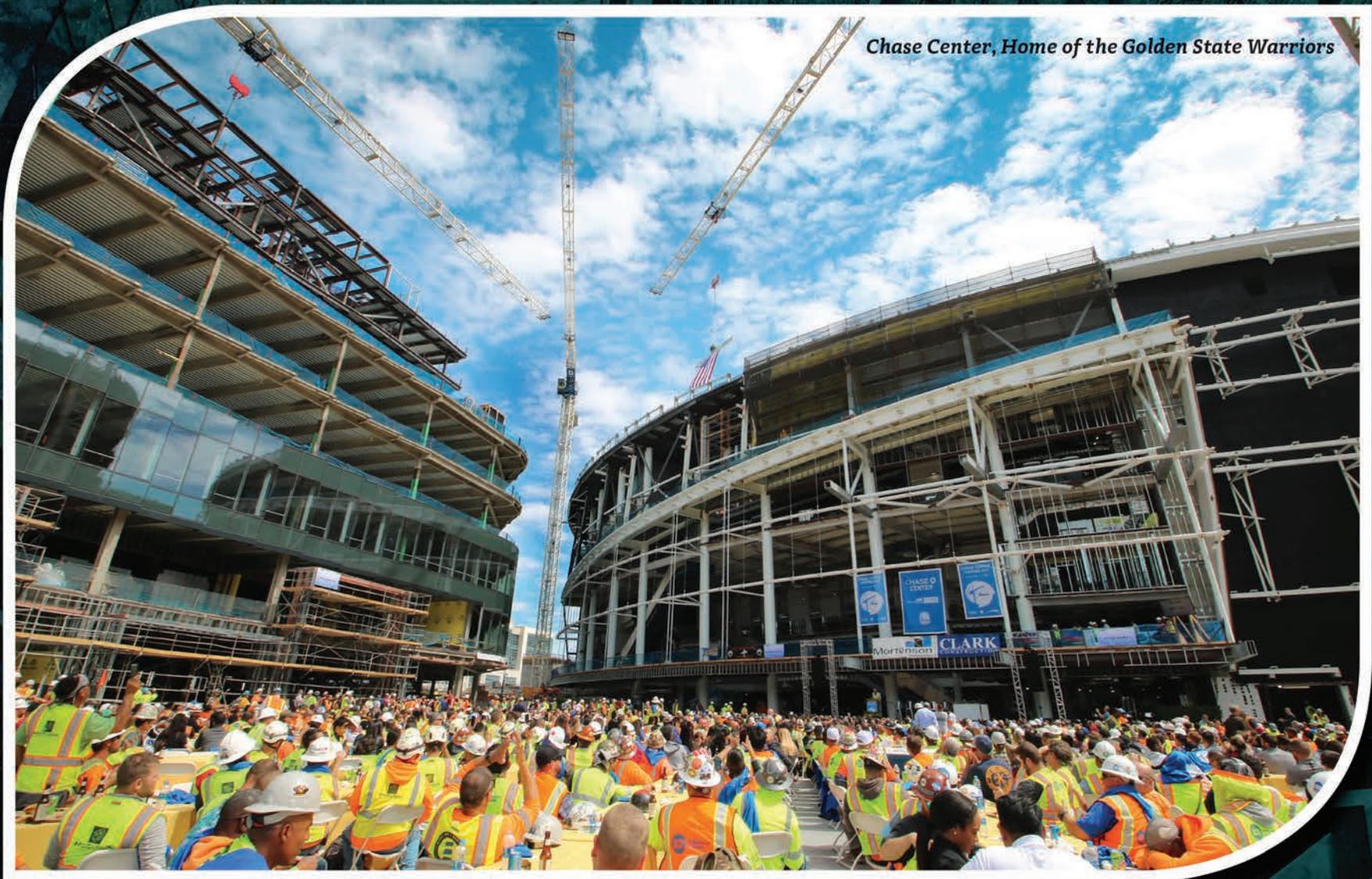
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'Look further down the road,' is record budget's message to UDOT

Brian Fryer

Engineering News Record-Rocky Mountain

In 2018, the Utah Legislature not only handed the Utah Department of Transportation a record \$1.7 billion budget, it also tasked the agency with looking a little further down the road, so to speak.

“The Legislature felt we had grown into a much larger organization, and there were a lot of things happening as far as autonomous vehicles and artificial intelligence and growth, so they broadened the scope of the department significantly,” said Carlos Braceras, UDOT executive director.

That expansion included UDOT

taking responsibility for enhanced statewide planning; working more closely with regional governments; and developing capital transit projects, including rail, bus rapid transit (BRT) and other transit initiatives. “We want to do a better job integrating with communities on understanding the impacts of their land-use decisions and our ability as a state department of transportation to help meet the needs of those communities,” Braceras said.

UDOT currently has 84 projects underway, and for fiscal year 2020, the agency will manage a budget of \$1.8 billion. Last year, to fulfill directives from the Legislature, UDOT promoted two employees, Teri Newell and Jason

Davis, to fill new deputy director positions. Newell manages planning and investment and Davis leads engineering and operations.

While those executive changes were underway, the agency continued to move forward with major projects. The largest is the \$450 million reconfiguration and improvement of freeway and state highway interchanges at the north end of Utah County, known as the Technology Corridor. The progressive design-build contract includes new overpasses, road realignments and widening. It is being completed by a joint venture of Ames Construction and Wadsworth Brothers Construction.

Also under construction is the

\$136 million widening of Interstate 15 in Salt Lake County, led by Draper-based Ralph L. Wadsworth Construction. The project adds a new southbound lane from 2100 South to 12300 South and redesigns the southbound ramps at the I-15/Interstate 215 south interchange to improve traffic flow.

This summer, crews will finish a reconstruction of I-215 from the I-15 interchange in North Salt Lake to 2200 North. Sundt Construction’s work on the \$25 million project is focused this spring on completing a new diverging diamond interchange (DDI) at Redwood Road and I-215.

A new project ramping up this year will be the \$158 million addition of nearly 12 miles of express lanes on northbound I-15 between the cities of Layton and Riverdale.

Rolling Out New Tech

In his new position as deputy director of engineering and operations, Davis has been overseeing implementation and testing of new technologies for the agency.

Last year the agency piloted a Dedicated Short-Range Communications (DSRC) and Multi-Modal Intelligent Traffic Signal System. It allows buses and other public vehicles to communicate with traffic signals in real time to keep traffic running as smoothly as possible on major arterials.

Working with the Utah Transit Authority, UDOT installed the system on a bus route along Redwood Road. The DSRC system was installed on signals at 24 intersections along 11 miles of the major north-south route.

“The bus talks with the signals and the signals talk with the bus,” Davis said. “The system knows where the bus is — if it’s on schedule, how many people are on the bus — and it can make decisions to adjust signals to keep it on schedule. We’ve seen a remarkable increase in reliability on the route, starting in the low 80 percent of on-time arrival up to the low 90 percent.”

The system has since been expanded to the two BRT vehicles operating in Provo and was tested on several snowplows this winter. “If we can give our snowplows signal pre-emption, we can get the roads cleared quicker, and that makes it safer for everyone,” Davis said. “We are going to evaluate what we saw from the tests we did at the end of this winter, and it may be something we expand to our fleet.”

Another innovation that will soon



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CONTINUED next page

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make its public debut is a self-driving shuttle.

“We want to be involved with this technology because we think it’s the next step in getting us closer to our goal of zero fatalities on the roads,” Davis said. “When seatbelts were introduced, they increased safety and the same with airbags and antilock brakes. Ninety-four percent of accidents are human-caused, but we want to get people used to the idea of not having a person driving the vehicle.”

In its recent session, the state Legislature adopted a measure to address the liability and legality of driverless vehicles. Partnering with a company called Easy Mile, UDOT driverless shuttles will be deployed in contained areas like shopping mall parking lots and university and state agency campuses, Davis said.

“It is really not very exciting when you first use it because it’s slow,” said Braceras. “But we don’t really want it to be exciting. We want people to see the capability and get used to it and see where we’re going.”

No More Easy Stuff

Planning leader Newell and her team will be focused on statewide efforts as Utah’s cities burgeon with new residents and bedroom communities or semi-rural towns feel the pressure on their roads.

“When we are faced with so much growth, we really need everybody to be focusing on how we are going to deal with it,” Newell said. “We have run out of easy solutions. The things we are facing in the next 30 years are going to take everybody working together and some real forward thinking to maintain quality of life.” Newell said a “stakeholder” committee was assembled within the past year that includes the Governor’s Office of Economic Development, Bike Utah, metro planning organizations, UTA and others to create a long-term vision for the state and the role of transportation.

“We are not sure what will come out of this process at this point, but in the end it will influence our project prioritization process,” Newell said. “The last time we made updates to our prioritization process was 15 years ago, and we know it is time to update it. We want to know what comes out of this visioning process so we can match up projects with statewide goals in mind.”

A division within Newell’s department also will include a technology and innovation group that gathers and analyzes data collected by the agency. “We collect a lot of data,” said Braceras. “When we lay all that data on top of each other, we think we will be able to ask better questions and get

better answers.”

Newell said bringing the collected data together within one group will allow it to be more useful. Among the new projects is a program to charge electric and alternative-fuel vehicles a fee for miles driven as a way to address the problem of lower tax revenue as many vehicles operate outside the reach of gasoline taxes and as fuel efficiency increases.

“We are looking at a voluntary [reporting] program that will begin in 2020,” Newell said. “We know this is the direction things are going, and we want to have a different collection mechanism in place in the future.”

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UDOT's current biggest project addresses growth and congestion in the north end of Utah County along the I-15 Technology Corridor.



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