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MARCH/APRIL 2019

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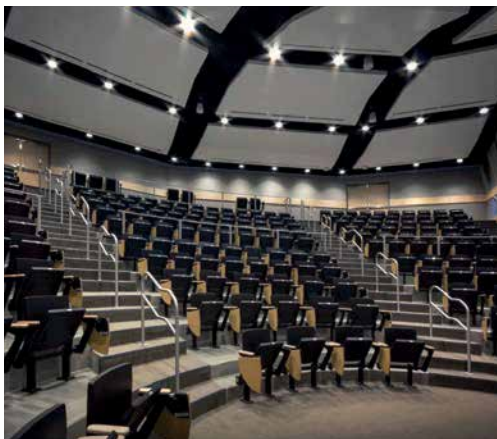
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PUBLISHER'S NOTE

I'm just going to go out there on the limb and say it: owners need to start paying their bills faster. That will not be a popular sentiment with the many owners who read BreakingGround, but it isn't the indictment it may seem.

Slow pay is not a new problem. Like bad weather, slow pay is something that makes doing construction more difficult. Unlike bad weather, slow pay doesn't occur naturally, and it makes construction more difficult than it needs to be.

In the fall of 2015, a handful of very experienced specialty contractors made a point of telling me that there was a noticeable delay in payments that had occurred during that summer. There was a common theme in their stories, which was that their receivables just seemed to stop coming in for about 30 days and then resumed as normal. One was certain there was some sort of industry-wide conspiracy to push all receivables out to 90 days. I am skeptical of nearly all conspiracy theories and didn't buy this particular one; however, I must also admit that I never thought I would talk about 90 days as the norm for payment terms.

Recently I have been hearing from some of the same people about this issue. It's not that there has been a further slippage, but the supply chain appears to be looking to the top of the pyramid to find answers to the question: where's my money?

There is a soft spot in my heart for specialty subcontractors and suppliers. These kinds of firms made up the lion's share of our customers at the Pittsburgh Construction News. Working with the subs and suppliers over the years exposed me to their business challenges. All, it seemed, had stories of chasing general contractors for payment. The truth, as the supply chain generally acknowledges, is that most general contractors pay them reasonably quickly, but only after the project's owner pays the general. Those are the provisions of most contracts. But those provisions don't require that payment be slow.

Specialty contractors aren't CMs. Half of their contract exposure is labor. Labor that is paid every week. If that labor operates under a union agreement, there are pension and benefit obligations that are due as well. Salaries aren't accrued and paid when paid. This means that the specialty contractors are financing the project to a degree. That has always been true but when the norm is 90 days, the specialty contractors are financing many projects entirely. That really isn't fair, and it has its drawbacks for owners, even if not all owners are aware of that fact.

Many of the gripes today are about the disproportionate holding back of payment because of minor disputes. This is true for general contractors as well. I'm not talking about the retained pay on the project (although the fairness

of retaining ten percent in today's conditions is another subject for debate). What seems to be happening with greater frequency is the withholding of substantial amounts of progress payment for what are punch list items.

As an example, an institutional owner withheld payment on \$200,000 worth of approved change orders because a kick plate hadn't been installed on one door. I understand. First, the contractor should install the kick plate. As soon as possible. But let's take a moment and look at the principle being applied here. Withholding payment is a legitimate device employed within the construction industry as leverage to enforce performance. Construction is a fluid enterprise and getting a contractor or subcontractor to re-engage in Project A after they have moved on to Project B is very difficult. But as a legitimate device, the withholding is meant to be commensurate with the incomplete work. In the example cited, that's one heck of a kick plate.

The subcontracting and supply chain tend to evaluate their customers on several main criteria. Do they shop my price? Do they manage their projects well or will they cost me money? Do they pay fairly and on time? Most will tell you that if a client does two of the three well, it's a client they want to work for. In the construction market of 2019, in a seller's market, will two out of three be good enough? If you're the project owner, do you want to be a client that companies don't want to work for?

In a busy market, specialty contractors will be selective about what they bid and should add a premium for conditions that add risk to a project. One of those is a slow-paying owner. Owners will get less favorable service. Since most of the owners building in Western PA occupy or manage the completed construction projects they do, getting good service from specialty contractors is a plus.

The best words I've heard on this subject came from a commercial real estate developer, Dick Donley, president of Chaska Property Advisors. Dick has developed more than a million square feet of office space over the past 20 years and works at being a responsive landlord for his occupants. That means being able to get HVAC service, or power, or roof repairs done as quickly as possible, no matter the time of day. That requires developing relationships with specialty contractors that are willing to respond, even when it's not convenient. There are a lot of factors that go into building those relationships. Slow pay isn't one of them. Dick Donley grasps that.

"How can I ask a guy for a favor when I'm 90 days behind with him?"



Jeff Burd

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REGIONAL MARKET UPDATE



Pittsburgh's economy performed roughly as expected in 2018. The region's number one liability, the lack of population growth, was a limiting factor in employment growth; however, employers continued to add to payrolls and look for more workers. Hiring in the seven-county metropolitan Pittsburgh market added 13,000 jobs in 2018 (a final number may be revised in April). That pace – one percent growth – put Pittsburgh behind most of its benchmark rival cities for employment gains.

Demographics continue to be a challenge in Pittsburgh. The number of people retiring outstripped those entering the workforce or moving to Pittsburgh. The prevailing demographic trends aren't likely to change for at least a decade but one very positive trend, the increase in younger residents within the city limits, is gaining strength. The median Pittsburgh resident is now younger than 33, which contrasts to the median average of 42 for the metropolitan area. The distribution of demographics is similar. The further you get from the center of the city, the older the population gets. While this is not a new trend, the aging population in the outlying counties presents a recruitment challenge for businesses there. The difficulty of meeting that challenge has motivated a number of large employers to move their headquarters from the suburbs to the city.

Looking towards 2019 and 2020, regional businesses remain optimistic about the economy but seem to be moderating their expectations, much like businesses nationwide. That's the conclusion that the Federal

Reserve Bank of Cleveland drew from its February survey of businesses for its Beige Book, the Summary Commentary of Current Economic Conditions.

According to Mekael Teshome, vice president and senior regional officer of the Pittsburgh branch of the Federal Reserve Bank of Cleveland, the responses of business owners in February were clustered around four main points:

1. Demand for products and services is still strong but the incremental gains are narrowing. Activity peaked in mid-2018. Fewer businesses are seeing demand growing in the coming quarter and the number has been diminishing since mid-2018.
2. Near term expectations have rebounded since December. Significantly more businesses expect conditions to improve during the coming three months; however, investment plans haven't changed. The number of businesses planning to make investments continued to decline slightly.
3. Upward pressure on pricing eased, but the trend is still higher. This was consistent for both costs and the prices charged to customers.
4. Tight labor markets are constraining a sizable minority of firms. Although most companies have been able to meet demand, 34 percent of the firms said that they couldn't meet demand because of the lack of skilled workers. That share has steadily increased over the past year.

"The February results tell me that regional economic growth is moderating from last year. The commentary

suggests that businesses expect 2019 to still be a good year, albeit a slower one than 2018," Teshome concludes. "Firms see a lot of downside risks to the outlook but there are still a lot of fundamental strengths in the economy. The labor market is still tight, but not any tighter than it was six months ago. Also, price pressures have eased

Total Pittsburgh MSA 2018	2,193	791	1,134	4,118
Total Pittsburgh MSA 2017	1,971	1,035	2,368	5,374
% Change	11.3%	-23.6%	-52.1%	-23.4%
By County	SFD	SFA	M/F	Total
Allegheny	972	416	914	2302
Beaver	91	28	144	263
Butler	495	166	0	661
Fayette	52	2	0	54
Washington	328	133	76	537
Westmoreland	255	46	0	301

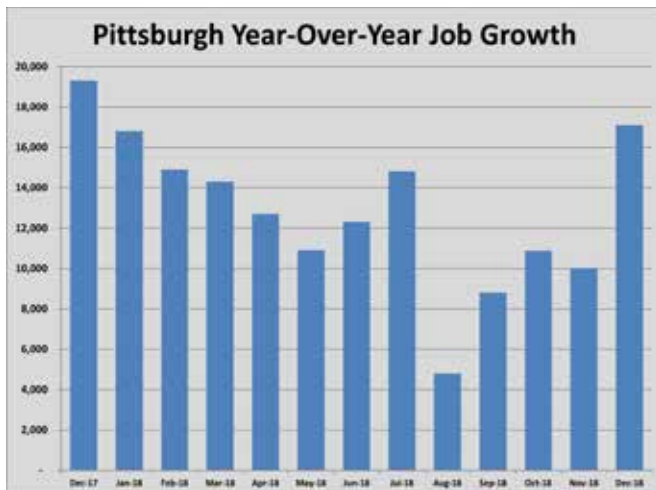


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somewhat from the spring to fall timeframe in 2018, when commodity prices rose sharply.”

The final tally of housing starts in Pittsburgh found several surprising changes from 2017, and the trends of the previous five years or so. Most notable among these was the steep decline in construction of new multi-family product. After five years of at least 2,100 new apartment or condo units, construction of new multi-family in the metropolitan Pittsburgh market fell 52.3 percent to 1,234 units. As has been true during the past decade, the preponderance of these new units were started within the city of Pittsburgh. There were 584 multi-family units permitted in the city proper, nearly half the total for the region.

Another trend that broke in 2018 was the output of townhouse or other attached homes. Driven by empty-nesters and first-time buyers, townhome construction has been supported by the demographics of Pittsburgh and the scarcity of single-family detached homes priced under \$250,000 to \$300,000. Both of those drivers were stronger in 2018, but construction of new single-family attached homes dropped 23.4 percent, or 244 units. There is little or no evidence that demand for townhouses declined, other than anecdotal evidence that younger buyers aren’t entering the market or aren’t interested in entering by the townhouse route. It’s likely that the decline, like with detached homes, stems from the lack of lots and new development.

The bright spot for residential construction in 2018 was the traditional single-family detached home, which saw an 11.3 percent increase to 2,193 units. The 222-unit jump from 2017 nearly offset the decline in attached homes.

There were a couple of other interesting notes in the housing data. In the more active communities, there were more new homes than during the past few years.

The municipality with the most new single-family homes, Pine Township, saw 162 new detached homes get underway. That’s the most new homes started in any municipality since before the Great Recession. And there were four communities with at least 100 new homes. There were zero apartments built in any of the top ten communities for single-family homes. And while apartment construction slowed, the City of Pittsburgh still had the most new residential units by far, with 673 units overall and 89 single-family dwellings.

It appears the combination of rising costs in mid-year and concerns about available workforce led to a lower nonresidential/commercial construction volume in 2018. Permit and construction start activity in the fourth quarter slowed significantly and unexpectedly. The volume for the full year 2018 was \$4.9 billion.

From early indications the caution has resulted in delays, as January’s and February’s starts have been atypically high. Among the work getting underway are some of the major projects that were expected to start in 2018, including the \$450 million UPMC Mercy Vision and Rehabilitation Hospital, CMU’s Tata Consulting Services building, and the long-awaited \$60 million conversion of the Terminal Building and 1600 Smallman Street. While UPMC is reported to have delayed two of its major capital projects – at Presbyterian and Shadyside/Hillman – the hospital system is pressing forward with its new South Hills hospital. Other announced major projects throughout the region, most notably the \$1.1 billion Pittsburgh International Airport Terminal Modernization Program, remain on schedule.

Assuming that market conditions merely delayed projects in 2018, one of the reasons that work is moving ahead on many fronts may be the continued competitive bidding environment. Reports from prime bidders indicate that subcontractors and suppliers are still responsive, even if at lower levels, and that bids have been relatively even with last year’s. The handful

Submarket	Inventory (\$F)	Direct Vacant (\$F)	Direct Vacancy Rate (%)	Class A Direct Vacancy Rate (%)	Class B Direct Vacancy Rate (%)	Class A Asking Rate (\$\$/YR)	Class B Asking Rate (\$\$/YR)	Under Construction (\$F)
CRD	24,545,892	3,920,510	16.0	9.1	25.8	30.35	21.95	0
Downtown Fringe	11,023,759	1,065,325	9.7	5.2	12.7	23.07	23.18	372,158
Oakland/Ford End	5,119,959	505,738	9.9	2.6	13.1	28.13	19.29	552,614
Urban Total	40,709,610	5,491,573	13.5	7.8	19.7	27.42	21.36	924,772
Greenbury	3,874,108	185,296	4.8	4.6	4.7	22.18	18.90	0
Parkway East	4,863,929	1,232,576	25.3	27.8	22.5	19.89	18.77	0
Parkway North	6,795,201	598,722	8.8	24.3	5.1	25.36	17.42	135,000
Parkway West	10,716,629	1,477,370	13.8	13.6	14.8	23.53	20.60	0
South	4,575,299	427,560	9.4	13.8	9.7	24.60	16.47	0
Southpointe	3,082,761	444,605	15.1	9.4	36.2	22.93	22.04	0
Suburban Total	33,907,927	4,506,029	13.3	13.9	12.1	22.71	18.11	1,35,000
Total	74,617,537	9,997,602	13.2	10.4	16.2	25.78	20.89	1,064,770

Source: CBRE Research, Q4 2018.

Submarket	Rentable Area (SF)	Vacant (SF)	Vacancy Rate (%)	Avail. Rate (%)	Q4 2018 Net Absorption (SF)	YTD Net Absorption (SF)	Under Construction (SF)	Avg. Asking Lease Rate (\$/SF/Yr)
Beaver County	11,415,594	451,100	3.95	7.07	9,550	22,570	0	4.16
Butler County	9,417,046	652,769	6.93	8.23	6,591	-38,427	0	4.95
City of Pittsburgh	13,635,508	692,585	5.08	7.28	-57,750	-118,249	0	5.22
Cranberry Twp.	7,542,487	144,978	1.92	3.71	-31,240	50,074	60,000	13.80
East	10,439,303	544,901	5.22	7.81	7,272	-76,530	0	6.42
Northwest	15,431,660	687,205	4.45	5.20	53,561	1,072	0	8.34
Northwest	5,800,173	159,128	2.74	3.06	0	261,398	0	6.00
South	11,967,706	500,218	4.18	6.68	-11,671	-90,292	35,000	6.35
Washington County	12,579,523	954,171	7.59	11.27	-43,430	201,650	721,000	5.35
West	19,966,715	1,599,700	8.01	9.80	314,393	828,223	725,204	7.26
Westmoreland County	2,559,967	2,481,366	9.69	10.26	65,586	466,126	0	4.51
Totals	143,794,884	8,868,141	6.17	7.96	375,362	1,507,615	1,541,204	5.78

Source: CBRE Research, Q4 2018.

of major public projects that have bid in the first quarter have benefitted from the competitive market.

This trend has been particularly noticeable in the K-12 market. North Allegheny School District and Franklin Regional School District each had similar elementary school programs out to bid involving two schools, worth roughly \$55 million at each district. The bids were at or below budget, with North Allegheny seeing more than a 20 percent savings. One of the factors that could be influencing the bidding is the reduced level of overlap between the K-12 and private construction markets. For all the news about the construction boom, activity in K-12 remains depressed. Being early to the market has always been an advantage in the K-12 market, as contractors look to build backlogs in winter, but in 2019 this may have been even truer.

Higher education is facing several head winds and a demographic cliff within the next five years. This news is dampening college and university construction but has had no effect on the largest institutions in Western PA.

Owing to its fruitful partnerships in emerging technology research, Carnegie Mellon University has moved along with its updated master plan. In addition to the Tata project, construction is underway on Ansys Hall and work should start later in 2019 on the \$32 million Graduate School of Industrial Administration, the \$45 million Skibo Hall and a new residence hall. The University of Pittsburgh has been active taking CM proposals on the \$90 million new student recreation center and qualifications for architectural services on its \$100 million One Bigelow Square academic building. The \$90 million Human Performance Center is expected to move forward later this spring. And

Penn State remains the state's largest buyer of construction services. In the midst of a \$5 billion capital plan, PSU is taking CM proposals on its \$300 million replacement of its two College of Engineering buildings. Penn State is also hiring an architect for its \$50 million Erie Hall project at the Behrend campus.

Commercial real estate is arguably the healthiest of the major sectors in Pittsburgh's construction industry. A look at the year-end market data suggests that Pittsburgh's real estate market is healthy and steady, but last year was stronger than the headline data. Vacancy rates for Pittsburgh's office and industrial markets were nearly identical to those at the end of 2017; however, absorption of space coming into the market was dramatically higher.

According to Newmark Knight Frank, the vacancy rate for industrial properties edged up from 5.0 to 5.1 percent year-over-year. Net absorption for the full year approached 1.5 million square feet. An additional 1.2 million square feet of industrial space was under construction as 2019 began, offering opportunities for users to upgrade space. For the office market, the vacancy rate declined from 16.9 percent to 16.4 percent but, like in the industrial market, the bigger story was the dramatic increase in absorption. Some 618,000 square feet of new space was absorbed in 2018. Roughly three times as much new space is currently under construction, more than 900,000 square feet to come available over the next 12-18 months.

The high net absorption numbers are very good news for the market, as is the news that developers are building significantly more spec space for the future. Spec development is a sign of confidence in the market. There is a risk of speculative development falling flat, particularly in a very mature economic cycle; however, the drivers of the Pittsburgh economy have rewarded spec developers over the past few years. This seems to be boosting confidence in the market. It's worth noting that the current spec office construction market is a "boom" relative to recent cycles. Compared to other mid-size secondary markets, Pittsburgh has room to grow and the current levels of new construction add only 1.6 percent more space to the mature office market. At completion, all of the new spec development would bring the vacancy rate to 18 percent. In a market with solid user activity, the risk of the new construction remaining vacant is low. **BG**



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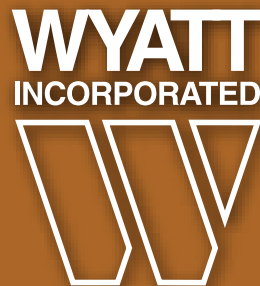


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NATIONAL MARKET UPDATE

Construction led off an uneven week of reports on the U.S. economy, when the Census Bureau reported on February 26 that housing starts had fallen by 11.2 percent from November to December 2018. The seasonally-adjusted 1,078,000 units was 10.9 percent lower than in December 2017.

Reports on the mindset of the consumer were more upbeat. The Conference Board released its survey of consumer confidence on February 26 as well, and it showed a rebound following three consecutive months of decline. The reading of 131.4 was a dramatic jump from January's reading of 121.7. The better frame of mind was attributed to the end of the federal government shutdown and the reduction in volatility in the stock market. It's worth noting that, although consumer confidence sagged from November through January, the levels of confidence during those months were still very high compared to the survey's history.

Data on consumer spending mirrored the readings on sentiment. The latest report on consumer spending showed a slight 0.5 percent decline in spending from November. Declines in consumption on cars and trucks, driven by year-end discounts, and on household utilities, a product of declining energy prices, were the main reasons for the lower spending. Unusual declines in prices, like those for vehicles and energy, can mask what will be otherwise normal spending patterns. That appears to be the case in December. Another interesting consumer data point that indicates a healthy consumer economy in December was the jump in personal savings rate from 6.1 percent to 7.6 percent. Personal income growth also jumped in 2018 to 4.5 percent, aided by tax cuts and a tighter labor market.

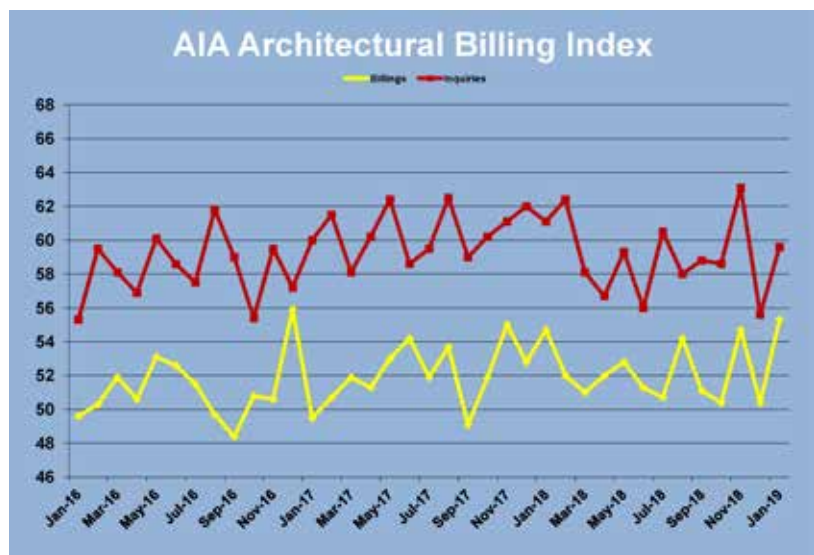
The decline in housing starts, although surprisingly steep, was explained somewhat by the perception of rising interest rates (long-term mortgage rates have stayed relatively flat) conveyed by the Federal Reserve Bank and uncertainty about the U.S. economy that surfaced during the holiday season. December's slow volume of starts was also offset by a surprising jump in permits issued for new homes to 1.326 million units. Permits are reliable predictors of future starts and suggest that the December slump is temporary. The March 8

report on January's starts confirmed that, as 1,230,000 units were started in the first month of 2019. That was a decrease of 7.8 percent compared to January 2018.

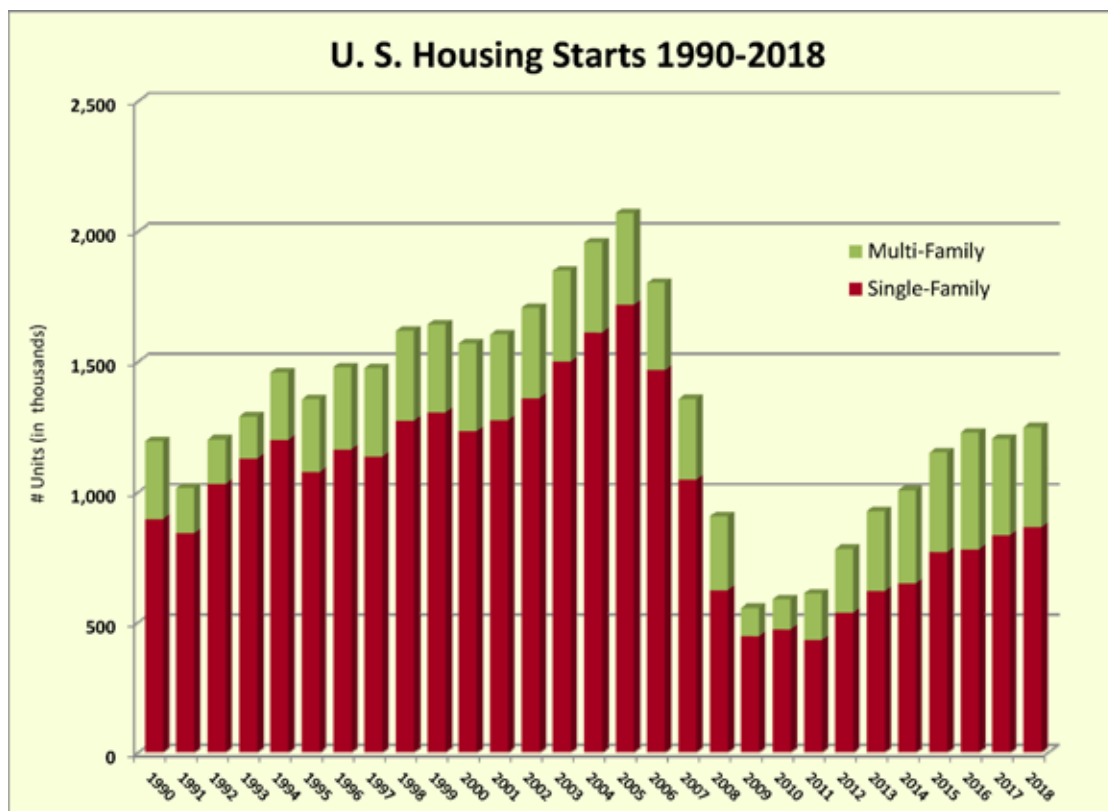
An estimated 1,317,900 housing units were started in 2018. This is 2.8 percent above the 2017 figure of 1,292,000.

Taking into account input from homebuilders and real estate agents, it seems that the steady rise in the Federal Reserve's Fed Funds Rate over the past few years had created the perception that borrowing costs were becoming less affordable. Coupled with the skyrocketing home prices in many markets, the perception of home affordability appeared to be taking a hit. The Fed Funds Rate, which is the interest rate member banks charge to lend overnight, has been moving higher while long-term rates, like the 30-year mortgage, eased upwards. Rates for a 30-year mortgage at year's end were, in fact, no higher than in April 2014 and never topped five percent on average.

Businesses also expressed some concerns about rising rates, especially with regard to the impact on capital investment, in recent Beige Book surveys. Federal Reserve Chairman Jerome Powell addressed those concerns and his own comments in the December Open Markets Committee readout when he met with Congress in late February. Powell cited the slower growth rate of the U.S. economy and the controlled



A key indicator of future construction volume, the AIA's Architectural Billings Index remained positive in December 2018.



Housing starts were relatively flat for the third year in a row in 2018. Source: U.S. Census Bureau.

rate of inflation as reasons why the Fed decided to step back from its pace of rate hikes.

"When I say that we are going to be patient, what that really means is that we are in no rush to make a judgment about changes in policy," Powell told the Senate Banking Committee. "We are going to be patient. We are going to allow the situation to evolve. I think we are in a very good place to do that."

The Federal Reserve sees growth in gross domestic product (GDP) falling to 2.5 percent or slightly below in 2018.

The shutdown of the federal government is delaying many of the economic surveys and reports but the first estimate of GDP growth for the fourth quarter came in at 2.6 percent, according to the Commerce Department. The U.S. economy appears to have grown slightly less than three percent for the full year of 2018, as the March 1 report estimated that the shutdown trimmed 0.1 percent from GDP, leaving growth at 2.9 percent.

Growth in GDP was not the headline economic story for 2018. As it was in 2017, gains in employment and wages were the top measures of an economy that has expanded for a decade. The strong job creation in December resulted in an average monthly gain of 220,000, nearly 40,000 more each month than in 2017. Wage growth edged above three percent during the

second half of 2018 and the robust labor markets appeared to have drawn more workers back into the market. In February 2019, job openings continued to rise, reaching more than 7.4 million compared to 6.5 million unemployed persons.

A further measure of the strength of the job market, the so-called "quits rate" – the percentage of people leaving jobs without another job – was at 2.3 percent. That was more than twice the 1.1 percent rate of layoffs by employers. The September 2018 quits rate of 2.4 percent was the highest since January 2001.

Employment gains in February continued the trend of accelerated hiring. The March 8 report by the Bureau of Labor Statistics found 20,000 new jobs were created last month. The unemployment rate was 3.8 percent.

Despite the solid economic growth, construction activity may not be as robust in 2019. Construction remains at multi-cyclical high levels, but the rate of growth is that of a mature business cycle. Economists who follow construction are in agreement that the volume of construction will outpace inflation, but only by a point or two. Construction spending growth estimates fall between three and five percent, with the latter relying on more optimistic scenarios than are likely to occur.

During 2018, construction spending overall remained in a tight range between \$1.26 billion and \$1.317 billion,

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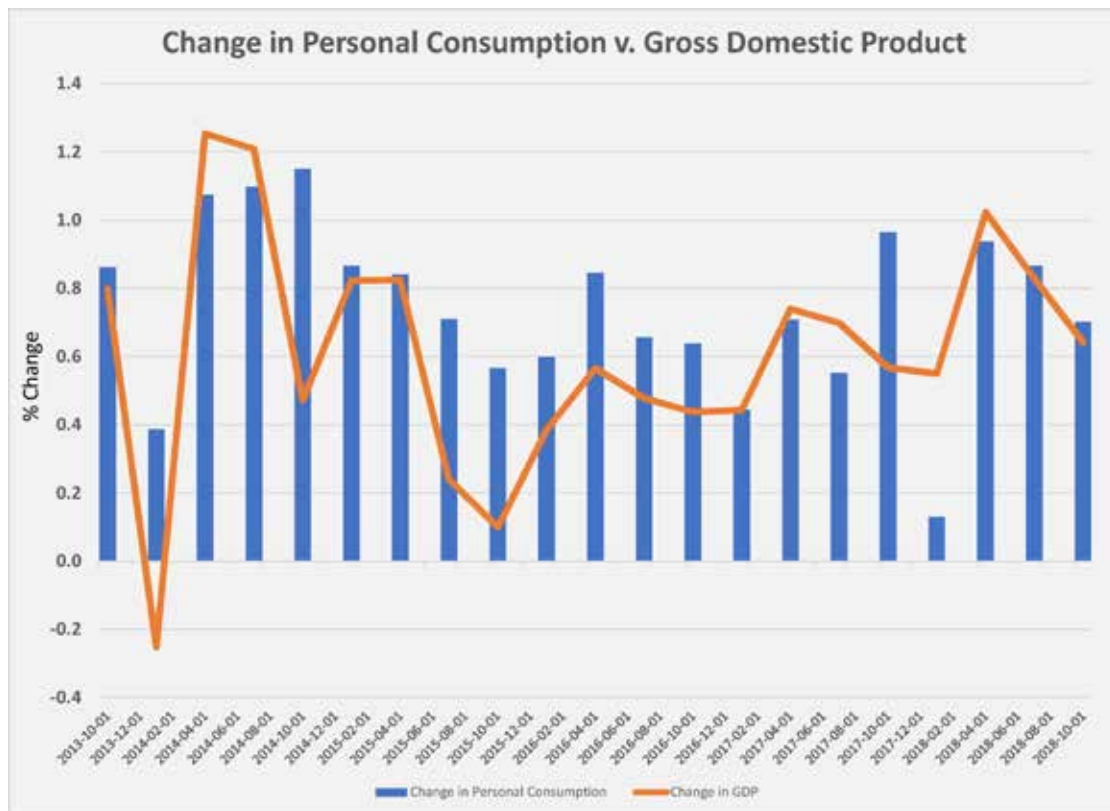
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Source: Federal Reserve Bank of St. Louis

with most months varying only a few hundred million dollars from the previous month. Total construction spending in December was \$1.29 trillion, up 1.6 percent from the December 2017 totals. Within the major subcategories, public construction rose 4.2 percent year-over-year; private nonresidential construction was 4.0 percent higher than the previous December; and private residential spending declined by 1.3 percent, largely due to a decrease in single-family construction of 5.2 percent.

Two forward-looking indicators of construction activity also support the forecasts of continued growth for nonresidential spending.

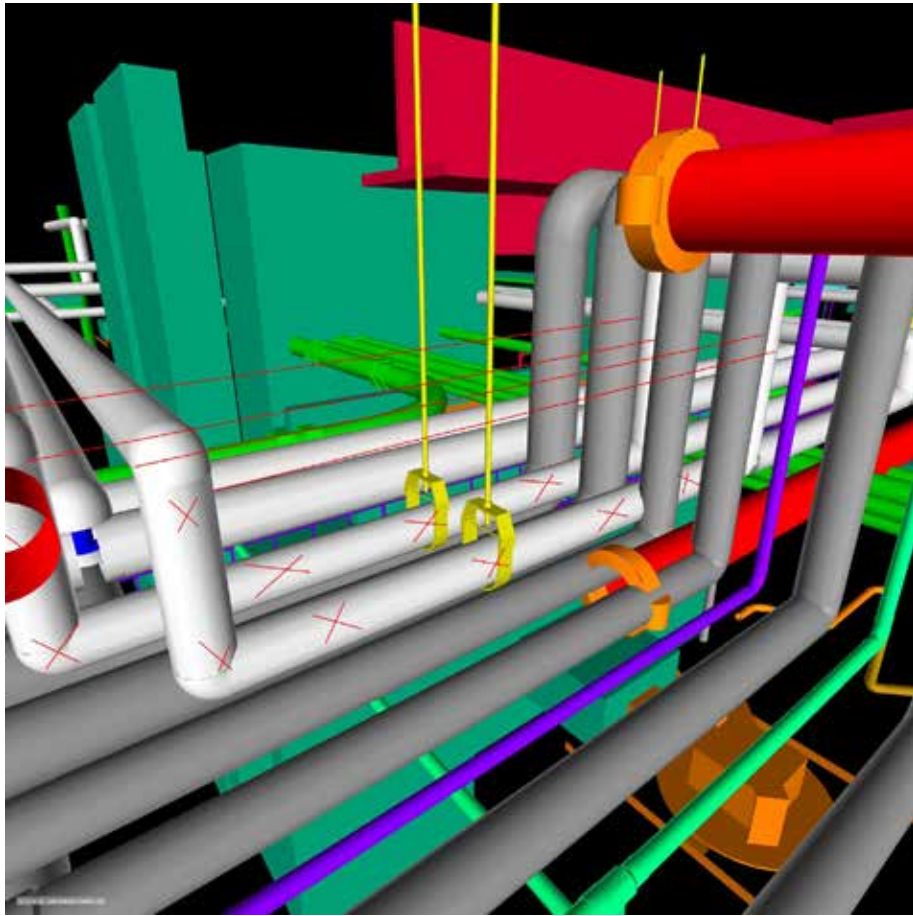
The final reading of architects' monthly billings for 2018 was positive for the 15th consecutive month. The American Institute of Architects' Architectural Billings Index (ABI) was at 50.4 for December, with inquiries at 55.6. A survey of firms asking whether billings were higher or lower than the previous month, the ABI has been above 50 (meaning there were more higher responses than lower) since September 2017. The index has registered below 50 only twice since September of 2016. ABI remained elevated in January 2019, jumping to 55.1.

The long-term trend for ABI is flattening but the continued positive reading indicates that construction will remain higher through 2019, assuming that the work

on the boards at architectural firms comes to fruition.

Engineers surveyed reported a decline in outlook during the final months in the year, but an overall positive look forward at business conditions. The American Council of Engineering Companies (ACEC) reported that in its fourth quarter 2018 Engineering Business Index (EBI) was 58.5, a score that was well above the neutral reading of 50. The fourth quarter responses were a sharp decline from the 66.3 score of the third quarter. A measure of market confidence, the fourth quarter 2018 EBI reflected declining outlooks for buildings and land development and continued confidence in transportation and water and wastewater.

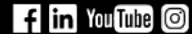
Taken as a whole, the data and confidence indicators for the U.S. construction economy are positive, particularly for the age of the business cycle. It's clear that a tight labor market is constraining economic growth, although there is insufficient data to judge the degree. Rising interest rates seem to have chilled demand slightly, but buyers and developers are likely to adjust to the small increase in actual borrowing costs, especially now that the Fed has signaled an end to the regular rate hikes. Declines in investment in all categories of structures during the fourth quarter therefore seem temporary. The case for another year of three percent growth in construction seems much clearer than the case for decline. **BG**



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WHAT'S IT COST?

Bureau of Labor Statistics (BLS) reported on February 14 that the producer price index (PPI) for final demand in January increased 0.6 percent from December and 4.9 percent year-over-year from January 2018. Final demand includes goods, services and five types of nonresidential buildings that BLS says make up 31 percent of total nonresidential construction. The PPI for new nonresidential building construction - the price that contractors say they would charge to build a fixed set of buildings - increased 0.7 percent for the month and 5.2 percent year-over-year.

All in all, this data was good news for the construction industry, and it mirrored good news on inflation for the overall economy. Prices leveled out during the last four months of 2018 and, for construction, balanced out the near double-digit spike in prices mid-year, when the tariffs were announced by the Trump Administration. January's report, which also showed that inflation was staying close to the Federal Reserve Bank's target, showed that there were fewer outliers (except to the downside) among the basic materials used in buildings and roads. The negative to that trend is that it means construction inflation is steadily registering at or above four percent.

Two factors in the calmer report bear further observation. First is that a dramatic decline in the price of oil and energy-related products was the primary reason for the lower inflation reading. Falling more than 40 percent since October 1, the price of crude oil has since rebounded more than 30 percent. Oil-derived products, like #2 diesel fuel and asphalt, saw prices fall by more than 25 percent over the same period. Those prices lag the crude oil price, so an increase in oil-related products is likely to follow in the coming months. The long-term outlook for oil is lower.

The second factor worth watching is construction wages. During December and January, wage inflation for construction was lower than wage growth overall. This bucks the trend that developed when wages began moving higher in 2017. Wage growth for construction was still ahead of inflation overall at 2.8 percent, compared to January 2018, but there are indicators that could put upward pressure on construction wages again. Construction job openings are at a cyclical high, suggesting that workers have more opportunity to push for higher wages. And the BLS's Job Openings and Labor Turnover Survey (JOLTS) showed highest quit rate for construction since 2005 at 2.2 percent. That more workers are leaving jobs without an offer is a warning sign that wage demands will rise faster.

The most promising news from January's

inflation report was that the PPI for inputs to construction stabilized further, remaining at 4.8 percent year-over-year. After jumping to 9.6 percent in April 2018, this PPI measure has moderated each month, staying more closely in the range of four to five percent.


Materials that saw extreme swings from December to January, and January 2018 to January 2019 were steel mill products (18.9 percent year-over-year), aluminum mill shapes (6.1 percent), fabricated structural metal (8.7 percent), architectural coatings (7.4 percent), asphalt paving mixtures (8.9 percent), #2 diesel fuel (-12.5 percent year-over-year and -14.6 percent since December), copper and brass mill shapes (-12.2 percent), and lumber/plywood (-6.1 percent). **BG**

PERCENTAGE CHANGES IN COSTS		Jan 2019 compared to		
		1 mo.	3 mo.	1 yr.
Consumer, Producer & Construction Prices				
Consumer price index (CPI-U)		0.2	(0.5)	1.6
Producer price index (PPI) for final demand		0.1	(0.5)	2.0
PPI for final demand construction		0.6	1.0	4.9
Costs by Construction Types/Subcontractors				
New warehouse construction		0.6	1.0	3.9
New school construction		0.7	0.7	5.2
New office construction		0.6	1.1	5.2
New industrial building construction		0.8	0.9	5.8
New health care building construction		1.0	1.2	4.8
Concrete contractors, nonresidential		0.6	0.8	6.1
Roofing contractors, nonresidential		2.2	2.2	2.8
Electrical contractors, nonresidential		(0.1)	0.5	4.0
Plumbing contractors, nonresidential		0.7	0.7	4.8
Construction wages and benefits		N/A	0.5	2.8
Architectural services		0.6	0.5	(0.7)
Costs for Specific Construction Inputs				
#2 diesel fuel		(14.6)	(25.9)	(12.5)
Asphalt paving mixtures and blocks		4.8	2.9	6.8
Cement		0.9	0.6	2.2
Concrete products		0.9	1.6	3.6
Brick and structural clay tile		0.7	1.0	1.3
Plastic construction products		0.8	1.1	3.9
Flat glass		1.0	0.7	1.6
Gypsum products		(0.8)	(3.1)	0.0
Lumber and plywood		(1.2)	(3.5)	(6.1)
Architectural coatings		0.5	4.2	7.4
Steel mill products		0.5	0.4	18.9
Copper and brass mill shapes		(1.5)	(2.4)	(12.2)
Aluminum mill shapes		0.5	(1.4)	6.1
Fabricated structural metal		(0.2)	(0.7)	8.7
Iron and steel scrap		(6.6)	1.4	(3.2)
Source Bureau of Labor Statistics, Updated February 14, 2019				
Compiled by Ken Simonson, AGC Chief Economist				

BIG DATA

Big Questions for the Engineering and Construction Industry

by Jay Snyder, Alyssa Menard and Natalie Spare

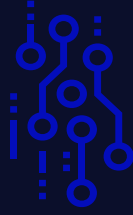


Engineering and construction companies that don't embrace the new norm of data-driven operations are likely to lose traction in the market and could become obsolete in the coming years. Is your organization ready to raise the bar and leverage big data and analytics in the future?



BIG DATA:

BIG QUESTIONS FOR THE E&C INDUSTRY



MISSED OPPORTUNITIES



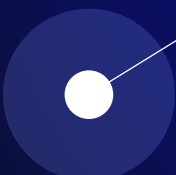
96% of all data goes unused in the E&C industry.



13% of working hours are spent looking for project data and information.



30% of E&C companies are using applications that don't integrate with one another.



8% of E&C firms have what they call real-time, full project management information systems that allow for dashboard reporting.



90% of data generated is unstructured. This includes tweets, photos, customer purchase history and even customer service call logs.

Sources:

vouchercloud

"Make it, or break it. Reimagining governance, people and technology in the construction industry." Global Construction Survey 2017. KPMG.

"Construction Disconnected. 2018 Industry Report." PlanGrid and FMI. 2018.

We're producing more data than ever—roughly 2.5 quintillion bytes of data every day, or just enough to fill 10 million blue ray discs (you remember those, right?).¹ With so much data being created and the use of data analytics starting to gain traction in engineering and construction (E&C), understanding what big data is and how your organization can leverage it to improve business processes is becoming an increasingly critical aspect of doing business.

Despite challenges associated with managing and implementing big data processes, companies that don't embrace the new norm of data-driven operations could lose traction in the market and become obsolete in the near future.

In this white paper, we break down some of the most challenging aspects of big data usage, explain the opportunities that present themselves when big data and analytics are properly implemented, and show the long-term power of utilizing big data as a business tool.

What Is Big Data?

The process of collecting large amounts of information and extracting useful insights through detailed analysis, big data in the E&C industry can be any information collected from sources such as:

- Sensors
- Drones
- Wearables
- Global positioning systems
- Email
- Transactions
- Financials
- Design plans
- Weather data
- The list goes on...

Consider this: Some of the largest infrastructure projects require an average of 130 million emails, 55 million documents and 12 million workflows.² With such vast amounts of data being captured from a multitude of sources, many firms can't manage and process this much information, which is why right now 95.5% of all

¹ Watanabe-Crockett, Lee. "The Daily Data Diet: Information Creation in Numbers." Global Citizen. 2016.

² Famous, Gabriele. "Three Technology Trends Shaping the Future of Design and Construction in 2018." Aconex Group. 2018.

data captured goes unused in the E&C industry.³

The good news is that big data can be captured and analyzed to reveal patterns or insights about an organization's processes, effectiveness, productivity, financials and other operational areas. Leading E&C firms are already using data for early risk detection to track equipment and productivity measures, leverage predictive analytics, and manage software integration and real-time data reporting. Using big data to gain insights about your organization comes with both challenges and opportunities. First, we'll explore the key challenges associated with big data:

Big Data Pain Points in the E&C Industry

Using big data effectively requires the right talent, tools and processes. Big data presents unique challenges for the E&C industry, and many organizations are either unprepared for or overwhelmed by the magnitude of information. Understanding which data can be useful and how it translates into business intelligence, for example, requires strategic planning and a clear understanding of your organization's overall goals and vision. Once you have a clear direction of what you want and need from your data, then you can begin to extract meaningful insights to help guide your organization. And while a data analytics platform can greatly improve business performance, those results won't come overnight. By having a clear understanding of the time frame and rollout process, you can more easily manage expectations during this transition.

Collecting and analyzing data can be a challenging task, especially if you don't know your end goal. Many firms struggle to understand how big data can be used to improve performance or processes. While getting the right tools may be as simple as buying a software program, finding the right people is a more difficult task. To successfully gain insights from your data, assemble a team that not only has a background working within the built environment and understands the life cycle of project work, but also has strong research and analytical skills to best leverage your data to improve business performance. Companies that don't invest in the right people often experience disappointing failures and are slow to realize a return on their investment (ROI). One new role to explore within the E&C industry is the "construction technologist." This professional combines industry knowledge with a background in research analytics to drive performance and generate strategic business insights.

³ Hill, Brian L. "Digging for the Big Data Gold in Today's Construction Projects." Xpera Group. 2017.



What Is a Construction Technologist?

"Construction technologists carry a specialization in IT with additional interest and domain expertise in construction. The dual knowledge possessed by a construction technologist allows for technology management, research, adoption and implementation. The construction technologist also acts as a conduit to communicate the latest trends and vet technology to determine the most beneficial solution for each unique company."

Source: JBKnowledge



Within the E&C industry, many data sources are heavily siloed or stored in disparate places, making effective data integration very challenging.

Recent research showed that 30% of companies are using applications that don't integrate with one another.⁴ This happens when data is stored on different systems, including desktops, phones, tablets, servers, hard drives and in the cloud. Unstructured data can also be captured from materials such as blueprints, timecards, emails and PDFs, leaving 49% of firms to transfer data manually between applications. A recent construction technology report indicated that over 83% of construction workers rate mobile capabilities, such as the use of phones and tablets, as important. This suggests that as technological capabilities advance in the E&C industry, we'll continue to see greater implementation of various data sources from devices such as wearables, augmented or virtual reality, or new software applications.

An abundance of data can be valuable, but mishandling that data—or not integrating your data sources—only leads to more data silos.⁵ Using multiple data sources is a great way to enrich your insights and create value for your organization; but it takes the skills to understand how to turn data into actionable insights.

For some E&C firms, current organizational processes simply can't accommodate advancements in data analytics. In an industry that is known for being behind the technology adoption curve, some firms struggle with frontline managers and field staff who often don't understand how to implement

analytical procedures. This can often make it difficult to get companywide participation in new data-driven processes, effectively slowing down the benefits of analytical tools within an organization. While some of the problem can be attributed to old-fashioned processes, long-standing cultures that are resistant to data-driven business models are also to blame. Recent research found that the biggest impediments to adopting new technology and advanced analytical tools are a reluctance from management or employees to change and budget restraints.⁶ However, in an industry where 35% of total costs can be attributed to waste and remedial work, using big data to reduce costs or increase productivity can have impactful gains on your organization.

⁶ Ibid.

"Like it or not, every construction company—and solutions provider—is now also in the data business. How well we help our customers transform that data into intelligence that drives better decisions to deliver projects more efficiently and more sustainably, with higher quality, lower costs and fewer risks is what defines the next frontier of construction management. Data is the key to improving the bottom line as well as protecting it. Our ability to break down data silos and transform raw data into action and intelligence is the crux to solving most challenges that rear their head in our industry. Solve the data problem and everything else falls into place."

—Jon Finland, General Manager,
Collaboration Solutions, Trimble

⁴ "2017 Construction Technology Report." JB Knowledge. 2017.

⁵ Ibid.

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Finally, return on investment comes into play when using or implementing big data practices. In the E&C industry—on average—less than 1% of annual revenue is funneled into research and development or innovation. This makes guaranteeing a good ROI challenging for two reasons. For starters, without strategic planning, jumping onboard with a new technology platform may produce less than desirable results and poor companywide implementation. This is especially true for organizations that don't carefully consider the reasons (or "why") for which they are implementing the new processes or technology in the first place. Secondly, the organization must invest not only in technology but also in the right people to help guide it through these changes.

How E&C Firms Are Leveraging Big Data

Leaders in the E&C industry are already effectively using data to improve business outcomes, gain better visibility over their operations, and streamline their business processes. Building information modeling (BIM) is one example of how big data and data analytics are creating more productive and efficient processes.

Recently, JE Dunn's CIO partnered with Autodesk



to build a real-time system that uses data-driven predictive modeling to create a custom visualization technology called LENS. This innovative tool speeds up the design process and reduces waste by allowing owners to see the project design, thus driving changes in the early design stages.

In the past, small changes contributed to major delays. Now changes are visible almost immediately. "Now you have a picture, the owner can see that concept model from our design partner and see the dollars tied to it," Jacobs explains. "You can say 'Show me what it would look like if we added another floor' or 'what if we made this part bigger?' Every element in the design is tied to our cost estimate. It is completely integrated so the solution changes visually, on the fly... That level of reliability is really changing the industry and effectiveness of our early pricing."

This predictive visualization software implementation is expected to save JE Dunn \$11 million on a \$60 million civic center construction project and reduce the project timeline by 12 weeks due to compression of the preconstruction phase.⁷

Skanska USA is another major E&C company that's leading by example. This global construction company leverages data to create better job sites and improve its project management practices. The company has embedded data usage into every corner of its business, including use of prefabrication methods, connected job sites, BIM, unmanned aircraft systems and virtual reality.

In 2016, for example, Skanska began using sensors to track employee, equipment and material movement. It found that workers on-site were walking up to six miles a day to procure equipment and materials. By using movement data and tracking worker location and comparing that information against worker activity data, the company configured the construction site to optimize tools and resources as well as positioning of the workers. This cut the movement and walking of on-site workers by one-third, thus boosting productivity by nearly an hour a day.

Along with the labor movement data, Skanska coupled geolocation and movement data that was collected via wearables plus information that workers provided about their daily activities. Analysts and software experts crunched the numbers and came up with an optimized solution centered on the ideal physical placement of objects within a spatial environment where things are almost always moving.⁸

⁷ Marr, Bernard. "How big data and analytics are transforming the construction industry." Forbes. 2016.

⁸ Wood, Chris. "Betting on Big Data: How Construction Firms are Leveraging Digi-

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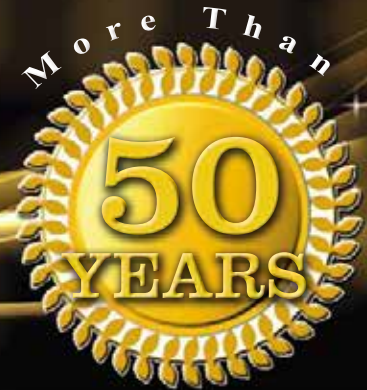
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purposes and at different frequencies, processes will be unnecessarily repeated across groups and within teams. This becomes a real problem when data is downloaded and analyzed on an ad hoc basis, with copies being made and saved locally. New data entries are added manually, and the most up-to-date documents only exist as localized copies. In this scenario, version control quickly becomes an issue. When multiple versions of the same documents exist simultaneously, team members won't know which versions are the most current. The root cause of all of these problems? Data silos.

Luckily, data silos can be broken down and avoided altogether by creating a central repository and set of rules or "standards" that govern data storage (i.e., how and where it's stored, who has access to it, and how often it's updated).

"While the value of data has evolved tremendously over the past 20 years—and business users recognize it—few companies have adjusted their approaches to capturing, sharing and managing corporate data assets," cloud software provider SAS points out. "Organizations need to create data strategies that match today's realities. To build such a comprehensive data strategy, they need to account for current business and technology commitments while also addressing new goals and objectives."¹¹

A strong data strategy also:

- Establishes good practices.
- Is essential in allowing a firm to fully utilize its data.
- Codifies processes and procedures.
- Creates shared resources.
- Eliminates duplicate efforts.
- Standardizes data formatting and naming conventions.
- Increases accessibility for all users.
- Guarantees that data is consistent across the organization.
- Ensures that data is treated and managed as an asset and tool (instead of simply as a byproduct of other business processes).

A well-designed data strategy should account for all of your data sources and repositories, including the third-party software vendors and point solutions that are in your firm's technology stack. Customer relationship management (CRM) systems like

Salesforce and Cosentia—and enterprise resource planning (ERP) platforms like CMiC, Oracle, Sage or Viewpoint—should be evaluated and defined in your data strategy.

When developing your data strategy, it's important that you know which systems integrate with one another (and which don't). Interoperability among systems is crucial to optimize organizationwide data flows. If two pieces of the stack don't communicate with one another and don't allow data to transfer between them, your company won't be able to efficiently process and use its own data. When systems can't talk to each other, duplicate data entry is required. This slows down workflows and decreases efficiency. In a fully optimized system, the same information should never need to be entered more than once.

For this reason, when you are adopting new technologies into your company's stack, it's important to choose software that utilizes an open Application Programming Interface (API). These interfaces allow one piece of software to interact and communicate with other pieces of software. When an API is "open," it means that the software is designed in such a way that the information can be easily extracted from the backend. This makes the raw data accessible for use in things like business intelligence dashboards and internally developed, proprietary applications. This kind of access becomes incredibly important when your company wants to start employing higher-level data analytics techniques, including dashboards and predictive modeling.

Software companies that lack open APIs often require customers to operate on closed systems, which



¹¹ "The 5 Essential Components of a Data Strategy," SAS, 2018.



means that the data entered into the system is self-contained and can only be extracted via reporting tools and spreadsheet exports. Along with requiring duplicate data entries, these systems can't accept data directly from other applications. That makes it difficult to directly compare data from across your company. With this setup, the only viable way to compare all of your data is to download it yourself from each application and then visually match the results by hand in a spreadsheet application.

Some companies build pre-existing integrations with systems for their customers to interact with. For example, PlanGrid, one of the leading document-sharing and collaboration tools in the construction industry, has existing integrations with CMiC, HoloBuilder, Kahua and others. These integrations allow data from those applications to be pulled into PlanGrid and used in its system. A user can then extract information about a project housed in CMiC and use the same project details in PlanGrid—all without having to re-enter information in the latter. This level of interoperability plays an essential role in any data strategy and allows a company to be more data-driven in its decision-making.

Developing a good data strategy helps you get the most out of your data by laying the necessary groundwork and putting all the pieces in place, ensuring that the information is both available and usable.

Creating Value and Actionable Insights

With good data practices and a solid data strategy in place, E&C companies can raise the bar and implement more sophisticated analytics. This foundation opens the door for a company to start using business intelligence (BI) tools like dashboards that take all stored, well-defined data and pull it into a centralized location where it can be displayed in a visual format for easier consumption. These dashboards allow you to aggregate separate data streams and compare the information within them in a single place.

A powerful business operations tool, a dashboard allows you to monitor your firm's performance in real time. The key measurable metrics include (but aren't limited to):

- Basic existing business data (e.g., finances).
- Custom, business-specific key performance indicators (KPIs) that utilize multiple data sources to paint a more intricate picture of your company's health.
- Information from public data sources that can be viewed in comparison to your company's data (for a snapshot of your firm's performance relative to the broader market).

Once you've established a solid data strategy, other analytical techniques, such as machine learning (ML) and artificial intelligence (AI), can help you gain insight from your data. These are two different types of data analysis that allow you to:

- Make predictions
- Discover relationships among data points
- Identify customer or market segments more intelligently
- Learn patterns from large and unwieldy data sets

Both machine learning and artificial intelligence require large amounts of data in order to be accurate. This is why it's so important to put a data strategy in place before using these methods. These technologies are already being used for drone and satellite image classification, real-time quality inspection and progress updates, immediate notification of code non-compliance, calculation and recalculation of a project's critical path, and prediction of safety issues before they happen. Both ML and AI represent the future of E&C. Companies that lay the groundwork of a comprehensive data strategy now will be better-equipped to adopt these new technologies and evolve with the industry in the future.

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Big Data Is the New Oil

Intimidating for many companies—and especially those that are just beginning to wake up its value—big data can't be ignored any longer. Cumulatively, we're generating roughly 2.5 quintillion bytes of data every day—a number that's on track to grow over the coming years. The organizations that take the time to gather the data, analyze it and turn it into actionable insights will gain a competitive advantage. The ones that bury their heads in the sand and hope it goes away will be quickly left behind.

Using the recommendations in this white paper, E&C companies can more effectively leverage their

big data without having to make a big investment in labor, equipment or devices. Its use is becoming commonplace among organizations that want to outperform their peers and rise to the top in their industries. In most industries, existing competitors and new entrants alike will use the strategies resulting from the analyzed data to compete, innovate and capture value. Finally, big data helps E&C organizations ferret out new growth opportunities, leverage new resources and optimize processes in unprecedented ways.



Jay P. Snyder is the technology practice leader with FMI. Jay has been in the engineering and construction industry throughout his entire career. He has industry experience as a construction project executive; corporate director of planning, design and construction for a health care system; founder and managing partner of a risk management tech startup company; and as a valued business consultant. He can be reached via email at jsnyder@fminet.com.



Alyssa Menard is a market research associate with FMI. Alyssa is responsible for conducting primary and secondary research around market trends within the AEC industry and built environment. Her primary objective is to ensure best practices in the collection, management, analysis and interpretation of data for content development within the organization. She can be reached via email at amenard@fminet.com.



Natalie Spare is a data consultant with FMI. Natalie holds a Bachelor of Science in marketing with a concentration in market research from the University of North Carolina at Greensboro. She is currently completing her second degree, an Associate of Applied Science in data science and programming support services, from Wake Technical Community College. She can be reached via email at nspare@fminet.com.

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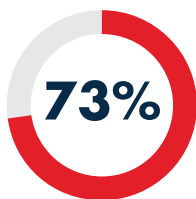
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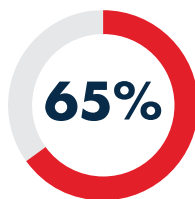
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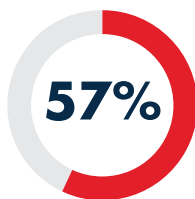
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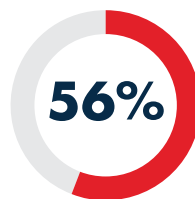
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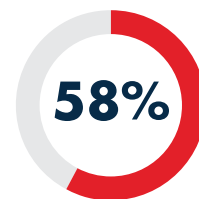
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PROJECT PROFILE

SOUTHERN TIER BREWING, PITTSBURGH TAP ROOM AND BEER GARDEN

Ahead of the 2017 baseball season, Southern Tier Brewing opened a much-anticipated tasting room and restaurant on Pittsburgh's North Shore Drive. The opening marked the end of a frenzied, \$2 million first phase buildout of new tenant space that was accomplished in less than five months. The tight schedule was one of the more obvious challenges of the project, but the speed of construction concealed a highly-fluid and creative job site.

Southern Tier Brewing chose Pittsburgh to open its first tap room and brewing location outside its home in Lakewood, NY, located just west of Chautauqua and Jamestown. The brewer leased the roughly 6,500 square foot space on the eastern corner of North Shore Drive. A North Shore location put Southern Tier in the midst of a robust neighborhood driven by crowds attending Pirates and Steelers games. Those professional sports crowds also created scheduling goals that were inflexible. To accomplish the project and optimize the beer-selling opportunity, the project was split into two phases, separating the interior fit-out from the

outdoor beer garden.

"I came here in November of 2016 just before the project really got going but Landau and Fukui Architects had already been working on it," says Mike Puschaver, general manager for the Pittsburgh tap room. "One reason we targeted Pittsburgh, from a brand standpoint and that location in particular, was obviously the proximity to Heinz Field and PNC Park. I think we're exactly halfway between the two. The other reason is that Frank B. Fuhrer Distributing is also in Pittsburgh and we are their second biggest brand in terms of sales. We knew we already had a great following here."

Because of the tight schedule, Southern Tier chose to hire its contractor shortly after bringing the architect on board. After requesting proposals for fee and approach, and conducting interviews with a select group of general contractors, Southern Tier chose Landau Building Company to manage its construction.

Landau was joining the process at the early stages of



Southern Tier's sign was cut by Hranec Corp. and mounted on a background and frame that Jeff Bono fabricated using scrap lumber.

development, even though there was not going to be much time before construction got underway. The architect, Fukui Architects, was still in the midst of interpreting the owner's needs and making that work in a practical way. Felix Fukui believes that having a contractor involved during that stage of the project helps clarify the design.

"As a firm, we tend to respect what builders bring to the table," he says. "I like to bring builders into the mix early

because of their input. They know things and do things that we just do not."

Sharing that knowledge was especially valuable for this client. Southern Tier was a boot-strapped startup brewer that had succeeded famously and had recently been acquired by Art Brew Ventures. While Southern Tier had expanded its footprint in Lakewood, the Pittsburgh tap room was its first new construction experience. Like many inexperienced owners, Southern Tier had to come to grips with the gap between its wish list and its budget. Having the contractor and the architect at the table during the design of the space was influenced by Southern Tier's home brewery and tap room, which included both industrial and rustic spaces.

"Southern Tier has a pre-engineered metal building at its brewery, but has also added onto that with heavy timbers and a rustic feel," notes Fukui. "They wanted to reflect that feel, saying that it was what people knew of them. The Pittsburgh tap room was going into a steel-framed office building. Our idea was to marry that rustic, heavy-timber vocabulary with the structural steel. The materials tend to be handled very simply and honestly to reflect that. And then we tried to have as much fun as we could with those materials."

Because the tap room was also going to include brewing



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production in about one-third the space, there were related design considerations. Glass walls separated the dining room from the brewery but they were over budget. Hollow metal storefront was substituted without detracting from the appearance.

One of the biggest challenges for Phase One, the interior portion, was incorporating the larger-than-expected German brewing equipment in the limited space. The second-floor mezzanine, originally planned to be storage and office space, was re-programmed to accommodate the brewing equipment that would not fit on the first floor. Fukui studied the brewing process and redesigned the system using 3-D design models. The vertical hops mill was relocated to the new mezzanine to create space on the ground floor. Landau designed, fabricated, and installed steel barn doors and a crane hoist on the beer garden-side of the second floor so that brewing materials, such as the hops, can be lifted straight to the mezzanine.

That sort of seat-of-the-pants problem solving became the norm for the Southern Tier project. More often than not, key elements of the project that the owner requested early in the design process exceeded the budget once details were worked out. Faced with little time, the project team could not go through the typical



Staves from used Southern Tier barrels were woven to create wainscoting.

request for information (RFI) and submittal protocols. Solving problems became a matter of Landau's superintendent, Jeff Bono, imagining a solution in the field and bouncing it off Fukui and his team. Bono is a skilled carpenter and his ideas were creative and practical. Fukui learned he could trust Bono, whether or not there was an approved submittal in advance.

"There was some of that, obviously at the right time,"

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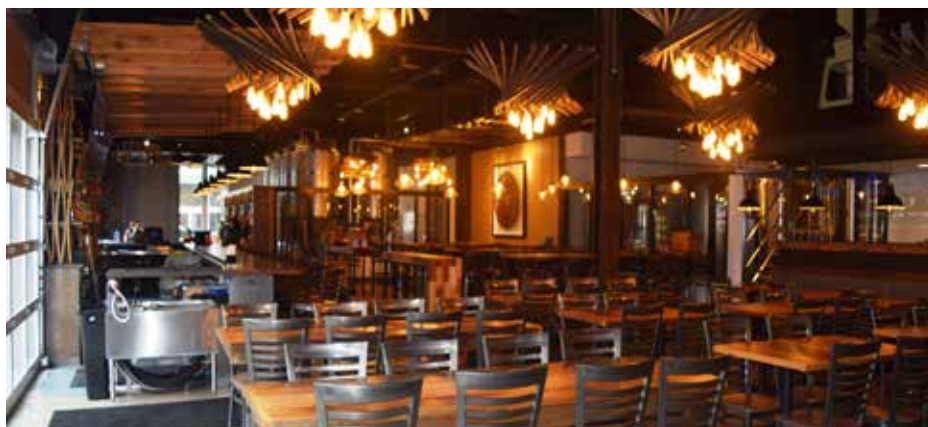
recalls Fukui. "We were pressed for time. We were all told to fish or cut bait, whatever the issue was. Sometimes we held our position too. Ultimately, we respected what Landau added and they respected our position. I didn't get the sense that Landau was suggesting things just to cut corners but they were trying to get done what we had in mind. They wanted to do things the right way and some of their solutions were actually more difficult."

"Felix was awesome to work with. To be honest with you, everyone from Landau to the architect to the owner were very collaborative," Bono says. "The paper chased the job; the job didn't chase the paper."

This freedom unleashed dozens of solutions that were worked out in the field, in real time. Recalling the days when superintendents and architects huddled around sheets of bum wad, hashing out details and approaches to field problems, the Southern Tier team took on each situation as a solution waiting to happen. Field issues sparked ideas rather than RFIs.

One of the most difficult of the problems faced during the construction was the main bar. Fukui had a vision for the bar that blended the cold, modern look of glass and stainless steel with several variations of wood. There was a completed elevation drawing of the bar, but it was difficult to document how the varying materials, most of which were custom fabrications, would be integrated. Rather than looking for the architect to detail assemblies that were likely going to be modified in the field, Bono and his team started talking through ideas with Fukui. Bono says that Fukui warmed to the process, feeding back his own ideas as the design was adapted to something that could be fabricated within the client's budget.

Stock timbers were purchased locally and milled to add the curves that the



architect envisioned for the wooden beam canopy over the bar. Landau used a scaffold to rack the beams and connected them with a single pipe slipped through each beam. Adding to the utility of this solution, the spoils from the beams were used to fabricate the individual tables that sit in front of the bar.

The placement of the bar required that a large piece of structural steel be added for header support to the adjacent wall. Rather than fighting the look of the 40-inch plate, a companion piece of non-structural plate was added to the wall on the opposite side of the bar. Completing the bar's finishes, stainless steel is used decoratively to hide the bar's piping and tap system components. A long live edge wooden slab is the bar surface. Aged wood panels and boards are used in the casework to create a rustic contrast to the stainless steel. And barrel staves are used decoratively, including as the vertical pieces of the shelving at each end of the bar.

Barrel staves proved to be a key design element throughout. Fukui's design emphasized the rustic elements of brewing in contrast to the cool stainless of the mashing and fermenting tanks. Southern Tier encouraged the use of the staves, which were taken from dozens of its older oak barrels from its brewery and distillery. The design called for weaving barrel staves into a herringbone pattern on wainscoting and vertical counter surfaces. Staves

were bundled to create the custom light fixtures that hang above the dining tables. Barrels were cut in half and used as lighting fixtures. The same rough, rustic treatment was used for the design of the individual and communal dining tables.

Part of the appeal of the rustic wood is the patina that the material picks up over time. Weather and heat (or fire, in the case of the barrel staves) give the wood uneven staining, which is the desirable effect. It proved difficult to match that appearance with stain for the trim that would surround or offset the natural wood. None of the wood stains were satisfactory to Bono or Fukui. Bono used a torch to seal and darken the trim, which gave the appearance of a picture frame when finished. A similar treatment was used to treat wooden covers for electrical outlets and access panels, which were originally designed as steel plates.

There were other field changes that enhanced Fukui's rustic design. Cedar siding was used on an exterior panel that was to be face brick. Bono asked Phoenix Roofing to fabricate aluminum panels on plywood to replace more expensive insulated panels for trim. Balancing the look on the interior, the building's exposed structural steel was clear-coated, painted black and left raw, depending on the design.

"Jeff and his team did a lot of improvising on the space. They were magicians," Puschaver says. "From an aesthetic standpoint they hit the



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Phase two of the project was the outdoor beer garden.

nail on the head.”

“The challenge was meeting the owner’s budget and maintaining the integrity of design at the same time,” says Bono.

Phase one started in July 2016 and was completed in December 2016. During the football season of 2016, Landau installed a temporary bar so that Southern Tier could serve its beer to Steelers fans. Phase Two kicked off in February 2017 and was completed in June 2017.

Although the outdoor beer garden was new space, building it wasn’t without its challenges. The first of those was in the ground.

“All the infrastructure for the lower end of the Downtown goes through that parking lot, so we were not allowed to do deep foundations,” says Bono. “There were electrical, phone and data lines within 18 inches of that canopy foundation. We contracted ground-penetrating radar to document where the utilities were during the first phase. What we built was basically a floating slab. Some of the

encumbrances were only 17 inches below the surface. We did a lot of digging and a lot of worrying while we were digging.”

The popularity of the Southern Tier location has proven the decision to locate in Pittsburgh was well-founded. Even the delay between the two phases had a happy result.

“Everyone’s goal was to get both the interior and exterior open at the same time,” recalls Puschaver. “That obviously didn’t happen, but from an operations standpoint, it was a blessing in disguise. Whenever you open a new location you really don’t know what you’re going to be faced with, so opening in two phases gave us a chance to adapt.”

In other circumstances, the Southern Tier Tap Room could have been a recipe for disaster. An inexperienced owner, asking for a design that isn’t tested in the marketplace, brought an architect and contractor together without much documentation to protect budget or schedule. Had any of the parties become uncommunicative or self-serving, it’s not hard to envision how badly the story could have ended. Fukui had recommended Landau Building Company as one of the contractors to compete for the job, but there existed no repeat client relationship between the three parties. Even without that history, trust developed and the team worked to reach the finish line.

“Southern Tier got the space they wanted, on budget and better than they probably expected,” concludes Fukui. “On most jobs you’re picking things from a catalog. On this project we had the opportunity to create things that won’t be in another project.”

“That’s why I say the relationship with Felix was awesome,” says Bono. “Felix was flexible on his design to give the owner the look that they wanted, but that they could not afford. It was an awesome project to work on.” **BC**

PROJECT TEAM

Landau Building Company.....	General Contractor
Southern Tier Brewing	Owner
Fukui Architects	Architect
Ruthrauff Sauer	Plumbing/Process Piping
Hranec Corporation	HVAC
M & J Electric.....	Electrical
Courtman Painting	Painting
Caseworks Inc.	Bar Casework
Phoenix Roofing Inc.	Roofing/Siding

Photo courtest University of Pittsburgh

The image displays a collection of 12 logos for various labor unions and organizations, arranged in a 4x3 grid. The logos are as follows:

- Top Row:**
 - Local Union #154: United Brotherhood of Carpenters and Joiners of America logo.
 - Local Union #9: International Brotherhood of Electrical Workers logo.
 - Local Union #226: International Brotherhood of Electrical Workers logo.
 - Local Union #235: International Brotherhood of Electrical Workers logo.
- Second Row:**
 - Local Union #235: International Brotherhood of Electrical Workers logo.
 - Local Union #235: International Brotherhood of Electrical Workers logo.
 - Local Union #235: International Brotherhood of Electrical Workers logo.
 - Local Union #235: International Brotherhood of Electrical Workers logo.
- Third Row:**
 - Local Union #235: International Brotherhood of Electrical Workers logo.
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 - Local Union #235: International Brotherhood of Electrical Workers logo.
- Bottom Row:**
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FIRM PROFILE

ADVANCED CONSTRUCTION ROBOTICS



It seems inevitable that Pittsburgh would be home to one of the first companies to create commercially-viable robotics and artificial intelligence solutions for the construction industry. Advanced Construction Robotics (ACR) was founded in 2016 by an innovative construction executive and a robotics researcher looking for an industry ripe for solutions. Construction's inefficiency made it an easy choice.

Jeremy Searock is a 2003 graduate of the Naval Academy who received his graduate degrees in robotics at Carnegie Mellon University as part of his military service. After serving 12 years of active duty – including two-plus years teaching robotics at the Naval Academy – he returned to CMU to

be part of the autonomous systems group at the Applied Research Lab of the Robotics Institute. He was searching for opportunities to apply his research commercially when he met Steve Muck, CEO of Brayman Construction.

"I have a lot of experience running projects, mostly for the government and the military. What we weren't getting from our time at Carnegie Mellon was implementation," Searock explains. "We would get a contract, build a prototype and then put it on the shelf. As soon as Uber and other autonomous car companies started to get involved in Pittsburgh, I wanted to do something that was going to make a difference. That's when I ran into Steve, and he and I started talking about the construction industry. Being very selective about what I wanted to do next, I didn't take his word for it and did my own research into the construction industry."

Muck runs Brayman, a heavy highway/bridge construction company, as well as several other specialty contracting firms. He had been exposed to the work being done at the Robotics Institute during a 2015 visit as part of a

Young Presidents Organization program. Muck was keenly aware of the issues of demographics, a shrinking skilled workforce and the struggle to manage the ever-growing costs of doing construction. His explanation of the challenges of the industry to Searock struck a chord.

"When you take a macro view, locally, nationally and internationally, there are a couple of very clear indicators [in construction]," Searock says. "One, there is a labor shortage, which is going to get worse as the years go on. Two, if you look at the productivity rates of the construction industry versus industry in general, there are many statistics out there that show that construction has a much lower productivity rate that is declining. On the flip side, demand is increasing so there is the divergence. There is more work to be done; there are not enough people to do it; and, their productivity is not what you would like it to be.

"I saw only two choices. Somehow the industry needs to recruit more workers, or you have to make an individual worker more productive. The way you do that is with technology. Robotics and artificial intelligence are the perfect technologies to make one individual worker more productive."

Muck had already started down the path of using technology to solve some of the problems he saw facing the construction industry. He points out that his motives were the improvement of his business, rather than getting into the robotics business.

"The impetus for the project was a contractor, in this case Brayman, watching productivity drop over the years. The focus was on shortening the critical path because our

customers demand that we get done quicker and quicker, so there's less disturbance to the traveling public," says Muck. "We have competitiveness issues. We are always trying to keep our costs down and labor is an element that is becoming less productive and, therefore, more expensive."

"We did a proof of concept with Carnegie Robotics," Muck continues. "For nine months we funded a prototype development. They developed a prototype and proved the technology exists to tie rebar using screed rails that already exist in the construction process. At that point I was faced with a decision. Carnegie Robotics wanted a million dollars to develop this robot but I knew there were other robotic devices I wanted to develop. At that point Jeremy and I became acquainted. I didn't want to outsource that development. I wanted to build a team that could build the first robot and then continue to develop others."

ACR was founded then to create and commercialize autonomous products to help solve industry-wide challenges, including construction workforce shortages. The firm's first product, TyBot, was the completion of the prototype of the autonomous rebar-tying robot. TyBot ties rebar intersections continuously, without breaks or injuries. Construction crews carry, place and frame the first ten percent of the deck rebar before the TyBot finishes the work. Manually tying rebar requires that crews place portions of the rebar before doubling back to tie what has been placed. Typically, half the crew places while the other ties. With TyBot, crews can maintain a pace that places rebar sections with enough preparation that the robot can tie continuously, including during off hours if necessary.



Advanced Construction Robotics' co-founders Steve Muck (left) and Jeremy Searock.

Contractors using TyBot see huge productivity gains. They also accrue other benefits, including significant safety improvements.

"Rebar tying is not a pleasant activity," says Muck. "Bridge deck tying spikes any bridge builder's crew. You need a special crew carrying and placing rebar and a special crew tying rebar. It's a critical path activity because it takes longer than pouring the deck concrete. A spike in crews means new workers and the vast majority of a contractor's workers compensation claims come from people they have employed less than 12 months, often less than 6 months. You are employing people in the heat of the season on a task that is unpleasant, has repetitive motion issues, and lower back issues and there are a lot of injuries."

TyBot can significantly reduce the number of workers involved in such a strenuous activity. That has a cascade of benefits. One factor is that you reduce the total number of labor hours, which reduces the exposure to workers comp claims. Fewer hours mean lower workers comp premiums. And of course there are the direct labor savings and the fringe benefit costs. There are also very tangible benefits to the worker.

"There are human benefits to this too. Construction workers work hard and sometimes their bodies don't make it to retirement," says Muck "Being a quality control technician on a robot is a job that can extend the career of an iron worker or laborer. On the other side of that equation, young people who might not have looked at the construction industry may become interested when they see we are applying technology like robotics or drones. We see technology as extending careers and attracting workers."

Muck also points out that technology like robotics can refresh the craft for the skilled construction worker, since robots can handle repetitive tasks that free up workers to apply higher-value skills on activities like complicated millwork or intricate masonry work.

The technology behind TyBot and

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other industrial robots is an integration of advanced motion, vision, sensing, algorithms, software and mechanical technologies. The AI involved is the rapid performance of a massive number of calculations that lead to machines making observations and decisions. Robots and AI can be more effective on tasks that are simpler and more repetitive. These are often the tasks that are least attractive, and more dangerous, for humans. ACR is focused for now on construction activities that meet these criteria, since they are the low-hanging fruit.

"In general what we are doing is choosing the low hanging fruit or the tasks within construction that are the easiest for the robot to do, which are usually the tasks that are difficult and painful for the human to perform because they are repetitive, labor intense and prone to injury," says Searock. "The bottom line for us is that, yes, robots are cool but they are just another product, just another tool. It's like an improved hammer that will get the job done better. The focus is just helping the industry."

Both Searock and Muck observe that the introduction of the robot into a construction jobsite has come with little push back. Muck's companies are signatory with multiple unions, so he is sensitive to their reactions. He says the Ironworkers have not raised an objection. The Laborers have been very supportive, including investing in the development of TyBot. The shortage of workers has left labor leaders in search of solutions beyond increased

recruiting too, and the reaction of the workers may be making it easier for labor to view the advancement of robotics more benignly.

"It is interesting to see the human reaction. For the most part, the human reaction is to be grateful that they don't have to tie rebar. They would rather use their skills for higher value activities," observes Searock. "One of the things on the technology front we like to focus on is that we don't see a future where we do not have people doing the work. There is going to be awesome collaboration between people doing what they're best at and robots doing what they are best at. Robots are really good at activities like moving from intersection to intersection and tying rebar. Humans are really good at planning all that out. In the end the collaboration of the two is going to be the only way I see to actually meet the increased demands of the industry."

TyBot is now established and entering its second full construction season. Six TyBot machines are in the field. ACR rents the machines on a per shift basis. Muck estimates that TyBot replaces five to seven people and saves about \$3,000 to \$5,000 per shift for a crew that size. Searock notes that they are developing TyBot to move into rebar-tying applications in other construction types. TyBot has started to get acclaim from the industry too. In October 2018, Brayman Construction and Advanced Construction Robotics were awarded the first ever first-place winner



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of the AGC-Autodesk Innovation Awards during the Associated General Contractors Centennial Celebration. In March, TyBot will be the first and only construction robot displayed at the prestigious triennial BAUMA trade show in Munich, the world's largest exhibit of heavy construction, mining and industrial equipment.

ACR continues to grow. The company employs 23 people at its manufacturing headquarters on Route 8 in Hampton Township. Searock says plans are nearing completion for beginning to sell TyBot machines. ACR has been developing robots for other construction activities and will announce its second product by April, with a third close behind. Inquiries are coming not only from across the U.S. but from around the globe, including a \$70 billion contractor that is India's largest construction company.

Both co-founders see their business as one of the first of what will become a mainstream movement, and they see advantages of being pioneers. One of those, especially for construction, is the opportunity to focus on simple activities first.

"We are at the beginning of the next wave of industrial revolution, with robotics and artificial intelligence," predicts Muck. "The technology that's being developed is not going to be a revolution. It's going to be a groundswell of robots that work with in and around humans doing some of the least pleasant and least

productive activities that require the least complex convergence of technology."

"We are focused on tasks that are labor intensive, where we have productivity issues and worker availability issues that we can use the simplest of some very complex artificial intelligence vision and motion control software solutions coming together to create something that is functional and has a significant economic benefit," concludes Searock. "We're focused on safety and labor reduction tasks that are strenuous and repetitive because those are activities we can impact." 

Advanced Construction Robotics

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LEGAL PERSPECTIVE

THE SPEARIN DOCTRINE: WIDELY RECOGNIZED, RARELY UNDERSTOOD, AND THE PROBLEM OF THE DAMN DAM

BY D. MATTHEW JAMESON III, ESQUIRE

Virtually everyone in the construction industry has heard of the Spearin doctrine, but in my experience a lot of people do not understand what this doctrine means or how it impacts the projects on which they are working. In 1918, the United States Supreme Court issued its decision in *United States v. Spearin*, 248 U.S. 132 (1918). A brief overview of the case is helpful to understand the impact of the doctrine: Spearin (the contractor) entered into a contract with the federal government (the owner) to “build a dry-dock at the Brooklyn Naval Yard in accordance with plans and specifications which had been prepared by the government.” *Id.* at 133. Before construction of the dock could begin, the contractor had to relocate a sewer line in accordance with the requirements set forth in the plans and specifications provided by the owner, who ultimately accepted the contractor’s sewer-line relocation work as satisfactory. About a year later, the relocated sewer line burst during a heavy rain because of an undisclosed dam that was part of the sewer system. Neither the owner nor the contractor knew of the dam. The contractor refused to continue with its work until the owner corrected the problems caused by the undisclosed dam. In response, the owner terminated the contract and refused to pay the contractor its anticipated profit on the work it did not get to perform. The Court was faced with determining which party bore the risk of such an undisclosed condition.

Ultimately, the U.S. Supreme Court agreed with the contractor and held as follows: “if the contractor is bound to build according to plans and specifications prepared by the owner, the contractor will not be responsible for the consequences of defects in the plans and specifications.” *Id.* at 136. The Court reasoned that the owner’s issuance of the plans and specifications constituted an implied warranty of adequacy of those plans and specs. The Court concluded that the contractor was not obligated to make any independent determination of whether the plans and specs were in fact adequate. As a result of its holding, the Court ruled that the owner’s termination of the contractor was improper, and the contractor was entitled to recover its lost profits on the work that it did not get to perform.

While many contractors recognize that the Spearin doctrine protects them from being held liable for project failures that result from defective plans and specs, many owners fail to recognize the risk they face as a result of the Spearin doctrine. A more detailed consideration of the problematic dam in *Spearin* highlights the risks that an owner faces. As noted, in *Spearin* the owner was not aware of the existence of the dam that caused the problems, therefore, there is no way the owner would have told its engineer about the existence of this dam. It is therefore likely that the owner (1) paid its engineer for a design that would not work, (2) paid its first contractor to build a portion of a project that was doomed to fail (and also paid that contractor profit on work it did not perform), (3) paid another engineer to come up with a new design since the first one did not work, and (4) and paid a replacement contractor to build according to the new design. So, what can an owner do to avoid the risk of incurring these costs?

Initially, an owner may think that the design professional would be liable for the costs incurred by the owner in *Spearin* since the design professional failed to include the dam in its plans and specs. Owners must remember, however, that the design professional’s liability to the owner is determined largely by the applicable standard of care. Under the commonly-used American Institute of Architects (“AIA”) B101 Owner/Architect Agreement, “The Architect shall perform its services consistent with the professional skill and care ordinarily provided by architects practicing in the same or similar locality under the same or similar circumstances. The Architect shall perform its services as expeditiously as is consistent with such professional skill and care and the orderly progress of the Project.” Frankly, this standard is basically a recitation of the common law standard in most jurisdictions that would be applicable to professionals in any field (e.g. – doctors, attorneys, accountants, architects, engineers, etc.). Under this standard of care, to the extent design professionals typically rely on information provided by the owner (e.g. – site surveys, geotechnical reports, environmental assessments, etc.), the design professional will likely be insulated from liability. So, what is an owner to do?



The use of either (1) the design-build project delivery method, or (2) performance specifications, may help to minimize the risk that Spearin places on owners. The website for Design-Build Institute of America defines this method of project delivery as follows:

The Owner manages only one contract with a single point of responsibility. The designer and contractor work together from the beginning, as a team, providing unified project recommendations to fit the Owner's schedule and budget. Any changes are addressed by the entire team, leading to collaborative problem-solving and innovation, not excuses or blame-shifting. While single-source contracting is the fundamental difference between design-build and the old ways [read design-bid-build], equally important is the culture of collaboration inherent in design-build.

From an owner's perspective, the key to avoid the numerous additional costs that the owner incurred in Spearin is to ensure that the design-builder is responsible for any and all pre-design site investigation. For example, from the owner's perspective, the design-builder should (1) obtain, review, and analyze all information regarding existing site conditions; (2) retain the geotechnical engineer to prepare the investigation and analysis of sub-surface conditions; and (3) retain appropriate consultants to conduct any and all environmental testing necessary to design and build the project (e.g. – asbestos, lead-paint, storm-water management, etc.). The design-builder, in turn, would need to make sure that the consultants performing the above tasks are adequately insured to

protect the design-builder against design errors arising from the work performed by any of its consultants. To the extent that the owner elects to perform those services itself and/or provide the design-builder with previous documents providing such analysis, the design-builder will likely be able to rely on the Spearin doctrine to argue that there was an implied warranty of adequacy from the owner.

The use of performance specifications is another way that an owner can protect itself from the potentially negative impact of the Spearin doctrine. The contractor was not liable for

the problems created by the dam in Spearin because the contractor followed the detailed plans and specs that were provided by the owner. If the owner had instead simply instructed the contractor to move the sewer line and ensure that the sewer continued to perform at a certain flow-rate, it is possible that the contractor would have been liable for the problems it encountered, because the contractor would have assumed a contractual obligation to ensure that it met the performance-based specification. Obviously, the risk to the owner under this scenario is that the contractor may have submitted a higher bid to protect itself from potential problems with moving the sewer line. This at least would have provided the owner with cost-certainty at the start of the project as opposed to the owner having to deal with financial disaster created in the middle of the project.

In conclusion, when an owner takes a traditional design-bid-build approach to a project, it is at greater risk for incurring unexpected cost overruns for which (1) the architect is not responsible under its standard of care and (2) the contractor is not responsible under the Spearin doctrine. Owners should consider alternative approaches to project delivery, such as design-build (or, at a minimum, design-assist to get its contractors on board earlier in the process), or performance-based project specifications. **BG**

Matt Jameson is a shareholder and trial attorney in the Construction Law Group at Babst Calland. He represents a variety of clients in the construction industry in all aspects of construction law. He can be reached at mjameson@babstcalland.com.

FINANCIAL PERSPECTIVE

HOW NEW TECHNOLOGY CAN HELP CONSTRUCTION FINANCE PROFESSIONALS

BY JASON KRANKOTA

Historically, the construction industry has been one of the slowest to adopt new technology, lagging only behind agriculture in digitalization. But that's changing as software entrepreneurs turn their attention to the needs of the deskless workforce.

The ubiquity of mobile devices, cheap and powerful cloud computing, 5G, and the Internet of Things (IoT) are all making it possible to put robust technology into the hands of deskless staff, including construction workers. The venture capital industry has taken notice—funding for construction technology has seen a steady uptick since 2013.

CFOs should partner with their IT teams to modernize their back-office systems, and prepare to handle a flood of data from the field as paper processes become digital. They should also figure out exactly what field data they want, what tools work best to get it, and how to integrate that data into their financial software. Deployed strategically, new tools can help construction finance teams resolve many challenges.

Business Continuity Planning

Family-owned businesses are common in the construction industry, and many thriving mid-market and even large companies are still majority-owned by founding families. Finance leaders need to create business continuity plans, whether that's figuring out how to transfer company ownership to the next generation, establishing an ESOP (Employee Stock Option Plan), or selling or merging the company. There's a lot of work involved in valuating the business, figuring out the best planning scenario, and helping negotiate relevant deals. Industry-specific ERPs (such as Viewpoint's Vista) and cloud procurement platforms (such as Concur) can give finance professionals a better view into their numbers, help with planning scenarios, and standardize the purchasing process across acquired or merged companies.

Changing Accounting Standards

Revenue recognition is always top of mind in the industry. For the past several years, the Construction Financial Management Association (CFMA) has sought to ensure that the new Financial

Accounting Standards Board (FASB) rules around revenue recognition are favorable—or at least not punitive—towards the construction industry. As these new rules are implemented, CFOs seek to refine their strategies for how to bill against contracts, and tie revenue to either a percentage of completion or work-in-progress schedules. Mobile technologies that expedite communication between the office and the field can also help speed the flow of information.

Risk Management

Construction carries more risk, especially out on the job site, than many other industries—and insurance costs are rising. Some companies are investigating captive insurance programs, in which multiple companies pool their assets and fund their own risk by placing money under management so they don't have to pay such exorbitant premiums.

Insurance companies have responded with more flexible products to try to help companies control their costs. CFOs need to evaluate their options—and if they want to participate in a captive insurance program, every participant needs to undergo a thorough assessment of their financial stability.

While a modern ERP system can facilitate most of that process, the assessment would also look at safety and security practices. There's a lot of technology that can help reduce jobsite risk. Drones can monitor job sites for safety and security. Sensor-equipped wearables can alert workers to smoke or toxic chemical exposure, and geo-fencing can provide alerts when they're entering a hazard zone. Firms can also use autonomous equipment to do work in environments that are too hazardous for human workers.

In the office, payment automation software can mitigate payment fraud as part of an overall risk-management program.

Attracting and Retaining Talent

Lots of companies face growth opportunities while lacking enough employees to do the work. With unemployment at new lows, it's been difficult to hire and keep good employees.

CFOs are working with HR—and, occasionally, external strategists—to refine their hiring, retention, and benefit strategies. Mobile training technology can help onboard unskilled workers faster, allowing companies to draw from a larger talent pool. Virtual reality technologies also offer promise for quicker training.

Improving Job Cost Accounting

Tablets and handheld phones let field staff capture data and send it back to their offices electronically. GPS-enabled time cards can record employee work hours and location on a mobile phone. IoT devices can measure equipment run time.

Cash Management Strategies

Cash management is probably the biggest challenge at any construction company, and effective work-in-progress (WIP) schedule management is critical. Key to the challenge is coordinating between the subcontractor confirming that a job is complete, project managers verifying that completion, and the accounting department billing the owner and syncing everything with the WIP schedule. This is also an area where drones and mobile apps can increase the speed and accuracy of data delivery to finance.

Finance also needs visibility, flexibility, and precision control over making and timing payments. With cloud-based payment-automation software, a project manager sitting in a truck can review a payment file, prioritize subcontractor payment schedules, and approve payments immediately, without having to return to the office to sign a stack of checks and backup documentation. Subs get paid faster and the job keeps moving.

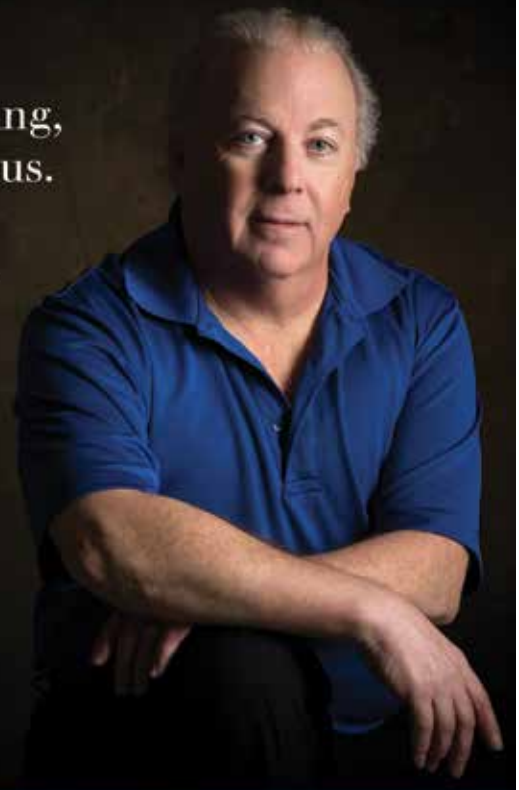
With all the new purpose-built technology coming down the pipe, we'll finally start to see some real movement towards digitizing the construction industry. Finance teams should prepare by enabling themselves with modern cloud systems for accounting, spend management, and payments. They need to enable the field with tools that communicate data back to the office in near real-time. Most importantly, they

need to work out how to coordinate it all towards productivity gains and growth, and join the ranks of data-driven CFOs who have done the same in other industries. **BC**

Jason Krankota is VP of Construction Sales, West Region at Nvoicepay. His expertise in construction business technology spans 20 years, with 10+ years focused on corporate payments, accounts payable, and expense management solutions.

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MANAGEMENT PERSPECTIVE

MANAGING RISK IN CONSTRUCTION CONTRACTS AND SUBCONTRACTS

BY ANDREW W. REINHART, ESQ. AND DOUGLAS C. HART, ESQ.

Managing Risk in Construction Contracts and Subcontracts

All construction contracts begin well before the contractor or subcontractor breaks ground. For all parties involved, the contracting process is a precursor to payment and performance, and carefully negotiating appropriate contract terms is essential to mitigating risk before, during and after the construction process.

Key Considerations for Contractual Risk Management

When negotiating contracts for construction projects, property owners, architects, builders, licensed professionals, subcontractors, and other entities must give due consideration to the value of the contract as well as the potential risks it entails. On the risk management side, contracting parties should consider the following:

1. Clear Delineation of Payment and Performance Obligation

In many cases, disputes arise due to ambiguities regarding contracting parties' payment and performance rights and responsibilities. If a subcontractor believes it has satisfactorily completed its work and the general contractor disagrees, in the absence of clear governing contract terms, a dispute can lead to unnecessary costs for both parties.

To avoid these types of issues, contracting parties should take the time to ensure that their expectations are clearly documented and that they outline clear remedies in the event of deficient performance or non-payment. This means carefully negotiating provisions regarding:

- Both parties' contractual duties (performance and payment)
- Project timeframes
- Inspection and sign-off requirements and conditions
- Change order procedures and conditions
- Remedies for performance defaults
- Remedies for payment defaults
- Procedures for informal dispute resolution

2. Identification of Project Risks to Be Managed

Beyond the risk of payment and performance defaults, parties to construction contracts can face a variety of other risks as well. The risks attendant to

any particular contractual relationship will depend upon factors ranging from the counterparty's professional experience and credit standing to the nature of the property and the work to be performed. Broadly speaking, however, these risks fall into two categories:

- The risk of physical injury to an employee or third party
- The risk of physical damage to the property under construction or adjacent property

With limited exceptions, all parties involved in residential, commercial and industrial construction projects will face risks in each of these categories. While contracting parties generally do not need to devote time to identifying all potential contingencies, they should make an effort to identify reasonable risks that are worth addressing prior to the start of construction.

3. Determination of Proper Risk Allocation

Once all reasonable risks have been identified, then the focus can shift to proper risk allocation. As a general rule, parties should be held liable for their own negligence and intentional acts, although there are potential exceptions. Additionally, although contracting parties will generally need to allocate risk between themselves, these parties can also use their agreements with suppliers, subcontractors, insurers, and other third parties to further allocate risks for which they should not hold (or are not comfortable holding) ultimate responsibility.

4. Assignment and Apportionment of Liability and Risk of Loss

The primary contractual mechanisms for assigning and apportioning risk related to construction projects are: (i) indemnification clauses, and (ii) provisions for mandatory insurance.

An indemnification clause normally requires one party (the "indemnitor") to provide a defense and pay any settlement or judgment liability incurred by the other party (the "indemnitee") arising out of third-party claims falling within the clause's scope. In the construction realm, there are three primary types of indemnification clauses:

- **Broad Form** – Transfers all risk to the indemnitor regardless of which party is responsible for the third-party claimant's property damage or personal injury.

- **Intermediate Form** – Transfers risk for liabilities specifically outlined in the contract, excluding only claims related to the indemnitee's sole negligence.
- **Limited Form** – Allocates risk based upon each party's share of liability as described in the contract.

Intermediate-form indemnification clauses are most common, as they will most often reflect a mutually-agreeable risk allocation between contracting parties with roughly equal bargaining power in an arm's length transaction. However, contracting parties should carefully assess their potential exposure in light of their own internal risk management policies, and should make informed and strategic decisions rather than simply defaulting to industry standards. Ultimately, the party that has the most control over a potential risk should be the one to hold financial responsibility.

5. Management of Risk Through Mandatory Insurance Provisions


With regard to provisions for mandatory insurance, contracting parties should consider a

few key factors. The first is the type (or types) of insurance to be required. While every transaction is unique, construction-related contracts will commonly include requirements for performing parties to carry the following types of policies:

- Automobile liability
- Commercial general liability
- Workers' compensation
- Excess liability
- Professional liability

Next, the party requiring insurance coverage should also ensure that it is named as an "additional insured." While this is as far as some contracts go, additional-insured clauses should generally also address issues such as:

- Specification of ongoing operations coverage or completed operations coverage;
- A requirement for downstream parties to also name the contractor as an additional insured;
- Clarifying that the contractor should not




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be designated as an "additional named insured," as this can lead to the imposition of deductibles and premiums;

- Waiver of subrogation by the insurance company; and,
- Delivery of an adequate certificate of insurance and endorsements prior to commencement of work.

6. Use of Payment and Performance Bonds

Payment and performance bonds can further mitigate the risk of performance and payment deficiencies for contractors and subcontractors. A performance bond obligates the issuer (or "surety") to complete the project if a subcontract is terminated due to non-performance or deficient performance, while a payment bond obligates the surety to make payments that are due and owing by an upstream party. If a performance or payment bond is desirable (as will often be the case), appropriate provisions should be included in the parties' agreement so that any unilateral or reciprocal obligations to secure bonds are clear.

7. Project Administration, Risk Management and Contract Enforcement

Finally, once the contract has been executed, both parties should have administration and enforcement systems in place to ensure that the terms of the contract are observed. For example, a general contractor should have a mechanism to ensure timely delivery of certificates of insurance and policy endorsements, and both parties should record key dates and timeframes for payment, performance and pursuing contractual remedies. Since the risk of a breach has liability implications for the non-breaching party's downstream and upstream obligations, any issues should be addressed promptly and parties should be prepared to take appropriate action to enforce their contractual rights if necessary. **BG**

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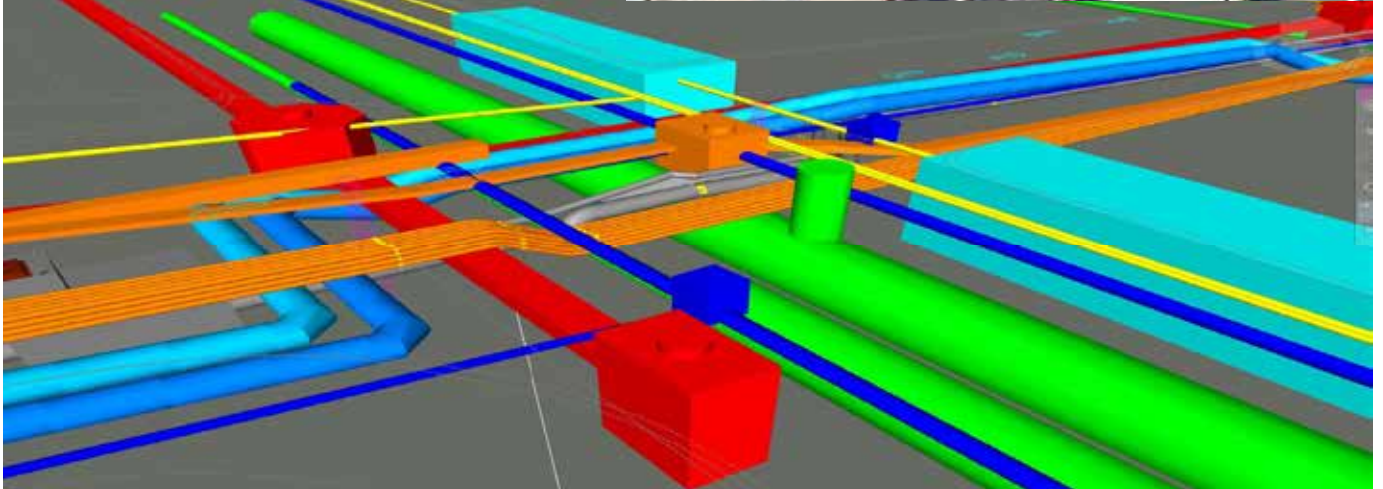
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TREND TO WATCH

TECHNOLOGY CONTRACTING: DESIGNING SYSTEMS FOR EFFICIENCY, INTEROPERABILITY AND SMART BUILDING OUTCOMES

BY JIM NANNINI, JOHNSON CONTROLS INC.

Over the course of a decade, a best practice has emerged for managing the design-assist, installation and integration of complex building, business and specialty systems. Known as Technology Contracting, it involves assigning a single point of responsibility upfront to bring an enterprise-wide perspective to managing the planning, design, installation, integration, commissioning and service of technology systems, business applications and supporting infrastructure. Technology Contracting can save time, reduce risk and decrease construction and operating costs while ensuring that technology is deployed and integrated in an orderly manner to achieve desired outcomes.

Defining the need

Often, before the construction process begins, the owner selects a construction manager or owner's representative, as well as the design team. The building goes out for bid and a general contractor wins the project. A separate subcontractor strategy is employed to align budget to design and desired outcomes, and the subcontractors bid on the plumbing, electrical, lighting, HVAC, fire alarms, security, communication and specialty systems, and each takes care of installing their own systems.

This process can be sufficient when the systems being installed are well defined, however, today with the Internet of Things driving IT standards and smart building outcomes across the enterprise, systems are better able to connect, share and optimize data across technology silos using a common communications language. Consequently, creating this smart, efficient, connected environment can be difficult to accomplish using a traditional construction approach:

- Who is responsible for bringing a holistic approach to technology within budget?
- Who can be counted on to bring the right solutions forward from market-leading partners, maximizing the efficiency, integration and interoperability of the technology systems across the enterprise?
- Who remains committed after installation to provide ongoing technical support, training and insight for the lifecycle of the building?

The traditional design approach is often challenged with leveraging the collective brainpower of different

systems types to enable smart building outcomes. Without a coordinated, enterprise-wide approach to large, complex technology initiatives, systems and infrastructure duplications are common, and systems and data are left unsecured across the enterprise. Also, opportunities for integration and installation efficiencies are likely to be missed. It is difficult and costly to take full advantage of these opportunities after the building goes up.

Constructing a smart building that meets energy, technology and operational objectives depends on early collaboration between the owner, design and construction teams, sharing informed, data-driven decisions about connectivity and interoperability. With deliberate expert attention applied early during the planning phase, pitfalls can be avoided. This is why, increasingly, building owners and their teams are selecting a single point of responsibility for technologies early in the process.

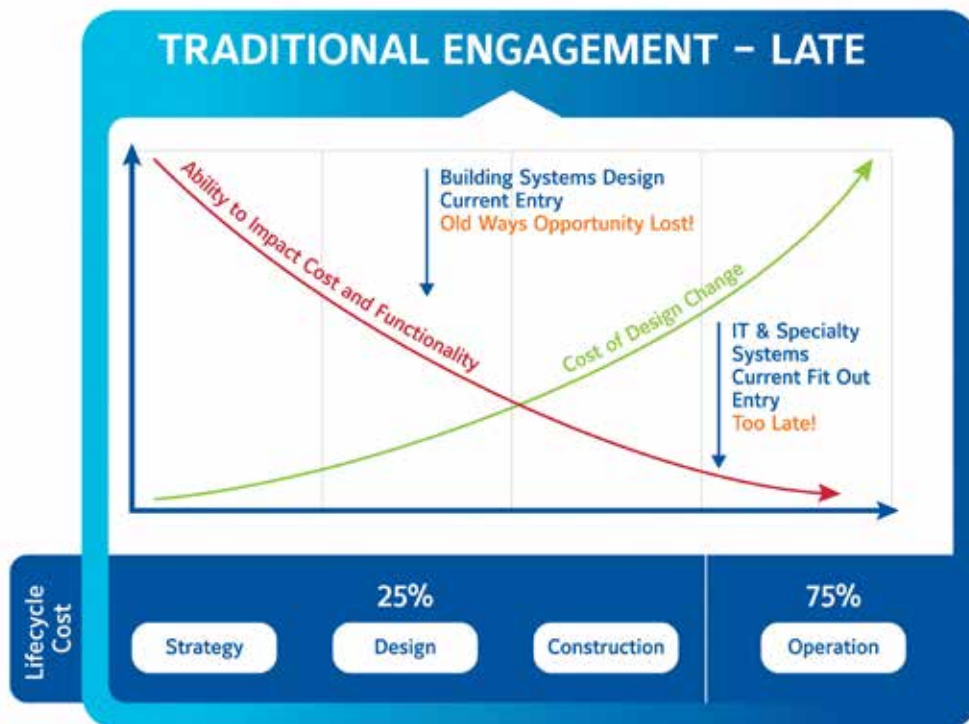
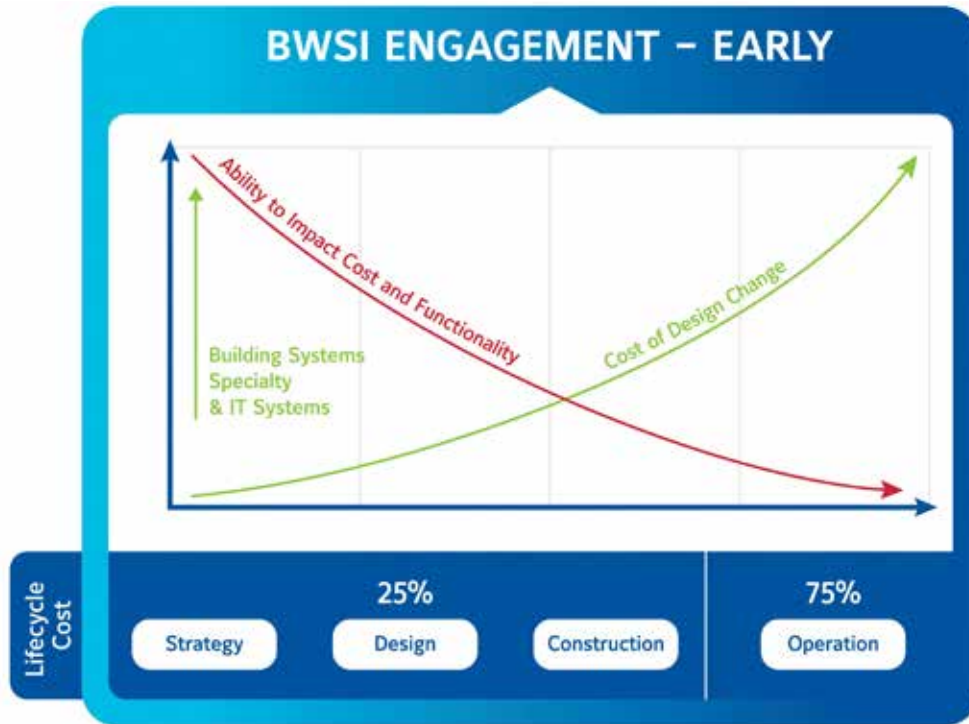
Technology Contracting Process

An updated contracting model achieves defined outcomes.

Technology Contracting is a proven strategy to support the owner's and construction manager's objectives. It adds a single point of responsibility for the on-time and under budget delivery of connected technology with an enterprise-wide perspective. The technology contractor has the authority and technical expertise to make decisions and influence how the information technology network – as well as HVAC, communications, life safety, asset tracking and business applications – will be chosen, procured, installed and operated, all under budget and on time.

With Technology Contracting, the building is created not as a collection of systems, but as a functional whole, conceived, designed and delivered with the end in mind. Technologies and other key systems are connected to deliver in full the smart outcomes the owner desires for the building and its occupants. Therefore, the time to consider a technology contractor is at the schematic stage of the project, following the definition of the desired building and business outcomes.

While details of the process itself can differ with each project, the approach allows the technology contractor to manage planning, design-assist, installation,



integration, commissioning and service of all technology systems in a building.

Why is technology integration so critical now?

Smart connectivity is critical for connecting technologies within and across buildings, creating systems that optimize building operations, reduce resource use, produce meaningful insights and increase productivity. The development of networked sensors, machine-to-machine communications, data analytics and real-time decision-making means previously fragmented technology systems within buildings are now converging on standards-based, secured platforms, applications and intelligent infrastructures. The process of translating raw data into useful insight and action is key to delivering smarter capabilities for buildings.

Consequently, building-wide system integration is more achievable than ever before, however, navigating this territory can be complex and costly, and many are left wondering what it means for their facility, how to start the process and where to spend their money. A technology contractor can help the building owner, architect and general contractor plan the best systems, applications and infrastructure for building occupants. The technology contractor is responsible for delivering, installing and supporting the right solution in every area.

While technology convergence is now possible, it doesn't happen without deliberate effort. If integration is attempted after the systems have been installed and construction is complete, the process is costlier, more

difficult and more time consuming than if it had been planned all along. A technology contractor will consider the various technology systems and integrations upfront, coordinating so that the systems live up to their full potential and support any future innovations while protecting the existing investment.

The Technology Contracting Process

A Technology Contracting relationship typically begins at the very early stages of building design. The objective is to respect the project's budget while making the most of the technology investment, achieving significant cost savings which can be used to meet the needs of the facility's prospective occupants. Involving the technology contractor early ensures that overall building architecture and systems are mutually supportive. The process results in mechanical and electrical systems that are efficient, optimized, and future ready.

Planning

Effective planning is the first step in a successful Technology Contracting engagement. In partnership with the design and construction teams, the technology contractor brings together all stakeholders – owner, representatives of different business units and departments, consultant, architect, contractors – for a facilitated planning session meant to uncover defined outcomes related to system and technology infrastructure priorities, maximizing every dollar spent. Beyond facilitating the discussion, the technology contractor's role is to be familiar with the ecosystem of feasible technology options and point out common packages and integrations, then recommend options to suit the project's

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budget. The technology contractor works with the design/construction project team to select and implement the technologies determined as essential for delivering the planned environment that meets the needs of the building occupants.

Design Assist

During the design process, the technology contractor collaborates with the design team to optimize layout and integration of systems and technologies required to meet the owner's desired outcomes. When all of the potential systems and technologies are identified the design team and technology contractor make objective product selections to maximize the efficiency, integration, interoperability and lifecycle service of technology systems. Moving these decisions to the earliest phase of the design process drives consensus, mitigates construction risk, and results in fewer change orders during construction and systems installation.

Installation and Integration

The technology contractor brings proven, repeatable, best-in-class technologies to the project by leveraging a partner ecosystem of manufacturers, distributors and value-added resellers with the experience, expertise and innovative services and solutions needed to create a connected environment. This ensures that energy, technology and operational objectives are met while reducing cost and risk.

The technology contractor collaborates with the partner ecosystem in the design of

an intelligent infrastructure on which to integrate technology and oversees the installation of technology systems, including building systems, business applications and supporting infrastructure.

Commissioning

Commissioning is a systematic process of testing to make sure all building systems perform according to the design intent and the owner's operational needs. The technology contractor works closely with the commissioning agent, because the commissioning process begins in the design phase of the project. The process ensures that commissioning considerations are planned into the selection and integration of systems, that the owner's business processes are fully supported, and that the building, business and specialty systems are integrated into a single secured operating model. Functional documentation, wire diagrams, and use case validation all contribute to the successful commissioning of the building prior to occupancy and make the process significantly more streamlined for the commissioning agent.

Service

Building owners may choose to manage equipment and systems maintenance or the technology contractor may have resources to provide maintenance, operational and management support after the building is occupied. Commissioning benchmarks performance, so the identification and repair of systems that have ceased to operate at acceptable performance levels is easy to manage. Effective systems design and monitoring can reduce expenditures on energy, maintenance and upgrade costs.

The State of the Industry

There have been many excellent examples of Technology Contracting in the healthcare facilities market. For example, hospitals use about three times as much energy as a similarly sized office building due to 24/7 operations and energy intensive processes such as operating room conditioning. A typical surgical suite is unoccupied 70-80 percent of the time during the week and up to 95 percent on weekends. By integrating the building management system with the surgical scheduling system and electronic patient records, excess energy used to condition, pressurize and ventilate the operating room can be reduced when unoccupied, saving an average of \$6,000 per year while delivering and documenting safer and more comfortable conditions.

Technology Contracting has applications in virtually

every sector including education, transportation, state and local government, commercial real estate, industrial manufacturing, and sports and entertainment facilities. Nevertheless, it remains an unfamiliar concept to many architects, engineers and general contractors. Although technology is available to make buildings smart, realizing the full potential of smart buildings requires integrating technology systems that communicate to fully optimize the environment and improve operations. Creating a smart, efficient, connected environment that meets the owner's business objectives can be difficult to accomplish using a traditional construction approach. To function effectively in the Technology Contracting role, a firm must have knowledge of smart connected equipment, building controls, fire and security, IT networks and systems, and specialty business applications. It must also be well versed in planning, design, construction, installation and commissioning. Ideally, the technology contractor also has resources to provide maintenance, operational and management support after the building is occupied.

Today, few firms possess broad enough expertise to perform well in a Technology Contracting role. In time, the discipline will achieve broader recognition and specialized professionals and boutique firms may find niches within it.

Buildings are huge investments. Particularly in mission-critical environments such as hospitals, life science facilities, manufacturing plants and large-scale commercial facilities, the efficiency and integration of systems can substantially affect the occupants' business performance. Taking an enterprise-wide approach to technology enhances integration, optimizes technology usage and maximizes budgets, ensuring building technology fulfills its promise and building owners realize their vision. **BG**

Jim Nannini is vice president of building wide system integration for Johnson Controls. He has worked in the information technology services field for the past 30 years. Previously, Jim held various leadership positions with a Fortune 50 company and technology startups.

BEST PRACTICE

SMART SOLUTIONS: THE KEYS TO GUIDING YOUR CLIENTS TO A SMARTER FUTURE

BY BRIAN FISCHBACH, P.E. LEEP AP

Technology is rapidly advancing, and governments are turning towards smart solutions to build smarter, not faster. As contractors and consultants to cities and communities, we must understand not only the drivers behind Smart Cities initiatives but also the initiatives we can be involved in to recommend to our clients. We must approach projects and look for ways to plan for what the future may look like, all while being innovative and environmentally conscious. Are we designing for the future or the past? And if we aren't looking to the future, how do we start? It's often up to us to equip our municipal decision makers with the roadmap to long-lasting, sustainable, and smart technology solutions in this rapidly evolving world. By offering guidance to our clients to help them understand how smart solutions fit into the larger goal of building a path to a smart community, we can help them attract residents, grow businesses, retain talent, and improve the overall quality of life.

Recently, Pennoni, along with others, sponsored ESI Thoughtlab's study, Smarter Cities 2025, which featured research into the impact of smart city solutions on urban performance. This study and the data collected has provided us with knowledge to help transform communities for continued success as we move into the future. The in-depth benchmarking surveyed government leaders in 136 cities around the world to understand their smart city perspectives, practices, and performance results. In addition, to gain insight into the views of city stakeholders, 750 business leaders and 2,000 residents were also surveyed in 11 "proxy" cities with varying levels of economic development, social and geographic diversity, and technology use. A smart city maturity score was assigned to each of the cities based on the level of smart city investments, the use of data analytics, the application of smart technologies and the city's self-rating on its stage of smart city maturity.

Key findings of the study included the importance of building a roadmap, which is essential for cities and communities to succeed. It's important to take into consideration that every community has a different "smart city" journey and that the top benefits of implementing smart solutions vary by stakeholder. According to the study, the most successful cities first put in place the five foundational pillars—governance, infrastructure, economy, talent, and funding before developing tech-enabled solutions for five other smart city pillars: the environment, mobility, public safety, public health, and payment systems.

**Are we designing
for the future or
the past? And if
we aren't looking
to the future,
how do we start?**

Governments must keep pace with digital innovations; failing to do so may cause them to become less competitive and attractive to businesses and consumers who are looking for an increasingly digital marketplace. To do this, they must rely both on internal teams and external ecosystems of suppliers and partners to accelerate digital transformation. Leading communities outsource implementation of digital innovations to consultants and partner with technology providers.

Across all maturity levels, communities are investing the most in mobility, environment, governance, and infrastructure.

Data is the rocket fuel for smart city transformation, and communities need to make data management a priority. Laying the IT groundwork is crucial for smart cities, since most smart technologies run on sensors and other connected assets that are linked together through wireless and broadband networks. Beginner communities will need to start to put in place the IT infrastructure required to support effective smart city transformation. Connected—and well maintained—buildings, roads, electricity, sewerage, telecommunications, and water systems are crucial building blocks for smart city development.

Of course, funding smart solutions is a key challenge for most communities, and urban leaders need to be creative and resourceful in finding ways to fund their futures. By 2021, public-private partnerships will be the dominant financing technique, followed by concession financing, revenue share financing, and department budgets, which will all grow in use over current levels.

Another essential takeaway from the study is that improving environmental sustainability, energy use and resource allocation through innovative solutions is the number one challenge that cities face, ranking just one above climate change, a related issue. Climate change, energy usage and environmental consideration are of increasing priority as a city matures. Integrated volt control capabilities from smart utility grids can help manage voltage on their distribution lines, allowing utilities to reduce the total energy used by citizens without sacrificing service or quality. Investments in smart grid technology generate annual per capita savings of \$29.86 and a reduction in CO2 emissions of 223 pounds per person.

Building automation systems is one way to address energy usage. Utilities Watch (UW), a solution we offer that takes smart buildings a step further, is a combination of software and engineering expertise that manages energy, reduces costs, and minimizes environmental impact by complying with carbon and emissions regulations. The UW solution compiles data from various disparate sources and locations: building automation systems (BAS), meters, mechanical equipment, third party applications, local weather stations, load profiles, occupancy schedules, etc. Finally, if a certain level of data isn't available, additional sensors and controllers can be installed throughout the

building, which provide insight into energy consumption patterns. We leverage this existing technology and data to provide real-time information along with actionable, measurable opportunities for improvement; because "you can't manage what you can't see."

Mobility is one of the most heavily funded pillars in a community. The future of mobility is multi-modal, involving a wide array of fully integrated and connected options, including public and private services across all modes of transportation. Smart communities are developing choices to meet their changing needs, such as ride-sharing, bike- and car-sharing, smart transit systems, smart traffic signals and smart parking. Adaptive traffic signals, for example can improve a community by cutting congestion and pollution. The study found that smart traffic signals can offer per capita annual personal time savings of 9.7 hours and fuel savings of 3.3 gallons per capita. Another area of focus is pedestrian and bicycle safety through initiatives such as Vision Zero and Complete Streets. The report found that cities in the United States expect walking and bike share to each increase in use by almost 30% over the next three years. When streets are designed to promote pedestrian and bicyclist safety, more people will turn to walking and biking.

We have always designed for the future; designing extra capacity in areas like our sewer and transportation systems. However, with population growth, climate change, and limited renewable resources, we need to take this thinking one step further. **BG**

Brian Fischbach is a licensed professional engineer and office director for Pennoni Associates in Pittsburgh. He can be reached at bfischbach@pennoni.com.

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INDUSTRY & COMMUNITY NEWS



The Master Builders' Association and the Construction Advancement Program awarded a \$10,000 scholarship to Derek Miller and a \$5,000 to James Suszynski at the MBA's annual membership meeting. Pictured with Miller are TEDCO's Jim Frantz, MBA Education Committee chair (left) and Steven Massaro (right).



Allegheny County Executive Director Rich Fitzgerald (left) with John Mascaro Jr. at the Gentlemen's Night Out.



The 2019 Gentlemen's Night Out on the North Shore benefitting the National Aviary was held on Friday, February 8th at Heinz Field Champions Club. The event was hosted by Michael Mascaro, executive vice president of Mascaro Construction and president of the National Aviary Board of Trustees. The evening raised more than \$160,000 in support of the National Aviary's work to save birds and protect their habitats. Pictured are Cheryl Tracy, National Aviary executive director, and Michael Mascaro.



On February 4, Mascaro's John Mascaro, Jr. (third from left), Don Madeja, and Mary Ann Berg presented at the Parkway West Career Technology Center to the juniors and seniors interested in the construction industry. This event was part of Mascaro's sponsorship of The Challenge Program, which provides cash incentives to students for excelling in five areas: attendance, STEM, community service, academic improvement, and academic excellence.



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(From left) The MBA's Jack Ramage, PNC's Pat Naughton and Jeff Nobers from the Builders Guild at the IWEA Annual Banquet.



Tom Szymczak from SSM Industries (left) and David McKamish at the Gentlemen's Night Out.



CREW board member Jessica McKinney from PJ Dick, with PJ Dick's Tara Noland (left) and Cyndy Mosites Walter from Corporate Art LLC (right).

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(From left) AIMS' Mike Tarle and Ashley Bianco with Jack Barry from W. G. Tomko at the ASA Annual Networking event.



Volpatt's John Zang (left) and Jamison Vernallis with Tomko's Dan White (center).



(From left) Rycon's Phil Marraway, Kenya Finn, Kim Cleckley, Toni Peitz, and Stephany DelSignore.



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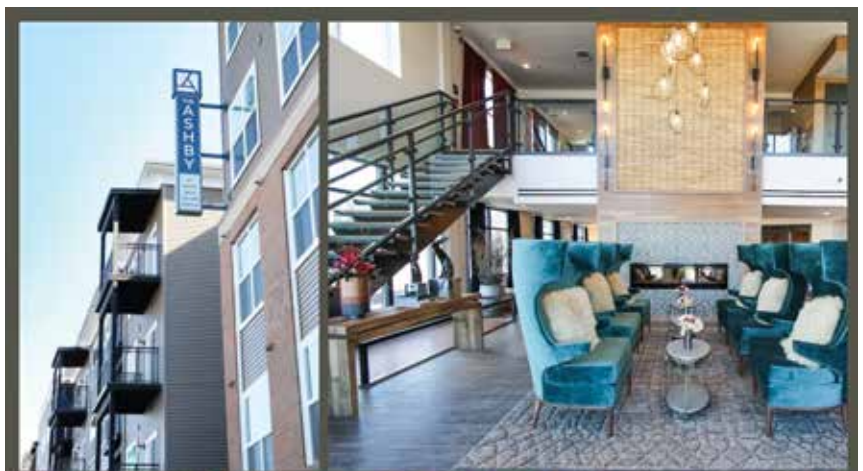
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(From left) Desmone Architects' Ryan Croyle, Katie Yatzkanic, Andre Clarke, Gregorio Torchia from WNA Engineering, Desmone's Jeffrey Wessel and Abby Spriggs.



(From left) Jendoco's Dan Freyer, Elmhurst's Brian Miller and wife Michelle, and Jendoco's Pierre Brun.



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Jack Mascaro was honored by the AIA-MBA Joint Committee with the James Kling Fellowship award at the Construction Industry Evening of Excellence on February 28. Committee co-chairs Rob Sklarsky of RJS Construction and Mark Dietrick (right) of Case Technologies presented the award.

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The MBA's Risk Management Committee established the Safety Champion Award to recognize an individual who is known within their company as a person who consistently practices the safety leadership skills needed to create a strong job site and organizational safety climate. John Widener of PJ Dick, Inc. was chosen as the inaugural honoree. John is a 33-year member of Carpenters Local Union No. 432, and accepted the award at the Construction Industry Evening of Excellence.



(From left) Ryan Casciani from Henderson Brothers, Joe Bosick from Pietragallo Gordon Alfano Bosick & Raspani and Dick Building's Alex Dick.



(From left) MBA Young Constructors' Chair Brian Budny from PJ Dick with MBA President Todd Dominick, from Rycon Construction, who was the speaker at the Young Constructors kickoff event, and PJ Dick's Eric Pascucci.





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Rudy DeStefano (left), with Molly Martini and Mike Larson-Edwards from A. Martini & Co.



(From left) Rothschild Doyno's Walt Haim, and WTW's Sierra Smith, Larry Payne and Jenna Glover.



USI Insurance's Charlie Salazar and Laleh Garanjik from Jendoco Construction.

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AWARDS & CONTRACTS

Marks-Landau Construction has begun core and shell construction, including site development, of WestRidge Corporate Park Building One in Morgantown WV. This three-story, 44,658 square foot multi-tenant office building is the first of three sister buildings. Desmone Architects is the architect.

Marks-Landau Construction has also begun design/build services along with Desmone Architects on the Agile Center of Excellence for technology company Leidos. This new 30,360 square foot office building is located in the WestRidge development of Morgantown WV. A completion date of November 2019 is expected.

Landau Building Company is the construction manager for a three-phase renovation of the third floor of WVU Hospital Physician Office Center, located in Morgantown, West Virginia. The 30,486 square foot renovations will upgrade the existing medical office spaces. The completion of the third floor renovation is anticipated for June 2019. The architect is Paradigm Architecture.

Landau Building Company has begun the UPMC Shadyside MRI Equipment Replacement project. The project includes a complete renovation of the existing MRI #2 unit as well as renovations to the adjacent control room and MRI equipment rooms. The architect is IKM, and the engineer is Allen and Shariff.

Landau Building Company is renovating 5,308 square feet of existing office space at the headquarters of American Iron and Steel Technology (AIST) located in Warrendale, PA. This is the third phase of renovations. The architect is Design 3 Architecture.

The Sarah Heinz House selected **Landau Building Company** as construction manager for its \$1.4 million renovation program. The architect is Desmone Architects.

A. Martini & Co. is the construction manager for the Josh Gibson Heritage Park on West Station Square

Drive. The park was designed by landscape architect J. Frank Studios.

TEDCO Construction was the successful contractor for the renovations to combine offices at the University of Pittsburgh Victoria Hall. The architect is Moshier Studio.

Sheet Metal Workers Local 12 awarded a contract to **F. J. Busse Co.** for its SMART Joint Apprenticeship Training Center Classroom Building on Gulf Lab Road in Harmar Township. The 8,500 square foot building was designed by Larson Design Group.

Carnegie Mellon University selected **Mosites Construction** as construction manager for its new \$45 million Forbes-Beeler residence hall. Construction is not expected until 2020. The building will be designed by Goody Clancy/IKM Inc.

Shannon Construction has started construction on the \$18.5 million renovation of Shannon Hall, the Davis Companies' conversion of the 230,000 square foot residence formerly used by Art Institute of Pittsburgh students into 205 apartments. The architect is Strada Architecture LLC.

Independence Excavating Inc. was awarded and began work as the design-assist site contractor by Gilbane-Massaro Joint Venture for the new Allegheny Health Network Wexford Hospital.

Independence Excavating Inc. commenced work on the site package and HOP package with Rycon Construction for the new Allegheny Health Network Hempfield – Neighborhood Hospital.

Duke LifePoint awarded **Massaro Corporation** the Conemaugh Memorial Medical Center – D Building Tower in Johnstown, PA. The project consists of the design and construction of a new five story addition that will house clinical components including central sterile, diagnostics, emergency, cardiology and ambulatory surgical stating departments. The building addition

consists of approximately 99,000 square feet of new construction. The renovation consists of approximately 40,520 square feet of major renovation. The architect is Stengel Hill Associates.

Highmark awarded **Massaro Corporation** the renovation of the third-floor conference area at Fifth Avenue Place. The project is located on the same floor and directly adjacent to the Blue Café previously renovated by Massaro.

The Club at Nevillewood awarded **Massaro Corporation** the new construction and renovation project for its facility in Presto, PA. Kicking off the enhancement is a new Golf Operations Center that will provide for golf cart storage, club storage, a streamlined check-in and drop off area and an adjacently-placed practice putting green. The architect is DLA+ Architects & Interior Designers.

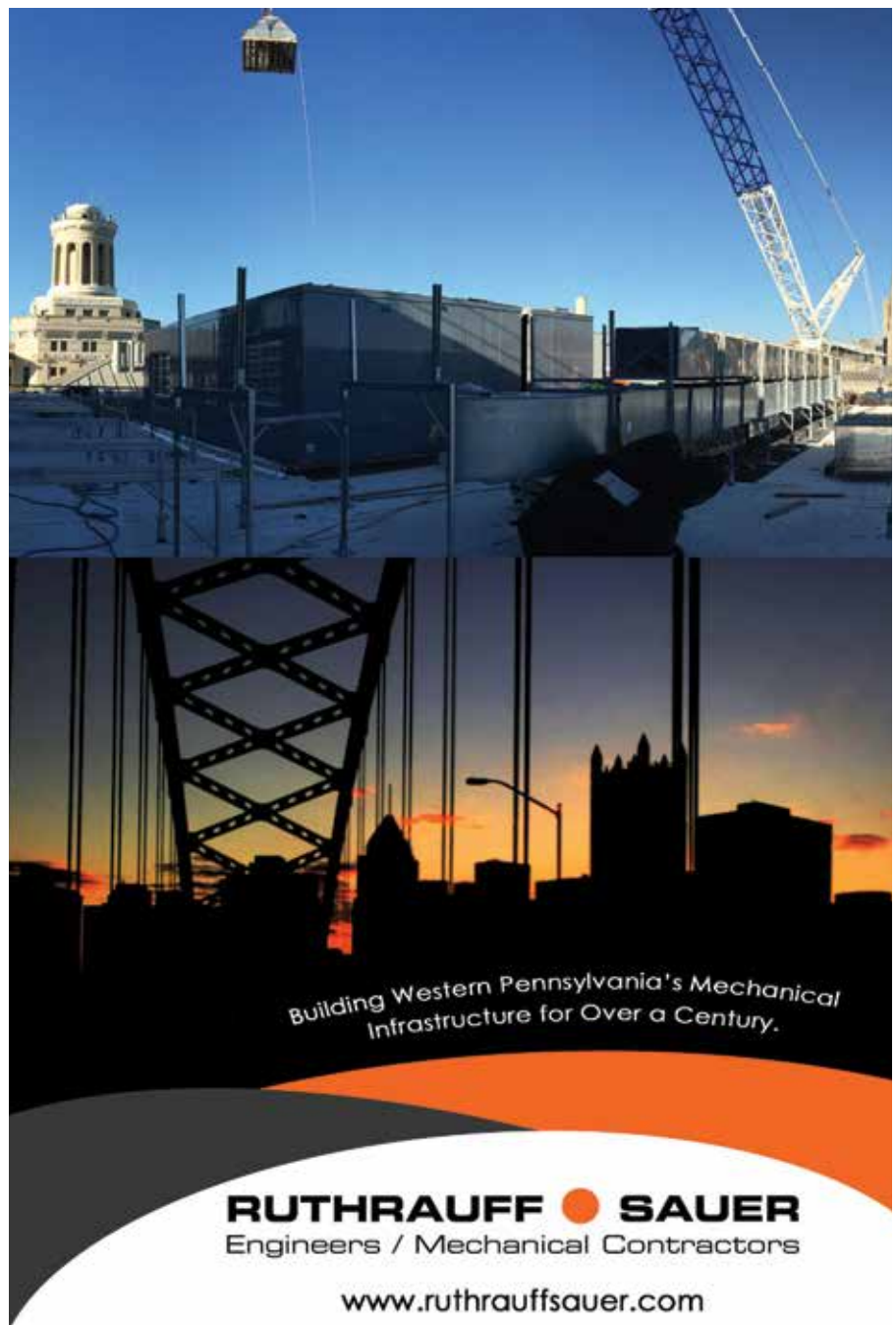
Allegheny College awarded **Massaro Corporation** the renovation of the restrooms in four student residence halls - Baldwin Hall, Crawford Hall, Edwards Hall and Walker Hall. The project will be delivered using contractor-led design build in partnership with MacLachlan Cornelius & Filoni Architects (MCF).

Allegheny Health Network awarded **Massaro Corporation** three projects at St. Vincent Hospital in Erie, PA. They include the renovation of the existing South Tower administrative offices on the first floor; selective demolition and renovation of two wings on second floor - 2NW/NE; and the Tower Modernization/Upgrade throughout patient towers.

Steward Healthcare Corporate Real Estate awarded **Massaro Corporation** various projects located

in Warren, Ohio and Sharron, Pennsylvania. Some of the project renovations include a new ED entrance, nurse's stations, hospital room renovation, exam rooms, imaging suites and more.

North Allegheny School District awarded a \$10.2 million contract to **Nello Construction** for the general construction portion of the \$17 million McKnight Elementary School. VEBH Architects is the architect.





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The General Services Administration awarded a \$4.54 million contract to **Burchick Construction** for the Weis Courthouse Backfill, a renovation of the federal courthouse in downtown Pittsburgh. The architect is MGA Partners.

The **Mascaro**/Barton Malow team will begin construction of the UPMC Vision and Rehabilitation Hospital at UPMC Mercy in February. Designed by HOK, the 410,000-square-foot hospital will provide research space, as well as a welcoming environment for patients with limited mobility and vision impairment.

Mascaro's Client Services Group will begin renovation work at WQED Multimedia to upgrade the toilet rooms on the first floor. The project, designed by Lab 8 Design, Inc., is expected to finish in the summer.

PJ Dick is providing CM at Risk Services for the University of Pittsburgh Scaife Hall School of Medicine Addition and Renovation.

PJ Dick was awarded the University of Pittsburgh Petersen Sports Complex Addition. The project features a 20,000 square foot expansion of the existing Support Building at the Petersen Sports Complex at Pitt's Upper Campus, a new third floor above the existing building and 12,000 square foot addition. Work also includes new locker rooms, coach's offices, team meeting spaces and new MEP systems to support the new spaces.

Rycon's Building Group was selected by Oxford Development to construct a new \$16 million office building, which is part of the second phase of the 3 Crossings Development, located in the Strip District. The 111,000 square foot building is expected to wrap up February 2020. Perkins Eastman is the architect.

Carnegie Mellon University chose **Rycon's** Building Group as construction manager to build their new 100,000 square foot residence hall & HUB. LEED Gold Certification is anticipated.

Work continues at One PNC Plaza in downtown Pittsburgh by **Rycon's** Building Group. Phases 7 & 8 are currently underway which consist of 68,000 square feet of upgrades. IKM Architects is the designer.

At Carnegie Mellon University, **Rycon's** Building Group will soon begin a \$1.6 million replacement of the existing fire

alarm system at Morewood Gardens residence hall. Meanwhile, phases 3 and 4 of restroom and HVAC upgrades are scheduled to start May 2019.

Rycon's Building Group is nearing completion on an office demolition within Highmark's 30th and 31st floors at Fifth Avenue Place in downtown Pittsburgh.

Rycon's Special Projects Group is responsible for the general trades package to five Verizon Wireless facilities throughout Western Pennsylvania. The scope includes selective demo, concrete, roofing, and more.

Allegheny Health Network awarded **Rycon's** Special Projects Group the CM package totaling over \$7 million to renovate seven pharmacies in multiple hospitals across Western PA. Stantec is the architect.

Rycon's Special Projects Group was chosen to renovate a genomics lab in Allegheny General Hospital for Allegheny Health Network. Radelet McCarthy Polletta is the architect.

Rycon was selected for the 9,300 square foot, \$1.3 million Octapharma Plasma renovation in Kansas City, KS.

In McDonough, GA, **Rycon** began construction of a new 40,000 square foot Dave & Buster's. The \$3.3 million project is expected to be complete by mid-July 2019.

AutoNation selected **Rycon** to construct a new \$3.6 million collision center. The 20,500 square foot project is located in Tucson, AZ.

In Atlanta, GA, **Rycon** is responsible

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for the renovation of a 28,000 square foot medical cannabis dispensary.

Rycon was selected by PREIT to build a new \$1.4 million retail shell outparcel at Magnolia Mall in Florence, SC.

Retail renovations are underway by **Rycon** at the Greenville Commons Shopping Center in Greenville, TN. The \$1.6 million project is slated for completion May 2019.

Office Depot chose **Rycon** to perform over \$420,000 in renovations to two locations in Florida and Georgia.

Rycon recently wrapped up a \$1 million Sears demolition at Macomb Mall in Roseville, MI.

In Parma, OH, **Rycon** is renovating a medical office for Cleveland Lower Extremity Specialists. The \$260,000 project is on track for a mid-March 2019 completion.

In Orwell, OH, work is underway by **Rycon** on phase 1 of an industrial addition. Kennametal recently awarded Rycon the approximately \$24.4 million phase 2 which will start June 2019 once phase 1 is complete.

Seritage Growth Properties chose **Rycon** as the construction manager responsible for a \$2.3 million TJ Maxx renovation at Southridge Mall in Greendale, WI. Herschman Architects is the designer for this 30,000 square foot project.

Rycon completed 2,400 square feet of renovations to a fast-casual pizza shop, Your Pie, in Brandon, FL.

In Hialeah, FL, Flagler Global Logistics recently awarded **Rycon** a



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contract to construct another new \$12.8 million industrial building in Countyline Corporate Park. **Rycon** was also selected last year to build a \$12.5 million facility in the same industrial park.

Rycon will soon begin construction of a new 3,600 square foot Chase Bank. The \$2.3 million building will be located in Davie, FL.

Turner Construction Co. was selected by Penn State University as design/build contractor for the \$14 million renovation of the Ostermayer Lab Building at the Greater Allegheny Campus in McKeesport. Bohlin Cywinski Jackson will be the architect for the complete renovation of the 21,739 square foot facility.

UPMC selected **Volpatt Construction** for the Shadyside Hospital JROC CT Scan replacement. The architect is RM Creative. Volpatt Construction was also selected for the linen room renovations at UPMC McKeesport. The architect is DRS Architects.

Volpatt Construction has started work on Wean Hall 7500 and Doherty Hall 2302 as part of Carnegie Mellon University's class room renovations.

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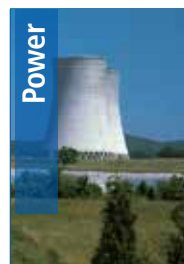
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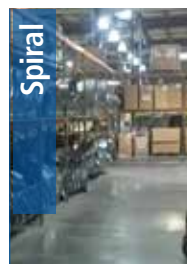
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FACES & NEW PLACES

Burchick Construction hired **Brian Shick** as project manager. Shick is a graduate of Virginia Polytechnical Institute with a major in Construction Engineering and Management. A native of Pittsburgh, Shick worked for the past five years for a large general contractor in Virginia.

Volpatt Construction announced that **Jim Huber** has been named director of preconstruction services.

Nicholson Construction Company announced the addition of **Jeffrey Grieder**, P.E., as director of operations. Grieder comes to Nicholson from Quanta Subsurface, headquartered in Spokane, Washington, where he held the position of operations manager. He holds a Bachelor of Science in Civil Engineering from the University of Calgary.

Jendoco Construction announced that **Yash Bharodia** has joined it's team as project engineer. Yash is a graduate of CMU with a Master of Science in Civil Engineering and a Bachelor of Technology in Civil Engineering from Sardar Vallabhbhai National Institute of Technology in Surat, Gujarat, India.

Jendoco Construction announced that **Evan Hoover** has joined it's estimating staff as senior estimator. Evan has a Bachelor of Architectural Engineering in Construction Management from Penn State University.

Jendoco Construction Corporation announced the promotion of **Robert P. Borland** from project manager to senior project manager. Rob has a Bachelor of Science in Civil and Environmental Engineering from University of Pittsburgh. He is a LEED Accredited Professional.

Landau Building Company welcomed **Noel Rangel** as project engineer. Noel graduated from the University of Pittsburgh with a B.S. in Civil Engineering. He is a member of the American Society of Civil Engineers and Society of Hispanic Professional Engineers.

Aaron Dye has joined **Independence Excavating Inc.** as a project engineer. Aaron is a graduate of WVU with extensive environmental and geotechnical experience.

Independence Excavating Inc. added **Brandon Ulishney** as a general foreman.

Shannon Construction announced that **Rich Amberson** had become an owner and member of the

board of Shannon Construction with the new title of executive vice president projects. Rich has over 16 years experience in construction, has a BS from the University of Pittsburgh, holds an MBA, and served as a leader in the Army National Guard.

Rob Fabean joined **Mascaro's** IT department on January 2. He received a Bachelor of Science degree in health information management from the University of Pittsburgh in 1993.

Mascaro welcomed **Adam Ottaviano** on January 2 as a health, safety, and environmental manager. A recent graduate of Slippery Rock University, Adam previously interned on several Mascaro projects.

Baily Keilbach became a member of **Mascaro's** team on February 4. A recent graduate of the University of Pittsburgh civil engineering program, Baily will be a project engineer on the UPMC Vision and Rehabilitation Hospital at UPMC Mercy project.

PJ Dick has hired **Eric. N. Barr** as an assistant project manager. Eric has 17 years of experience working in construction labor and inspection. He has a B.S. in Criminal Justice from Kutztown University.

PJ Dick has hired **Josh T. Brem** as a project superintendent. Josh has a B.S. in Construction Management from The Pennsylvania College of Technology.

PJ Dick has hired **Sean Fischer** as a project engineer. He has a BA in Architectural Studies and a Minor in Construction Management from Kent State University.

PJ Dick has hired **Daniel Culver** as a project superintendent. He has 25 years of experience and will be working on the Rehabilitation of the Visitor Center at Valley Forge National Historical Park.

Mosites Construction Company welcomed **Shane Antonik** as project engineer in December, 2018. Shane attended West Virginia University and graduated in 2015 with a degree in Civil Engineering, Mining Engineering, and a minor in Economics. He is currently working on our Port Authority Paint Booth project.

Mosites announced that **Stephanie Bearse** joined it's team as a project management administrative assistant for the Building Division. Stephanie is a graduate of the University of Pittsburgh.

Danielle Ault was recently hired as an executive assistant within **Rycon's** Pittsburgh office. She has over 15 years' experience in customer service, sales, and administrative services.

Project engineer **Tony Beahn** was hired in **Rycon's** Special Projects Group. He graduated from Coastal Carolina University where he earned a degree in Business Administration.

John Brooks was added to **Rycon's** Casework & Millwork Division as a project coordinator. He is a graduate of Davenport University and has over ten years' experience working within a custom cabinetry shop.

Project manager **Randy Bryant** recently joined **Rycon's** Atlanta team.

With over five years' industry experience, **Rycon's** Casework & Millwork Division added **Colin Fischetti** as a project engineer.

Daniel Gillespie, director of interiors, joined **Rycon's** Atlanta office. He has a background in project management, estimating, and supervision as well as 30 years' interior renovation and fit-out experience.

Leticia Gonzales joined **Rycon's** Building Group as an estimating assistant. She recently served four years Active Duty in the United States Marine Corps.

Rycon's Philadelphia office hired **Tim Heller** as a project engineer. He is a recent graduate with one-year experience and a degree in Civil Engineering from the University of Pittsburgh.

With 31 years' experience, **Kurt Johnson** has been hired as site executive within **Rycon's** Building Group.

Lisa Landolfo joined **Rycon's** Cleveland office as a senior project manager. She holds an engineering degree from Ohio University and has nearly 30 years' industry experience.



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Sam Mora has been hired at **Rycon** as a marketing and proposal coordinator. She brings over three years' marketing experience to the company.

Parth Patel was hired as an assistant project manager at **Rycon's** Philadelphia office. He has a degree in Civil Engineering from Drexel University.

Rycon's Casework & Millwork Division recently hired **Kayleigh Shue** as an administrative assistant.

Matt Stoffan was hired as a project engineer in **Rycon's** Building Group. He has over 12 years' experience in the petroleum industry.

Bringing over 25 years of valuable experience to the company, **Joe Tavella** joined **Rycon's** Building Group as senior corporate preconstruction manager. He holds a Civil Engineering degree from the University of Pittsburgh.

Rycon welcomed University of Pittsburgh student **Nicole Thompson** as a CO-OP in the Building Group. Nicole is currently earning a degree in Civil Engineering.

David Traficante has been hired as a project engineer assisting **Rycon's** self-perform operations. He has 15 years' relevant experience and a degree in Building Construction Supervision.

Larrie Trione joined **Rycon's** Atlanta office as an experienced project coordinator.

Rycon Pittsburgh promoted the following employees to new roles: **Eric Danko**, project manager, **Pat Ferguson**, safety director, and **Shawna Shamlin**, marketing manager.

Michael Norcutt was hired by **Massaro Corporation** as the new director of preconstruction late in 2018. Mike is a graduate of the California University of PA.

Dick Wimer recently joined **Massaro**



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as project executive to oversee large scale, complex construction projects. Dick has been in the industry since 1990 and has experience in commercial, correctional, healthcare, government, historic renovation and LEED certified projects throughout the region.

Colin Gibbons was hired by **Massaro Corporation** as a senior project manager early in 2019 bringing with him more than 18 years of experience in the industry along with his extensive expertise working on higher-ed campuses.

Lauren Copeman has more than 16 years of experience in the construction industry and recently joined **Massaro Corporation** as a project manager.

Holly Andrews was hired by **Massaro Corporation** as an accounting specialist. She brings 20 years of accounting experience in the construction industry. Prior to her new role at Massaro, Holly was employed at the Laborers Union/Local 373. She supports the controller and CFO with her keen attention to detail.

Massaro Corporation hired **Diane Osterwise** in mid-2018 as a project coordinator. She comes to Massaro with more than 25 years of experience. She is fully certified in Procore and has become the company's subject matter expert.

Massaro Corporation hired **Tyler Mains** as one of its newest project engineers. Tyler graduated from the University of Pittsburgh at Johnstown in 2016 with a degree in civil engineering. He was hired by Massaro in 2018 after two years of experience in the industry.

Nathan DiPietro was recently hired by **Massaro Corporation** as a project engineer. Nate graduated from Kent State University in 2018 with a construction management degree.

Anthony Carmassi was recently hired by **Massaro Corporation** as a project engineer to assist with the AHN AGH Cancer Center addition. Anthony graduated from the University of Pittsburgh in 2011 with a degree in civil engineering. He recently received his PE license. **BC**



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BY JACK RAMAGE

The Bureau of Labor Statistics data, as analyzed by AGC of America, reveals some troublesome trends. Despite the strong economic growth and low unemployment, despite the rise in construction volume, data shows that Pennsylvania's construction employment perhaps may not be growing as fast as it should. Signatory contractors are busy, very busy, but while no one is watching, the underground construction economy is exploding and believe it or not, signatory contractors are losing market share.

Speculation and actual evidence has us pointing to the underground construction economy as the reason for this counterintuitive analysis. It's underground in that ghost workers that are nonexistent on paper are creating a real drain on the industry that snatches jobs from honest contractors and exploits craft workers. We know a great deal about this "shadow economy" in Pittsburgh thanks to the Keystone + Mountain + Lakes Regional Council of Carpenters. Unscrupulous or perhaps just plain desperate construction owners, developers and general contractors are hiring subcontractors and sub-subcontractors that use labor brokers to supply workers to projects. These workers, bussed in from Washington DC, Florida and elsewhere are flooding the Pittsburgh and western Pennsylvania market. These workers are not documented (or more accurately defined as not being required to produce basic information by their employers as a condition of employment), have no social security numbers, have no insurance coverage and all are paid in cash through a labor broker so there are no records that these workers even exist. No taxes are paid. No taxes are withheld. No workers compensation insurance is provided to these workers. The injurious effects are far reaching. The good players — tax-paying contractors, craft workers and citizens — all suffer.

To be clear, the term "undocumented" does not refer to the worker's immigration status. This underground workforce is made up of people who want to be off the grid for a variety of reasons. Workers may be avoiding child support or alimony. They may have criminal records or failed drug tests that make them less employable. Their immigration status may be illegal. Or they may simply want to have more cash in their pay packet, without having to make the fair benefit and payroll contributions that legitimately-hired workers make. None of these motives benefit the construction industry or society in general.

Research on the size of this underground workforce is understandably thin but the gap between what taxpayers are paying and what they should be paying is over \$450 billion a year. Most of the data collected by the government on workforce comes from payroll surveys and collection of W-2 information. These workers aren't in the W-2 universe. Estimates of the size of this underground workforce have been done by the KML Carpenters in cities where the problem has

existed for several years. In markets like Washington, DC, the Carpenters see evidence that as many as 70 percent of the construction workers on interior fit-out projects are supplied by labor brokers that keep their workers "off the books." Here in Western PA, the Carpenters estimate that the share is now 15 percent. If that share of the workforce were to be undocumented for all trades in Western PA, more than 3,000 workers would be working in the industry without any accountability.

With the Carpenters dogged persistence, the City of Pittsburgh and the Commonwealth of Pennsylvania are beginning to fight back. Pittsburgh City Council voted in February to establish the Joint Task Force on Construction Industry Fraud, which will work to identify and combat "unfair trade practices, including tax fraud" among the city's construction businesses. The resolution takes particular aim at construction companies that commit wage violations that result in underpayment or nonpayment of taxes, as well as too-low pay rates that prevent some workers from being able to support their families. The task force will not focus on the practice of hiring undocumented workers, however. The group will be made up of representatives from the city council; mayor's office; Pittsburgh Regional Building and Construction Trades Council; Allegheny County District Attorney's Office; Pennsylvania Department of Labor and Industry; and the Pittsburgh Department of Permits, Licenses and Inspections.

This is a good beginning but more help is needed. The U.S. Department of Treasury needs to be part of the task force and an interagency oversight commission should be appointed by the governor and charged with uncovering the unscrupulous tax activities of bad-actor contractors. In addition, the commission needs to work on aggressive ways to revoke the business licenses of those who deliberately misclassify employees and dodge paying taxes. Models exist from other states that have empaneled such commissions.

As we navigate 2019, we ask our members and labor partners to be wary. Do not be fooled by a robust economy. We must work harder than ever to combat and destroy the underground economy, regain market share and restore integrity to the construction economy of Pittsburgh and all of Pennsylvania.

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