DODGE DATA & ANALYTICS

Civil Quarterly

Q1 2021 Business Conditions, Including Supply Chain Impacts

New Findings: Gathering and Analyzing Civil Construction Data

Case Study: Managing Survey Data on a Major Highway Project

New Research: Contractor Use of GIS

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Message From the Publisher

Welcome to the fourth edition of the *Civil Quarterly,* Dodge's unique periodic research report focused solely on heavy/civil/infrastructure design and construction. This edition marks the first full year of *Civil Quarterly* reports.

In this issue, we get the insights from civil contractors and engineers about how they gather and analyze data, and the benefits and challenges they experience in doing so.

- Two times a year, the business conditions section of the report includes the impact of the supply chain on contractors' businesses. This time, we found a dramatic increase in the contractors experiencing challenges with getting materials and equipment on their sites.
- However, other negative impacts from the pandemic on backlog and contractor optimism appear to have leveled off.
- The section on data gathering and analysis benchmarks industry performance in these areas, highlights the benefits from what has already been done and the challenges that the industry needs to overcome to improve this vital area.
- The report also features a look at the use of GIS by contractors, a case study on improving the management of survey data on a large highway project and the top 25 planning and start projects from the last quarter in Dodge.

As always, we thank our funding and research partners, and we look forward to providing everyone associated with the industry a better understanding of the business of civil construction as it continues to evolve and adapt to a rapidly changing world.

Stephen Jones
Senior Director, Industry Insights Research
Dodge Data & Analytics

Message From the Founding Partner

In 1977, when our founders started a consulting company in my dad's garage, nothing was more important to our business than data. Collecting data, analyzing it, and drawing conclusive insights from the raw numbers was (and still is) our bread and butter. In those early days, we were just beginning to introduce the idea of computerized analysis. By pairing human expertise with emerging technology, we could take our analyses further than ever before.

Over 40 years later, I'm reminded of a classic quote from Jean-Baptiste Alphonse Karr— "the more things change, the more they stay the same." Today's technology far exceeds what our founders and earliest employees used several decades ago. It's even fair to say that it exceeds what was available only five years ago. Thanks to rovers, drones, satellites, wearable tracking tech and more, we have access to an abundance of site, material and personnel data. Still, thoughtful analysis of that data is just as critical today as it was in 1977.

One year into the launch of the *Civil Quarterly,* we're thrilled to be a part of this issue and its focus on the rising prevalence of data gathering and analysis. In this report, we find that at least 90% of civil contractors are collecting and analyzing data. Large companies implement this data strategically, while we see small-to-midsize companies hone in on tactical, short-term actions. As data collection and analysis tools become increasingly ubiquitous, we hope to see strategic insights grow across the board as heavy civil construction evolves into an industry that is supported, enhanced and driven by data.

Will McClave
President of Systems
Infotech

Civil Quarterly

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We Want Your Feedback!

What do you think about the findings and perspectives you see in this edition of the **Civil Quarterly**? What are your thoughts/hopes/concerns about the business of heavy civil construction? Do you have suggestions for what you'd like to see explored in future editions? We'd love to hear from you and will be featuring reader comments and responses in future issues. Please send all comments to TCQ@construction.com.

We read all feedback carefully, but may not be able to respond to each submission individually. If you provide your email address, you agree that we may contact you to better understand the comments you submitted.

BUSINESS CONDITIONS

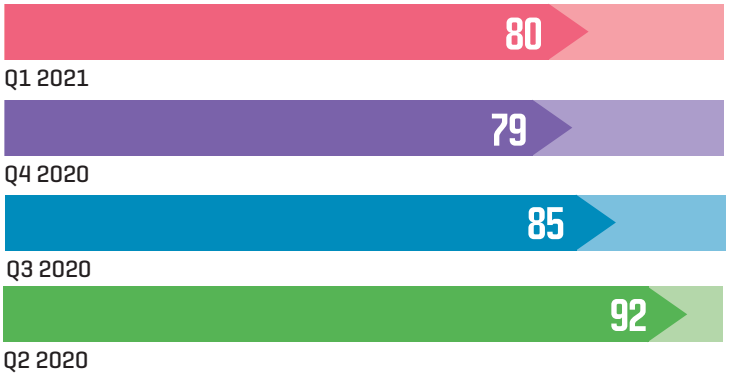
Each *Civil Quarterly* survey takes the pulse of civil contractors about a variety of business conditions they are experiencing, from backlog, revenue and profit margins to project performance, costs and planned investments. This quarter, the data include the impact of the supply chain.

Current Backlog

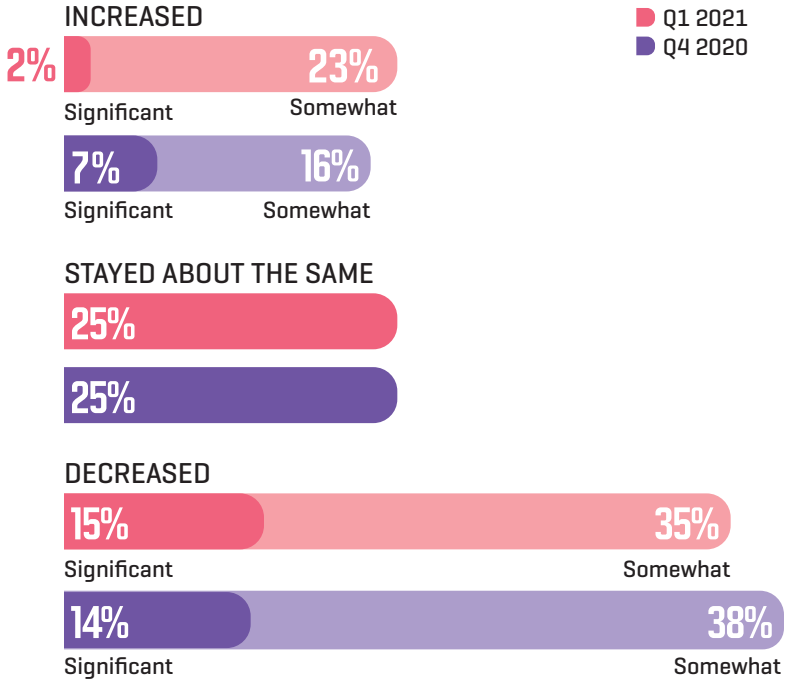
Civil contractors were asked how many months of backlog they currently have and what their ideal figure would be. The ratio between those two figures for the last four quarters is represented in the chart at right, and it indicates that the declining ratio evident during the pandemic in 2020 may be leveling off, with the Q1 ratio (80) roughly similar to that of Q4 (79).

Contractors were also asked whether their backlog has increased, stayed about the same or decreased in the last six months. Unlike in Q4 2020, when both those reporting increases and those reporting decreases grew notably compared with the previous quarter, the findings in Q1 largely mirror those in Q4. Thus, even though those who experienced a decrease continue to outnumber those whose backlogs increased, the similarity of the findings between Q4 2020 and Q1 2021 may suggest that the industry is stabilizing in terms of the impact of the pandemic.

Ratio of Current to Ideal Backlog



Change in Backlog in Last 6 Months



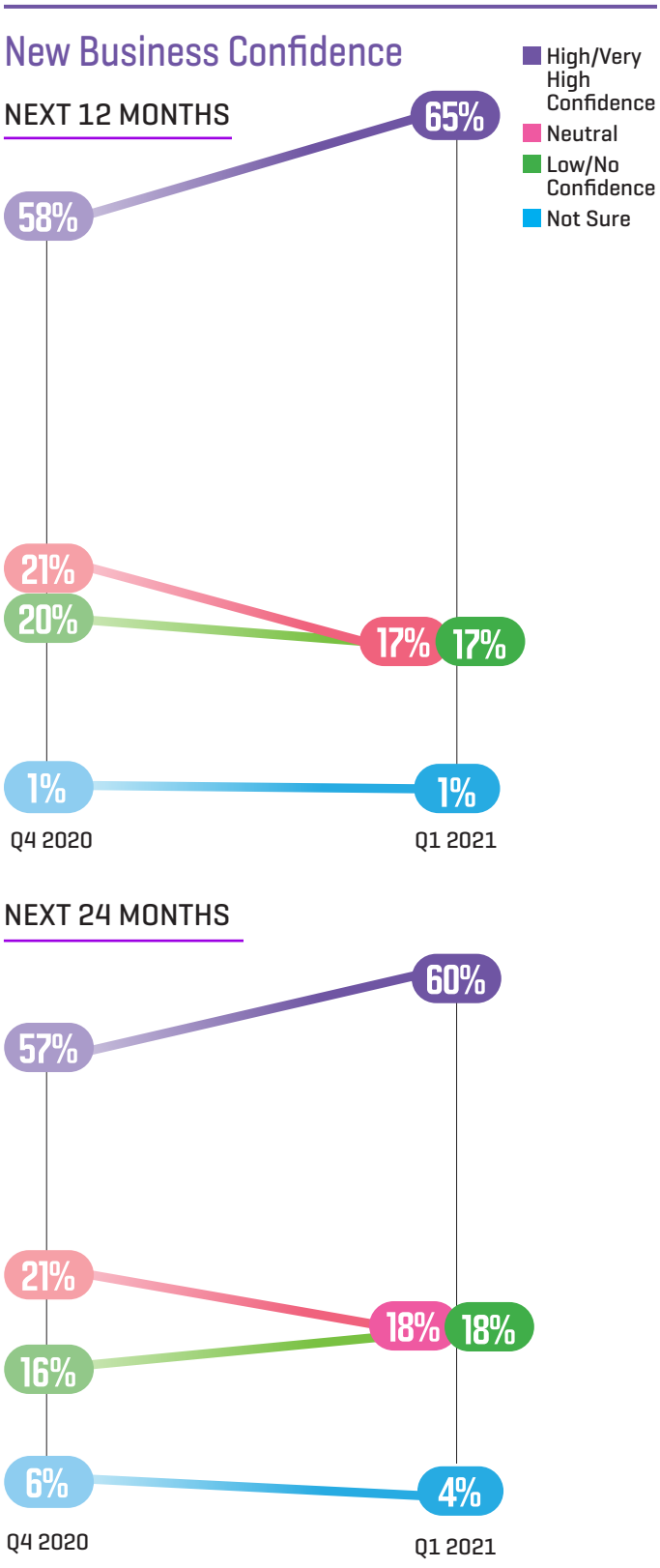
New Business Confidence

Every quarter, civil contractors are asked to rate their confidence in the market's ability to supply them with new business in the next 12 and 24 months on a 10-point scale. The chart at right compares their levels of confidence in the first quarter of 2021 with the previous quarter.

- Those with high/very high confidence in the market for the next 12 months increased seven points to 65%. This shows growing optimism among contractors, especially as it comes after confidence already grew six points in Q4 2020 over the Q3 level. Civil contractors increasingly expect the market to improve.
- There were declines in both those with a negative and neutral outlook, each of which only accounted for 17% of the total respondents.

This increased optimism in their outlook for the next 12 months also supports the theory that many think the impact from the pandemic has leveled off by Q1 2021.

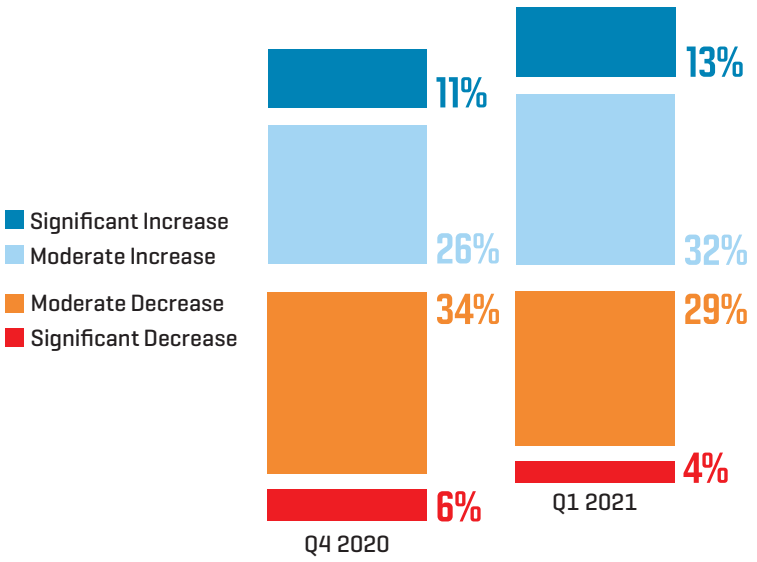
Optimism is also increasing, although at a more measured pace, for their 24-month outlook. Perhaps most notable is the degree to which the 24-month outlook generally mirrors the 12-month outlook, suggesting that civil contractors are largely expecting most of the short-term recovery of work to occur in the next 12 months.



Revenue Change

Civil contractors were asked to describe the change in revenue they expect in the next 12 months. The chart at right shows those expecting increases or decreases in revenue, and it suggests that the contractors are growing more optimistic that revenue will increase, with 45% expecting an increase in Q1 compared with 37% in Q4, and a corresponding decline in those expecting a decrease. The optimism about revenue is likely driven by the higher percentage who believe the market will offer them sufficient opportunities in the next 12 to 24 months (see page 3).

Expected Change in Revenue in 12 Months



Profit Margin Change

The growth in optimism about revenue, however, does not translate into a growth in optimism about profit margin. Generally, expectations about change in profit margin in Q1 2021 are consistent with those in Q4 2020, with about one third expecting an increase, and about 40% expecting a decrease.

Some of the factors that are making them more conservative about whether their profit margins will improve are discussed on page 5.

The remaining respondents do not anticipate any change.

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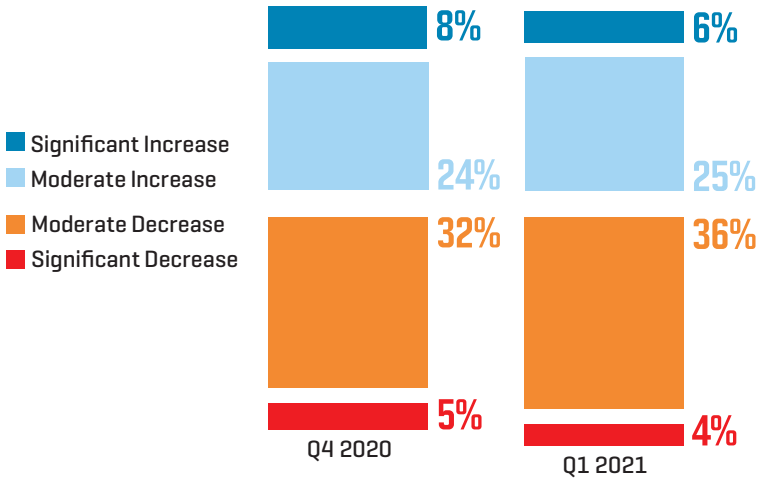
Expected Change in Profit Margin in 12 Months



Reasons for Reductions

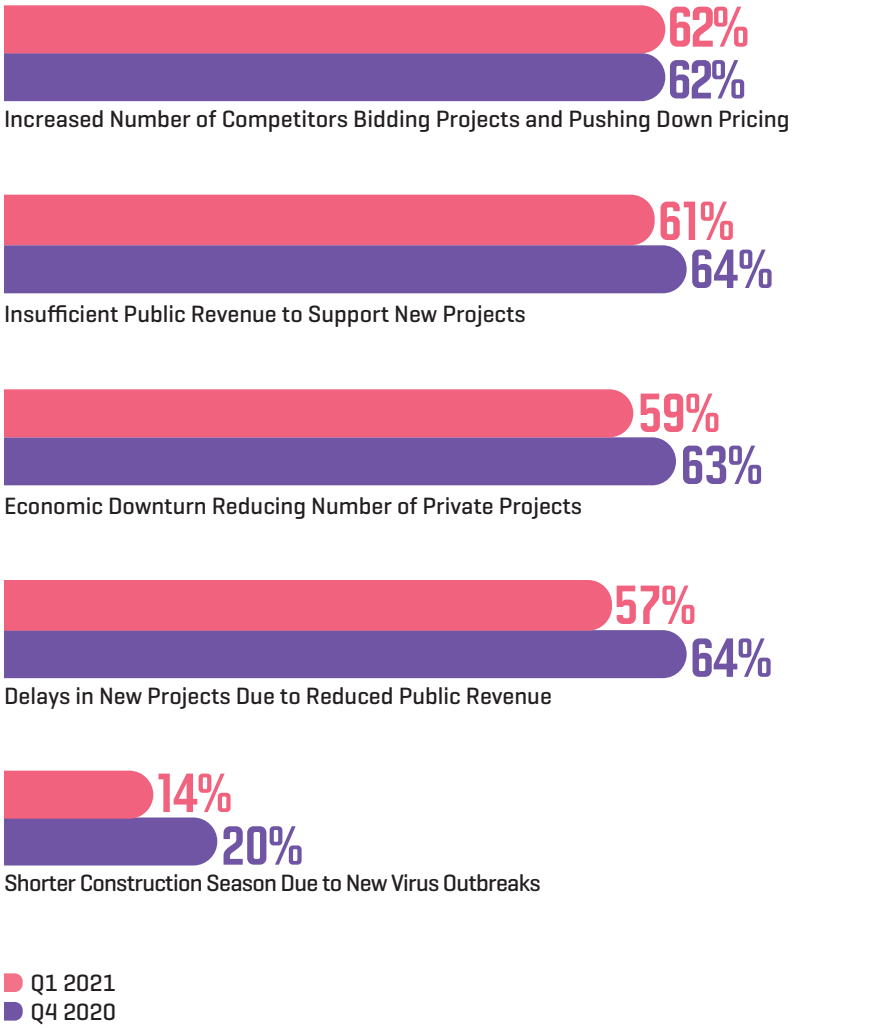
Contractors who expect reductions in either revenue or profit margin were asked why they believe those reductions will occur. The list of options they could select are in the chart at right, which shows the contrast between the Q1 2021 and Q4 2020 responses.

Notably, no single reason explains why contractors expect to see declines in revenue or profit margin. They are nearly equally concerned about an increasing number of competitors bidding projects and pushing down pricing, insufficient public revenue to support new projects, the economic downturn reducing the number of private projects and delays in new projects due to reduced public revenue.

One issue not included in the list of responses that may be influencing them as well is growing concern about the availability of building products/materials/equipment, which is evident in this quarter's findings (see pages 7–9).

Reasons for Reductions

According to Those Anticipating Reduced Revenue or Profit Margins



Reasons for Expected Increases in Revenue and/or Profit Margin

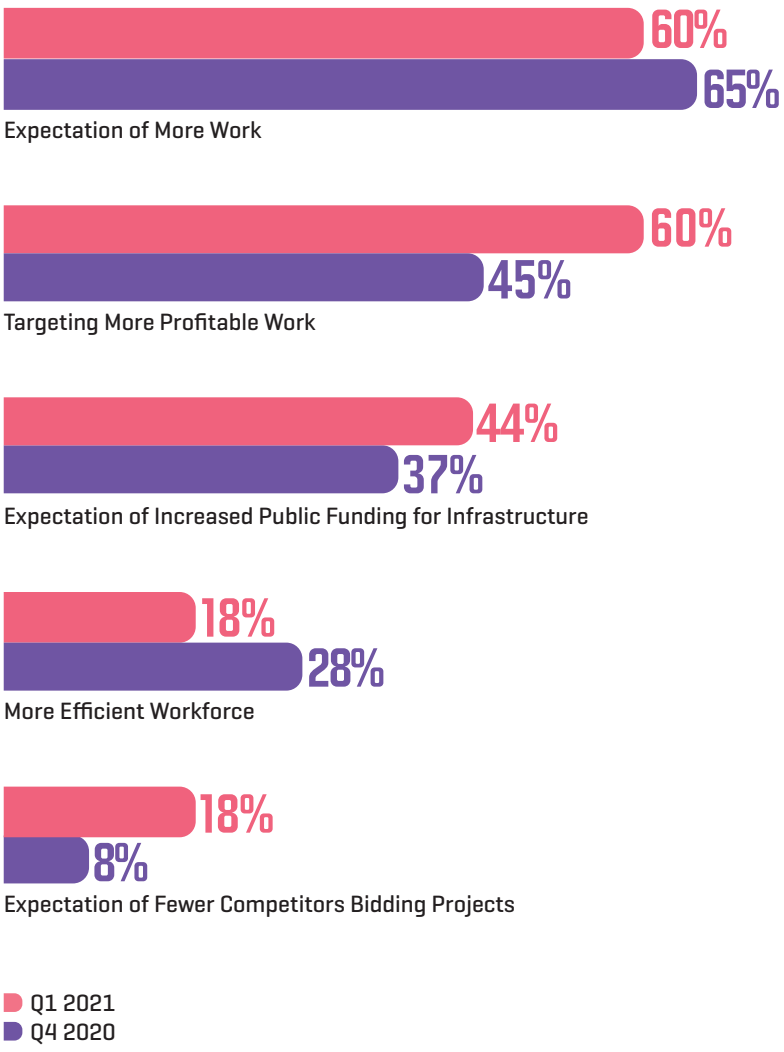
Contractors who expect increases in revenue and/or profit margin were asked why they believe those increases will occur. They could select all options that applied that are listed in the chart at right.

Unlike those who were expecting declines, those expecting increases in revenue or profit margins largely agree on two reasons for the increase: the expectation of more work and the ability to target more profitable work. In fact, the latter reason saw a significant increase in Q4 compared with Q1.

More civil contractors in Q1 are also expecting public funding for infrastructure to increase than had that expectation in Q4, which is likely why they are expecting a larger volume of work. This may be related to expectations of support for state and local funding in the stimulus bill or the emphasis that the Biden administration has placed on getting a large infrastructure bill passed.

Reasons for Expected Increase

According to Those Expecting an Increase in Revenue and/or Profit Margins



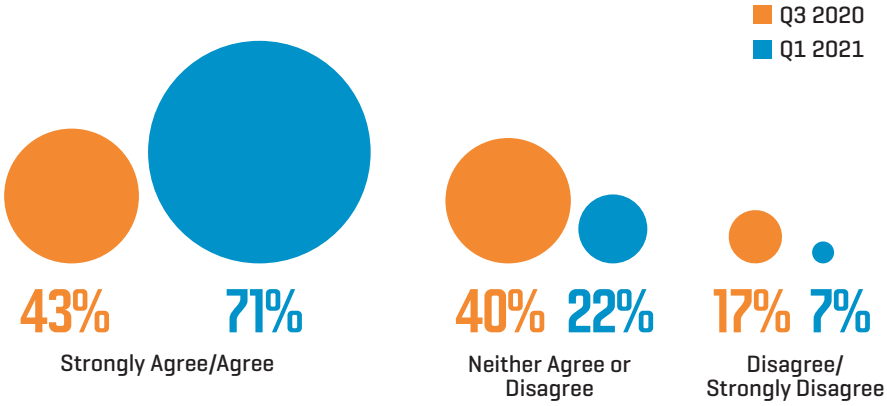
Fluctuations in the Cost of Construction Materials

This quarter features data on how the supply chain impacts the businesses of civil contractors. First, they were asked two questions about changes to the cost of construction materials: whether cost fluctuations in the past six months impacted their projects and whether they are concerned about cost increases in the future.

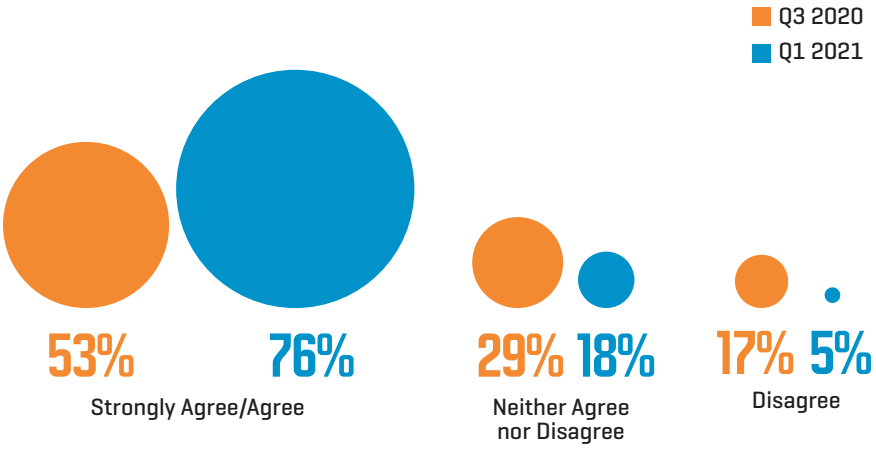
The responses to both questions differ dramatically from what they reported in Q3 2020. Nearly three quarters (71%) now report that their projects have been impacted by fluctuations in the cost of construction materials in the past six months, and even more (76%) expect cost increases in the next six months.

It is likely that these challenges are due to the pandemic, as backlogs of materials have been reduced over time, and new production and distribution of materials have been disrupted.

Fluctuations in the Cost of Construction Materials Have Impacted Our Construction Projects in the Past 6 Months



Our Company Is Concerned About Cost Increases for Construction Materials in the Next 6 Months



Materials of Concern

Contractors who are concerned about cost increases in the next six months were asked which materials they are most concerned about.

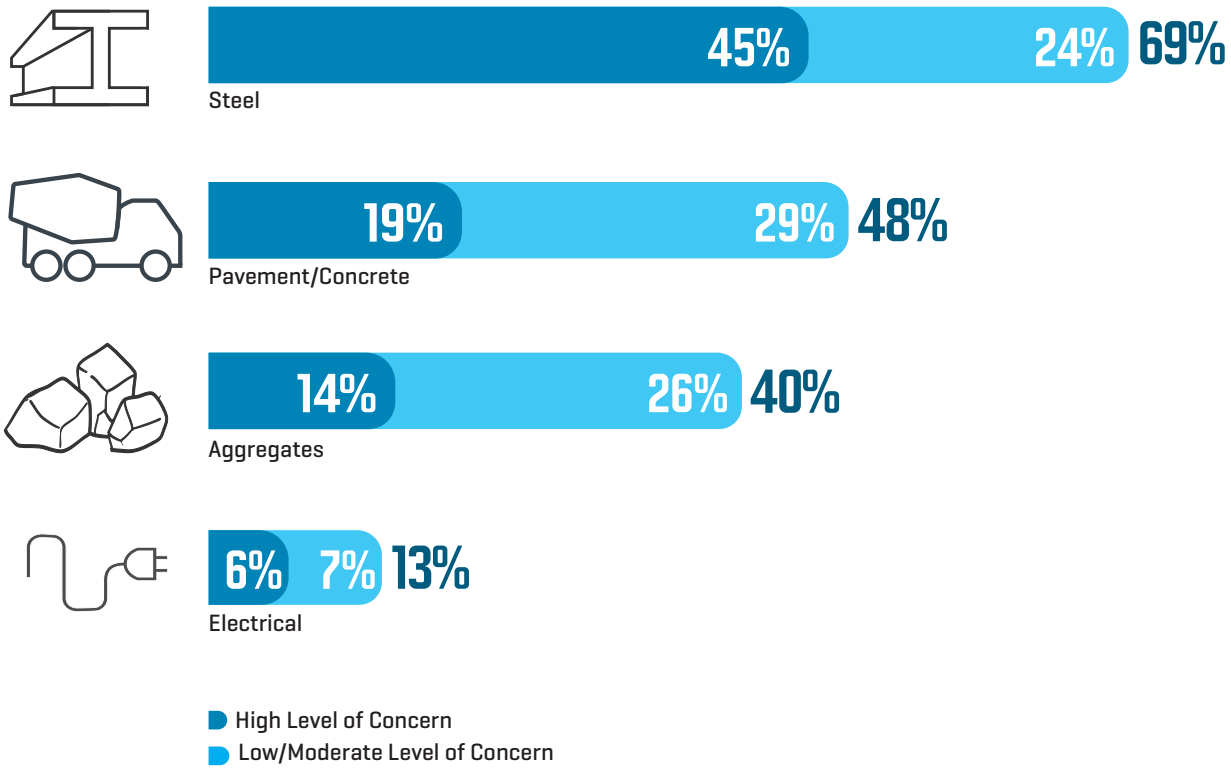
By far, steel is the material most frequently selected by contractors. Nearly half (45%) are highly concerned about the possibility of cost increases for steel, a large increase over the 32% who reported high concern in Q3 2020. And overall, over two thirds (69%) of all civil contractors concerned about material cost increases at all report some degree of concern about the cost of steel.

Nearly half of civil contractors (48%) also report at least some level of concern about rising costs for pavement and concrete, and 40% have concerns about the cost of aggregates.

While not included in the options provided to respondents, several civil contractors also noted their concerns about cost increases for lumber and piping. To better capture those concerns, these materials will be formally included in the Q3 2021 Civil Quarterly study, which is the next time supply chain issues will be included in the quarterly survey.

Materials of Concern for Cost Increases

According to Contractors Who Think Cost Will Increase



Construction Equipment Concerns

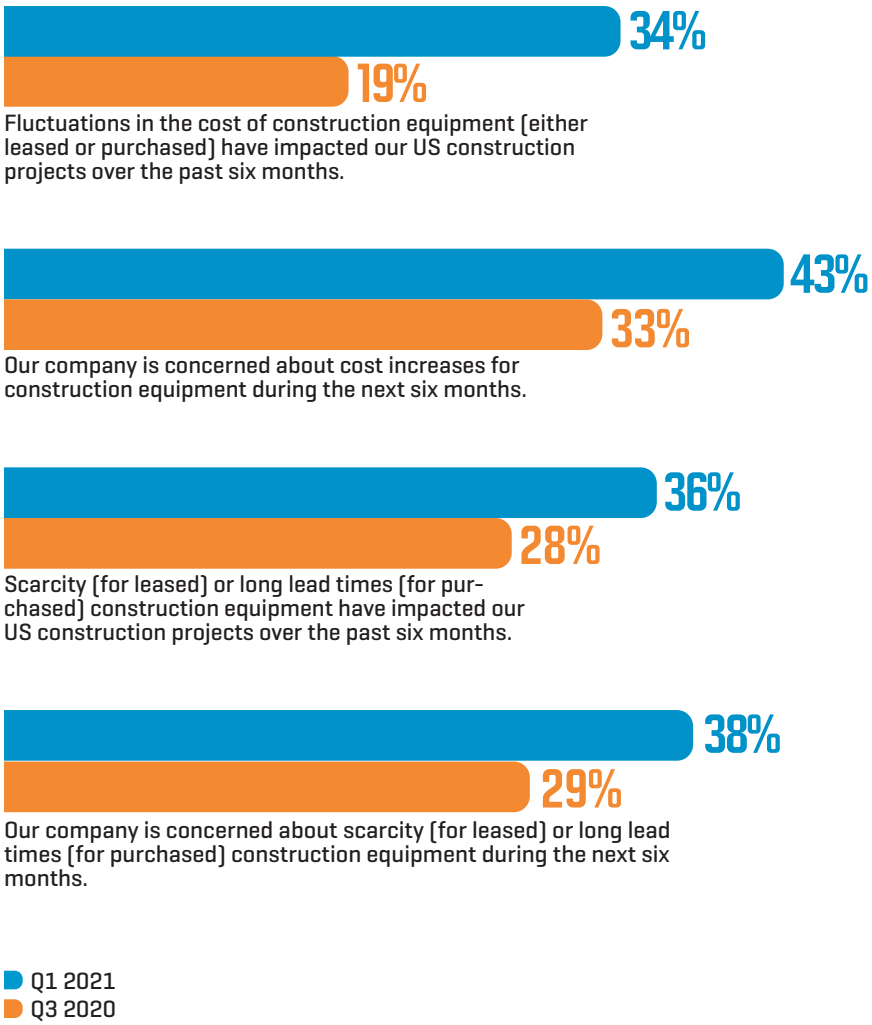
Contractors were asked about their cost and scarcity concerns for construction equipment as well. Although fewer are experiencing challenges with the cost and availability of equipment than those experiencing cost challenges with construction materials, it is still notable that the concerns have increased significantly since Q3 2020.

- While less than one fifth (19%) reported that their businesses were impacted by fluctuations in the cost of equipment in Q3, over one third (34%) now find that to be true.
- Even more (43%) are concerned about equipment cost increases in the next six months, far more than in Q3.
- The availability of construction equipment is already a challenge for over one third (36%) and about the same percentage (38%) expect it to be an issue in the next six months.

It will be interesting to see how long it will take for increased supply chain challenges to abate when and if the US is able to control the spread of COVID-19.

Construction Equipment Concerns

Percentage Who Agree With Each Statement



IN THE PIPELINE

The amount of work in planning provides a glimpse into the volume of work contractors can expect to be released for bidding. Therefore, every quarter, civil engineers are asked about their backlog of projects as well as their confidence in the market to supply them with new work.

Backlog

Civil engineers were asked about their current and ideal levels of backlog. The ratios between these two for Q1 2021, and Q4 and Q3 2020 are shown in the chart at upper right.

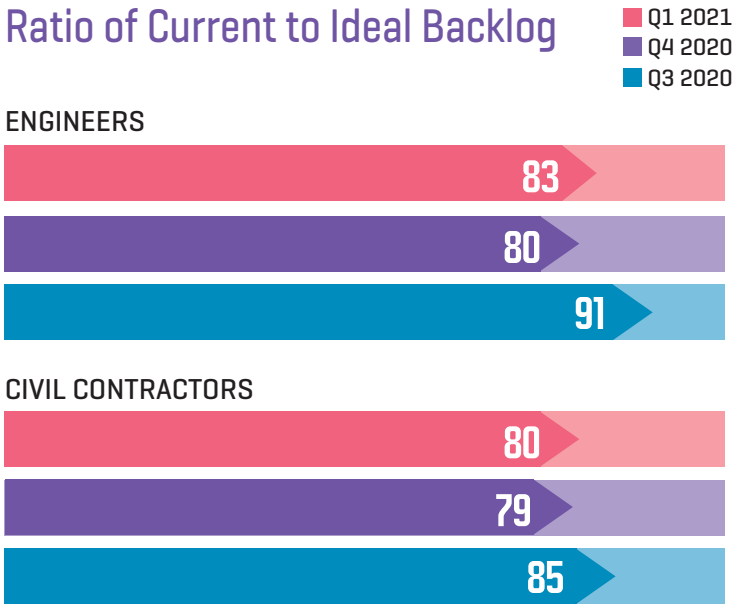
It is notable how similar the engineers and civil contractors are, with a large drop in backlog between Q3 and Q4, and a slight recovery between Q4 and Q1. It will be interesting to see if backlog begins to recover when the economy recovers in 2021, as Dodge is currently forecasting.

Focusing just on their current backlog:

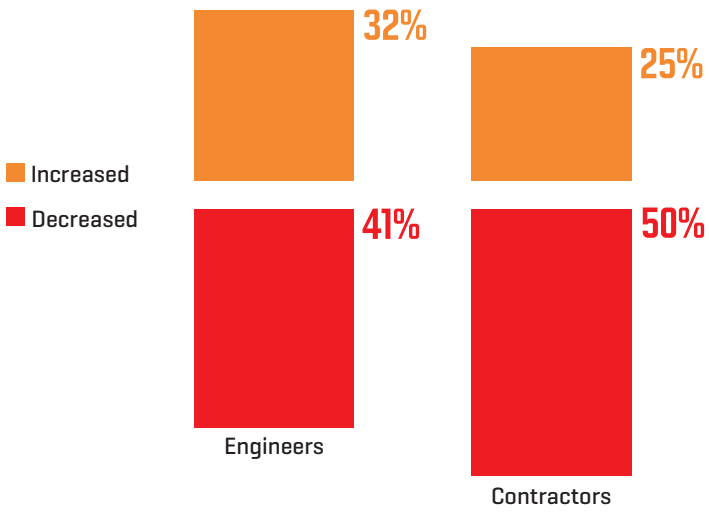
- A larger share of the engineers (32%) than contractors (25%) have experienced increases in their backlog in the last six months. This is very consistent with last quarter's findings.
- More engineers (41%) experienced a decrease in their backlog this quarter than last quarter (37%), but a smaller share of engineers are still experiencing decreases than are contractors (50%), similar to Q4.

Only further data this year will reveal whether the higher percentage of engineers experiencing a decrease in backlog is just data noise, the beginning of a downward shift or the nadir of the impact of the pandemic.

Ratio of Current to Ideal Backlog



Change in Backlog in Last 6 Months



New Business Confidence

Civil engineers, like civil contractors, were also asked to rate their confidence in the ability of the market to provide them with new business opportunities in the next 12 and 24 months on a scale of one to 10.

- Fewer civil engineers in Q1 2021 (63%) reported high confidence in the market than did so in Q4 2020 (68%), a continued decline from the 72% with high confidence in Q3.
- However, engineers remain consistently confident in their 24-month outlook.

Civil construction declines and recoveries often lag behind overall economic forecasts, given the funding process and cycle for much civil work. With the economic recovery expected to take hold in the latter half of 2021, it is not surprising that engineers are more confident in the longer range forecast.

New Business Confidence According to Civil Engineers

Data Gathering & Analysis

Increasing sophistication in data collection and gathering will help the civil construction industry improve productivity, safety and profitability.

Data Gathering By Civil Contractors

Civil contractors were asked how they gather the eight types of data shown in the chart below and continuing on the next page. They were allowed to select all means that they currently use for each type of data or to indicate that they do not collect that type of data at all.

The findings reveal the following:

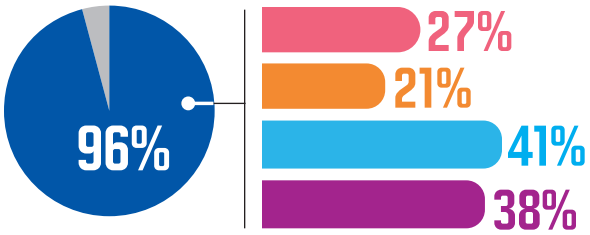
- Nearly all civil contractors are collecting data on safety, work item progress and material/project delivery, and most are gathering project inspection, personnel and equipment tracking data.
- The fewest contractors track survey/terrain or utility mapping/location data, but even those are gathered by a majority of civil contractors.
- If using dedicated apps/software to collect data, contractors more frequently rely on commercially available tools and less frequently on tools created by their company.

Means Used to Collect Data

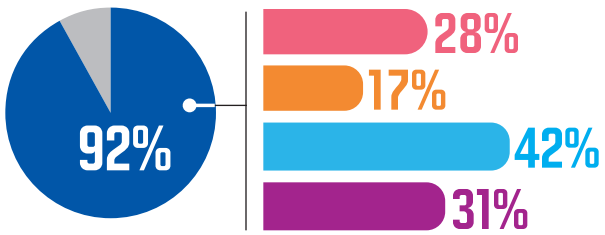
According to Percentage of Civil Contractors Collecting Data

- Commercially Available Dedicated Apps/Software
- Dedicated Apps/Software Created by the Contractor
- Electronic Forms Created by the Contractor
- Paper Forms
- Percentage Collecting Data

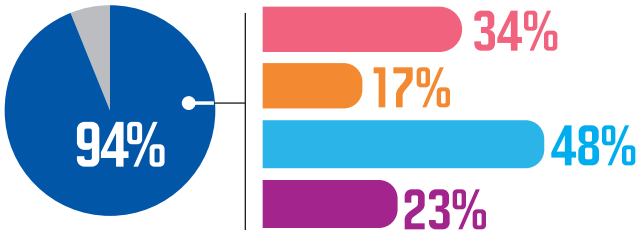
SAFETY DATA



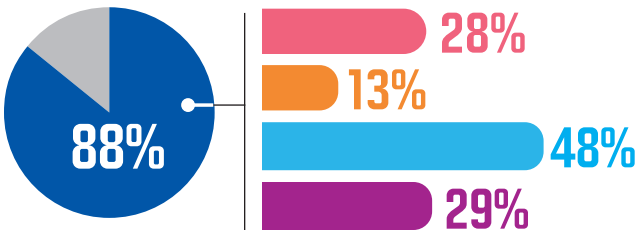
MATERIAL/PROJECT DELIVERY DATA



WORK ITEM PROGRESS DATA



PROJECT INSPECTION DATA



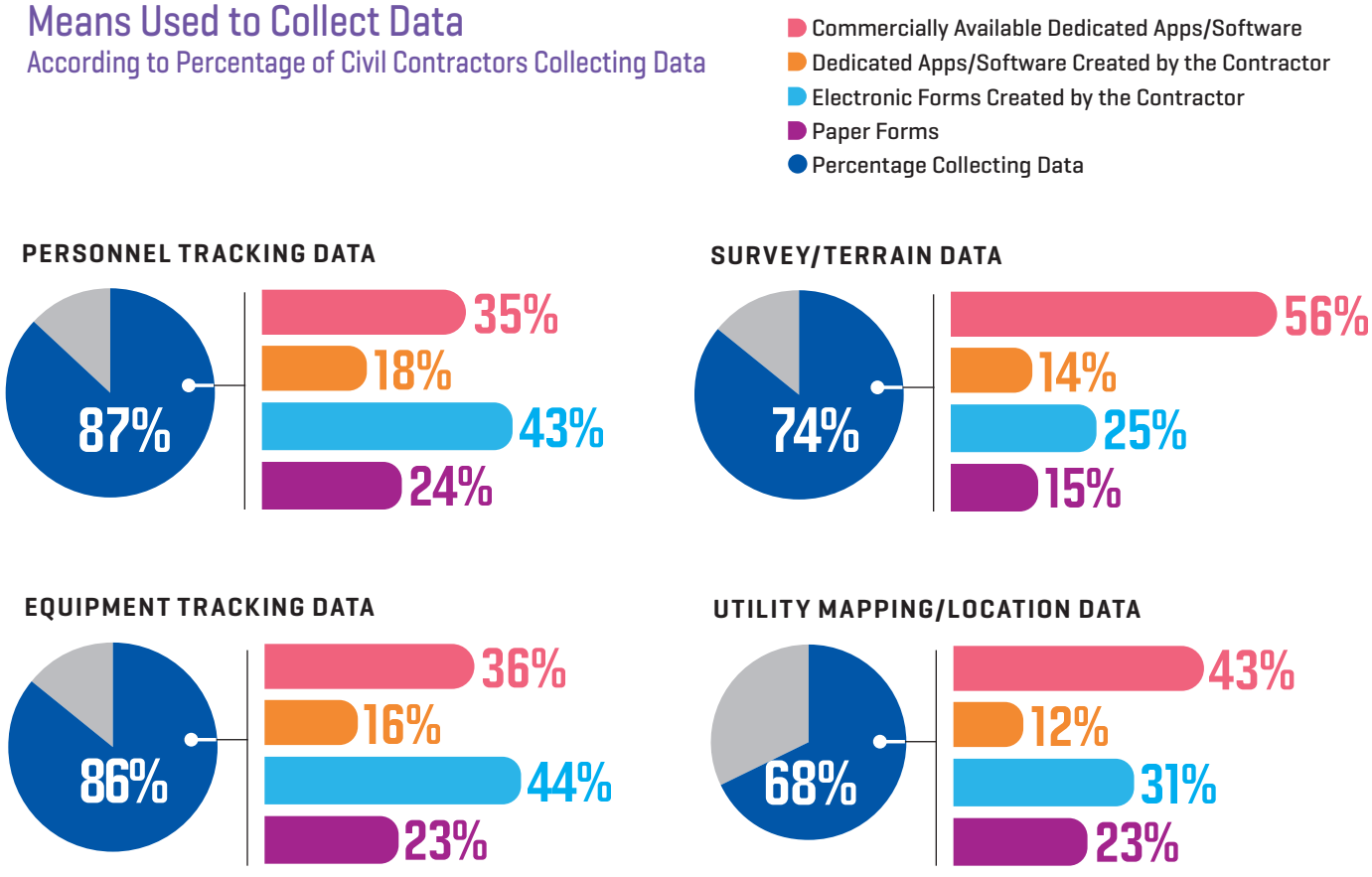
Data Gathering & Analysis

- Survey/terrain and utility mapping/location data are the most frequently gathered using commercially available dedicated apps/software, and the least frequently gathered through electronic forms created by the contractor.
- However, electronic forms created by the contractor are widely used for all other types of data gathering, with the highest percentage reporting using them to collect data on work item progress (48%) and project inspection (48%).
- Many civil contractors still rely on paper forms for collecting data, especially for safety (38%) and material project delivery (31%). In contrast, only 15% use paper forms for survey/terrain data.

It is also generally notable that many contractors are using more than one means of gathering each type of data currently. This suggests that contractors are likely to face challenges in having comparable, up-to-date data in many cases for each category across the patchwork of different data inputs.

Means Used to Collect Data

According to Percentage of Civil Contractors Collecting Data



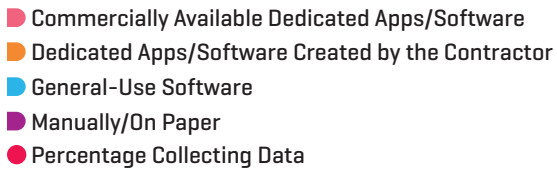
Data Gathering & Analysis

Data Analysis by Civil Contractors

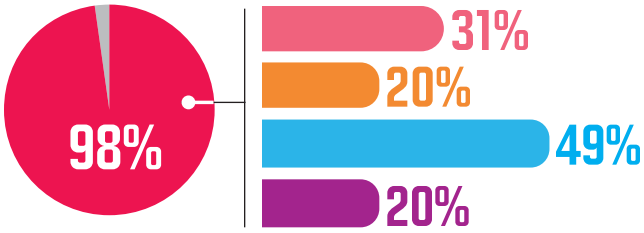
While data gathering is critical as a foundation, the real value comes from a contractor´s ability to analyze the data they gather. Therefore, civil contractors were also asked what means they use to analyze each of the eight types of data listed in the chart below and continuing on the following page, from apps/software created for that purpose to general use software like Excel, to manual data analysis on paper.

- Nearly all (90% or more) civil contractors who collect data also conduct some form of analysis using that data. The most widely analyzed type of data is work item progress data and the least frequently analyzed is survey/terrain data.
- Civil contractors most often rely on general-use software for their analysis of safety, work item progress, material/project delivery, inspection, personnel tracking and equipment tracking data,

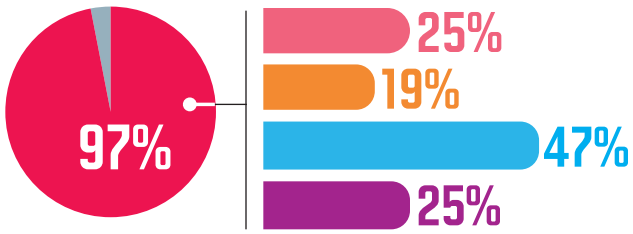
Tools Used to Analyze Data
According to Civil Contractors Collecting Data



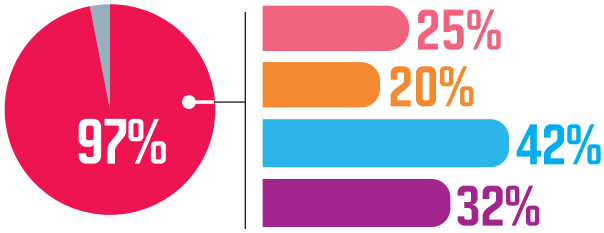
WORK ITEM PROGRESS DATA



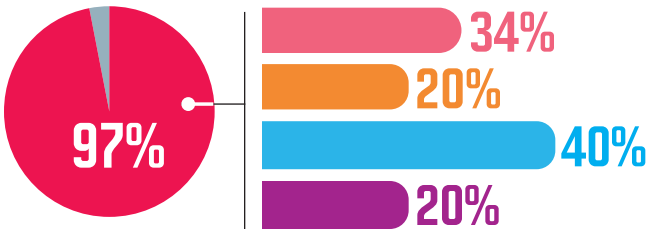
MATERIAL/PROJECT DELIVERY DATA



SAFETY DATA



PERSONNEL TRACKING DATA



Data Gathering & Analysis

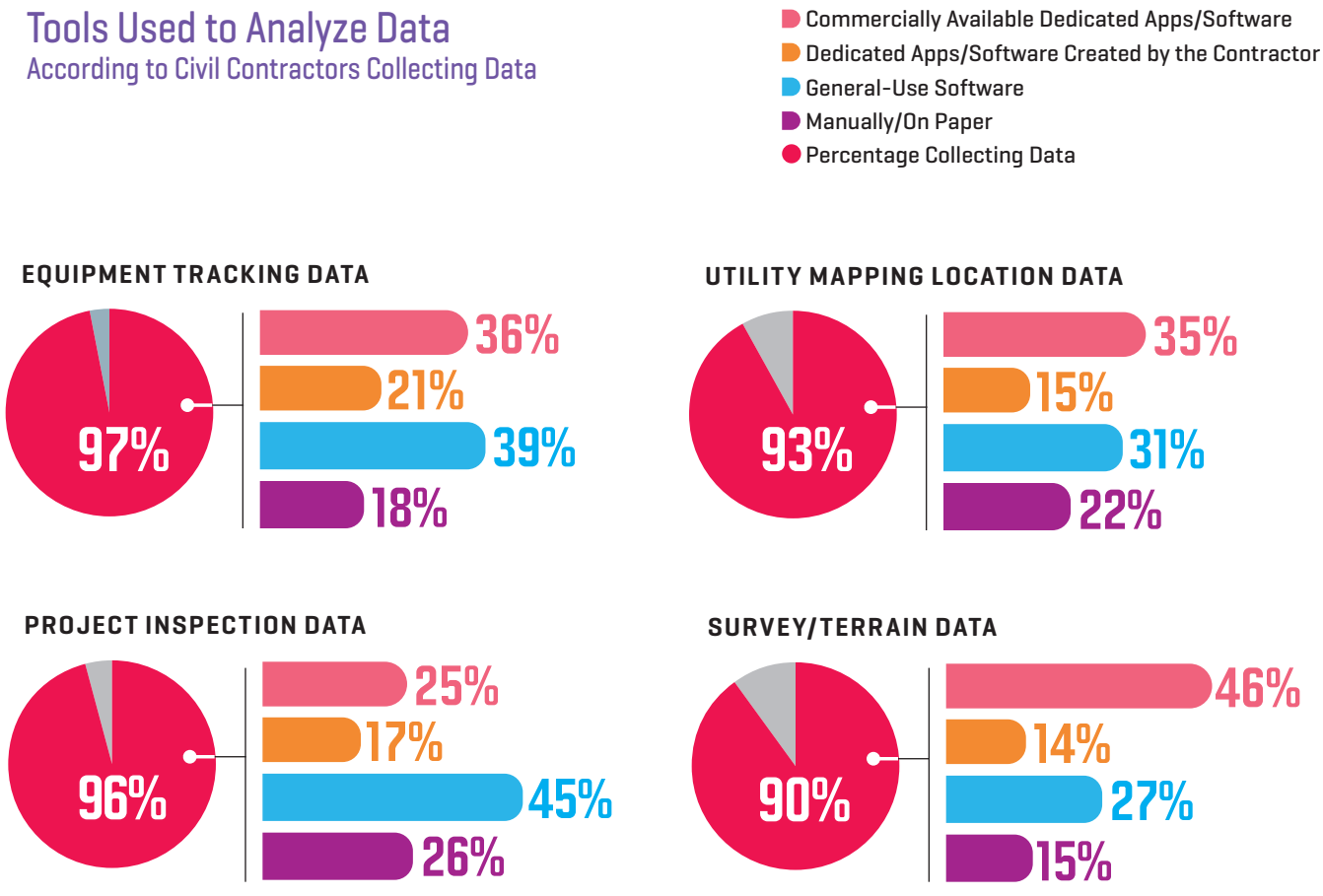
with over a third to just under one half using those tools to analyze each of these types of data.

- Commercially available dedicated apps/software are used by nearly half (46%) of contractors to analyze survey/terrain data, and they are also used more frequently than general-use software for utility mapping/location data. However, only one quarter use them for safety, material/project delivery and project inspection data.
- Most of the civil contractors do not rely on dedicated apps/software created by their own company to conduct analysis.
- A notable share of civil contractors still conduct analysis manually on paper, especially for safety data, which is analyzed in this way by nearly one third (32%) of those collecting data.

The findings may suggest a need for better tools for analyzing safety, material/project delivery and project inspection data. They also reveal a lack of uniformity across the industry about how data is analyzed, similar to the various means by which it is gathered.

Tools Used to Analyze Data

According to Civil Contractors Collecting Data



Data Gathering & Analysis

Roles Using Data for Contractors

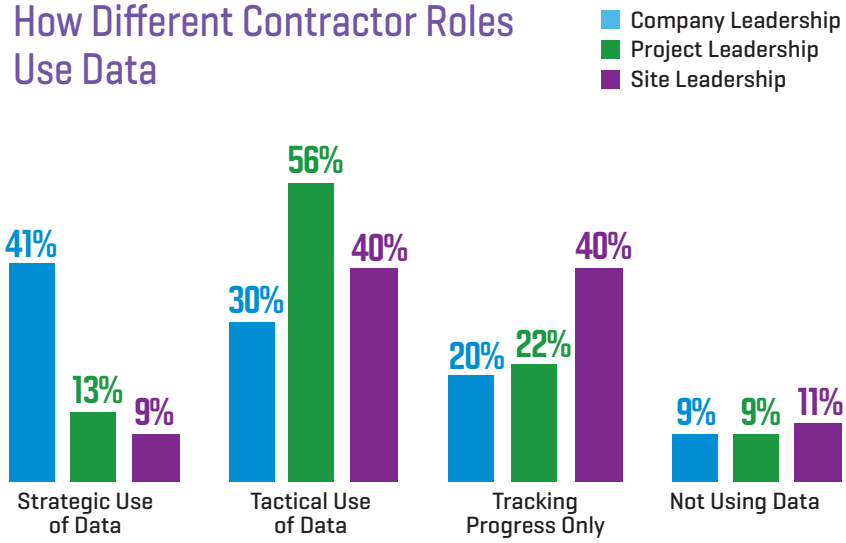
Civil contractors were asked to identify how their company, project and site leadership are utilizing data overall. The first chart reveals the overall use by role, including whether or not they use data at all. The second chart (at bottom right and continuing on the next page) demonstrates how the size of the company influences how data is utilized.

Company Leadership

Nearly all (91%) civil contractors report that their company leadership is using data, with the highest percentage (41%) reporting that they use it strategically and 30% reporting tactical use.

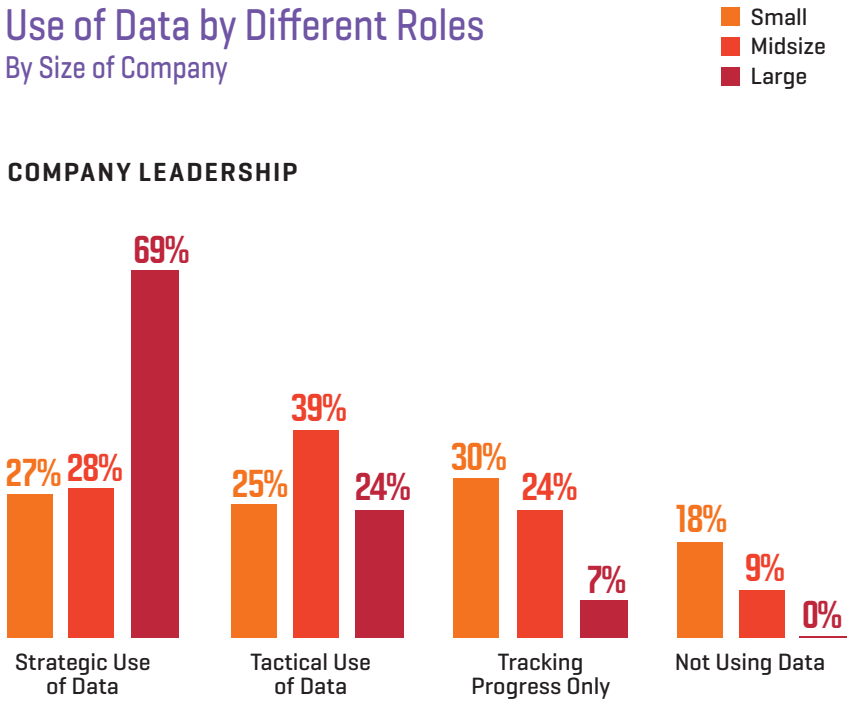
However, the degree to which company leadership uses data is largely dependent on the size of the company. While 69% of large companies (annual revenue of $50M or more) report using data strategically, fewer than 30% of smaller companies do. In fact, a higher percentage (39%) of company leadership at midsize companies ($10M to $49M annual revenue) use data tactically than strategically (28%), and the highest percentage (30%) of respondents from small companies (under $10M annual revenue)

How Different Contractor Roles Use Data



Use of Data by Different Roles

By Size of Company



Data Gathering & Analysis

report that their leadership use data for tracking purposes only.

Project Leadership

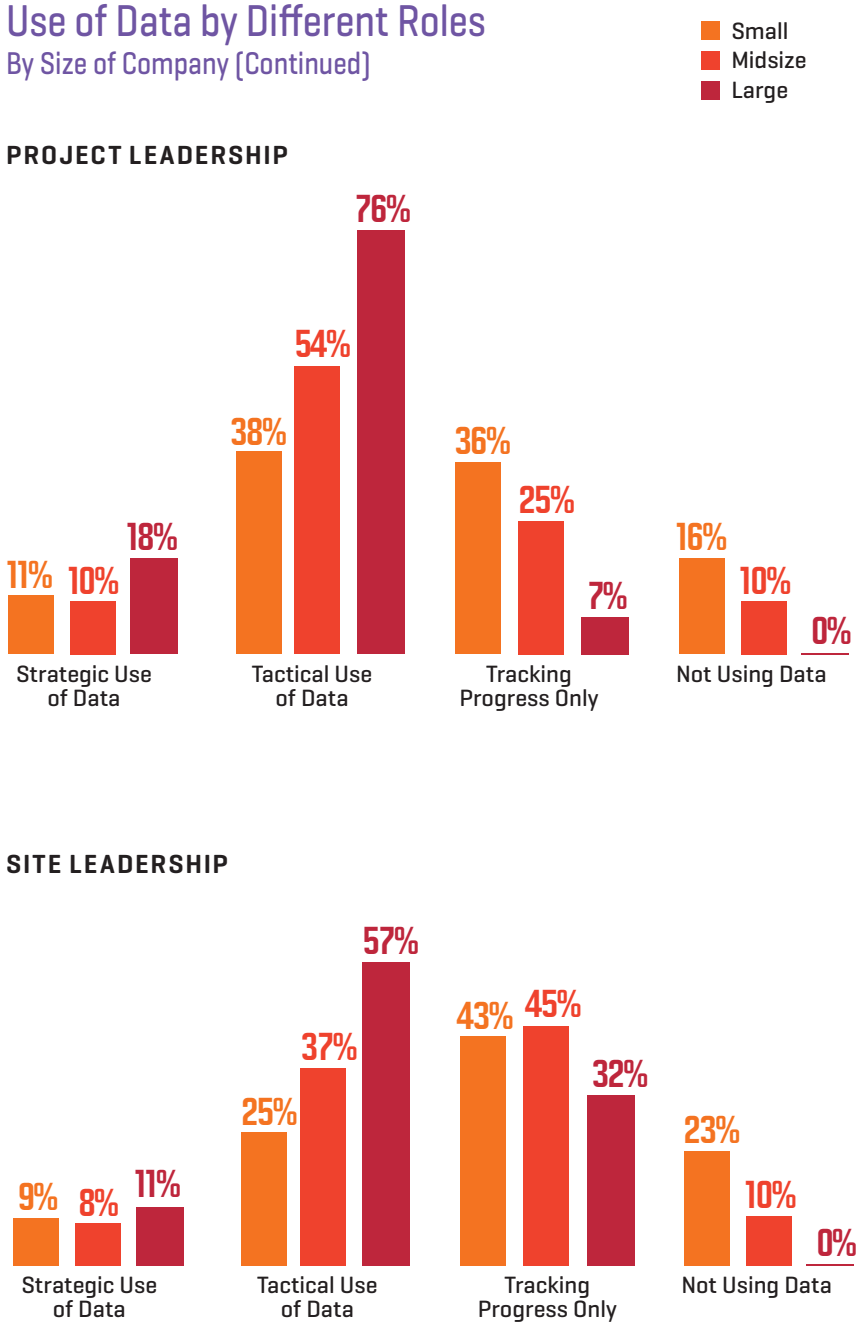
Overall, data use by project leadership is as common as it is for company leadership, with 91% reporting their project leadership use data in some way, dominated largely by tactical use. There is consensus among small, midsize and large companies that project leadership most frequently use data tactically, but one quarter of midsize companies and over one third (36%) of small companies report that their project leaders use it only to track progress.

Site Leadership

Overall, respondents are evenly split that their site leadership use data tactically or only to track progress. However, almost one quarter of small companies (23%) report that their site leadership does not use data at all, and the highest percentage of small (43%) and midsize (45%) companies say site leaders use it for tracking purposes only. Only large companies have a high percentage (57%) reporting tactical use of data by site leadership.

Use of Data by Different Roles

By Size of Company (Continued)



Data Gathering & Analysis

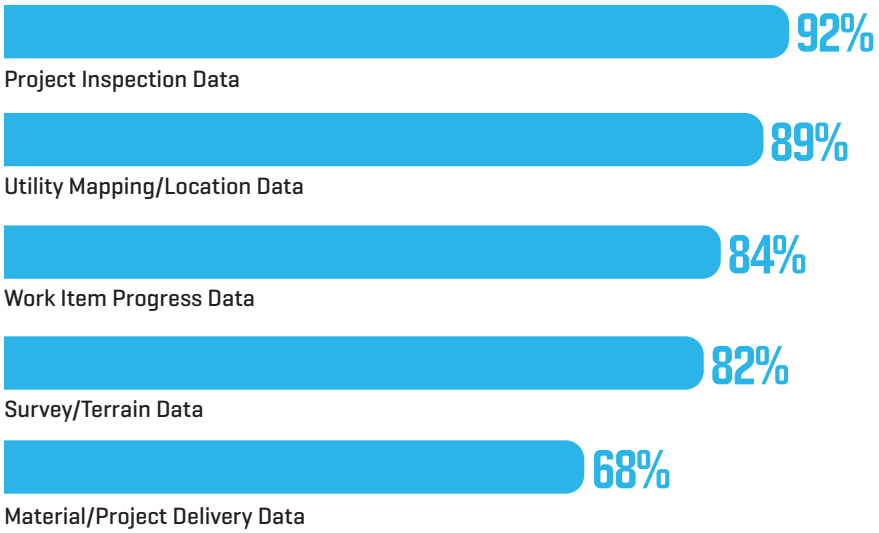
Data Obtained by Civil Engineers

Civil engineers can also benefit from access to site data, but they may not be able to gather that data directly. Therefore, they were asked a set of questions about what types of data they get on projects and where they get the data from.

The percentage of civil engineers who obtain five different types of project data are shown in the chart at right, and the share of projects on which they get that data is noted in the chart on the opposite page.

- Project inspection data is the most common type that civil engineers have access to, with nearly all (92%) reporting they access it on at least some projects. However, nearly half (49%) obtain this data on less than half of their projects, and only 31% get it on 75% or more of their projects.
- Utility mapping/location and survey/terrain data are also commonly obtained by civil engineers, with more than 80% reporting that they get this data. Notably, this is far more than the share of contractors who report obtaining this data on their projects (see page

Share of Civil Engineers Who Get This Type of Data on Their Projects

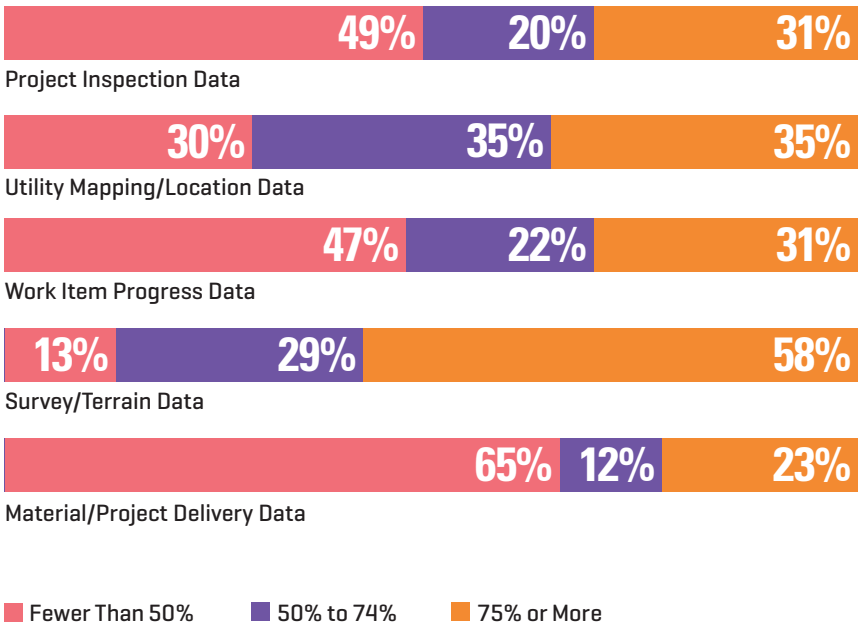


Data Gathering & Analysis

13). In addition, more than half (58%) of civil engineers report that they get survey/terrain data on 75% or more of their projects. Utility mapping/location data is also obtained on a larger share of projects than work item progress, material/project delivery or project inspection data, even if it is not quite as frequently obtained by civil engineers as survey/terrain data. It is not surprising that it is more common for engineers than contractors to access these types of data, given how important they are to the planning stages of a project.

- Most civil engineers (84%) also get work item progress data, but nearly half (47%) report that they only get it on fewer than 50% of their projects. Clearly, there is not a common industry practice for engineers to obtain this type of data.
- Material/project delivery data is the least common for civil engineers to obtain, with only 68% who get that data at all, and only about one third (35%) who get it on half or more of their projects.

Share of Projects on Which Data Is Obtained



Data Gathering & Analysis

Means of Obtaining Data for Civil Engineers

Civil engineers who obtain data were asked how they do so for each data category, and they could select as many as apply from the options shown in the table below.

The table makes it clear that civil engineers get data from a wide variety of sources, and those sources vary based on the type of data obtained.

- Project inspection data is often gathered manually by the engineers, with 41% reporting this process. A notable share also get it digitally from the owner (35%) and contractors (22%).
- Civil engineers most frequently gather survey/terrain data themselves through dedicated apps/software, and at 30%, this is the widest use of these tools by them for data gathering.
- Almost half (43%) of civil engineers get utility mapping/location data from a third party other than the owner and GC, and a relatively high share also gather it manually themselves (32%) or digitally through apps/software (24%).
- Civil engineers rely most frequently on contractors for work item progress data (32%) and material/project delivery data (30%).

Means of Obtaining Data
According to Those Obtaining Data

	Shared Digitally by Contractor	Shared Digitally by Owner	Gathered Digitally by Engineer Through Dedicated Apps/ Software	Gathered Manually by Engineer	Obtained From 3rd Party Source
Project Inspection Data	22%	35%	19%	41%	11%
Utility Mapping/Location Data	11%	19%	24%	32%	43%
Work Item Progress Data	32%	16%	22%	30%	0%
Survey/Terrain Data	16%	19%	30%	24%	24%
Material/Project Delivery Data	30%	14%	14%	19%	3%

0 to10% 11% to 20% 21% to 30% 31% to 40% 41% to 50%

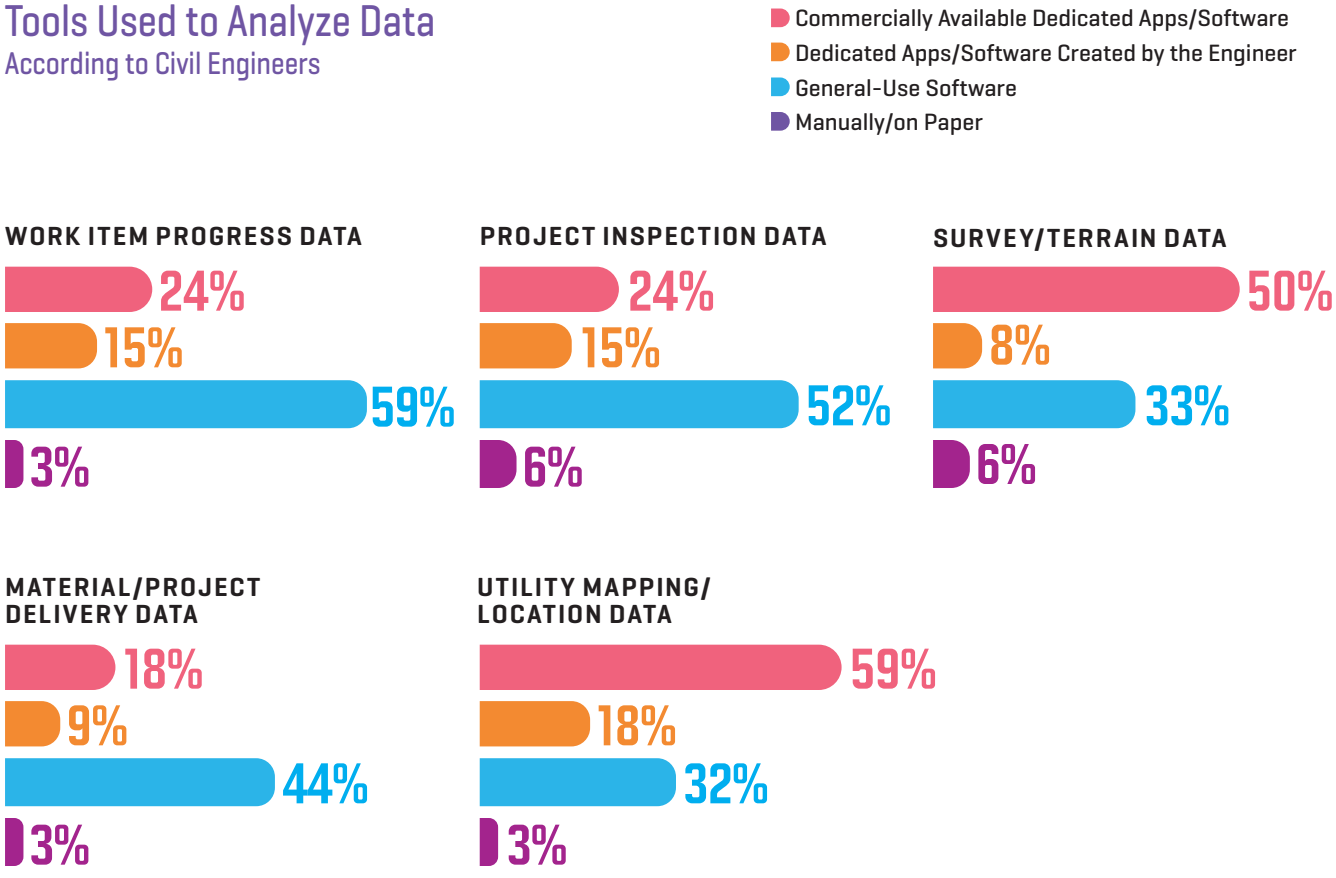
Data Gathering & Analysis

Tools Used by Civil Engineers to Analyze Data

Similar to the civil contractors, civil engineers were asked about the tools they use to analyze the data they obtain. Nearly all (92%) conduct analysis, ranging from 97% doing analysis on their survey/terrain data to 89% doing analysis on project inspection data.

- Commercially available dedicated apps/software are most frequently used to analyze survey/terrain and utility mapping/location data. They are least frequently used for material/project delivery data.
- General-use software like Excel is still commonly used by civil engineers, especially for work item progress and project inspection data.
- Unlike the civil contractors, only a small share of civil engineers do any analysis manually/on paper. For project data, it is also uncommon for them to use dedicated apps/software created by their companies.

Tools Used to Analyze Data
According to Civil Engineers



Data Gathering & Analysis

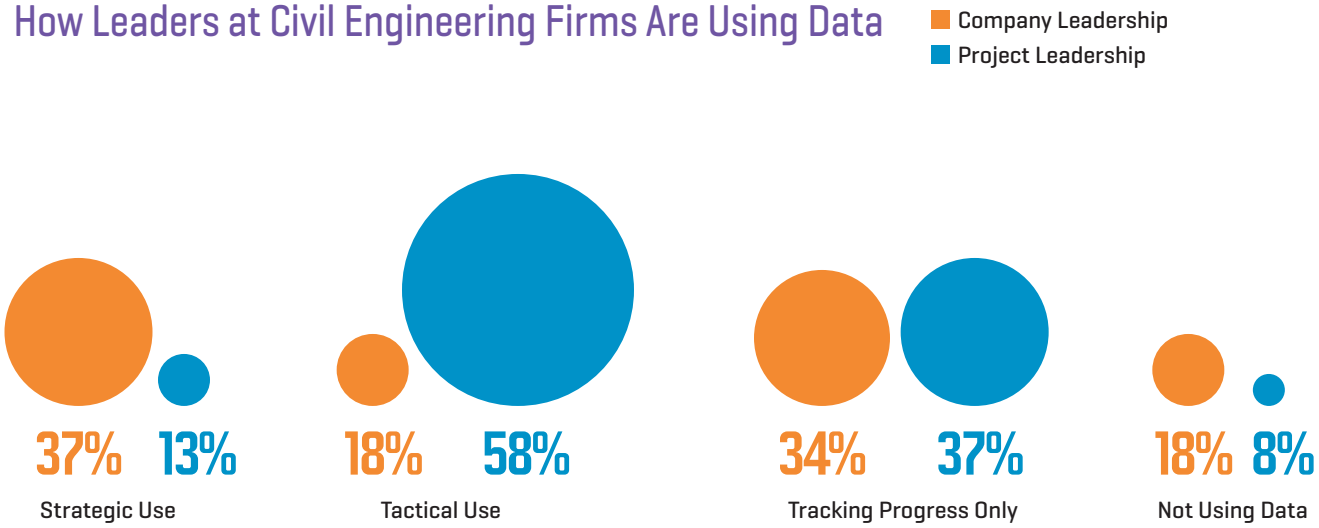
How Leaders at Engineering Firms Are Using Data

Similar to the civil contractors, civil engineers were asked about how different roles in their company use the data and analysis on projects.

Most agree that company leadership is using data, but a notable percentage (18%) say that they are not. In addition, while 37% believe company leadership use the data strategically, nearly as many (34%) believe that they are just using data to track progress on the job. In contrast, most of the contractors who do not find that their company leadership use data strategically report that they use it tactically rather than just to track progress (see page 16 for more details).

An even higher percentage (92%) of civil engineers believe that their project leadership use data, and the majority (58%) believe that the data is being used tactically. Very few report strategic use (13%), and a more than one third (37%) still report that the data is used for tracking purposes only. Here, the findings roughly correspond to those of the contractors.

How Leaders at Civil Engineering Firms Are Using Data



Data Gathering & Analysis

Challenges Reported by Civil Contractors to Consistently Gathering Data

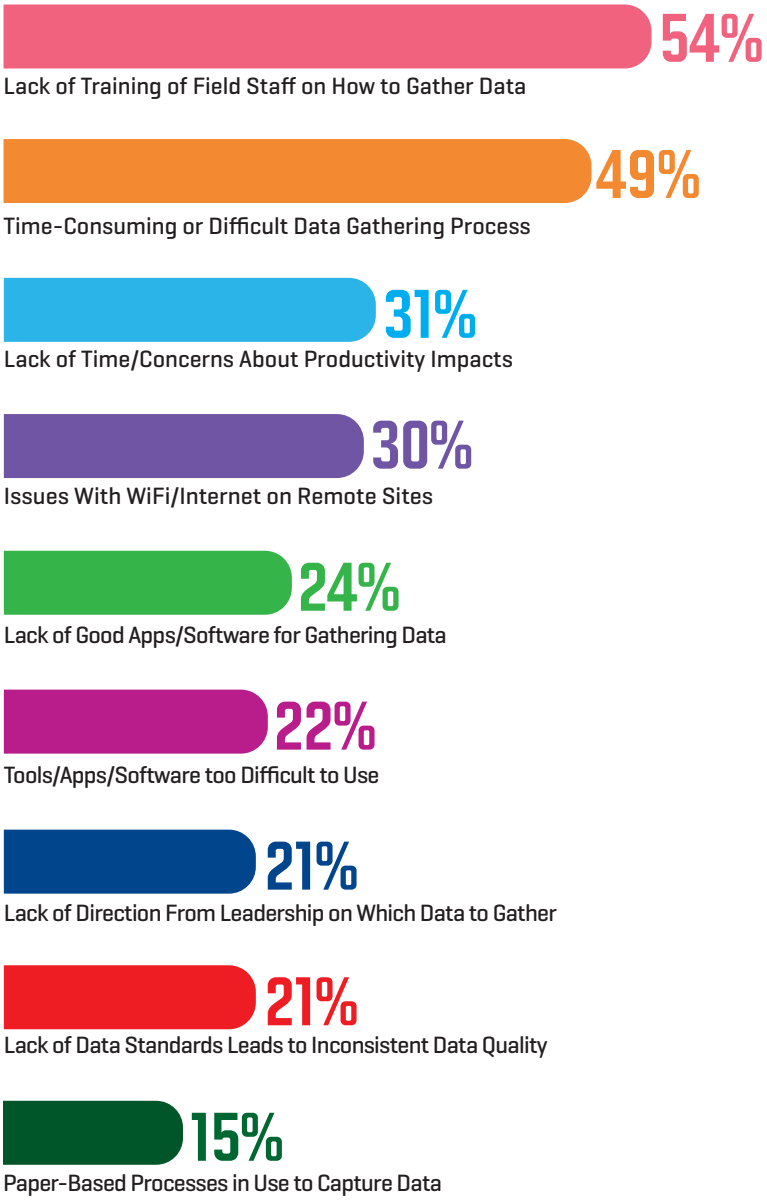
Civil contractors were asked to select the biggest challenges that interfere with their ability to consistently gather data from the list of options in the chart at right. They were allowed to select as many options as they felt applied.

Two factors are the most frequently noted challenges: Lack of training of field staff on how to gather data was selected by 54%, and the time-consuming or difficult process of data gathering was chosen by 49%. These findings suggest that if data gathering could be simplified, more contractors would engage in it.

Under one third also felt that concerns about productivity impacts (31%) and issues with WiFi/internet on remote sites (30%) were also notable challenges.

On the other hand, fewer reported that tools/apps/software, the lack of data standards or their paper-based processes are major challenges. Given the relatively high percentage still reliant on paper, it is surprising that few consider their paper-based processes a significant issue.

Biggest Challenges to Civil Contractors´ Ability to Consistently Gather Data



Data Gathering & Analysis

Biggest Challenges Interfering With Engineers´ Ability to Consistently Obtain Data

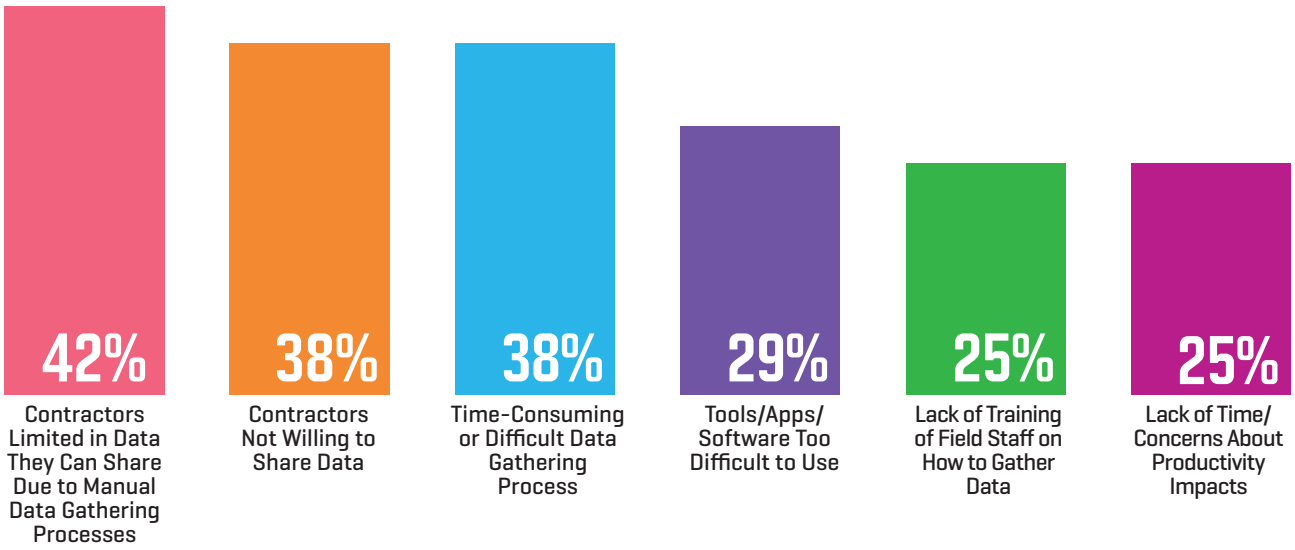
As with the civil contractors, civil engineers were also asked to select the biggest challenge to their ability to consistently obtain data. They were presented with the options listed in the chart below, which differed slightly from those asked of contractors.

Interestingly, despite the fact that they could select as many options as they thought were relevant, fewer than half selected any single option offered. This suggests that several issues, rather than one or two primary ones, should be considered when attempting to improve data gathering in the civil design and construction industry.

The highest share of civil engineers felt that the contractors were the biggest obstacle to their ability to obtain project data, either because of the contractors´ manual data gathering practices or because they are not willing to share the data. The former is notable because the contractors themselves did not consider their manual data gathering processes to be an obstacle to obtaining data on a project. The engineers also felt the process of data gathering themselves is too onerous.

As with contractors, concerns about tools/apps were much lower than the other concerns noted.

Biggest Challenges Interfering With Engineers´ Ability to Analyze Data



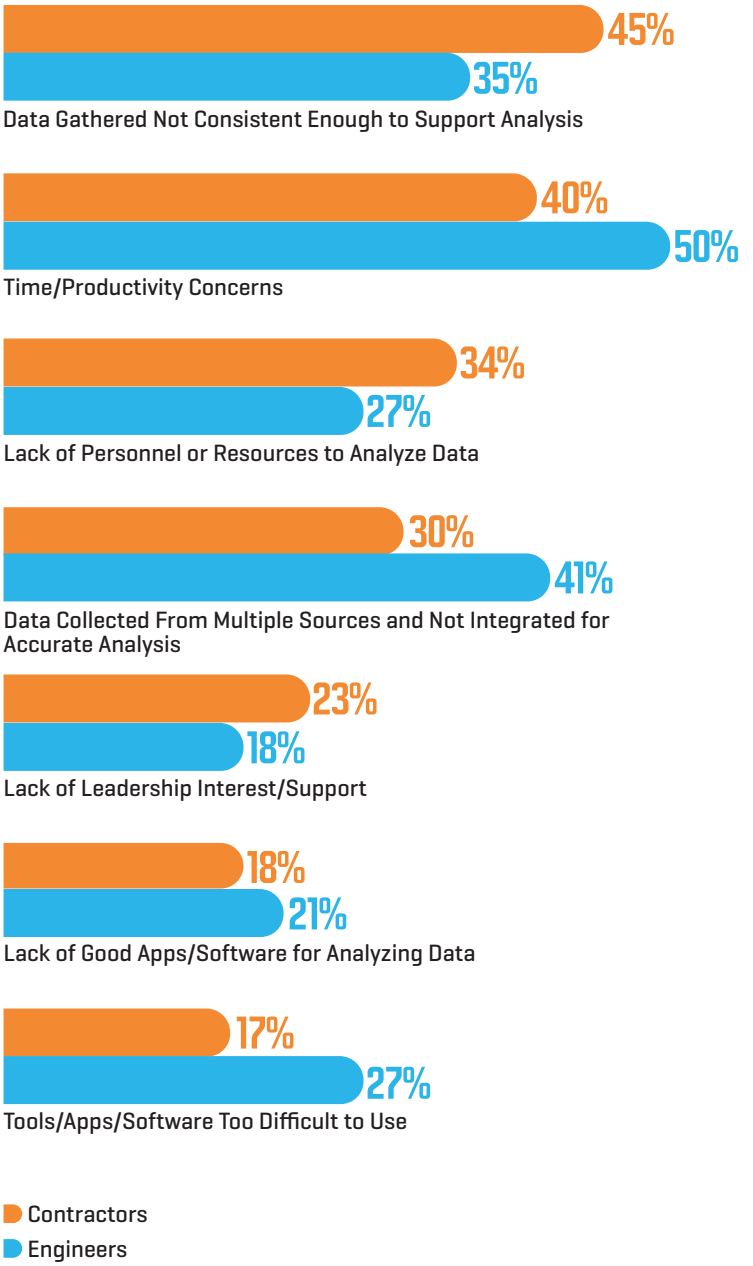
Data Gathering & Analysis

Biggest Challenges Interfering With the Ability to Analyze Data

Civil contractors and engineers who analyze data were asked about the biggest challenges that interfere with their ability to do so.

- The top two challenges selected by civil contractors are inconsistent data gathering and time/productivity concerns.
- A relatively high percentage of civil engineers share the concerns about time/productivity impacts, but they select the multiple types of unintegrated data more frequently as a major challenge than inconsistent data. This may be in part due to the number of sources on which they rely for project data (see page 20). However, even though a smaller share of contractors select this option than do architects, it still ranks third for contractors as well, so it is a notable issue for them, too.
- A higher share of engineers than contractors are also concerned about tools/apps/software being too difficult to use. Again this may be due to the multiple sources of data they need to utilize to obtain project data, since some tools may work better with some data sources than with others.

Biggest Challenges Interfering With the Ability to Analyze Data



Data Gathering & Analysis

Most Valuable Types of Data According to Contractors

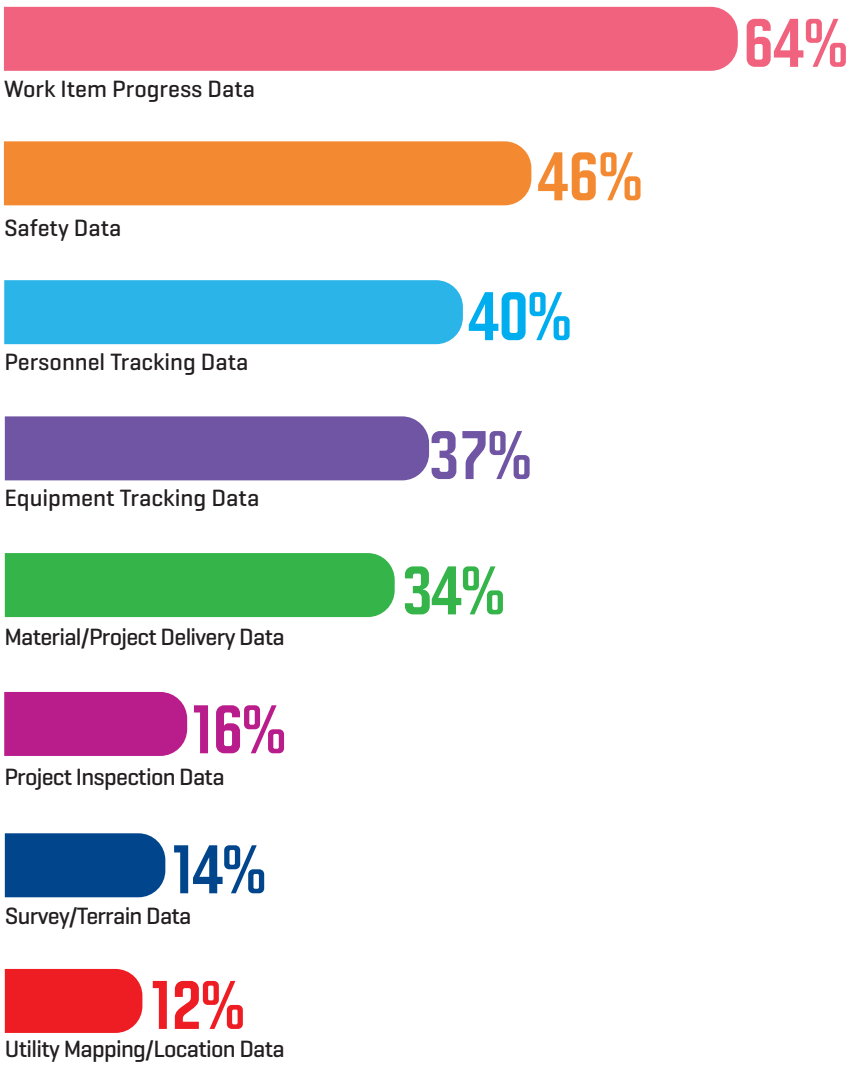
Civil contractors were asked to select the top three most valuable types of data from the list of the eight types of data asked about in the rest of the survey.

- By far, the highest percentage (64%) select work item progress data as among the most valuable. Work item progress is necessary for schedule management, a top performance indicator for projects.
- 40% or more also regard safety and personnel tracking data as among the most valuable.
- Over one third find equipment tracking and material/project delivery data highly valuable.

Interestingly, civil contractors rely heavily on electronic forms and general-use software rather than dedicated apps/software to gather and analyze the data considered most valuable. This may be because they have needed to gather and analyze this data before specialized tools were in place and may not have the interest or the time to shift to another approach.

Most Valuable Types of Data Currently Gathered/Analyzed

Selected by Contractors Among the Top Three



Data Gathering & Analysis

Most Valuable Types of Data According to Civil Engineers

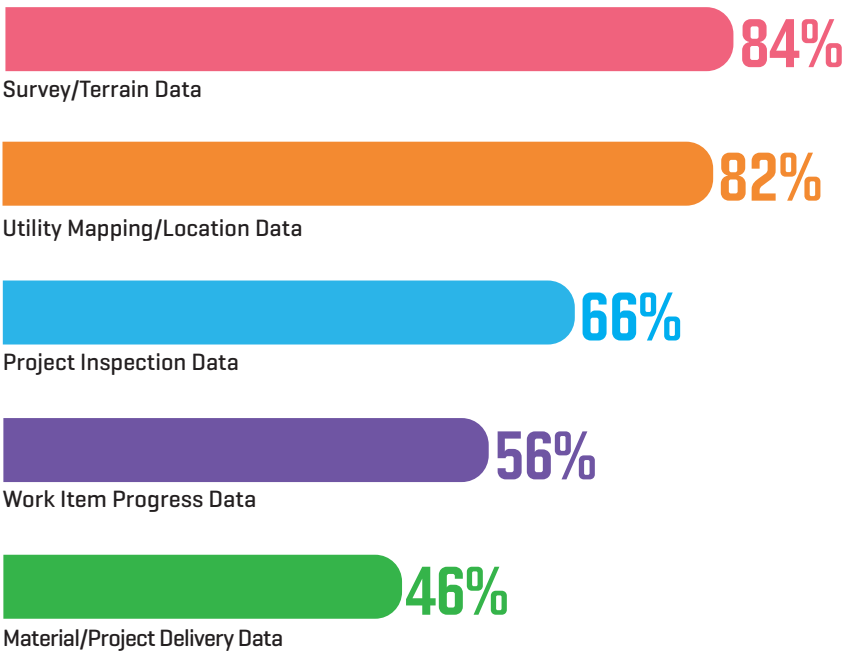
Civil engineers were asked to rate the value of each type of data listed in the chart at right on a five-point scale, from not valuable to having very high value. The chart at right shows the percentage who rated each option as a four or five (having high or very high value).

The vast majority of the civil engineers place a high value on the data that helps with their design efforts, including survey/terrain data (84%) and utility mapping/location data (82%). These are also the data they obtain on the largest share of their projects (see page 19).

Two thirds (66%) also rate project inspection data as having high or very high value, and about half do the same for work item progress (56%) and material/project delivery data (46%). It is clear that data that focus more on construction than on design still is highly valuable to the majority of engineers.

Most Valuable Types of Data Currently Gathered/Analyzed

Rated as High/Very High Value by Engineers Using This Data



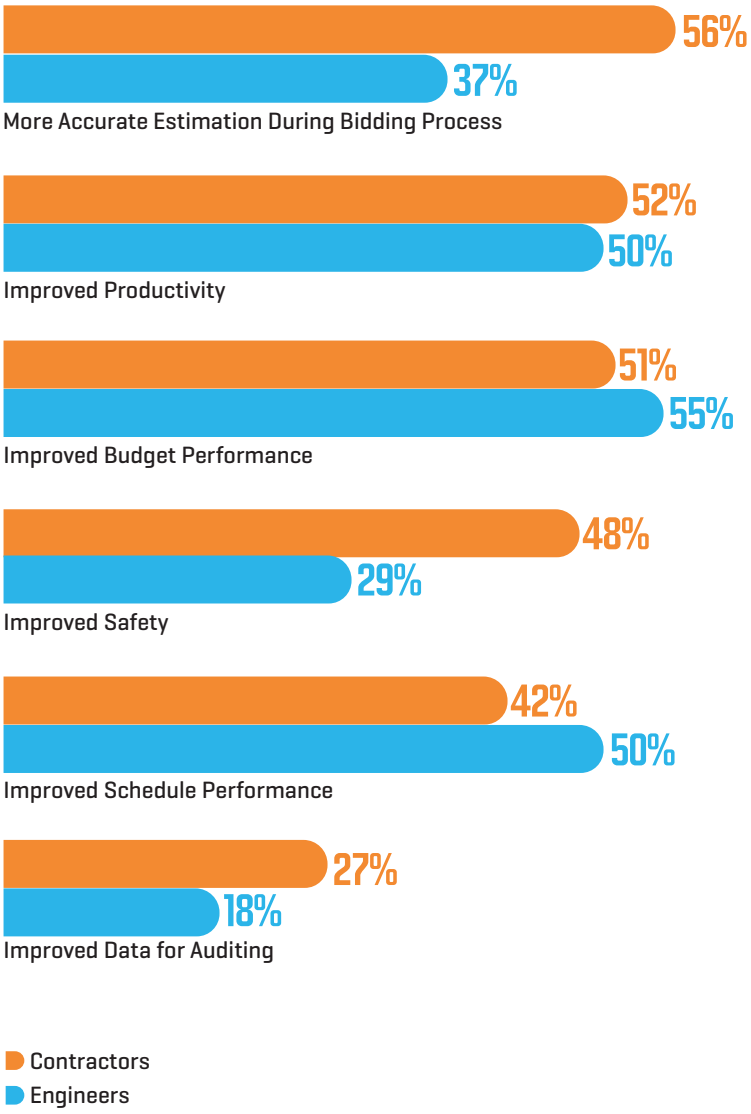
Data Gathering & Analysis

Positive Impacts on Projects From Data Gathering and Analysis

Civil contractors and engineers were asked what measurable impacts they have seen on project performance due to their data gathering/analysis efforts.

- About half of civil contractors report measurable positive impacts on the accuracy of their estimation during the bidding process (56%), improved productivity (52%), improved budget performance (51%), improved safety (48%) and improved schedule performance (42%). Productivity, budget, safety and schedule are widely recognized as top key performance indicators for successful construction projects.
- Improved budget performance is the impact most frequently experienced by civil engineers due to their data gathering and analysis efforts, followed closely by improved productivity and improved schedule performance.
- While it is not surprising that more civil contractors report more accurate estimation during bidding and improved safety than engineers, it is somewhat surprising that engineers more frequently experience improved schedule performance than do contractors.

Positive Impacts on Projects From Data Gathering/Analysis



Data Gathering & Analysis

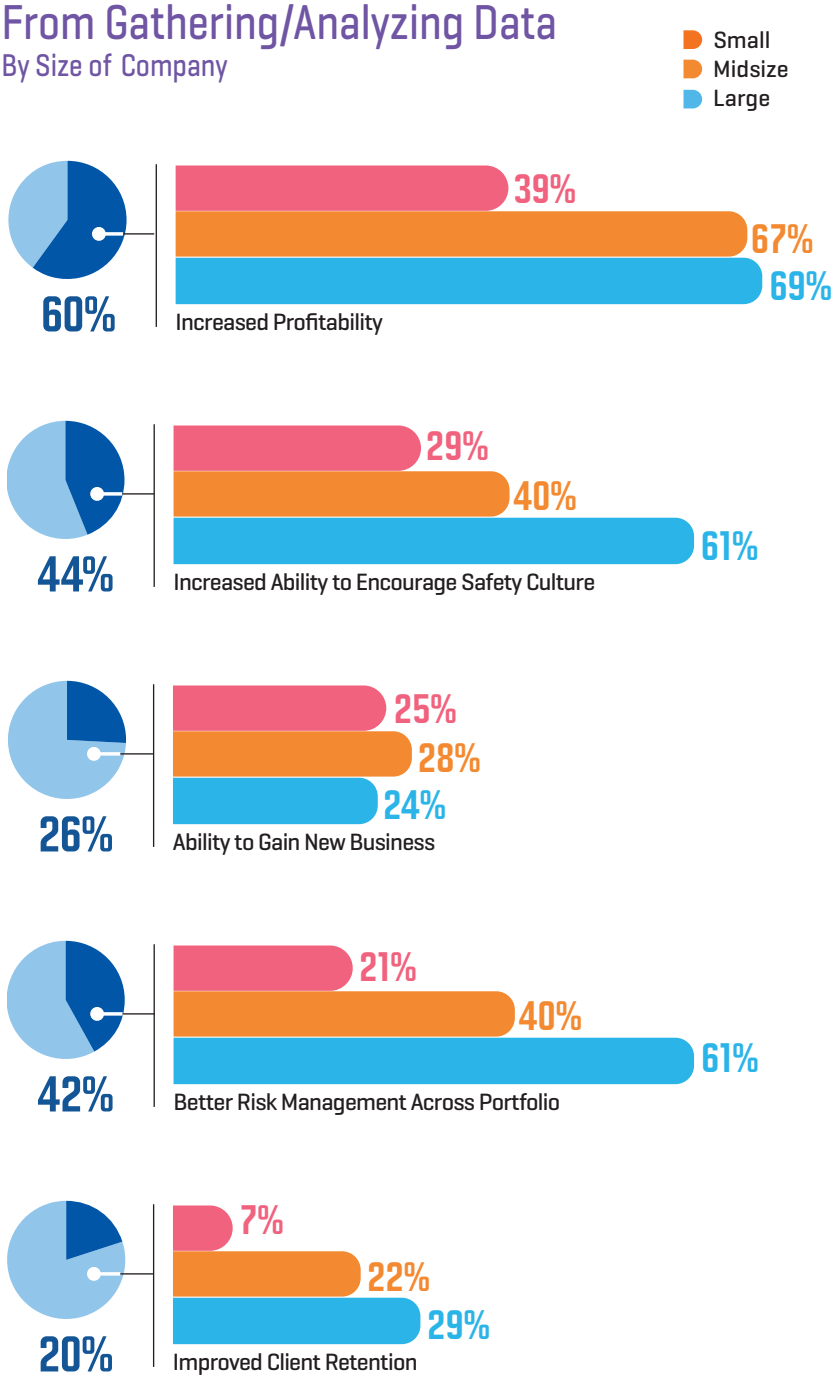
Contractors´ Top Positive Business Impacts From Data Gathering/ Analysis

Civil contractors were also asked about the top positive business impacts due to their data gathering/analysis efforts, and their responses are shown in the chart at right. The overall percentage who said they experienced the business impacts are shown in the pie, with the responses by company size shown in the bars.

- Overall, contractors most commonly experience increased profitability, reported by 60%. Increased ability to encourage safety culture (44%) and better risk management across their portfolios (42%) are also widely experienced.
- All of these widely experienced business benefits are reported by a much higher percentage of large companies (revenues $50M and over) than midsize (revenues $10M to $49M) or small (revenues under $10M) ones. This directly correlates to the more intensive use of data by large companies than by smaller ones (see pages 16 and 17) and demonstrates the need to utilize data effectively to increase competitiveness.

Top Positive Business Impacts for Contractors From Gathering/Analyzing Data

By Size of Company



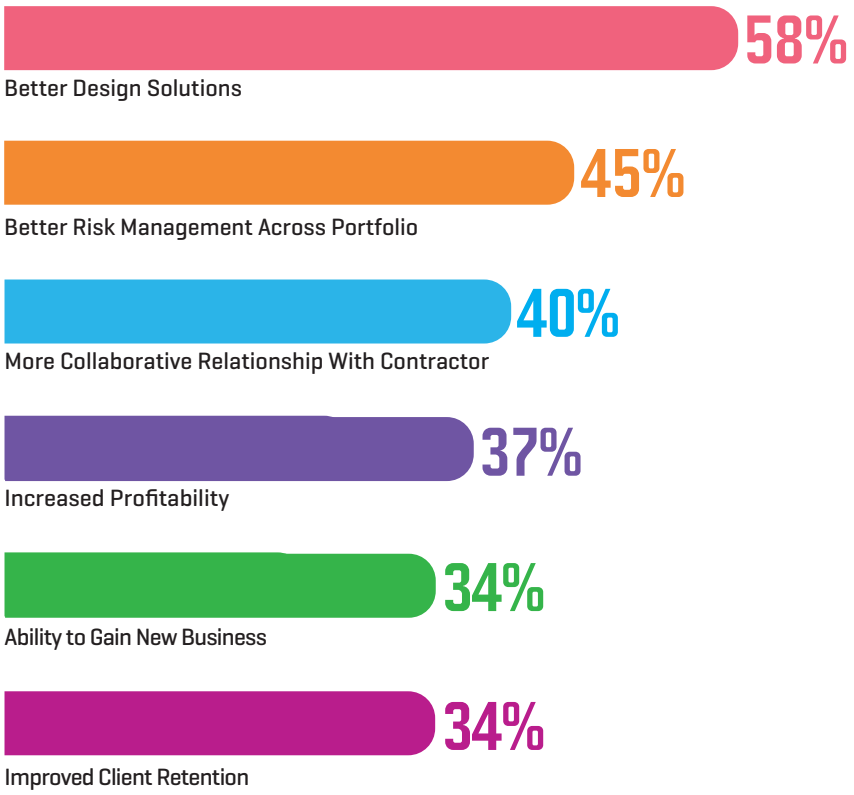
Data Gathering & Analysis

Civil Engineers´ Top Positive Business Impacts From Their Data Gathering/ Analysis

Civil engineers were also asked what measurable impacts they have experienced on their company´s performance due to the their data gathering/analysis efforts. They could select any of the options in the chart at right that applied to them.

- The top benefit, experienced by 58%, is that the data on projects helped them to develop better design solutions. Of course, this applies to survey/terrain and utility mapping data, but in some cases, it may also be due to receiving construction data, which can create a positive feedback loop.
- 40% or more civil engineers also report measurable improvements to their ability to manage risk and to form a collaborative relationship with the contractor.
- Over one third also increased their profitability, gained new business and improved their client retention due to the data they use.

Top Positive Business Impacts for Civil Engineers From Gathering/Analyzing Data



Data Gathering & Analysis

Eliminating Waste According to Civil Contractors

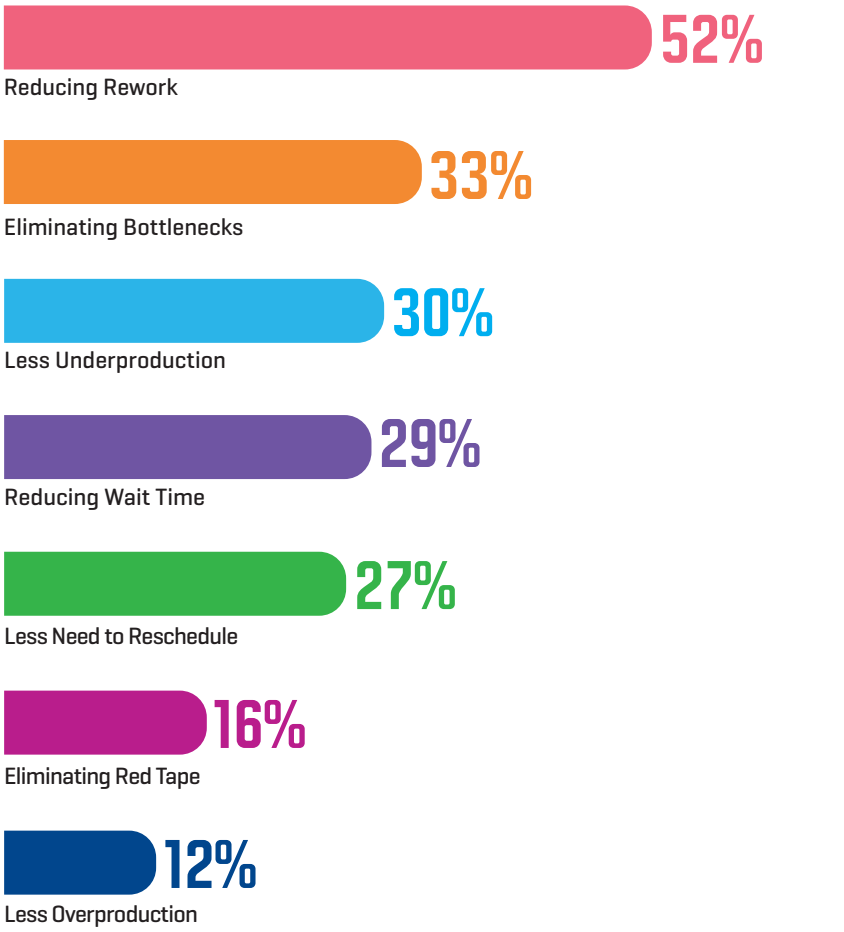
In addition to the measurable benefits to their projects and companies, civil contractors were also asked to select the top three ways in which they have been able to eliminate waste through their process of gathering and analyzing data.

By far, the highest percentage of contractors say that data gathering and analysis helps reduce rework, selected among the top three by 52%. Data gathered from the field is essential for determining quickly when issues arise, and rework is costly for contractors in terms of both budget and schedule.

In addition, a series of ways to eliminate waste were selected by between one quarter and one third of the contractors, including eliminating bottlenecks, less underproduction, reduced wait times and less need to reschedule. Clearly, contractors are able to improve efficiency and productivity in their projects due to the flow of data between the jobsite and the office, in ways that have a positive impact on their schedule in particular.

Top Ways Contractors Have Eliminated Waste Due to Data Gathering/Analysis

Selected in Top Three



Data Gathering & Analysis

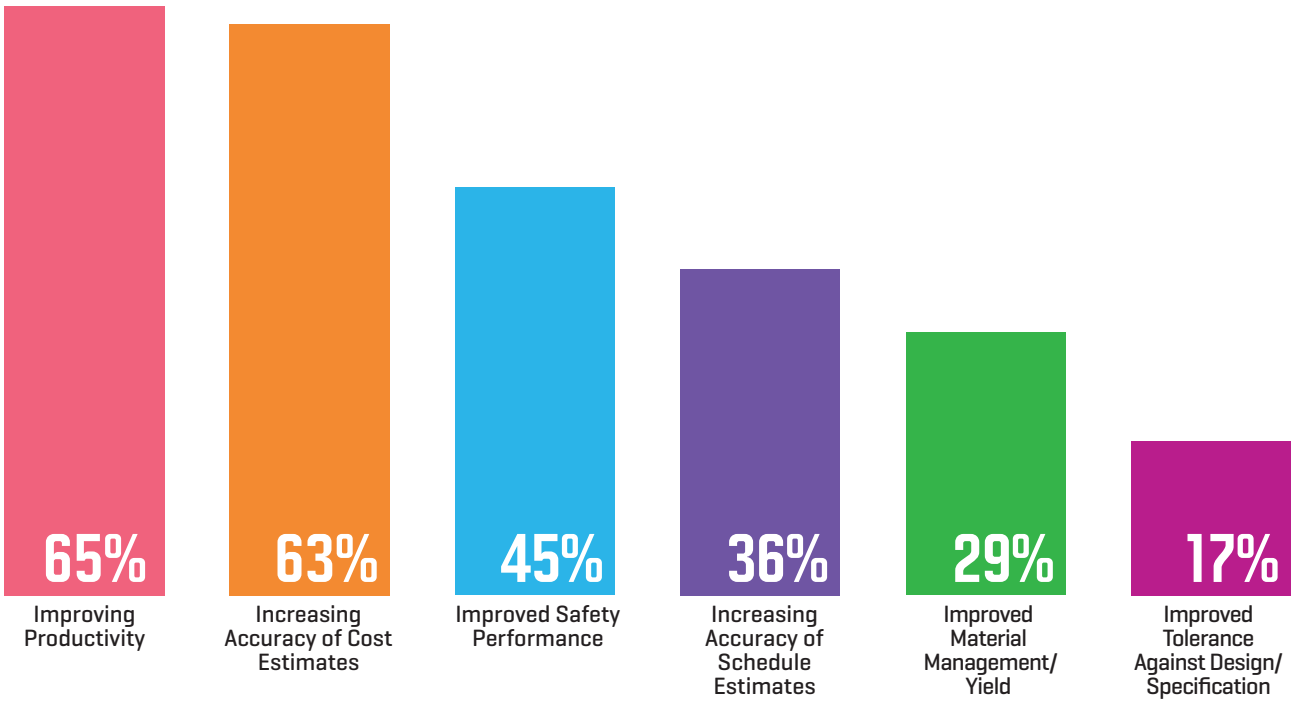
Encouraging Investments for Civil Contractors

Civil contractors were asked to select the benefits, listed in the chart below, that would encourage them to increase their investment in data gathering/analysis resources. They were asked to select all that apply.

Nearly two thirds report that they would increase their investment in data gathering/analysis if that investment would help improve productivity and increase the accuracy of their cost estimates. The challenges they face with finding skilled labor makes improved productivity even more important to help them meet their project schedules, and knowing their cost estimates are accurate helps ensure a dependable level of profitability from project to project. The findings already demonstrate that these are the top benefits contractors experience currently from their data gathering/analysis (see page 28), which bodes well for increased investment in this area.

Also important to civil contractors is improving their safety performance and increasing the accuracy of schedule estimates, selected by 45% and 36%, respectively.

Benefits That Would Encourage Civil Contractors to Increase Their Investments in Data Gathering/Analysis Resources



Data Gathering & Analysis

Encouraging Investments for Civil Engineers

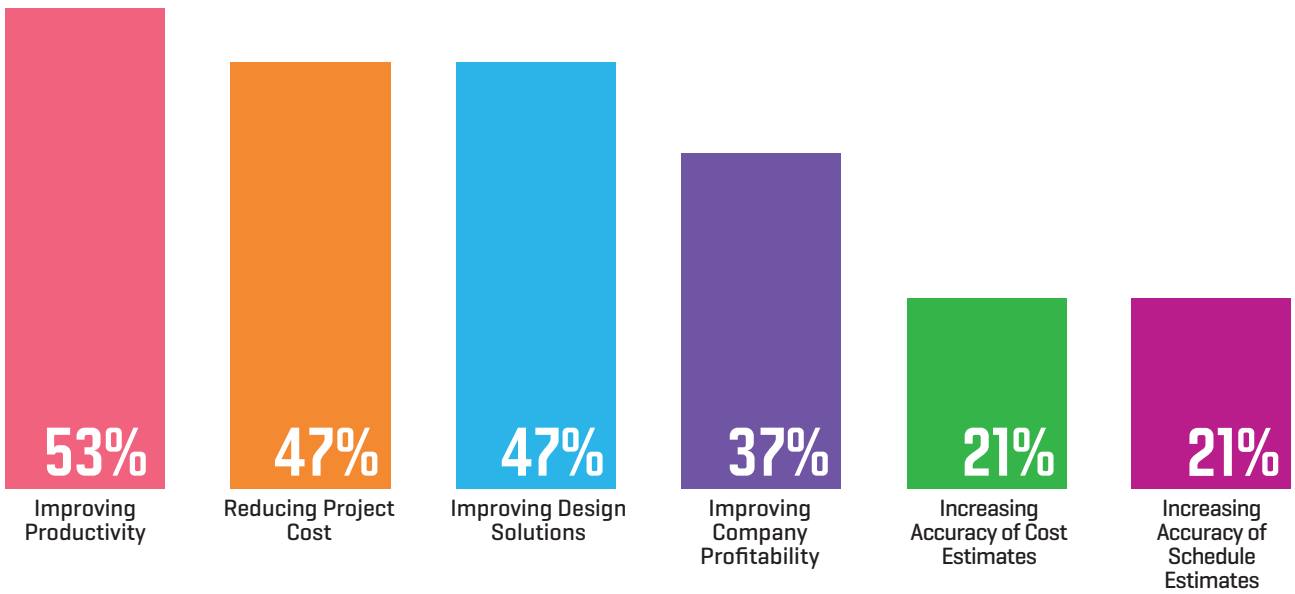
Civil engineers were asked a similar question about the benefits that would encourage them to increase their investments in data gathering/analysis resources. Again, they could also select all that they felt applied to them.

Three benefits top the list: improving productivity, reducing project cost and improving design solutions.

- Civil engineers are likely to improve their productivity by having accurate, complete data on utilities and terrain during design, which can save them from significant additional work if issues are uncovered during construction.
- Reducing project cost could help them with client satisfaction and retention.
- Improving design solutions is likely at the heart of reducing project cost, and both are equally valued by the engineers. Again, data from throughout the project lifecycle can help improve future projects.

Over one third also find that improving their company's profitability would encourage them to invest in data gathering/analysis.

Benefits That Would Encourage Civil Engineers to Increase Their Investments in Data Gathering/Analysis Resources



Dodge Perspective

The Age of Data in Construction

By Steve Jones, Editor

As a civilization, we are most definitely in the age of data. And although the construction industry is complex—its projects are unique, and its data flows from hundreds of sources—it is imperative that we learn as an industry to master large-scale data collection and analytics so we can exert more effective control, be more accurately predictive and produce ever-improving outcomes for everyone involved.

But this is a challenging task. There is so much data available from projects that patterns are often lost to the noise of the details. However, consistently gathering data that is comparable, accurate and timely across projects will support emerging technologies such as AI that help us derive meaningful patterns from diverse data. These insights will enable us to streamline processes, optimize precious resources and improve critical metrics of cost, schedule, quality, safety and sustainability.

The findings provided in this study are intended to allow companies to benchmark their own performance on data gathering, their use of dedicated apps/software to make data comparable across different projects and their experience conducting meaningful analytics that can improve productivity and reveal better practices on a larger scale. Key trends from the research include:

DATA GATHERING: At least two thirds of civil firms currently use technology to gather critical types of project site data. This encouraging finding suggests we will soon be well positioned with the raw material for meaningful downstream analysis and action.

DATA ANALYTICS: Today about half of the industry still relies on general-use software or conducts analysis on paper, but the other half are taking advantage of dedicated apps/software to make the process of analysis more consistent and less burdensome from project to project and to support a shift to wider analytics across projects as their pool of accurate data continues to grow deeper.

DATA USAGE: The findings about how data is used, and the benefits seen by companies of various sizes show that we need to help smaller companies advance so that the whole industry can thrive. While the small to midsize construction companies are investing in data gathering and analysis, their smaller datasets severely limit the strategic or even tactical ways they can apply it. Yet if given access to larger, anonymized datasets available from third parties/software vendors, they will be able to capitalize on cross-industry efforts to understand larger trends and practices and can benefit as much as their larger peers.

TECHNOLOGY ADOPTION AND BENEFITS: The tools to gather and analyze data are out there already, so few respondents are concerned about that. Where they struggle is the training and time needed to use them. Meanwhile the reported benefits are extremely encouraging, with about half of the contractors reporting improved estimation, productivity, budget performance, safety and schedule performance.

This research provides an important snapshot of where the industry is now, what it stands to gain and what is limiting its advancement. Overall, we are still in the early part of this transformative journey. But much as how we advanced from the shovel to the excavator, the potential of data as a critical tool for civil construction is truly vast. CQ

Case Study

Managing Survey Data Is Key to Success of Major Highway Project

As soon as the Archer-United Joint Venture was awarded the $421 million Midlands Connection project, Doug Browning, senior survey manager, says that he started to think about how they were going to manage their data on the project. The vast size of the project, widening an existing highway corridor for 16 miles and replacing 10 bridges, makes it critical to ensure that everyone was using the most up-to-date plans. Bringing the survey data into that documentation adds another layer to the challenge. "We are constantly referencing the CAD files we have, because it is unrealistic to receive updated CAD files to do what we need to do with them on the survey side as many times as we have revisions," says Browning.

He drew from experience on smaller projects to come up with a solution to manage the data they need because, as he states, "If we can't manage the data, we have a hard time keeping our production crews going."

How Survey Data Is Managed and Utilized

One key element that makes the accuracy and completeness of the survey data particularly crucial is their use of automated equipment. "We've invested a lot of money into our machine-controlled fleet on this project, " says Browning, "and for us to use the earth-moving equipment and all that to its fullest, it takes a lot of prep time upfront

IMAGES COURTESY OF THE ARCHER-UNITED JOINT VENTURE

The Midlands Connection project includes new lanes and bridges.

Case Study

Survey data directly impacts the ability to set up the operation of the machine-controlled fleet of equipment.

Project	SCDOT Midlands Connection I26 Widening
Owner	South Carolina Department of Transportation
Construction Start	March 2020
Expected Completion Date	Late 2024/Early 2025
Construction Cost	$421 Million

with the data ... It isn't just a 'plug-and-play' type deal. There's a constructability aspect where we clean the files for our field crews." He points out that, "if you do it right upfront, you save yourself a lot of time in the long run."

They are also gathering data from two main sources. About half of the data comes from conventional survey methods with a robotic total station, and the other half is GPS. Therefore, they needed a way to manage data that could integrate the data from both sources. He worked with a vendor to find a cloud-based solution that had several advantages. First, the field crews can access the solution via a tablet which brings the data together. Browning describes how "one of my crews can have a robotic total station set up and then, with the click of a button, switch right over to GPS."

In addition, the solution allows him to track work progress back at his office, or even, due to the pandemic, from his home. "I can sit at my computer and see the same screen that [my bulldozer operator] sees in the cab of the dozer. I can give him files, and I can take files out. I can roll off the correct data for the correct model of whatever tasks of scope of work he's [doing]." He points out that this ease of access is particularly critical when they have about a dozen pieces of equipment online at the same time, each needing to have the correct data to get the work done properly.

Implementation

For implementing a system for this scale project, Browning worked with a vendor with whom he had a relationship and who had provided a great deal of support for them in the past. He cites collaboration with the vendor as a key part of the successful implementation of the technology. He states, "A month after we were awarded the project, I sat down with the team [from the vendor], and we discussed ... what we envisioned our needs to be, and we were able to come up with a plan before we even broke ground or purchased equipment. That really helped us out a lot." In fact, when asked about the challenges he found in implementation, Browning


View seen in the office from the field

The biggest advice I would give another contractor is know the scope, have the support and take every advantage you have to [plan ahead] ... You've got to put the legwork in upfront. — DOUG BROWNING
SENIOR SURVEY MANAGER

responds that "we had some hiccups, but not enough where anything has been an issue or even 'lessons learned.' "

The ease of implementation and of using the platform was particularly important in this project because of the diverse crews that were brought together. The size of the project brought people within Browning's company together who hadn't worked together before, and they are also part of a joint venture, so they had to combine teams from two different companies as well. Browning explains, "that is why I tried to do as much legwork upfront."

More important, though, Browning recommends having a plan for data management before you break ground as a critical factor for success, along with choosing a vendor who will provide support after the sale. "The biggest advice I would give another contractor is know the scope, have the support, and take every advantage you have to [plan ahead] ... You've got to put the legwork in upfront."

One unexpected advantage for the successful implementation of this technology was the timing: The project broke ground in March 2020, just as the COVID-19 pandemic was drastically impacting work in the US. Browning describes how the delays associated with that allowed them more time to "create surface models, which are critical for our grade crews." He believes that the extra time to work with the data helped to prevent rework and ultimately saved the project money.

Benefits of Survey Data Management

Browning finds that the biggest benefit they have experienced is improved productivity. Instead of prepping data in the office, putting it on a thumb drive and bringing it to the crew, everything is connected in the cloud. As Browning explains, "It's a couple of pushes of a button, and away you go." Since the greater productivity is the result of having up-to-date information and better communication between the field and the office, Browning also believes it has helped improve safety. "I think safety just falls right in line when you do the prep work upfront."

In addition, Browning believes that working with these technologies can provide a competitive advantage. Based on his experience with this project, he is considering other technologies that can continue to improve his projects. "I am looking for any and all ways that I can separate myself and my department to give us advantages over our competitors." CQ

A Closer Look

Use of GIS Demonstrates Importance of Data for Construction

A new study from Dodge Data & Analytics, titled *The Business Value of GIS for Design and Construction SmartMarket Report* and published in partnership with Esri and Autodesk, reveals that contractors are using GIS to have access to critical data about their projects and experiencing benefits to both their projects and their businesses as a result.

Use of GIS

Ove three quarters (78%) of general contractors who participated in the study report that they use GIS. Use is far more common among larger contractors than smaller ones currently, consistent with the data demonstrated in this edition of the *Civil Quarterly* about use of data in the construction industry in general among civil contractors. However, over half (52%) of the small contractors (those with annual revenues less than $10M) report using GIS, which demonstrates that it is a viable and powerful tool for contractors regardless of the size of the company.

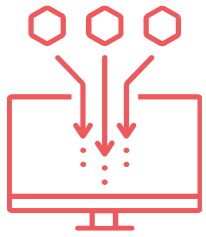
Over 80% of general contractors using GIS use it in a variety of ways that impact the productivity, profitability and safety on a project, including to collect site data, monitor the location and use of materials and equipment, track construction progress, monitor issues (RFIs, punchlists, etc.) and address safety and security. However, despite such a wide range of uses, fewer than half of the contractors use any of these functions on the majority of their projects, suggesting that while the construction industry is finding a wide range of applications for GIS and its data, it is still in the early stages of widely deploying it on its projects.

Percentage of General Contractors Currently Using GIS

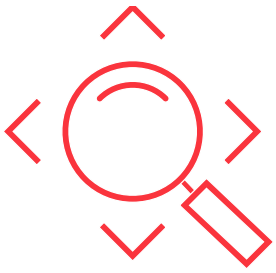
78%

One of the experts featured in the report, Donna Huey, senior vice president and director of client technologies at Atkins North America, says that

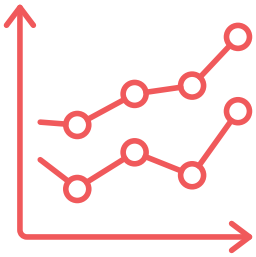
Top Uses for GIS



Site Data Collection



Monitoring Issues (RFIs, Punchlists, etc.)



Tracking Construction Progress

Monitoring Use and Location of Materials and Equipment

A Closer Look

interoperability still remains a challenge that prevents the industry from getting the most out of GIS data. "Even though the industry has made strides [in this area], it's not perfect and [more is needed]."

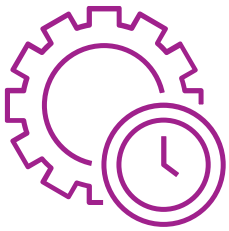
One of the biggest areas that many are currently exploring is the best way to integrate building information modeling (BIM) and GIS. One example of doing so featured in the report, the HS2 (high-speed railway) Project in the United Kingdom, was able to achieve notable benefits, including the ability to use automated tools to estimate the volume of excavation materials on the project, with results that are "85% to 95% accurate and 10 times faster [than conventional processes]," according to George Floros, senior GIS data specialist with the Skanska-Costain-STRABAG Joint Venture, which is conducting the work.

Benefits of GIS

More broadly, the findings of the Dodge study reveal that contractors experience a variety of benefits from their current use of GIS. For example, the top ways that contractors report that GIS provides risk reduction on their projects is through reduced conflicts, field coordination problems and changes during construction, and by improving their ability to manage project complexity. This is likely the direct result of the top improvement they report to their processes, which is better multiparty communication and understanding from improved visualization.

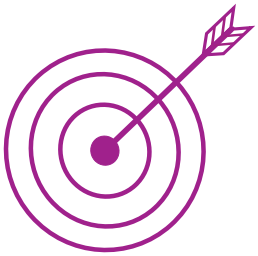
The use of GIS also results in benefits to their project outcomes and businesses.

Top Benefits of GIS



Internal Business: Improved Productivity

Market-Related: Improved Client Satisfaction



Project Outcomes: Improved Quality

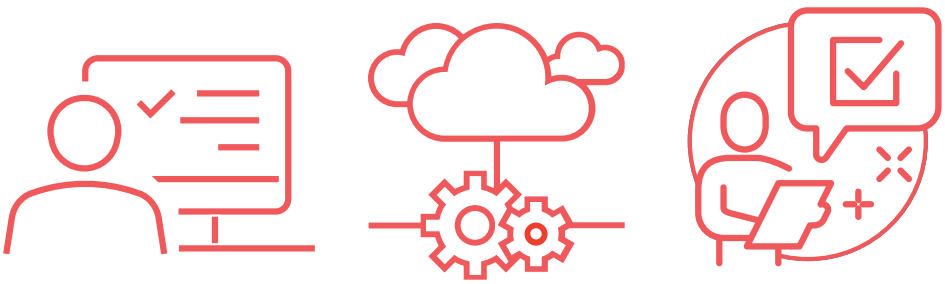
- The top project outcome that contractors report due to GIS data is improved quality of the completed project.
- The top internal business benefit they experience is improved productivity.
- The top market-related business benefit is improved client satisfaction.

Another expert interviewed in the report, Sanjay Kumar, the founder and CEO of Geospatial Media and Communications, states quite simply that "GEO-BIM technologies are helping the construction industry to be more efficient and productive." He says, "The construction phase is where GIS brings a huge advantage to the entire workflow [because] it helps you monitor what you design and construct," and he believes that GIS will be at the heart of construction in the future.

Huey also sees the value of GIS grow through the lifecycle of projects, which will continue to make GIS more valuable in the future. "If done properly, the information that you build [in the planning stage, typically with GIS] grows in value [throughout the project lifecycle into operations]. If we can get incentives aligned through the supply chain of

A Closer Look

Top Challenges of GIS



Finding Qualified Staff to Manage GIS

Interoperability

Explaining the Value of GIS

delivery of infrastructure so that we place importance on information management as a key component of benefit outcomes in the end state, that will be a big leap forward."

Challenges When Using GIS

Like many other forms of data, the industry is still working through the challenges of fully incorporating GIS into its workflows. The top three challenges experienced at a high/very high level by around half of contractors are finding qualified staff to manage GIS, interoperability with other tools and explaining the value of GIS. The biggest interoperability challenge reported by 50% of contractors is in using GIS data in BIM applications, but over one third also struggle to use GIS data in CAD applications, to use BIM data in GIS applications and to prepare presentation comprised of CAD/BIM and GIS.

The third expert featured in the report, Cory Dippold, vice president of special projects applications at Mott MacDonald, has worked extensively on interoperability. He has found that "some things, location information and geometry, mapped very well from BIM into GIS, but things like color, texture and parametric information [did not]." He also notes that "getting BIM data into a GIS tended to work better than getting GIS data into a BIM model." He has seen significant improvement in interoperability between GIS and BIM lately, but still feels like there is a long way to go. He believes that "a better understanding of what preferred workflows would look like between GIS and the traditional engineer BIM tools" is needed. "In the absence of that," he states, "engineering companies are all left to their own devices, and that seems like a longer road to the finish line."

The Future of GIS Use for Construction

While the majority of contractors in the study were using GIS, there were also questions directed to those who do not in order to understand what is needed to encourage wider adoption in the future. Most of the non-users are on the fence about engaging with this technology, reporting that they are open to exploring its potential value, and very few are not interested in its use at all. In fact, two thirds of the non-users of GIS in the study (including architects and engineers), report that they expect that GIS will be moderately to highly important to the industry in the next five years. With improved productivity one of the top benefits that would be most likely to influence their decision to use GIS in the future, and its ranking among the top benefits already experienced by contractors, GIS use is likely to grow, both among those not using it yet, and in wider use by those who have already adopted it. CQ

Dodge Economic Insight

Top 25 Infrastructure Projects in Planning

The projects listed in the table below are the top 25 projects by value still in the planning stages published in Dodge Construction Central from Dec. 1,2020 to Feb. 28, 2021. While highway projects dominate the list, the top five are a mix between transit, pipeline, rail and highway projects. Maryland has two major projects, a P3 highway improvement project and a MagLev rail system.

Data on the top projects in planning reported in Dodge for the previous three months will be an ongoing feature in the *Civil Quarterly*.

	STATE	DOLLAR VALUE	PROJECT NAME	CITY
1	CA	$14 B	Sepulveda Pass Transit Corridor/Tunnel PPP	Los Angeles
2	AK	$10 B	Alaska LNG Gas Pipeline	Prudhoe Bay
3	MD	$10 B	MD/DOT I-495 & I-270 P3 Program Improvements P3	Bethesda
4	MD	$9 B	Baltimore/Washington MagLev Rail System	Baltimore
5	NE	$8 B	Keystone Pipeline Phase IV - Keystone XL (US Section)	Steele City
6	NY	$7 B	Cross Harbor Freight Tunnel and Rail Improvements	Brooklyn
7	NY	$5.5 B	Gateway Tunnel Project	New York
8	NV	$4.8 B	High Speed Rail (Las Vegas to Victorville CA)	Las Vegas
9	GA	$4.2 B	GA/DOT: I-285 Top End Express Lanes (DESIGN/BUILD)	
10	TX	$3.6 B	TX/DOT: Segment 3 Highway Improvements	Houston
11	CA	$3.5 B	Los Angeles - San Diego Corridor Phase 2 South	Los Angeles
12	SC	$2.4 B	SC/DOT: I-73 Corridor (Horry/Dillion/Marion/Marlboro Co)	Myrtle Beach
13	IL	$2.3 B	Rapid Transit Red Line	Chicago
14	LA	$2.2 B	Driftwood LNG Pipeline	
15	TX	$1.8 B	TX/DOT: IH 45 Interchange Improvements	Houston
16	NY	$1.7 B	Brooklyn-Queens Expressway IBQEI-278)[Rehab][Design/Build]	Brooklyn
17	IN	$1.5 B	IN/DOT: I-69 Ohio River Crossing	Evansville
18	TX	$1.5 B	TX/DOT: IH 45 Interchange Recostruction	
19	LA	$1.4 B	Mid-Barataria Sediment Diversion	
20	UT	$1.4B	Uinta Basin Railway PPP	Vernal
21	NY	$1.2 B	Kensico-Eastview Connection (KEC) Project KENSEAST	Valhalla
22	FL	$1.1 B	FL/DOT: I 275 SR 93 NB Express Lane Interchange	
23	PA	$1.1 B	King of Prussia Rail (NHSL Extension)- Ph I	Upper Darby
24	CA	$1 B	Dugout Loop - Underground Tunnel to Dodgers Stadium	Los Angeles
25	NC	$950 M	NC/DOT: I-26 Connector (SECTIONS A, BD & C)	Asheville

Dodge Economic Insight

Top 25 Infrastructure Projects in Start

The projects listed in the table below are the top 25 projects by value reported in Start in Dodge Construction Central from Dec. 1, 2020 to Feb. 28, 2021. While many highway proejcts dominate the list, activity in the water sector is well represented among the top five starts,from dredging in MI to work on water facilities in San Diego.

Data on the top projects reported in the start phase in Dodge for the previous three months will be an ongoing feature in the *Civil Quarterly*.

	STATE	DOLLAR VALUE	PROJECT NAME	CITY
1	MI	$910 M	FY20 Great Lakes Dredging IDIQ IQC	Detroit
2	PA	$530 M	Leidy South Marcellus and Utica Takeaway Expansion	
3	TX	$440 M	TX/DOT: Oak Hills Pkwy US 290 Highway	Austin
4	CA	$394 M	CA/DOT: US 50 Multimodal Corridor Enhancement REBID	Sacramento
5	CA	$375 M	Various Waterfront Facilities Repair IDIQ	San Diego
6	CA	$357 M	North City Pure Water Facility	San Diego
7	FL	$305 M	Kirkman Road Extension PPP	Orlando
8	MN	$276 M	MN/DOT: Grading Bituminous Resurfacing	
9	GA	$229 M	GA/DOT: 404 E & WB Widening & Reconstruction (C0001) REBID	Macon
10	TX	$210 M	TX/DOT: Ih 35 Widen Road Improvements	
11	NY	$200 M	NY/DOT: Guiderail & Drainage Improvements (CO 385)	
12	FL	$197 M	WASD South and Central WWTP Sludge Thickening & Dewatering	Cutler Bay
13	LA	$173 M	LA/DOT: Belle Chasse Replacement Tunnel and Bridge H004791	Belle Chasse
14	WI	$161 M	WI/DOT: USH 045 Zoo Interchange Improvements	Milwaukee
15	NV	$155 M	NV/DOT Us-95nw Phase 3D/E Centennial Bowl	Las Vegas
16	IL	$152 M	Roadway Bridge Widening Reconstruction	Elgin
17	NE	$144 M	Runway Repair & Replacement	Offutt Afb
18	CA	$139 M	Mountain Tunnel Improvements REBID	San Francisco
19	IN	$137 M	Sherman Minton Bridge DESIGN/BUILD	New Albany
20	CA	$134 M	CA/DOT: Structural Concrete Barrier	Sunol
21	TX	$124 M	13R-31L Dallas Love Field Taxiway Reconstruction Phase I	Dallas
22	GA	$118 M	Container Berth 1 Realignment	Garden City
23	FL	$117 M	SR 417 Widening John Young Parkway - Landstar Boulevard	Orlando
24	NY	$115 M	Lower Westchester Bridge Bundle Improvements	
25	IL	$112 M	I-294 Roadway Bridge Widening & Reconstruction	

METHODOLOGY

Dodge Data & Analytics conducted an online survey from Feb. 1 to Feb. 22, 2021 of contractors and engineers active in civil projects. They were drawn from several sources:

- The DD&A Contractor Panel (over 2,700 decision-makers that includes general contractors, construction managers, design-builders and trade contractors)
- The DD&A database of contractors and engineers
- Outreach by Infotech, Hexagon, Command Alkon, Iowa State University, University of Florida, Civil + Structural Engineer, and the Design-Build Institute of America

185 contractors and 38 engineers who work on heavy civil infrastructure projects responded to the survey.

Location

94% do most of their construction work in one of the four census regions:

- 25% in the Midwest
- 26% in the South
- 27% in the West
- 17% in the Northeast

Type of Contractor

- 65% general contractors, construction managers, design-builders
- 15% non-building contractors
- 20% trade contractors

Contractor Job Functions

- 37% of contractors identify themselves as executives (CEO/Owner/Partner/President/Principal/Other C-Level)
- 32% identify themselves as project leadership (Project Manager/Project Engineer, Project Executive/Construction Manager)
- 21% identify as estimators, and 10% as other

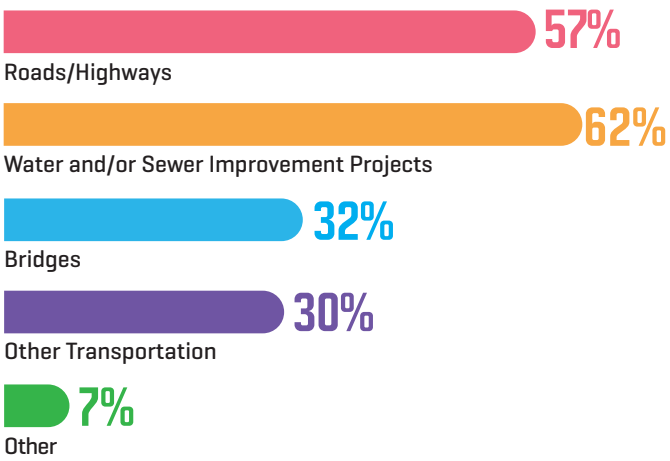
Contractor Size by Annual Revenue

- 30% small contractors (revenues less than $10M)
- 36% midsize contractors (revenues from $10M to less than $50M)
- 33% large contractors (revenues of $50M and over)

Civil Engineers

Civil engineers were asked similar questions to those asked of contractors about their backlog and market expectations. Their responses are featured in the Pipeline section. Their responses are also included in the Data Gathering & Analysis section.

Project Types (Contractors)



RESOURCES

Additional Resources on the Heavy Civil Construction Industry

FOUNDING PARTNER

Infotech www.infotechinc.com

PLATINUM PARTNER

Hexagon https://www.hexagon.com

GOLD PARTNERS

Command Alkon https://commandalkon.com

Digital Construction Works www.digitalconstructionworks.com

RESEARCH PARTNERS

Civil+Structural Engineer https://csengineermag.com

Design-Build Institute of America https://dbia.org

Iowa State University Civil, Construction and Environmental Engineering
https://www.ccee.iastate.edu

The University of Florida M.E. Rinker, Sr. School of Construction Management
https://dcp.ufl.edu/rinker

OTHER RESOURCES

FHWA Resource Center https://www.fhwa.dot.gov/resourcecenter

Acknowledgements

We would like to thank our founding partner, Infotech, for their vision in joining us in this effort. We would also like to thank our platinum partner, Hexagon, and gold partners, Command Alkon and Digital Construction Works.

We appreciate the efforts of our research partners, Civil+Structural Engineer, the Design-Build Institute of America, Iowa State University and the University of Florida.

We thank all those who participated in our feature articles for sharing their insights and experience with us on critical topics impacting heavy civil construction.

We Need Your Feedback!

What would you like to see in our next report? What trends would you like to know more about? Let us know at **TCQ@construction.com**.

DODGE
DATA & ANALYTICS

About Dodge Data & Analytics

Dodge Data & Analytics is North America's leading provider of analytics and software-based workflow integration solutions for the construction industry. Building product manufacturers, architects, engineers, contractors, and service providers leverage Dodge to identify and pursue unseen growth opportunities and execute on those opportunities for enhanced business performance. Whether it's on a local, regional or national level, Dodge makes the hidden obvious, empowering its clients to better understand their markets, uncover key relationships, size growth opportunities, and pursue those opportunities with success.

The company's construction project information is the most comprehensive and verified in the industry. Dodge is leveraging its 100-year-old legacy of continuous innovation to help the industry meet the building challenges of the future. To learn more, visit www.construction.com.

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