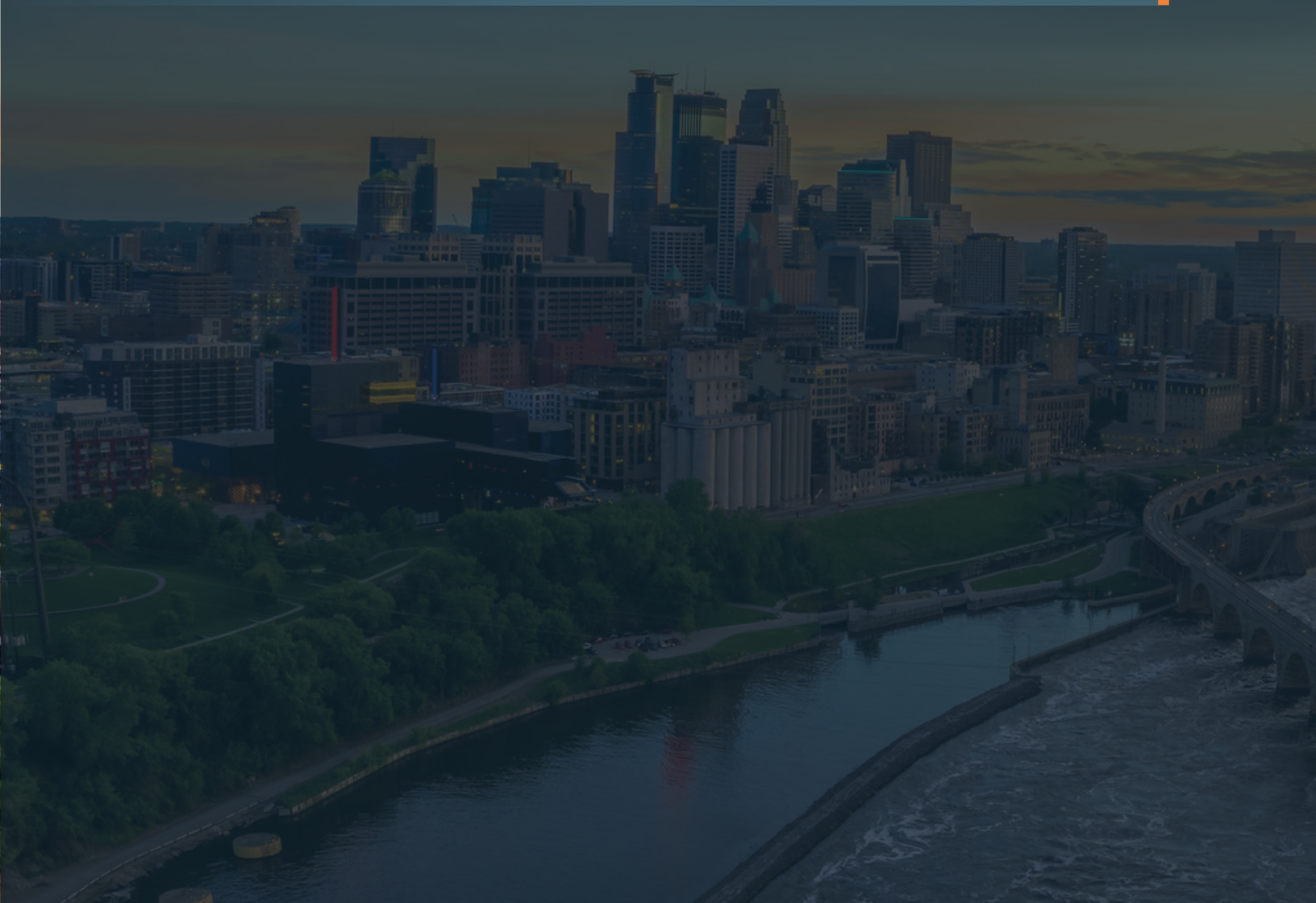




CASE STUDY:
CITY OF
MINNEAPOLIS



iPads & ForneyVault: How a Municipal Lab Became One of the Most Advanced Testing Operations in the Twin Cities

There are six major testing organizations working in the Twin Cities area.

That's six different companies engaged in materials testing. While all following ASTM testing protocols, each use its own methods, workflows and technology to get the job done.

But one of them is not like the others: Minneapolis' own public lab. Operated by the city, this facility handles quality control for all public project jobs within municipal limits.

And, while the private companies have their own productivity and profit goals, the municipal lab prioritizes something else: protecting the public good.

As a government agency, its main goal is ensuring the safety of infrastructure, so everyone – the engineers, project owners, materials producers, and members of the public using that infrastructure – can sleep at night.

That's a serious purpose. But government organizations in general are often pigeonholed as antiquated, inefficient and slow, because they lack the private resources to keep up with the technological pace of the rest of the world.

This couldn't be farther from the truth.

Chris DeDene, PhD, PE, Materials Engineer for City of Minneapolis also has a different perspective. He envisioned an advanced City lab that could compete technically with the private sector – and be in a superior position to ensure the public good.

The City of Minneapolis Full-Service Materials Testing Lab

- 1,300 ft²
- 10 technicians
- 4-6 summer interns
- Tests all soils, concrete and asphalt in the City right-of-way
- Private and public projects
- Breaks an average of 30 cylinders a day

A MISSION TO MODERNIZE

From summer-to-summer, the City of Minneapolis lab breaks around 4,000 cylinders on average. That's about 30 individual cylinders per day during the construction season. Surrounded by private labs that can test several hundred cylinders per day, it's easy for the City lab to feel small.

But running a small operation isn't a bad thing, and the City of Minneapolis wasn't looking to expand anyway. They were looking to stand out in a different way.

"I wanted to move into the modern times with what our lab can do," explained Chris.

So, that's exactly what the City of Minneapolis set out to achieve.

BEFORE: Sticking to the Paper-Based Status Quo

The City of Minneapolis materials testing lab works just like any other testing lab – with one major exception. Most of the projects it participates in are owned and/or managed by the City itself. This highlights the two different but equally critical roles for which the City is responsible: asset owner and quality control lab.

For example, after the City (as asset owner) hires a construction company to put in new sidewalks, they do the quality control testing (as a QC lab) to verify that the materials are meeting the specs they're supposed to meet. The City of Minneapolis also has its own construction divisions, which will self-perform work that the lab then tests. In all roles, the City is responsible for ensuring the quality of infrastructure and public safety.

But, just like many traditional testing labs, the City of Minneapolis relied on a highly paper-based, manual process.

Billie Kurek, Engineering Technician II at the City lab, experienced this paper system firsthand when she started working at the lab two years ago. She explains it like this:

For every sample, there are six or seven separate sheets of paper. There's one for the high-level project information, including trucks, yardage, ticket numbers and suppliers from the job site. Then, there's more paper for every set of cylinders we cast. On one sheet we would write for the 7-day break, the 28-day breaks, plus any additional break ages that the engineer wants, and you would record air, slump, temperature, weather and any other data that pertains to a particular set on the piece of paper.

Then you cast the cylinders onsite and leave them to cure in the field. The paper specific to the set sits on a clipboard in the lab while the cylinder cures. We also had a logbook that kept track of cylinders in cure tanks. To see what needed to be broken every day, we have to check the logbook.

Then, after breaking the cylinders, we hand recorded the break number from the machine in the empty space at the bottom of the paper. And then, we'd have to bring it to our computer area and enter all the information again – slump, air, break age, break number, supplier, everything – into Excel spreadsheets and Access databases set up with formulas. We'd save the document in the folder structure on our computer, and then we'd print out this computerized version, staple it to the paper version and file it all in boxes.

We'd have to have someone dedicating hours a day putting all of this information into the computer and checking everything for errors.

She sounded exasperated as she walked through the redundant, convoluted process.

By nature, paper-based processes like this not only take up valuable engineering time but also have a lot more room for error.

“Part of my job is to review reports when they come in,” said Chris. “I noticed while reviewing reports that we had at least one transposition error per month. Clearly human error, like an extra digit on the break strength.”

In 2019, the City broke over 4,500 cylinders. Due to transposition and other data errors, Chris estimated up to 55 suspect cylinders in the year.

It's no wonder they wanted to find a more modern way of doing things.

DURING: Getting Comfortable with the Cloud

Despite the paper-based system, the City of Minneapolis was no stranger to automation. In 2014, they bought an automatic testing machine from Forney LP to remove operator error. The machine allowed for more consistent and repeatable testing with just the push of a button.

Fast forward a couple years later when the City was first introduced to Forney's new cloud-based integrated CMT platform, ForneyVault, to streamline the process of exporting project information and reports to engineers. At the time, though, the City was resistant to moving to the cloud. They were so used to their paper-based filing system that changing it seemed insurmountable.

They used the automatic machine to remove operator error, only to have human error still sneak into the results through the manual data transfer process. The desire to improve continued to compound.

Plus, they already had the compatible automatic machine and an open line of communication with the Forney team. Over time, they learned more about ForneyVault and how it could make the precision of an automatic machine even better in a couple major ways:

- 1. Preloading:** When the machine is connected to the ForneyVault cloud database, test protocols, settings and unique specimen and sample set data can be downloaded to the machine ahead of time. The machine will “know” what it’s testing and automatically preload the test. The technician saves time by not having to manually key in this information or make any calculations or adjustments.
- 2. Sanity checks:** ForneyVault enables machines to conduct “sanity” checks before starting a test, issuing a warning if something in the data doesn’t match what you’re trying to break. When data is not typical, the technician must confirm in order to start the test. When the data is clearly wrong or egregious, the technician can’t start the test until it’s resolved.
- 3. Data collection:** Results flow automatically from the machine to the cloud database—no need to manually write down results and pass from one person and system to the next.

It’s clear that these features were going to save the City of Minneapolis a considerable amount of resources.

“In 2019, we were finally ready to make the change,” said Billie. “We had some turnover in the lab, so we could train the new team members right from the start, making the transition from paper to cloud much easier.”

After a few conversations, the City of Minneapolis implemented ForneyVault. Using the machine they already owned, the City of Minneapolis configured ForneyVault so results are automatically recorded after each break and sent to the secure cloud environment. Then, it generates PDF reports, which can be added into the City’s larger system for project folders or sent directly to contractors or anyone else who needs to see them.

“It was an easy process to get up and running because ForneyVault is so easy to talk with. They even developed custom reporting features when we realized we needed a unique type of report,” Billie added.

Chris agreed. “Once we got over that initial hump, everyone was able to see the benefit it has to their workflow. As an organization, the change was smooth. ForneyVault is the right tool for our needs.”

AFTER: A Truly Modern Lab

The City of Minneapolis took ForneyVault to the next level when they coupled the technology with tablet computers in the field.

“I wanted our lab to move into the modern times ... and we did. We started using iPads in the field, and they integrated really well with ForneyVault,” said Chris. “We use them everywhere. Now, every technician has an iPad and a phone – no more clipboards or pieces of paper or even laptops. We no longer have to write down, type up or re-enter information. Whether we’re breaking a cylinder and indicating which one was grabbed or recording information like slump in the field, we only have to key it in the iPad once – then it’s in ForneyVault, forever.”

Walk into the City of Minneapolis’ 1,300 ft² lab or any of its job sites and you’ll see an example of what modern construction materials testing should look like.

But, of course, it’s about more than looks. The combination of ForneyVault and tablet technology delivered four major benefits to the City of Minneapolis.

1. Time Saved

When it comes to running concrete tests, ForneyVault saves Engineering Technicians, like Billie, a lot of time.

Four labor hours a week, on average, are saved from not typing up the cylinder break results into the computer system.

Now, Billie can run more tests in less time. And she has more time to do other important tasks in the lab.

Plus, the use of tablets in the field—instead of manually recording field test results—saves technicians an estimated one hour per week. With 10 employees, that amounts to a cumulative savings of 10 hours per week. If you include Billie’s four hours of savings, that’s a total labor savings of 14 hours per week during the busy construction season.

2. Fewer Errors

After implementing ForneyVault, Chris reflected on his responsibility of checking reports for errors: “I have not seen an obviously wrong test result. Concrete usually breaks somewhere between 3,000 and 5,000 psi, so when something comes in outside of that range, I know it’s an issue with the concrete itself and not a result of human error. So, human errors from data transposition have dropped to zero. It’s just not possible to have those simple errors anymore. Moreover, ForneyVault helps the City catch instances of human error that they didn’t even know about previously.”

“It showed us our faults,” said Billie. “We realized quite quickly that we were messing up dates, breaking a 7-day cylinder on the sixth day due to a handwriting error. Before, if we wrote the wrong dates, we wouldn’t even know about it. Now we can catch things like that.”

3. Better Data Access for Customers

In the old, paper-based system, the City saved files by set number and added them to project folders on a computer.

“It was hard to figure out what was done on what day unless you opened every document in the folder to find it. And there could be hundreds in a single folder,” explained Billie. “Unless you specifically asked me to send you the results while I’m doing the test – or if we see something failing at the 28-day mark – we wouldn’t share results with our customers. No news was good news.”

But with ForneyVault, the City can easily compile sample data and download reports for specific times and projects. Instead of only sharing results when there is a problem, they are able to be completely transparent with customers. Not to mention they look more professional with organization letterhead—another request that ForneyVault customized for the lab.

4. Access to Historical Data

Not only can the City of Minneapolis now easily share data with customers whenever they ask for results, but they also can access historical data to streamline billing and optimize their operations.

At the end of the week, the City lab used to log one hour on their billing sheets just for doing the reports and manually putting in all of the information. Now that they have ForneyVault, they can quickly see what cylinders had been brought in and broken during the week and bill those accordingly.

Also, this newfound ability to see historical data has allowed the City to conduct analysis that simply wasn’t possible before. They can answer questions like “How many cylinders did we break last month?”

They have more data on averages on a much larger scale, allowing them to make better future decisions.

LOOKING FORWARD

“Our goal is to make ForneyVault our exclusive LIMS file management system,” said Chris. “We’re still learning and working with Scott Grumski at ForneyVault to make it work even better for us. Right now, we export results and send them through email. Soon, our clients will be able to log into ForneyVault to see their results.”

Though they continue to explore all of the opportunities of ForneyVault, the City of Minneapolis sees ForneyVault as an innovation that has brought the City up to speed with the private sector.

“We’re probably the only lab in the area using iPads, and I know there are still private sector companies that break cylinders and write results down by hand,” said Chris. “We can now say, ‘We’re using iPads, improving efficiency and modernizing the way we do business.’”