

CDM Podcasts: Cities of the Future A Conversation with Wayne Miles

PAUL: Hi, I'm Paul Brown president of CDM's public services group and host of our podcast series cities of the future. In this series we speak with experts about innovative and practical ways to create urban communities that improve quality of life, protect natural resources, and create economic opportunities. Our topic today is infrastructure rehabilitation and our guest is Wayne Miles. Wayne is a CDM vice president and leads CDM's infrastructure rehabilitation services group in the southeast. He's assisted over 45 communities in 15 states in identifying priorities, developing budgets, and justifying the need for infrastructure renewal. Wayne joins us today from our Raleigh, NC office. Welcome, Wayne.

WAYNE: Thank you, Paul. Appreciate the opportunity to join you today.

PAUL: Wayne, I want to start with a definition of infrastructure rehabilitation. What are we really talking about here?

WAYNE: Well, what we're trying to accomplish here, Paul, is to help utilities that have especially underground infrastructure that is often aging and deteriorated. We need to help them better understand what the condition of their infrastructure is and then help them make better decisions about where to renew, rehabilitate or replace that infrastructure so that it reduces their risk because a lot of this infrastructure can really be a problem for them if it starts failing.

PAUL: And what is underground?

WAYNE: Well, there's a variety of things a lot of it is water and sewer pipelines many of which were installed back near the turn of the century. But when you get underground especially in a in a urban environment downtown, you can run into endless types of infrastructure. You've got gas lines, you've got communication lines, you've got other types of past transportation infrastructure that might be buried or under levels of concrete or pavement. So it really can get very complex in making decisions of how best to first find out what the condition of the infrastructure is and second, how to replace or rehabilitate it.

PAUL: Well, in the past, have most communities just waited for sewer line breaks or water main breaks to identify where problems are.

WAYNE: Unfortunately that often has been the mode and the past Paul. You know this infrastructures underground so you know there's the out of site out of mind mentality. So, that's a challenge for utilities, often times, to get the funding that really should be invested in underground infrastructure. Because that funding sometimes is limited the mode of operation is: wait until it breaks and then we'll fix it.

PAUL: And, what do you recommend in place of that somewhat reactive and corrective approach?

WAYNE: Well, one of the ideas that I advocate, Paul, is that I think we—as utilities managers and engineers—can do a much better job making the case of why we should invest in understanding the condition of infrastructure and rehabilitating before it fails. And there are a lot of good arguments to make. First of all, waiting for infrastructure to fail can often be a high risk, especially if it's a pressurized line. When it fails, it can impact other infrastructure. It can cause risk to citizens of the community. It can cause streets to fail, and so forth. So, there are real risks associated with a wait to fail type of strategy. It's also more expensive to fix infrastructure after it's failed. You're often dealing with unforeseen circumstances. You're working under emergency conditions, many times at night or off working hours. So if you can make a logical and controlled decision about where you should be investing your rehabilitation money it really is going to save money for the community in the long term.

PAUL: Well, let's start at the condition assessment which you mentioned as the first step in this process. What is the method by which we can determine the condition of this buried infrastructure?

WAYNE: Well, if you're talking about sewer systems, especially gravity sewer systems, the technologies fairly well understood. You can put closed circuit television inspection cameras through the sewers and actually visually observe problems. We can do flow monitoring in the system to identify the flows relative to the capacity of the system as well as identify parts of the system where you may have extraneous rainfall entering or leaking into the system which can over load the system. When you get into pressurized lines, that's often much greater of a challenge and the best method of assessing the condition really depends on the type of pipe. For example, if you've got old cast iron pipe the walls are usually very thick usually you don't have to worry about external corrosion; although internal corrosion can occur, which decreases the carrying capacity and the diameter of those lines. We can do leak detection of pressurize lines often times the mode of failure is those older pipes will start leaking at the joints that can wash away the soil that's supporting the pipes that leads to failures. So, by doing a leak detection type of project which we can do when the line is in service, that can help us do a better job in forecasting where problems are occurring in the system and correct those before they actually fail. And then there's a whole realm of other new technologies that are available: ultrasonic, electromagnetics, ground penetrating radar. These new tools that are available can help us basically see underground where problems may be occurring and make better decisions of where we need to proactively invest in rehabilitating those lines.

PAUL: How frequently and how comprehensively should these condition assessments be undertaken?

WAYNE: Well, it depends on a number of factors. Having a good understanding of historical failure rates is actually a very good method of helping to predict how often we need to assess

and how frequently we need to assess the condition of these pipes. Another type of analysis that we like to help clients perform is called a risk assessment or a risk management assessment. And we look at predicting not only the condition of pipes, which can also be thought of as probability of failure but we want to look at the criticality of the pipes. Another way of thinking of criticality is the consequences of failure. So if you look at the probability of failure times the consequences of failure that's often used as a definition of risk. So we want to help clients set priorities that are based on focusing their efforts where they have the highest risk in order to mitigate those risks and better improve operation of system.

PAUL: The condition assessment itself is probably an activity that you undertake in a relatively short period of time. I presume that when we get to rehabilitation we're talking about multi-year programs of repair and replacement.

WAYNE: Yes. Typically we are, Paul, and I think utilities need to think of it that way because it can be a very big investment overall and it's not something that can be done all at once or even should be done all at once. We obviously need to set priorities to make sure that we're spending our money and investing in a system in the right places to get the best return on that investment early on but it really needs to be a continued investment over time. While the cost of rehabilitation has actually come down over the years because technology's improved, competitions and the companies that are doing these rehabilitations have become greater. The cost has actually has come down especially compared to a lot of other types of construction. But it is still expensive and so it needs to be phased in over a number of years and implemented over time so that eventually over longer periods of time, larger portions of this system can be renewed.

PAUL: Is there any rule of thumb regarding how much of a utility's budget should be focused on issues of rehabilitation and repair?

WAYNE: Well, one rule of thumb that often helps is to first get an idea of what the full replacement rehabilitation value of the system is. And just going through that process can be very enlightening to many systems when they realize that for example a wastewater collections system may be the largest assets that the municipality or community owns. And once you've gone through that process and have an understanding of what the true value is in terms of dollars, then you can start using rules of thumb based on expected design lives. For example, rehabilitating 1% of the system would correspond to taking 100 years to rehabilitate the entire system. So, systems that already have pipe that might be approaching a hundred years, may have some catching up to do and have to rehabilitate a larger percentage per year to catch up. But ultimately reach sustainable level that may be on the order of one to two percent just based on those design lives that are expected.

PAUL: You've talked about some of the new technologies associated with condition assessment. Can you tell us about some of the new technologies available to rehabilitate underground infrastructure?

WAYNE: Sure. There are a number of lining techniques many of which have been around for 10 or 20 years or more so some of these lining techniques cured in place liners, slip liners, are well understood. Many of the more recent advances in these technologies have allowed us though to not only line the main sewer lines and water lines with minimal digging, but now we can go in and repair rehabilitate the actual service connections whether those be lateral connections from a gravity sewer line or water can service connections on pressurized line these are have been a big challenge in the past and some of the new technologies have allowed us to renew and reconnect those services with no digging – which really reduces the overall impacts to the community during these rehabilitation projects.

PAUL: How do you do that?

WAYNE: Well, they are done remotely using robotics and many cases. There have been a lot of advances in robotic technology that allow us to work from inside the system. We have television cameras that help us see where we are. And we have lots of other techniques that allow us to trenchless through with trenchless technologies directional drill and tap these lines with without having to dig up streets and curbs which can really increase the cost overall. There are also other technologies where, for example, pipe bursting where we can increase the capacity of the line at the same time that we're rehabilitating it.

PAUL: Where utilities may be directors may be responsible for water, wastewater, stormwater, streets is it important to integrate the program across all these utilities?

WAYNE: Yeah, absolutely Paul. It's very important to coordinate infrastructure renewal programs from different types of utilities because they do impact each other very dramatically in many cases. There are a lot of cross points of intersection between water and sewer lines, stormwater lines, so often we are advocating especially in urban areas when utilities looking at a renewal program coordinating water, sewer, stormwater at the same time provides a lot of advantages in terms of impacts that the community as well as cost.

PAUL: Thank you, Wayne. This is Paul Brown. Please join us for our next Cities of the Future podcast.