Recording #3— Fort Collins Utilities Oral History Project, Owen Randall

Location—City of Fort Collins Utilities

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Abstract:

In this interview, Owen Randall discusses the challenges and triumphs that came with the expansion of Fort Collins Utilities water infrastructure beginning in the late 1970s. Speaking primarily on water pipelines throughout, Randall first acknowledges the importance of foresight and long-term planning to properly provide water for a rapidly expanding population. As Randall explains, supplying water to expanding residential areas in northeastern Fort Collins and southern Fort Collins in the late 1970s and 1980s was made possible by Utilities’ ability to lay pipe prior to the areas becoming as busy as they are today. In addition to long term planning, Randall also points to redundancy, and the ability to redirect water in case of emergency as a critically important aspect of Fort Collins water distribution. Randall also explores the limitations of low-bid contracts in relation to pipeline expansion in the 1970s and 1980s, pointing to the Alternative Product Delivery System as a way to better address such complex projects. Throughout the interview Randall explains the many ways in which technology has shifted practices across the decades, whether in tracing water usage, combatting corrosion, or picking pipeline material. Randall also highlights the importance of communication and community outreach in fostering a healthy and productive relationship with the public. Randall concludes by pointing out that while the city may not need to further expand infrastructure, it is critical that Utilities employs the same foresight as planners in the 1970s when it comes to maintenance, repair, and replacement of older pipelines.

Interview

Q: This is Ruth Alexander. It’s March 26, 2019. I’m a Professor of History at the Public Lands History Center and in the History Department at Colorado State University, and this is our third interview with Owen Randall, Chief Engineer of Utilities with the city of Fort Collins. The subject of our interview today with Owen will be his involvement in the Utilities building of a very extensive water and wastewater pipeline infrastructure to meet the needs of a city growing in both population and geographic size.

The pipeline infrastructure was built up over several decades, actually at various points, in the twentieth century, the 1920s, the 1950s, and then the 1980s, and we’re going to be focusing on the period of the growth from the 1980s forward, and this growth in infrastructure
included the design and building of large transmission mains. Pipeline infrastructure was added to the west and northeast of the city and outward from older sections of the city to newer sections around Harmony Road, Timberline Road, Summit View Road, and the foothills.

The expanding infrastructure included raw water, treated water, and wastewater pipelines, as well as sanitary sewers and diversion boxes. Today we will be dealing primarily with transmission lines for treated water, and rather than simply discussing when and where the various pipelines were built, our interview today with Owen will focus on questions related to the infrastructure building process, looking at planning, materials, and outreach to the public. Owen, perhaps we can begin with a few questions about Utilities’ process for measuring and evaluating demand for water. So I’m going to start with this question: how over time has the Utilities Department measured increase in demand? What metrics, what other information has Utilities relied upon to figure out how demand is increasing and what kind of responses are needed?

RANDALL: That’s a big question with a lot of answers that have changed over time. Through the years, what was true and applicable in the ‘80s is certainly not true and applicable today. Things have changed completely. One of the things, how we measure it, maybe the first thing I’d say is in the olden days the water wasn’t metered in Fort Collins. If you were a customer in Fort Collins and whether you used 5,000 gallons a month or 5,000 gallons a day, it cost you the same amount of money, and so we didn’t have meters that told us what each individual home was using.

The way we could tell how much water we were using was how much water went out the door, so to speak, at the water treatment plant, and so a lot of the planning was simply done around demand from the water treatment plant and common projections that were used on a
population basis. If we had 50,000 people on a per-capita basis, they use 150 gallons a day. I believe when I graduated school, I think that was the number that we used as a good standard number for what amount of water we needed to produce for people was 150 gallons per person per day. That’s how we established what the demand was, part of the way we established; then in conjunction with what we actually saw what those demands were.

That was how the treatment plants were sized and how they were built, and we used growth projections. Population is such and such today, or ten years ago it was such and such, and today it’s such and such, and we project growth at some percentage. We need so much water ten years from now and 20 years from now and 50 years from now, and those projections were used for not only treatment and not only transmission, but also for planning for raw water storage, so we had water in storage, so it was there when we needed it for drought projections.

That’s an enormous question to go back if you go to all the intricacies of water demand. I’ll say in the early ‘80s, that was principally how it was done, and then going on to transmission and just recent pipelines, we took those numbers and put them in some very, very rudimentary water models. Literally, water models were done by hand to project as you went across town what size pipelines you needed in order to get enough water to a certain portion of town, that they had adequate pressure and adequate water on what they call a peak day, hot temperatures, demand all over the city. We’re planning for a peak day or even peak hour, because demand even in the summer, any time of year, you see different demands throughout the daytime, so we plan for peak hour or peak day, peak month, peak week. All those are different projections that we use.

You asked about metrics. In those days, that was a metric. Now it’s changed tremendously, particularly in the last ten years. Not only is everything metered now, and we can
read what the water demand is almost on an hourly basis, so we actually know how much water we’re using, but the whole concept of water conservation and using facilities both inside the house—toilets and sinks and showerheads and all that that lower demand way, way down compared to the 150 gallons per capita per day.

We’re pushing 100 gallons a day, I believe, now, maybe 105, something like that. It’s way, way, way lower than it used to be. A lot of the planning and the facilities that we’ve built, in some sense, are oversized for what the demands are today. What that actually gives us is more capacity for future growth that’s in the system already. Does that answer your question about metrics and planning?

Q: Yeah. That answers the question quite well. I do have one little follow-up on that and that is, who is doing the projections on population growth in the city of Fort Collins? The city as a whole, many branches of the city, have to be concerned with population projections.

RANDALL: Exactly.

Q: Who’s doing those?

RANDALL: The Planning Department, I would say, is who heads that up. Very similar set of circumstances, they know how many people live here today, and they know how many people have moved here, and how many people are leaving, and then they incorporate that with new subdivisions and businesses that are moving to town to do planning. We’re projecting water demand. They’re projecting a certain number of people will be here, so we work really closely with them and use a lot of their data in our projections.

One of the huge challenges that we have is that our service area as a water utility is not congruent with the city. We have water districts that surround us, in fact, water districts that serve significant portion of the city limits of Fort Collins, so we can say Fort Collins has 150,000
people in it. That’s not a whole lot of help to us, because we don’t serve those 150,000 people. Because we don’t serve the same area, it’s not congruent. It makes it harder than it might be if our service areas were the same.

Q: I’d like to turn this question around just a little bit and ask how your job as an engineer has involved you in the process of planning for increased demand over time, especially as you’ve added more and more responsibility to your job over the years. So how have you become involved in planning for growing water demand for water?

09:46

RANDALL: In our infrastructure?

Q: Yeah.

RANDALL: That supports it. One of the challenges that we have is we can’t build water transmission distribution at the snap of the fingers. Somebody can’t say, well, we don’t have enough water at Harmony and College. Get us some more water there. It takes a long time to design and build the infrastructure. More than that, it takes even more time to do the planning.

Our goal all along is to get there ahead of the demand. It saves us time. It saves us money. It saves enormous impact to the public in terms of what the construction does to traffic and people’s lives all the way around, and so when I drive around Fort Collins today and think about and look at where we’ve built major water infrastructure, and sewer infrastructure, through the years, if somebody came today and said, build the Harmony transmission main, there is not enough money, there’s not enough time, and there is not enough political willpower to try to build what we built 25, 30 years ago.

If you tried to build that today, the disruption and the cost would be enormous, and so part of that planning was to build that infrastructure before we needed it, and some of that
infrastructure, the full use of it is still years and years away, but we got it in the ground ahead of
time so that the impact and the costs were as limited as they could be. Maybe this is a good time
to talk a little bit about this map that you see in the background here.

You won’t be able to see the detail, but the principal idea is here, this is Fort Collins. Here’s Horsetooth Reservoir on the west side, Terry Lake up north. I-25 is right along here. This is the city where people live today, and principally, if you look back at the growth of Fort Collins, it kind of happened in three major growth spurts, I’ll call it. In the 1920s, roughly, some of these orange lines up here were built. At that time, do you remember back to the discussion we had from Gateway Park? Our water treatment plant was up the Poudre Canyon, so this orange line was the principal line that came into town.

At that time, there was another one that came here, and then came into town. That was the transmission system that served Fort Collins in the 1920s. And then in the 1950s, they added what was called the south-side transmission main, and it ran from the water treatment plant, it ran basically to Prospect and College, and I suspect that somebody, whatever changed, I don’t know, but they didn’t complete a major transmission loop around here. This 24-inch main, there’s a 24-inch watermain, two feet in diameter, that literally ends at College and Prospect.

At that time, I think there were two 8s and a 12-inch lead [ph] from there. That was the big transmission main built in the ‘50s, and then, as probably everybody knows, in the late ‘70s, growth in Fort Collins really took off all the way until currently, and so we set out, at that time, to build new transmission capacity around Fort Collins, and so all of these red lines, we built the line to Anheuser-Busch, which is not just for Anheuser-Busch. It is the transmission main that serves the whole north side of Fort Collins.
We have ties off of that line all across town, built a line down around the whole east side of town called the Harmony transmission main across the south side of town, and the west side transmission main down the west side of town.

The west wide is principally a 60-inch line, 60 inches in diameter. The Harmony transmission main varies from 54- down to 36-inch down by HP on Harmony Road, and then the lines that we built up the east side are principally 24-inch lines.

The Anheuser-Busch lines varies from 48 down to 30 inches in diameter, so that whole system, the water flows around the town this way and around the town this way, serves everything inside. So that planning that was done, you think about the Harmony corridor right now, even when we built this line in the late ‘80s, early ‘90s, it was extremely difficult, even with the amount of growth that was there, at that time, and now it’s orders of magnitude more difficult with everything down there.

Q: Harmony is an extraordinarily busy corridor right now, and it was used, of course, in the early and mid ‘80s, but it was nothing like it is now.

RANDALL: Nothing like today, and it was difficult to build it then. In fact, most of the line is actually not in Harmony until you get all the way over by Timberline Road. It’s not in Harmony where we found semi back roads that we built—it’s just north of Harmony Road. Even in those days, the corridor, actually putting it in Harmony would have been extremely expensive and difficult and high impact.

Q: How did you and others with Utilities determine when to put in a 40-inch pipe, when to put in a 24-inch pipe? How did you figure out those kinds of things? Why not just put in a big one all the way around?
RANDALL: In an engineering sense, the pipelines and transmission pipelines are much like the interstate highway system, and so if you have a certain number of cars going down the road can be equivalent to the number of gallons of water going through it, and so in some places, you’ve been in big cities, big interstates where it’s six, eight, lanes wide maybe in each direction.

It’s very much the same thing. It’s how much volume of water you need to get through it. Just like a car, you can have an interstate that runs at 70 miles an hour, 50 miles an hour. An interstate doesn’t, but even large roads, 30 miles an hour, same thing. It’s how fast the water goes through the pipeline.

We weigh cost of the pipeline vs. the demand vs. the velocity. Too much velocity in a pipeline can create challenges and problems and some technical issues, so we have standards of how fast we want the water to go through the pipeline, and then we have a very advanced computer water model now where we can tell you the velocity, any day of the year what the velocity is at this point or that point or this point. As long as the velocity stays low enough, and the demand can be met everywhere, that’s what we’re trying to do with the water model.

It was all based on projections, because this model was not an advanced computer model when we did it. A lot of it was done by hand. That’s the way, believe it or not, engineering used to be done, but we have a very, very robust transmission system throughout Fort Collins. A critical part of good planning for water is that if something goes wrong with the pipeline somewhere that people are not out of water, or a very small number of people are out of water for a short amount of time, and so there’s strategic locations on all our pipelines where there are in-line valves where we can shut the water off, and there are critical points where we are tied to the smaller distribution lines off of the transmission mains in strategic locations, and there’s redundant sources.
Say that square mile, they don’t get their water from just one line, so they can get water from here or here or here or here or here. The water can come from lots of directions, so we want to keep it—we have main breaks occasionally. People damage our lines occasionally. We want to make it so that people have water 99.99% of the time, so that’s also part of what goes into the planning, and transmission is really critical. If we only had one line that left the water treatment plant, you could design it so it came across here and fed the whole city off of one line, but if something goes wrong with that line, there’s going to be a lot of people without water, maybe for a very long period of time, so we do a lot of work to plan that it’s redundant in the systems as we can possibly have.

That varies with everything, from the big transmission mains you see highlighted on the map, all the way down to the six-inch watermain in your street. Even in your street where you’re tapped off of, we have strategic valves and water is fed from more than one direction. Almost exclusively, we could go to great lengths to try and make sure of that, so you have a main break, we may have to shut off a block, and there’s 20 houses that don’t have water for a short amount of time, but it’s not a subdivision of multiple blocks kind of thing.

Q: That gets to one of the questions I was going to ask, and you’ve just suggested that redundancy is one of the most critical pieces of really effective planning. You’ve got to have redundancy. You’ve got to have multiple sources of water for a given location so that if something goes wrong with one pipe, you’ve got another pipe that can be utilized for that particular area.

20:11

RANDALL: Exactly, and we know that from the time it leaves the treatment plant, there are, I believe, and I’d have to count for sure, six major transmission mains that leave the water
treatment plant. Even from the time it leaves the fence line of the treatment plant, there’s multiple ways to get water into town so that redundancy is carried all the way through the whole system.

Q: You’ve also suggested that computer programming has dramatically changed what Utilities can do, what it can see, and how it goes about its work. Can you talk a little bit more about that, about how computer systems have altered over time the transmission of water for Utilities?

RANDALL: Yes, I can. How to answer that question somewhat succinctly. What we have done probably above and beyond what most entities do is that we’ve built our computer system with basically every pipe that exists in our system greater than four inches in diameter. That’s really small. From the 60-inch to the four-inch, they’re all in our system, and so we can project and put demands on the system at each individual home or what’s called a node inside that model at any time.

We’ve got two scenarios that we’re dealing with. One of the challenges is summer peak flows. People use a lot more water. They’re watering their yards. They’re washing their cars and everything that goes on, so that’s one end of the spectrum that we have to plan for and deal with. The other end of the spectrum is wintertime when there’s very low demands. The only demand is inside the house, and so our demands right now at the treatment plant go from in the middle of the winter, we’re down in the low teens, 12 to 15 million gallons of water a day, to summer time when we’re using five times that much water, and so that equates directly to the velocity that’s in the pipeline.

Inside the distribution system in the wintertime when there’s very little demand, there’s very few cars driving down the Interstate, and so there’s not much velocity. The water’s
moving very, very slowly, and we have water quality concerns. We could just build an 84-inch watermain all the way around the outside of town. We’d have terrible quality problems in the wintertime, because you just don’t move enough water, don’t use enough water to constantly have it refreshed and moving through the system.

On the other end of the spectrum, some places, if their pipelines are not large enough, you have really high velocities, because there’s so much demand in the pipelines. That creates some degree of risk and challenge of building pipelines, because with velocity comes a force that has to be taken care of. Lines break and cause more damage. Actually, a lot of that rolls into your design, how you design your pipelines, so we have a very robust system. No matter what happens, we can keep water to people. It has relatively low velocities compared to some entities, because of the size of our pipelines, but sizing the pipelines without good basis for it, also the bigger the pipe is, the more it costs, and so we don’t want to spend money we don’t need to build. That fits into that equation also, so there’s a lot of factors that go into pipelines.

Q: It sounds as though the city has basically done a very good job of keeping up with demand and putting in place redundancies and computer systems that allows Utilities to track every effectively how much water is being demanded.

RANDALL: That is certainly true, and I think one of the points when I think back 30, 35 years, there were times a long, long time ago when, in my own mind, at that time, it was hard for me to project that we would have the demand for these big pipelines that were down here. Well, look what we were talking about a while ago with the Harmony corridor and how difficult it would be today. It would be almost impossible to build a pipeline in that Harmony corridor today. The political impact to people and their lives and cost would just be—I can’t even comprehend how you’d get a project done down there. It would not be fun for anybody.
The point I’m trying to get across is that the foresight to do these projects years in advance of when they’re absolutely needed was extremely valuable to Fort Collins Utilities, and not just to Utilities, to the whole city, and the infrastructure that’s there, the water quality that’s there today, because of the infrastructure that was built.

Q: You said that the city began in the 1980s to really expand its infrastructure. Growth, of course, is continuing today, but the city is not responsible for meeting all of the demand. Do you think that there were points in time when the city responded too hastily or a little too slowly to increases in demand?

RANDALL: In building the infrastructure?

Q: In building the infrastructure.

RANDALL: That answer’s too easy. I'll say no. I think that the foresight to get it built when we did was appropriate.

It wasn’t decades in advance when it was needed, so we invested a lot of money that didn’t need to be spent for many years, but we did it. By and large, we beat the growth. We got there before the growth did, so it made it possible to do it economically. It also did it so that when the demand was there, the infrastructure to support demand was in place.

It was done in conjunction—we talked about the Planning Department and demand projections. We were looking at what the projected growth was for Fort Collins, in a lot of cases, where the projected growth was for Fort Collins and were simply trying to be there before the growth was. We didn’t wait until the last minute, and my personal opinion, that’s a wise way to build infrastructure is just to beat the growth so that it can be done economically. It can minimize the impact of the public in general, and yet have the infrastructure that’s needed to support the people and the lifestyle that Fort Collins wants to have.
Q: We’re going to return to the question of the public and public outreach in a little while, but before we get to that, I’d like to turn back to another issue that we’ve addressed in multiple interviews now, and that’s the question of moving from a hard-bid delivery to your alternative product delivery system, and I’m wondering if you could expand on how and when the city in expanding its transmission infrastructure moved from hard-bid delivery to your alternative product delivery system.

RANDALL: Good question. When you look at that map, principally, the huge majority of those lines were all built with hard-bid system. Alternative product delivery system, I don’t know. If people have watched the other ones, they won’t know so much about it, but it’s a qualification-based selection process with both a design engineer and a construction contractor working hand-in-hand with us, understanding the challenges, the risks, the problems, the goals, the project all do the same thing. There’s huge, enormous value in that in complicated high-risk projects.

As we got through talking the last 15 minutes, a lot of these pipelines were built ahead of a lot of the complexities that exist today, and it was also they were built ahead of the “invention of APDS,” and when we saw times we needed it so badly, so a lot of these were build hard-bid. When you have projects with low risk, that works pretty well usually, and so a lot of these transmission mains were built, I’ll call it, in a cornfield; few conflicts, few risks, straightforward jobs.

We still tried from the very start to always establish positive relationships with the contractors to get the point across that we were there to help them get it built, not to fight them to get it built, which a lot of entities do, but we work hand-in-hand, and, by and large, these projects were all built very successfully, low change order mounts, bill on schedule. There were
sometimes some painful, particularly talking about the public again, situations we went through where the contractor really didn’t care about his impact to the public, and so trying to get them to at least halfway play in the game and get the public to understand what’s going on and why it’s going on was—

Q: Can you give an example without naming names?

RANDALL: Of a specific instance like that?

31:00

Q: Yeah.

RANDALL: Well, yeah, we could do this all day long, but at the corner of Taft Hill Road and Drake, we laid a 60-inch watermain in a 20-inch watermain side-by-side, so that corridor from the intersection of Taft Hill and Horsetooth South, there’s a trailer park on the west side, there’s Imperial Estates on the east side. We put the pipelines along what was the edge of the road, in those days, so you’d dig out all that dirt. We put it on top of the road so you couldn’t go through there. You couldn’t walk through there.

Traffic was an enormous issue. Even in those days, Taft Hill, it was a main corridor, north/south, and people and people after people would drive up in their cars after driving for a whole mile with the road-closed signs, road closed, road closed, and they’d get down there and they’d say, can I go through here? Pile of dirt 25 feet high, and people were just furious. Well, I’m going to go through there anyway. Step aside and go ahead, if you can drive over the 25-foot pile of dirt. People just really, really upset about road closures, always upset about that, because it impacts their life. We understand that.

Q: How was that related to the hard-bid system that was used, at that time?
RANDALL: I guess, by and large, that specific instance would have been true no matter what. If that was the right corridor to build pipelines through, there was simply no way in the world that traffic was ever going to be open. On the other end of that half mile is County Road 38E. There’s a Jif [ph] store. In those days, there was a boat dealer there, and we impacted their business big time, because we actually went right through there. Their access off of Taft Hill, we blocked all that to get through there, and it impacted their business, their pocketbook.

A lot of specific stories about people’s businesses that were impacted by the necessity to build infrastructure in the public right-of-way. Building a sewer down the west side of Shields Street on the west side of campus, same thing. There was enormous impact of traffic. As busy as Shields Street is, we closed three lanes of Shields, had two-way traffic on the very east side, build a sewer 20-some-feet deep inside those three lanes. It was a huge impact to traffic, to people.

A lot of the challenges with hard-bid there was simply traffic control. Traffic control is a really, really hard thing to bid as to how much it costs, so the traffic control people want as few signs out there as they can. They want as few people out there as possible, because traffic control, every time you drive down the street and there’s an orange barrel, somebody’s paying $2 a day for that orange barrel to sit there, and you’re paying for somebody to come back and put the orange barrel, tilt [ph] it back up when some guy runs over it. You’re paying for that traffic control officer to come back and make sure it’s maintained. You’d better be paying for the safety to have enough barrels there to keep people where they’re supposed to be so they don’t either drive into construction and kill somebody. It just goes on and on. Traffic control is a painful, painful experience.
In the APDS process where our traffic control people are part of our team, and we understand the safety requirements, we understand that somebody needs to be there on a regular basis—we define what regular means, depending on the circumstance—but we just have everybody with the same goal instead of low-bid, is just do it as cheap as you can possibly do it and get by.

It was always a struggle. We ended up literally hiring off-duty police officers when we were doing this piece on Taft Hill I was talking about, because until there was a police officer standing with flashing lights, they’d get mad, and they were going to do what they wanted to do, and we had to hire police officers and pay them whatever it was, $50 an hour, to sit there literally with their flashing lights on. Hopefully, that answers, at least touches your questions. Quality is another huge—talking about APDS vs. low-bid, it’s a quality thing.

All those pipelines that you see represented there, they have a lifetime of we hope at least 100 years, so that lifetime of the infrastructure is partially determined by how well it’s built, how well it’s put in the ground, and if it’s done right, it will last lots longer than if it’s not done right. In a hard-bid situation, we have people onsite called resident engineers. I spent many, many years doing this, literally trying to watch every piece of pipe go in the ground to make sure every bit of the bedding was put in right, that it was compacted right. We were talking about it takes them a while [ph]. The anodes were put on right. It just goes on and on and on that it’s done right.

In the APDS circumstance, the contractor wants to do it right. We’re paying him to do it right. We can get it done with a hard-bid, but it’s just a whale of a lot harder, and you have a lot more risk that it doesn’t get done right. If somebody’s not standing there watching some
contractors, some contractors, not all, will take advantage of the opportunity to cut every corner they can.

Q: I have one more question as a follow-up on this issue of putting in infrastructure, whether it’s hard-bid or APDS, and the complexity of the problem, the timing, and the disturbance it causes to the public. Lots of times when we’re driving down a busy interstate, we’re aware that some road improvement operation is going to be going on in the nighttime. There will be signs that say, this road is going to be reduced to two lanes starting at 11:00, or whatever it is. Has the city had to make use of that kind of planning to do certain kinds of work at night when there’s less traffic?

RANDALL: Absolutely. We’ve done, and still to this day do that from time to time, depending on the circumstances, so then you have a different set of challenges working at night. The public generally doesn’t like us working at night either, because we make noise. There’s all kinds of reasons, but nightwork is not a solution. It eliminates some impacts; it creates other impacts, but we’ve done it through the years.

I was looking at pictures yesterday or something. We built the Anheuser-Busch line out here when you cross Lemay Avenue. We did it at night. It was a hard-bid job. We gave the contractor—it was in the specifications he could close it at 6:00 p.m., and he had to have it open at 6:00 a.m. As it turned out, it was about the coldest night that whole February. It was like 8 below zero. It was a bitter-cold night, and they had to dig across Lemay Avenue and lay the waterline, get it all backfilled and put a temporary paving surface back on by 6:00 in the morning.

Let’s just say the contractor wasn’t nearly as motivated as we were. It was, whatever, 30+ years ago, and I still remember that night and the arguing and yelling and screaming. It got
to be midnight, and they didn’t even have the trench dug across the road yet, those kinds of things.

One of the huge ones, and this is a slightly different subject, but it was a capital project. We built a stormwater project out by where Hughes Stadium was on the west side off of Overland Trail, and we had to move, I think it was, 100,000 yards of dirt we excavated out of there. To make a long story short, that dirt had to go to the east side of town, which saved us hundreds of thousands of dollars, maybe even a million dollars it saved the utility.

The agreement was made that we’d haul that dirt at night to not impact, because it was a ton of truck—we had 35 or 50 belly dumps running back and forth across town, right down Prospect Road. We went to Prospect and up Lemay. Well, it created complete chaos. The whole city was just chaos, because of us trying to haul at night. To minimize traffic, it created a whole other set of issues.

40:53

Q: You created lots of noise.

RANDALL: It was noise, and they didn’t like the traffic at nighttime either. That was one of the more painful projects I can ever remember being involved in. It was known as Rodeo Pond, and all the issues around hauling dirt at night. We never hauled dirt at night again. That was the last time.

Q: What was the big cost savings there that you mentioned?

RANDALL: Well, it was a hard-bid job, and so the contractor that got the bid, and don’t hold me to these numbers, I’d have to look back and see, but I want to say the second bidder was $3 million, and the low bidder was $1.3 million or something.

Q: To move all of this dirt.
RANDALL: To excavate all the dirt out of here and move it over here. Well, what the contractor did was he wrangled a deal with the developer of Walmart. Walmart needed dirt to fill that whole area that Walmart is in, so he sold the dirt to Walmart, so Walmart, in effect, or whoever the developer was, they paid the contractor to haul the dirt and put it in there instead of us paying. This #2 bidder, I don’t know what he was going to do with the dirt, but we were paying for all of it. I’m sure it was over $1 million what Utilities saved in that circumstance. The contractor made the same amount of money. Maybe he made more money. I don’t know what his deal was with Walmart, but the bottom line was we paid way, way, way less money than we’d have paid otherwise.

Q: Were you moving all of that dirt, because you were putting in lines and the dirt was in the way? Why was all the dirt going from one spot to another?

RANDALL: That project was a stormwater detention basin, so we basically dug a big basin in the ground. It’s where the Frisbee golf course is out there. What that is is a stormwater detention basin, so in a large event that thing will fill up with water, so we made storage for water to keep the water from going downstream. We’ll talk stormwater projects later on, but that’s why we had to move all that dirt. There’s a 60-inch pipeline that runs right down the edge of that basin out there that we worked around as we built that basin; that 60-inch west side transmission main is right there also.

Q: I’d like to talk about materials now and how pipe materials have changed over the years, how the city has tried in the process of building up its transmission capacity, how the city has used different kinds of piping materials, tried to minimize corrosion and that sort of thing, so I’m wondering if you can talk about how Utilities has made decisions about pipeline materials,
how priorities may have changed over time, how the quality of the pipes themselves have
changed.

RANDALL: Actually, that’s a good question, and it partially will help answer the last
question that you asked about APDS vs. hard-bid. We have a variety of pipeline materials in
these big transmission mains, and the reason we have a variety of materials is that we gave the
contractors—in theory, they’re equal. There were four major kinds of pipeline for water
transmission. One’s called ductal iron pipe. One’s called steel pipe. One’s called pretension
concrete, or now it’s called bar-wrap pipe, and pre-stress pipe. They’re completely different
technologies. They’re all pipes, but the similarities after that end.

Well, not only did we bid, the projects, different contractors would bid on it; then we
gave the contractors the option to give us prices for different pipe materials, so they could bid
ductal iron pipe, and they could bid steel, and they could bid pre-tension, and they would give us
different prices, because a lot of the price of those jobs is buying the material. We had the
contractors bidding against the other. Well, then you have the pipe suppliers. They’re also
bidding against each other, and they aren’t necessarily giving the same price to every contractor
in the room.

They have a certain relationship with this contractor, so you get a better price than she
gets, than he gets, and so every time we would bid a job, we would, all of a sudden, be faced
with—I’ll never forget the first phase of that west side transmission main. We had six
contractors bid it, and we had four pipe materials, and most of the contractors bid all pipe
materials, and then to make it even more complicated than that, we bid a pipe to here and a pipe
to here and a pipe to here and a pipe to here.
We had 35 options, 35 different prices to choose from, so we did that. Partly we did it, because we had a certain amount of budget. We wanted to build as much pipe as we could build. We didn’t know how much the job would cost, so we had different links of pipe, and we built as much as we could, and I know I didn’t know, and I don’t feel like we as a utility didn’t really understand the ramifications of putting those different kinds of pipe material in the ground, and so today we have pre-tension pipe. We have steel pipe. We’ve got ductal iron pipe. 

Q: How do they all interact with one another? Is that an issue?

RANDALL: That’s an issue.

Q: Can you talk about that?

RANDALL: Not so much how they interact with each other, but particularly the ability to fix it, to take care of it. If somebody damages steel pipe, it’s a completely different case than if somebody damages the pre-tension pipe, than if they damage the ductal iron pipe. They’re all different in how you going about fixing them, and the ability to fix it is completely different.

Q: They were all transmission pipe. Are certain types of pipe preferable in certain settings? Can you talk about that? If you’re using an APDS system where it’s not going to the lowest bidder and everybody’s got the same goals in mind and quality is a priority, is there one pipe that’s more likely to be chosen than another pipe? How do you make those decisions?

RANDALL: Well, I’d do it different today than I knew how to do it 35 years ago. It’s either the beauty or the challenge of life you at least think you know a lot more now than I knew 30 years ago. I’m pretty sure I do.

We’re challenged by one of those pipe materials that we have in the ground today. We’ve talked about the criticality of the transmission capacity, and if that pipeline goes down, if it gets significantly damaged, and it doesn’t take very much to make it significant, it will take
days to fix it. There’s just no two ways that we have all the materials in our yard right now. We literally would come in and take sections of that pipe apart or place them with new pipe. We have a whole system. We spend half-a-million dollars buying replacement parts to be able to fix that pipe.

Q: Which would that pipe be?

49:30

RANDALL: The pre-tension pipe is not conducive to repair. It’s just not conducive to repair. It’s very, very difficult to repair, expensive, time-consuming. Steel pipe, it literally is rolled steel, and all you’ve got to do is get the water so it’s not running out of it, and in a pinch, if nothing else, in a pinch you get a welder and a piece of steel bigger than the hole and you weld it in place, and it will carry water again. There’s some other challenges to repairing the lining and stuff like that, but you could put it back in service in hours.

Ductal iron is extremely difficult to damage. It can be done, but it is extremely difficult to damage, harder than steel is to damage, and you’ve got to weigh all these. Certain pipes have size ranges where they’re most economical, and so basically for years we drew a line. If it was 24-inch and down it was ductal. If it was 24 and up, it was pre-tension or steel.

Eventually, we got away, so we’re not going to go any more pre-tension. Above 24 is was steel, below 24 it was ductal, and actually 24-inch was kind of right on the line. Depending on circumstances, we could do either one. Another player that came into the market is PVC. All our small lines for the last 25 years are PVC. No corrosion. They’re plastic. There’s no corrosion anymore.

Q: How easily are they damaged?
RANDALL: If an excavator or backhoe sticks a tooth in it, it’s pretty easy to damage it, but it’s pretty easy to fix it. It’s very easy to fix. It’s cheap to fix. PVC has grown in size where you can buy—I’m not even sure how big—big PVC today. Anything smaller than 24-inch, we’re going to put PVC in the ground. It’s not even a decision. You don’t need to spend five minutes discussing it. PVC’s the right answer today.

The other part that weighs into that material question is cathodic protection. Anything you put steel in the ground, metallic that you put in the ground, it will corrode, and different soils will make it corrode at different rates, but it will eat the steel away. Whatever the metallic materials, it will eat it away, and there are places in town where if you don’t do anything to protect it, and that’s a whole other topic, but if you put bare ductal iron pipe in the ground, there’s places in town where it’ll eat ductal iron pipe that’s that thick. It will eat a hole through it in less than ten years, and you’ve got leaks going everywhere. Protecting the pipe, there’s coating systems, there’s cathodic protection systems, what we call sacrificial anodes, they go away instead of the pipe going away.

We have cathodic protection systems on all our large-diameter transmission mains that we built from the ‘80s on.

Q: So did that not exist beforehand? Cathodic protection was not available before the ‘80s?

RANDALL: Not in the water municipal world. It was not a recognized issue or problem, and eventually the ductal iron people realized it was, and they and we started putting basically a big Visqueen bag that went over the pipe. Before you put it in the ground, you covered it with plastic. Makes a huge difference, helps tremendously. It doesn’t make the issue go away, and so
we developed standards for ductal iron where every piece of ductal iron pipe is about 20 feet long.

We put what we call jumper cables, almost just like your battery cable, we welded them from every joint together so that it was a continuous piece of pipe, and that gave us the ability to protect the pipe with cathodic protection systems. If it’s not bonded together, then every single piece of pipe is a separate entity, and you’d have to go into every piece of pipe to protect it. We have actually some pretty large ductal iron in the ground that is not cathodically-protected. It’s not wrapped. It’s not bonded. There’s nothing we can do with it but—

Q: Monitor it.

RANDALL: Well, you can’t even monitor it. We have what you call test stations on our cathodically-protected pipes, so we can monitor it. We can see how active corrosion is on the pipeline, how much steel we’re losing out of the pipeline, but on a pipeline that’s not bonded, you can’t even do that.

The way you monitor is how many leaks you have on it, and not in our big transmission mains, but in the ductal iron that was put in the ground in the ‘70s and even ‘80s, the small eight-inch stuff, we have whole subdivisions we need to replace. It is so full of holes that we have to go in and replace that pipe.

Q: How are you doing that? Can you give an example of a subdivision where that’s an issue?

RANDALL: Well, the area around the mall, the pipelines that are on the mall site that provide water and fire protection.

Q: Foothills Mall.
RANDALL: Foothills Mall. That ground, we call it hot. It’s very corrosive, a lot of that ductal iron, and in that area, the subdivisions around there that were built with ductal iron around Warren Lake—

Q: So is that an ongoing process of replacing those pipes as they corrode?

RANDALL: Yeah.

Q: Getting back to the cathodic protection, you were suggesting a few minutes ago that if you link the pipes together, what I understood you to say is that you can have a cathode that’s protecting an extensive length of connected pipes.

RANDALL: Yeah, exactly.

Q: How often would you need one of those cathodes on a length of pipe?

RANDALL: That’s called anodes, is what goes in the ground, and so that depends on the size of the pipe, the type of pipe, and the chemical nature of the soils as to how many you need, and so each of those pipelines that we design, we design a cathodic protection system with it based on exploratory data we did on the design of the route to see how hot the soils were and what kind of cathodic protection system we needed to do.

Basically, there’s, I’d say, two kinds of systems, and one’s called an active system, and one’s called a passive system, and exclusively we built passive systems. We put anodes onto the pipe into the ground and, just like I said, the steel goes away. The anodes are designed to go away instead of the steel. We have a lot of our system that needs to be replaced now. Those anodes have lived their life. Somewhere in the 20- to 30-year range, that’s how long they last, and that’s what they’re supposed to do. Now we need to replace those, so that’s the challenge we’re faced with right now. We have an ongoing program to replace cathodic protection system.
The other system is called an active system, and that’s where we induce current—we have what they call a deep-bend anode, so instead of putting an anode—we have anodes on our system right now that vary from, I’ll say, every 60 feet to every 500 feet. We put either an anode, or sometimes we put a whole bed of anodes in the ground. Instead of going in and digging all those up or digging up new ones and putting new anodes in, another option is to put an active system in, and that’s what we are actually going to do on the Anheuser-Busch line all the way across here.

Q: So you’re going to replace a passive system with an active system.

RANDALL: Well, it’s complicated.

Q: Not quite.

RANDALL: We’re not going to replace it. We’re going to put one on for the first time, so there’s a long story, but there is no cathodic protection system on the Anheuser-Busch line. We have monitored it for all these years. We need to put cathodic protection on it, so instead of going in and digging it up, I don’t know how many, 500 places, we’re going to put four deep-bed anodes in. We’re going to induce the current into it that will protect that pipeline, and that literally is going to be done this summer. We’re going to put four anodes in, along with an induced current, and protect that whole seven-and-a-half miles of line to the brewery.

Q: Interesting.

RANDALL: Cathodic protection, a) it’s not a science; it’s an art, because you get ten cathodic protection engineers in the room, and they’ll come up with at least nine-and-a-half solutions to it. It’s an individual thing.

Q: There are lots of variables.
RANDALL: There’s lots of variables, and those variables are not absolutely definable in every way, and so there’s different ways to do this. You might have one cathodic protection engineer that thinks you ought to put an anode every 40 feet. The next guy wants to put a bed of anodes every 1,000 feet, different size anodes, different types of anodes. This goes on and on and on. The bottom line is, we have test stations on all those pipelines where we go in and we can read the current on it, the resistance, and we can tell how much active corrosion is going on in that pipeline, and so we can tell whether our anodes are doing their job or not, and that’s why we know that these systems are reaching the end of their life and they need to be replaced.

The whole CP system, it’s not cheap. It costs money, but it’s like if your house is worth half-a-million dollars and insurance costs whatever, $2,000 a year, it costs, and you go, I don’t want to buy insurance, and you don’t need any insurance either, as long as it doesn’t hail or your house doesn’t catch on fire or a waterline break inside and flood everything, you don’t need insurance.

Pipelines are all underground. That’s one reason we’re sitting in here instead of out—there’s no place to go to show you pipelines, because they’re out of sight. They’re out of sight. They’re out of people’s minds, but we have an enormous investment in all of those pipes in the ground; I mean, hundreds of millions of dollars are invested in those pipelines. Cathodic protection is like an insurance policy, but it’s even better than an insurance policy, because you don’t know.

You can live 100 years and you may never have a claim on your house, but I guarantee you those pipelines, there’s going to be a claim on the house, because they will corrode, and they will last a certain amount of time, and then trying to fix a highly-corroded pipeline is, at best, a marginal solution. There’s not a good way to fix a large-diameter pipeline
that has major corrosion on it. You can’t do that. So the insurance you need to buy, and it’s cheap in comparison to the amount of money invested in those pipelines. That’s cathodic protection, but sometimes people go, you really want to spend half-a-million dollars to put—well, you can either do that, or in some amount of years you’re going to need to spend $50 million to replace that pipeline. It will happen.

Q: This is probably a good point to talk about public outreach and the challenges that the city has faced in meeting demand in putting in new transmission and maintaining those pipes. Can you talk about how Utilities has worked to develop public outreach while expanding the pipeline infrastructure and maintaining it?

RANDALL: Yeah. It’s a critical part of everything we do today, but it’s interesting to look back, and what public outreach meant in 1985 and in ’95 and in ’05 and today, it’s changed tremendously.

Q: Can you describe that?

RANDALL: The tools have changed tremendously. Work internal with other people on our staff, who really that’s their job. They’re the experts at it, and so they’re an integral part of our design team and our construction team. I’m talking today, and they use all the new social media ways to outreach, but, still, the most effective kind, in my opinion, the most effective thing we do is go and talk to people face-to-face, answer their questions, make sure they understand that there is a problem and that we’re the right people to do it, and that we have a solution, the right solution, to fix it, and we understand their concerns, and we’re going to do everything we can to minimize the impact to their lives.

One of the challenges, minimize that impact; that covers the gamut from almost no impact whatsoever to, still, it’s a huge impact, but if people understand what we’re doing, why
we’re doing it, and that we’re the right people to do it, it solves 90% of the problems, 90% of the challenges. Initially, you go back 25, 30, 35 years ago, it was one person working with one project manager to talk about who we needed to go talk to and how we got it done.

Part of that that also we didn’t talk too much about here, but a lot of these big infrastructure projects required easements. A lot of them are not built in public rights-of-way, so we had to go to people, individuals, and get an easement on their property to put our pipeline in. The public outreach, that’s absolutely hand-in-hand with acquiring easements from people, and there’s been a lot in the press around Fort Collins just in the past year about Thornton trying to build their pipeline.

We built pipelines in the very same route that all the to-do is about right now, and a lot of the reason that I think, by and large, this all went by under the radar, nobody made any noise at all was of our public outreach that we did, the program that we set up, and the way we treated people without going through a county 1041 process. They didn’t exist in those days, but we worked hand-in-hand and face-to-face with the neighbors—not neighbors, they became neighbors—with the people that were going to be affected by our projects, and a lot of times we literally were buying easement and put pipeline in their property, and so it impacted them for a short amount of time during construction, and then we’d work with them to restore their property, did everything we possibly could to make it better than it was when we got there.

Public outreach, I don’t know if that answered your question, but it’s a concerted effort with a specific plan, with a specific, I’d say, set of deliverables. Now we use the webpages, social media. Every project has a webpage where people can get on, whether they’re directly impacted or whether they drive down the road, or whether they just want to know.
They can get on our website and see what we’re doing, why we’re doing it. Those webpages are updated regularly during construction so they see where we’re at. They can see what the schedule is. There’s no secrets. Anything that is going, they can know about it, the huge majority of the information just simply by getting on the web.

We do weekly emailings. We establish an email list to all the concerned parties or anybody that wants to know. Every Friday afternoon, here’s a summary of what we did, where we’re at, what the schedule is, and what we’re going to do next week. It goes out to all those people. Outreach to the press, that’s not, in my opinion, a really important part of it, because it’s hard for us to control. You don’t know exactly what you’re going to give, but we do it. It’s another source of reaching out.

Internal in the city [ph], we coordinate impacts to all the departments or agencies that could be affected, fire and police and ambulance and school districts and all the people that can be affected by work. We’re doing the right-of-way as part of our public outreach program. There’s probably a lot of things I forgot here.

Q: No. You’re giving me a good sense of how many layers of outreach there are, how critical information is to the public, but I think you’ve also said something very interesting, which is that in addition to making information available to the public on the web, through social media, through newspapers, etc., the city has also invested for a very long time in face-to-face contact. That face-to-face contact is really critical, and especially, of course, where you need an easement.

01:09:14

RANDALL: We literally establish real relationships with the real people. The line to the brewery, I still have the notebooks downstairs, there were 87 different properties that we
acquired easements on, and some of those were 50 feet and some of them were two miles, and they were people’s front yards literally, and they were farmers’ fields.

   Everybody has a different—grandma’s rosebush is planted there. Don’t touch her rosebush, to that level of detail. I plant my corn on April 1<sup>st</sup>. I need to be out in the field on April 1<sup>st</sup>. A hundred or 500 different constraints that we work with and to do everything we can to minimize the impact to people. I plant corn on April 1<sup>st</sup>. I’m sorry, you can’t plant corn this year, because the only way we can do this is we’re going to be there from March until July, and we’ve got to buy their corn that year. That’s what we do. The impacts and the cost to us, sometimes it’s really little, and sometimes you guy 500 acres of corn, because you’re going to intercept his irrigation for the whole growing season.

Q: And then the city has to get into the business of selling that corn?

RANDALL: If his normal income, X dollars per acre of corn, we pay him for it, and he’s not going to grow any corn this year. He can’t.

Q: He’s not going to grow any.

RANDALL: That’s what I mean by buy his corn. We’re paying him for his income that he lost, because we impacted him for the year. Those are kind of the extremes.

Q: That’s an ongoing process. The city’s always involved in some kind of outreach to the public about water and transmission.

RANDALL: We are. I’m not the city. I’m the Utilities, and what’s done and has been done in the Utilities is not always—I think it’s becoming closer in the city now that everybody’s doing similar, but we went way, way above and beyond for years and years and years where other people didn’t. They just didn’t do that.
Q: It sounds as though the city has done a really effective job of getting all these transmission pipelines in the ground, and the city’s been really proactive. What do you anticipate in the future? As you’ve pointed out, there are other utilities that are involved in providing water to people who are effectively in the city of Fort Collins, so the city will continue to increase in population density. Do you see the city having major new transmission projects in the future, and how will the city handle those if they occur?

RANDALL: Good question, and the brief answer to transmission capacity, no. We don’t need any more transmission capacity. As long as the political subdivisions of districts stay approximately the same, we don’t need any more transmission capacity, and we won’t. The challenge that’s down the road is rehabilitation of existing infrastructure. After all those lines built in the ‘20s, they’re 100 years old. They have a useful life, and when you start talking about pipelines that are in the ground 100 years, it’s not that they won’t last longer, but we’ve got our money’s worth out of that infrastructure.

Those need to be on the list and need to be thinking about how to replace them or if you need to replace them or what you need to do to replace them, but even the ones in the ‘50s, you’re talking 70+ years old, and there are some there that are ductal iron that are not wrapped, that are not bonded.

Some of them are in some horrible locations as far as trying to maintain them. That’s one thing I haven’t talked about, but one of the design criteria of transmission mains is that you can get to them to do—most common maintenance, you can get to the cathodic protection stations. You can get to the valves. You can get to blow-offs, the air releases. There’s a lot of details of transmission we haven’t talked about, but there’s parts on the transmission mains that
You have to be able to maintain, and not only you have to be able to, you have to do it. You ought to do it.

It’s kind of like the insurance again. If you don’t take care of it, or like your car, if you’ve never changed the oil in it, it will not last nearly as long as if you do the standard maintenance to it. It’s true of pipelines the same way. There were some pipelines built a long time ago that in the ‘20s to the ‘50s where maybe open fields or whatever, and then people came in and developed subdivisions around them, and some people didn’t give a lot of foresight to—we have a large-diameter ductal iron transmission main between Taft and Shields that has an irrigation ditch on one side, and it’s in the back yards of everybody’s house.

Back yards are only whatever. From the ditch to the house it’s 50 feet. You can imagine your back yard if you have a large-diameter ductal iron pipeline, would you like to have a backhoe somehow get in your back yard, which might be a challenge itself, and then dig it up to do anything to it? We’ve got some pipelines in bad locations, easements that are not accessible; not very many, but there’s a few that are not good.

Q: That’s a very substantial project that you’re continually dealing with, when and how to replace these old pipes.

RANDALL: Well, it’s a critical project that needs to be going on and needs to be recognized, because those kinds of things, you don’t replace a large-diameter pipeline. You don’t just go do that tomorrow. It takes a lot of work, a lot of planning, a lot of public outreach. If you’re going to do anything to the pipelines in those people’s back yards, I don’t even know where you start. I really don’t. It’s not like it’s two houses either. It’s 100 houses in a row.

Q: But it will have to happen.
RANDALL: Something will have to be done with that pipeline. It will have to happen, and I’ll bet the huge majority do not know it even exists in their yards.

Q: I’m sure that’s true. Whose radar is it on to get that work done, to start thinking about it, to start planning?

RANDALL: Other than mine?

Q: Yeah.

RANDALL: I don’t know the answer to that question. That’s one of a myriad of things that are challenges that Utilities has with, my opinion, a lack of resources and the amount of work that is out there that needs to be recognized and put on somebody’s radar and planned for and addressed in a timely manner, not when it becomes an emergency. That’s too late. So it becomes a matter of priority, and if you’ve got 50 things on your priority list, you can’t have 50 of them at the top. Hopefully, it’s not #50, because, at some point, it will, all of a sudden, go from #50 to #1, and that’s always a bad deal when the priority changes completely.

Q: I’m just looking at that map and looking at the orange line from the 1920s and the purple line from the 1950s and wondering about how long they’re going to last and the state of those pipes, at this point.

RANDALL: We’ve done a little bit of work on this 1920s one out here, so some of that looking at replacement. Some of that realize that these were the large transmission mains, at that time. Well, now what supports the whole city is out here. This is going to need something, but it may not need to be replaced in kind, and so there’s a section of this, I forget if it was 20 or 27, that we actually pulled what was called a *, PE, a plastic line inside that existing line; went from a 24 to a 12 or a 15, so we just pulled that inside.
It carries all the water it needs to carry today. It doesn’t have to carry what it did originally, and we had an opportunity through a couple of different jobs. It was a good time to do it, and we did that, but that’s what needs to be on people’s radar. We need to do the planning. We need to do the modeling to say, okay, this was the 27. Sometimes it does not need to be a 27. It shouldn’t be a 27. It doesn’t move enough water today, and we can replace it with a 12-inch main or something like that.

Q: Thinking this through in relation to the issue of redundancy that you spoke about before, let’s say there were problems along many lengths of the transmission piping that was put in in the 1950s, and it would be really, really difficult to access that pipe to replace it. Would it be possible, at least to some extent, to just turn off those pipes, basically cut off the water going into those pipes and use redundancy in the pipes put in after the 1980s to service those areas?

RANDALL: It might be. That’s a modeling question. Something I didn’t touch on, transmission, by and large, we have very little—there’s not water services off a transmission main every block or every house or something like that. It’s like an interstate. You can only get off the interstate at interchanges; basically, same kind of thing. So you’re going to get off the interstate every one to five miles. That’s all you can get off; same thing with a pipeline. There’s only water going out of it every one to five miles. Not one to five miles, but you get the same idea.

So if this whole section of pipe, if it feeds off ten different distribution lines, it’s going to be really hard to abandon it in place. If this one over here only has one off of it, maybe we could. We can run our model and see how difficult it is to abandon this mile of pipe, whether it
will work at all, what we’d have to do to make it work. Could you pull a line inside that, pull a 24 inside that 36?

Q: Maybe so.

RANDALL: Maybe so.

Q: Are there any topics that we haven’t covered that you’d like to talk about?

RANDALL: Well, I guess I’d emphasize, again, the criticality of not only maintaining the cathodic protection system on these pipelines, but the criticality of maintaining the pipelines themselves. So on a transmission main, we have what we call air vacuum valves, so if there’s air inside the line, it let’s the air out. In the case of a break, a major break on a pipeline, on a steel pipeline, basically, you think about, all of a sudden, if you cut a pipeline and that water, it all went roaring out, something’s got to fill that void behind it, and basically it creates a suction. I’ve seen pictures of steel lines that literally this collapsed half-a-mile of pipe. It created a vacuum, so a vacuum valve lets air into the line, so it’s an insurance policy again. It should never happen, probably will never happen, but if it does happen and that air vac doesn’t work, you could that quick $2 million of pipe is literally gone. So maintaining the infrastructure, there’s blow-offs. We have places in low points where in some kind of worst-case scenario we need to get the water out of that pipeline, we open it up, and we can blow the water off, open valves and just let it go.

Blow-offs, air vacs, line valves, all those are critical that they’re maintained on a regular basis and make sure they work at all times. The whole maintenance of the system is really, really important down the road, and I think the older it gets, just like anything else mechanical, if you drive a car that’s ten years old, maintenance is one thing. If you’re driving a
car that’s 30 years old or 50 years old, it’s a different thing, and the older it gets, the more critical
the maintenance of the transmission pipelines are.

They easily have a 100-year lifetime. They should last 100 years, almost exclusively. There’s rare instances when things happen to them, but just take care of it. I could talk about
pipelines all day long. Unless you have a different question, I think I’ll quit, because there’s
infinite details about them.

Q: Thank you. I think I’ve gotten to the end of my questions.