PIPELINE CONDITION ASSESSMENT
THE DEVIL IS IN THE DETAILS
CITY OF DE SOTO KANSAS RAW WATER MAIN
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APRIL 27, 2017
We all know most projects don’t follow the plan exactly. And sometimes projects take on a life of their own. That is why I titled this one “The Devil is in the Details”. This is one of those projects. Started out as a simple pipe inspection job evolved into a pretty complicated pipeline cleaning job. So I will go over the project background.....then the numerous phases as the project unfolded.
HISTORY AND BACKGROUND
CITY OF DE SOTO, KANSAS

• 30 MILES SOUTHWEST OF KC
• POPULATION 6000
• 1600 WATER SERVICE CONNECTIONS
• 800K GPD WTP
• ALONG THE KANSAS RIVER
HISTORY AND BACKGROUND
CITY OF DE SOTO, KANSAS

• SUNFLOWER ARMY AMMUNITION PLANT
  • 1940S
  • LOCATED SOUTH OF DE SOTO
• REACTIVATED IN 1960S
  • VIETNAM WAR EFFORT
  • 12 WELLS INSTALLED IN 1967
    • 6 SOUTH OF KANSAS RIVER
    • 6 NORTH OF KANSAS RIVER
HISTORY AND BACKGROUND
CITY OF DE SOTO, KANSAS

• SUNFLOWER ARMY AMMUNITION PLANT
  • DEACTIVATED 1993

• CITY OF DE SOTO TOOK OVER WATER SYSTEM
  • CURRENTLY OPERATING
    • 3 WELLS NORTH OF KANSAS RIVER
    • 2 WELLS SOUTH OF RIVER
    • WTP NEAR FORMER AMMUNITION PLANT
HISTORY AND BACKGROUND
CITY OF DE SOTO, KANSAS

• OUR CASE STUDY
  • 3 WELLS NORTH OF KANSAS RIVER
  • 3000 FT
  • 16-INCH DIAMETER
  • DUCTILE IRON PIPE
DE SOTO, KANSAS
PHASE 1 - INITIAL SCOPE: CONDITION ASSESSMENT

• NORTH WELL FIELD - PRESSURE DROP UNDER THE RIVER
  • NORTH OF RIVER – 250 PSI
  • SOUTH OF RIVER – 150 PSI

• LITTLE CONSTRUCTION INFORMATION FOR TRANSMISSION MAIN UNDER RIVER

• WHAT WAS THE CONDITION OF THE TRANSMISSION MAIN, ESPECIALLY UNDER RIVER?
DIRECT MAIN INSERTION INSPECTION TOOL

LDS1000
- 12” and greater pipe diameter (all pipe materials up to 42”)
- Access: ARV, hot tap, gate valve, pigging wye, 2” Access
- HD quality CCTV and footage
- Acoustic leak detection
- Sonde for X-Y-Z
- 3,300’ in a single deployment (neutral buoyant cable)
- Electronic drive and drum system
- Use of drogue (parachute) to navigate under active flow conditions
- Up to 250 psi
- Real-time observations in the field

Start at 33:58
3" mains
PHASE 1 - INITIAL SCOPE: CONDITION ASSESSMENT

CONCLUSION

• COULD NOT EVEN BEGIN THE INSPECTION
• PIPE HAD SITLED UP OVER 40+ YEARS
PHASE 2 - REVISED SCOPE: CLEANING

• TRANSMISSION MAIN CLEANING PLAN
• TAKE WELL FIELD OUT OF SERVICE – COORDINATE WITH CITY
• DRAIN THE SYSTEM
• USE JETTER TRUCK TO REMOVE THE BUILD UP
• PUT SYSTEM BACK IN SERVICE
• PERFORM VIDEO INSPECTION UNDER THE RIVER
JETTER TRUCK

- 120 GPM JETTER
- WARTHOG JETTER WITH ROTATING BLADES
- TANKER TRUCKED THE WATER TO USE WITH THE JETTER
PHASE 2 - REVISED SCOPE: CLEANING

CONCLUSIONS

• COORDINATING WITH CITY WAS CHALLENGING
  • HAD RESERVED WATER FOR 5 DAYS OUT OF SERVICE, BUT HIGH DEMAND PERIOD
  • FORGOT TO TELL OTHER CITY SERVICES
    • PUBLIC WORKS – ROAD DUST CONTROL
    • PARKS – IRRIGATION
  • PUT THE WELL FIELD BACK INTO SERVICE BEFORE CLEANING WAS COMPLETE

• 120 GPM JETTER WAS LIMITED IN ITS CLEANING
  • DID GREAT JOB FOR LEVEL SHOTS
  • LONGEST SHOT WAS OVER 1700 FT CLEANED
  • DID GREAT JOB FOR THE FIRST 700 FT TO GET UNDER THE RIVER
  • ELEVATION CHANGES UNDER THE RIVER COULD NOT ADVANCE ANY MORE
  • DIDN’T KNOW IF THERE WERE OTHER IMPEDIMENTS TO JETTING
PHASE 3 – REVISED SCOPE CONDITION ASSESSMENT

• WAS IT ELEVATION CHANGES UNDER THE RIVER COULD NOT ADVANCE ANY MORE?
• WAS IT OTHER IMPEDIMENTS TO JETTING
• RE-ATTEMPT DIRECT MAIN INSPECTION CCTV UNDER RIVER
PHASE 3 – REVISED SCOPE: CONDITION ASSESSMENT

CONCLUSIONS

- PRESSURE WAS TOO HIGH FOR VELOCITY OF WELL FIELD
  - REDUCE TO 150 PSI
  - VELOCITY WAS TOO LOW
  - TETHER WAS GETTING FORCED OUT OF THE PIPE
  - INSPECTION WAS ABANDONED
PHASE 4 - REVISED SCOPE: CLEANING

• DEBATE PIGGING VS. BIGGER JETTER TRUCK

• PIGGING
  • START WITH SOFTER PIGS AND INCREASE SIZE AND RIGIDITY

• PROS
  • SOFT PIGS COMPRESS AND BREAK UP; WON'T GET STUCK
  • LESS EXPENSIVE

• CONS
  • REQUIRES LOTS OF WATER TO MANAGE
  • CAN'T TRACK LOCATION
  • SET UP A LAUNCHING STATION
PHASE 4 - REVISED SCOPE: CLEANING
PHASE 4 - REVISED SCOPE: CLEANING

- BIGGER JETTER TRUCK
  - PROS
    - LESS WATER TO MANAGE
    - TRACK PROGRESS WITH LENGTH OF HOSE
  - CONS
    - MORE EXPENSIVE
    - MOBILIZE FROM NEW JERSEY
    - POTENTIAL TO GET HOSE CAUGHT IN COLLAPSING DEBRIS

- FINAL DECISION
  - CLIENT WAS MOST COMFORTABLE WITH THE JETTER TRUCK
The NWM JC mobilized and field work began to prep the site and organize the activities; Ace and the City met to discuss the prep work and approach, do a brief safety meeting, and take care of additional supplies and minor equipment needed; All prep work was completed and cleaning operations started on Thursday.
PHASE 4 - REVISED SCOPE: CLEANING

CONCLUSIONS

• BIGGER JETTER TRUCK
  • CLEANING WAS SUCCESSFUL
  • PIPE CONDITION WAS EXCELLENT

There's also the problem with pipe build-up that can impact a successful launch and inspection. Left photo is a 57 year-old 16" DIP with 5-6" of wall build-up (discovered during an initial LDS1000 launch last fall). The right photo is the same pipe that was cleaned by Ace (thank you NWM for sending your big-ass jetter and skilled operator to get this 1,500 under-the-river crossing cleaned so we can go back in and re-inspect it using Ace's LDS1000...it was impressive)!

The client is EXTREMELY pleased with the work and results; We've been asked to make a brief presentation to the City Council on March 16th for project update, justification for the contract amendment, and recommendation to push on-ward to the City's WTP (budget is $400K); Providence will be submitting a final report to the City once the last of the pipeline has been internally inspected.
PHASE 5 – CONDITION ASSESSMENT

• STILL WANTED TO KNOW CONDITION UNDER RIVER
• RE-ATTEMPTED LIVE MAIN INSPECTION WITH LDS1000
• PRESSURES AND FRICTION (CHANGE IN ELEVATION) TOO HIGH
• FLOW VELOCITY TOO LOW
• TODAY PLANNING TO TRY INSPECTION WITH DIFFERENT TOOL
  • JD7 BULLET
**JD7 Bullet©**

- Tethered or Untethered
- **Access:** ARV, hot tap, gate valve, pigging wye, 2” Access
- HD quality CCTV and footage (Not Live)
- Acoustic leak detection (Not Liver)
- Sonde for X-Y-Z
- Much Farther Deployments
- Electronic drive and drum system with thin filament
- Use of drogue (parachute) to navigate under active flow conditions
- Up to 250 psi
MAKE SURE YOUR TOOL BOX IS FULL!

• THE DEVIL IS IN THE DETAILS
QUESTIONS???
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