Optimization of GIS-Centric Platforms Replaces “Best-Guess Practices”

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Overview

• Learn how Southgate developed upon its initial investment in the ArcGIS Platform and integrated other technologies systems to attain a truly GIS-Centric Asset Management Program.
• Approximately 88,000 Colorado residents.
• Approximately 235 miles of distribution systems (water)
• Approximately 240 miles of collection systems (wastewater)
• Service area of 18 square miles:
  – Including portions of Cherry Hills Village, Centennial, Greenwood Village, City of Lone Tree, Unincorporated Arapahoe County and Unincorporated Douglas County.
- Rigorous Preventive Maintenance Program
- New Capacity Capital Improvements subject to the periodically updated facility master plan
- 100 year useful life analysis with projection of timing and cost
- Long range Fiscal Forecasting (50 yr) based on 100 year useful life analysis
  - 100% of new capacity capital improvements
  - 100% of rehabilitation and replacement
- Technology
  - Technologically challenged.
  - Limited to hand drawn paper maps
  - Computer based CAD mapping and asset inventory (AutoCAD)
• Tracking of incident reports, breaks and blockages using push pins on aerial photo
• Tracking of sewer condition in a spreadsheet based on video inspection
• Rehabilitation and replacement decisions via interaction between District Engineer and Ops Supervisor
• Update paper maps using CAD mapping and asset inventory

• Shift to Esri Platform
  – ArcGIS Desktop
- Data conversion, collection and storage
- Conduct QA/QC
- Conduct inspections on Sewer mains and manholes
- Track customer complaints and work history on assets digitally
- Flow monitoring

- ArcGIS Desktop 9.3.1
- ArcGIS Server 9.3.1
- Oracle
- Granite XP
- Granite XP Scoring Module
- Cityworks Desktop 4.5
- Flow Link
• Distinct and disconnected systems
  – Update and maintain asset inventory and asset attribute data (ArcGIS Desktop)
  – Share data throughout the organization both in the Office and in the field (ArcGIS Server)
  – Document complaints and work history on assets (Cityworks Desktop and Anywhere)
  – CCTV inspections of sewer mains
• Monitor flow conditions and establish Diurnal patterns in preparation for Sewer modeling

• ArcGIS 10.x
• Shift in focus from Application Development Framework (ADF) to Application Programming Interfaces (APIs). Esri no longer supported support ADF from 10.1 version release and onward
Derive a repeatable framework to help determine where and how to direct resources

Determine risk, predict present and future costs and facilitate decision-making for rehabilitation, repair and replacement strategies through cost-based scenarios

Vision

Technology

• ArcGIS Desktop
• ArcGIS Server
• Cityworks Desktop v 4.5
• Granite XP
• Granite XP Scoring Module
• Flow Link
• Infrastructure Optimization Toolset (IO)
- Asset condition (Physical) (based on institutional knowledge)
- Fiscal Forecasting
- Decision-making through cost-based scenarios for rehabilitation, repair and replacement strategies

- Granite XP v 4.6.1 and Esri (ArcMap) Integration
- Inspections captured in PACP and MACP format
- Access data within one interface versus very distinct and disconnected systems
- Determine physical conditions of Sewer mains and Manholes based on Industry Best Practices
- Determine hydraulic conditions of Sewer mains based on Industry Best Practices
- Streamline organizational workflow

- ArcGIS Desktop
- ArcGIS Server
- Cityworks Desktop v 4.5
- Granite XP
- Granite XP Scoring Module
- Flow Link
- Infrastructure Optimization Toolset
- InfoSewer
- CCTV Interface for PACP
- Streamlined workflow between and amongst systems and departments
- Condition scores (Physical and Hydraulic) based on Industry Best Practices
- Fully integrated system
- No duplicate data entry between systems
- Better data to be mined for decision-making

- Cityworks Desktop 2013 and Cityworks Server AMS 2013
  - Condition scoring of assets (Water)
- Integration between data derived from Hydraulic Modeling (InfoSewer) and ArcGIS
Citizen-sourced Data (Service Requests)

Question 1: What is your address? (Is the address within the district?)
Answer: Yes.

Question 2: What is the problem?
Answer: LOW WATER PRESSURE in 10 of 20 UNITS

Question 3: Do you have a TPO?
Answer: Unknown.

Question 4: Do you notice the pressure on the outside or inside?
Answer: Outside.

Question 5: INTERNAL. Is the pressure high or low?
Answer: Low.

Question 6: Is it all time low?
Answer: No.

Heat Maps

Enable heat map for selected graphic layers.

- YTD Locates 2014
- YTD Low/Pressure

Merge Graphics

Gradient: [ ]
Intensity: [ ]
Opacity: [ ]
Work History Tells Us Which Assets Need Our Attention The Most
Access to Tangible Evidence Within One Interface
Condition Scores Based on Best Industry Practices

Condition Scores Based on Institutionalize Knowledge

POF

COF

BRE
Physical Condition vs. Hydraulic Condition

DSGV: Deposits Settled Gravel
Determining the Best Approach

Legend
Sewer Mains (d/D Ratio)
- 0.00 - 0.70
- 0.70 - 0.90
- 0.80 - 1.00
- > 1.00 (surcharging)

Layers
GIS_Observations Events
- Code, CodeDescr
  - ACOM, Cleanout Mainline
  - AEP, End of Pipe
  - AMH, Manhole
  - DAE, Deposits Attached Encrustation
  - DAGS, Deposits Attached Grease
  - DAZ, Deposits Attached Other
  - DH, Deformed Horizontal Brick
  - DSF, Deposits Settled Fine
  - DSGV, Deposits Settled Gravel
  - DSZ, Deposits Settled Other

Sewer Main Score Cues TPS for PACP
- 0 - 19
- 20 - 39
- 40 - 59
- 60 - 79
- 80 - 100

Text:
1. Results shown are for peak flows under design wet-weather flow conditions.
2. Rainfall derived infiltration & inflow has been proportionately allocated to all active manholes based on the total number of upstream manholes.
3. A synthetic pattern has been applied to all I/I loads to simulate a 50-year, 60 minute design storm event under EPS analyses.
- Extend Asset Management into the field in real-time
- System impacts for operational decisions

**Technology**
- ArcGIS Desktop
- ArcGIS Server
- Cityworks Desktop 2013
- Cityworks Server 2013
- Granite XP
- Granite XP Scoring Module
- Flow Link
- Infrastructure Optimization Toolset
- InfoSewer
- Sedaru
• Optimized environment for data collection on mobile devices
• Increased communication between office and field staff
• Assists with immediate and long-term risk, consequences of decisions and impacts to system facilities and customers
• System Monitoring
- Pumps and SCADA
- Sewer
- Project Management
Questions
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