RedZone/ICOM3

Solo Robot and ICOM3 Software Pilot

FOR:
Dallas Water Utilities
City of Dallas

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Asset Program Management Defined:

**INSPECT** > **UNDERSTAND** > **PLAN** > **EXECUTE**

- **INSPECT**:
  - Manholes
  - Small pipe
  - Large pipe
  - Tunnels

- **UNDERSTAND**:
  - History
  - Condition
  - Capacity
  - Risks

- **PLAN**:
  - Inspection mgmt
  - Work mgmt
  - Asset mgmt/
    Risk & Criticality
  - Regulatory
    Compliance

- **EXECUTE**:
  - Repair
  - Renew
  - Replace
  - Clean
REDZONE PROVIDES INSPECTION SERVICES
AND ICOM3, AN ADVANCED CMMS SYSTEM

• ICOM3 Asset Management Software
  • A complete CMMS system for wastewater, water, streets and buildings.
    • Inspection Management
    • Work Management
    • Asset Management, including risk and criticality analysis
  • Solo Robot
    • Small diameter, battery operated robot, for pipes 8-12”.
  • Responder Robot
    • Large diameter inspection robot for pipes 36” and above.
Dallas Water Utilities Solo Pilot

- Solo Inspection Technology
- 2 week rental period
- City of Dallas crews inspected approximately 42,000 feet of small diameter pipeline.
- All data was presented in the ICOM3 CMMS.
SMALL ROBOT, HUGE IMPACT

- Inspect in smaller pipe: 8”, 10” & 12”
- Truly autonomous, battery operated inspections
  - Force multiplication
- Tremendous daily output versus conventional CCTV
- Small, low-cost modular platform
  - Lightweight
- 100% pipe coverage
- Digital data format
- Increased safety
- Simplified access
- Not limited by weather conditions
ICOM3® INSPECT > UNDERSTAND > PLAN > EXECUTE

PROGRAM MANAGEMENT SOFTWARE

- Comprehensive Asset Management Programs - Water, Waste Water, Storm Water, Streets, Buildings
- Web-based, operating in connected or mobile disconnected mode
- Customized for every client
- Can import ALL historical CCTV data, and past work order history, regardless of vendor.
- Asset and activity based
- Performance Monitoring, Tracking, Budgeting, and Reporting Functionality, including automatic preparation of regulatory reports.
- Accepts Engineering/Water Modeling Results Vendor Agnostic
- Incorporates SCADA systems.
LARGE DIAMETER PIPE ROBOT

- Flexible locomotion platform - inspection in larger pipe (>=36”) at longer distances (>8000 ft)
- Integrated sensors for pipe mapping and 100% pipe coverage
  - **3D laser**: pipe bends, corrosion, ovality
  - **Sonar**: sediment levels below the flow
  - **CCTV imaging**
  - **Gas sensors** to detect corrosive gas presence
- Record multiple sensors per run for synchronized data collection
- Quantifiable data resulting with a definable error tolerance
- Floating & driving deployment capabilities
Responder/MSI Viewer
Key Benefits of CMMS for City of Dallas

- Provides GIS-based Inspection Management, Work Management, and Criticality and Risk analysis, including powerful query and reporting capability.
- Increases productivity of City of Dallas personnel by having a powerful centralized CMMS that organizes all information.
- ICOM3 works with Dallas’ existing CMMS programs, and sharing information back and forth.
- Facilitates regulatory compliance tracking
- Facilitates decision processes for maintenance planning, scheduling, and CIP management
- Provides key performance indicators and tracking
- Incorporates life cycle cost for the assets
1. **Asset Inventory and GIS Integration:**
   - Integrate with existing GIS and Asset Management systems.
   - Provide asset inventory capabilities
     - Provide a GIS based view of assets
     - Ability to link asset information and associated documents to an asset hierarchy.
   - Integrated GIS map viewer in the application allowing personnel without GIS or mapping applications on their computers to utilize the GIS map.
   - Provide for full GIS functionality in the field when disconnected from the internet or enterprise systems. Capable of synchronizing automatically when re-connected.
2. INSPECTION MANAGEMENT:

• Consolidate and prioritize CCTV and multi sensor investigations, including historical inspections.
• Plan and schedule pipeline and structure inspection activities including:
  - Cleaning (flushing, rodding, etc)
  - CCTV / Laser Inspections
  - Manhole Inspections
  - PM and RCM for lift stations
• Tracks and Reports on all Activities for all assets
• Integrates with existing GIS mapping and CMMS systems
2. INSPECTION MANAGEMENT (CONTINUED):

- Inspections are planned by individual segment or groups of assets (routes).

- Assets can be selected by physical attributes, area, inspection results, or previously planned inspection dates.

- Software shows total footage based on selected criteria and summarizes selected assets by basin, size, age, etc.
2. INSPECTION MANAGEMENT (CONTINUED):

- Establish inspection priorities based on criticality assessment rather than simple rotation or age based approaches.

Characterize based on:

- **Physical Attributes such as**
  - Age
  - Size
  - Material

- **Criticality**

- **In-situ conditions**

- **Maintenance histories**
FORMULA FOR A COMPLETE CMMS (Cont.)

3. WORK MANAGEMENT:

Facilitate the planning, issuing and tracking of work orders for:

- Routine Preventative Maintenance (Flushing, Roding, CCTV)
- CCTV Inspections
- Chemical Root Treatment
- Repairs/Replacements
- SSO’s
- Smoke and Dye Testing
- Manhole Inspections
- Lateral Maintenance (Lateral CCTV, Roding, Repairs)

- **Planning** - Should include an inspection and maintenance planner that provides the ability to plan future work and establish maintenance goals and objectives.
  
  - Ability to create maintenance plans and schedules for single assets or groups of assets or routes.
  
  - Ability to view inspection and maintenance plans and schedules as highlighted assets graphically on the GIS map.

- **Scheduling** - Provide an interface that shows planned activities over a given time frame by their planned date of completion.
3. WORK MANAGEMENT (Continued):

- **Issuing, Tracking, and Closing Work Orders:**
  - View all work orders by status (Open, Closed, Cancel, Altered, Deleted).
  - Track outstanding work orders by activity.
  - Ability to re-assign work orders from one crew to the next to balance work distribution.
  - Ability to send digital work orders to select wireless mobile devices in the field.
  - Included shall be the ability to print custom paper work orders with an automatically generated map.

- **Performance and Metric Tracking**
  - Ability to perform planned versus actual comparisons for activities.
  - Perform monthly workload distribution by balancing planned work with available resources.
  - Ability to produce highlighted maps of completed maintenance task by crew, activity, date range, etc.
FORMULA FOR A COMPLETE CMMS (Cont.)

4. Criticality and Risk Analysis:

- **Condition Assessments**
  - Querying of damage information and condition severity of inspected pipes.
  - Rank and prioritize City’s collection system assets using these tools.

- **Criticality and Risk Analysis**
  
  **Probability of Failure:**
  - Ability to estimate probability of failure for a collection system asset by taking into account:
    - asset age, material, construction method, depth of cover, traffic loading, theoretical capacity, and soil condition.
    - Ability to incorporate condition assessments from CCTV or other routine maintenance activities into the probability of failure estimate.

  **Consequence of Failure:**
  - Ability to estimate consequence of failure for a collection system asset by taking into account:
    - Proximity to a body of water, impacts on adjoining land uses, estimated spill volume, containment capability, mitigation costs, regulatory fines, and loss of production.

  **Analysis:**
  - Ability to rank assets based on their overall risk level defined by Probability of Failure x Consequence of Failure.
  - Ability to produce reports and highlighted maps of assets by their overall risk level.
  - Assign and track repair, refurbishment, and replacement assessments (R3)
Assessing Failure Modes

CCTV Condition Assessment → DSI Damage Severity Index × In-Situ Contributing Factors = Probability of Failure Ranking

Offset Pipe

Risk Matrix:

- • Offset Pipe
- Probability of Failure
- Consequence of Failure

Key to actions:
- Repair or replace within one month
- Repair or replace within six months
- Set high CCTV frequency, monitor for change
- Set low CCTV frequency

Figure 1: Typical risk probability/consequence matrix, sewer pipe
5. Capacity Model Integration

- Import capacity model data results after a model has been generated.
- Ability to exporting a file structure that can be read and opened in capacity modeling software.
- Should incorporate capacity model results into routine maintenance and planning activities.