### City of Chicago Water Resource Management

Presentation to the Metropolitan Planning Council and Openlands March 31, 2011

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City of Chicago Department of Water Management





### Water Supply Area

- Serves over 5.3 million people (41% of Illinois – 806 sq mi)
- City of Chicago 2.7 million people – 228 sq mi
- Serves 48 municipalities that have a direct connection to us
- 125 Suburban Communities –
  2.6 million people 578 sq mi
- 2010 Water Use 773 mgd
  City 484 mgd Sub 289 mgd

### City of Chicago Water Use





### Water Main Replacement

- Largest source of unaccounted for loss
- 4,200 miles of water mains
- Over 600 miles of water mains 16-60 inch diameter
- Goal to replace 42 miles per year (1%)
- Caretakers of an aging water system



# Underground Leak Detection and Repair

- Goal to survey 1,500 miles per year
- Yielding between 400 to 900 leaks/year
- Using "state of art" leak correlators
- Permalog leak detection technology
- Radcom SoundSens leak correlation technology
- Echologics –LeakFinder RT







# Changes From Paper to Electronic Work Orders

#### Forman Report

| location   | Cator Dat Order No 653081   |  |  |  |  |  |  |
|--|---|--|--|--|--|--|--|
|  | Rar   |  |  |  |  |  |  |
| Address  | 1900 W 23.00  |  |  |  |  |  |  |
| Date 🗹   | -10 - 04 Time Atlas Page  |  |  |  |  |  |  |
| Field Data:  | 1 Main Break  |  |  |  |  |  |  |
| (roreman)  | Type of Pipe CAS size 6" Type of Joint Land Main Cover 6  |  |  |  |  |  |  |
|  | Type of Break; 🔲 Circumferential 🛛 🕂 Longitudinal Break Est G P.M   |  |  |  |  |  |  |
|  | Circum, and Long Pipe Blowout   |  |  |  |  |  |  |
|  | 🔲 Joint 📋 Fitting 📄 Split at Corp. Cox  |  |  |  |  |  |  |
|  | U Water Leak  |  |  |  |  |  |  |
|  | Pipe or Service MaterialSizeCover   |  |  |  |  |  |  |
| r  | 1.) Main: Joint 📋 Fitting 📄 M.J. Bolts 🔲 Leak Est. G.P.M.   |  |  |  |  |  |  |
|  | 2.) Valve: Packing 🗍 Joint 📋 Gasket 🔲   |  |  |  |  |  |  |
|  | 3.) Service: Tap 📋 Tap Joint 📋 Lead 🗌 Roundway 🗌 Roundway Joint 🗍   |  |  |  |  |  |  |
|  | 4.) Meter: 📋 Meter Riser 📋 Meter Coup 📳   |  |  |  |  |  |  |
|  |   |  |  |  |  |  |  |
|  | 5 ) Hydrant: Base 📋 Hydrant Seat 🔲 Hydrant Branch 🛄   |  |  |  |  |  |  |
| General:   | 5) Hydrant: Base   Hydrant Seat   Hydrant Branch  <br>Remarks: <u>Lut Jong on 6° NA', W MAK Repair</u>  |  |  |  |  |  |  |
| General:   | 5) Hydrant: Base   Hydrant Seat   Hydrant Branch  <br>Remarks: <u>List Jong on 6 NA'r MAR Repair</u><br><u>500 Conglist</u><br>Provinition Utilities: 21 ° Cong To On 6 Hal   |  |  |  |  |  |  |
| General:   | 5) Hydrant: Base   Hydrant Seat   Hydrant Branch  <br>Remarks: <u>lit long on 6 NA'r MAR Pepajar</u><br><u>500 Con glitt</u><br>Proximity of Other Utilities: <u>16' Cons</u> <u>to One</u> <u>Hale</u><br>Ture of Sullat Vin (100)   |  |  |  |  |  |  |
| General:   | 5) Hydrant: Base   Hydrant Seat   Hydrant Branch  <br>Remarks: <u>first clong in 6' (A'iW MAK Depaar</u><br><u>Shi Conglist</u><br>Proximity of Other Utilities: <u>b' Cong to One Hale</u><br>Type of Soli at Dig: <u>[] Ay</u><br>Anarard Conglist ( <u>Corganize</u> M. Prov Workmanthin   Inconger Berlding   |  |  |  |  |  |  |
| General:   | 5) Hydrant: Base   Hydrant Seat   Hydrant Branch  <br>Remarks: <u>first long in 6' (A'iW MAR Depair</u><br><u>Shi Conglist</u><br>Proximity of Other Utilities: <u>b' Cong to One Hale</u><br>Type of Soli at Dig: <u>(by</u><br>Apparent Cause of Failure: Corrosion & Poor Workmanship   Improper Bedding  <br>Differentiation Solitance:   Other Courts   Hydrant Via  |  |  |  |  |  |  |
| General:   | 5) Hydrant: Base   Hydrant Seat   Hydrant Branch  <br>Remarks: Lit: Long on 6 NA'iW MAR Depair<br>500 Con glitt<br>Proximity of Other Utilities: Lo' Const To One Hale<br>Type of Soil at Dig: Lay<br>Apparent Cause of Failure: Corrosion   Poor Workmanship   Improper Bedding  <br>Differential Settlement   Other Constr.   Hydrant Usa  <br>Differential Settlement   Other Constr.   Hydrant Usa  |  |  |  |  |  |  |
| General:   | 5) Hydrant: Base       Hydrant Seat       Hydrant Branch         Remarks:       List:       Long and binding       Algebra         State       State       Algebra       Algebra         Proximity of Other Utilities:       List:       Conglist:       Hydrant Branch         Type of Soil at Dig:       List:       List:       Conglist:       Hydrant Branch         Apparent Cause of Failure:       Corrosion       Poor Workmanship       Improper Bedding         Differential Settlement:       Other Constr.       Hydrant Use         Deoth of Frost       In.       Deoth of Snow       In.  |  |  |  |  |  |  |
| General:<br>Additional   | 5) Hydrant: Base       Hydrant Seat       Hydrant Branch         Remarks:       List:       Log Pion       6 MAirW MAR       Poppin         State       State       State       Frozimity of Other Utilities:       16 MairW       MairW       Poppin         Proximity of Other Utilities:       List:       State       State       Poppin         Type of Soil at Dig:       List:       State       State       Poor Workmanship       Improper Bedding         Differential Settlement:       Other Constr.       Hydrant Use       Deoth of Frost       In.       Deoth of Snow       In.       Air Temp         USE REVERSE SIDE IF NEEDED       Improve State       State       State       State       State     |  |  |  |  |  |  |
| General:<br>Additional<br>Data:<br>Dist. Office)                               | 5) Hydrant: Base   Hydrant Seat   Hydrant Branch    Remarks: Litt Domp on 6 MA'rW MAR Dopa'r  Type of Solia to Big: Lay  Apparent Cause of Failure: Corrosion   Poor Workmanship   Improper Bedding    Differential Settlement   Other Constr.   Hydrant Usa    Deoth of Frost In. Deoth of Snow In. Air Temp  USE REVERSE SIDE IF NEEDED  Repair Difficulties: Hand dung on May FAON 36 CAS MAW  |  |  |  |  |  |  |
| General:<br>Additional<br>Data:<br>Dist. Office)                               | 5) Hydrant: Base   Hydrant Seat   Hydrant Branch  <br>Remarks: [Lift Damp and b' MA'IW MAR Dapage<br>   |  |  |  |  |  |  |
| General:<br>Additional<br>Data:<br>Dist. Office)                               | S) Hydrant: Base       Hydrant Seat       Hydrant Branch         Remarks:       List Damp and b' MA'LW MALL Depart         Structure       Structure         Proximity of Other Utilities:       B' Conglist         Type of Soil at Dig:       List         Apparent Cause of Failure:       Corrosion IX       Poor Workmanship         Differential Settlement       Other Constr.       Hydrant Use         Depth of Frost       In.       Depth of Snow       In.         USE REVERSE SIDE IF NEEDED       Repair Difficulties:       Hand dug on Say FAOM 316''       CAS MA'W         Foreman Making Repairs:       W.       Jong       Date Laid or Installed:       Line Say |  |  |  |  |  |  |
| General:<br>Additional<br>Data:<br>Dist. Office)<br>office Data:<br>Engineers) | 5) Hydrant: Base       Hydrant Seat       Hydrant Branch         Remarks:       List:       List:       List:         Proximity of Other Utilities:       List:       List:       List:         Type of Soil at Dig:       List:       List:       List:         Apparent Cause of Failure:       Corrosion       Dor Workmanship       Improper Bedding         Differential Settlement:       Other Constr.       Hydrant Util       Deoth of Frost       In.         USE REVERSE SIDE IF NEEDED       Repair Difficulties:       Hadding Constr.       In.       Air Temp         Date Laid or Installed:  |  |  |  |  |  |  |

#### DataStream Work Order Report

|   | Work order #: 0   | 8-01935685,<br>Status:   | Closed   | LUTER   |   |  |  |  |  |
|---|---|--|--|---|---|--|--|--|--|
| CSR Ticket #<br>Priority<br>Assigned Truck<br>Digger #<br>Water Atlas Page #<br>Water Atlas Page #<br>Water Atlas Page #<br>Water Atlas Page #<br>Dept/Find<br>Action<br>Problem<br>Investigated by<br>Total WO Cost<br>Notes | Status: Closed           08-01935685         Type         Emergency Work           1         Permit #, Date         876759017           WSD913         Permit #, Date         GORDONROH           47         Supervisor         GORDONROH           47         Scheduled Start Date         9/23/08           NDNE         Scheduled End Date         9/24/08           WATER         Activity         W321           Date Started         9/23/08 11:00 PM           Date Completed         9/23/08 11:00 PM           St,702.40         Details: BROKEN 8" WATERMAIN VERFIEDFLOODINGREFER TO REPAIR CREV           STREET AND REPART BM         EMERGENCY DO NOWNOTIFIED ELIZABETH @ D           NOTIFY ALL UTILITIESDIG#-876724393EMERGENCY DO NOW         Created BY: 981768494           CDOT Lame: CRTRLANE         COT Side: ~"           Investigator         "           Investigator         B' WATERMAIN |  |  |   |   |  | W TO DIG<br>DIGGER   |  |  |
|   | User Entered Co   | omments:bad stre   | eet leak notit   | fied and  | made eb   |  | - here been  | etreet di  | in and   |
|   | exposed broken<br>and backfilled.<br>Water Main Brez<br>Type of Pipe: CI<br>Size: 8<br>Type of Break: L<br>Apparent Cause<br>DVM Work Req<br>Street Opening:<br>No. of Openings<br>Alley: NO<br>Size 1: 7x15  | main, cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure: Corre<br>uired to Restore<br>YES<br>: 1   | moved 12' of<br>osion<br>Area  | f broken  | main. ins   | ut down<br>talled 1:                               | , broke<br>2' of di p  | sireer, u  | and and ored wate  |
| Crew Foreman Sign.:   | exposed broken<br>and backflied.<br>Water Main Brez<br>Type of Pipe: Cl<br>Size, 8<br>Type of Break: L<br>Apparent Cause<br>DVM Work Req<br>Street Openings<br>No, of Openings<br>Alley: No. Size 1: 7x15   | main, cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure: Corro<br>uired to Restore<br>YES<br>1   | moved 12' of<br>osion<br>Area<br>Asst. Super   | f broken  | n.:   | ut down<br>talled 1:                               | , broke<br>2' of di p  | sireer, u  | and                                |
| Crew Foreman Sign.:<br>Booked Hours<br>Employee ID  | exposed broken<br>and backfilled.<br>Water Main Bree<br>Type of Pipe: Cl<br>Size, 8<br>Type of Break: L<br>Apparent Cause<br>DVM Work Req<br>Street Openings<br>Aley: NO<br>Size 1: 7x15  | main. cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure. Corro<br>uired to Restore<br>YES<br>1<br>Trade  | moved 12" of<br>osion<br>Area<br>Asst. Super   | f broken  | n.:<br>Date   | Start  | End  | Hours  | Cost   |
| Crew Foreman Sign.:<br>booked Hours<br>Employee ID  | exposed broken<br>and backfiled.<br>Water Main Bree<br>Type of Pipe: CI<br>Size: 8<br>Type of Break: L<br>Apparent Cause<br>DVM Work Req<br>Street Opening:<br>No. of Openings<br>Alley: No.<br>Size 1: 7x15  | main, cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure. Corro<br>uirred to Restore<br>YES<br>: 1<br>Trade<br>LABORER-W  | moved 12" of<br>osion<br>Area<br>Asst. Super<br>Rate Type<br>N                       | rint. Sig   | n.:<br>Date<br>9/23/08  | Start<br>15:00                                     | End 23:00  | Hours<br>8.00  | Cost<br>0.00   |
| Crew Foreman Sign.:<br>looked Hours<br>Employee ID  | exposed broken<br>and backfilled.<br>Water Main Bree<br>Type of Pripe: CI<br>Size: 8<br>Type of Break: L<br>Apparent Cause<br>DWM Work Reg<br>Street Openings<br>Alley: NO<br>Size 1: 7x15  | main, cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure: Corre<br>uired to Restore<br>YES<br>: 1<br>Trade<br>LABORER-W<br>FRNN-WPC   | moved 12' of<br>bsion<br>Area<br>Asst. Super<br>Rate Type<br>N<br>N                  | rint. Sig<br>Rate<br>0<br>41.7  | n.:<br>Date<br>9/23/08  | Start<br>15:00                                     | End<br>23:00<br>23:00  | Hours<br>8.00<br>8.00  | Cost<br>0.00<br>333.60   |
| Crew Foreman Sign.:<br>Booked Hours<br>Employee ID  | exposed broken<br>and backfilled.<br>Water Main Bree<br>Type of Pipe: Cl<br>Size 8<br>Type of Break L<br>Aparent Cause<br>DWM Work Reg<br>Street Openings<br>Alley: NO<br>Size 1: 7x15  | main, cut and re ak & Street Leak ongitudinal of Failure: Corre uired to Restore YES : 1 Trade LABORER-W FRMN-WPC HE   | moved 12° of<br>bsion<br>Area<br>Asst. Super<br>Rate Type<br>N<br>N<br>N             | rint. Sig<br>Rate<br>0<br>41.7<br>41.55   | n.:<br>Date<br>9/23/08<br>9/23/08   | Start<br>15:00<br>15:00                            | End<br>23:00<br>23:00  | Hours<br>8.00<br>8.00  | Cost<br>0.00<br>333.60<br>332.40                                       |
| Crew Foreman Sign.:<br>Sooked Hours<br>Employee ID  | exposed broken<br>and backfiled.<br>Water Main Brez<br>Type of Pipe: Cl<br>Size, 8<br>Type of Break: L<br>Apparent Cause<br>DVM Work Req<br>Street Openings<br>No, of Openings<br>Alley: No<br>Size 1: 7x15   | main. cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure. Corro<br>uired to Restore<br>YES<br>1<br>Trade<br>LABORER-W<br>FRMN-WPC<br>HE<br>MTD                                      | moved 12° of<br>sion<br>Area<br>Asst. Super<br>Rate Type<br>N<br>N<br>N<br>N         | rint. Sig<br>Rate<br>0<br>41.7<br>41.55<br>29.15                                | n.:<br>Date<br>9/23/08<br>9/23/08<br>9/23/08                                  | Start<br>15:00<br>15:00                            | End<br>23:00<br>23:00<br>23:00<br>23:00                            | Hours<br>8.00<br>8.00<br>8.00<br>8.00                                | Cost<br>0.00<br>333.60<br>332.40<br>233.20                             |
| Crew Foreman Sign.:<br>Booked Hours<br>Employee ID  | exposed broken<br>and backfilled.<br>Water Main Bree<br>Type of Pripe: CI<br>Size: 8<br>Type of Break: L<br>Apparent Cause<br>DWM Work Reg<br>Street Openings<br>Alley: NO<br>Size 1: 7x15  | main. cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure: Corre<br>uired to Restore<br>YES<br>: 1<br>Trade<br>LABORER-W<br>FRMN-WPC<br>HE<br>MTD<br>CAULKER                         | Area Area Area N N N N N N N N N N N N N N N N N N N                                 | rint. Sig<br>Rate<br>0<br>41.7<br>41.55<br>29.15<br>39.7                        | n.:<br>Date<br>9/23/08<br>9/23/08<br>9/23/08<br>9/23/08                       | Start<br>15:00<br>15:00<br>15:00                   | End<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00                   | Hours<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00                        | Cost<br>0.00<br>333.60<br>233.20<br>317.60                             |
| Crew Foreman Sign.:<br>Booked Hours<br>Employee ID  | exposed broken<br>and backfilled.<br>Water Main Bree<br>Type of Pipe: CI<br>Size 3<br>Type of Pipe: CI<br>Size 3<br>Type of Pireak L<br>Apparent Cause<br>DWM Work Reg<br>Street Openings<br>Alley: NO<br>Size 1: 7x15  | main, cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure. Corre<br>uired to Restore<br>YES<br>: 1<br>Trade<br>LABORER-W<br>FRMN-WPC<br>HE<br>MTD<br>CAULKER<br>LABORER-W            | moved 12° of<br>psion<br>Area<br>Asst. Super<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N | rint. Sig<br>Rate<br>0<br>41.7<br>41.55<br>29.15<br>39.7<br>0                   | n.:<br>Date<br>9/23/08<br>9/23/08<br>9/23/08<br>9/23/08<br>9/23/08            | Start<br>15:00<br>15:00<br>15:00<br>15:00<br>15:00 | End<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00          | Hours<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00        | Cost<br>0.00<br>333.60<br>332.40<br>233.20<br>317.60<br>0.00           |
| Crew Foreman Sign.:<br>Booked Hours<br>Employee ID  | exposed broken<br>and backfilled.<br>Water Main Bree<br>Type of Pipe: Cl<br>Size: 8<br>Type of Break: L<br>Apparent Cause<br>DVM Work Req<br>DVM Work Req<br>Street Openings<br>Aley: NO<br>Size 1: 7x15  | main. cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure. Corro<br>uired to Restore<br>YES<br>1<br>Trade<br>LABORER-W<br>FRMN-WPC<br>HE<br>MTD<br>CAULKER<br>LABORER-W<br>LABORER-W | Area Asst. Super Rate Type N N N N N N N N N N N N N N N N N N N                     | rint. Sig<br>Rate<br>0<br>41.7<br>41.55<br>29.15<br>39.7<br>0<br>31.55          | n.:<br>Date<br>9/23/08<br>9/23/08<br>9/23/08<br>9/23/08<br>9/23/08            | Start<br>15:00<br>15:00<br>15:00<br>15:00          | End<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00 | Hours<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00        | Cost<br>0.00<br>333.60<br>332.40<br>233.20<br>317.60<br>0.00<br>252.40 |
| Crew Foreman Sign.:<br>Booked Hours<br>Employee ID  | exposed broken<br>and backfilled.<br>Water Main Brex<br>Type of Pipe: CI<br>Size: 8<br>Type of Break: L<br>Apparent Cause<br>DWM Work Req<br>Street Openings<br>Alley: NO<br>Size 1: 7x15   | main. cut and re<br>ak & Street Leak<br>ongitudinal<br>of Failure: Corre<br>uired to Restore<br>YES<br>: 1<br>Trade<br>LABORER-W<br>HE<br>MTD<br>CAULKER<br>LABORER-W<br>LABORER-W<br>MTD    | Area Asst. Super Rate Type N N N N N N N N N N N N N N N N N N N                     | rint. Sig<br>Rate<br>0<br>41.7<br>41.55<br>29.15<br>39.7<br>0<br>31.55<br>29.15 | n.:<br>Date<br>9/23/08<br>9/23/08<br>9/23/08<br>9/23/08<br>9/23/08<br>9/23/08 | Start<br>15:00<br>15:00<br>15:00<br>15:00<br>15:00 | End<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00<br>23:00 | Hours<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00<br>8.00<br>8.0 | Cost<br>0.00<br>333.60<br>233.20<br>317.60<br>0.00<br>252.40<br>253.20 |

# Planning Using GIS

### Layers Displayed

- Existing Water Facilities
- WM Characteristics
- Breaks and Leaks
- 311 Data
- DataStream Work Orders
- Landbase Information
- Coordination with CDOT



### **Current Metering Status**

- Metered accounts:
  - 184,172 accounts
  - High usage industrial, commercial, suburban
  - 80% of water revenue
  - Flat rate of \$2.01 / 1,000 gallons for all customers
  - Technology upgraded to Automatic Meter Reading (AMR)
- Non-metered accounts:
  - 313,311 accounts
  - Low usage single family homes, 2-flats
  - 20% of water revenue
  - Based on the lot size, number of fixtures, etc.

# METERSAVE.ORG

- The word is spreading!
  - Over 10,300 volunteers to date
- People are saving money!
  - Avg. savings is over 50% to date
- People are saving water!
  - Customers say they pay more attention to their water use
- Effect of the economy
  - people are looking for ways to save money
- Significant IT and Operational changes were needed to make the process fast & effective
  - Over 5,400 meters installed so far; goal for 2011 is 7,000 more!
  - Work culture change paperless, automated, website driven