Capacity Development Project for Non Revenue Water (NRW) Reduction In Colombo City.

Training program on GIS Mapping

Introduction to AutoCAD MAP

USE OF AUTOCADMAP IN THE PROJECT

OBJECTIVES OF THE PRESENTATION

- Discuss the features of AutoCADMap in brief.
- Different stages of Data Conversion and How AutoCADMap has been used for Data Conversion.

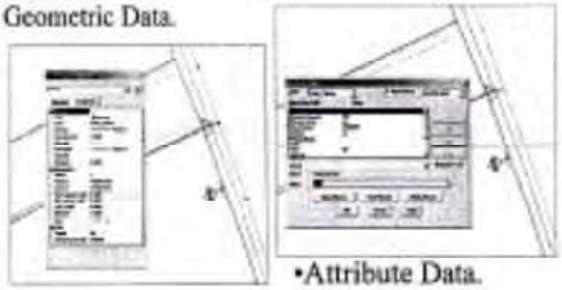
FEATURES OF AUTOCADMAP

What is AutoCADMap 2000?

- It is a GIS software by Autodesk.
- In the Project AutoCADMap has used as a conversion tool.

What kind of Data could it convert?

- Geometric Data.

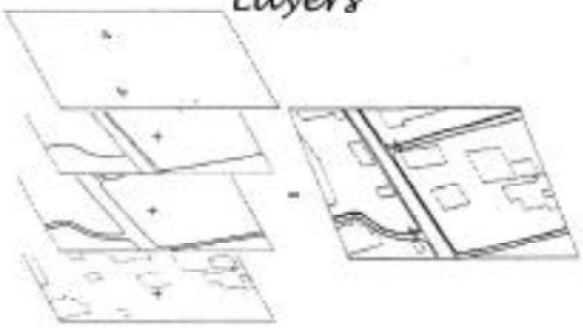


•Attribute Data.

How Data can be organize with AutoCADMap ?

- Geometric Data – categorize in to different **Layers**
- Object Data - create different **Object Data Tables**

Data organized into Layers



Different Object Data Tables for Feature Classes

Water_ pipeline	Water_fire _hydrant	Water_ valve	Water_ Office	Water_ meter	Water_ Station	Water_ Storage
Digitized_ Date	Digitized_D ate	Digitized_D ate	Digitized_D ate	Digitized_D ate	Digitized_D ate	Digitized_D ate
Distance	Map_numb er	Map_numb er	Map_numb er	Map_numb er	Map_numb er	Map_numb er
Diameter_U nit	Type	Type	Type	Type	Type	Type
Map_numbe r	Status	Diameter	Material	Account_ Number	Diameter_ outlet	Capacity
Material	Valve	Material	Status	Importance	Diameter_ sludge	Water_leve l_Top
Project Name	Valve_H_ No	Valve_H_ No			Pump	Water_leve l_bottom
Class	Installed_ye	Status				Overflow_l evel

How to create Maps with AutoCADMap?

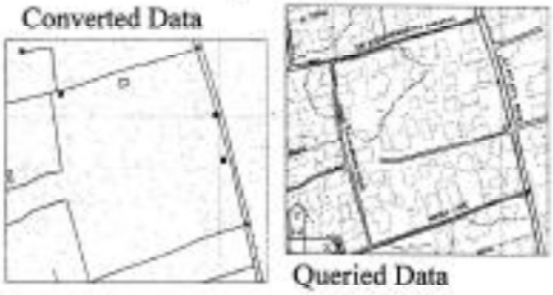
- Digitizing
- Import Data of other formats such as
  - MicroStation Design File (*.dgn)
  - MapInfo Interchange File (*.mif)
  - ArcView Shape File (*.shp)
  - ARC/INFO Coverage

How to Analyze Data with AutoCADMap?

- Data can be query and analyze with AutoCADMap

Data analyzed with Query

Converted Data



Queried Data

DIFFERENT STAGES OF DATA CONVERSION & HOW AUTOCADMAP HAS BEEN USED FOR DATA CONVERSION

OBJECT DATA

Object data is text information attached to objects in your drawings. To use object data, create tables of information, and then attach specific records from the table to the objects. Use object data tables to save any kind of information, such as the diameter, material, type or class of water pipelines. Depending on the application kind of information may vary from the flow of traffic, or the cost of an electrical outlet, lot sizes, property values to the brand of computer on each employee's desk.

You can view and edit the data, and run queries based on information in the tables. For example, you can find all pipes larger than a certain diameter, or all property lots worth more than a specified amount.

1.1DEFINE OBJECT DATA TABLES

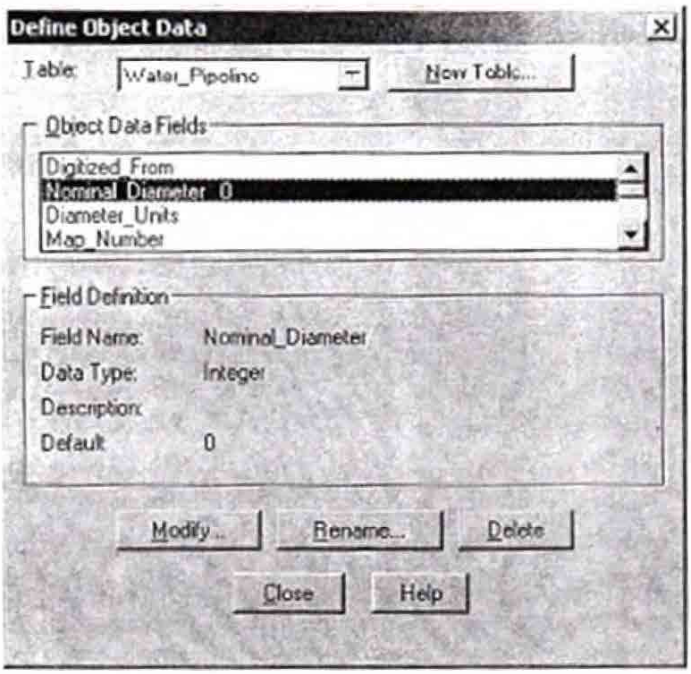


Figure 1-1 Define Object Data Dialogue Box.

Object data tables store text information related to an object. To create an object data table, do the following: (Command Line: ADEDEFDATA).

1 From the Map menu, choose Object Data-> Define Object Data.

2 In the Define Object Data dialog box, select a table to modify, or click New to create a new table. If you select an existing table, the Data Fields list displays fields already defined for the table.

If you click New, enter a name for the new table.

3 To create a new data field, fill in the Field Definition area:

Enter a name and description for the field. Enter a description that will help you remember what the field is when you view this information later. Select the field type. The type specifies what kind of information can be entered in the field. Specify the default value for the field. This value is automatically attached to the object unless you change it.

4 Click the Add button to add the new field to the table.

5 Add any additional fields to the table.

1.2 ATTACH OBJECT DATA

When you attach data to an object, you attach all fields from the table, so create tables that have the fields you need. You can create more tables, and you can attach as many tables to an object as you wish. (Command Line: ADEATTACHDATA)

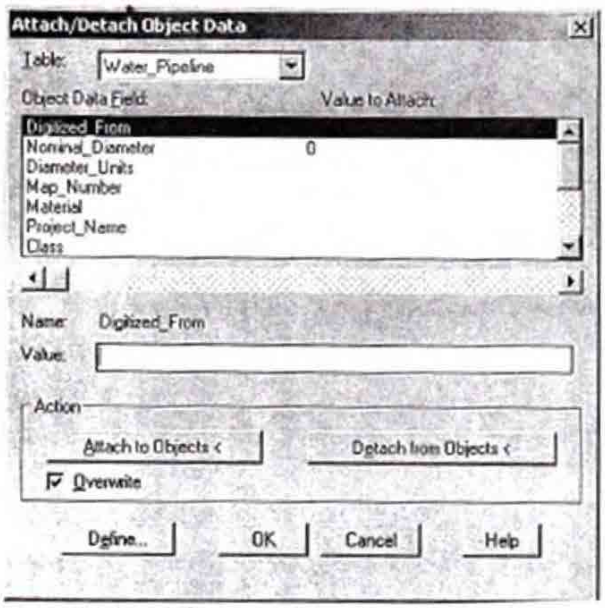


Figure 1-2 Attach/Detach Object Data Dialogue Box.

To attach data to an object, do the following:

1 From the Map menu, choose Object Data-> Attach/Detach Object Data.

2 In the Attach/Detach Object Data dialog box, select a table.

3 Review the default values for the fields in the table.

To change a value, select the data field, type a new value in the Value box, and press ENTER.

4 To overwrite any values for this table already attached to the object, check the Overwrite checkbox. If this box is not checked, the object will have both the old and the new values attached.

5 Click the Attach To Objects button.

6 Select the objects.

1.3 DETACH OBJECT DATA

You can always detach data from an object, to which data has been attached. (Command Line: ADEATTACHDATA)

To detach data from an object, do the following:

1 From the Map menu, choose Object Data-> Attach/Detach Object Data.

2 In the Attach/Detach Object Data dialog box, select the table you want to detach from the object.

3 Click the Detach From Objects button.

4 Select the objects.

1.4 EDITING OBJECT DATA

You can always view or modify already attached data to an object. To view or modify data: (Command Line: ADEEDITDATA)

1 From the Map menu, choose Object Data Edit Object Data.

2 Select the object whose data you want to view.

3 In the Edit Object Data dialog box, review the values for each data field.

4 To change a value, select the data field and enter a new value in the Value box at the bottom of the screen.

5 To view object data from another table, select the table from the Table list.

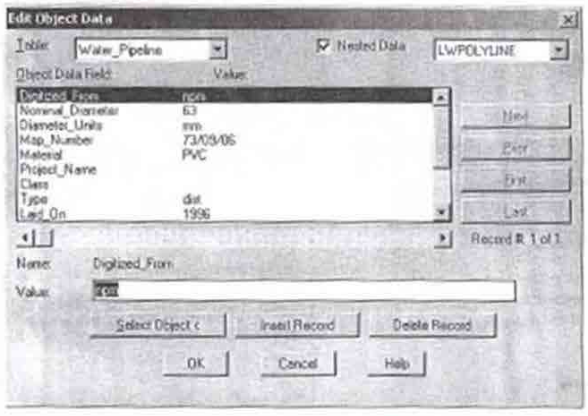


Figure 1-3 Edit Object Data Dialogue Box

DIGITIZING

Digitizing is the process of converting paper-based graphical information into a digital format. One-way to input existing maps into AutoCAD Map is to use a digitizing tablet to trace, or digitize the map. The digitizing tablet is usually connected to your computer through a serial port.

2.1 HEADS UP DIGITIZING

Heads up digitizing is the process of converting data into a digital format on the computer screen. A digitizing tablet is not required for this process. The map is inserted to the screen as a raster image and digitizing is done on top of the raster image. (Refer Chapter 4, Working with Rasters.)

2.2 DIGITIZING SET UP

Before you begin digitizing, you must set up your digitizer and specify digitizing options. (Command Line: MAPDIGISETUP)

To specify digitizing options

2.2.1 LINEAR OBJECTS

1 From the Map menu, choose Data Entry-> Digitize Setup.

2 In the Digitize Setup dialog box, select object type as Linear to digitize polylines.

3 To attach data to objects as you digitize them, select the Attach Data check box. Then click the Data To Attach button and select the table to use for the data. As you digitize the objects, you are prompted for the data to attach to the object.

4 To change the label point for objects as you digitize them, select the Prompt For Label Point check box.

5 Specify the layer for new objects.

6 Specify the block to use when creating the new objects.

7 Specify whether to snap insertion point.

Select whether the objects are 2D or 3D. For 2D objects, specify a width.

Click OK to close the dialog box and save your settings.

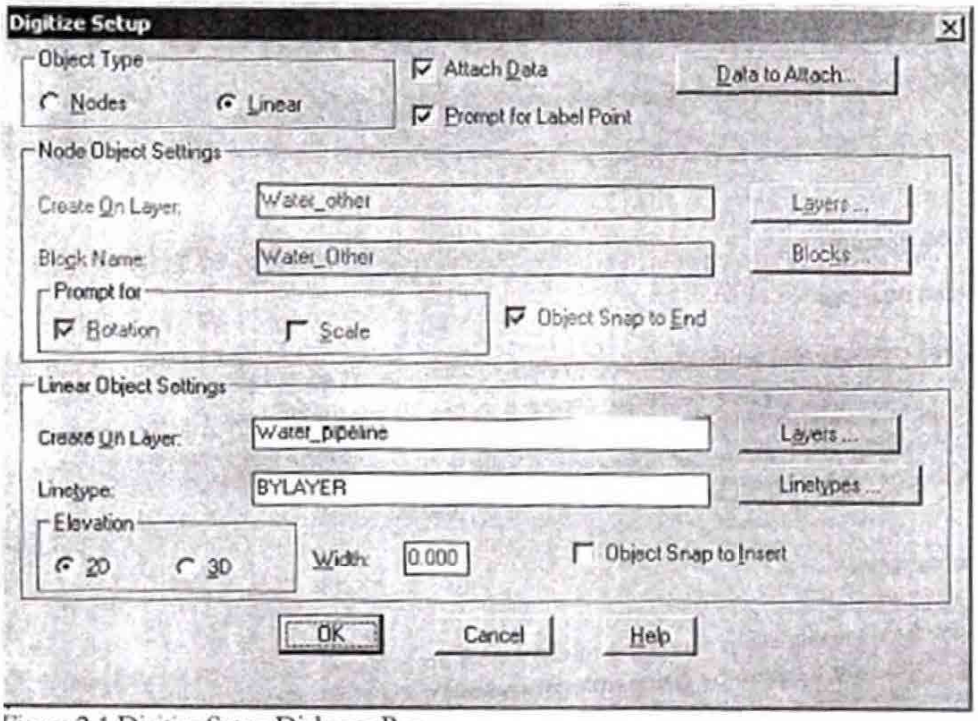


Figure 2-1 Digitize Setup Dialogue Box.

2.2.2 NODE OBJECTS

1 From the Map menu, choose Data Entry-> Digitize Setup.

2 In the Digitize Setup dialog box, select object type as Nodes to digitize points or blocks.

3 To attach data to objects as you digitize them, select the Attach Data check box.

4 Then click the Data To Attach button and select the table to use for the data. As you digitize the objects, you are prompted for the data to attach to the object.

5 To change the label point for objects as you digitize them, select the Prompt For Label Point check box.

6 Specify the layer for new objects.

7 Specify the block to use when creating the new objects.

8 Specify whether to snap to the closest endpoint

9 Select whether you want to specify the rotation and scale of each node block.

10 Click OK to close the dialog box and save your settings.

2.3 THE DIGITIZING PROCESS

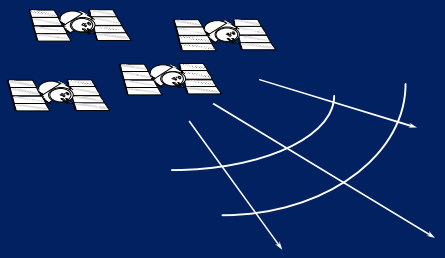
2.3.1 DIGITIZING LINEAR OBJECTS

Before start digitizing, set the digitizing setup according to digitize set up in above 2.2.1 Then select Data Entry Digitize from the Map menu. Digitize by giving necessary points as input and press Enter and you will be prompted with the relevant Object Data Table. Enter the values to Object Data Fields and select OK. If you have selected Prompt for Label Point now it will prompt for the Label Point otherwise you can start digitizing the next line. (Command Line: MAPDIGITIZE)

2.3.2 DIGITIZING NODE OBJECTS

Before start digitizing, set the digitizing setup according to digitize set up in above 2.2.2 Then select Data Entry Digitize from the Map menu. Digitize by giving necessary point for the Node Point and press Enter and you will be prompted with the relevant Object Data Table. Enter the values to Object Data Fields and select OK. If you have selected Prompt for Label Point now it will prompt for the Label Point otherwise you can start digitizing the next node. (Command Line: MAPDIGITIZE)*Surveying poles, Theodolites, EDM (Electronic Distance Meter), Total Station and GPS (Global Positioning System).*

GPS (Global Positioning Systems)



K Jagath Ananda

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Agenda

- Global Positioning System
- What is GPS
- How Accurate is GPS/ Accuracy
- Ensuring Good Quality Data
- Errors of GPS
- Differential Correction
- Examples of Maps
- GPS for GIS Data Collection
- GPS Applications for GIS
- GPS Used Industries
- Data Dictionary
- Data Collection Techniques
- Data Processing/ Display & Export
- Maintaining GIS

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Global Positioning System

- A utility
- An information technology
- An enabling technology
- Used in many industries

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Characteristics of GPS

- Free
- Accurate
- Reliable
- Worldwide
- Unlimited user capacity

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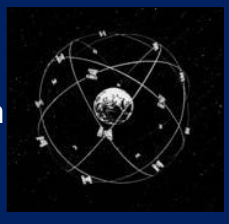
What is GPS?

A very precise positioning system

- Developed and maintained by the US Department of Defense
- Satellite-based
  - 24 satellites
  - Satellites in very high orbit (20,200 km)



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How Accurate is GPS?

Depends on some variables

- Time spent on measurements
- Design of receiver
- Relative positions of satellites
- Use of Differential Techniques

6

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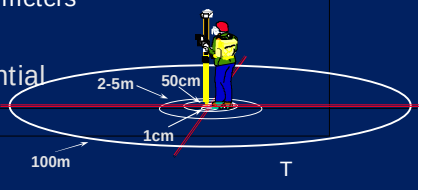
Accuracy

- Autonomous
  - 15 meters
- Differential
  - Two to five meters
  - Sub-meter
- Phase Differential
  - Decimeter
  - Centimeter



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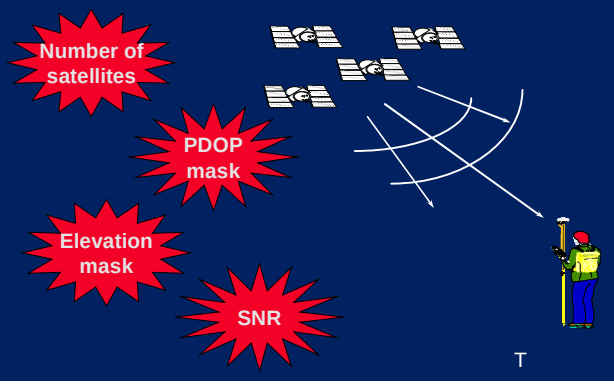
Ensuring Good Quality Data



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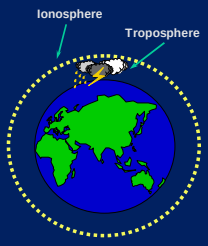
Errors of GPS

Atmospheric corrections

Receiver estimates delays on the signal as it passed through the atmosphere

Multipath
Clock Errors



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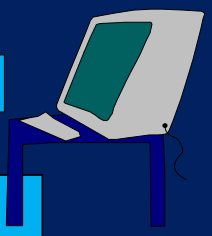
Differential Correction

Differential correction

Field data processed to remove and other systematic errors



Errors can be reduced in either:
Real-time mode (in the field)
Postprocessed mode (in the office)

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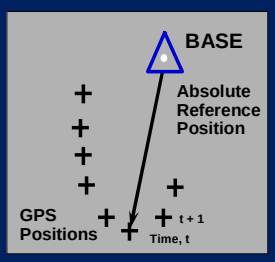
Differential Correction

- A GPS receiver is setup at a known location
  - Called a 'Base Station'

This receiver knows precisely where it is…

…so the error can be calculated



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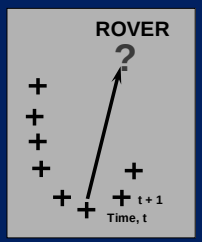
Differential Correction

- While you collect positions at many different locations
  - You do not know where you are



At the same time - the errors occurring at one location are occurring everywhere within the same vicinity…

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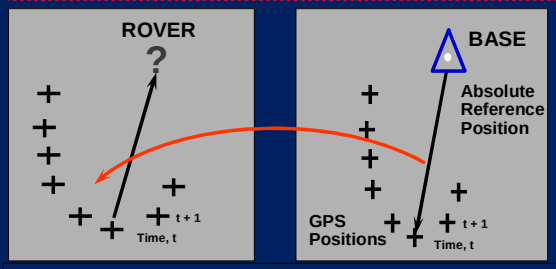
⑤ Introduction to GPS (Seminar for Management Level)

Differential Correction



...So the error calculated at the base station can be applied to the positions collected by the roving receiver...

Correcting the roving receivers positions

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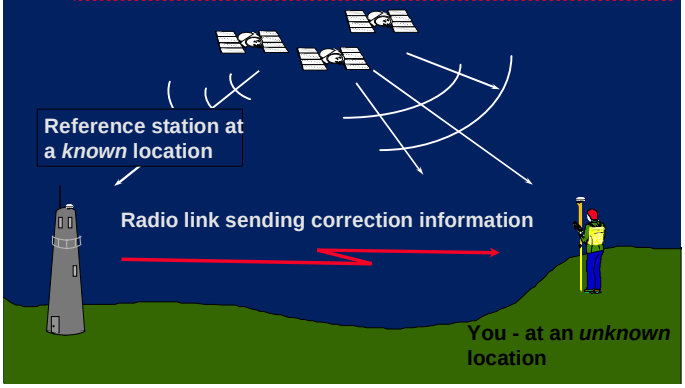
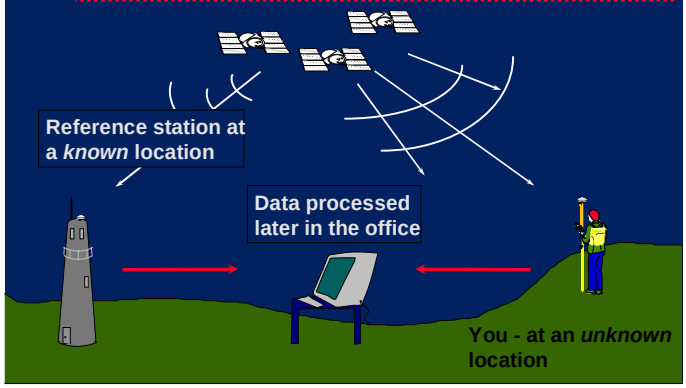
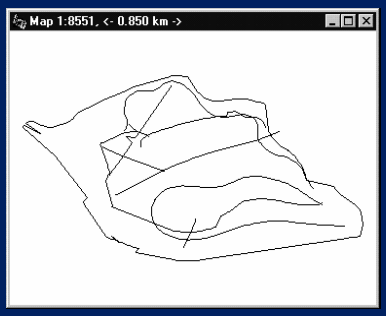
Real-time Differential



Postprocessing Differential



Example of Uncorrected File



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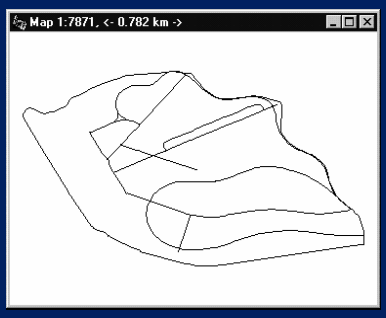
Example of Corrected File



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GPS for GIS Data Collection

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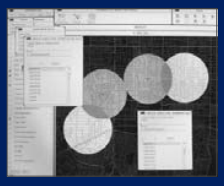
What is GIS?

- Geographic Information System
- Database management system for *spatially* distributed features and attributes
  - Spatial data collection
  - Management
  - Display
  - Analysis and research
  - Decision making



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So . . . Why Use GPS for GIS Data Collection?

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GPS Used Industries

Why GPS…

- Accurate positions for points, lines and areas
  - GIS data collection
- Navigate to existing features
  - Data update and verification

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Creating a Data Dictionary

Description of features & attributes

- Created in the office
- Prompts you in the field to enter attribute information

Feature name:	**Pole**
Feature type:	**Point**
Attribute names:	**ID, Height, etc**
Attribute values:	**TG58, 15m, etc**

- Different data dictionaries for different jobs

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Features in a Data Dictionary

- Points
  - one position
- Lines (Arcs)
  - positions joined together
- Areas (Polygons)
  - positions joined together to enclose the area

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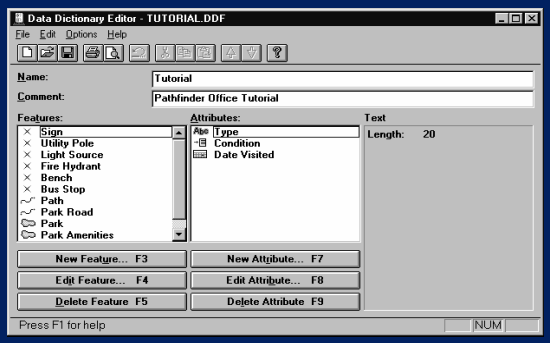
⑤ Introduction to GPS (Seminar for Management Level)

Data Dictionary



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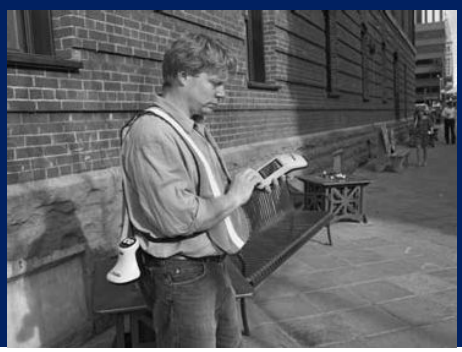
Data collection in the field



In the Field

- Visit (or traverse) the site
- GPS positions recorded automatically
- Enter features and associated attributes
- Check data,
- Export to the Database

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Data Collection Techniques

- Special techniques for collecting data quickly and effectively
  - Repeated features
  - Nested points
  - Segmented lines
  - Offsets

28

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Repeating Features

- Attributes from a previous feature can be repeated
  - Saves time
- Useful when recording many similar features
  - Power poles
  - Trees
  - Utility access covers

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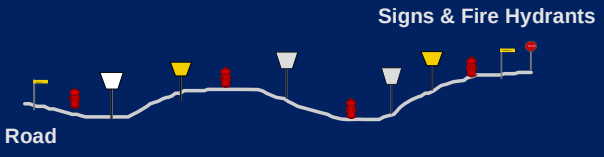
Nesting Point Features

- Point features captured while recording a line or area feature
- No need to retrace steps



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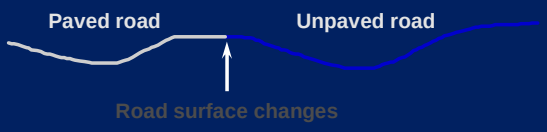
Segmenting Lines

- Divides line features into segments
- Different attributes for each segment
- Ensures connected lines for GIS



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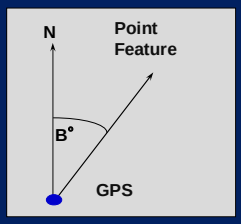
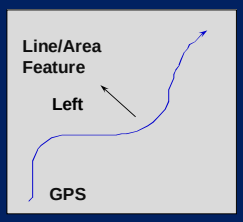
Offsets

- Collecting the location of a feature without actually visiting the feature





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External Sensor Recording

- GPS linked/ Built in to other electronic devices such as
  - Laser range -finders
    - for distances, offsets and heights
  - Digital Cameras
    - for photo images of features

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Processing Back in the Office

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Processing the Data

- Process data
  - Differential correction
  - Edit data
- Transfer data to office computer
- Export to GIS

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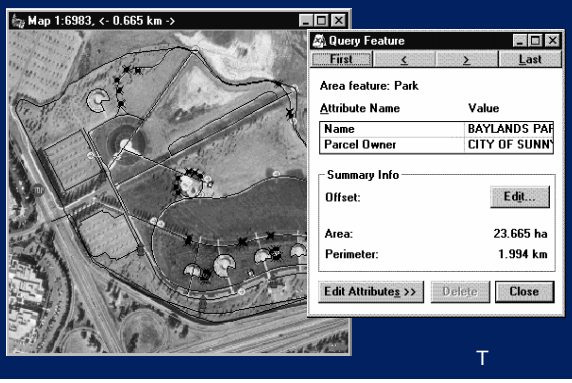
Display Collected GPS Data



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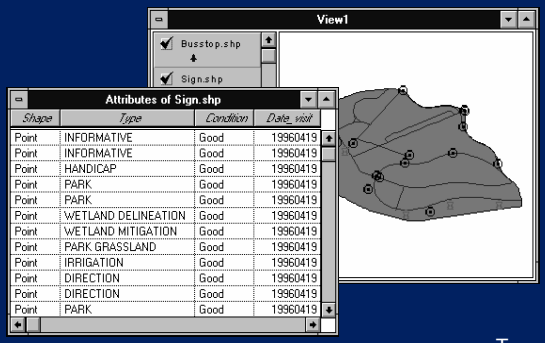
⑤ Introduction to GPS (Seminar for Management Level)

GIS Export



Shape	Type	Condition	Date_visit
Point	INFORMATIVE	Good	19960419
Point	INFORMATIVE	Good	19960419
Point	HANDICAP	Good	19960419
Point	PARK	Good	19960419
Point	PARK	Good	19960419
Point	WETLAND DELINEATION	Good	19960419
Point	WETLAND MITIGATION	Good	19960419
Point	PARK GRASSLAND	Good	19960419
Point	IRRIGATION	Good	19960419
Point	DIRECTION	Good	19960419
Point	DIRECTION	Good	19960419
Point	PARK	Good	19960419

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Maintaining GIS

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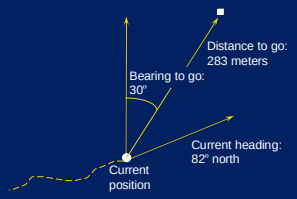
Updating the Data

- Take existing data to the field
  - GPS used to navigate to features
  - Update Attribute information quickly and easily



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Thank You

for your valuable time

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Annex -3 Training Materials (7)

(8) Presentation Materials for Seminar Held on 28th February, 2012

List of Materials

①: Brief Explanation on the Project
②: Findings in Training Program in Japan
③: Findings in Technical Exchange Program in Indonesia
④: Usage of GIS
⑤: Results of the Pilot Project Activities in Borella
⑥: Results of the Pilot Project Activities in Kotahena
⑦: Similar Activities in Other Areas
⑧: PR Activities
⑨: Dissemination of Activities to the Other Areas

THE CAPACITY DEVELOPMENT PROJECT FOR NRW REDUCTION IN COLOMBO CITY

Purpose of the Project

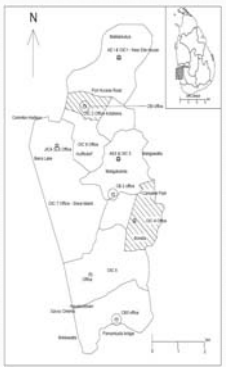
- NWSDB Capacity to implement NRW reduction activity in Colombo City is Strengthened

Outcome of the Project

- Management Capacity of Senior Officers of RSC (W-C) to Plan and Supervise NRW Reduction Activities is Enhanced
- Technical and Operational Capacity to Conduct NRW reduction activities by officer / Staff of RSC (W-C) is Developed

Colombo City - 2008

Location of Pilot Project Area 2009



NRW Components

- Leaks
- Unauthorized consumption
- Administrative losses
- Free water

(8) Presentation Materials for Seminar Held on 28th February, 2012

①: Brief Explanation on the Project

Resources and Funding

- Foreign Experts
- Local Engineers
- Equipment
- Transport
- Grant Funds (No cost to GOSL)

Equipment Provided

Training

- On the Job Training
  - Asset Management Equipment,
  - Geographic Information System (GIS)
- Class Room – EA's, Fitters
- Field Work Shop – EA's, Fitters
- Other Country Exposure
  - Training in Japan
  - Technical Exchange program – Jordan, Indonesia

Public Relation

- Identification of NWSDB Staff
- Gift for Cooperation

Saying of Confucius

"I hear I forget,

I see I remember,

I do I understand"

Thank You

(8) Presentation Materials for Seminar Held on 28th February, 2012

②: Findings in Training Program in Japan

OUTCOME OF THE TRAINING COURSE IN TOKYO, JAPAN ON NRW REDUCTION

3rd to 11th November, 2011
NWSDB, Sri Lanka

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OUR TEAM

2

1. SCHEDULE

- 4/Nov (Fri)
  - AM: Registration and Briefing
  - PM: (L)Good Public Relations and NRW Reduction
- 7/Nov (Mon)
  - AM: (F)Visit Tokyo Water History Museum
  - AM: (F)Visit The Water Supply Operation Center
  - PM: (L)Measures for preventing Water leakage conducted by Bureau of Waterworks Tokyo Metropolitan Government
- 8/Nov (Tue)
  - AM: (F)Visit Asaka Water Purification Plant
  - PM: (L)Utilization of GIS in waterworks

(L):Lecture (F):Field Study (D):Discussion

3

1. SCHEDULE CONT.

- 9/Nov (Wed)
  - AM: (L)PR activities by waterworks bureau
  - AM: (F)Visit Call Center
  - PM: (D)Wrap-up for the training course / Preparation for the presentation of training outcome
- 10/Nov (Thu)
  - AM: Presentation and course evaluation

(L):Lecture (F):Field Study (D):Discussion

4

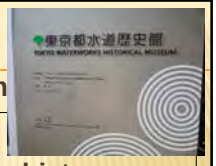
4/Nov (Fri)L

Impression/Findings Good Public Relations and NRW Reduction

- Japanese meter reader's role for collecting information about customer's water consumption pattern
- Upgrade the attitude of meter readers for better communication (to have good relationship with customer)
- Awareness programs for public and school children
- Introduce uniform for meter readers
- Periodical replacement of water meter in order to keep accuracy
- Collecting leakage information through meter readers and public
- Provide transportation and equipment with meter

7/Nov.(Mon)

Impression/Findings - Tokyo Water History Museum



- Importance of having water history museum
- Collection of available historical information and materials to set up a museum
- Importance of Preparing some models for existing water supply schemes

6

(8) Presentation Materials for Seminar Held on 28th February, 2012

②: Findings in Training Program in Japan

SOME MODELS AT HISTORY MUSE

7

8

Impression/Findings - Water Supply Operation Center

9

WATER SUPPLY OPERATION CENTER

- Comprehensive monitoring of water pressure and volume at all the purification plants, transmission and distribution system
- Operation center finds out possible leakage and gives instruction to react quickly
- Utilizing VSD and booster pumps to improve low pressure areas

10

Impression/Findings

Measures for preventing Water leakage
conducted by Bureau of Waterworks Tokyo Metropolitan Government

- Use of Leakage detection instrument
- Stainless steel pipe is used for service connection
- Introducing mobile leakage repair gang
- Zoning of pipeline network and installation of bulk meter
- Measuring minimum night flow to know the magnitude of water leakage
- Introducing zone valves for leakage repair

TRAINING CENTRE

12

(8) Presentation Materials for Seminar Held on 28th February, 2012

②: Findings in Training Program in Japan

8/Nov(Wed) **Impression/Findings (Asaka Water Purification Plant)**

- Proper communication with the control system
- Control of production with weather pattern
- Advanced treatment system (by using ozone and biological activated carbon) is introduced
- Children can drink water directly from the tap
- Minimum maintenance staff
- Uniform for staff

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14

Impression/Findings
Utilization of GIS in waterworks

- Maintaining and updating database including important parameters
- Mapping of proper pipe network details
- Pipe network analysis

15

9/Nov(Wed) **Impression/Findings**
PR activities/Call Center waterworks bureau

- Disconnection method
- Tracing of unpaid customers
- Outsourcing of call center activities
- Real time display of the number of inquiries
- Strict security system
- Actively conducting publicity campaigns

16

17

10/Nov(Thu) **What we would like to tell/disseminate to our colleagues**

- Sharing the knowledge with other staff
- Prepare action plan considering the knowledge gained from this training course
- Conducting awareness programs for public and school children
- Enhancing positive attitude of meter readers and other employees
- Introducing uniforms for meter readers and waterworks staff

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What we would like to tell/disseminate to our colleagues / What we would like to do after going back

- Introducing zoning concept
- Procurement of leakage detection instrument
- Introducing mobile leakage repair gangs
- Replacement of defective water meters
- Promotion of call center activities
- Modeling pipe network

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JAPANESE FOOD

20

THANK YOU

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Study Tour in Indonesia

December 2011

NRW Reduction Team, NWSDB

Tecnical Exchange Programme

Water supply schemes at city of Makassar

- *NWSDB team were welcome by MFO & PDMA Makassar office*
- *Meeting held with PDMA officials and presented their NRW activities under JICA pilot project areas*

Demonstration of leak Detection Equiptments

- *PDMA –Makassar staff demonstrate their leak detection equipements and their usage*

Monthly progress meeting of 4 PDMAS

Attende monthy PIU meeting at Bantimurung.

NWSDB presented their NRW pilot project activities.

- *4PDMAs presented their NRW activities and their water supply systems.*
- *End of the presentation 4 PDMAs staff and NWSDB staff shared about their experience about NRW.*

Evaluation of knowledge

- *NRW comprehention test (type of NRW components)*
- *Competence to operate leak detection equipments*
- *Discussed the effective operating systems of equipments and better selection*

(8) Presentation Materials for Seminar Held on 28th February, 2012

③: Findings in Technical Exchange Program in Indonesia

Sources of raw water

- *Site visit to Billi billi dam (reservoir)*
- *Cater to two water supply schemes in Makassar and Takalar*
- *Reservoir reservation is highly restricted for public*
- *Turbidity was higher*


Pilot project in Makassar

- *Field visit to JICA pilot project area Makassar*
- *316 No. of connection*
- *4"district meter*
- *487m length of4" dia. PVC main 310m length of 2" dia PVC branches.*


PDMA GOWA

- *Presentation made by NWSDB about NRW activities in Colombo*
- *Presentation made by PDMA Gowa about their NRW activities*
- *Discussion with GIS Management team*
- *Site visit to WTP, Intake*


PDMA Takalar

- *Presentation made by NWSDB about their NRW activities in Colombo*
- *Discussion with NRW reduction team Takalar*
- *Field visit with leak survey equipment*


Comparision of NRW Activities in Pilot Zones

Scheme	Colombo		Gowa		Makassar		Takalar		Maros	
	Zone 1	Zone2	Zone 1	Zone2	Zone 1	Zone2	Zone 1	Zone2	Zone 1	Zone2
No of Consumers	320	569	651	235	316	341				
Age of Selected area	Older than 100 years		Less than 20 years		Less than 20 years		Less than 20 years		Less than 20 years	
Isolation of Pilot zone - No of input and output	Greater than 05		Less than 03		Less than 03		Less than 03		Less than 04	
Reduction of NRW										
Initial	83	55	13.7	39	11.2	28.8	36	37	61.1	
Final	52	16	4.7	14	5.5	12.7	21	17	26.6	

Pilot Project Gowa

- *651 No. of connections*
- *2 No. of district meters (4' &3")*
- *480m length of 4"dia PVC, 150m length of 3"dia PVC mains with 2"& 1 ½'branches*

Outcomes from NRW pilot project activities

- *Significant increase in minimum and maximum pressure*
- *Identification of NRW in each pilot zones*
- *Implimentation of NRW reduction methology under guidence of JICA expert team*
- *Improvement of technical capacity of NRW reductin teams with aid of sofisticated equipments .*

- *In Colombo it is difficult to isolate zones due to unknown pipe lines & connections. But in PDMA sites it is easy to isolate.*

General Comparision

	Indoneasia	Sri Lanka
1	Each PDMA have their own Tariff system	One system for through out the Country
2	Revenue vs collection efficiency is 80%	100%
3	No free water supply	10% of water production is for free water outlets
4	Leak rectification can be done at any time of the day	Only at night time
5	Disconnection for arrases are carried out after six month	Disconnection for arrases are carried out based on amount of arrears

GIS Activities

- *Application of GIS mapping system recently implemented under the JICA expert guidence.*
- *In 04 PDMAs already started GIS application and use for day to day activities*
- *We gained a knowledge of GIS application with main components, application model , how to collect data, structure of data, desktop mapping , their processing and final out come.*

Sharing of Knowledge

- *The methdologies of reduction NRW at 04 PDMAs were discusussed with their officials.*
- *We had a oppertunity to familier with leak detection equipments as leak noise Correlator, Non metal pipe locator, etc*
- *Self meter reading display card for house closed premises*
- *PDMA staff wearing uniforms, but not in NWSDB staff*

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Capacity Development Project
For Non Revenue Water (NRW) Reduction
In Colombo City.

GIS ACTIVITIES IN PILOT AREA

Activities

- Preparation of Base map using satellite image.
- Collection of field data using GPS
- Preparation of Spatial Database.

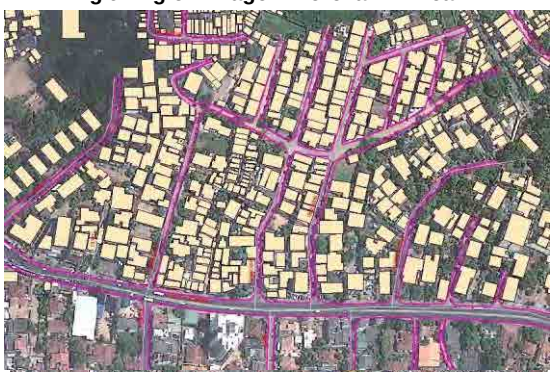
Available digital data at NWS&DB for Colombo city

- Base map
  Developed under Norad Project using areal Photograph in 2000.
- Water utility network
  Developed under Norad Project using Norplan maps, as built data and field information. (2000 – 2006)

Reason to Update Base Map

Satellite image – Borella B4 Area

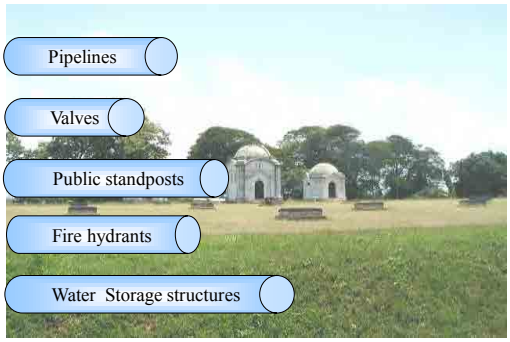
Digitizing on image – Borella B4 Area



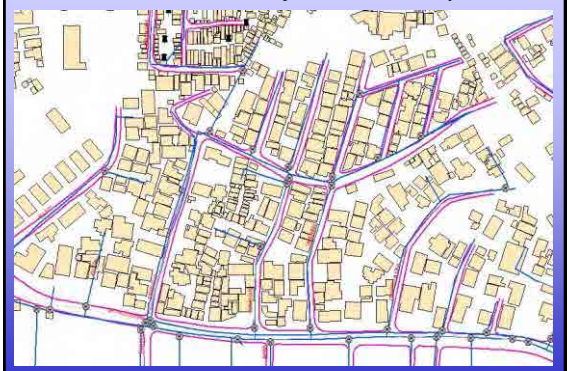
Other Digitized Base map features

- ❑ Water bodies
- ❑ Railways
- ❑ Vegetation Boundaries
- ❑ Other important Structures

Available digital data at NWSDB

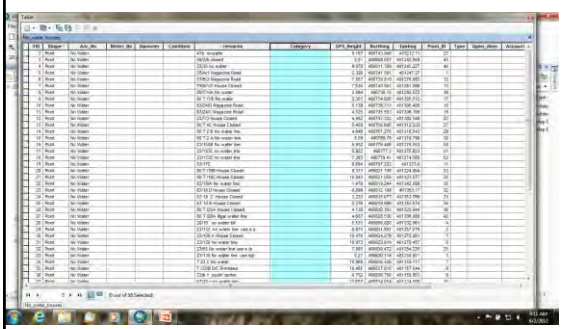


Water distribution system on Base map



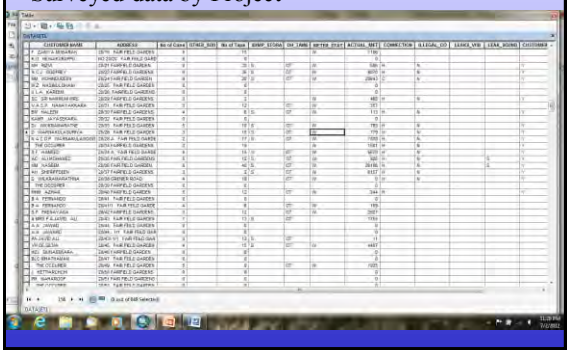
Field information on Base map

Data collection by GPS Field survey



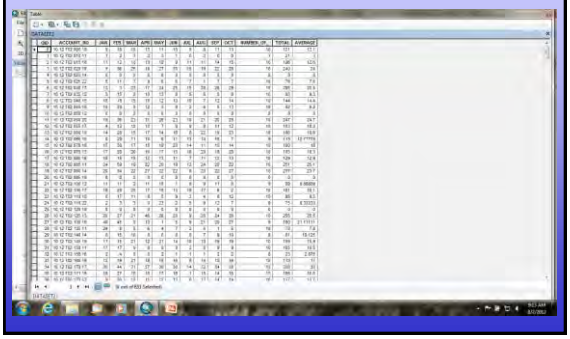
Other data sources

Surveyed data by Project

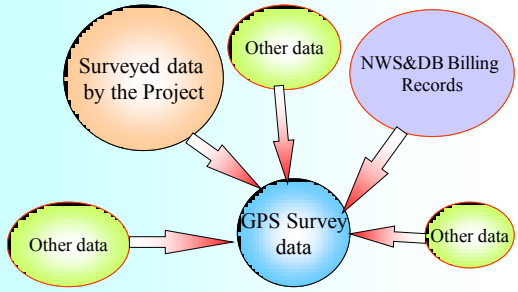


Other data sources

Customer Data from NWS&DB (Billing Records)



Data Manipulation

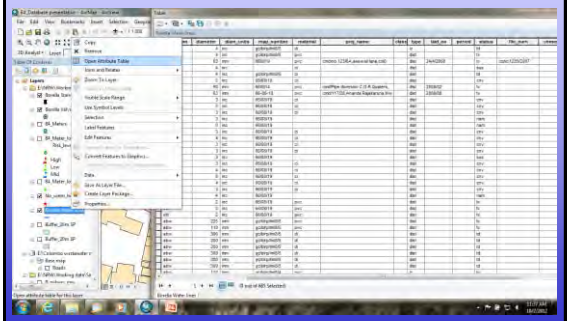


Examples for GIS usage

- Exploring information of pipe lines, Valves, Stand post, & ect.
- Selecting of High priority illegal connections
- Response to customer complains can be expedited
- Maintain Repair records easily & edited quickly
- Many more…..

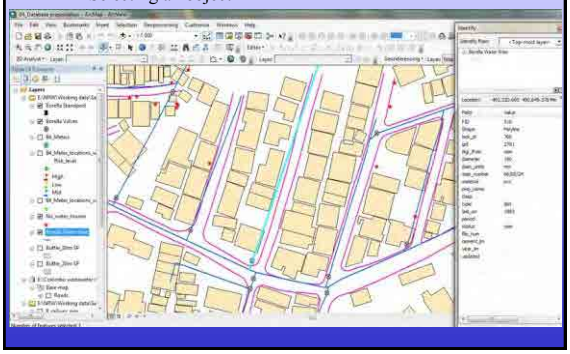
Exploring pipe information

By attribute Table



Exploring pipe information

Selecting an object



Exploring pipe information

Querying Objects

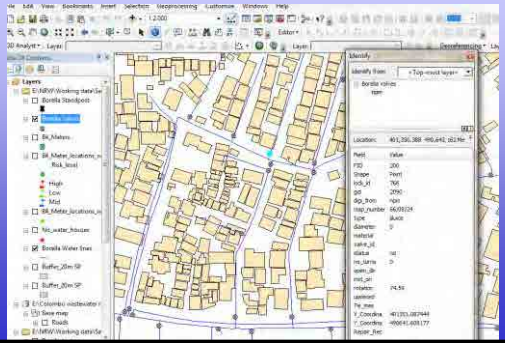
Annex -3 Training Materials (8)

④ Usage of GIS

(8) Presentation Materials for Seminar Held on 28th February, 2012

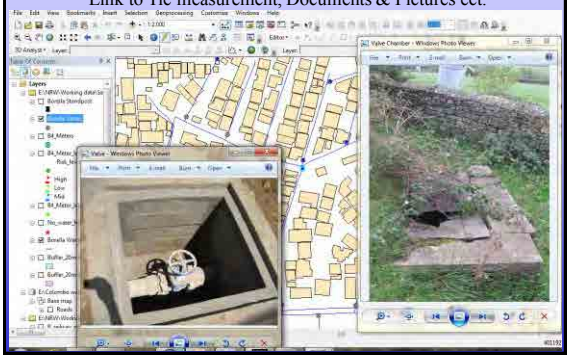
Exploring Valve information

Same thing can be done as pipelines



Exploring Valve information

Link to Tie measurement, Documents & Pictures ect.



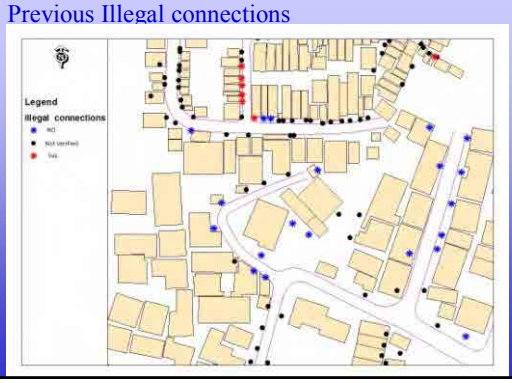
An Idea to Select suspected illegal connections

Parameters to be used

- ❑ Previous Illegal connections
- ❑ No water connections
- ❑ Extremely low consumption
- ❑ Distance from Public Stand post

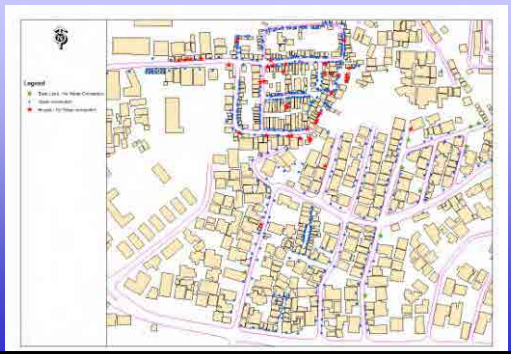
Select suspected illegal connections

Previous Illegal connections

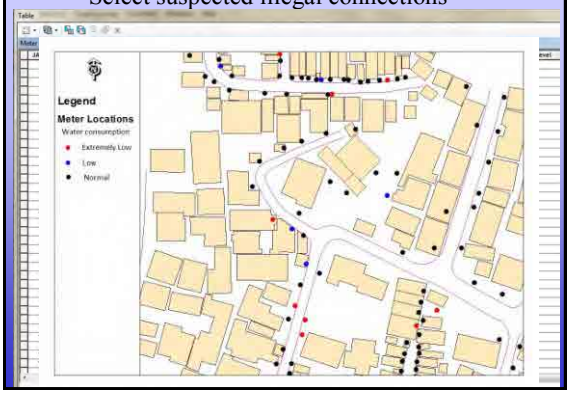


Select suspected illegal connections

No water connections



Select suspected illegal connections



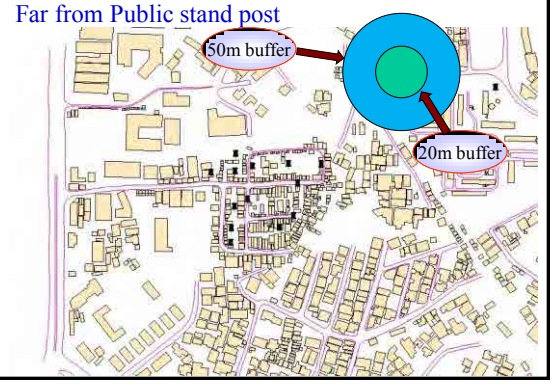
Annex -3 Training Materials (8)

④ Usage of GIS

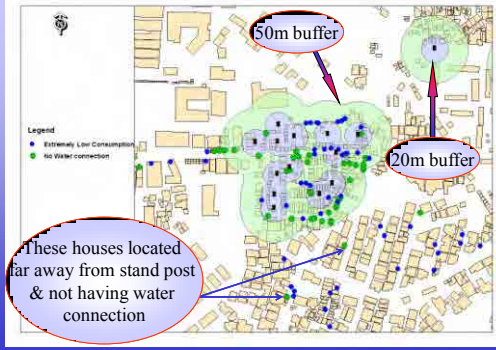
(8) Presentation Materials for Seminar Held on 28th February, 2012

Select suspected illegal connections

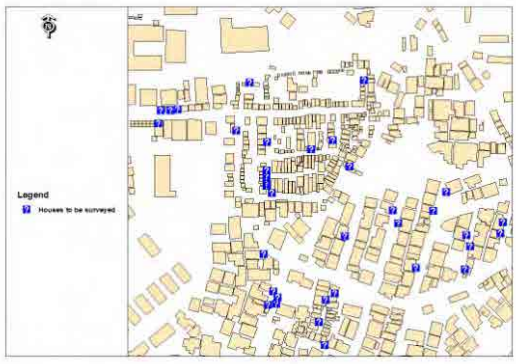
Far from Public stand post



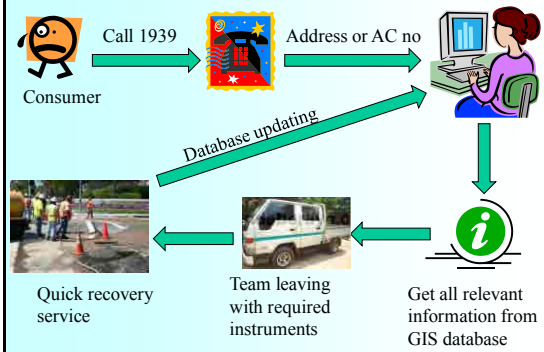
Select suspected illegal connections



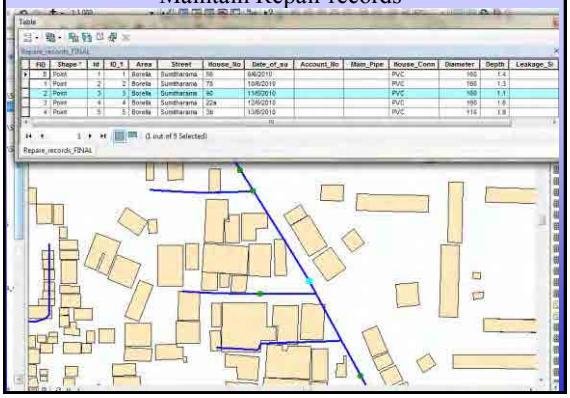
High priority location for illegal connection inspection



Response to customer complain



Maintain Repair records



Thank you