Enterprise Wide GIS

Presentation for the SERUG

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Trevor W. Feagin, AICP GISP

TAMARAC
The City For Your Life

Trevor W. Feagin, AICP, GISP

- 22 years in Mapping, Surveying GIS, City and Transportation Planning
- 1990 BA Geography University of Texas
- 1994 MUP Texas A&M University
- 14 years as GIS Manager City of Tamarac Florida

City Of Tamarac Florida

- @12 Square Miles In Broward County Florida
- 2009 Population @ 61,000

Tamarac GIS History

- 1991 Road Map in Auto Cad
- 1992 NFIP CRS
- 1994 Map Graphix with land use map
- 1995 Enterprise Wide Approach CRS 9
- 1996/97 GIS Report
- 1998/99 Pilot Project Completed
- 1999 Planimetric Mapping
- 2000 Underground Utility Mapping

Tamarac GIS History

- 2001 SDE Zoning Analyst
- 2002 Arc View IMS Utility Lap Tops CRS 8
- 2003 Planimetric Update Arc IMS Online Maps
  - Utilities Laptops
- 2004 -07 More of the same Flood Maps CRS 7
- 2008 Planimetric and Utilities Update

Enterprise Wide Approach

- Previous departmental / project level failures
- Inclusive approach
- Large then smaller committee over time
- Policy then Technical committees
- Cooperative acceptance and modification of project scope
- Unified Support for GIS Funding

GIS Reports

- Overview of technology
- Feasibility study 1995
- Cost benefits analysis 1996 - 97
- Researched hardware, software data base and map development and funding

Why Should We Invest In A GIS?
What Can We Get Out Of A GIS?

- Save Money/Cost Avoidance
- Save Time
- Increase Efficiency
- Increase Productivity
- Increase Accuracy of Maps
- Increase Communication & Cooperation

Why Should We Invest In A GIS? What Can We Get Out Of A GIS?

- Generate Revenue and Aid Budgeting
- Support Decision Making and Manage Resources
- Automate Workflow
- Build an Enterprise Wide Information Base
- Improve Access to Government

GIS Benefits Explained

- Save Money/Cost Avoidance 

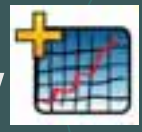
  How can GIS reduce the cost of doing business?

  In 1997 The City Of Tamarac Florida (Pop of 48,000)Identified @ 110k in annual cost avoidance In 2005 The City Identified @ $340,000 in annual cost avoidance with more expected as more third party programs are added – ROI 4 to 5 years

  In 1990 The City of West Palm Beach Florida (Pop 67,000) Identified $1,010,000 indirect and in direct benefits from their existing Cad and GIS maps developed in 1987- 1990 – ROI 3 yrs

  In 2000 the Lehigh County Water Authority in Pennsylvania reported an annual cost avoidance of @ $247, 587 – ROI 5-6 yrs

GIS Benefits Explained

- Save Time  Increase Efficiency  & Productivity 

  How can GIS be used to reengineer daily work?

  In 2004 the City of Tamarac reported @ %50 reduction in the number of hours spent on researching utility line locations.

  In 2000 to 2004 the Lehigh County Water Authority reported average annual time reductions of @4863 man hours.

  In 1990 The South Florida Water Management District reported a one year reduction of 1,327 worker days on 3 mapping projects.

  In 2003 the City of Houston Public Works Department reported a %60 reduction in the time needed to process their @1000 daily utility line locations.

GIS Benefits Explained

- Increase Accuracy of Maps and Data

  - The more accurate the information the more accurate the analysis, reports and results
  - With engineering accuracy base maps the City of Tamarac reduced the amount of asphalt purchased for 140 miles of roads by 6 % and reduced engineering costs by 4%
  - With LIDAR data (very accurate and dense elevations) and GIS maps, City of Plantation, Florida is able to identify problems with FEMA's flood insurance rate maps and is encouraging its @ 22,000 property owners to apply for letters of map revision that can reduce flood insurance by 300 to 400 a year per single family home.
  - In 1992 Williamson County, Texas added 93 previously un mapped properties to the tax roll.

GIS Benefits Explained

- Increase Communication & Cooperation

The process of Integrating a GIS generates effective communication and cooperation between departments and revenue sources.

A GIS can assemble and share a range information among various departments and present it in an understandable way that is useful for county employees and the public.

A common map that displays information about the community aids in the building of and gaining acceptance of projects within the community.

The County can develop maps that show where new projects are planned and or under construction.

GIS Benefits Explained

- Generate Revenue  and aid in Budgeting 
  - The county can use GIS as a part of annexation calculations.
  - The county can use GIS to examine the rezoning implications.
  - The use of GIS as a spread sheet can show tax payers where their taxes are going.
  - GIS maps are a part of many CDGB and HUD reporting requirements.
  - Displaying capital projects on a map can illustrate the level of investment in a particular area, addressing citizen concerns

GIS Benefits Explained

- Support Decision Making and Manage Resources

With a single display source for data, more alternatives can be reviewed in an amount of time.

Governments can determine the highest and best use of a piece of property, should the county build a new park or a new school.

Is this site better for a water treatment plan or a sewage plant?

Exxon/Mobil, the largest private landowner in the nation, uses real estate GIS to aid in developing projects ranging from new oil wells to building the City of Friendswood Texas.

GIS Benefits Explained

- Automate Workflow 
  - GIS can easily automate entering data in to a data base often with menus, dependencies and pick lists that reduce errors.
  - GIS maps are easier to update than paper or manually generated maps
  - The county can add letters of map revision to the Flood Insurance Rate Map then print out numerous copies.
  - The county can add in water valve data and use the map to help visually check for errors

GIS Benefits Explained

- Build an Enterprise Wide Information Base 

The larger a jurisdiction, the more decision makers have to rely on organization wide data. Organizing data in a GIS creates data sets that are reusable and geographically referenced.

One common dataset reduces the chance of multiple and inefficient competing data entry efforts that may erase data.

The county can use a county wide map to help determining where a new police station would be most effective then can reuse the same data to look at distances from proposed parks.

Once the county enters in waterline information, it will be less likely to need to be changed. If the valve is replaced, only valve data will need updating

GIS Benefits Explained

- Improve Access to Government

Nearly 90% of all government data can be shown on a map

Improving the ability to see and understand government data improves citizen acceptance of the data and decisions based on the data

Arc IMS maps accessible via the internet help people and companies do their work.

The county can offer an address map with precinct and commission boundaries

Costs of GIS

- Base Mapping can be up to 90% of the initial cost
  - In some cases, already be done in AutoCAD or on Mylar
  - In general the more accurate the more cost and benefit
  - Update a minimum of every 5 years through contractors
- Hardware can be up to 10% of the initial cost
  - GIS can use up to 40,000 more data than a memo and use a lot of bandwidth
  - Replace workstations and upgrade servers every 2 years, replace servers every 4 years
- Software ESRI is most of the market, use it
- Staffing is a cumulative cost, should be well qualified and well paid
- Training should be provided, use a train the trainer approach

GIS or No Change

- Why Implement a GIS?
  - Advantages
    - Long Term Cost Recovery
    - Better Data
    - Base & Utility Maps
  - Disadvantages
    - High Initial Cost
    - Need to Learn New Technology
    - Learning Curve
    - New Personnel
- Why No Change?
  - Advantages
    - Low Capital Cost
    - Low Learning Curve
    - No New Personnel
  - Disadvantages
    - High Maintenance Costs
    - Low Usability and High Inefficiency
    - No Long-Term Benefits

Return On Investment

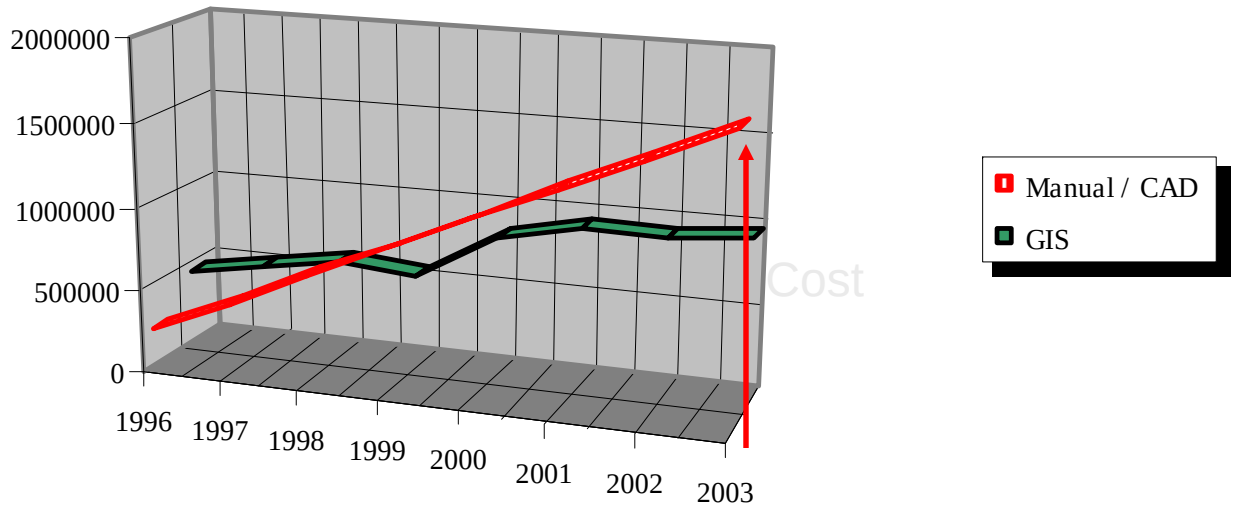
- How long will it take to get our money back?
  - Depending on the costs and benefits
  - In general 5 to 6 years
- How can the County calculate ROI?
  - Add cost of building system subtract benefits like cost reduction and better decision making and compare with the cost of doing things the way they always were done.
  - Cumulative costs of an enterprise GIS will be less over time
  - Hire a GIS consultant that has performed numerous studies

Return On Investment Calculation for a Small Municipality

- $90,000 a square mile for mapping, 12 square miles urban in two phases- above then below ground
- $50,000 for hardware and GIS software
- $50,000 for third party software
- $100,000 a year for new staffing, support training etc.
- $340,000 a year spent on tasks that could improve with a GIS
- First Year ROI 0.5:1 break even @ 4 years
- Cumulative ROI 2.5:1

Cost Benefit Ratios

Cumulative Costs and Benefits of
Competing Mapping Systems



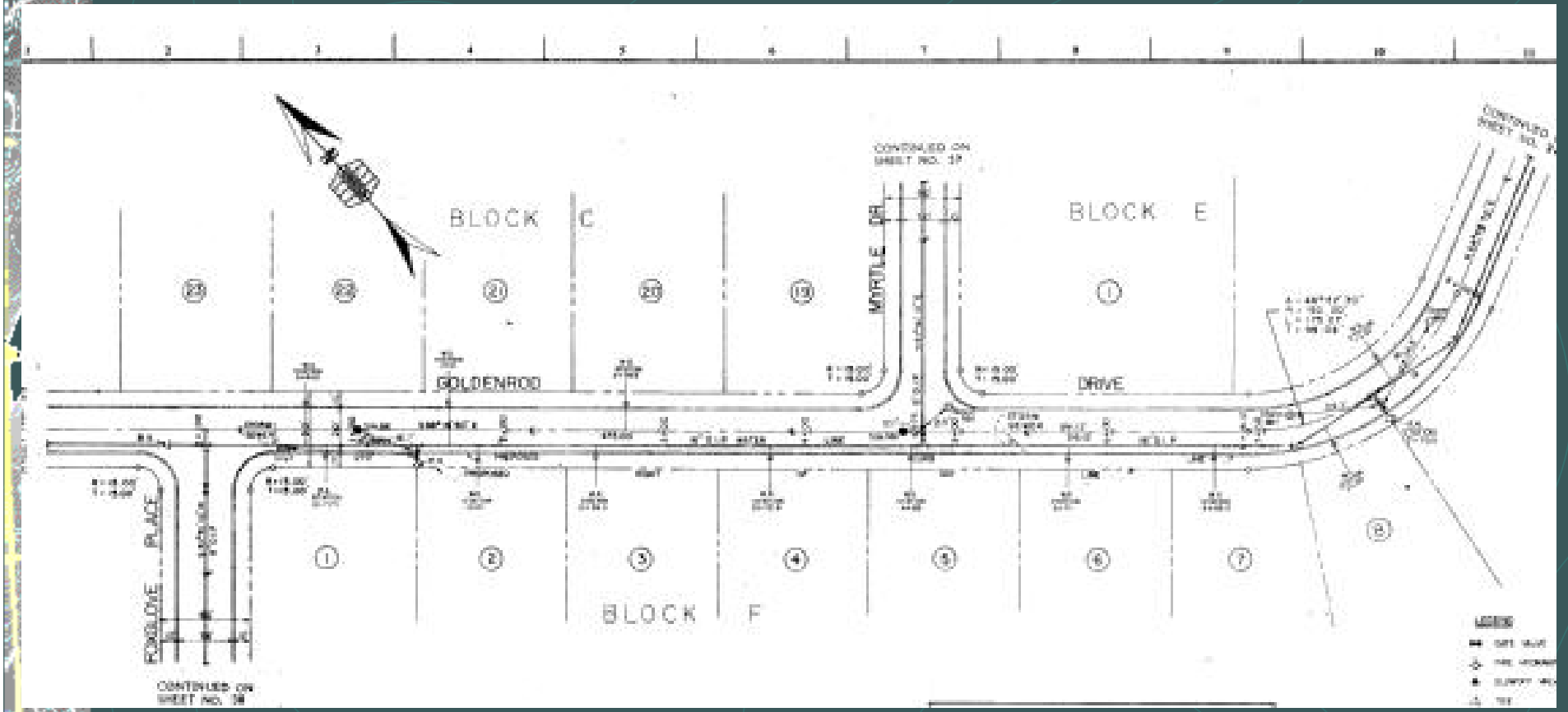
Which Costs Less?

Funding

- GIS as CIP
- Long Term Costs and Benefits
- Greater Accuracy Greater Benefits
- Pooled Recourses
- Multi Year Commitment
- High Level of Support and Consensus
- Milestones and Showcases

Land Base – Digital Orthophoto

Plan As Built

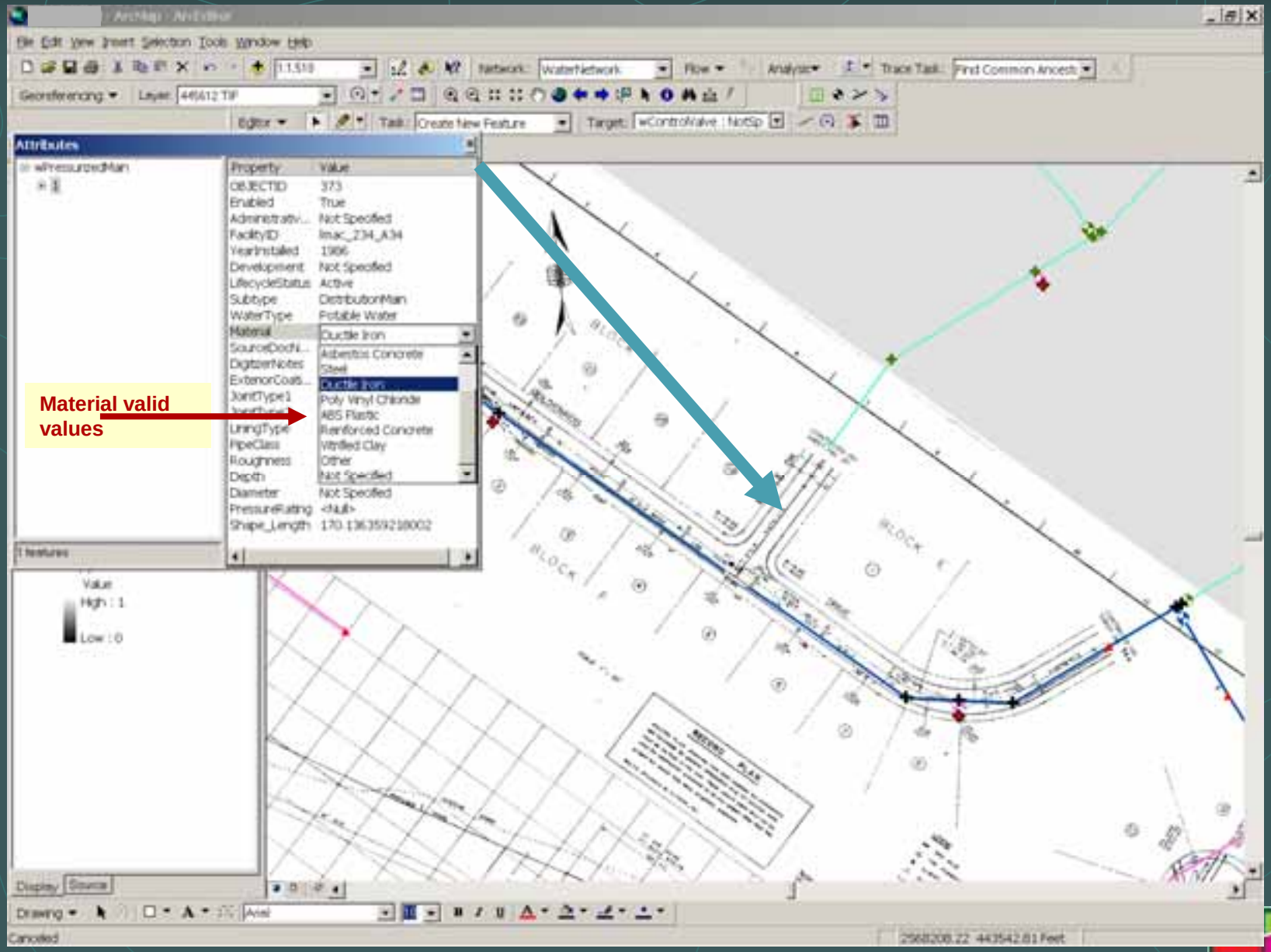


Georeferenced Scan of As Built

Tamarac GIS Planimetric And Utility Map


N UNIVERSITY
NW 59TH S

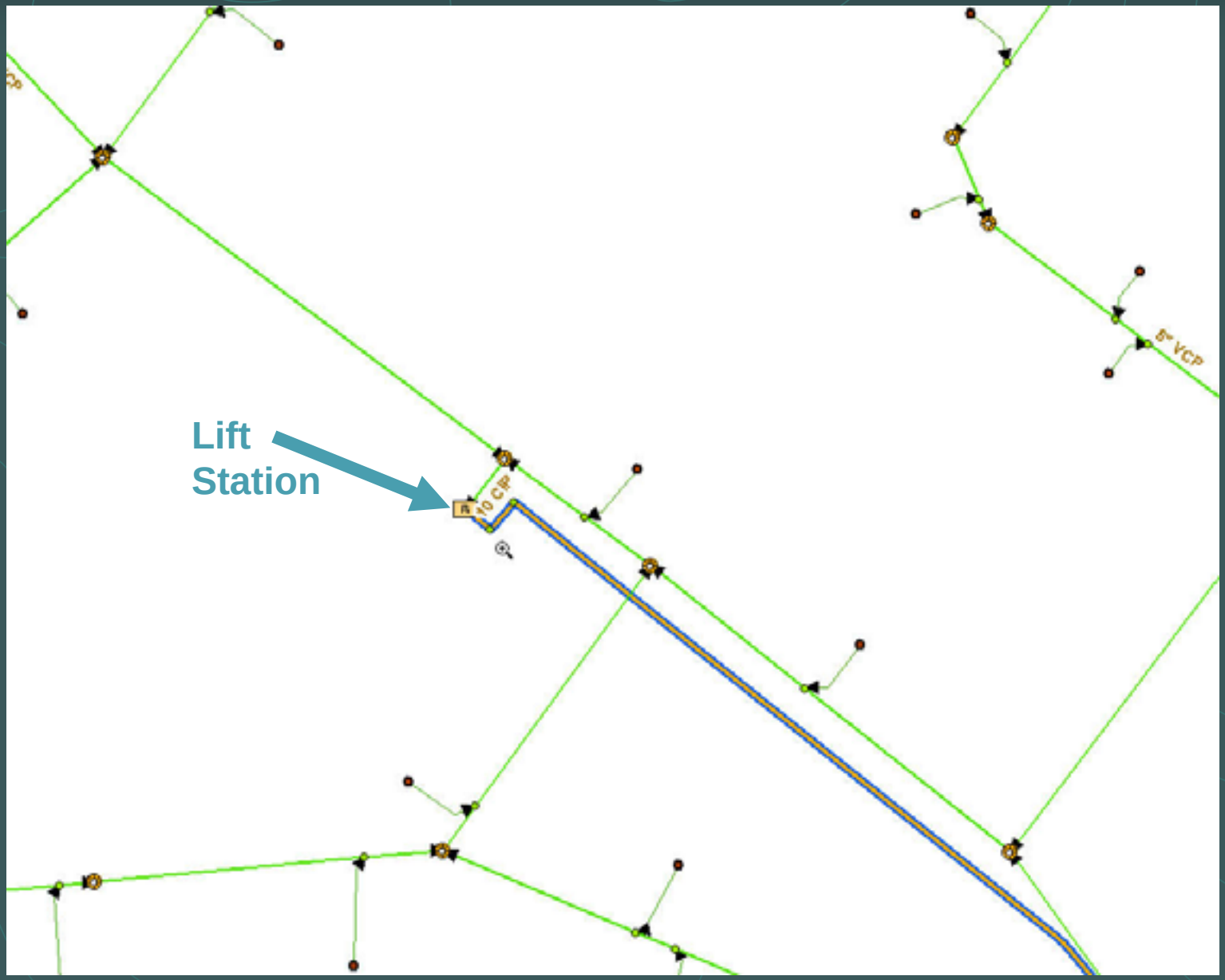
Valid Values



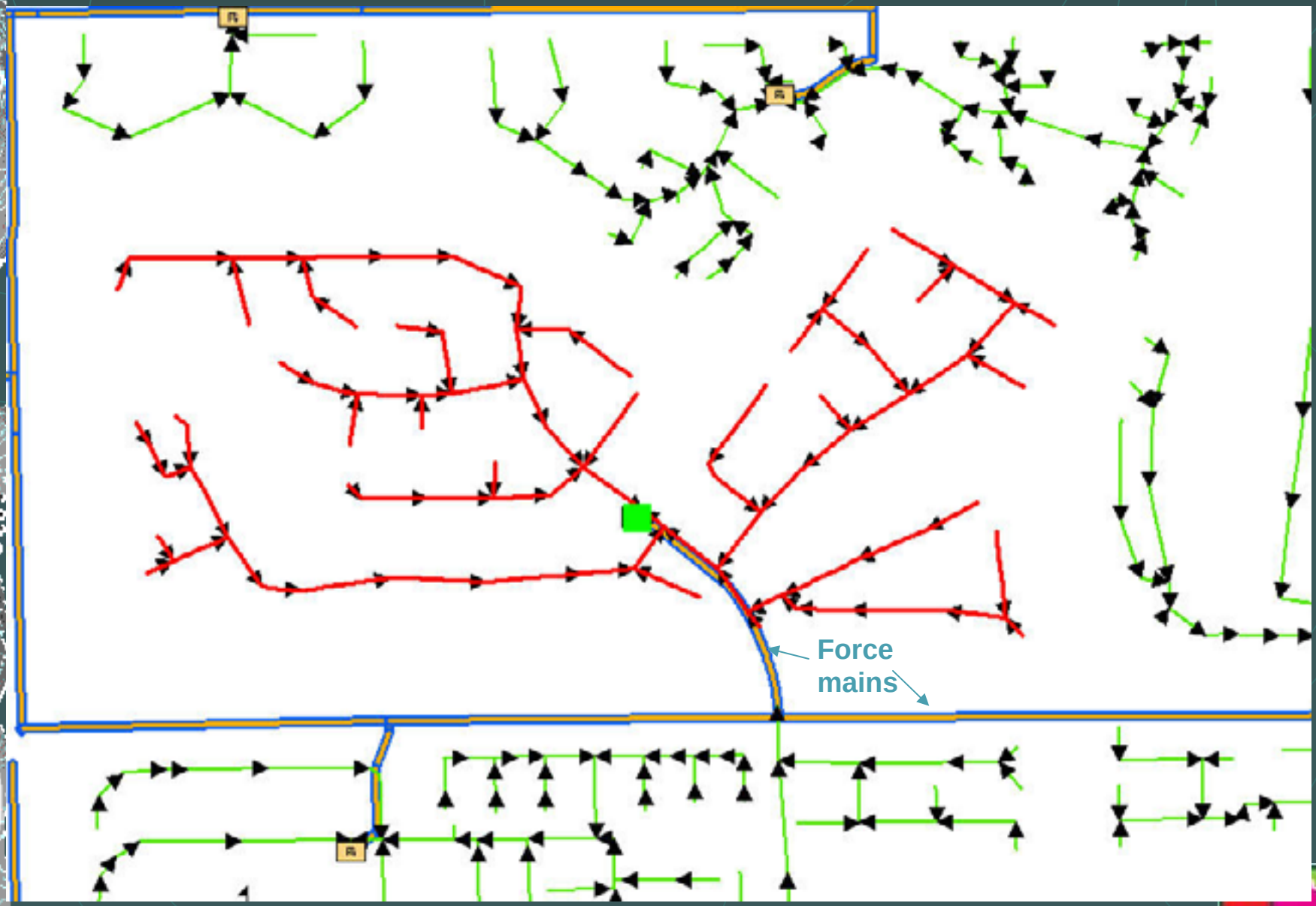
Comparison with NMAS

NSSDA	NMAS
Agencies set thresholds or tolerances for their product specifications	Defined thresholds
95% confidence	90% confidence
Horizontal Accuracy 1.7308 * $RMSE_r$	Horizontal Accuracy 1.5175 * $RMSE_r$
Vertical Accuracy 1.9600 * $RMSE_z$	Vertical Accuracy 1.645 * $RMSE_z$

Wastewater Lift Station



Wastewater Pump Station



Initial Procurement

- Large Scale Photogrammetric Mapping
  - Negative Scale : 1” = 300’
  - Map Scale : 1” = 40’
- Digital Orthophotography
  - 6” pixel
- Needs Assessment and data base design for planimetric and utilities

Mapping

- Pilot completed in 1998/99
- Planimetric and above ground utilities on going
- Underground utilities 2001, 2005 2008
- Parcel map development completed under cost sharing with Broward PAO

Utility Mapping

- Accurate enough to meet the needs of all departments
- Utility mapping and location
- Road resurfacing
- Preliminary engineering
- Flood and run off calculations

GIS Organization

- Centered in Community Development
- Distributed to Public Works, Utilities and other departments
- Data on server, accessible across network
- Most users are located in Community Development, Public Works and Utilities
- As system expands, so do users

Enterprise GIS Implementation*

- Linked / Interfaced
  - Access through shared data or network
  - Move from one machine to another
  - Casual users and maintenance relationship
- Coupled / Interoperable
  - Enterprise approach to reduce duplication
  - Central Data, Dispersed Clients
  - More formal structure, prioritizing needs, some collective development and maintenance

Enterprise GIS Implementation

- Integrated
  - Centralized and controlled data source
  - Formalized agreements for data development and maintenance
  - Specified Uniform Data Base Standards
  - Uniform data server with a common format
  - Differing client and user platforms and software
  - May have a central service bureau
  - May have internet access
  - Servers connected to clients through Intranet
  - Common software applications

Tamarac Enterprise Implementation

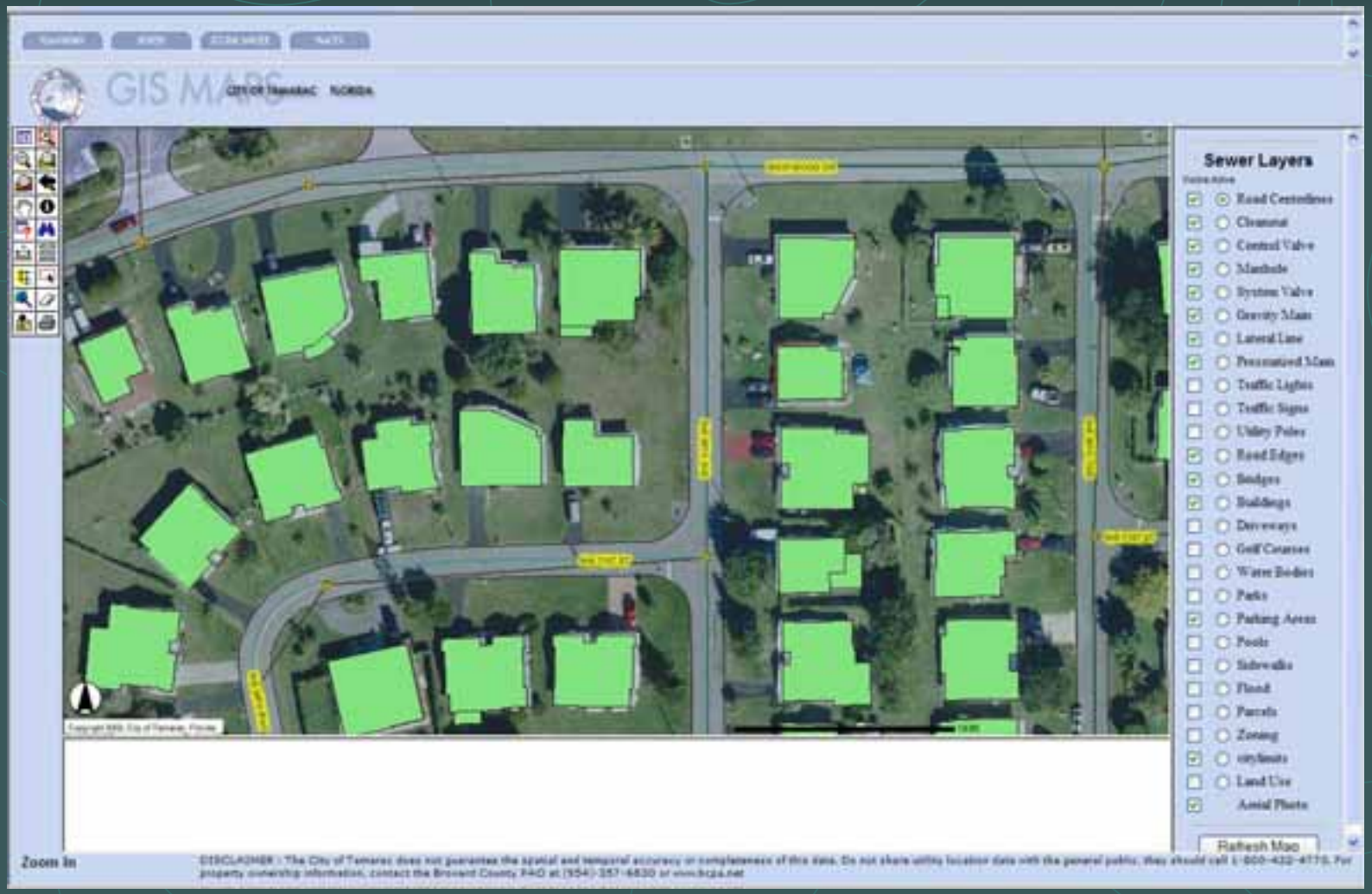
- High Level Management and Executive Support
- Improving physical technology
- Long Term funding, development and maintenance agreement
- Similar integrated client and server software (ESRI SDE/Arc INFO, Auto Cad Arc GIS Server)
- Intranet 1998 Internet / IMS 2000/ 2001

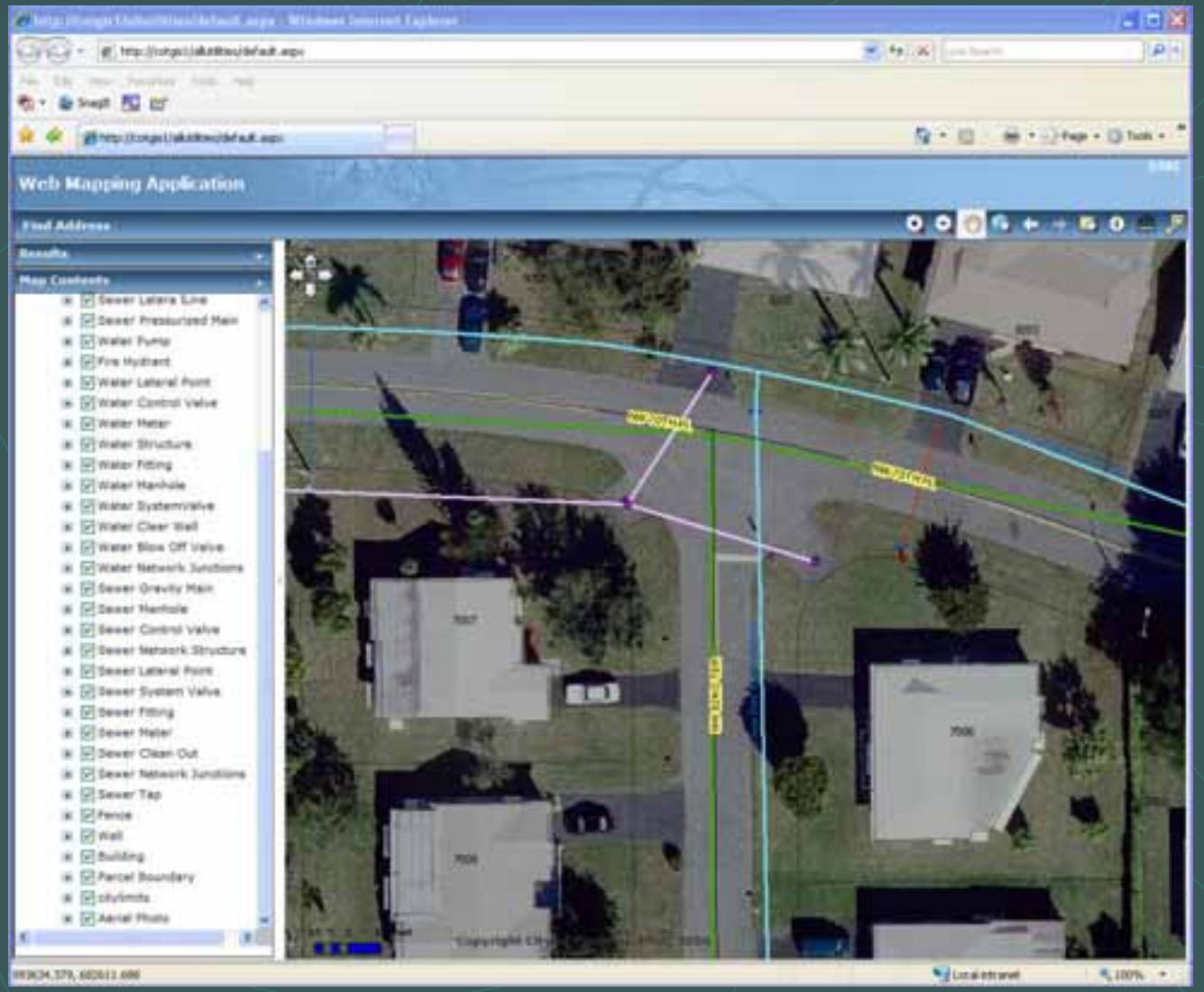
More Implementation History

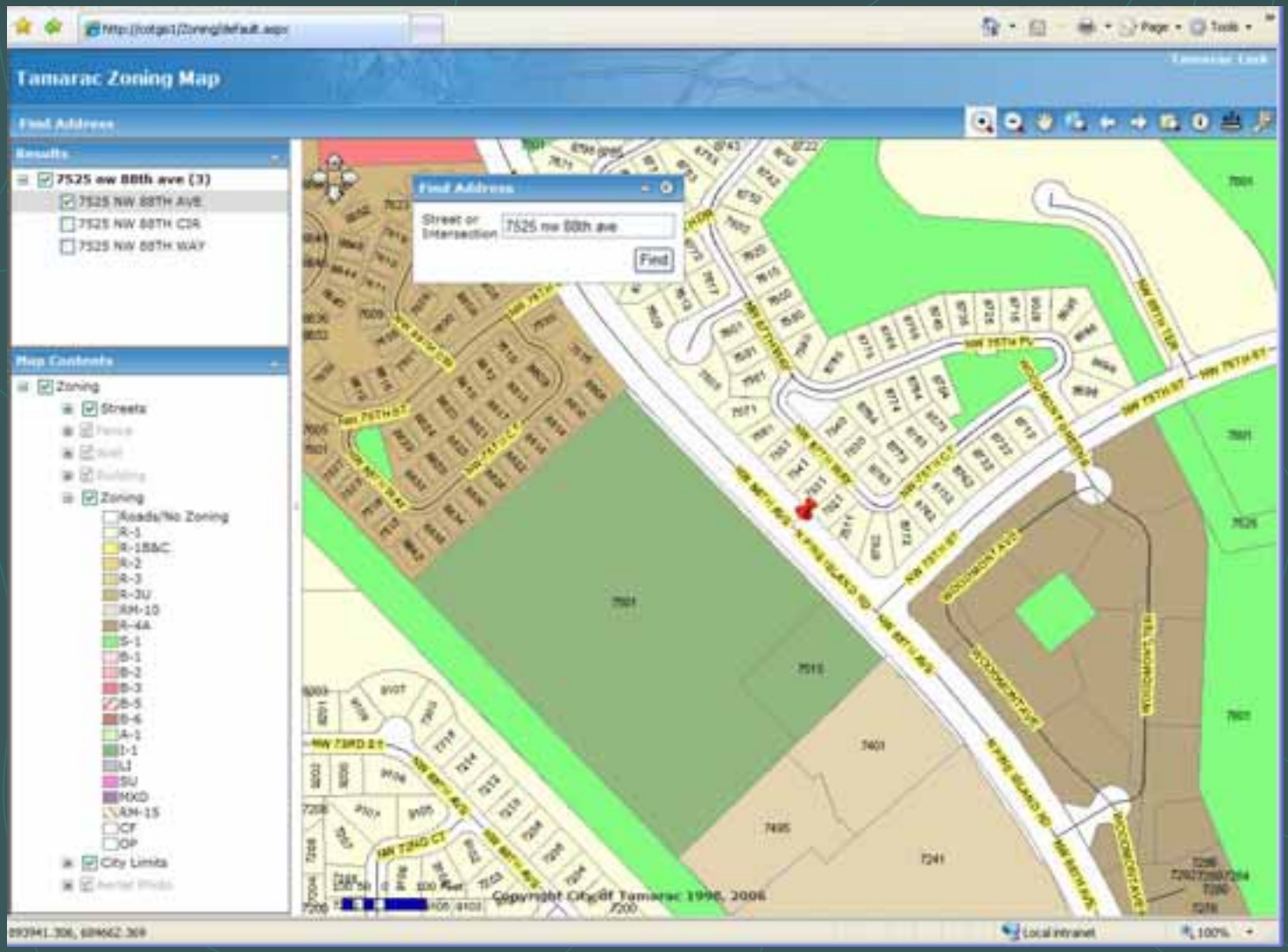
- 2001 SDE Zoning Analyst
- 2002 Arc View IMS Utility Lap Tops CRS 8
- 2003 Planimetric Update Arc IMS Online Maps
  - Public Works Laptops
- 2004 -07 More of the same Flood Maps CRS 7
- 2008 Planimetric and Utilities Update

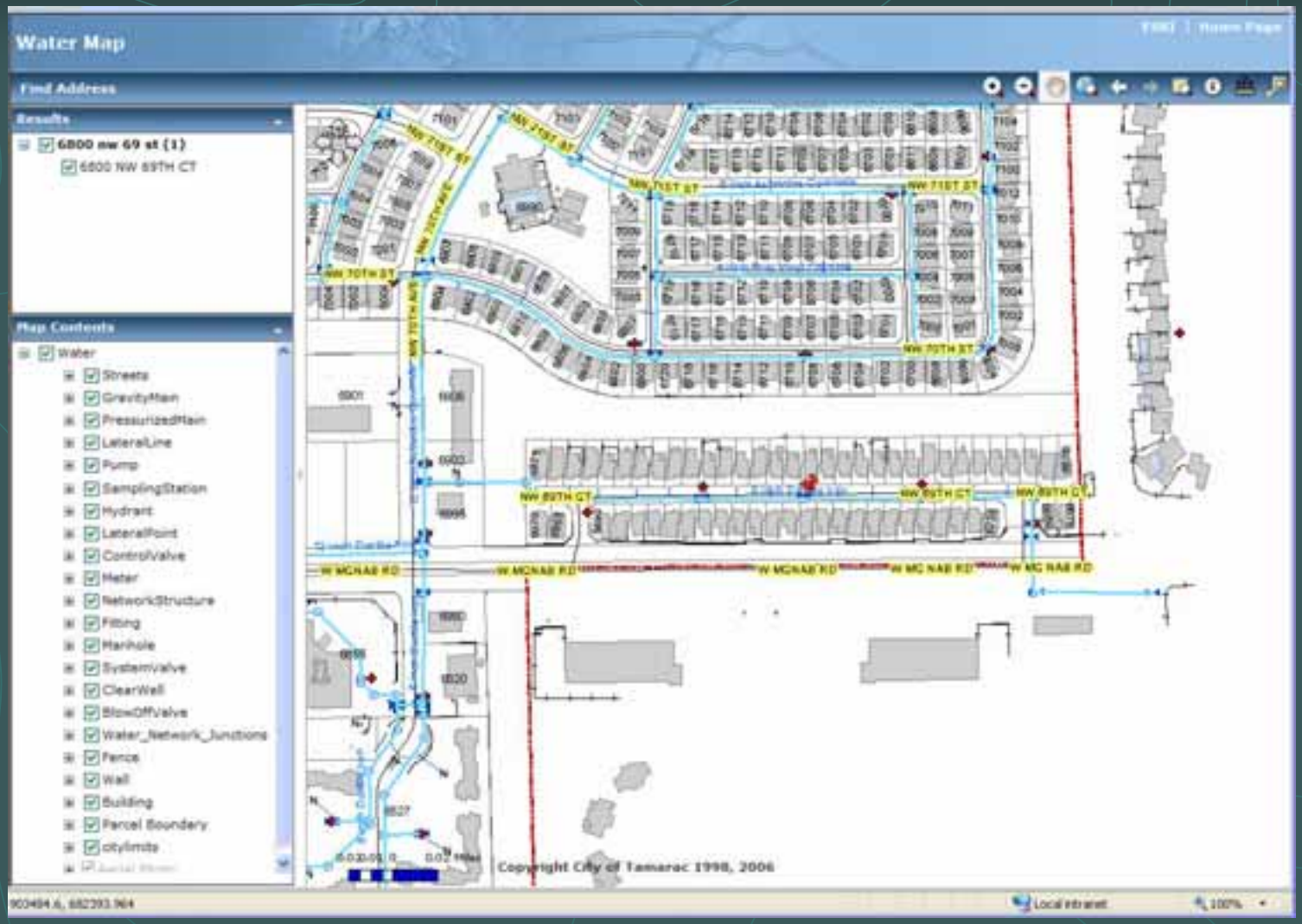
Tamarac GIS Web Page

- http://www.tamarac.org/city-departments/com-development--code/gis-maps/maps-index.aspx
- Go to Tamarac home page www.tamarac.org
- Go to On Line Services
- Go to GIS Maps
- Or Go to Departments
- Go to Community Development/Code
- Go to GIS Maps


GIS MAPS
Sewer Layers
Road Centerlines
Cleanout
Control Valve
Manhole
System Valve
Gravity Main
Lateral Line
Pressurized Main
Traffic Lights
Traffic Signs
Utility Poles
Road Edges
Bridges
Buildings
Driveways
Golf Courses
Water Bodies
Parks
Parking Areas
Pools
Sidewalks
Flood
Parcels
Zoning
Land Use
Aerial Photo
Refresh Map
Zoom In


Web Mapping Application
Find Address
Results
Map Contents
Sewer Lateral Line
Sewer Pressurized Main
Water Pump
Fire Hydrant
Water Lateral Point
Water Control Valve
Water Meter
Water Structure
Water Fitting
Water Manhole
Water SystemValve
Water Clear Well
Water Blow Off Valve
Water Network Junctions
Sewer Gravity Main
Sewer Manhole
Sewer Control Valve
Sewer Network Structure
Sewer Lateral Point
Sewer System Valve
Sewer Fitting
Sewer Meter
Sewer Clean Out
Sewer Network Junctions
Sewer Tap
Fence
Wall
Building
Parcel Boundary
citylimits
Aerial Photo


Tamarac Zoning Map
Find Address
Results
7525 nw 88th ave (3)
7525 NW 88TH AVE
7525 NW 88TH CIR
7525 NW 88TH WAY
Map Contents
Zoning
Streets
Zoning
Roads/No Zoning
R-1
R-1B&C
R-2
R-3
R-3U
RM-10
R-4A
S-1
B-1
B-2
B-3
B-5
B-6
A-1
I-1
LI
SU
MXD
RM-15
CF
OP
City Limits
Find Address
Street or Intersection
7525 nw 88th ave
Find
Copyright City of Tamarac 1996, 2006


Water Map
Find Address
Results
6800 nw 69 st (1)
6800 NW 69TH CT
Map Contents
Water
Streets
GravityMain
PressurizedMain
LateralLine
Pump
SamplingStation
Hydrant
LateralPoint
ControlValve
Meter
NetworkStructure
Fitting
Manhole
SystemValve
ClearWell
BlowOffValve
Water_Network_Junctions
Fence
Wall
Building
Parcel Boundary
citylimits
NW 71ST ST
NW 70TH ST
NW 69TH CT
W MCNAB RD
Copyright City of Tamarac 1998, 2006

Questions

Trevor W. Feagin, AICP, GISP
GIS Manager
Community Development Department
7525 N.W. 88th Ave
Tamarac, FL 33321-2401
(954) 597-3534
Trevorf@Tamarac.org