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Oracle Spatial Users Conference

April 27, 2006
Tampa Convention Center
Tampa, Florida, USA

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J. R. Smith

Senior GIS Analyst
Public Works Dept
City of Tacoma, WA
JR.Smith@CityOfTacoma.org

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Achieving GIS Interoperability

Is Like Getting Pigs to Fly !

You Can Do It
by Redefining a Few Terms

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GIS Interoperability

Outline

- Define (or redefine) "***GIS***"
- Define (or redefine) "***Interoperability***"
- Working Model of GIS Interoperability
- Opportunities, Constraints, and Solutions
- Q & A
- Closing Remarks

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GIS Interoperability

- Define (or redefine) "***GIS***"
  - Software centric approach
    - Software that creates, displays, analyzes, and manages geographic information
  - Data centric approach
    - An organized collection of geographic information

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GIS Interoperability

- Define (or redefine) "***Interoperability***"

Google™

  - The ability of a system or a product to work with other systems or products without special effort on the part of the customer.
    www.education.tas.gov.au/wiseweb/appendices/glossary.htm

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GIS Interoperability

- Define (or redefine) "***Interoperability***"

Google

  - A condition that exists when the distinctions between information systems are not a barrier to accomplishing a task that spans multiple systems.

    www.gils.net/gilsappb.html

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GIS Interoperability

- Define (or redefine) "***Interoperability***"

Google™

  - The ability of various types of computers and programs to work together.
    www.dmreview.com/resources/glossary.cfm

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GIS Interoperability

- Definition of "***GIS Interoperability***"
  (per City of Tacoma Public Works Dept)
  - An organized collection of real-time geographic information
    (data centric)
  - Accessed by various GIS desktop applications, databases, and web-based programs
    (no barriers)
  - Without special effort on the part of the end user
    (functional for technical users – easy for non-intuitive users)

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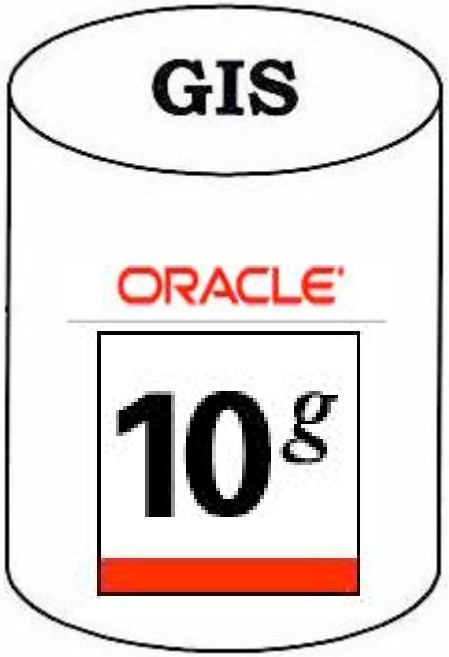
GIS Interoperability



Data centric using Oracle

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GIS Interoperability

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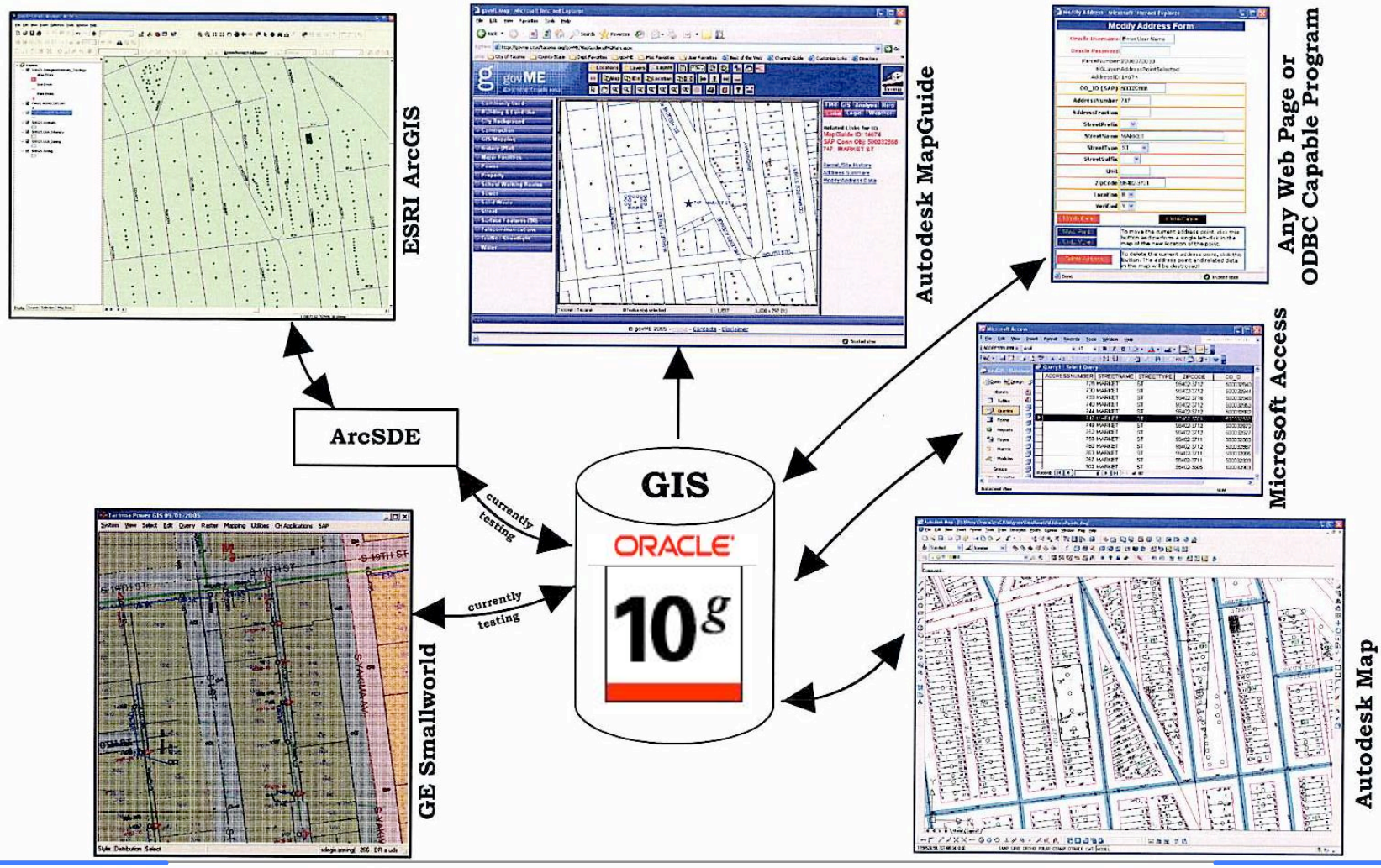

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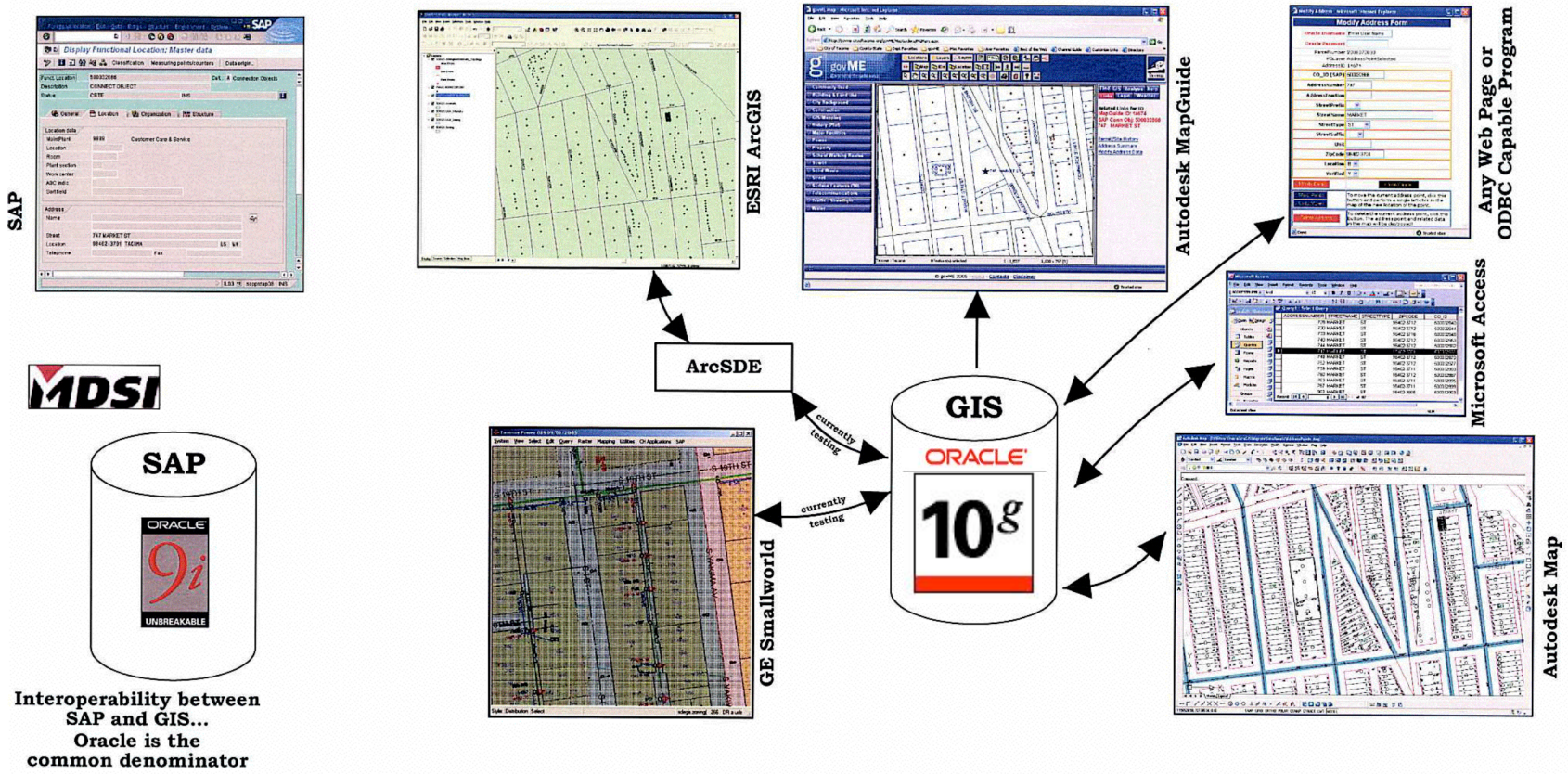

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GIS Interoperability

- **Opportunities**, Constraints, and Solutions
  - Wide selection of GIS “tools”
    - ESRI ArcGIS – Planning focus
    - Autodesk Map 3D – Engineering focus
    - GE Smallworld – Utility focus
    - Autodesk MapGuide – Internet delivery
    - Oracle SQL – “On-the-fly” spatial queries
    - Microsoft Access – Attribute updates (Call2Haul)

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GIS Interoperability

- **Opportunities**, Constraints, and Solutions

  - Suitable for a wide range of GIS users
    - GIS staff
    - Engineers and technicians
    - Permitting, land use, and code compliance staff
    - Field crews for maintenance and utility locates
    - Solid waste and recycling staff
    - John Q. Public

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GIS Interoperability

- **Opportunities**, Constraints, and Solutions
  - Real-time data for end users
    - govME – **gov**ernment **M**ade **E**asy

      http://www.govME.org/Map

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GIS Interoperability

- Opportunities, **Constraints**, and Solutions
  - Not for the weak-hearted
    - Thorough understanding of GIS concepts
    - Expertise with GIS desktop products
    - Intimate knowledge of Oracle concepts
    - Ability to obtain executive support
    - Ability to rally the troops – technical and non-technical

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GIS Interoperability

- Opportunities, **Constraints**, and Solutions
  - OGC compliance for spatial objects is not enough
  - Vendor-specific differences in storage strategies
    - Autodesk – x, y, **z** with multiple SDO_Geometry
    - ESRI – x, y with one **and only one** SDO_Geometry
    - GE Smallworld – x, y with multiple SDO_Geometry
    - Autodesk – ADMP columns and metadata tables
    - ESRI – SDE schema with many metadata tables
    - GE Smallworld – InSync

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GIS Interoperability

- Opportunities, Constraints, and **Solutions**
  - One GIS product per theme selected as “master”
  - Oracle triggers used to “mirroring” the data
  - One way synchronization
  - Analysis via SQL and Oracle spatial functions

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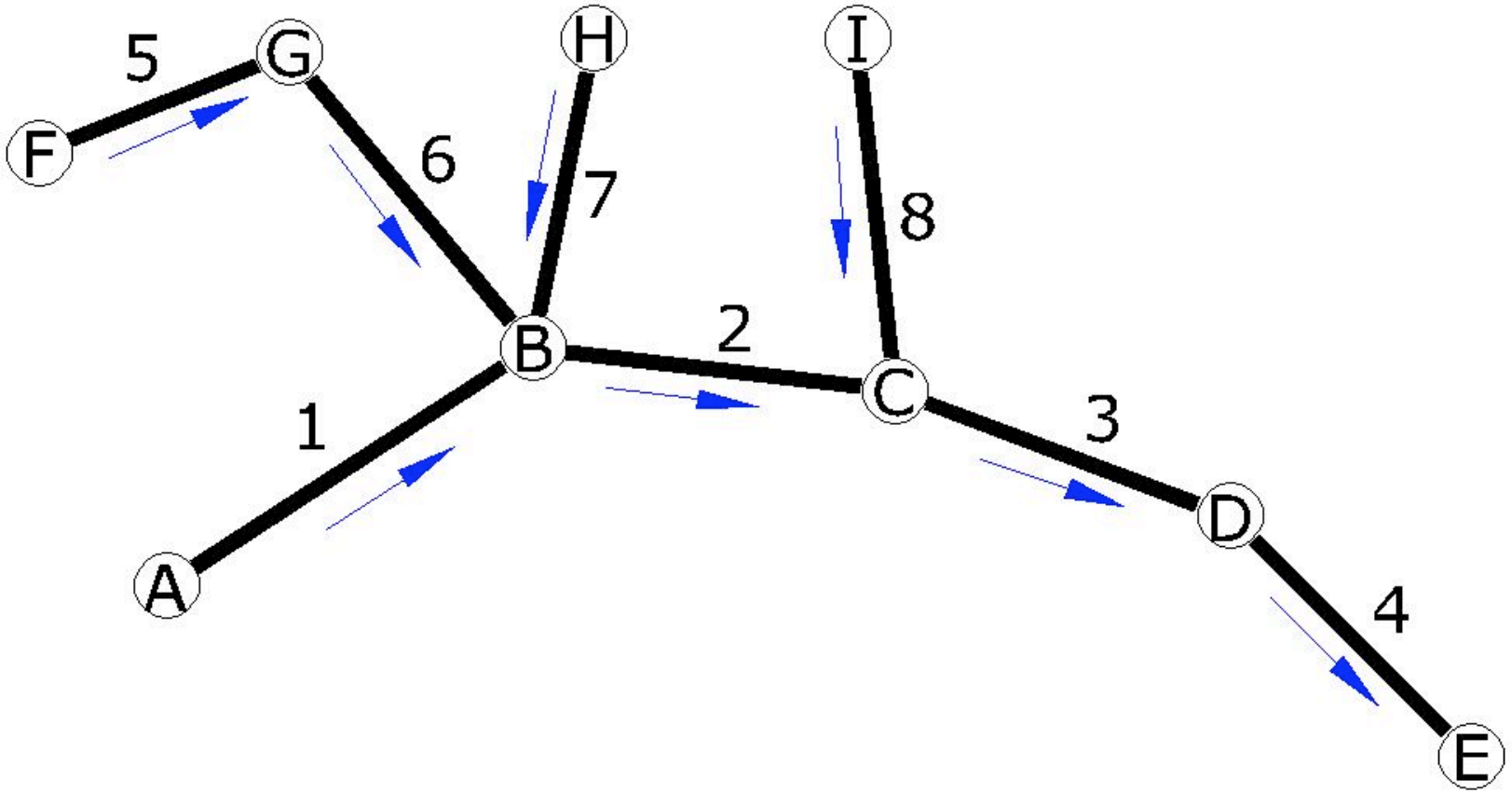
GIS Interoperability

Analysis Example: Tracing Sewer pipes downstream



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GIS Interoperability

Analysis Example: Tracing Sewer pipes downstream

SewerPipes

Pipe_ID	UpstreamNode	DownstreamNode	Geometry
1	A	B	SDO_GEOMETRY(2002,…
2	B	C	SDO_GEOMETRY(2002,…
3	C	D	SDO_GEOMETRY(2002,…
4	D	E	SDO_GEOMETRY(2002,…
5	F	G	SDO_GEOMETRY(2002,…
6	G	B	SDO_GEOMETRY(2002,…
7	H	B	SDO_GEOMETRY(2002,…
8	I	C	SDO_GEOMETRY(2002,…

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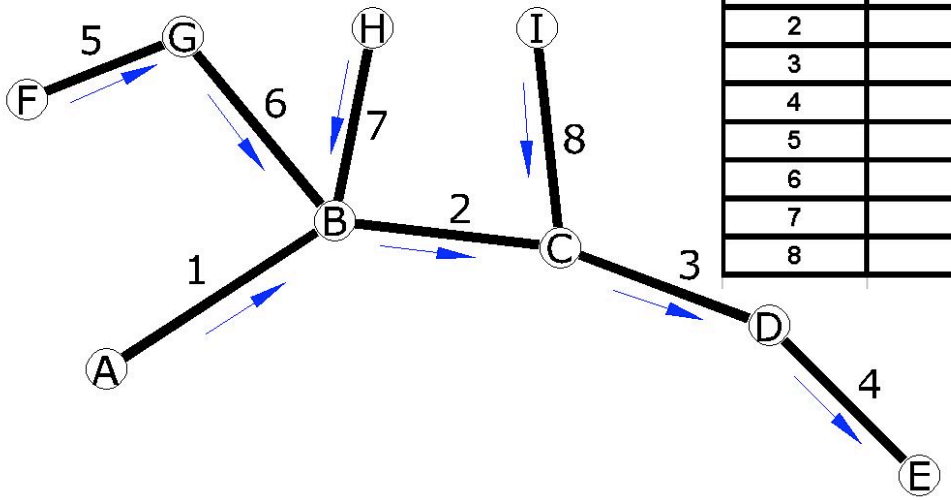
GIS Interoperability

GIS, SQL
or spatial solution?



SewerPipes			
Pipe_ID	UpstreamNode	DownstreamNode	Geometry
1	A	B	SDO_GEOMETRY(2002,…
2	B	C	SDO_GEOMETRY(2002,…
3	C	D	SDO_GEOMETRY(2002,…
4	D	E	SDO_GEOMETRY(2002,…
5	F	G	SDO_GEOMETRY(2002,…
6	G	B	SDO_GEOMETRY(2002,…
7	H	B	SDO_GEOMETRY(2002,…
8	I	C	SDO_GEOMETRY(2002,…

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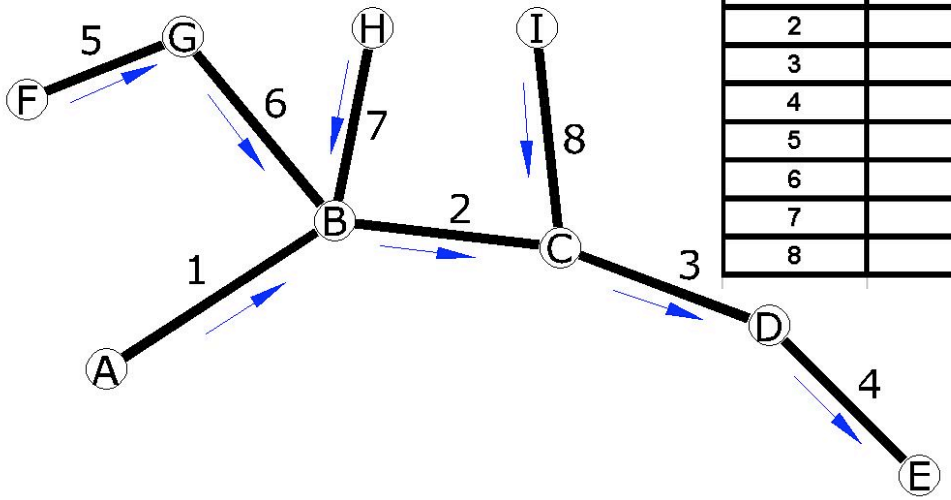
GIS Interoperability

Tracing Sewer pipes downstream via SQL



SewerPipes

Pipe_ID	UpstreamNode	DownstreamNode	Geometry
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2	B	C	SDO_GEOMETRY(2002,…
3	C	D	SDO_GEOMETRY(2002,…
4	D	E	SDO_GEOMETRY(2002,…
5	F	G	SDO_GEOMETRY(2002,…
6	G	B	SDO_GEOMETRY(2002,…
7	H	B	SDO_GEOMETRY(2002,…
8	I	C	SDO_GEOMETRY(2002,…

```
SELECT Pipe_ID FROM SewerPipes
START WITH Pipe_ID = 1
CONNECT BY PRIOR DownstreamNode = UpStreamNode
```

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GIS Interoperability

```
SELECT Pipe_ID FROM SewerPipes
START WITH Pipe_ID = 1
CONNECT BY PRIOR DownstreamNode = UpStreamNode
```

```
SELECT Pipe_ID FROM SewerPipes
WHERE LEVEL <= 5
START WITH Pipe_ID = 1
CONNECT BY PRIOR DownstreamNode = UpStreamNode
```

```
SELECT Pipe_ID FROM SewerPipes
WHERE LEVEL <= 20
START WITH Pipe_ID = 4
CONNECT BY PRIOR UpstreamNode = DownstreamNode
```

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GIS Interoperability

- Opportunities, Constraints, and **Solutions**

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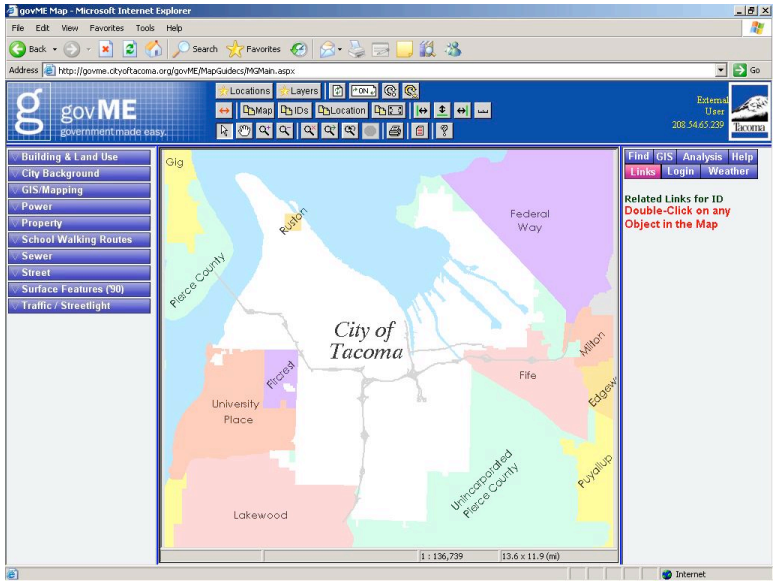
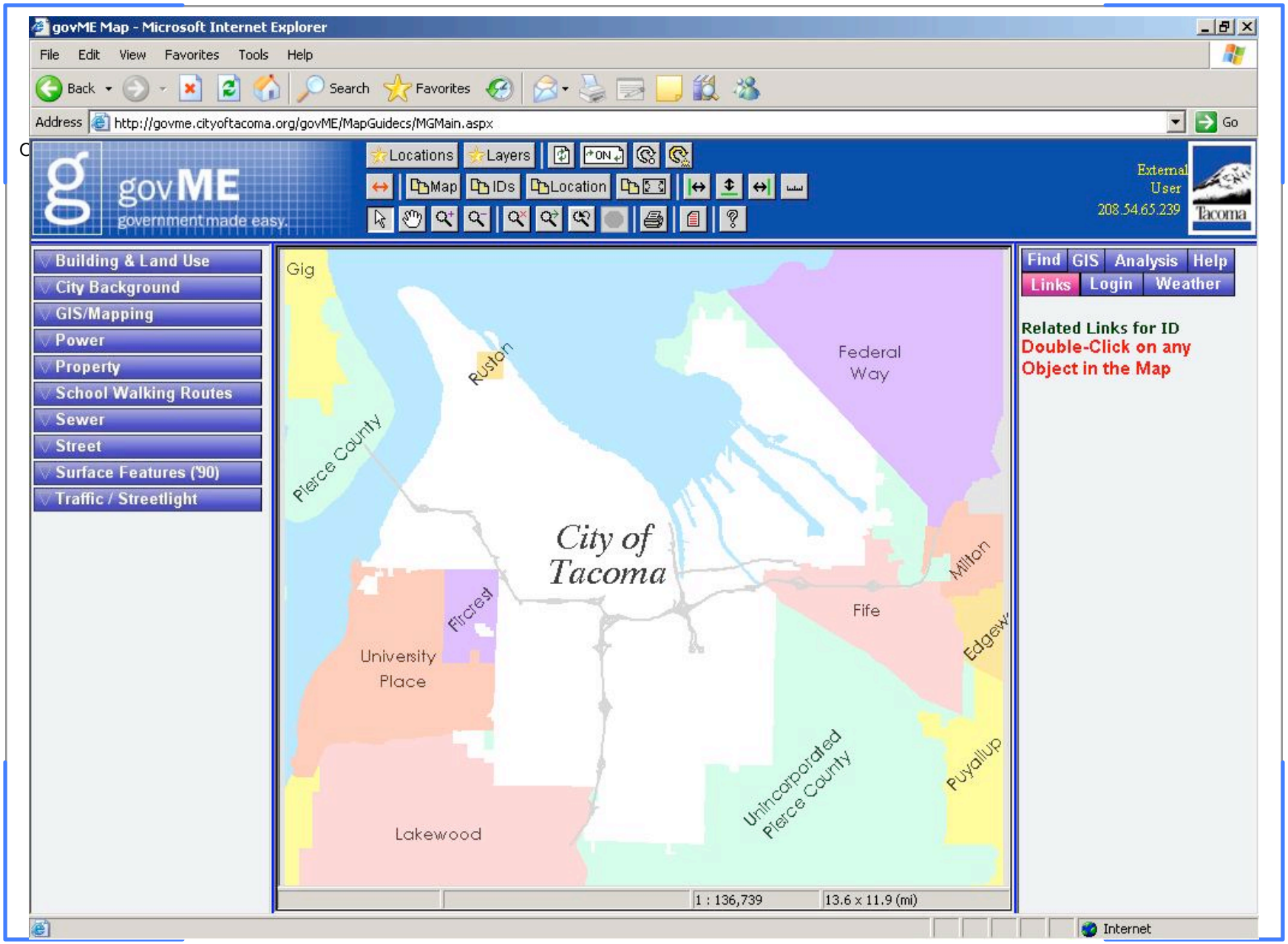
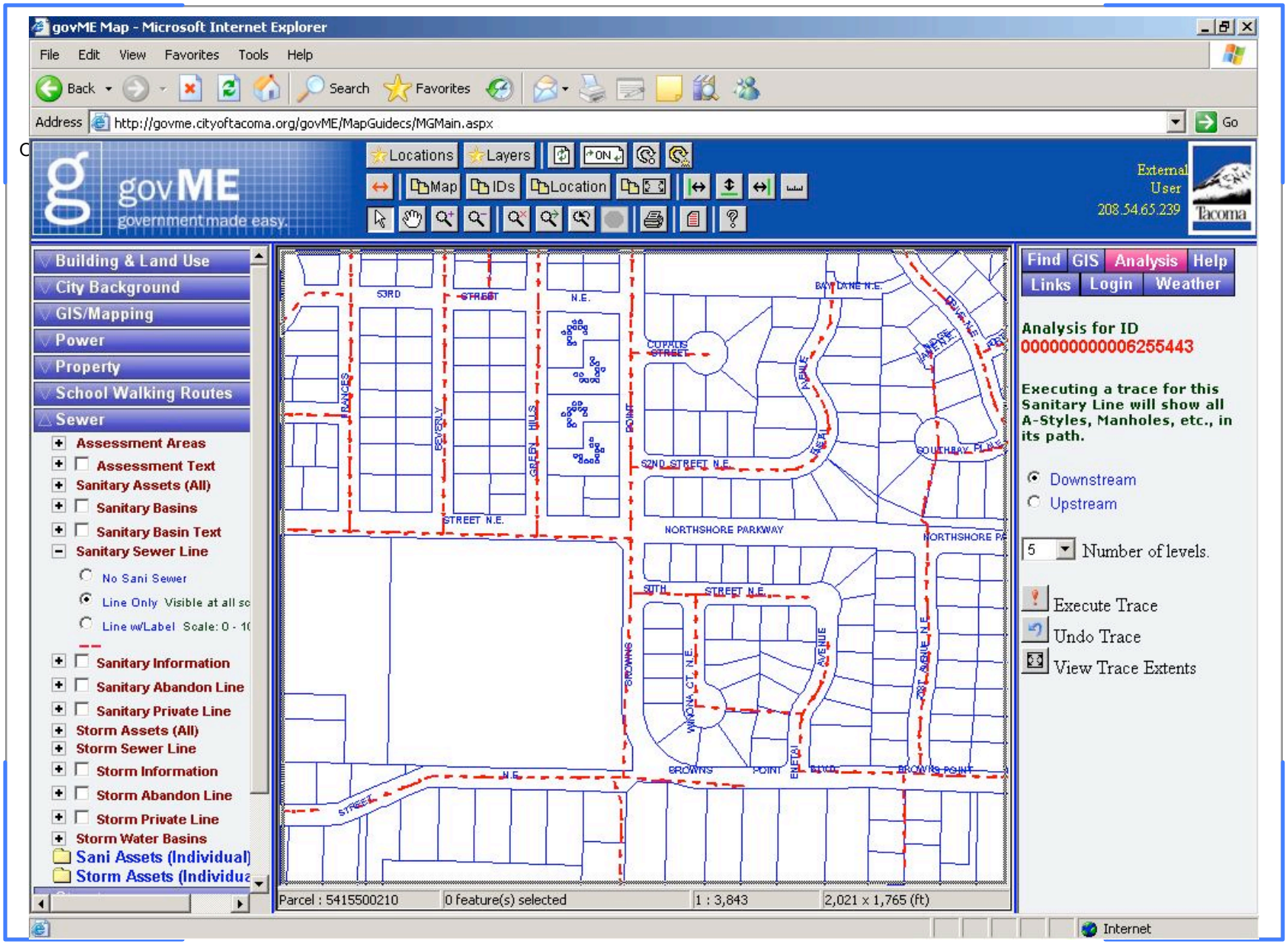
http://www.govME.org/Map




govME Map - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://govme.cityoftacoma.org/govME/MapGuidecs/MGMain.aspx
Go
govME
government made easy.
Locations Layers
Map IDs Location
External User
208.54.65.239
Tacoma
Building & Land Use
City Background
GIS/Mapping
Power
Property
School Walking Routes
Sewer
Street
Surface Features ('90)
Traffic / Streetlight
Gig
Ruston
Federal Way
Pierce County
City of Tacoma
Milton
Fife
Edgew
Fircrest
University Place
Lakewood
Unincorporated Pierce County
Puyallup
Find GIS Analysis Help
Links Login Weather
Related Links for ID
Double-Click on any
Object in the Map
1 : 136,739
13.6 x 11.9 (mi)
Internet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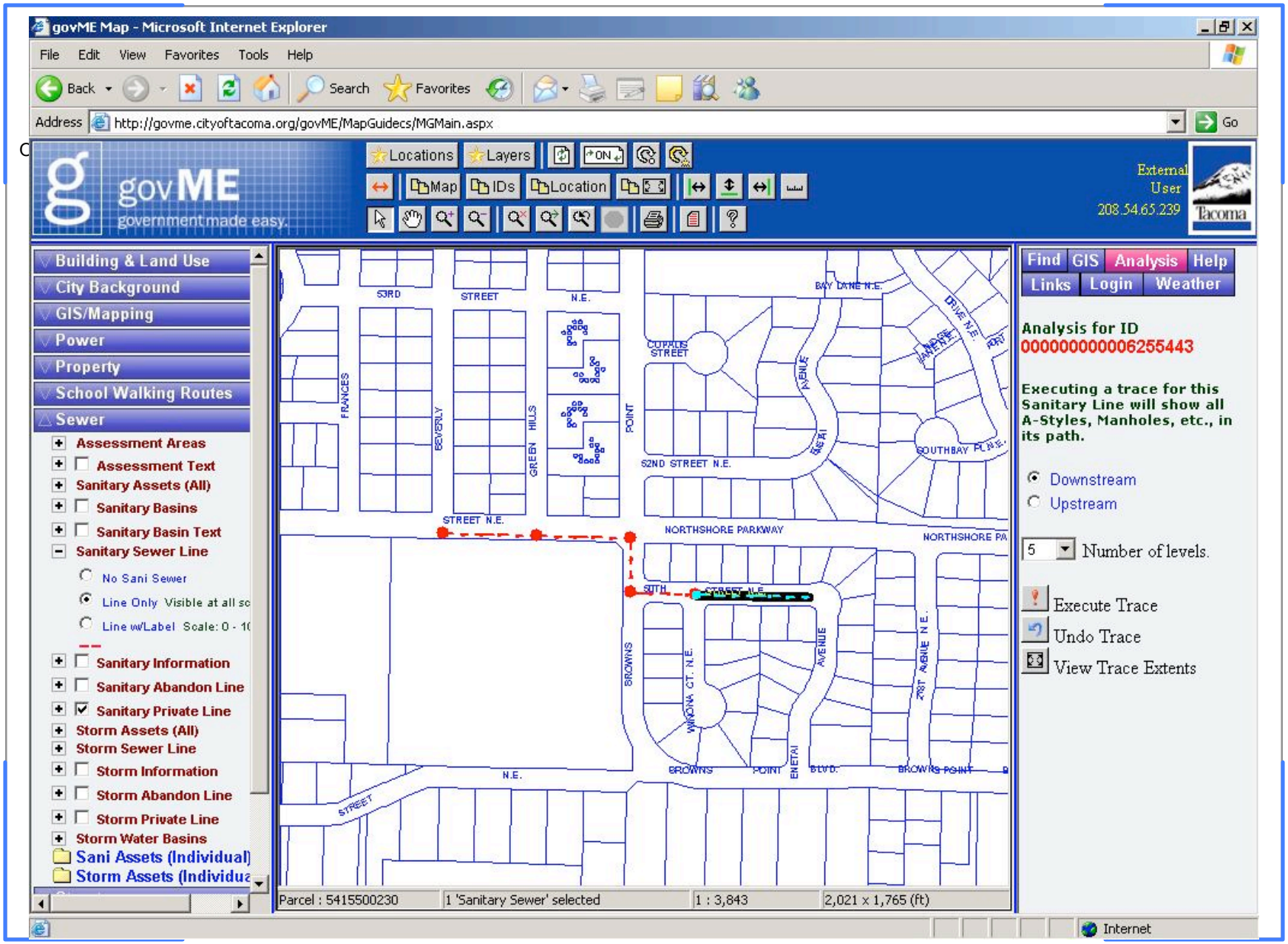
208.54.65.239
Tacoma
Building & Land Use
City Background
GIS/Mapping
Power
Property
School Walking Routes
Sewer
Assessment Areas
Assessment Text
Sanitary Assets (All)
Sanitary Basins
Sanitary Basin Text
Sanitary Sewer Line
No Sani Sewer
Line Only Visible at all sc
Line w/Label Scale: 0 - 1(
Sanitary Information
Sanitary Abandon Line
Sanitary Private Line
Storm Assets (All)
Storm Sewer Line
Storm Information
Storm Abandon Line
Storm Private Line
Storm Water Basins
Sani Assets (Individual)
Storm Assets (Individua
NORTHSHORE PARKWAY
S2ND STREET N.E.
BROWNS POINT
Find GIS Analysis Help
Links Login Weather
Analysis for ID
00000000006255443
Executing a trace for this Sanitary Line will show all A-Styles, Manholes, etc., in its path.
Downstream
Upstream
5
Number of levels.
Execute Trace
Undo Trace
View Trace Extents
Parcel : 5415500210
0 feature(s) selected
1 : 3,843
2,021 x 1,765 (ft)
Internet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Assessment Areas
Assessment Text
Sanitary Assets (All)
Sanitary Basins
Sanitary Basin Text
Sanitary Sewer Line
No Sani Sewer
Line Only Visible at all sc
Line w/Label Scale: 0 - 1
Sanitary Information
Sanitary Abandon Line
Sanitary Private Line
Storm Assets (All)
Storm Sewer Line
Storm Information
Storm Abandon Line
Storm Private Line
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Sani Assets (Individual)
Storm Assets (Individua
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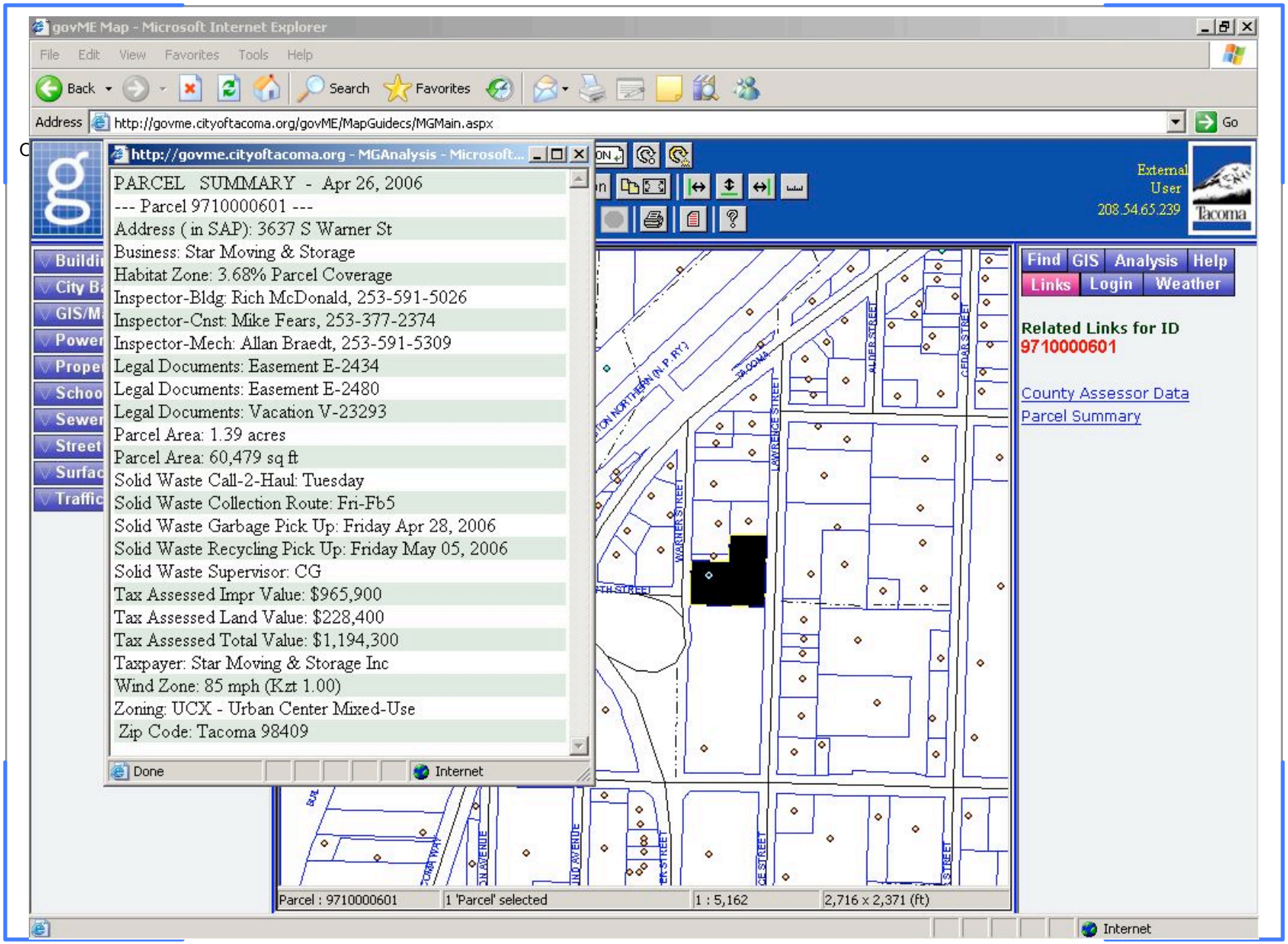
Upstream
5
Number of levels.
Execute Trace
Undo Trace
View Trace Extents
NORTHSHORE PARKWAY
S2ND STREET N.E.
BROWNS POINT BLVD.
Parcel : 5415500230
1 'Sanitary Sewer' selected
1 : 3,843
2,021 x 1,765 (ft)
Internet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File Edit View Favorites Tools Help
Back Search Favorites
Address http://govme.cityoftacoma.org/govME/MapGuidecs/MGMain.aspx
Go
http://govme.cityoftacoma.org - MGAnalysis - Microsoft...
PARCEL SUMMARY - Apr 26, 2006
--- Parcel 9710000601 ---
Address (in SAP): 3637 S Warner St
Business: Star Moving & Storage
Habitat Zone: 3.68% Parcel Coverage
Inspector-Bldg: Rich McDonald, 253-591-5026
Inspector-Cnst: Mike Fears, 253-377-2374
Inspector-Mech: Allan Braedt, 253-591-5309
Legal Documents: Easement E-2434
Legal Documents: Easement E-2480
Legal Documents: Vacation V-23293
Parcel Area: 1.39 acres
Parcel Area: 60,479 sq ft
Solid Waste Call-2-Haul: Tuesday
Solid Waste Collection Route: Fri-Fb5
Solid Waste Garbage Pick Up: Friday Apr 28, 2006
Solid Waste Recycling Pick Up: Friday May 05, 2006
Solid Waste Supervisor: CG
Tax Assessed Impr Value: $965,900
Tax Assessed Land Value: $228,400
Tax Assessed Total Value: $1,194,300
Taxpayer: Star Moving & Storage Inc
Wind Zone: 85 mph (Kzt 1.00)
Zoning: UCX - Urban Center Mixed-Use
Zip Code: Tacoma 98409
Done
Internet
External User
208.54.65.239
Tacoma
Find GIS Analysis Help
Links Login Weather
Related Links for ID
9710000601
County Assessor Data
Parcel Summary
Parcel : 9710000601
1 'Parcel' selected
1 : 5,162
2,716 x 2,371 (ft)
Internet

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```
SELECT  'Address (in SAP): '   ||   a.Address
FROM  GIS.AddressPoint a,  GIS.ParcelPoly b
WHERE
SDO_AnyInteract(a.Geometry, b.Geometry) = 'TRUE'
AND  b.Tax_Parcel = ‘9710000601'
UNION
SELECT  'Zoning: ' ||  a.ZoningCode
FROM SDEGIS.Zoning a,  GIS.ParcelPoly b
WHERE
SDO_AnyInteract(a.Shape, b.Geometry) = 'TRUE'
AND  b.Tax_Parcel = ‘9710000601'
```


Q&A

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This Year....
GIS Interoperability

Productive **I**nteroperable **G**eospatial **S**ystem

P.I.G.S.

Data Centric with Oracle at the Core
(it's Flying !!!)

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Next Year....
GIS Interoperability

Regional **A**utomated **M**apping **A**nd
Local **A**rea **M**odeling, **A**nalyzed
Digital **I**nformation, **N**ew **G**eospatial
Data, **O**racle **N**etworked **G**raphics

RAMA LAMA DING DONG

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