



Oracle Spatial Users Conference

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



April 2006
Oracle Spatial Users Conference

J. R. Smith

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





April 2006
Oracle Spatial Users Conference

Achieving GIS Interoperability

Is Like Getting Pigs to Fly !

You Can Do It
by Redefining a Few Terms

GIS Interoperability

Outline

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



April 2006
Oracle Spatial Users Conference

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

GIS Interoperability

- Define (or redefine) “*Interoperability*”



- 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

GIS Interoperability

- Define (or redefine) “*Interoperability*”



- 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



April 2006
Oracle Spatial Users Conference

GIS Interoperability

- Define (or redefine) “*Interoperability*”



- The ability of various types of computers and programs to work together.

www.dmreview.com/resources/glossary.cfm

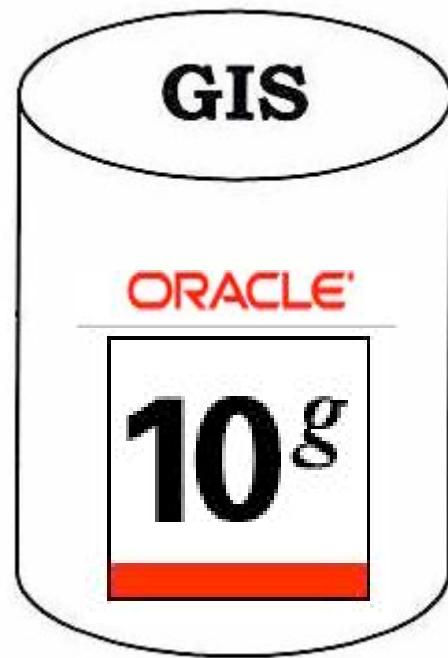
GIS Interoperability

- 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*)



April 2006
Oracle Spatial Users Conference

GIS Interoperability

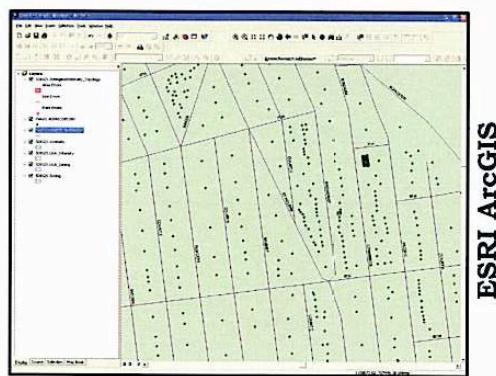


Data centric using Oracle

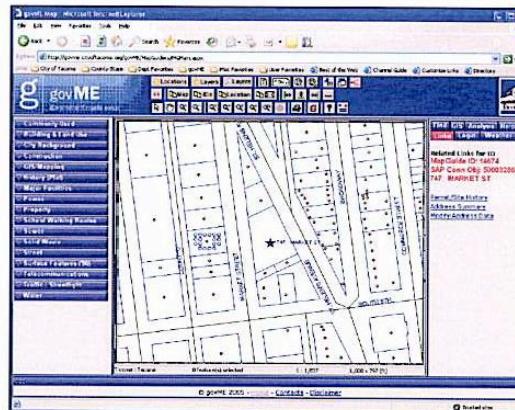


April 2006
Oracle Spatial Users Conference

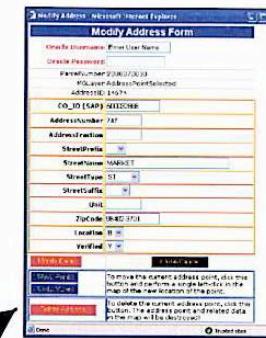
GIS Interoperability



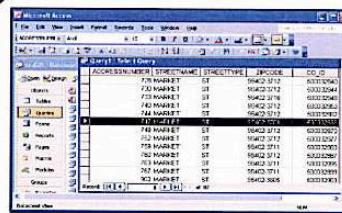
ESRI ArcGIS



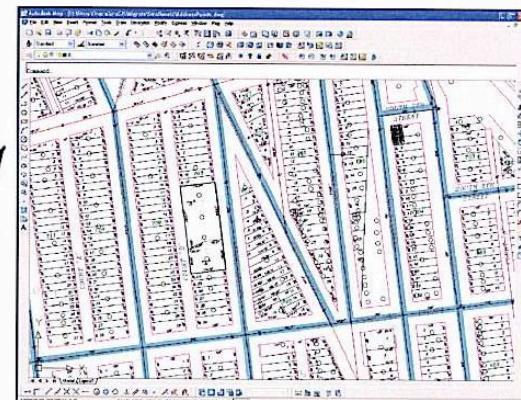
Autodesk MapGuide



Any Web Page or
ODBC Capable Program

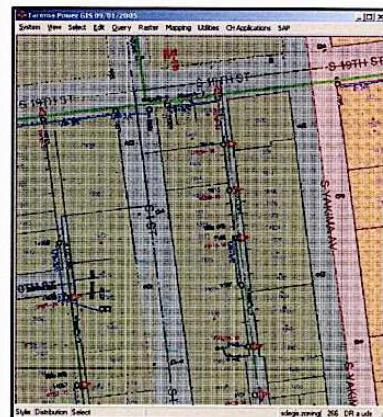


Microsoft Access

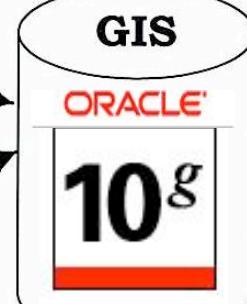


Autodesk Map

GE Smallworld



ArcSDE



currently
testing

currently
testing

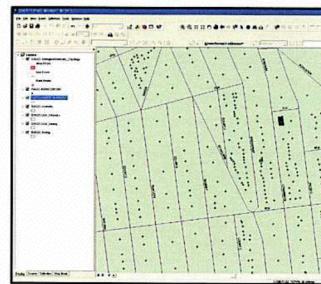
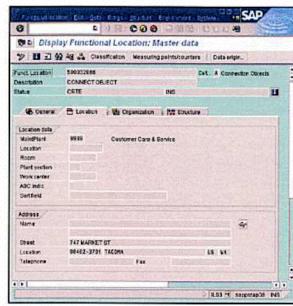
10g



April 2006
Oracle Spatial Users Conference

GIS Interoperability

SAP



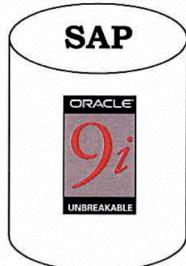
ESRI ArcGIS



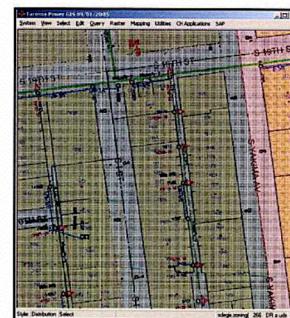
Autodesk MapGuide



Microsoft Access
Any Web Page or
ODBC Capable Program



Interoperability between
SAP and GIS...
Oracle is the
common denominator

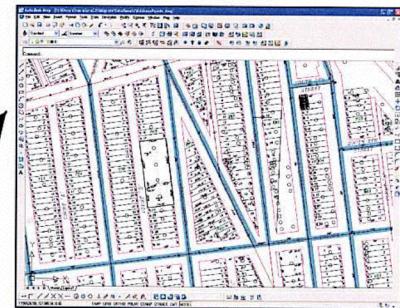


GE Smallworld



currently
testing

currently
testing



Autodesk Map

Interoperability with a Central GIS Database

September 2005



April 2006
Oracle Spatial Users Conference

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)

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

GIS Interoperability

- **Opportunities**, Constraints, and Solutions

- Real-time data for end users
 - govME – government Made Easy

<http://www.govME.org/Map>





April 2006
Oracle Spatial Users Conference

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

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



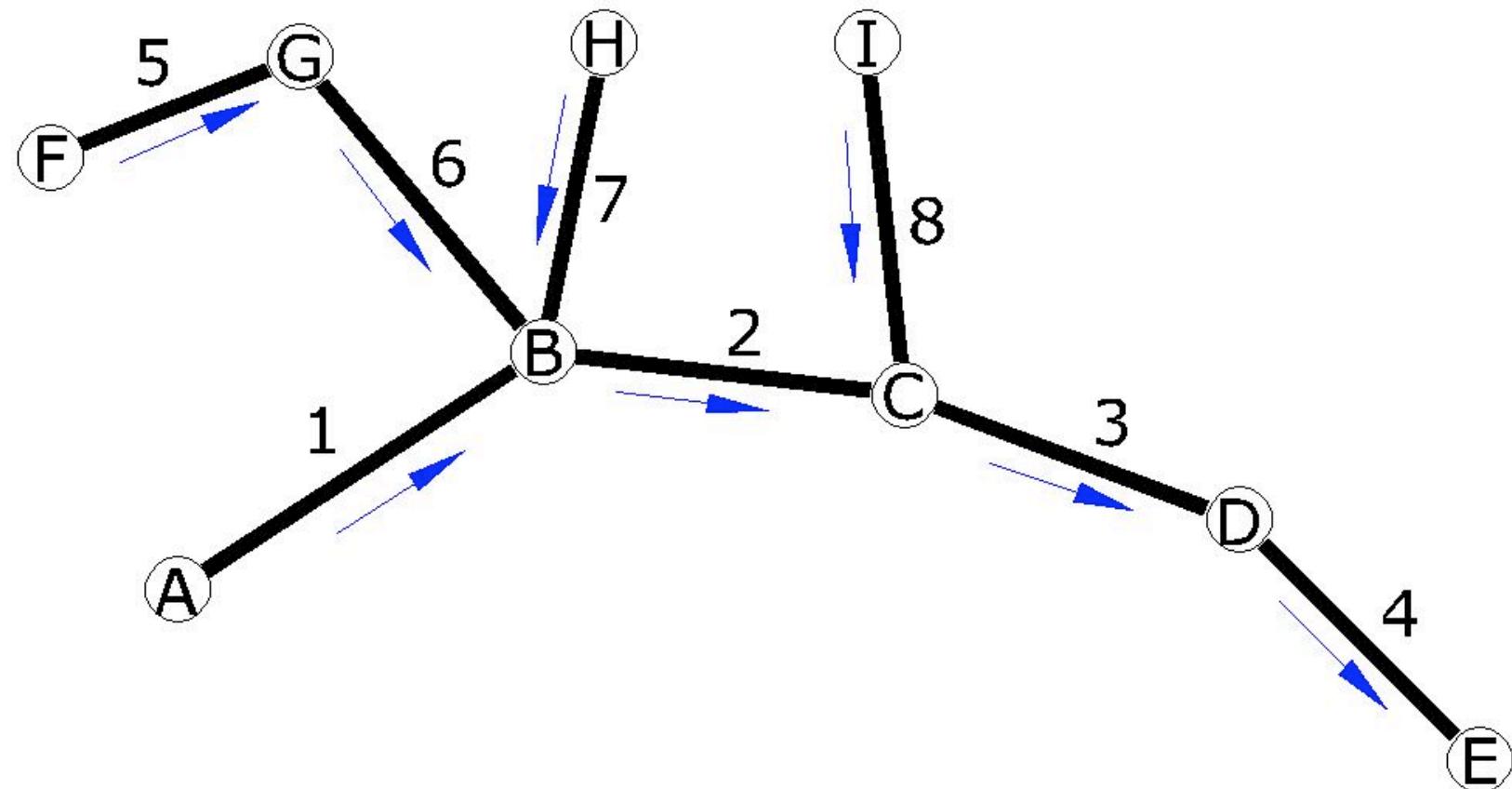
April 2006
Oracle Spatial Users Conference

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

GIS Interoperability

Analysis Example: Tracing Sewer pipes downstream

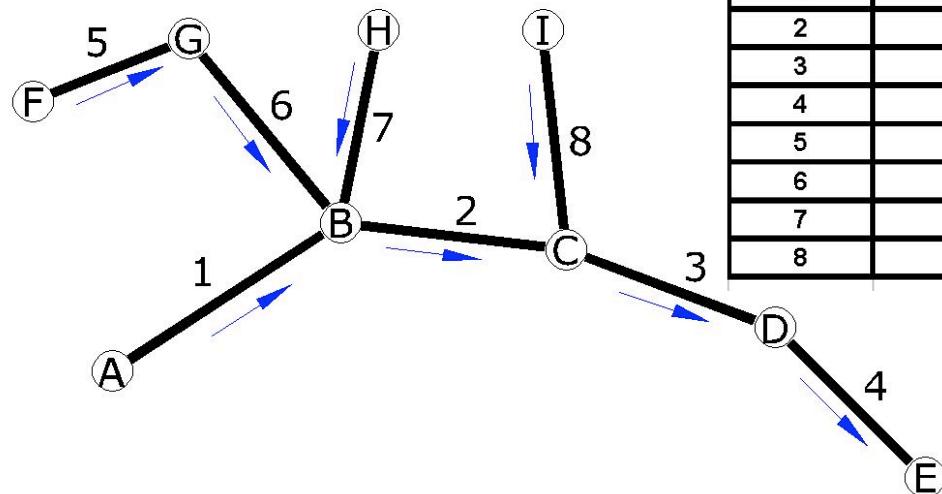


GIS Interoperability

Analysis Example: Tracing Sewer pipes downstream

SewerPipes			
Pipe_ID	Upstream Node	Downstream Node	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,...

GIS, SQL
or spatial solution?

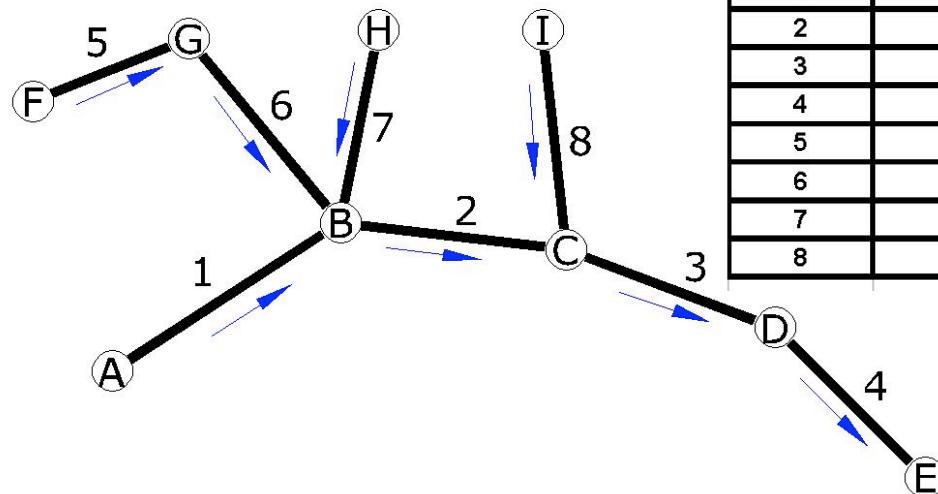


GIS Interoperability

SewerPipes			
Pipe_ID	Upstream Node	Downstream Node	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,...)

GIS Interoperability

Tracing Sewer pipes downstream via SQL



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,...)

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

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
```

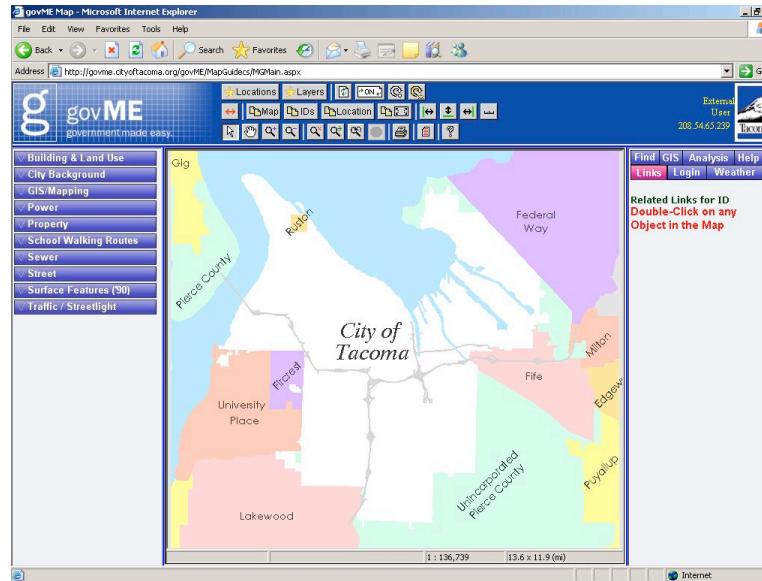
```
SELECT Pipe_ID FROM SewerPipes  
WHERE LEVEL <= 20  
START WITH Pipe_ID = 4  
CONNECT BY PRIOR UpstreamNode = DownstreamNode
```

GIS Interoperability

- Opportunities, Constraints, and Solutions

govME – government Made Easy

<http://www.govME.org/Map>



The screenshot shows a Microsoft Internet Explorer window displaying the govME Map. The map covers the City of Tacoma and parts of Pierce and Kitsap counties. Key areas labeled include Gig Harbor, Ruston, Federal Way, Milton, Fife, University Place, Lakewood, Finsel, Edgewood, and Puyallup. The map is color-coded by jurisdiction. A legend at the top provides tools for location and layer selection. On the left, a sidebar lists various government services. On the right, there are links for GIS, analysis, and help, along with a weather icon for Tacoma. The address bar shows the URL <http://govme.cityoftacoma.org/govME/MapGuidecs/MGMain.aspx>.

govME Map - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Favorites Location

Address <http://govme.cityoftacoma.org/govME/MapGuidecs/MGMain.aspx> Go

govME government made easy.

External User 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 scales
Line w/Label Scale: 0 - 10
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 (Individual)

Locations Layers

Map IDs Location

Find GIS Analysis Help
Links Login Weather

Analysis for ID 0000000000006255443
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

govME Map - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Favorites Location

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
Assessment Areas
Assessment Text
Sanitary Assets (All)
Sanitary Basins
Sanitary Basin Text
Sanitary Sewer Line
No Sani Sewer
Line Only Visible at all scales
Line w/Label Scale: 0 - 10
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 (Individual)

FRANCES BEVERLY GREEN HILLS STREET N.E. S3RD STREET N.E. N.E. POINT BAY DANE N.E. DRIVE N.E. JANE N.E. SOUTHBAY PL. S2ND STREET N.E. NORTHSHORE PARKWAY NORTHSHORE PA. BROWNS WINDA CT. N.E. AVENUE 28TH AVENUE N.E. BROWNS POINT ENTR. STVD. BROWNS POINT N.E. STREET N.E.

Find GIS Analysis Help
Links Login Weather

Analysis for ID
0000000000006255443
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 : 5415500230 1 'Sanitary Sewer' selected 1 : 3,843 2,021 x 1,765 (ft)

Internet

The screenshot shows a Microsoft Internet Explorer window displaying a parcel summary and a map for Parcel 9710000601 in Tacoma, Washington. The window has a toolbar with standard buttons like Back, Forward, Stop, Refresh, and Search. The address bar shows the URL <http://govme.cityoftacoma.org/govME/MapGuidecs/MGMain.aspx>. The main content area is divided into several sections:

- Left Sidebar:** A vertical list of categories: Building, City Bldg, GIS/M, Power, Property, School, Sewer, Street, Surface, and Traffic.
- Parcel Summary:** A large text block containing detailed information about the parcel, including address, business name, habitat zone, inspector contact information, legal documents, parcel area, waste collection details, tax assessed value, and taxpayer information.
- Map:** A detailed map of the parcel's location in Tacoma, Washington. The map shows streets like 10th Street, Alder Street, Lawrence Street, and Cedar Street. The parcel itself is highlighted with a black rectangle. A legend at the bottom of the map shows symbols for property lines, roads, and other features.
- Right Sidebar:** Includes links for "External User" (IP 208.54.65.239), "Find", "GIS", "Analysis", and "Help". Below these are buttons for "Links", "Login", and "Weather". A section titled "Related Links for ID 9710000601" lists "County Assessor Data" and "Parcel Summary".



April 2006
Oracle Spatial Users Conference

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

GIS Interoperability

```
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

This Year.... GIS Interoperability

Productive Interoperable Geospatial System

P.I.G.S.

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



April 2006
Oracle Spatial Users Conference

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

R_{A_MA} L_{A_MA} D_{I_NG} D_{O_NG}



April 2006
Oracle Spatial Users Conference

J. R. Smith

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





Oracle Spatial Users Conference

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