SPATIAL

March 2007
Oracle Spatial User Conference

ORACLE®

SPATIAL

Oracle Spatial User Conference

March 8, 2007
Henry B. Gonzalez
Convention Center
San Antonio, Texas USA

ORACLE SPATIAL

March 2007
Oracle Spatial User Conference

Jesse M. Day

Florida Turnpike Enterprise Asset Management System (TEAMS)

Data Maintenance Manager

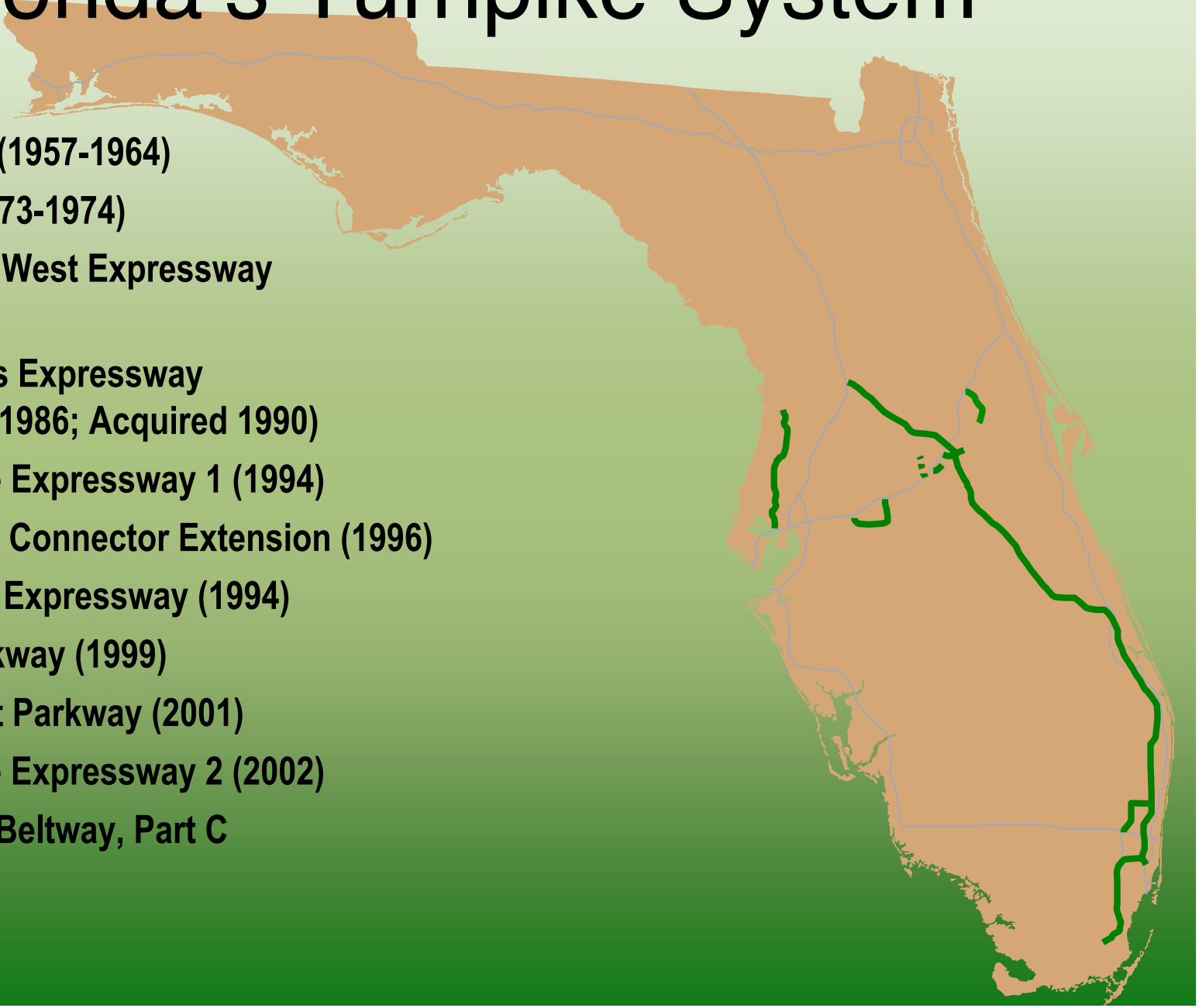
ORACLE SPATIAL

March 2007
Oracle Spatial User Conference

“Virtual” Connected Live Field Data Maintenance

Turnpike Enterprise Asset Management System (TEAMS)

Florida's Turnpike System



Mainline (1957-1964)

HEFT (1973-1974)

Bee Line West Expressway (1973)

Sawgrass Expressway (Opened 1986; Acquired 1990)

Seminole Expressway 1 (1994)

Southern Connector Extension (1996)

Veterans Expressway (1994)

Polk Parkway (1999)

Suncoast Parkway (2001)

Seminole Expressway 2 (2002)

Western Beltway, Part C

Florida's Turnpike System

449 miles
125 miles
21 miles

595 miles

Florida's Turnpike System

Other FDOT Owned

Other FDOT Operated

System Background

Turnpike Enterprise Asset Management System

TEAMS is an intranet application that:

- Provides an accurate inventory of infrastructure assets (and certain other capital assets)
- Provide the current condition of assets
- A method to forecast and prioritize capital expenditures required for periodic renewal & replacement

Assets Managed in TEAMS

- PAVEMENT
- ROADWAY
- FACILITIES
- BRIDGES
- NPDES
- SAFETY
- ENVIRONMENTAL PERMITS
- UTILITIES

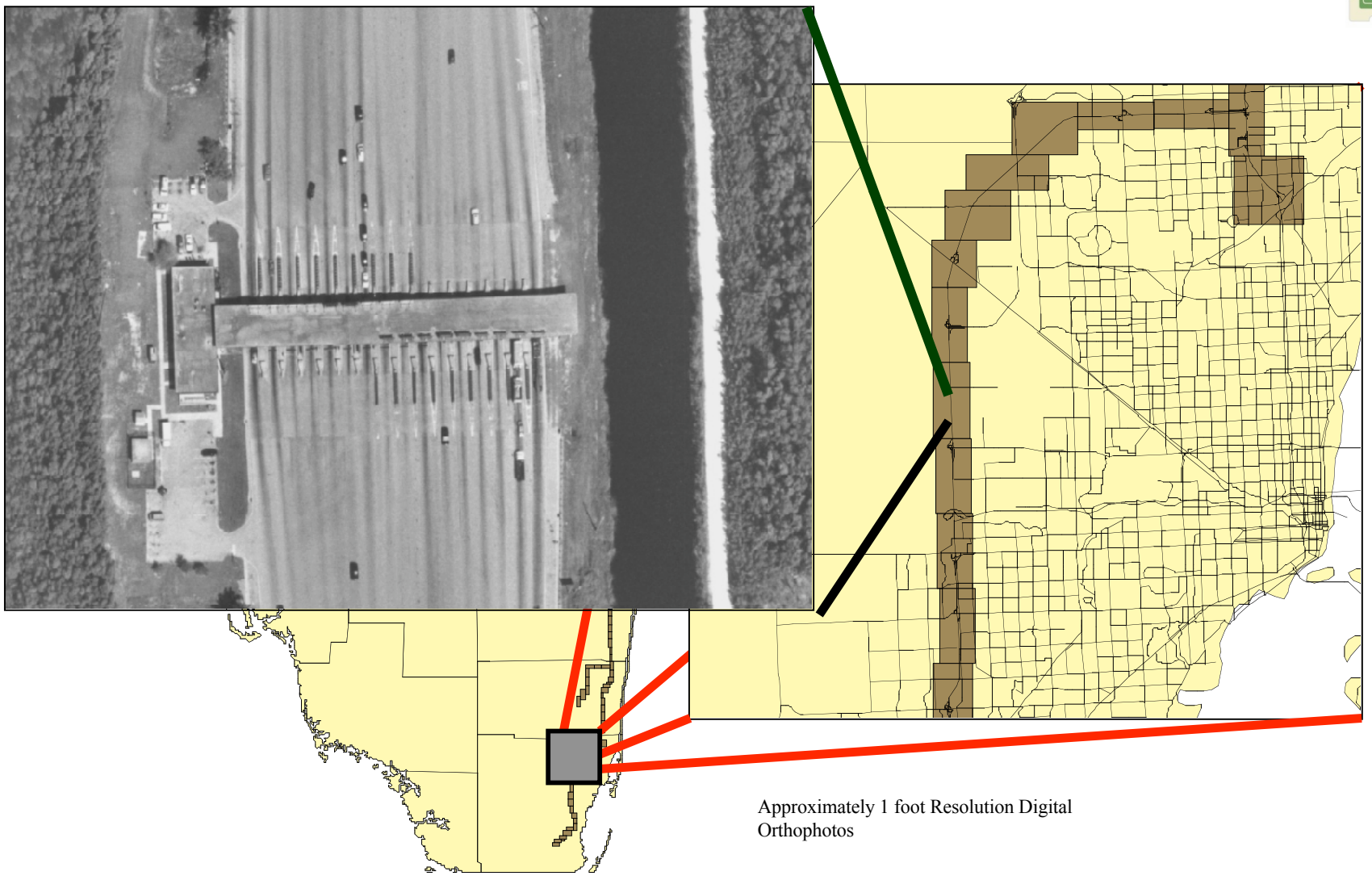
Initial Data Collection Process

- Multi Source Approach
  - Photogrammetry
  - VISAT VAN
  - GPS Field Data Collections Units

ORACLE SPATIAL

Photogrammetry

FLORIDA'S TURNPIKE ENTERPRISE

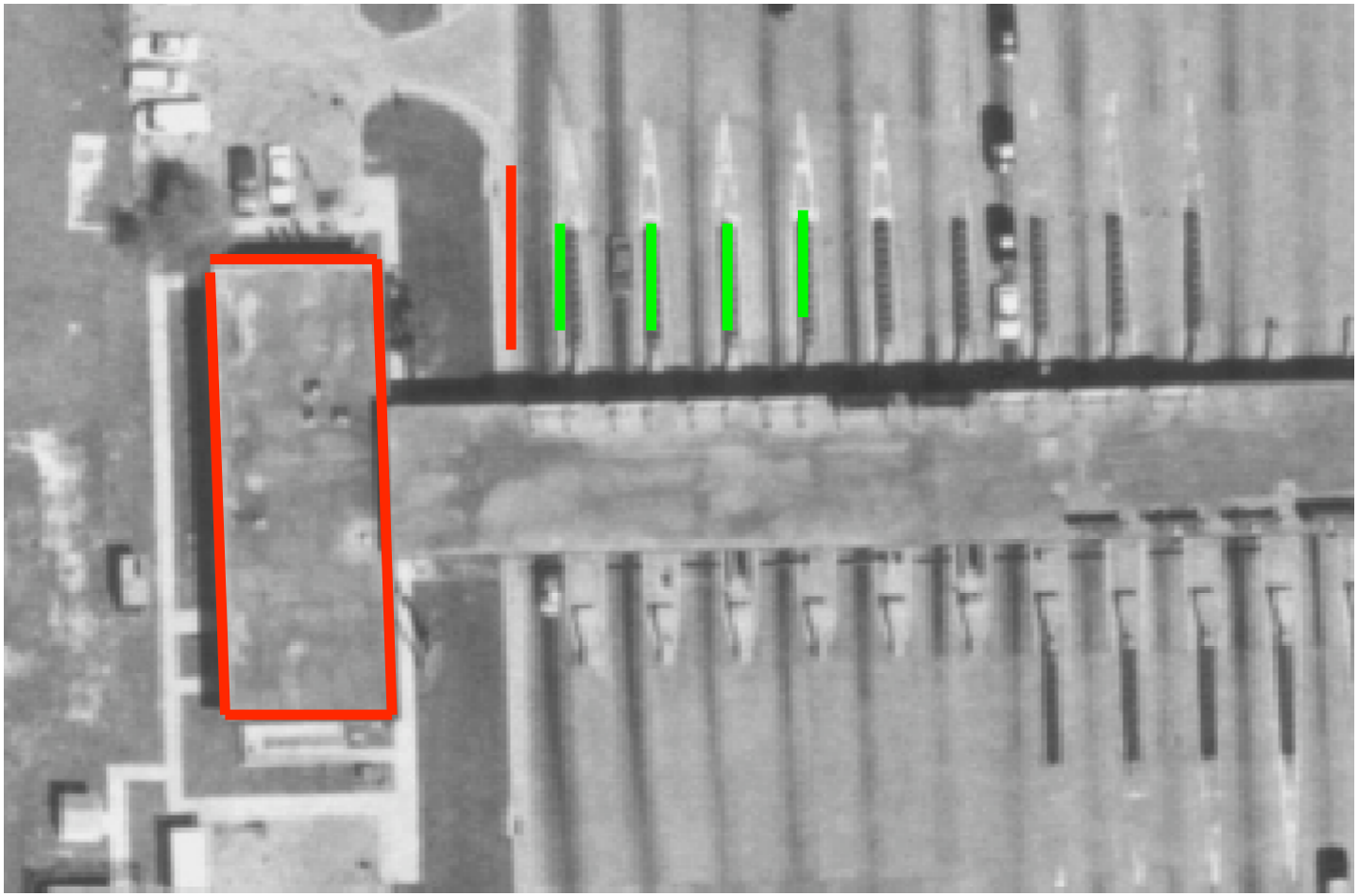


Approximately 1 foot Resolution Digital Orthophotos

ORACLE SPATIAL

Photogrammetry

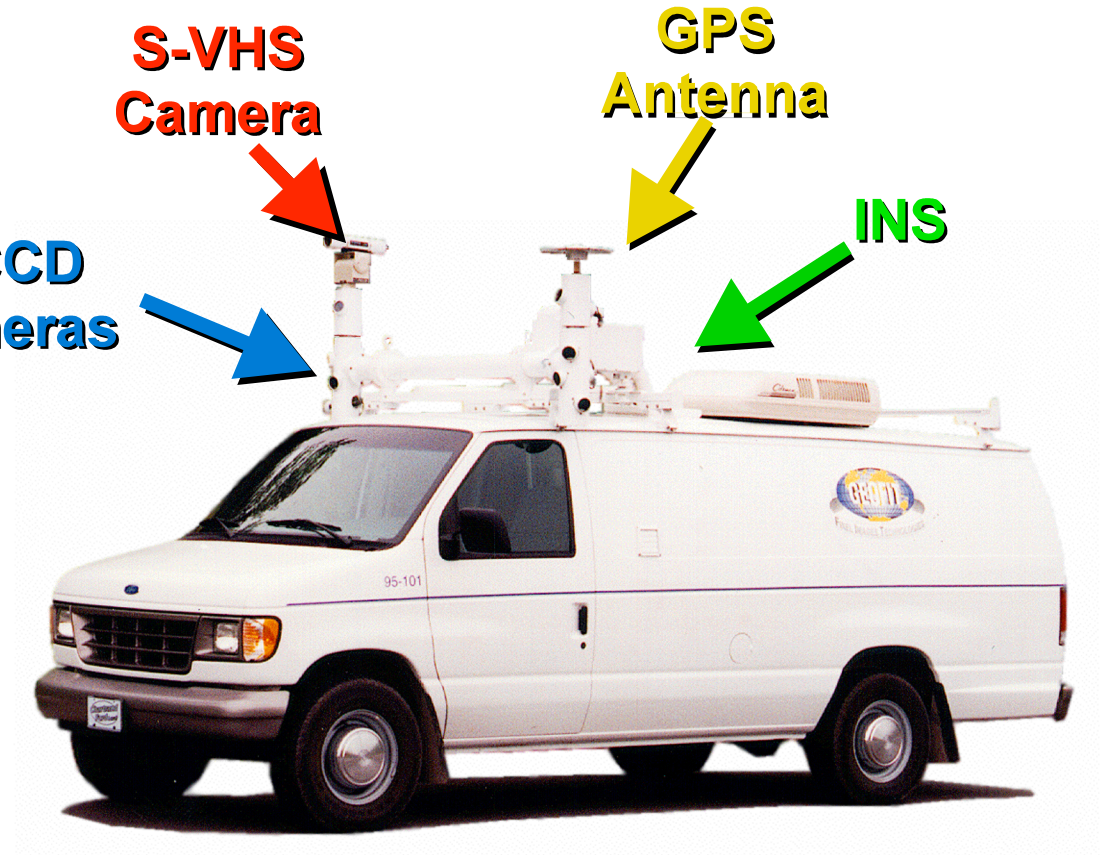
FLORIDA'S TURNPIKE ENTERPRISE



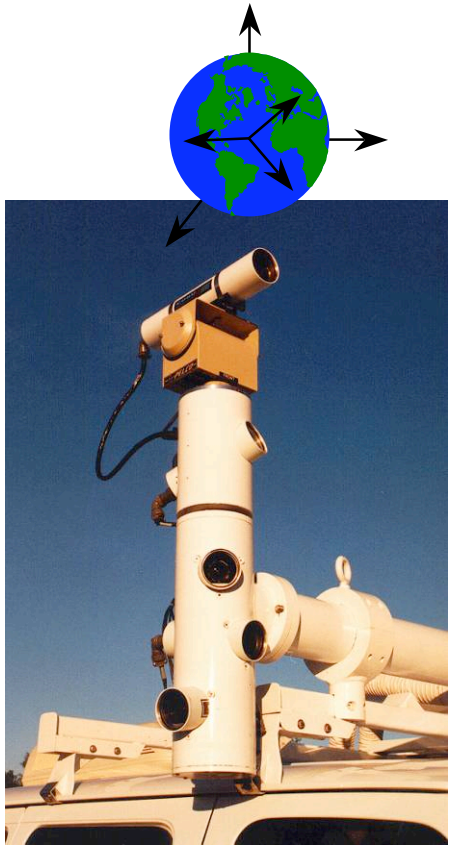
VISAT VAN

The VISAT Van

VISAT

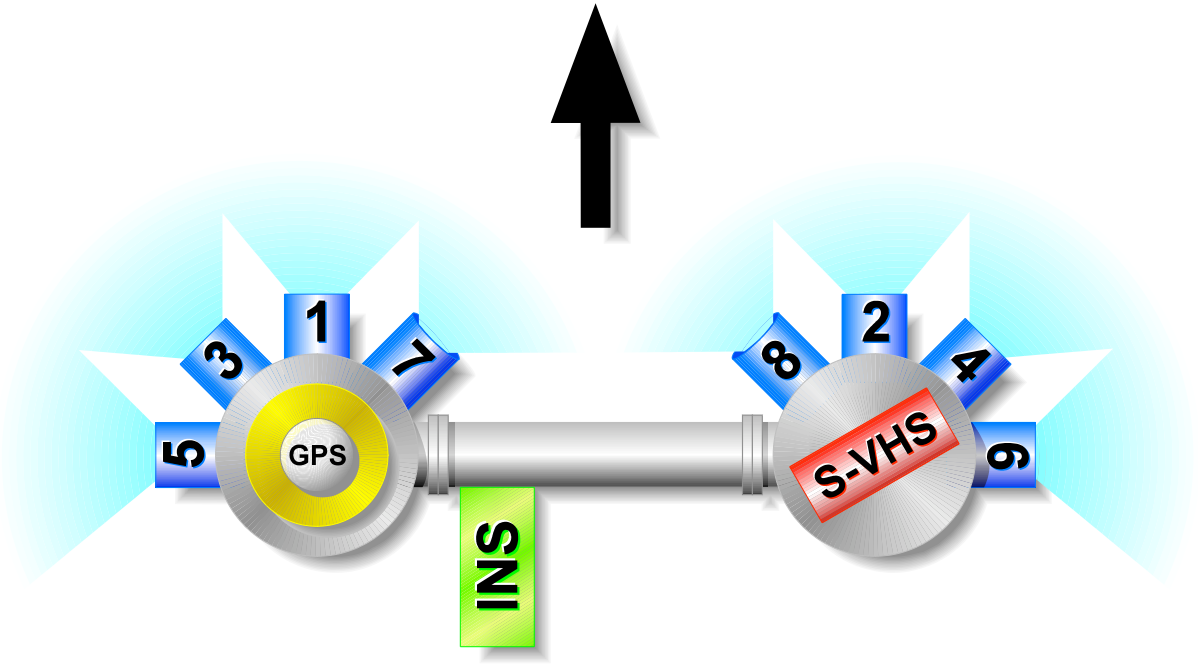


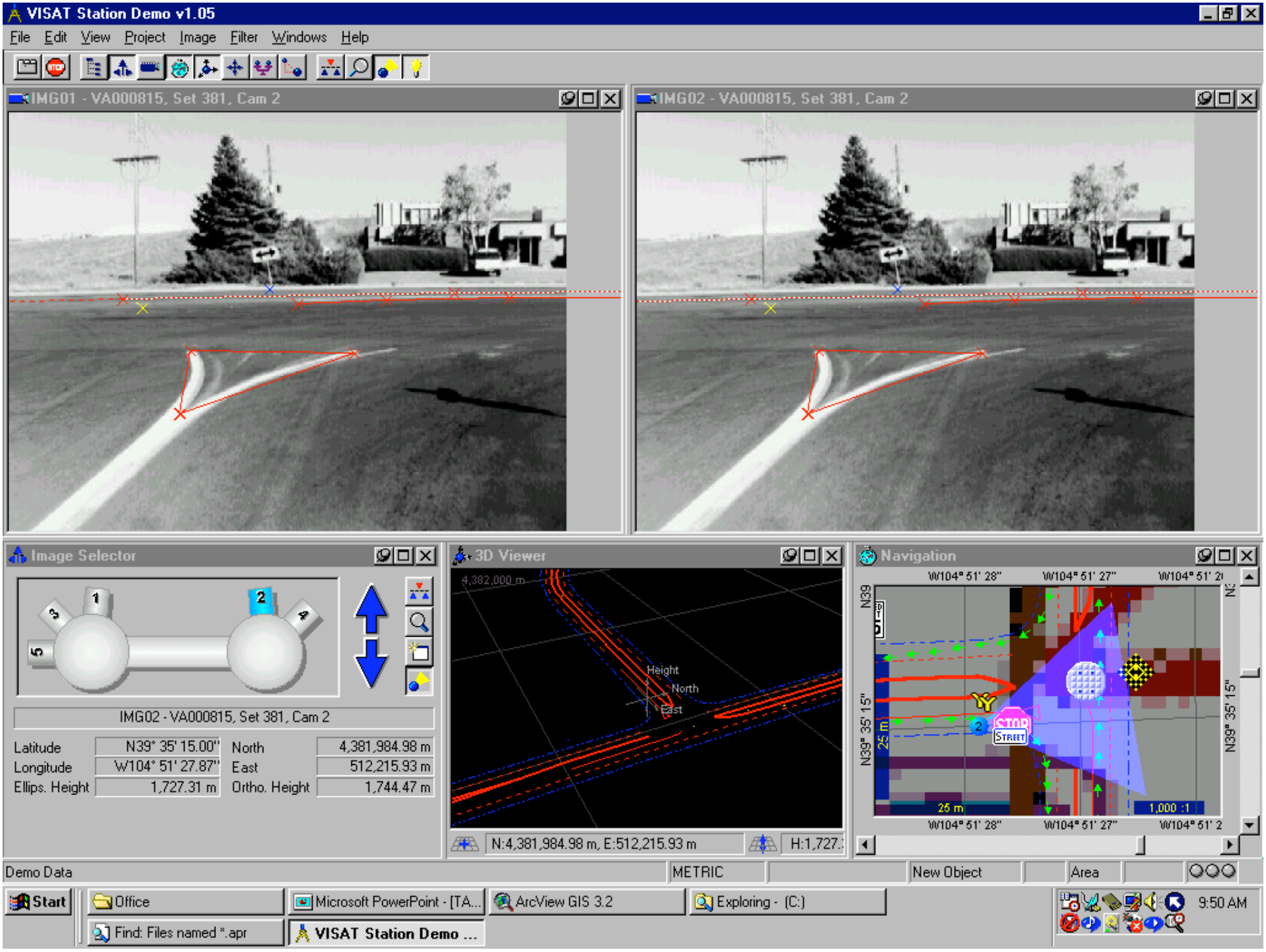
VISAT VAN



VISAT

Cameras Field of View




VISAT Station Demo v1.05
File Edit View Project Image Filter Windows Help
IMG01 - VA000815, Set 381, Cam 2
IMG02 - VA000815, Set 381, Cam 2
Image Selector
IMG02 - VA000815, Set 381, Cam 2
Latitude N39° 35' 15.00" North 4,381,984.98 m
Longitude W104° 51' 27.87" East 512,215.93 m
Ellips. Height 1,727.31 m Ortho. Height 1,744.47 m
3D Viewer
4,382,000 m
Height
North
East
N:4,381,984.98 m, E:512,215.93 m
H:1,727.
Navigation
W104° 51' 28"
W104° 51' 27"
N39° 35' 15"
25 m
1,000 :1
STOP
STREET
Demo Data
METRIC
New Object
Area
Start
Office
Microsoft PowerPoint - [TA...
ArcView GIS 3.2
Exploring - (C:)
Find: Files named *.apr
VISAT Station Demo ...
9:50 AM

Field Data Collection

- VoCarta Voice Activated Data Collection Software
- Digital Camera
- Electronic Notepad
- GPS Unit

Field Data Collection Issues

What Have We Learned?

- Software has to be maintainable by in-house staff.
  - Both VISAT and VoCarta required vendor experts for even the simplest modifications or changes.
- Collect the data in the same format as it is going to be stored when in production.
  - Translating data from one proprietary format to another causes unexpected problems, which complicates the process.
- The software must tie the digital photo to the asset at collection time.
- Data Collection Software tends to be expensive - $1000 – $2000 per license

Field Data Collection Issues

What Have We Learned?

- Hardware must be suitable for field conditions.
  - •Most computers will stop, or almost stop running at 100 degrees Fahrenheit – it gets real hot in Florida
- To the extent possible – control data quality at input.
  - •Don't assume the software has this capability
- To the extent possible limit the number of software "components" in your data collection process.

Field Data Collection Issues

Vision:

- Low per user software cost - $750 or less
- Works on all MS Windows operating system
- Easily maintained / modifiable software
- Easy to use – no more that 8hrs training required
- Works in disconnected or connect environment – no upgrade cost when (or if) Wi-Fi is available
- Fully compatible with Oracle – requires no translation.

ORACLE SPATIAL

FLORIDA'S TURNPIKE ENTERPRISE

Field Data Collection Solution

Software

Acquis Remote and Acquis Mobile for Oracle Spatial

- Enterprise J2EE software that natively extends Oracle MapViewer
  - Extracts business logic, metadata and data (including structured and unstructured data as well as user-defined types) directly from Oracle Database
  - Integrated into ANY business workflow, application or GIS
- Single code base for web, remote and mobile – “develop once, deploy anywhere”
- Operates in real-time and disconnected modes while preserving Oracle Spatial native format throughout business process lifecycle
- Extremely LOW cost

Hardware

- 2 Trimble Geo XTs

- 2 Panasonic Toughbook 18s

Panasonic recommends
Windows® XP Professional

Application Development

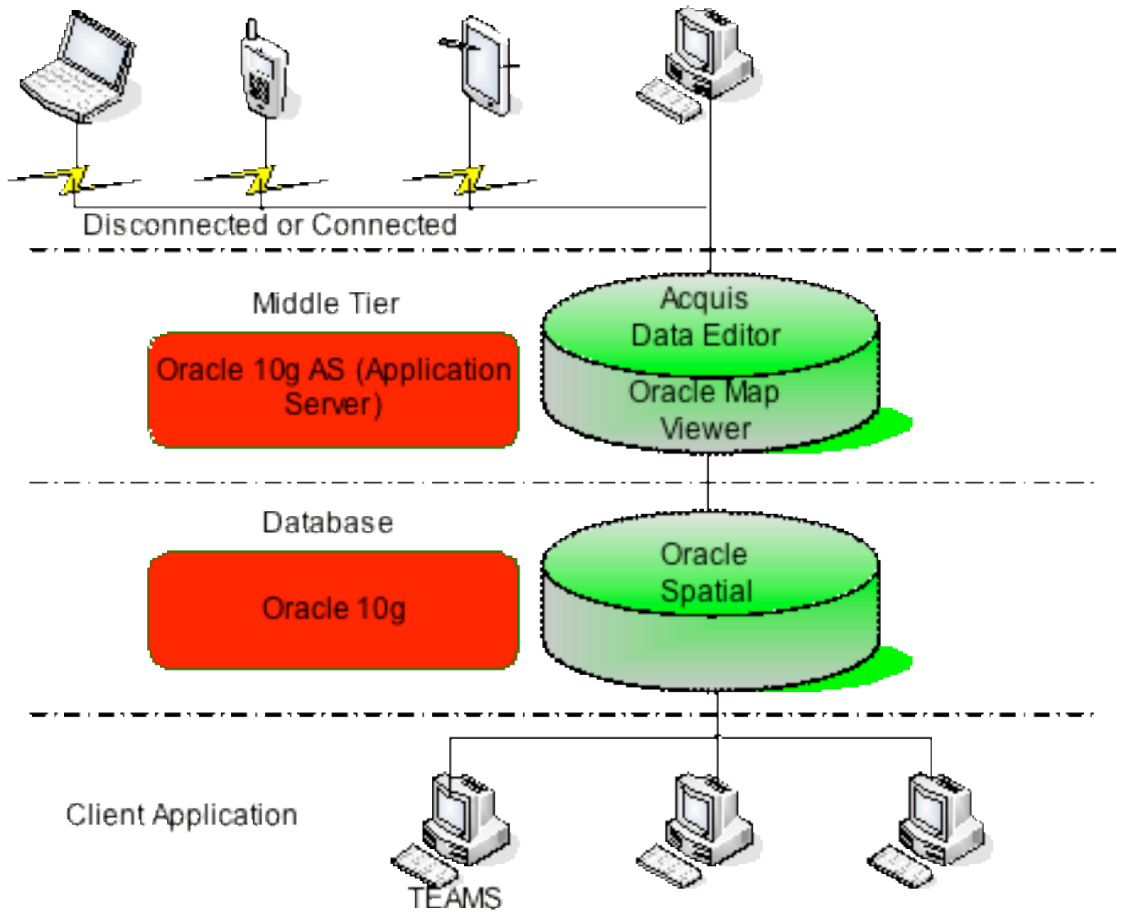
3 Phase Approach

- Phase 1: Sign Structure and Panel collection and validation – to include integration of digital photos
- Phase 2: All assets – Roadway and Facilities
- Phase 3: Development of TEAMS Field – Full TEAMS capabilities in the Field.

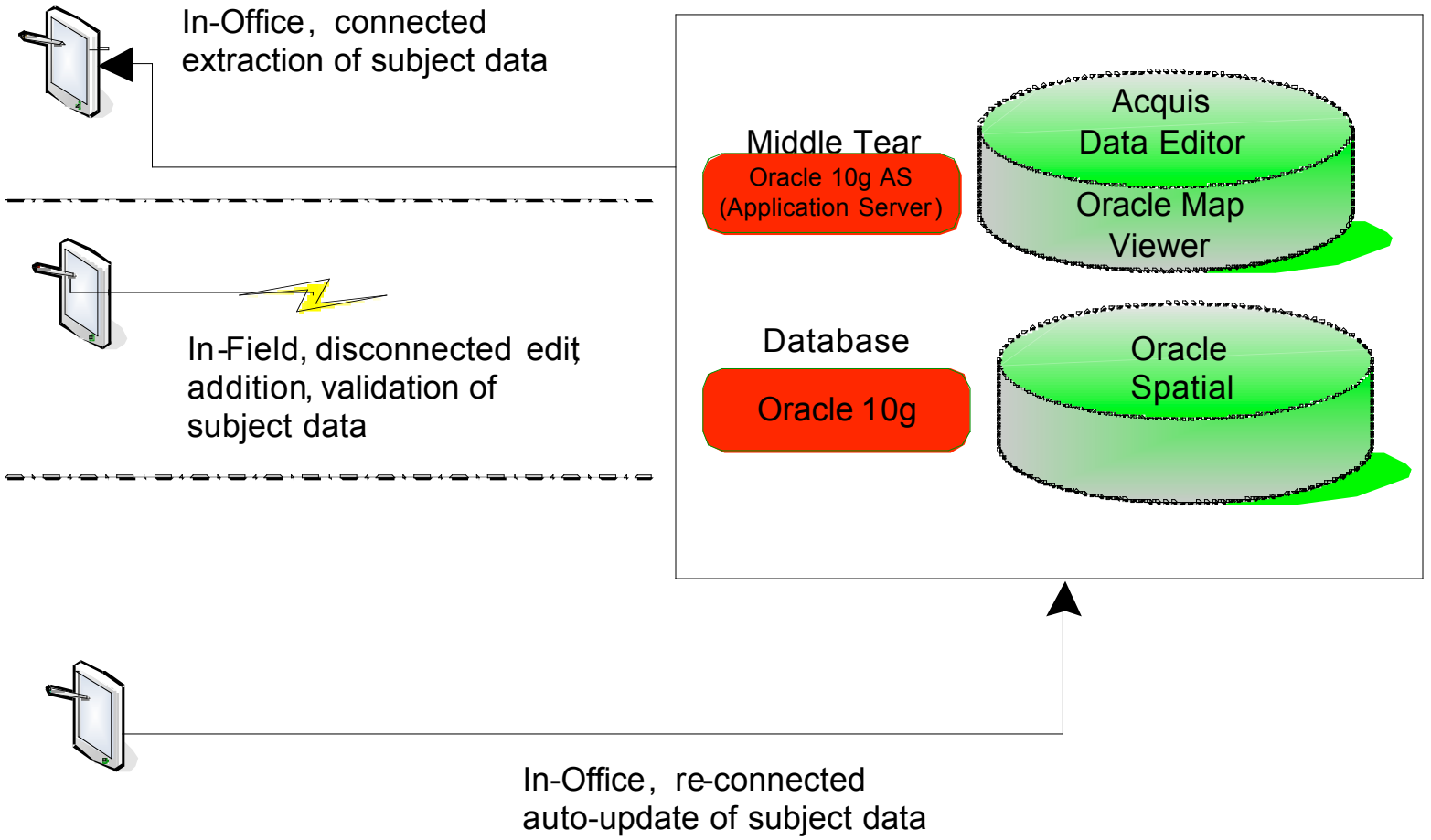
ORACLE SPATIAL

System Configuration

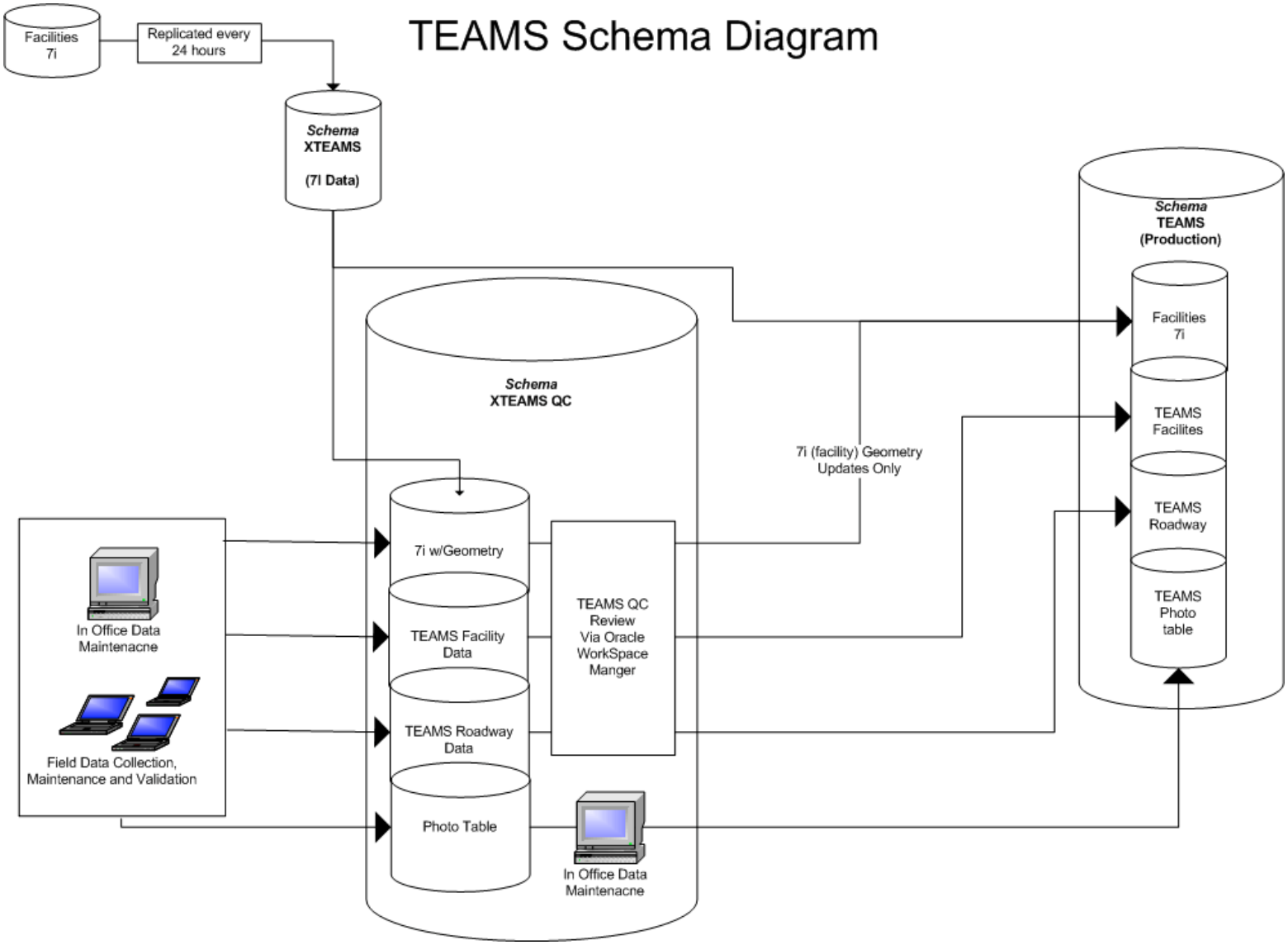
FLORIDA'S TURNPIKE ENTERPRISE



Work Flow


In-Office, connected extraction of subject data
In-Field, disconnected edit, addition, validation of subject data
In-Office, re-connected auto-update of subject data
Middle Tear
Oracle 10g AS (Application Server)
Acquis Data Editor
Oracle Map Viewer
Database
Oracle 10g
Oracle Spatial

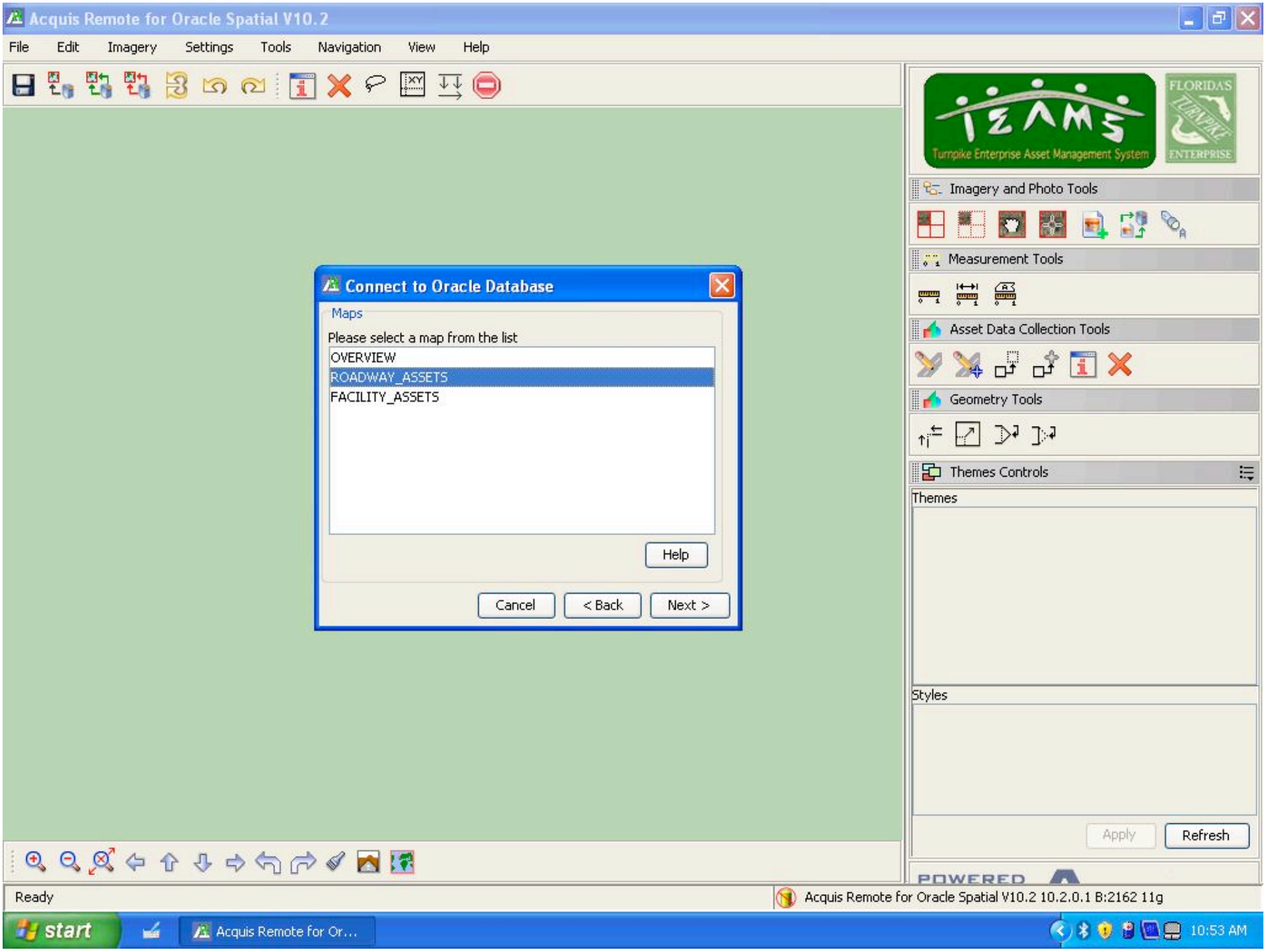
TEAMS Schema Diagram

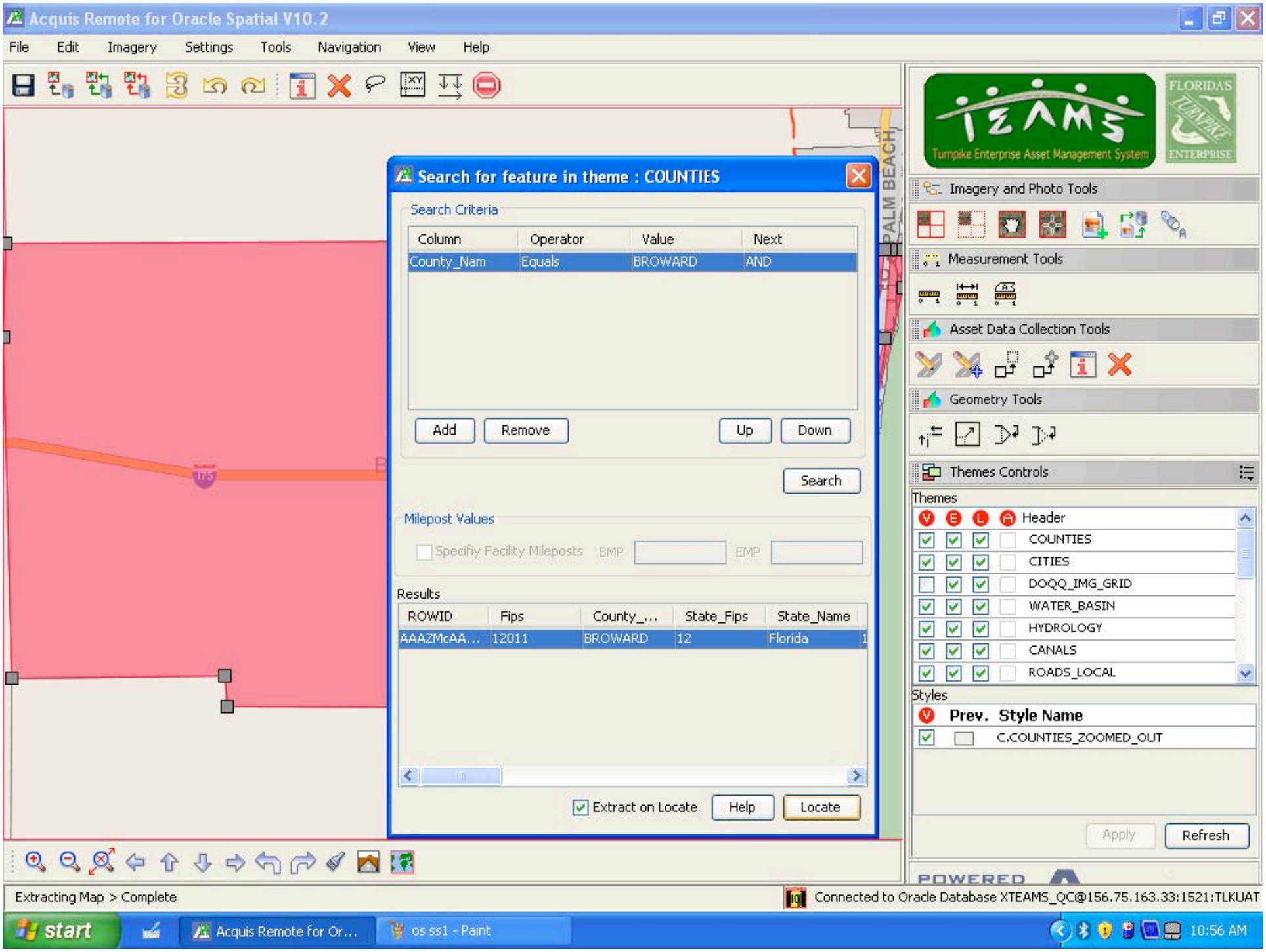


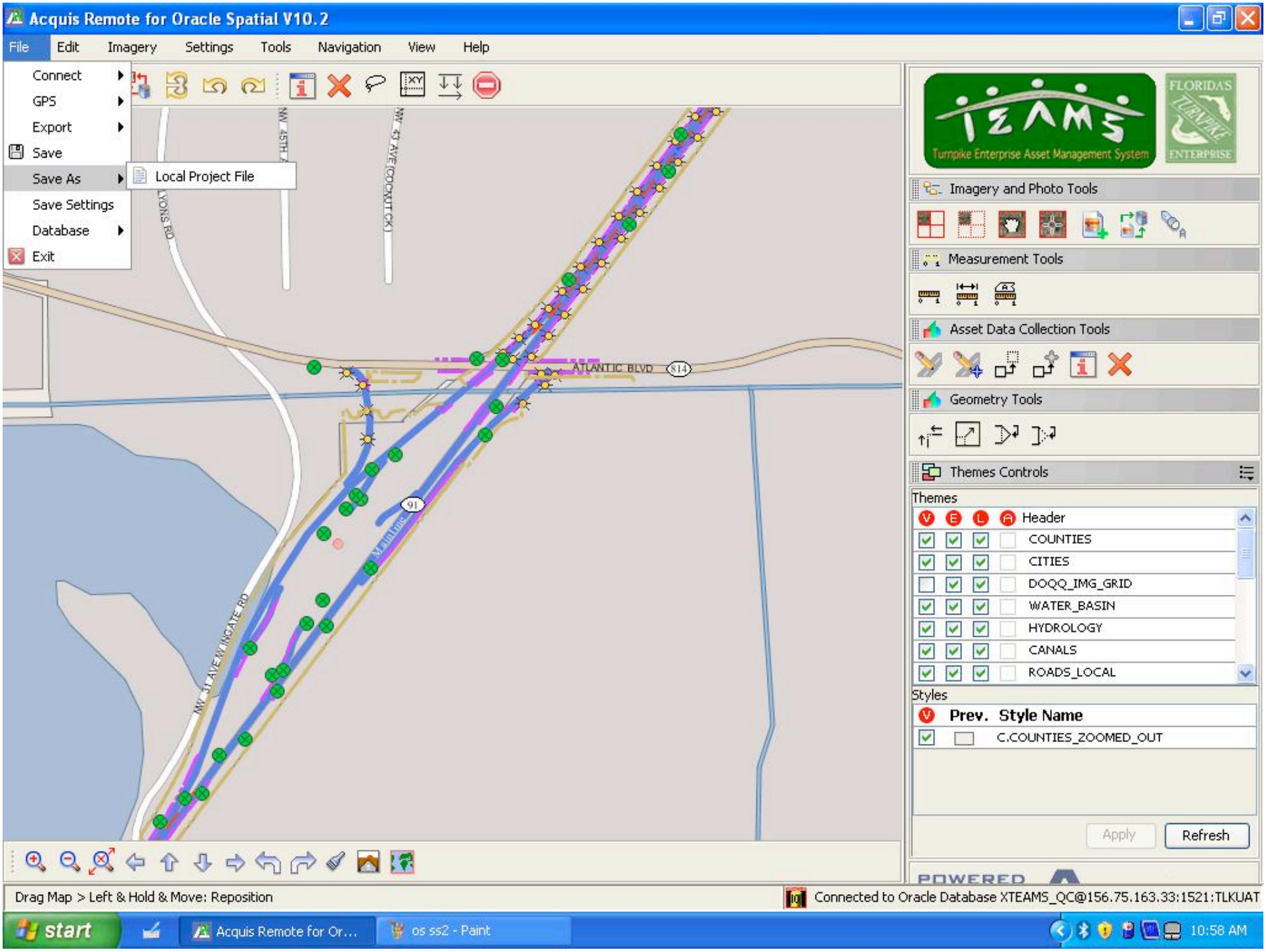
ORACLE SPATIAL

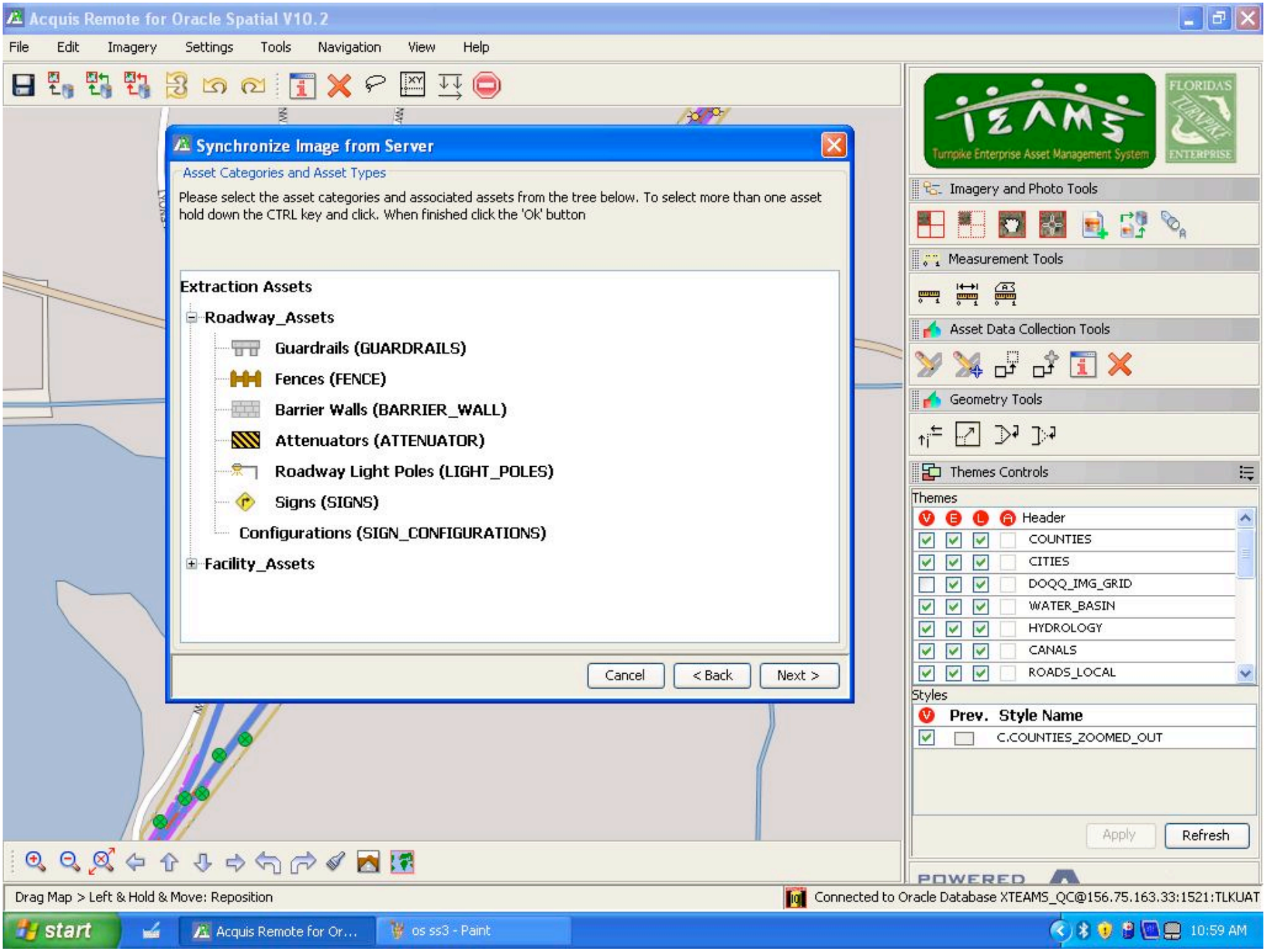
FLORIDA'S TURNPIKE ENTERPRISE

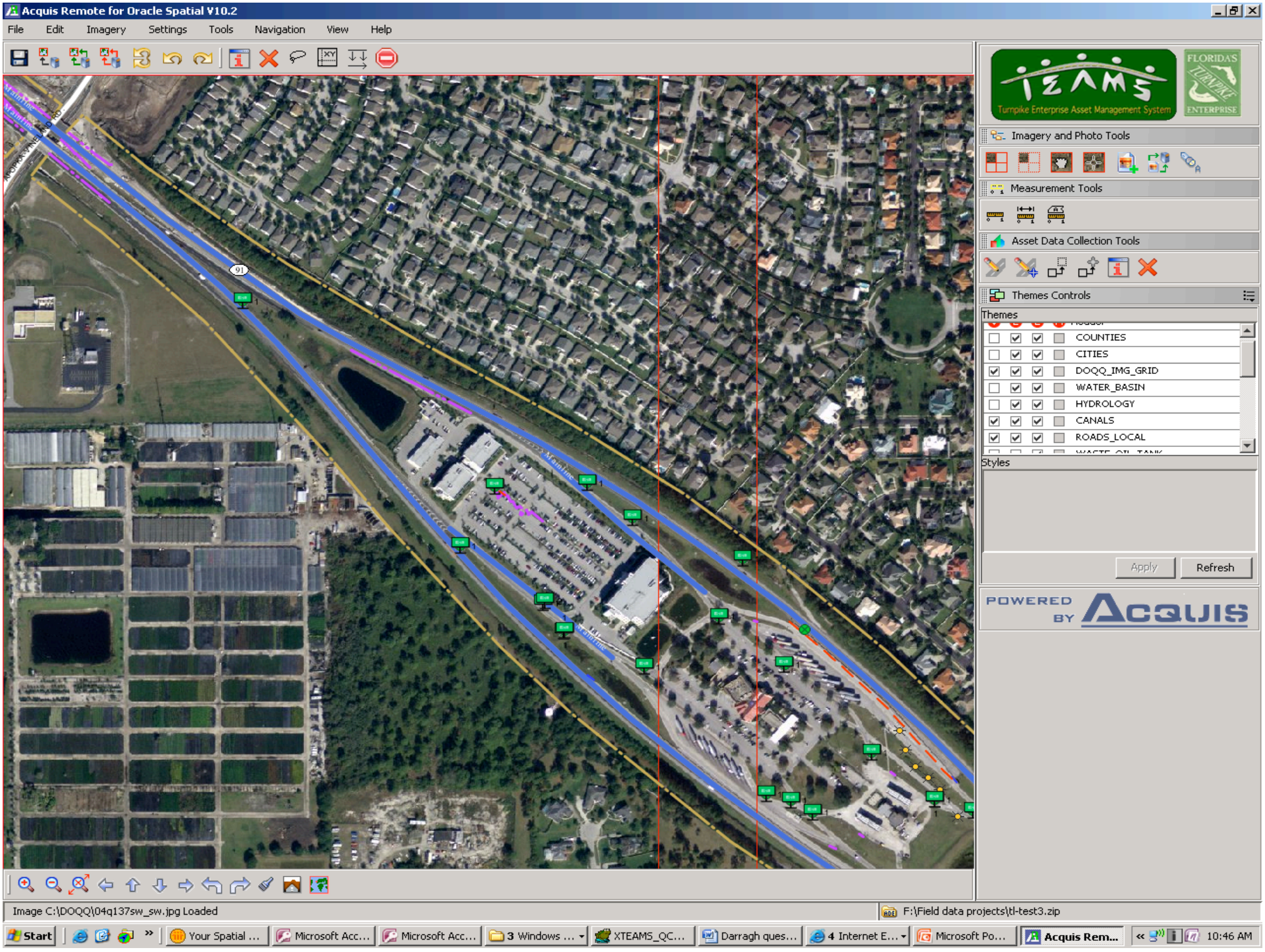
Data Extraction / Disconnected


Acquis Remote for Oracle Spatial V10.2
File
Edit
Imagery
Settings
Tools
Navigation
View
Help
Connect to Oracle Database
Maps
Please select a map from the list
OVERVIEW
ROADWAY_ASSETS
FACILITY_ASSETS
Help
Cancel
< Back
Next >
TEAMS
Turnpike Enterprise Asset Management System
FLORIDA'S TURNPIKE ENTERPRISE
Imagery and Photo Tools
Measurement Tools
Asset Data Collection Tools
Geometry Tools
Themes Controls
Themes
Styles
Apply
Refresh
POWERED
Ready
Acquis Remote for Oracle Spatial V10.2 10.2.0.1 B:2162 11g
start
Acquis Remote for Or...
10:53 AM


Acquis Remote for Oracle Spatial V10.2
File
Edit
Imagery
Settings
Tools
Navigation
View
Help
Search for feature in theme : COUNTIES
Search Criteria
Column
Operator
Value
Next
County_Nam
Equals
BROWARD
AND
Add
Remove
Up
Down
Search
Milepost Values
Specify Facility Mileposts
BMP
EMP
Results
ROWID
Fips
County_...
State_Fips
State_Name
AAAZMcAA...
12011
BROWARD
12
Florida
Extract on Locate
Help
Locate
PALM BEACH
TEAMS
Turnpike Enterprise Asset Management System
FLORIDA'S TURNPIKE ENTERPRISE
Imagery and Photo Tools
Measurement Tools
Asset Data Collection Tools
Geometry Tools
Themes Controls
Themes
Header
COUNTIES
CITIES
DOQQ_IMG_GRID
WATER_BASIN
HYDROLOGY
CANALS
ROADS_LOCAL
Styles
Prev.
Style Name
C.COUNTIES_ZOOMED_OUT
Apply
Refresh
POWERED
Extracting Map > Complete
Connected to Oracle Database XTEAMS_QC@156.75.163.33:1521:TLKUAT
start
Acquis Remote for Or...
os ss1 - Paint
10:56 AM


Acquis Remote for Oracle Spatial V10.2
File
Edit
Imagery
Settings
Tools
Navigation
View
Help
Connect
GPS
Export
Save
Save As
Local Project File
Save Settings
Database
Exit
NW 45TH
NW 43 AVE (COCONUT CK)
LYONS RD
ATLANTIC BLVD
91
NW 31 AVE W INGATE RD
Turnpike Enterprise Asset Management System
FLORIDA'S TURNPIKE ENTERPRISE
Imagery and Photo Tools
Measurement Tools
Asset Data Collection Tools
Geometry Tools
Themes Controls
Themes
Header
COUNTIES
CITIES
DOQQ_IMG_GRID
WATER_BASIN
HYDROLOGY
CANALS
ROADS_LOCAL
Styles
Prev.
Style Name
C.COUNTIES_ZOOMED_OUT
Apply
Refresh
POWERED
Drag Map > Left & Hold & Move: Reposition
Connected to Oracle Database XTEAMS_QC@156.75.163.33:1521:TLKUAT
start
Acquis Remote for Or...
os ss2 - Paint
10:58 AM


Acquis Remote for Oracle Spatial V10.2
File
Edit
Imagery
Settings
Tools
Navigation
View
Help
Synchronize Image from Server
Asset Categories and Asset Types
Please select the asset categories and associated assets from the tree below. To select more than one asset hold down the CTRL key and click. When finished click the 'Ok' button
Extraction Assets
Roadway_Assets
Guardrails (GUARDRAILS)
Fences (FENCE)
Barrier Walls (BARRIER_WALL)
Attenuators (ATTENUATOR)
Roadway Light Poles (LIGHT_POLES)
Signs (SIGNS)
Configurations (SIGN_CONFIGURATIONS)
Facility_Assets
Cancel
< Back
Next >
Turnpike Enterprise Asset Management System
Imagery and Photo Tools
Measurement Tools
Asset Data Collection Tools
Geometry Tools
Themes Controls
Themes
Header
COUNTIES
CITIES
DOQQ_IMG_GRID
WATER_BASIN
HYDROLOGY
CANALS
ROADS_LOCAL
Styles
Prev.
Style Name
C.COUNTIES_ZOOMED_OUT
Apply
Refresh
Drag Map > Left & Hold & Move: Reposition
Connected to Oracle Database XTEAMS_QC@156.75.163.33:1521:TLKUAT
start
Acquis Remote for Or...
os ss3 - Paint
10:59 AM

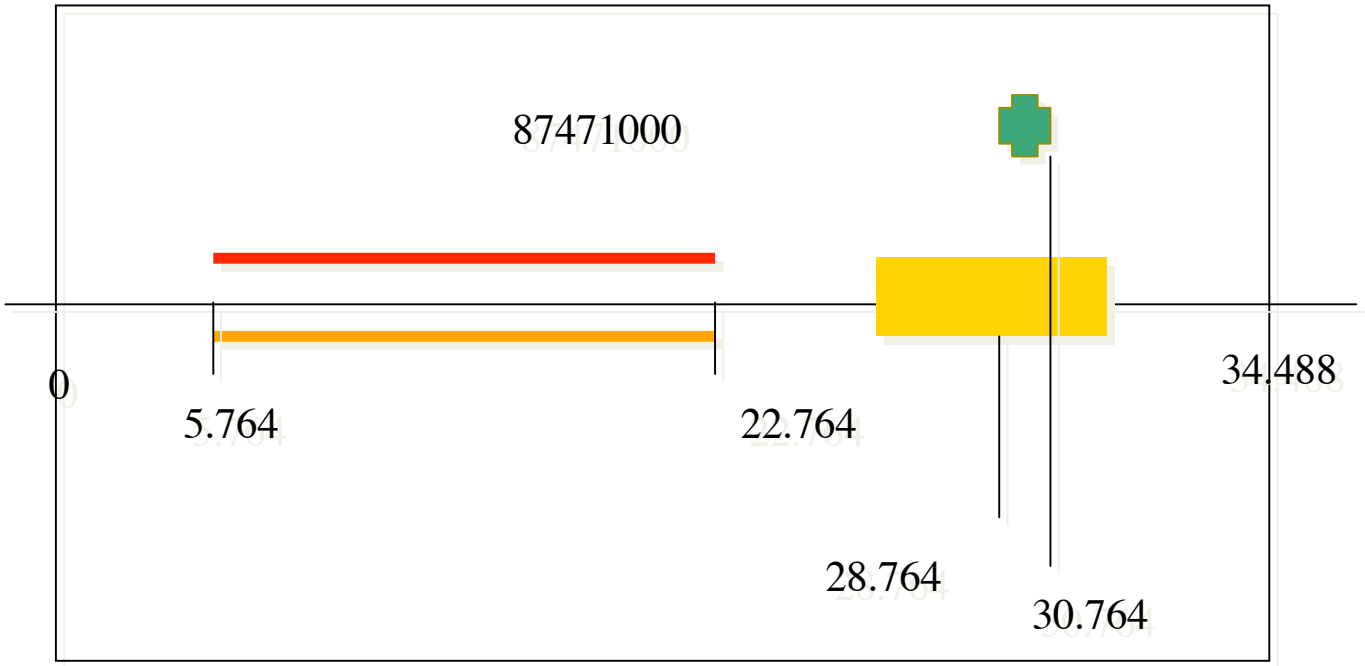

Acquis Remote for Oracle Spatial V10.2
File
Edit
Imagery
Settings
Tools
Navigation
View
Help
Turnpike Enterprise Asset Management System
FLORIDA'S TURNPIKE ENTERPRISE
Imagery and Photo Tools
Measurement Tools
Asset Data Collection Tools
Themes Controls
Themes
COUNTIES
CITIES
DOQQ_IMG_GRID
WATER_BASIN
HYDROLOGY
CANALS
ROADS_LOCAL
Styles
Apply
Refresh
POWERED BY Acquis
Image C:\DOQQ\04q137sw_sw.jpg Loaded
F:\Field data projects\tl-test3.zip
Start
Your Spatial ...
Microsoft Acc...
Microsoft Acc...
3 Windows ...
XTEAMS_QC...
Darragh ques...
4 Internet E...
Microsoft Po...
Acquis Rem...
10:46 AM

Linear Referencing 101

Two types of cartographic "objects":

LRS – Dynamically Segmented
Legacy Databases: RCI, FM(WPA),Crash, Pavement

Geographic – x, y coordinates
Data Collected specifically for TEAMS



All TEAMS assets have a unique roadway id and milepost

ORACLE

SPATIAL

March 2007
Oracle Spatial User Conference

D E M O N S T R A T I O N

Live Disconnected Demonstration

ORACLE®
SPATIAL