Case Studies for the Application of GIS in Traffic Engineering Projects

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Outline

- Overview - GIS in transportation
- Tools
- Case Studies
- Challenges
- Summary

Overview

- What would data look like in Excel?
- What would the same data look like in a GIS map?

Overview (cont'd)

- Inventory of roads, signage, signals and other elements
- Intelligent Transportation Systems/Traffic Management
- Routing and Delivery
- Public Transportation
- Incident Management/Emergency Response

Case Studies

1) City of Falls Church, VA
   - Traffic Signal Inventory Data

2) Baltimore City, MD
   - Citywide Traffic Operating Conditions
   - CCTV Master Plan

3) District of Columbia
   - Citywide Data Collection Plan & Data Sharing

Case Study 1

Falls Church, VA - Traffic Signal Inventory Data

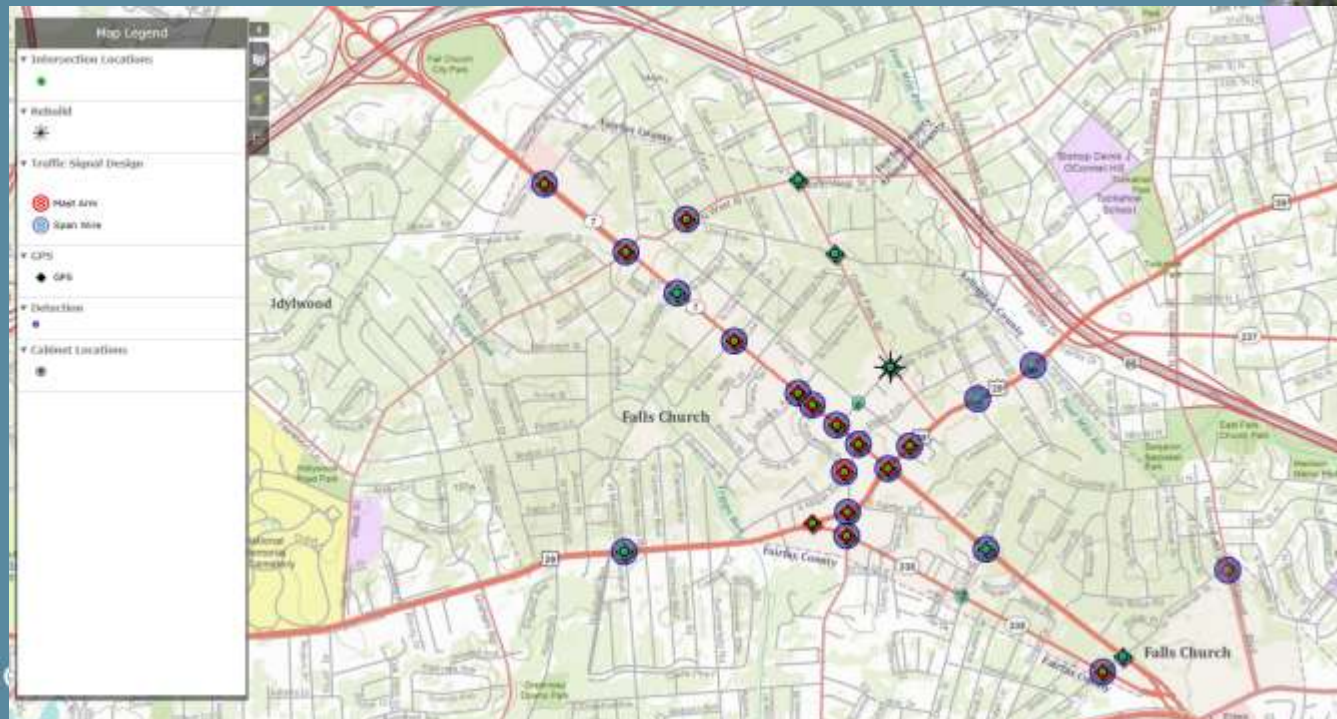
- Objective
  - Catalog existing equipment in the field
    - Identify locations that require equipment upgrades
    - Plan for equipment replacement

Case Study 1

- Scope
  - 26 intersections
  - Signal controller equipment
  - Mounting Structure
  - Vehicle Detection

Case Study 1

- Database
  - Created from scratch
  - Data collection
    - Spreadsheet for field data inventory



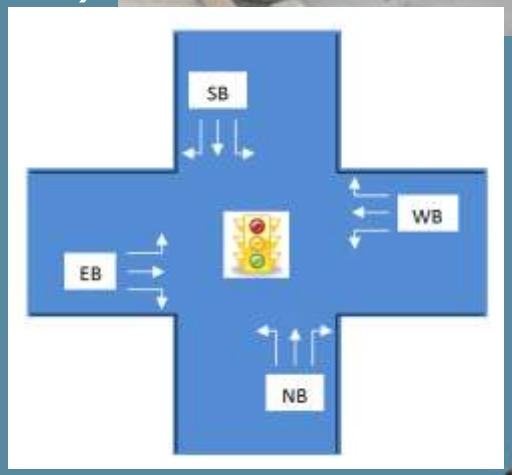
Case Study 2

Baltimore, MD – Citywide Traffic Operating Conditions

- Objectives
  - Display operational condition of signalized intersections within Baltimore City
    - AM, Midday & PM peaks
  - Create a data repository for quick & easy access to data

Case Study 2

- Scope
  - 1300+ signals
  - Signal number (unique identifier)
  - Turning Movement Counts
  - MOEs:
    - Delay
    - Volume to Capacity ratio (V/C)
    - Level-of-Service (LOS)



Case Study 2

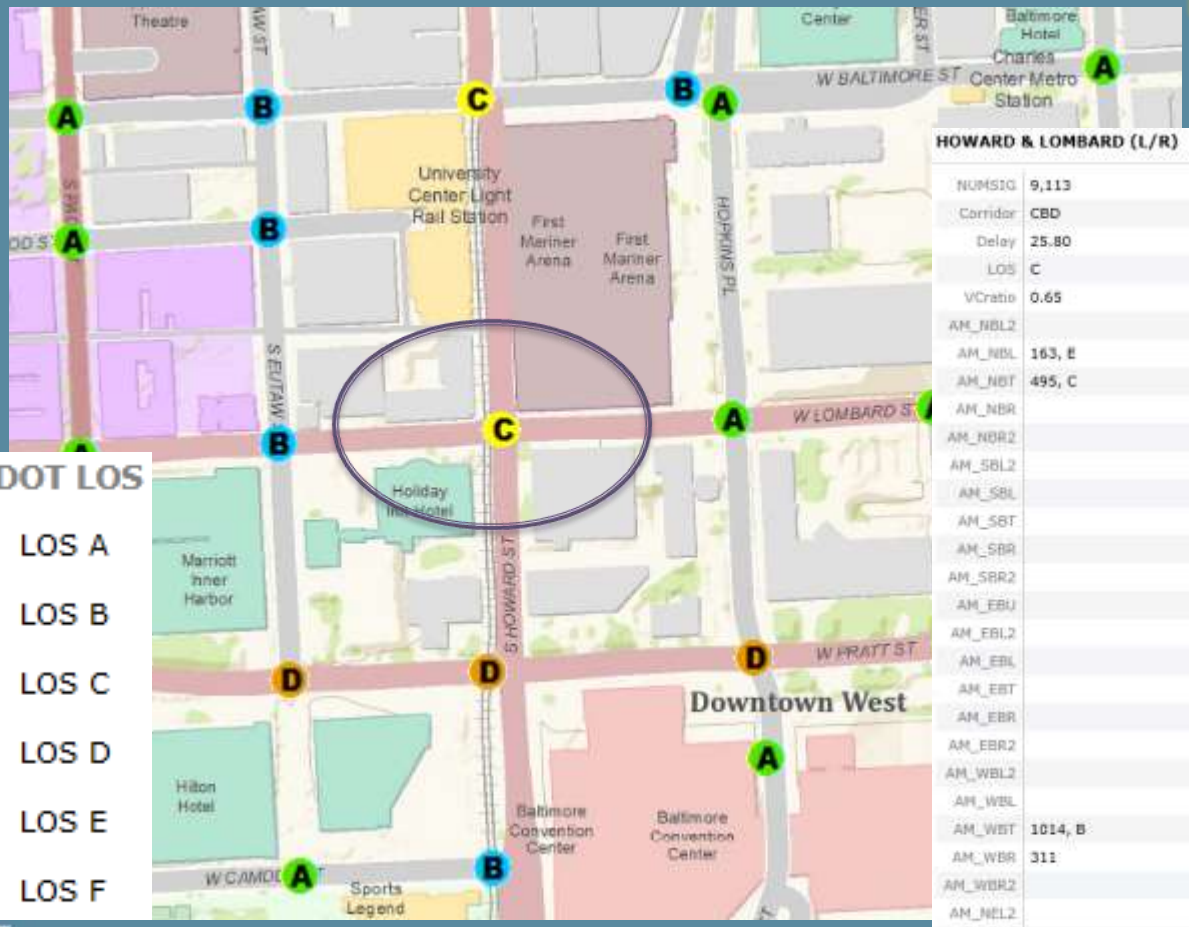
- Database design
  - Database with traffic signals
    - QA/QC agency provided data
    - Add newly built signals
  - Synchro output
    - UTDF files
    - Reports

Case Study 2

- SYNCHRO (ex. AM peak)

Case Study 2

- Map (ex. Lombard St & Howard St)



HOWARD & LOMBARD (L/R)

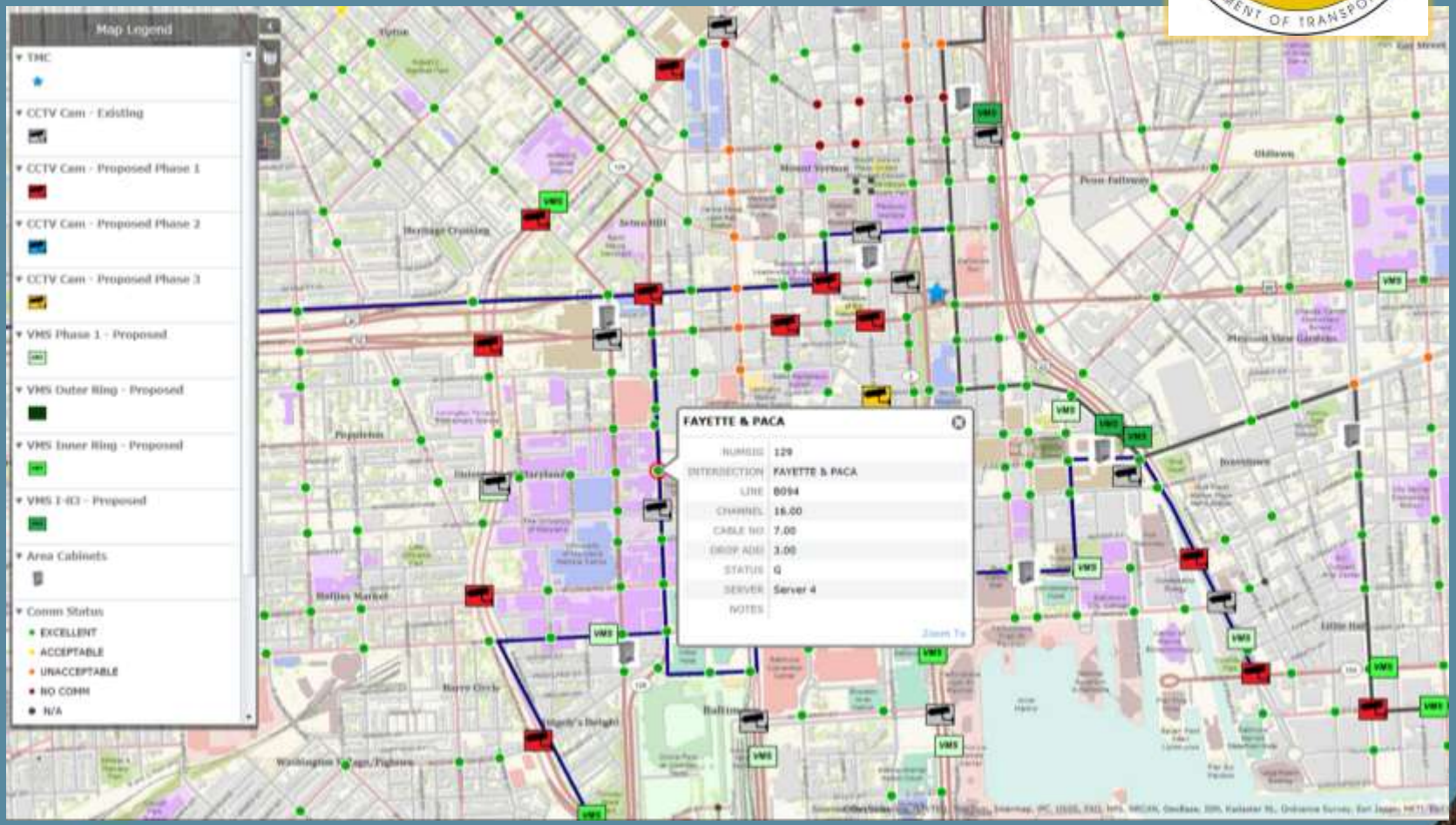
NUMSIG	9,113
Corridor	CBD
Delay	25.80
LOS	C
VCratio	0.65
AM_NBL2	
AM_NBL	163, E
AM_NBT	495, C
AM_NBR	
AM_NBR2	
AM_SBL2	
AM_SBL	
AM_SBT	
AM_SBR	
AM_SBR2	
AM_EBU	
AM_EBL2	
AM_EBL	
AM_EBT	
AM_EBR	
AM_EBR2	
AM_WBL2	
AM_WBL	
AM_WBT	1014, B
AM_WBR	311
AM_WBR2	
AM_NEL2	
AM_NEL	
AM_NET	

Case Study 3

Baltimore, MD – CCTV Master Plan

- Objectives
  - Display existing and planned coverage
- Information
  - CCTV Cameras
  - Fiber optics coverage
  - Communication hubs (area cabinets)
  - Other ITS devices
- Database design
  - Device locations
    - Converted from KML files
    - Spreadsheets

Case Study 3


Map Legend
TMC
CCTV Cam - Existing
CCTV Cam - Proposed Phase 1
CCTV Cam - Proposed Phase 2
CCTV Cam - Proposed Phase 3
VMS Phase 1 - Proposed
VMS Outer Ring - Proposed
VMS Inner Ring - Proposed
VMS I-83 - Proposed
Area Cabinets
Comm Status
EXCELLENT
ACCEPTABLE
UNACCEPTABLE
NO COMM
N/A
FAYETTE & PACA
NUMBER 129
INTERSECTION FAYETTE & PACA
LINE 8094
CHANNEL 16.00
CABLE NO 7.00
DROP ADD 3.00
STATUS Q
SERVER Server 4
NOTES
Zoom To

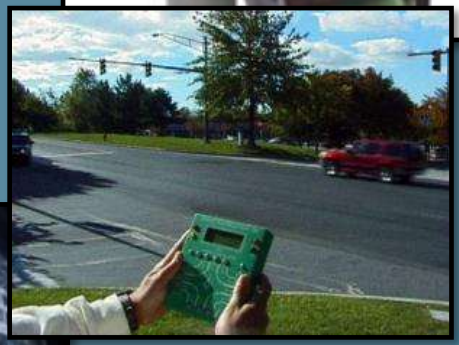
Case Study 4

Washington, DC – Data Collection Plan & Data Sharing

District Department of Transportation

Background:

- City-wide signal timing optimization
- 1600+ locations
  - Perform turning movement counts
  - Collect signal timing data
- Corridors
  - Travel time runs
- Priority areas & corridors



Case Study 4

d. District Department of Transportation

- Objectives
  - Partition Network
  - Classify Intersections
  - Single Shared Data Source
    - Client
    - Project team & subconsultants
  - Keep a continuously refined data repository

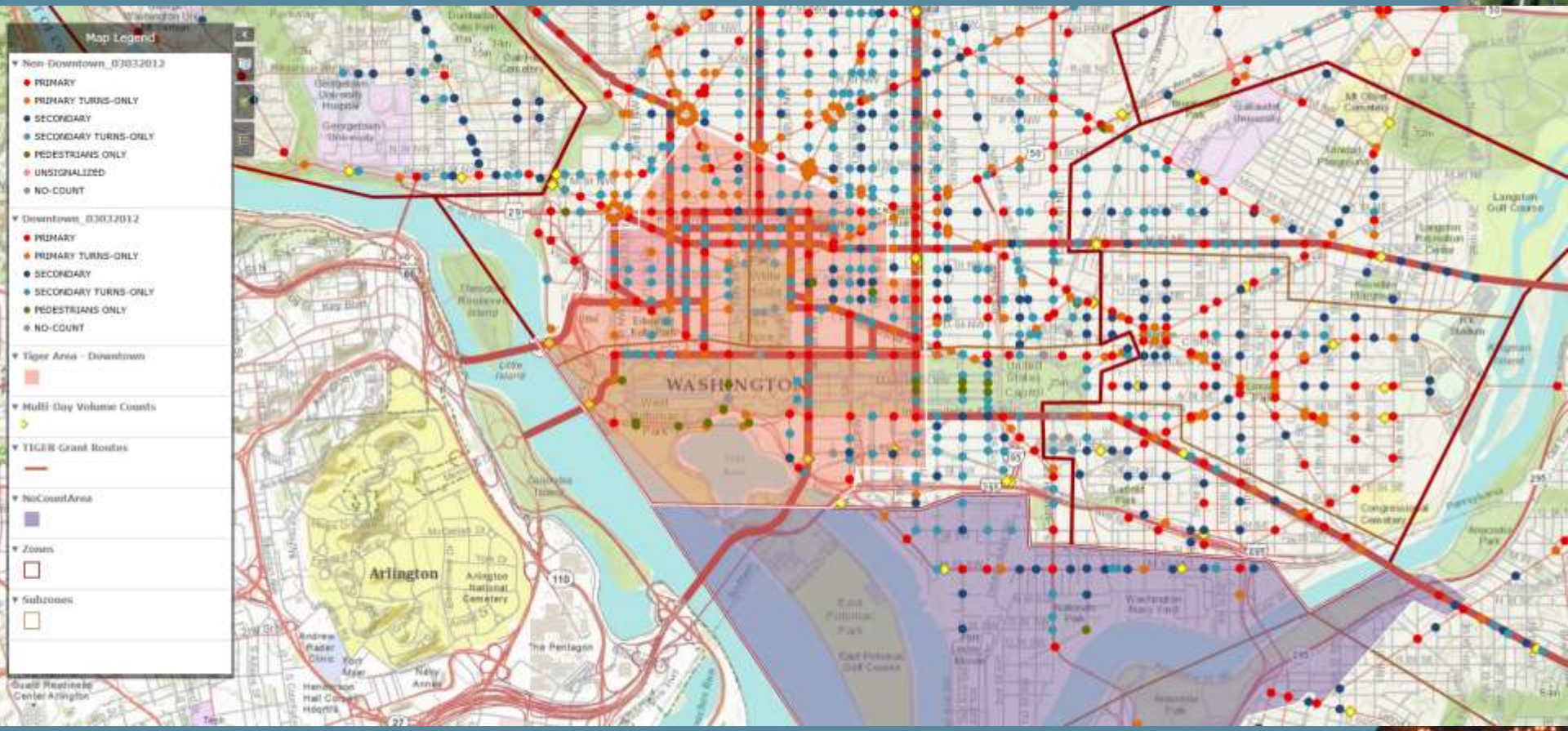
Case Study 4

d. District Department of Transportation

- Database
  - DC's existing GIS database traffic signals
    - Large database
    - QA/QC
      - Misplaced points
      - Signal ID (ACISA)
      - Newly built signals
      - Multiple intersections controlled by single controller

Case Study 4

d. District Department of Transportation



Tools

- ArcMap 10.1 with basic license (ArcView)
  - Create database
  - Print maps
- ArcGIS Explorer Online
- ArcGIS Beta Community Online
- Google Earth
  - Non-GIS staff
- Python Scripting

Summary

- Delineate project phases
- Set budget for project tasks
- Visualize project networks
- Learn what needs to be improved
- Display future actions
- Share / Publish data

Lessons Learned

- Traffic Engineering ~ Large databases
- Data QA/QC ~ Time consuming
- Process automation

“A database is only as good as the data.”

“It is not only important to have accurate data, but also up-to-date data.”

Case Studies for the Application of GIS in Traffic Engineering Projects

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