



**APPLICATIONS OF GIS, LINEAR REFERENCING
SYSTEMS, DATABASES AND PROGRAMMING IN
FLOATING CAR STUDIES USING GPS**

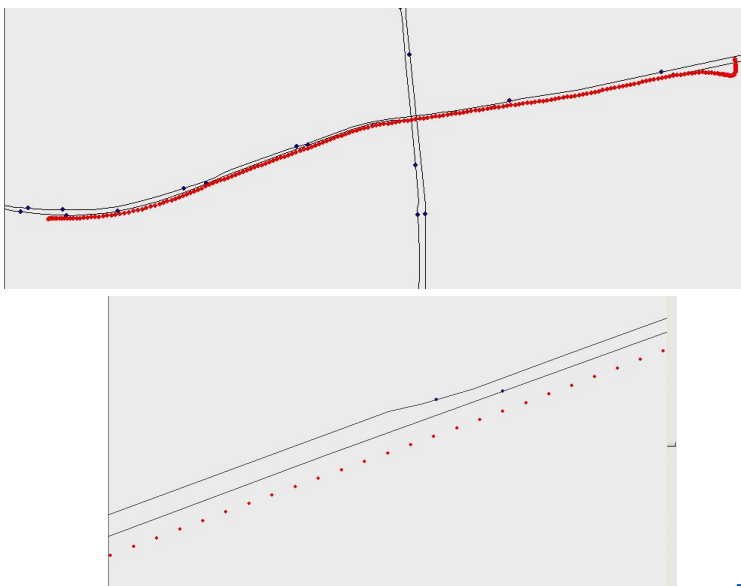
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Floating Car Studies Using GPS

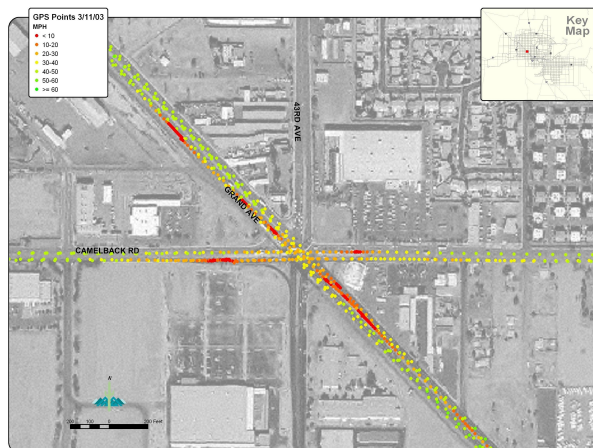
- Vehicles equipped with GPS units and PDAs float with traffic
- Data stored every one second.
- Quantitative Measures of Effectiveness – Travel Time, Delay, Average Speed etc
- Applications in Congestion Management (CMS / CMP)
- Before / After Signal Co-ordination, Model Calibration



Examples

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Examples

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Advantages

- Only one person needed per car
- Mid-block congestion can be identified
- Stops and approximate queue lengths
- High accuracy estimates of MOEs
- Good Automation potential
- Flexible Segmentation
- No fixed infrastructure needed

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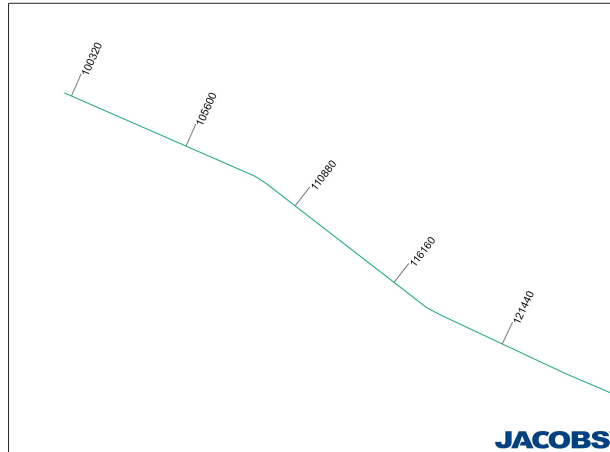
Jacobs Process In a Nutshell

- Collect Roadway attributes by mapping
- Build a Linear Referencing System
- Collect GPS data
- Process GPS data, QA/QC
- Analyze data
- Identify congestion based on client defined thresholds
- Develop recommendations for mitigations
- Prioritize segments

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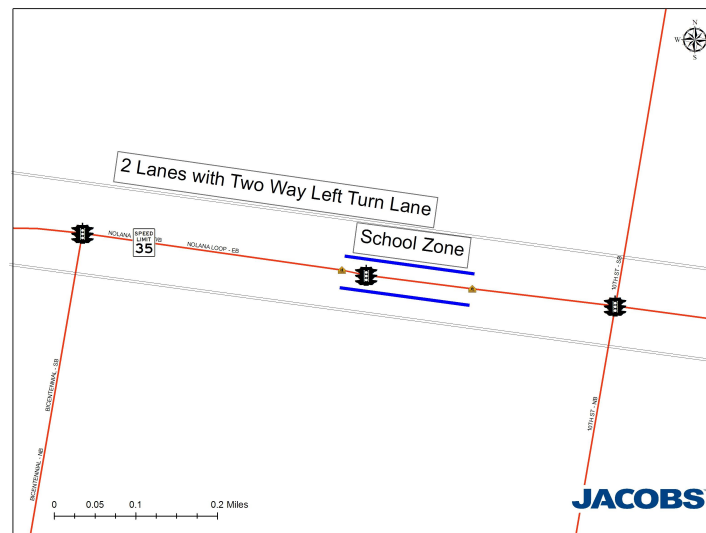
Linear Referencing System

- Similar to mile markers
- Lines in GIS that are “measure” aware
- All data refer to route locations



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LRS Example



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Floating Car Data Collection

- Custom Program for Windows Mobile OS on Dell Axim PDA
- Bluetooth GPS with real-time differential correction
- Stores RouteID, Driver Name apart from Lat/Long etc on each GPS Point
- Compressed XML

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PDA Program



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Data Management

- Web based data management for upload and download of field data
- No e-mail or FTP transfers

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Data Management

Transfer GPS Datafiles

User: gogulamx [Click here to change your password](#)

Role: RRDA GPS Administrator

GPS Files | Map

Week Ending: Company:

☐ Datafile	Driver	Collected Date	Collected On	Uploaded By	Uploaded On	Size (Kb)	Download Count
+ Week Ending: 02/16/2007 (36 Files)							
+ Week Ending: 02/23/2007 (530 Files)							
+ Week Ending: 03/02/2007 (488 Files)							
+ Week Ending: 03/09/2007 (312 Files)							
+ Week Ending: 03/30/2007 (455 Files)							
+ Week Ending: 04/06/2007 (564 Files)							
- Company: Traffic Research and Analysis (306 Files)							
☐	1094-14-0acd0ad66e1	Wilkins	04/03/2007	4/3/2007 9:04:06...	Simpson	4/6/2007 4:06:56 PM	512
☐	1093-14-5101015890aa	Wilkins	04/03/2007	4/3/2007 8:47:59...	Simpson	4/6/2007 4:06:33 PM	473
☐	1052-14-5e339f26edbb	Wilkins	04/03/2007	4/3/2007 8:24:57...	Simpson	4/6/2007 4:06:28 PM	669
☐	1048-14-4134e0131271	Wilkins	04/03/2007	4/3/2007 10:04:0...	Simpson	4/6/2007 4:06:05 PM	975
☐	1047-14-b9453047dd62	Wilkins	04/03/2007	4/3/2007 9:22:00...	Simpson	4/6/2007 4:05:50 PM	1,463
☐	1009-14-c22a2edc6910	Wilkins	04/03/2007	4/3/2007 11:45:5...	Simpson	4/6/2007 4:04:32 PM	683
☐	1006-14-c17bfe16d43f	Wilkins	04/03/2007	4/3/2007 10:57:3...	Simpson	4/6/2007 4:04:05 PM	1,109
☐	1294-12-18780ee070f7	Lannes	04/04/2007	4/4/2007 5:55:04...	Walters	4/6/2007 3:52:42 PM	381
☐	1294-12-322cde9aa8f0	Lannes	04/03/2007	4/3/2007 11:32:5...	Walters	4/6/2007 3:52:39 PM	514
☐	1294-12-170ac0e32b69	Lannes	04/03/2007	4/3/2007 12:04:1...	Walters	4/6/2007 3:52:35 PM	484
☐	1294-12-32c7be1e9c6b	Lannes	04/03/2007	4/3/2007 7:55:37...	Walters	4/6/2007 3:52:32 PM	243

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Automated Data Processing and QA/QC

- ArcObjects / ESRI ArcGIS®
- Route matching – Verify and correct driver assigned Route Identifiers
- Measure assignment
- Extraneous data exclusion
- Time Period checks
- Assign Segment Identifiers

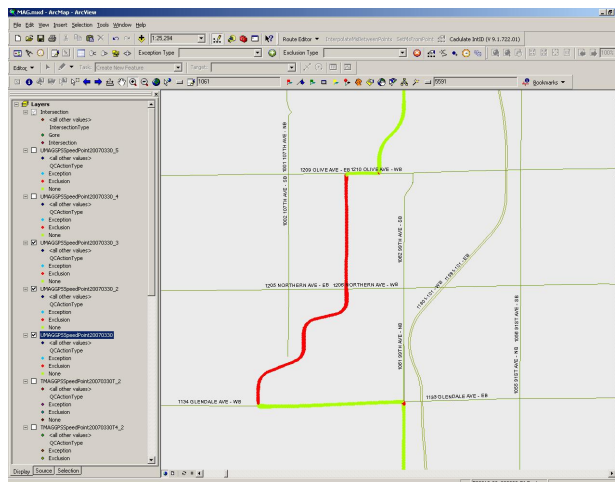
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Database Processing

- ArcSDE and Microsoft SQL Server®
- Additional QA/QC
- MOEs for all runs on all routes
- Average Speed, Travel Time, Delay etc
- Standard Deviation
- Outliers
- Views

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Quality Assurance



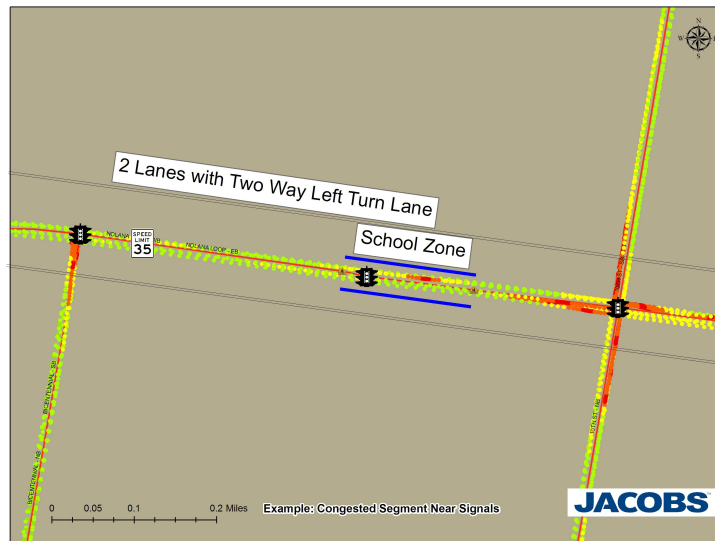
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Reporting



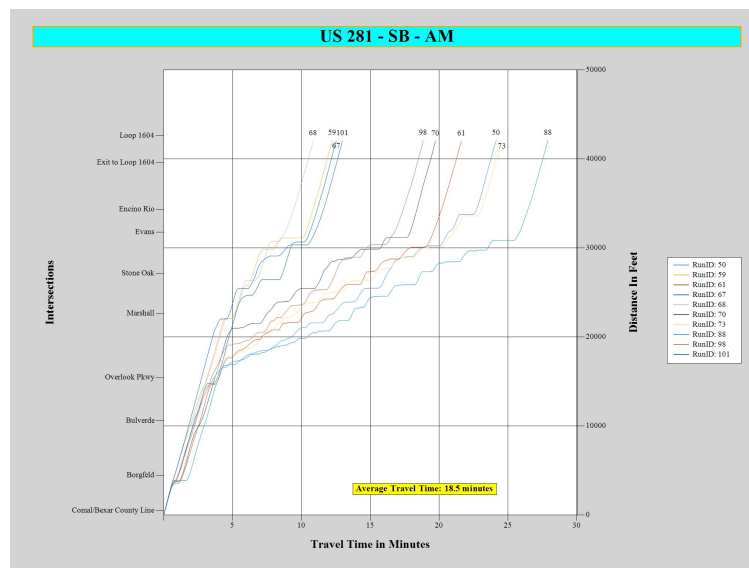
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High Level of Detail



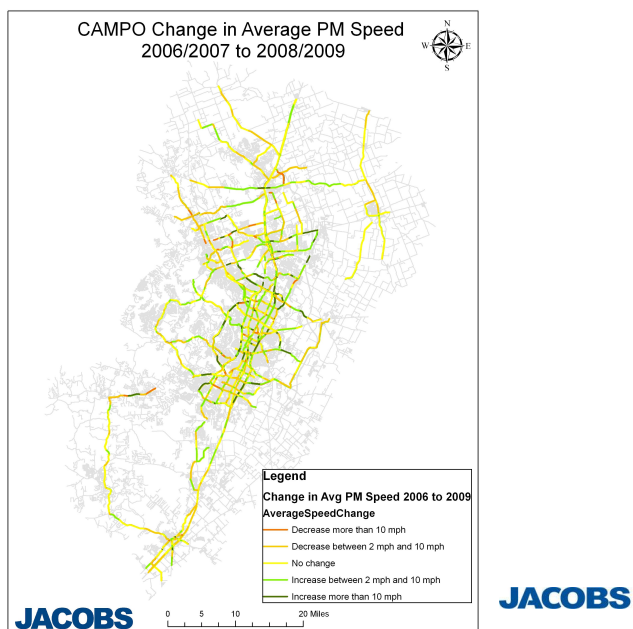
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Reporting



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Historic Comparison



Questions?

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