PIMA CO. AZ GIS LINEAR REFERENCING SYSTEM (LRS) DYNAMIC SEGMENTATION (DYNSEG)

ESRI UC 2010, San Diego, CA

Cody Cohn – Sr. GIS Analyst

Pima County AZ

Topics

- LRS / DynSeg Basics & Uses
- Pima County's LRS / DynSeg Setup & Processes
- Demo
- Lessons Learned & Challenges

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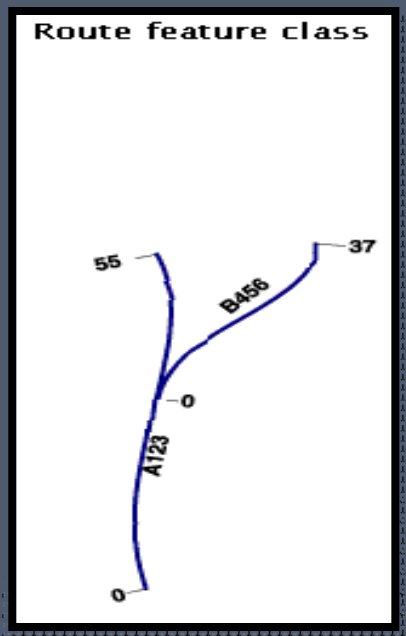
LRS / DynSeg Overview

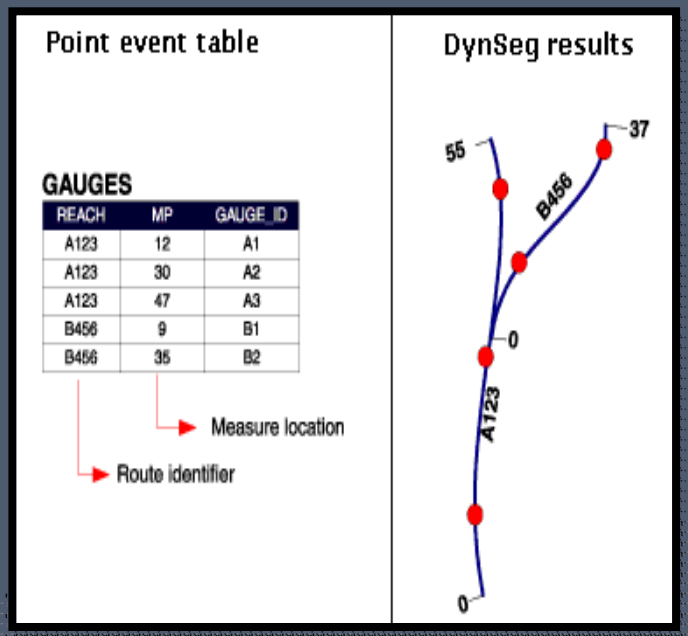
- Linear Referencing (LRS)
  - Is the term used to describe the methodology for storing, transferring and displaying data using a route layer and measures.
- Dynamic Segmentation (DynSeg)
  - Is the process of computing and displaying the location of events in an event table.

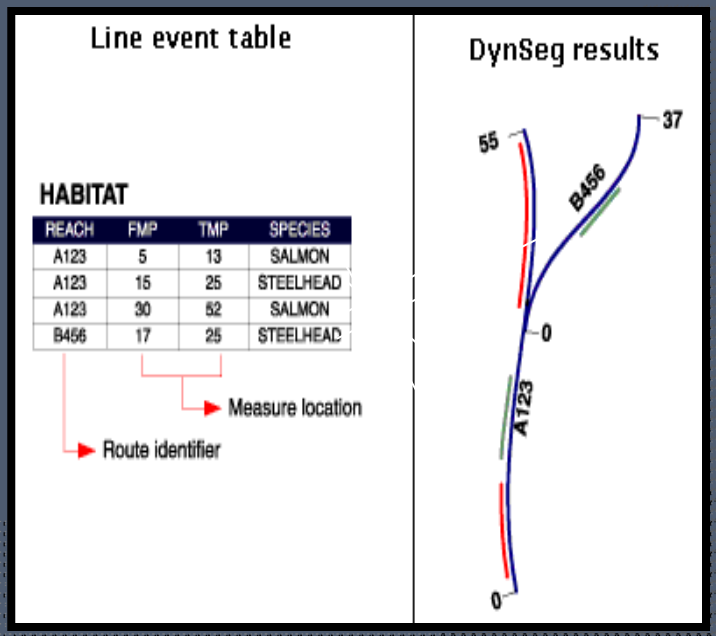
Source: ESRI help

LRS / DynSeg: The Basics

- Need:
  - Route
  - Reference location
  - Geographic locations (or events) stored in tabular form







Source: ESRI help

Why Use LRS / DynSeg?

- Standardized data collection
  - Between Multiple Jurisdictions
- Simplifies storage of data
  - Eliminates segmenting original street network
  - Reduced editing time

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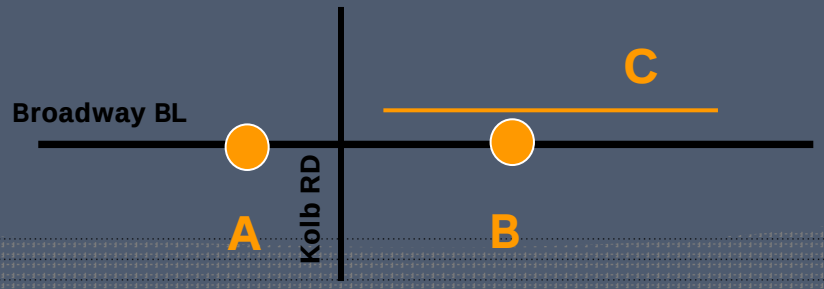
Pima County's LRS/DynSeg

- Purpose: Stop breaking up the street network – LOWER MAINTENANCE
- Why?
  - Wanted edits to street network to key all changes needed for LRS/DynSeg
- How?
  - 'Intersection' Based
  - Several different features classes used in concert to satisfy the Big 3 Needs
    - Had to account for unique configuration of street network

PC's LRS/DynSeg:

- Reference segment – Route from street network (and exceptions)
- Reference location – 'Intersections' or Cross streets
- Event features plotted 'from' reference location (& distance), 'to' reference location (& distance)

Route – Broadway BL
Cross Street – Kolb RD

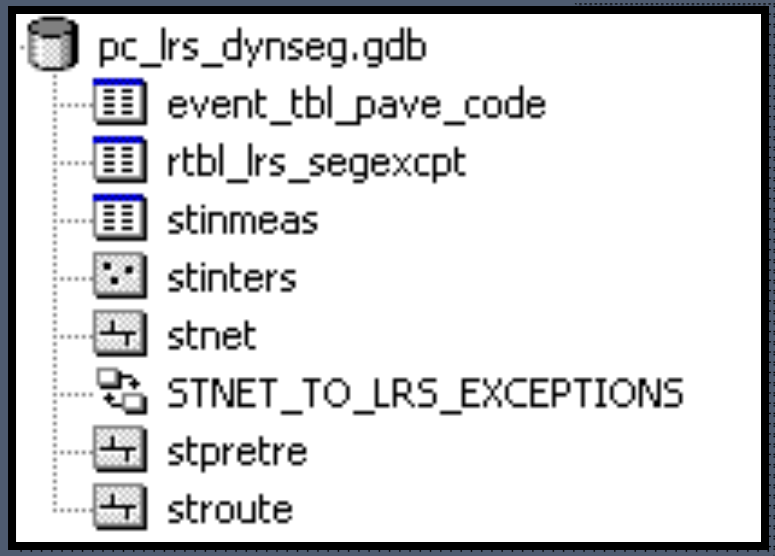


A is 10 units W from Intersection (-10)

B is 30 units E from Intersection (+30)

C starts 5 units E from Intersection and goes 45 more units

Data Components



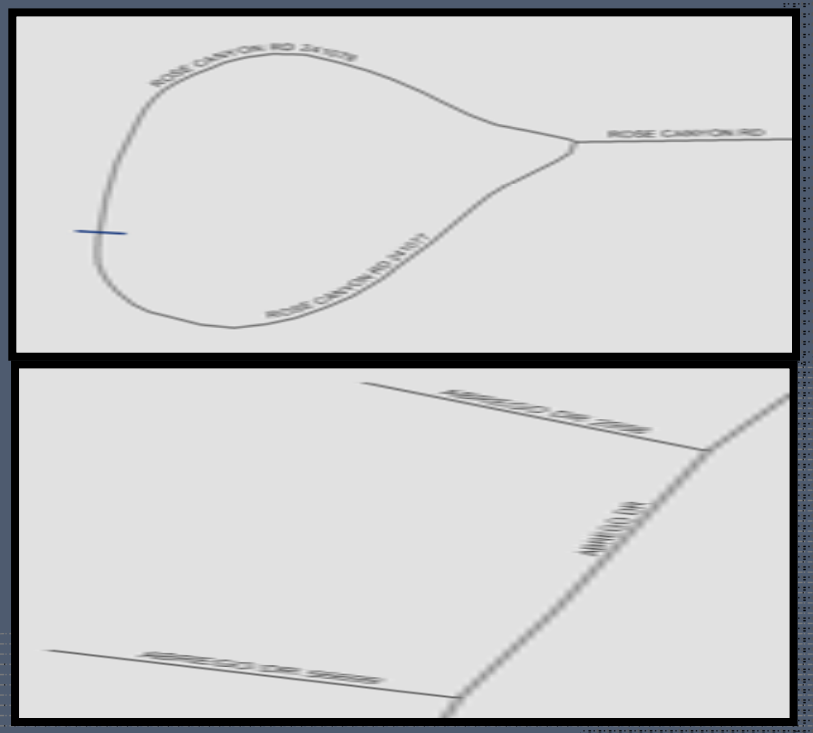
- Route = STROUTE :
  - STNET
  - RTBL_LRS_SEGEXCPT
  - STPRERTE
- Intersections or Cross Streets
  - STINTERS
  - STINTMEAS
- Events
  - Event table

ROUTE

- STNET = Maintained road network
- RTBL_LRS_SEGEXCPT = Exceptions table that flags funky segments
  - FK Join ROADID to STNET
- STPRERTE = Streets with exceptions accounted for
- STROUTE = routed STPRERTE

ROADID *	EXCEPTION_TYPE
241077	LOOP
241078	LOOP
2958	KNUCKLE
56699	KNUCKLE

Segment Exceptions Related Table



Intersections or Cross Streets

- STINTERS = Polyline endpoints from STNET
- STINTMEAS = table with M values along STROUTE at STINTERS (except end of road)
- Some necessary attributes in STINTMEAS to handle 'Duplicate' Intersections
  - Example: Loops, Different Jurisdictions (Ajo and City of Tucson), Zig Zag, etc

Intersections or Cross Streets

- STINTMEAS as a View provides the Reference Location for events
  - Measure along STROUTE
  - CRSTR_LINK is the FK Join
- Necessary Attributes :
  - CROSSTREET – Simple cross street ID
  - The STINTERID is appended when referencing Dup Intersection

RID	CROSSTREET	MEAS	COUNTER	STINTERID	CRSTR_LINK	X_COORD	Y_COORD
VAIL VIEW RD 54080	VAIL VIEW RD	0.00000000	1	7404	VAIL VIEW RD	1073335.6...	354462.1...
BROADVIEW DR	VAIL VIEW RD	2764.18600000	2	41411	VAIL VIEW RD 41411	1073244.4...	355000.9...
VAIL VIEW RD	BROADVIEW DR	2598.95100000	2	41411	BROADVIEW DR 41411	1073244.4...	355000.9...
SAHUARITA RD	VAIL VIEW RD	88008.48600000	1	20228	VAIL VIEW RD	1073199.4...	352418.0...
VAIL VIEW RD	SAHUARITA RD	0.00000000	1	20228	SAHUARITA RD	1073199.4...	352418.0...
IRIS PL	VAIL VIEW RD	0.00000000	2	14063	VAIL VIEW RD 14063	1073251.3...	352955.1...

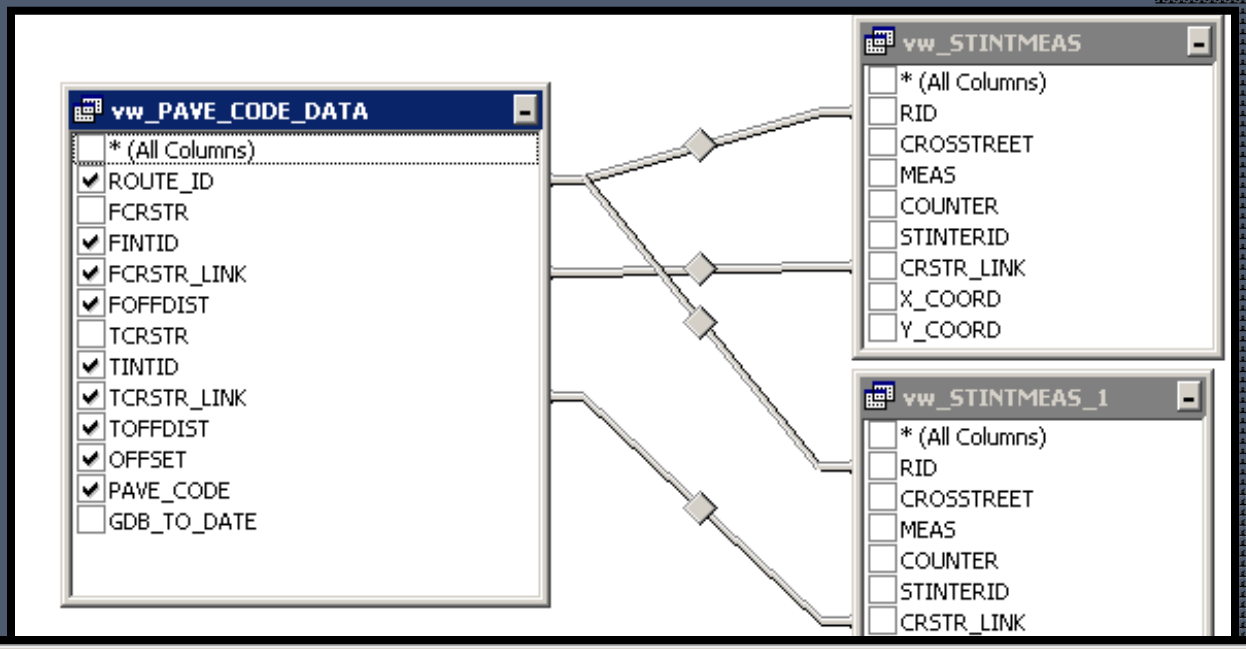
Event Data Table Fields

(All manual entry)

- ROUTE_ID - route that the event is on
- FCRSTR - from cross street name
- FINTID – FROM STINTERID for duplicate intersections
- FOFFDIST - distance from the FROMCROSSTR
- TCRSTR - to cross street name
- TINTID – TO STINTERID for duplicate intersections
- TOFFDIST - distance from the TOCROSSTR
- OFFSET (only if applicable) – used to display event on either side of route
- EVENT_ID – unique ID in event data table

View for Event Data Table

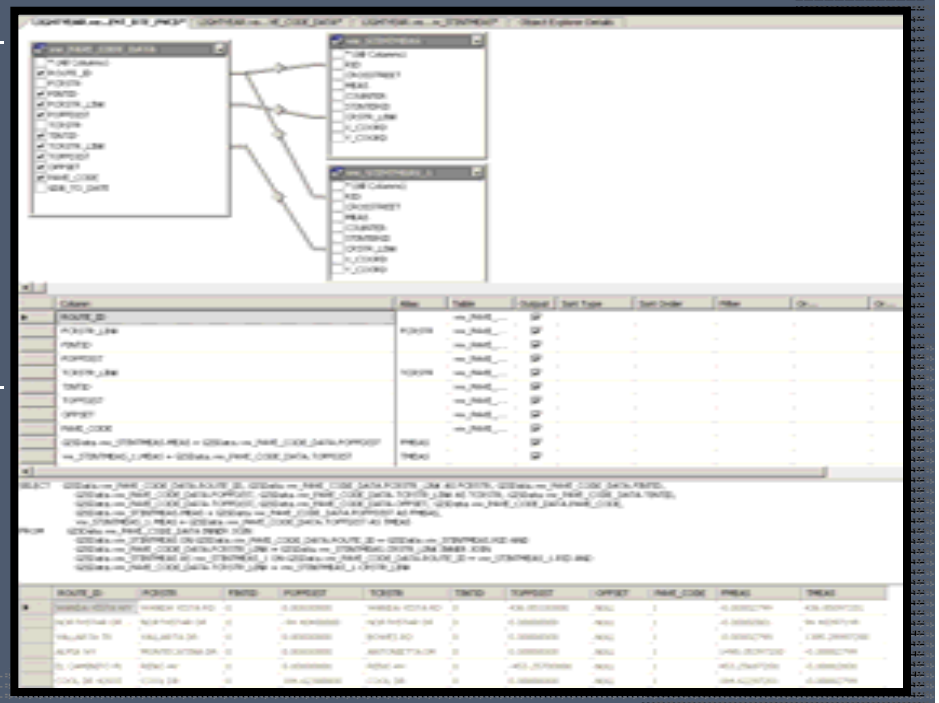
- Created to concatenate user entered fields so it can be joined to STINTMEAS view



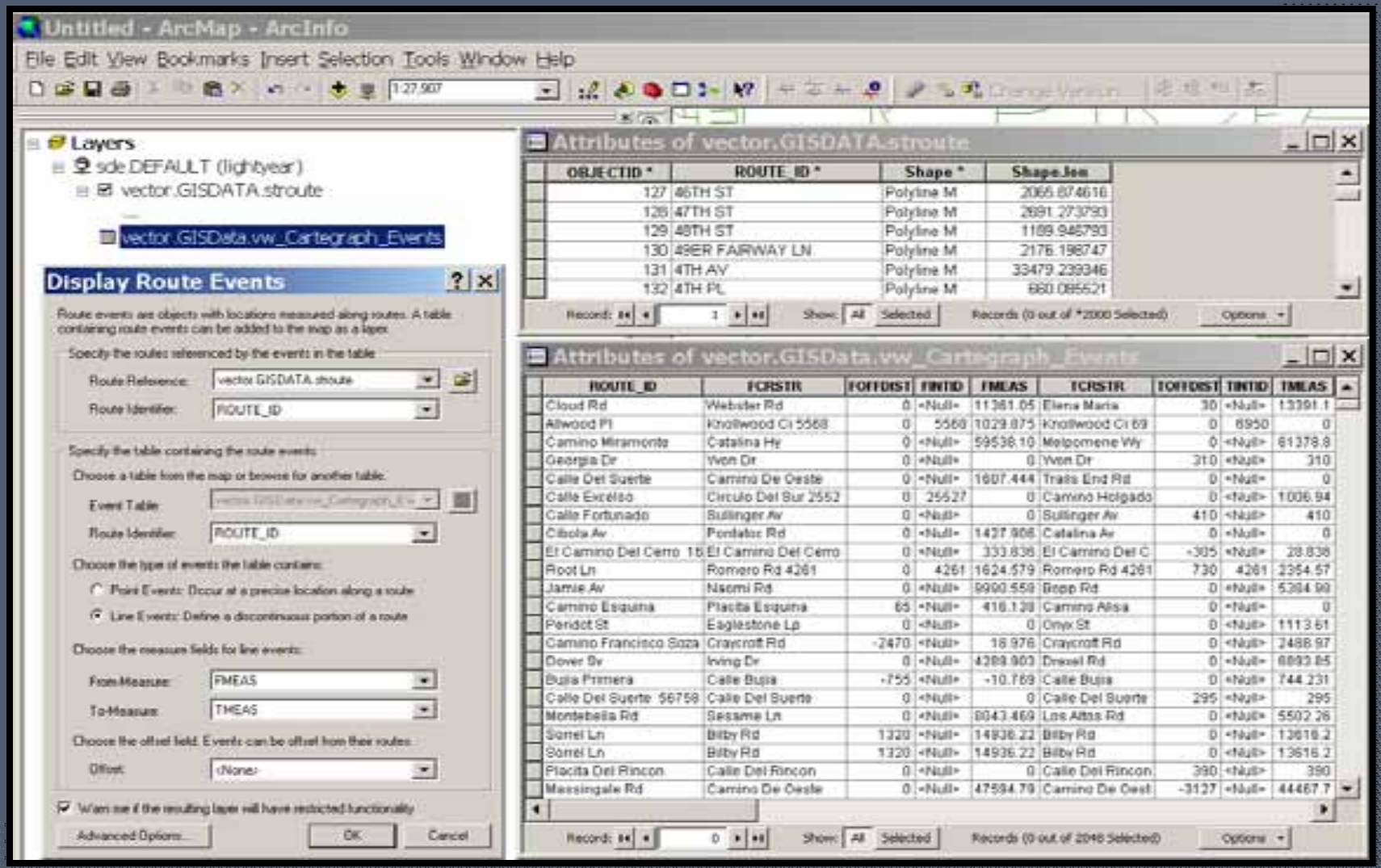
ROUTE_ID	FCRSTR	FINTID	FCRSTR_LINK	FOFFDIST	TCRSTR	TINTID	TCRSTR_LINK	TOFFDIST	OFFSET	PAVE_CODE	GDB_TO_DATE
3RD ST	MCKINLEY AV	90477	MCKINLEY AV 90477	0.00000000	2ND AV	113592	2ND AV 113592	0.00000...	NULL	1	12/31/9999 12:...
40TH ST	ALVERNON WY	0	ALVERNON WY	-630.521...	ALVERNON WY	0	ALVERNON WY	0.00000...	NULL	1	12/31/9999 12:...
43RD PL	DODGE BL	0	DODGE BL	0.00000000	DODGE BL	0	DODGE BL	691.439...	NULL	1	12/31/9999 12:...
44TH ST	DODGE BL	59442	DODGE BL 59442	0.00000000	DODGE BL	59442	DODGE BL 59442	938.504...	NULL	1	12/31/9999 12:...
44TH ST	PALO VERDE RD	0	PALO VERDE RD	0.00000000	DODGE BL	59441	DODGE BL 59441	0.00000...	NULL	1	12/31/9999 12:...

Create Final Event Table

- Join event view and STINTMEAS view
- Calculate FMEAS:
  - GISData.vw_STINTMEAS.MEAS + GISData.vw_PAVE_CODE_DATA.FOFFDIST
- Calculate TMEAS:
  - GISDatavw_STINTMEAS_1.MEAS + GISData.vw_PAVE_CODE_DATA.TOFFDIST



Display Route Event Table ArcMAP



Nightly Processes

- STINTERS
- STROUTE
- STINTMEAS
- Unmapped events
- Flipped routes
- 3 days history – STROUTE, STINTMEAS, mapped events feature classes

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Challenges

- Issues
  - Unique physical aspects of the street network
  - Data Structure
  - Event mapping process
- Challenges
  - Rules and allowances to realize the advantage of single edits with dynamic consequences – esp. across jurisdictions
  - Converting data resources
  - Converting human resources

Lessons Learned

- LRS / DynSeg is not a plug and play environment
- Typical street network configuration is not route creation friendly
- Limited reference information on LRS / DynSeg
- Many flavors of setup
- Nightly processes play a big role

Final Thoughts

- Goal was to have an environment that would be dynamic; allowing typical day to day edits to occur once while supporting mapping for many referenced phenomena automatically …
- We did that, and better yet, it appears to work!
- It wasn't hard, but it was time consuming and an adventure in problem solving

Thanks!

- Cody Cohn
  - lewis.cohn@pima.gov