

Unifying LRS and Routing Networks

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GeoMedia Transportation Product Manager

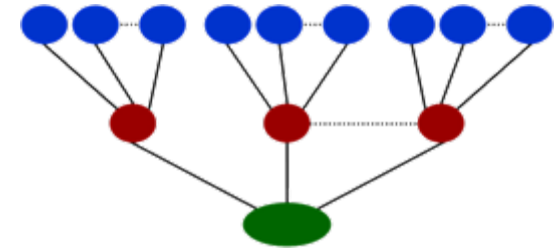


BRINGING
IT TOGETHER.

GeoTrans 

What is GeoTrans?

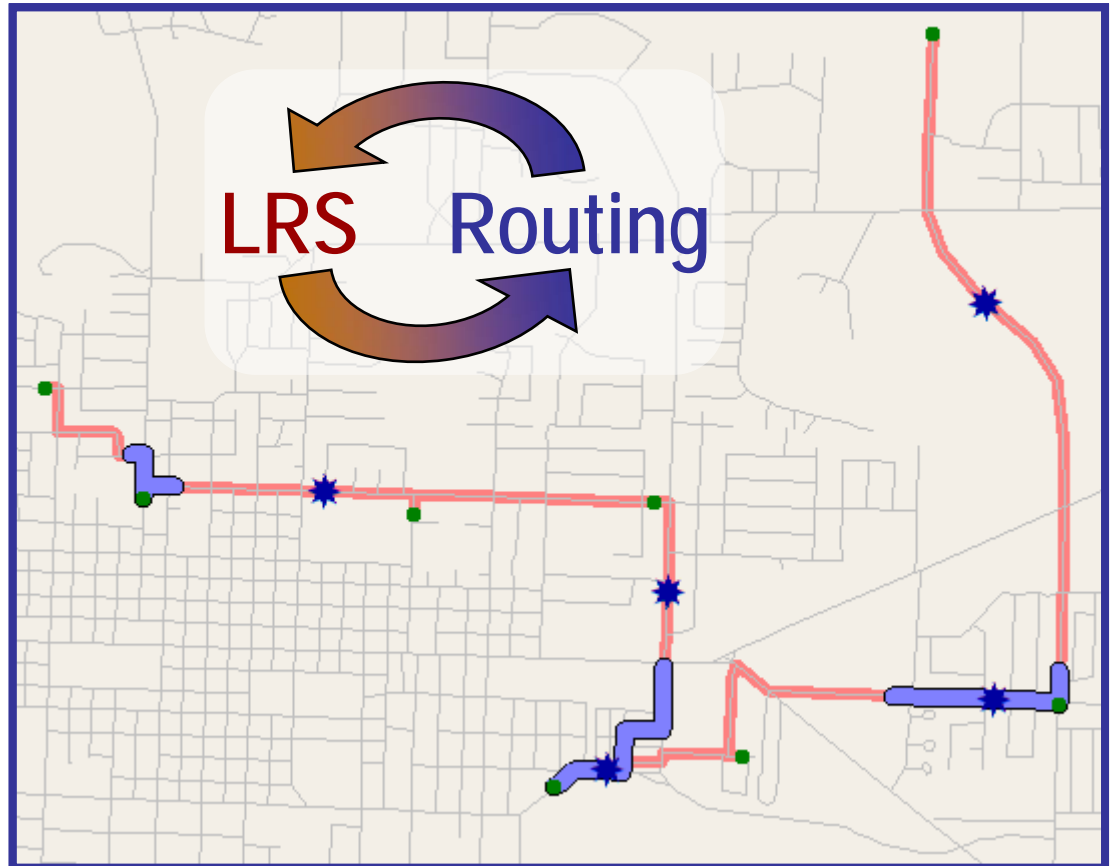
- Part Transportation data model
- Part LRS best practices
- Part data maintenance guide
- Built upon the wealth of quality transportation research available
- Provided mainly for Intergraph customers ... but has wider applicability
- Kept in sync with our Transportation offerings



LRS / Routing Synergy

Bus Route Example

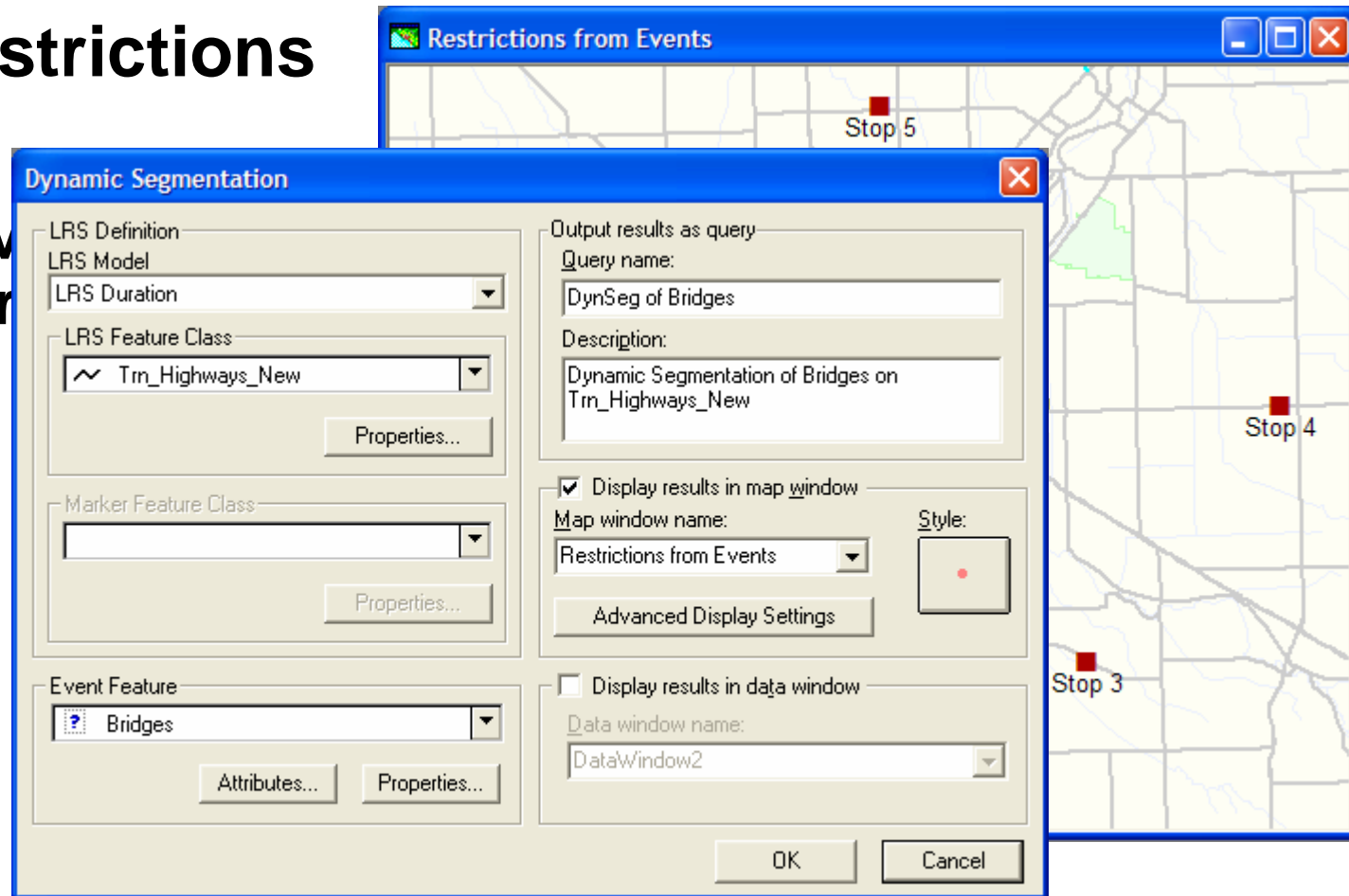
- Bus Stops from LRS point events
- Bus Route using Best Path
- Bus Route as LRS



LRS / Routing Synergy

Travel Restrictions Example

- Using event routing



LRS / Routing Synergy

Travel Restrictions Example

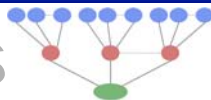
- Using routing

The screenshot shows a software interface for handling travel restrictions. The background is a map window titled "Restrictions from Events" displaying a network of roads with several red dots and squares labeled "Stop 3", "Stop 4", and "Stop 5". Overlaid on this is a dialog box titled "Aggregation".

The "Aggregation" dialog box has the following settings:

- Aggregate to summary features in: Trn_Highways_New
- From detail features in: DynSeg of Bridges
- Spatial Aggregation: Aggregate where summary features: touch, detail features
- Output aggregation as query: Query name: Trn_Highways, Description: (empty)
- Display aggregation in map window: (Map window name: (empty), Style: (empty))
- Display aggregation in data window: (Data window name: (empty))

Buttons for "OK" and "Cancel" are at the bottom right of the dialog.



LRS / Routing Synergy

Travel Exam

- Use
rou

Functional Attribute

Functional attribute name: MaxWeight Output type: Long Integer

Expression:
MIN(Detail.MaxWeight)

OK Cancel Undo Paste

+ - * / = <> < <= > >= AND OR NOT LIKE ()

Categories:
Most Commonly Used Functions
All Functions
Operators
Constants
Date & Time
Geometry
Logical
Math & Trig
Misc
Statistical
Text

Functions:
IF
ROUND
SEARCH
X
Y
GEOMETRIES
FILTERLINEAR
FIRST
MIN
VALUE
STARTPOINT
DEGREES

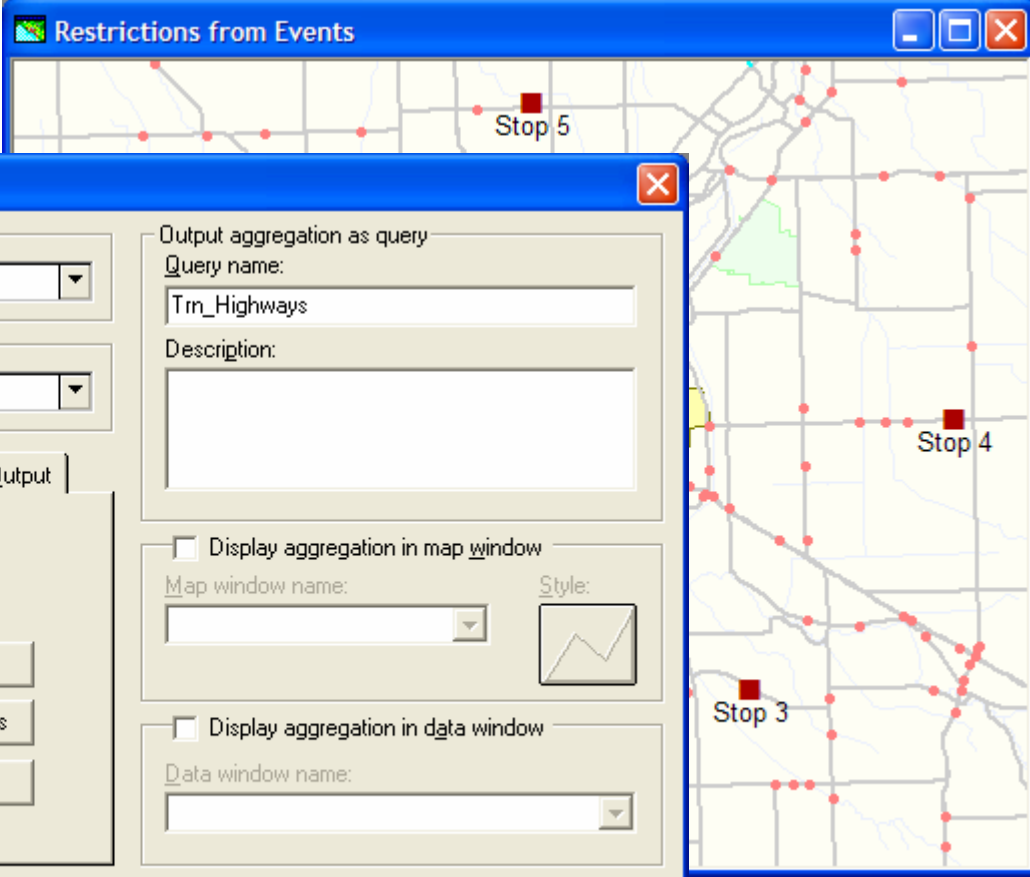
Attributes:
Detail.CS_KEY
Detail.Geometry1
Detail.KM
Detail.MaxWeight
Detail.Status1
Input.Beg_Km
Input.Blocked
Input.CS_KEY
Input.Edge_Geometry
Input.Edge_ID
Input.FromNode
Input.ID

MIN(value1,value2,...)
Returns the smallest value in a set of values.

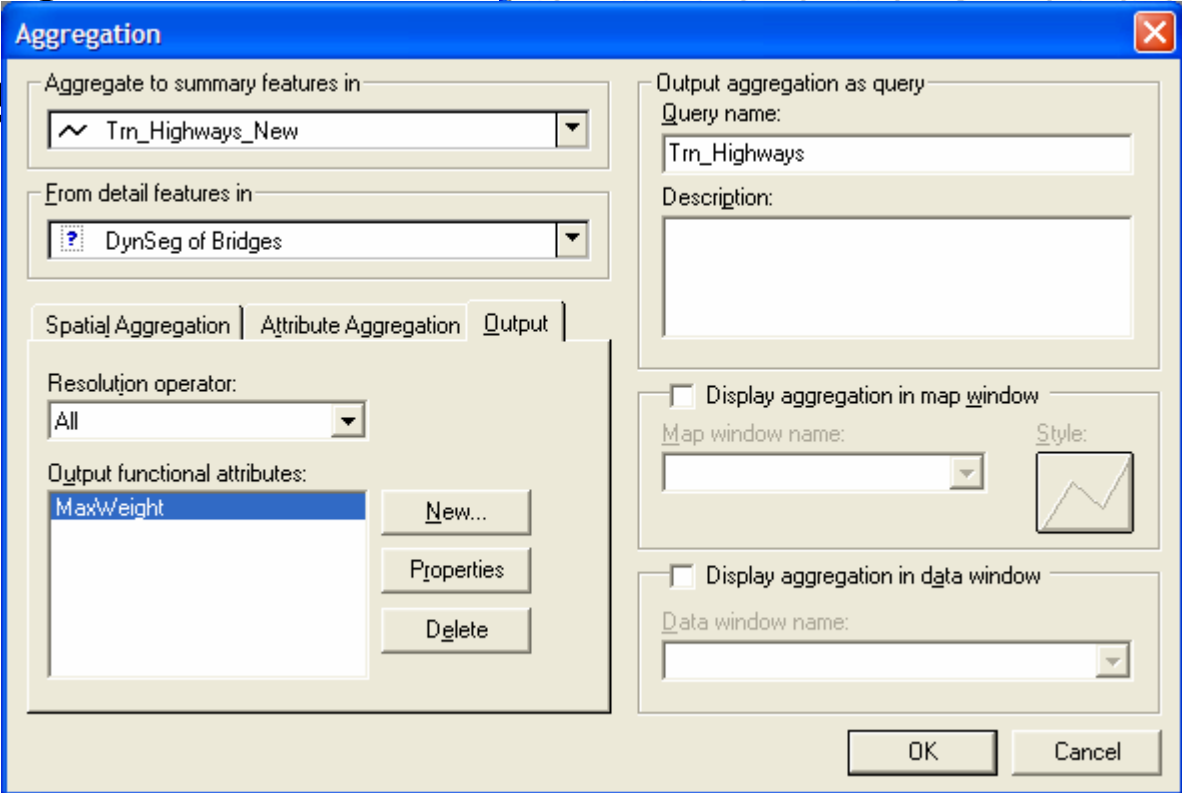
LRS / Routing Synergy

Travel Restrictions Example

- Using routing



The 'Restrictions from Events' window displays a map with a network of roads. Three specific locations are marked with red squares and labeled 'Stop 3', 'Stop 4', and 'Stop 5'. Numerous red dots are scattered along the road network, representing various travel restrictions.



The 'Aggregation' dialog box is used to configure the aggregation process. It includes the following settings:

- Aggregate to summary features in:** Trn_Highways_New
- From detail features in:** DynSeg of Bridges
- Spatial Aggregation | Attribute Aggregation | Output:** Output tab is selected.
- Resolution operator:** All
- Output functional attributes:** MaxWeight (with buttons for New..., Properties, and Delete)
- Output aggregation as query:** Query name: Trn_Highways, Description: (empty)
- Display aggregation in map window
- Map window name:** (empty), **Style:** (graph icon)
- Display aggregation in data window
- Data window name:** (empty)
- Buttons:** OK, Cancel

LRS / Routing Synergy

Travel Restrictions Example

- Using events to set routing restrictions

The screenshot displays a GIS application window titled "Restrictions from Events". The map shows a network of roads with several red square markers labeled "Stop 1", "Stop 2", "Stop 5", and "Stop 6". A yellow highlighted area on the map represents a travel restriction. A "Trm_Highways Properties" dialog box is open, showing the following attributes:

Name	Value
CS_KEY	05280040HU
Beg_Km	0.00
FromNode	28
ToNode	26
TravelTime	
Edge_ID	26
OneWay	
Blocked	0
Length_Km	16.27
ID	26
MaxWeight	65000

LRS / Routing Synergy

Travel Restrictions Example

- Using routing

Restrictor Editor

Select restrictor feature

EdgeRestrictions

Restrict features in

Trn_Highways

Restrictions from Events

Functional Attribute

Functional attribute name: MaxWeight_LT_50K Output type: Boolean

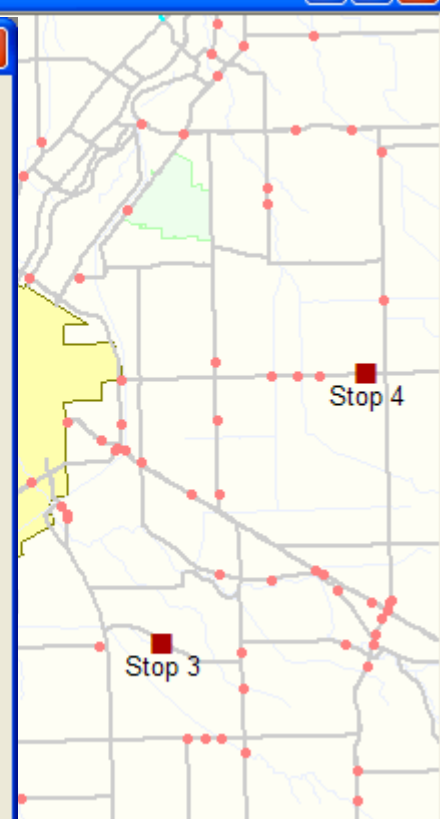
Expression: IF(MaxWeight is not null and MaxWeight < 50000, FALSE(), TRUE())

OK Cancel Undo Paste

+ - * / = <> < <= > >= AND OR NOT LIKE ()

Categories:	Functions:	Attributes:
Most Commonly Used Functions	IF	Beg_Km
All Functions	ROUND	Blocked
Operators	SEARCH	CS_KEY
Constants	X	Edge_Geometry
Date & Time	Y	Edge_ID
Geometry	GEOMETRIES	FromNode
Logical	FILTERLINEAR	ID
Math & Trig	MIN	Length_Km
Misc	FIRST	MaxWeight
Statistical	VALUE	OneWay
Text	STARTPOINT	ToNode
	DEGREES	TravelTime

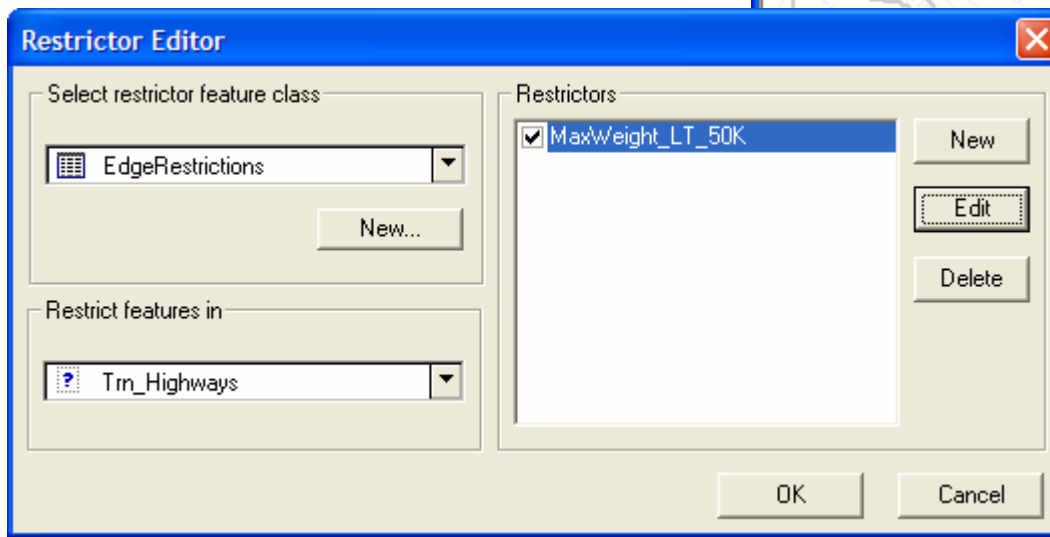
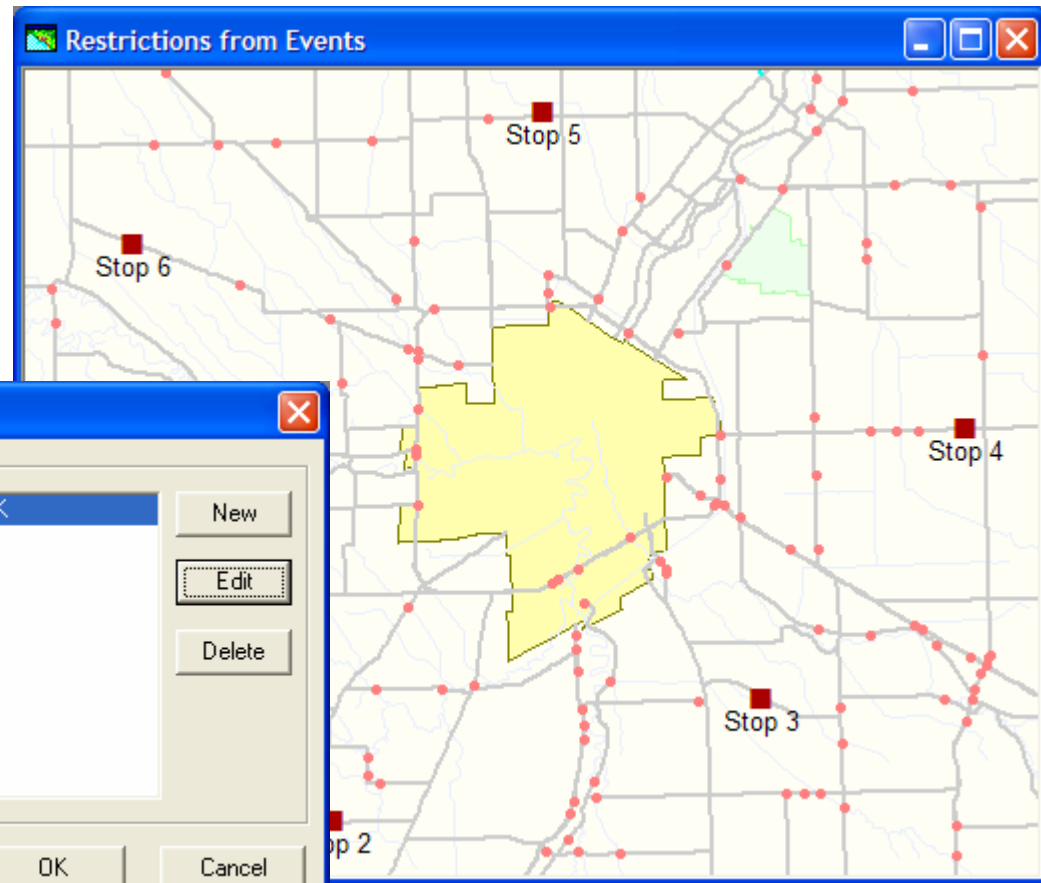
IF(logical_test, value_if_true, value_if_false)
Returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE.



LRS / Routing Synergy

Travel Restrictions Example

- Using events to set routing restrictions



LRS / Routing Synergy

Travel Restrictions Example

Best Path Analysis


Network:
Edges: Trn_Highways
Nodes: Trn_Nodes
Turns: Trn_Turns
Properties...

Order options:
 Best order
 Return to start
 Start fixed
 End fixed

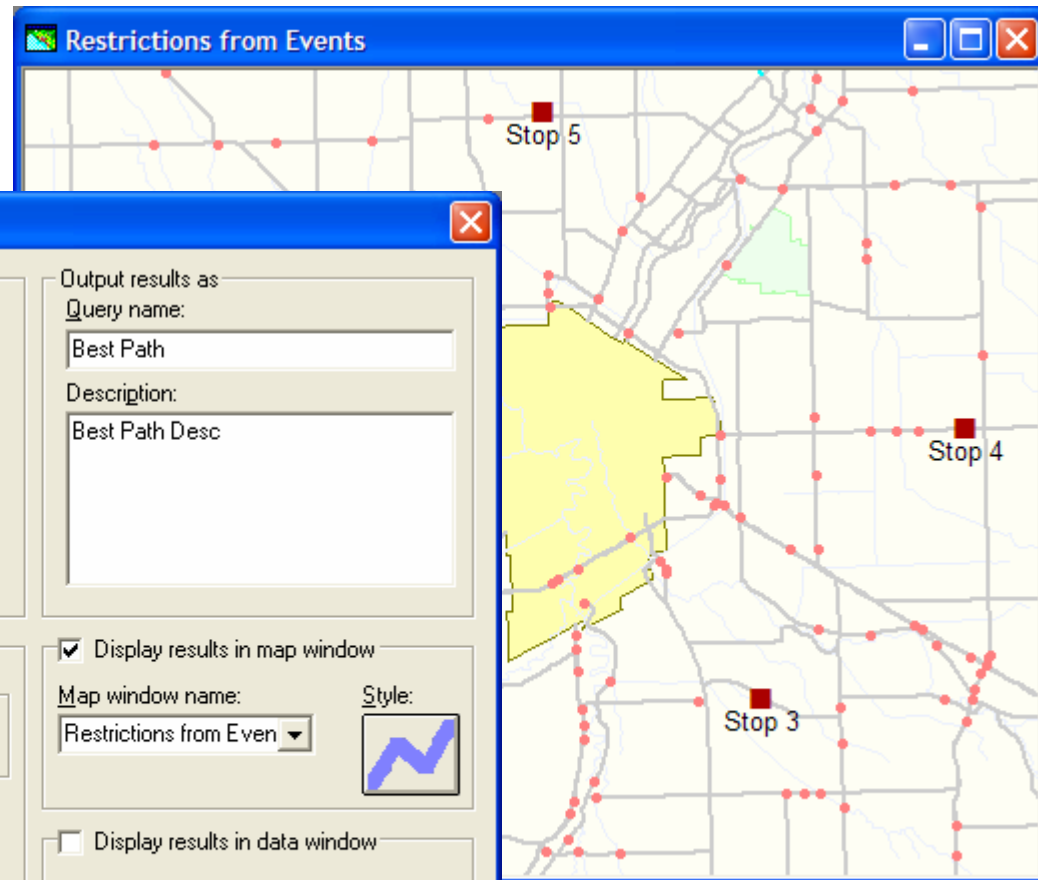
Output results as:
Query name: Best Path
Description: Best Path Desc

Stops:
Select stop features: Trn_Stops
Properties...
Select stop set: Demo
Snap tolerance: .5 km

Route options:
Minimize:
 Distance Cost
 Use restrictors
 Disable U-turns
 Include last stop costs

Display results in map window:
 Display results in map window
Map window name: Restrictions from Even
Style: 
 Display results in data window
Data window name: DataWindow2

OK Cancel



LRS / Routing Synergy

Travel Restrictions Example

Best Path Analysis

Network:

Edges: Trn_Highways

Nodes: Trn_Nodes

Turns: Trn_Turns

Properties...

Order options:

Best order

Return to start

Start fixed

End fixed

Output results as:

Query name: Best Path

Description: Best Path Desc

Stops:

Select stop features: Trn_Stops

Properties...

Select stop set: Demo

Snap tolerance: .5 km

Route options:

Minimize:

Distance Cost

Use restrictors


Disable U-turns

Include last stop costs

Display results in map window:

Display results in map window

Map window name: Restrictions from Even

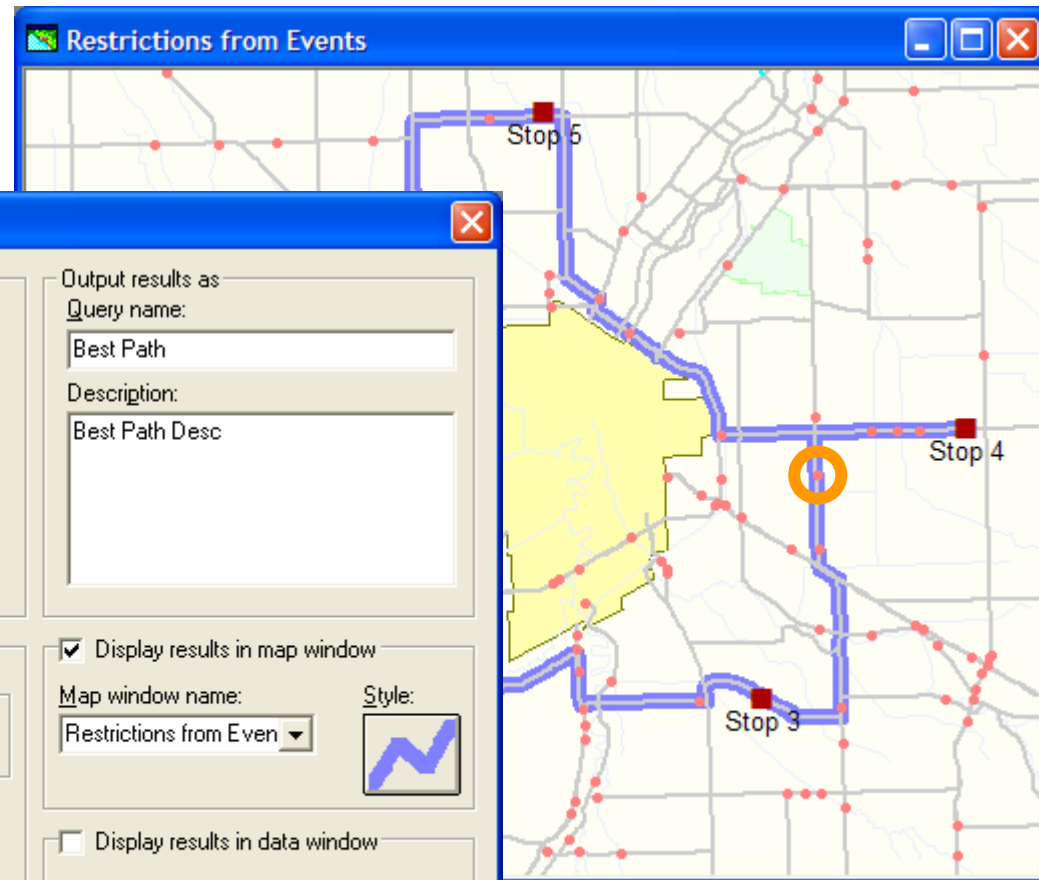
Style: 

Display results in data window:

Display results in data window

Data window name: DataWindow2

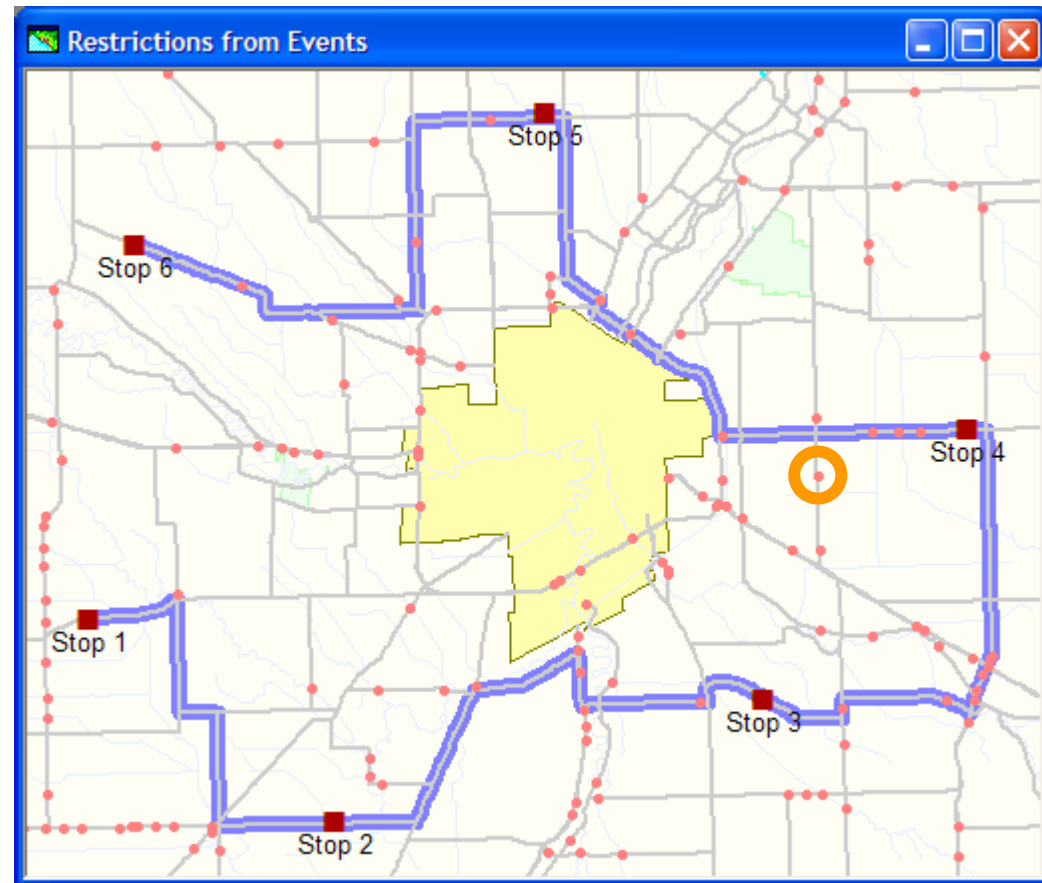
OK Cancel



LRS / Routing Synergy

Travel Restrictions Example

- Using events to set routing restrictions



LRS / Routing Synergy

Other Examples

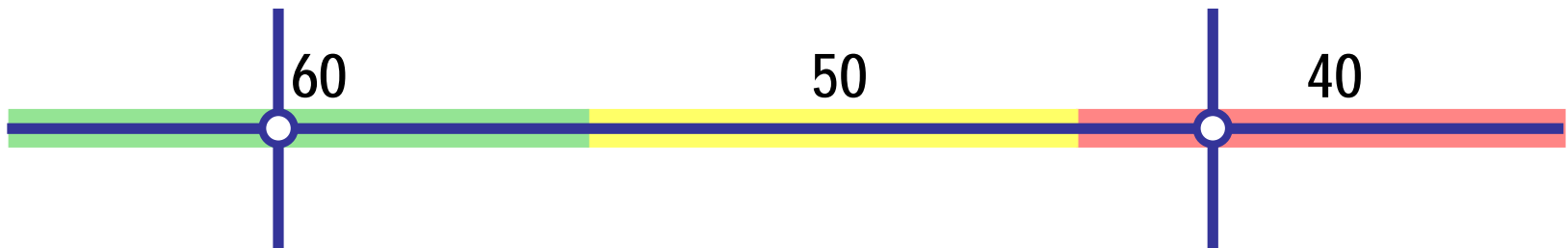
- Building Train Route network over rail line network
 - ◆ Use Best Path and Build Network



LRS / Routing Synergy

Other Examples

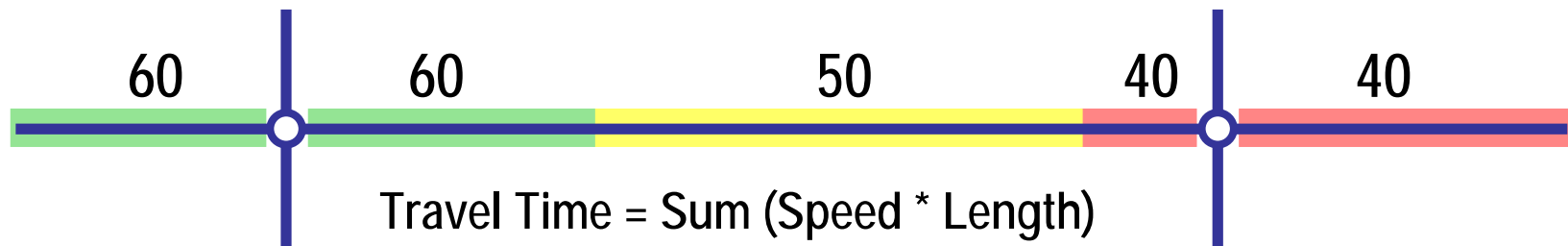
- **Building Train Route network over rail line network**
 - ◆ Use Best Path and Build Network
- **Populating edge travel time from Speed Limit events**
 - ◆ Use Event Overlay and Aggregation



LRS / Routing Synergy

Other Examples

- **Building Train Route network over rail line network**
 - ◆ Use Best Path and Build Network
- **Populating edge travel time from Speed Limit events**
 - ◆ Use Event Overlay and Aggregation

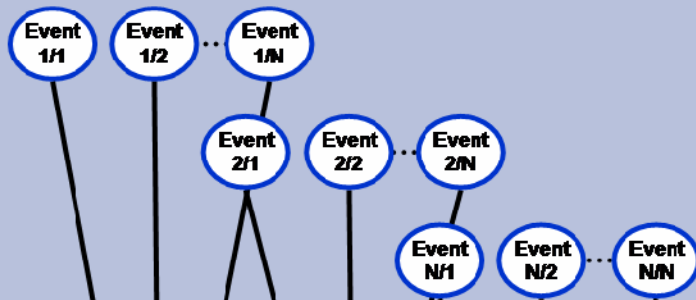


GeoTrans Transportation Data Model

Conceptual

Physical Template

Event Data Layer



Stops
▪ ID
▪ StopSetName
▪ StopName
▪ StopOrder
▪ Cost
▪ Enabled
▪ Geometry
▪ Attribute(s)

- LRMkey(s) to match LRM Event table
- 2 dates or 1 date

Events
LRM Keyset
Location
Timestamp
Attribute(s)

- Volatile Options:
- Measure
 - Duration
 - Coordinates
 - External Marker Offset
- Stable Option:
- Internal Marker Offset
- As needed or Foreign key link to attribute table

LRM Layer

Associated via Dynamic Segmentation



Associated via Dynamic Segmentation

- pkLRM_ID
- DatumKey
- Beg_Marker
- Beg_Offset
- End_Marker
- End_Offset
- FromNode
- ToNode
- Cost(s)
- One-Way
- Blocked
- Restriction(s)

LRM Events
ID
LRM Reference
Datum Reference
Routing
Timestamp

- LRMkey(s)
- LRM_Marker
- Beg_LRM_Meas
- LRM_Length
- Beg_Service
- End_Service
- DBtimestamp
- Status

Nodes
▪ ID
▪ Cost
▪ Blocked

Restrictors
▪ ID
▪ Name
▪ Enabled
▪ Expression

Turns
▪ ID
▪ FromEdge
▪ MidNode
▪ ToEdge
▪ Cost
▪ Blocked

Event Markers
▪ ID
▪ LRMkey(s)
▪ Measure
▪ Name

Datum Layer



- pkDatumID

- Marker_Name
- Beg_Meas
- Length
- Geometry

LRS Datum
ID
Datum Keyset
Measurement
Timestamp

- DatumKey(s)
- Beg_Service
- End_Service
- DBtimestamp
- Status

Datum Layer

Unchanged from previous version

- pkDatumID

- Marker_Name

- Beg_Meas

- Length

- Geometry

LRS Datum
ID
Datum Keyset
Measurement
Timestamp

- DatumKey(s)

- Beg_Service

- End_Service

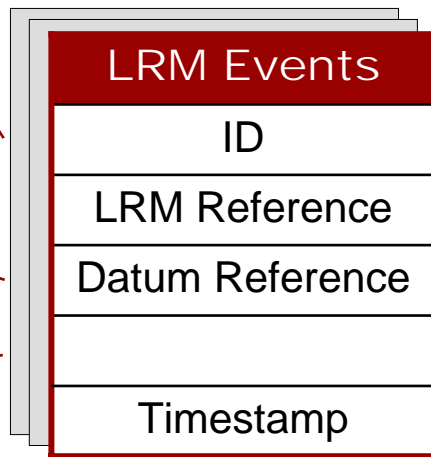
- DBtimestamp

- Status

LRM Layer

Updated to include routing

- pkLRM_ID
- DatumKey
- Beg_Marker
- Beg_Offset
- End_Marker
- End_Offset
- FromNode
- ToNode
- Cost(s)
- One-Way
- Blocked
- Restriction(s)



- LRMkey(s)
- LRM_Marker
- Beg_LRM_Meas
- LRM_Length
- Beg_Service
- End_Service
- DBtimestamp
- Status

Nodes

- ID
- Cost
- Blocked

Restrictors

- ID
- Name
- Enabled
- Expression

Turns

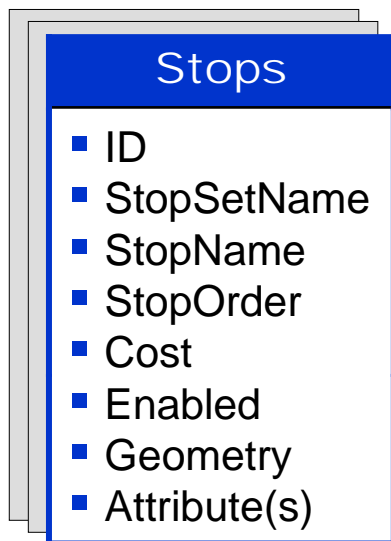
- ID
- FromEdge
- MidNode
- ToEdge
- Cost
- Blocked

Event Markers

- ID
- LRMkey(s)
- Measure
- Name

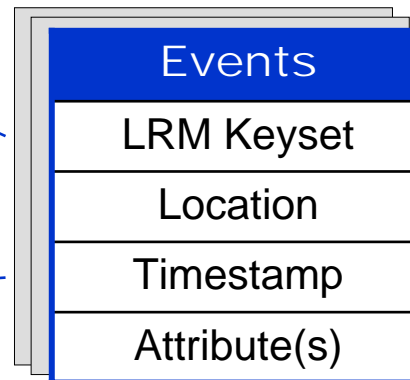
Event Layer

Updated to include routing



▪ LRMkey(s)
to match LRM
Event table

▪ 2 dates
or
▪ 1 date



Volatile Options:

- Measure
- Duration
- External Marker Offset

Stable Options:

- Internal Marker Offset
- Coordinates

▪ As needed
or

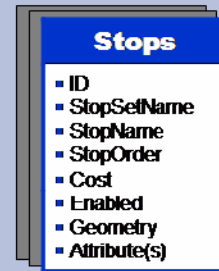
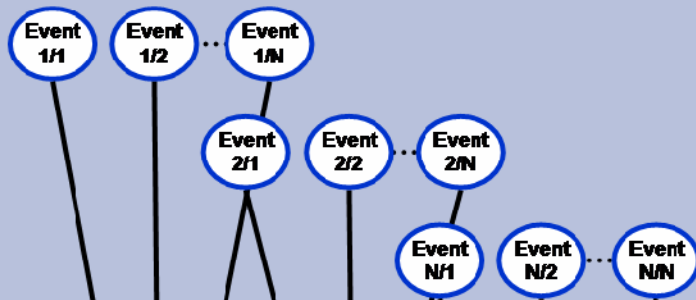
- Foreign key link
to attribute table

GeoTrans Transportation Data Model

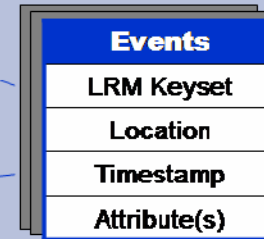
Conceptual

Physical Template

Event Data Layer



- LRMkey(s) to match LRM Event table
- 2 dates or
- 1 date



- Volatile Options:
- Measure
 - Duration
 - Coordinates
 - External Marker Offset
- Stable Option:
- Internal Marker Offset
- As needed or
- Foreignkey link to attribute table

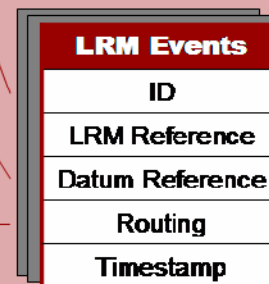
LRM Layer

Associated via Dynamic Segmentation

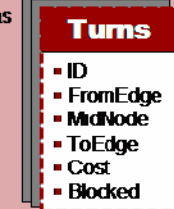
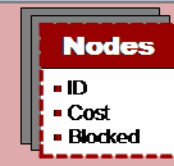


Associated via Dynamic Segmentation

- pkLRM_ID
- DatumKey
- Beg_Marker
- Beg_Offset
- End_Marker
- End_Offset
- FromNode
- ToNode
- Cost(s)
- One-Way
- Blocked
- Restriction(s)



- LRMkey(s)
- LRM_Marker
- Beg_LRM_Meas
- LRM_Length
- Beg_Service
- End_Service
- DBtimestamp
- Status

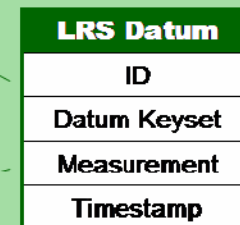


Datum Layer



- pkDatumID

- Marker_Name
- Beg_Meas
- Length
- Geometry



- DatumKey(s)
- Beg_Service
- End_Service
- DBtimestamp
- Status

Contact Info:

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