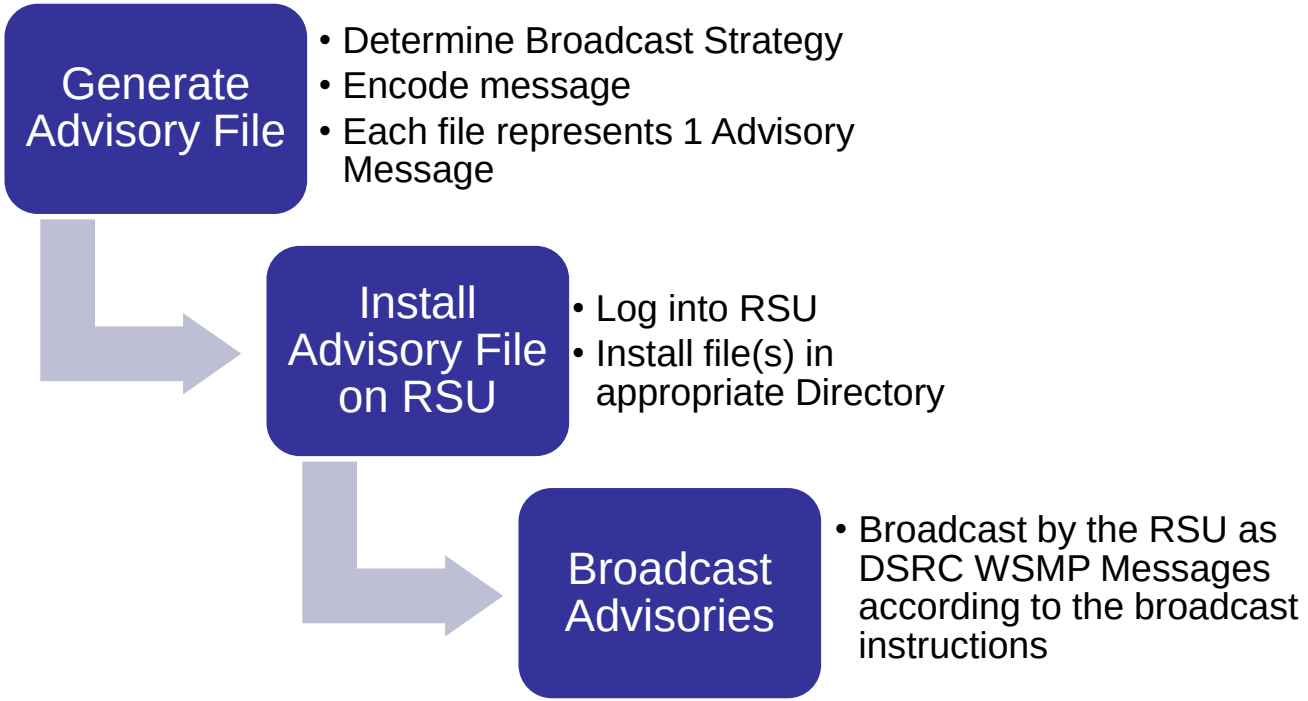
Traveler Situation Data
Field Situation Data
Vehicle Situation Data

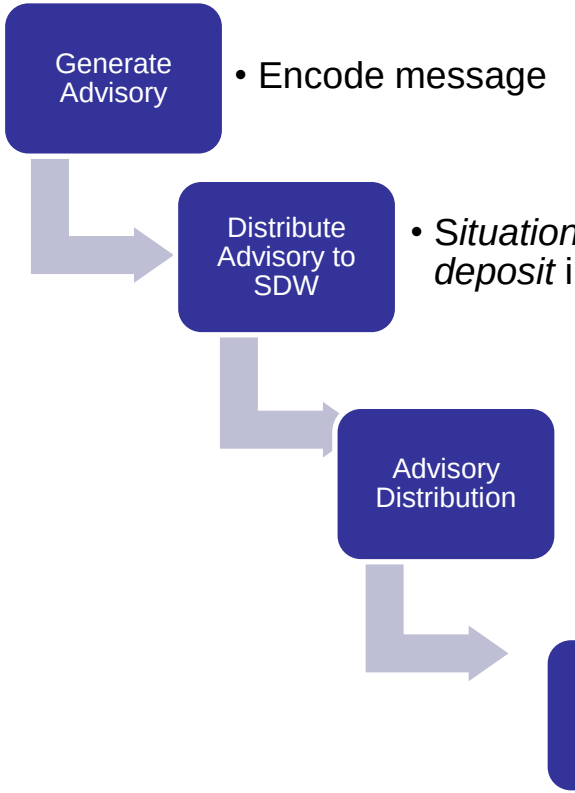
Unified Implementation of the CVRIA – Regional Scale
Design Details, Tools to Assist Interoperable Implementations

RSE 3.0



- Requires operations personnel to determine\understand the broadcast strategy (i.e. PSID, DSRC Channel, Transmit Mode (Continuous or Alternating), message priority, signature, encryption, etc.)
- Requires operations personnel to have direct access to all RSUs and be knowledgeable in the operations of RSUs from multiple vendors.

2014 Architecture



- Encode message
- *Situation data deposit* interface
- *Situation data distribution* interface for broadcast by RSU
- *Situation data delivery* interface for IP distribution directly to vehicles
- D*ata delivery* interface for broadcast by RSU as DSRC WSMP Messages
- Vehicles request bundles via IP

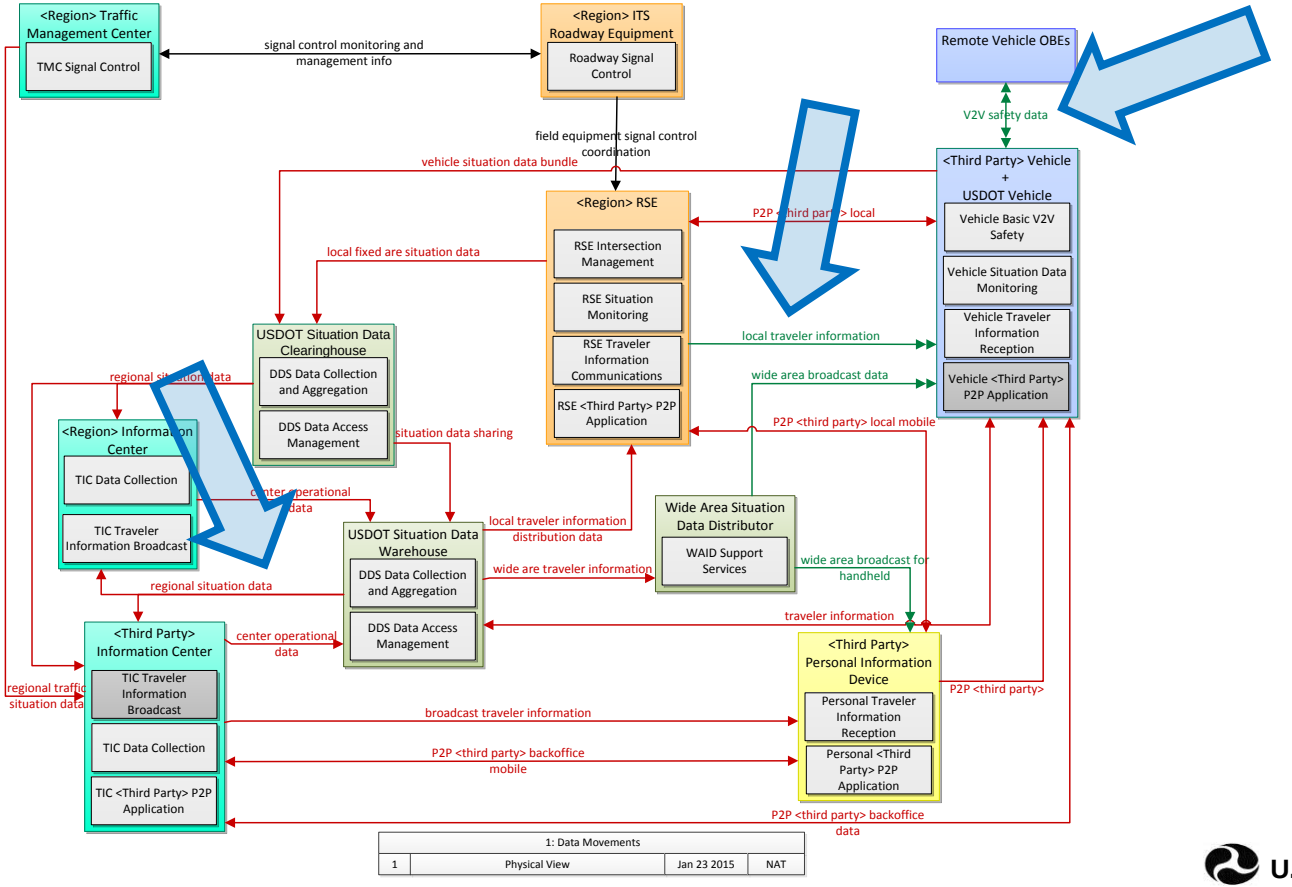
- Automates the message distribution process
- Situation Data Warehouse (SDW) assigns broadcast instructions\strategy based on message type
- Reduces knowledge base requirement of operations personnel
- Requires personnel to only have access to a single location (SDW)

Focus on Key Interfaces

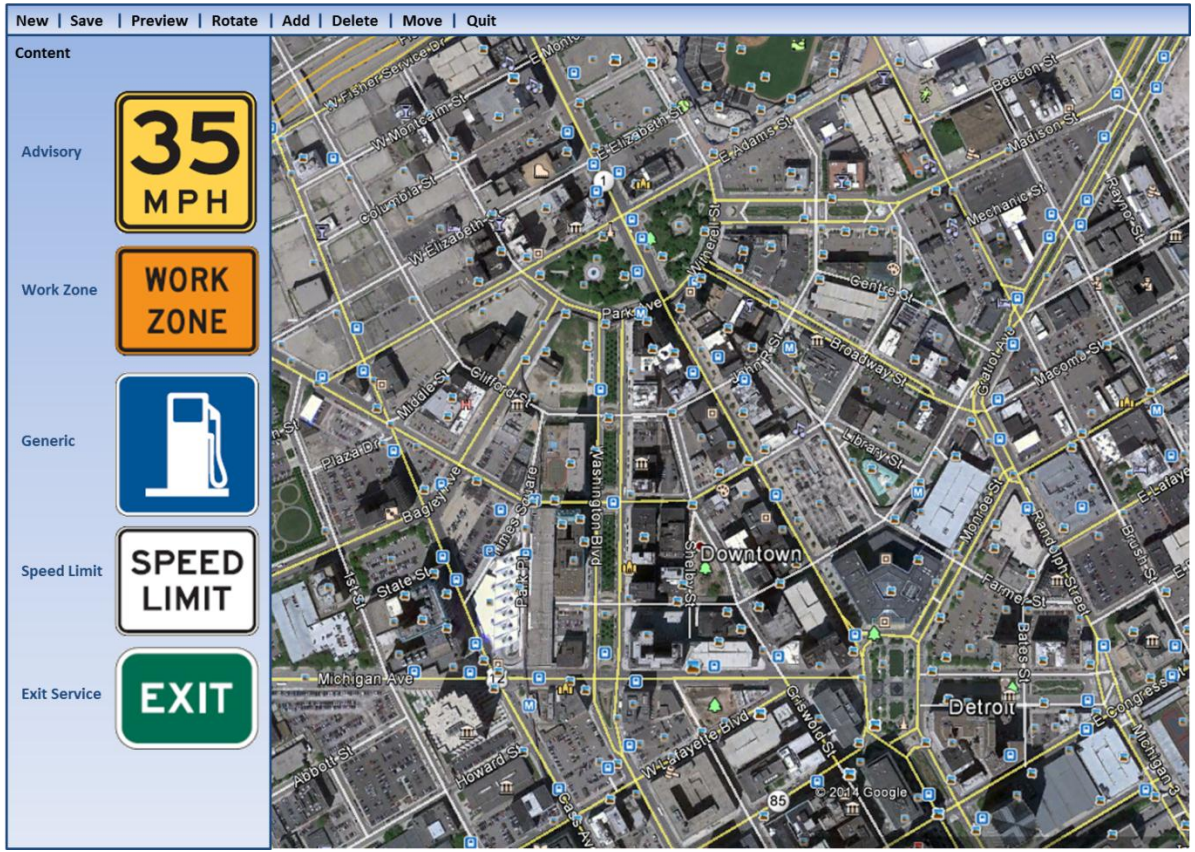
Promote Interoperability by forcing -

- All BSM's meet performance requirements (Vehicle Situation Data)
- All MAP's and SPaT's created using the same interpretation (Field Situation Data)
- All Traveler Situation Data distributed using the USDOT Warehouse (Travel Situation Data)

2014 Architecture

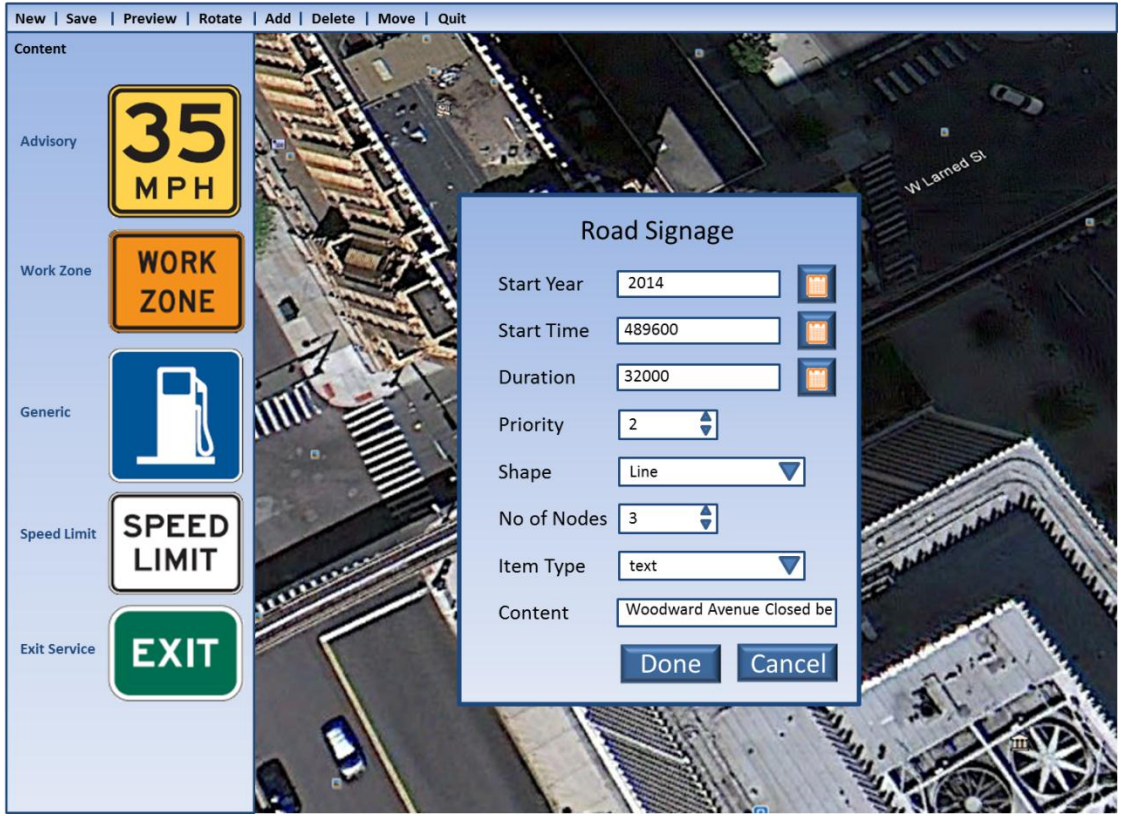


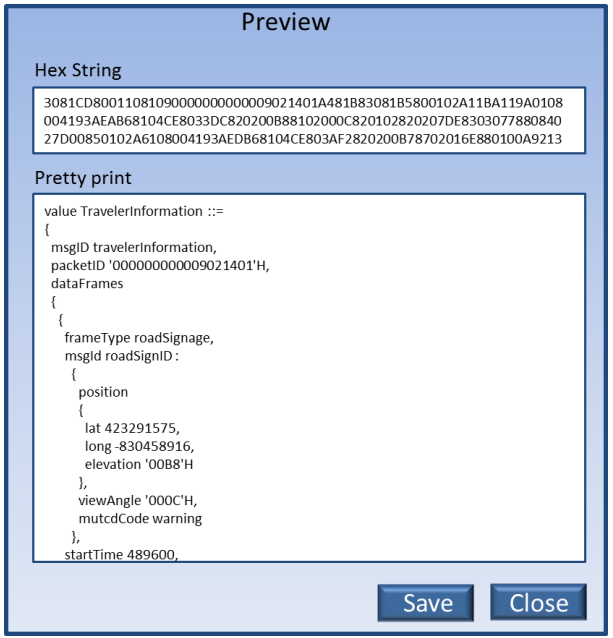
Traveler Situation Data Tool



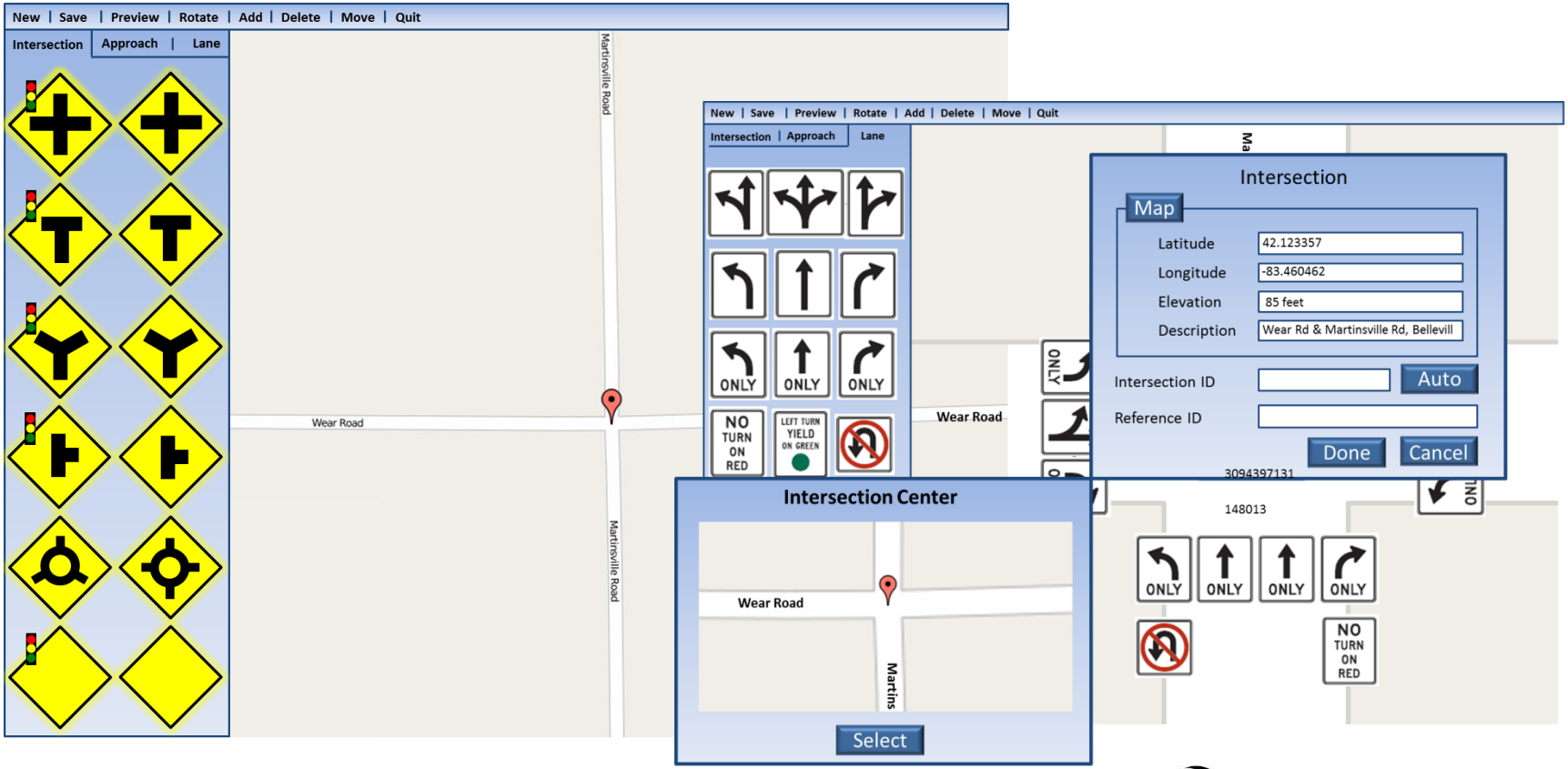
- Objective
  - Provide less tedious and more user friendly way of creating Traveler Situation Data Messages (TIMs)
  - Common cases are easy and general case is possible
- Approach
  - Allow data entry via icon library drag and drop
  - Allow geo information to be provided from a map
  - Detect elevation from a geo point

Traveler Situation Data Tool, cont.





Intersection Situation Data Tool



GUI – based conventions, example 1

- Two lane roads, two-way stop signs.

- Screen 1 of the GUI:

Message ID: 7
Message Count: 0 (0 - 127)
Layer Type: 3 (Optional)
Select Number of Intersections 1
Next Step

- Message count can be varied.
- Layer Type 3 is intersection data.

Cont.

- Screen 2, Intersection location and ID:
- Reference point data is the location of the center of the intersection.
- Intersection ID is

Intersection Sequence Data 1

Descriptive Name: 1200N, Woodford Co, IL (Optional, Max Length = 63)
e.g. Major Street and Minor Street, City, ST

Reference Point Data - Use Decimal Degrees Notation

Latitude: 40.765020 e.g. 42.12345

Longitude: -89.140284 e.g. -83.45678

Elevation: 224 (Optional) Enter Value in Meters

Intersection ID: C3FF22E0 Auto Generate Unique ID

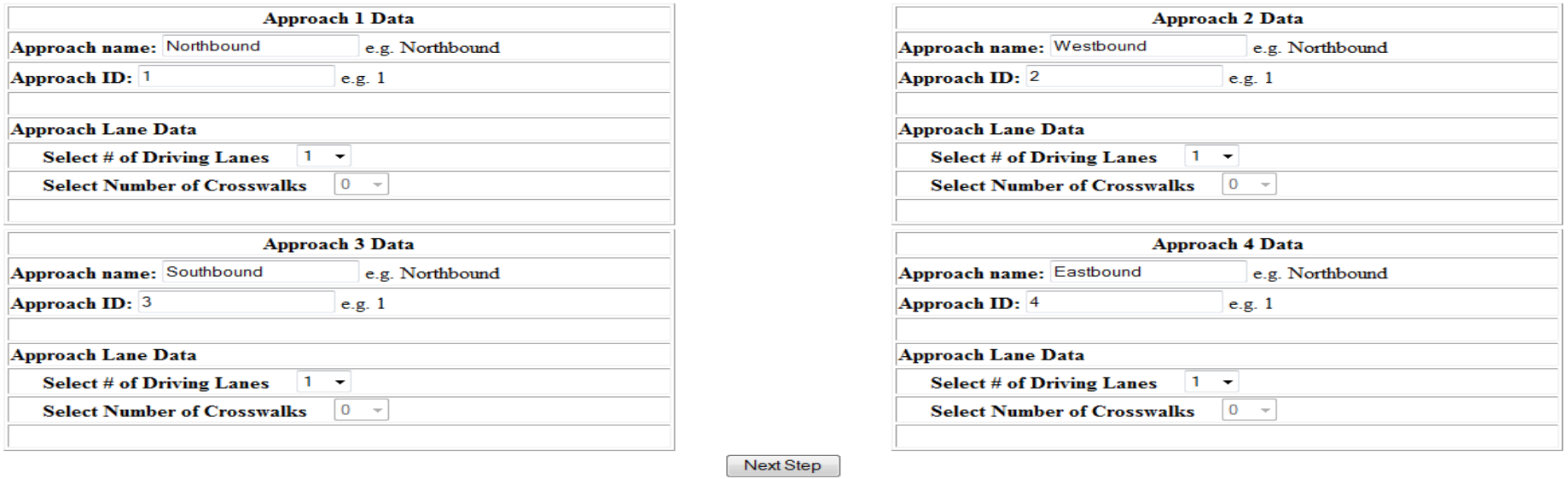
Reference Intersection ID: 21004 (Optional)

Select Number of Approaches 4

Next Step

Cont.

- Screen 3, Approaches:
- Start with Northbound at Approach number 1 and continue numbering counterclockwise.



Cont.

- Screen 5. ASN.1 encoded data:

Data Element and Value	Encoded Data
Message ID: 7	800107
Message Count: 0	810100
Layer Type: 3	830103
Number of Intersections: 1	
Intersection Descriptive Name: 2100E and 1200N, Woodford Co, IL	802032313030452061 6e6420313230304e2c20576f6f64666f726420-
Intersection ID: C3FF22E0	8100

Approach Descriptive Name: Northbound	800a4e6f727468626f756e64
Approach ID: 1	810101
Number of Driving Lanes: 1	
Approach Drive Lane Number: 1	800101
Approach Drive Lane Width: 275	81020113
Approach Drive Lane Attributes: 14	82010e
Approach Drive Lane Offsets:	A310040600b0fcf800e004060000df1c00e0

3082011E80010781010083010 3A582010D308201098020323130304520
616E6420313230304E2C20576F6F64666F726420436F2C20494C8100A
2128004184C3F988104CADE45A88204000000E08302520CA781CA3031
A22F800A4E6F727468626F756E64810101A21E301C8001018102011382
010EA310040600B0FCF800E004060000DF1C00E03030A22E800957657
374626F756E64810102A21E301C800102810201138201 0EA31004060159
DC1300E004062E13000000E03031A22F800A536F757468626F756E6481
0103A21E301C800103810201138201 0EA3100406FF8B032900E00406000

SPaT

Approach Data		
Approach 1	Select Type of Light and Color for Approach	Set Time To Change
Lane Number: 1	Solid Ball	12002
	Green	
	State Confidence	
	Time Likely to Change	
Approach 2	Select Type of Light and Color for Approach	Set Time To Change
Lane Number: 2	Flashing Ball	12002
	Red	
	State Confidence	
	Time Likely to Change	
Approach 3	Select Type of Light and Color for Approach	Set Time To Change
Lane Number: 3	Solid Ball	12002
	Green	
	State Confidence	
	Time Likely to Change	
Approach 4	Select Type of Light and Color for Approach	
Lane Number: 4	Flashing Ball	
	Red	

- Stop signs will be encoded as a flashing Red Ball.
- Yield signs will be encoded as a flashing Yellow Ball.
- TimeMark will be encoded as 12002 - undefined time

Signal Phase Indications Encoding

	Green	Yellow	Red	Flashing
Ball	0x00000001	0x00000002	0x00000004	0x00000008
Left Arrow	0x00000010	0x00000020	0x00000040	0x00000080
Right Arrow	0x00000100	0x00000200	0x00000400	0x00000800
Straight Arrow	0x00001000	0x00002000	0x00004000	0x00008000
Soft Left Arrow	0x00010000	0x00020000	0x00040000	0x00080000
Soft Right Arrow	0x00100000	0x00200000	0x00400000	0x00800000
U-Turn Arrow	0x01000000	0x02000000	0x04000000	0x08000000

* Note: DARK = 0x00000000

The Signal Light State value is built by ORing the various bitmasks together for that approach.

DDateTime

Enter DDate Time or leave default value

201473113440

Time Stamp:	8004E8BBBD7F

- Absolute time when data elements are created.
- UTC within 1msec.
- DYear, DMonth, DDay,
- DHour, DMinute entered as integers.
- *DSecond entered as in integer in units of seconds.*

Bundle Header

Dialog ID:	800200A2
Sequence ID:	810105
Request ID:	820402E072F2
Bundle ID:	830101
Time To Live:	840102
Geo Region:	A51CA00C8004184C47098104CADE3BD4A10C8004184C38268104CADE4F7D
MAP Payload:	808201223082011E800107810100830103A582010D3082010980203231303045206 16E6420313
Time Stamp:	8004E8BBBD7F
SPAT Payload:	81363034800113A22f8100820100A528300882010183010486003008820102830104860030088 2
ISD Record	3082019B800200A2810105820402E072F2830101840102A51CA00C8004184C47098104CADE

- Geo Region automatically calculated based on the most Northerly, Westerly, Southerly, and Easterly points in lane definitions