

WELCOME

NHDOT Resources and Tools

What is GIS in NHDOT

Geo-Referencing transportation assets to
specific location to the earth surface

NHDOT's GIS Functions

- **Business Support**
 - Turning Data into Information
- **Customer Service**
 - Analysis – Maps – Reports – Imagery
- **GIS Development**
 - Tools – Web Development – Customizations

GIS in NHDOT

- **ESRI GIS Shop using Oracle**
 - ArcMap 9.3 moving to 10 this summer
 - ArcServer 10
- **Centralized GIS core with distributed users**
 - 8 people in the core group
 - 30-40 skilled users

Note: 3 years ago NHDOT had 12 skilled users

GIS Transportation Resources, Tools, and Uses

- GIS Transportation System
 - Base-map – (Aerial imagery and LRS)
 - Transportation Assets
 - GIS Tools
 - Uses
 - Sharing

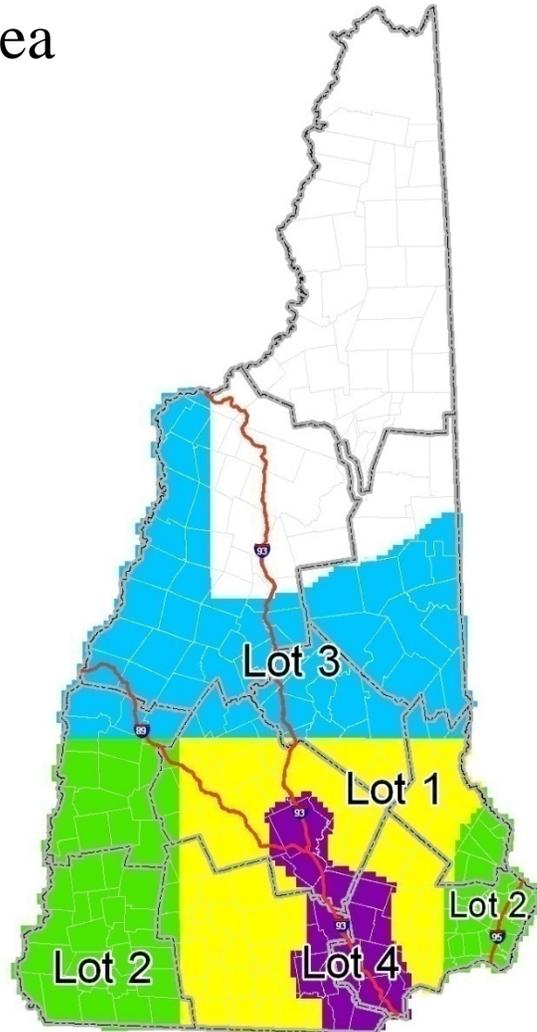
Aerial Imagery

Most Current imagery is 2010 Statewide 1-ft
Pixel resolution imagery

Well most of the State

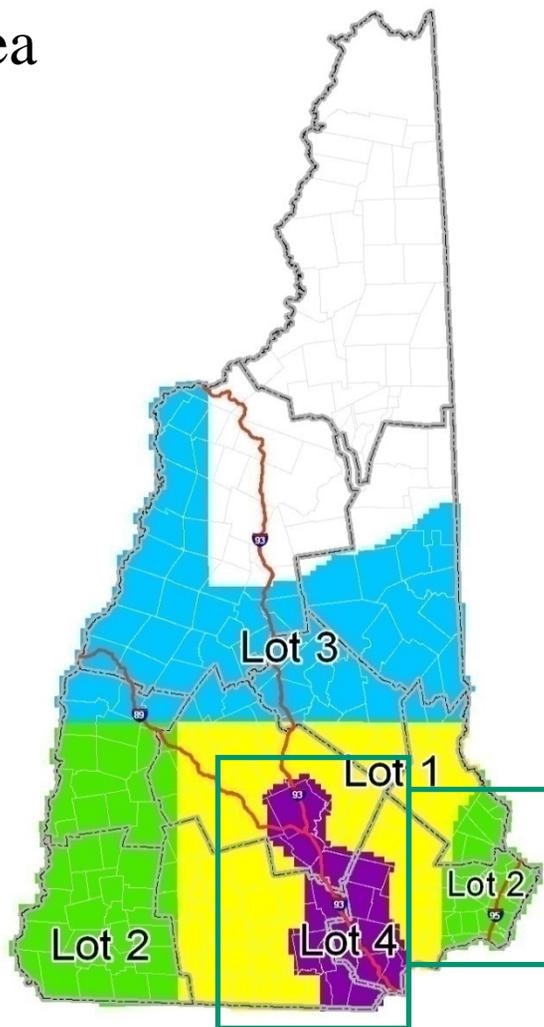
Joint project with USGS, NHDOT, NHDOS and
NHDRA

2010 Collection Area by Delivery Lots



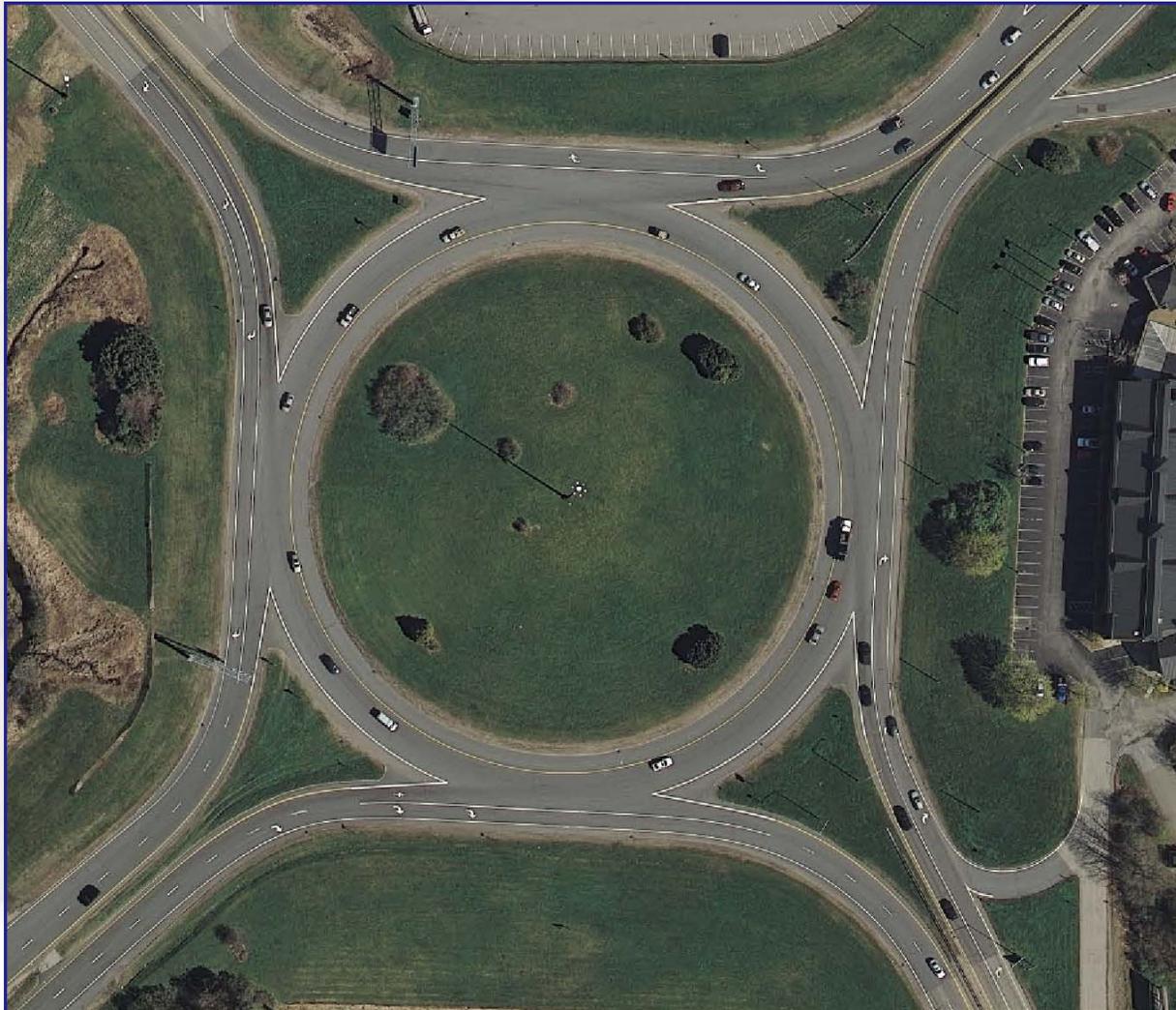
*Mother Nature
did not want her
picture take in the
Spring of 2010
and again in 2011*

2010 Collection Area by Delivery Lots



*6-inch imagery
for the Seacoast
Region and the
I-93 corridor
from Salem to
Manchester*

***Lots 2 & 4
6-inch Imagery***



*Portsmouth
Traffic Circle
6-inch
Pixel
Resolution*

1-foot

vs..

6-inch



1" = 200' or 1:2400

1" = 100' or 1:1200

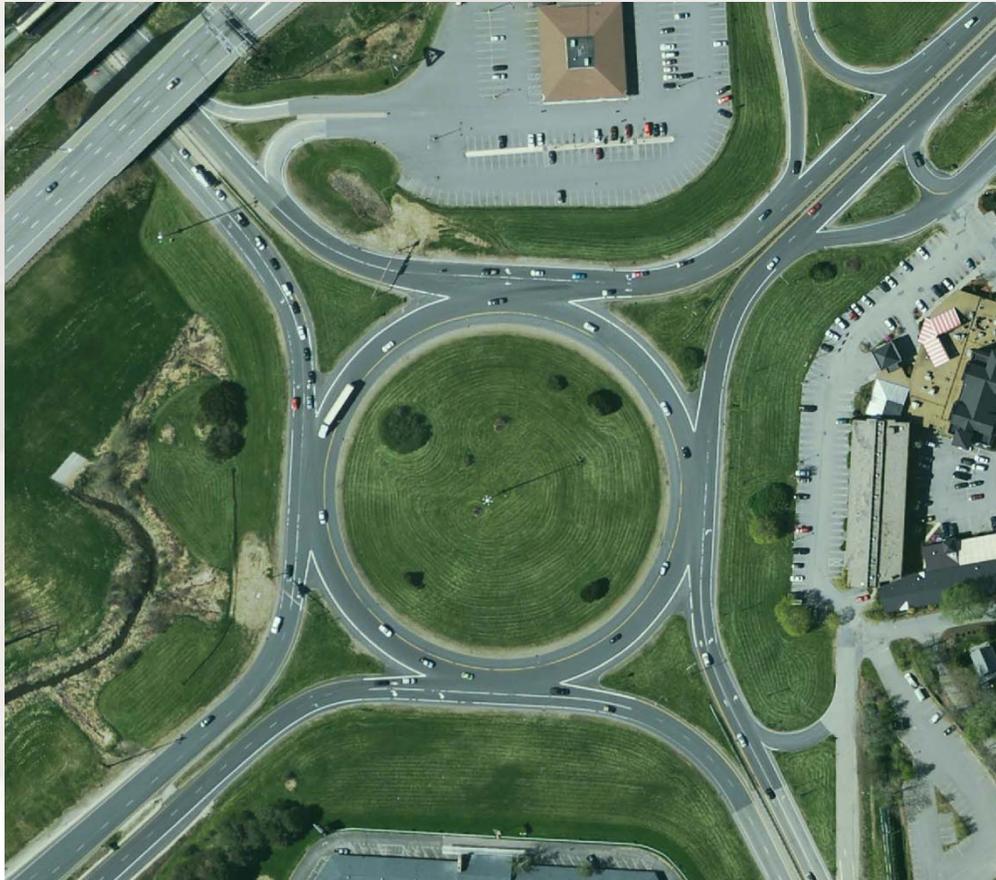
2010 1-foot Aerial Imagery Additional Resources

- **Imagery in MrSID Format**
 - Smaller files size- some loss of clarity
 - Viewable in Internet Explorer w/ add-on
- **Stereo Pairs**
 - Source for contour mapping (5')
 - Planimetric data

Archive Imagery

- **2005** 1-foot color imagery
 - Eastern portion of the state
 - Initiated as part of the CTAP project
- **2009** Statewide 1-Meter (NAIP) color imagery
- **1981** Statewide 1" – 400' black and white
- **1960-1980** Project specific imagery

2005 1-foot Imagery Coverage



*Portsmouth
Traffic Circle
2005*

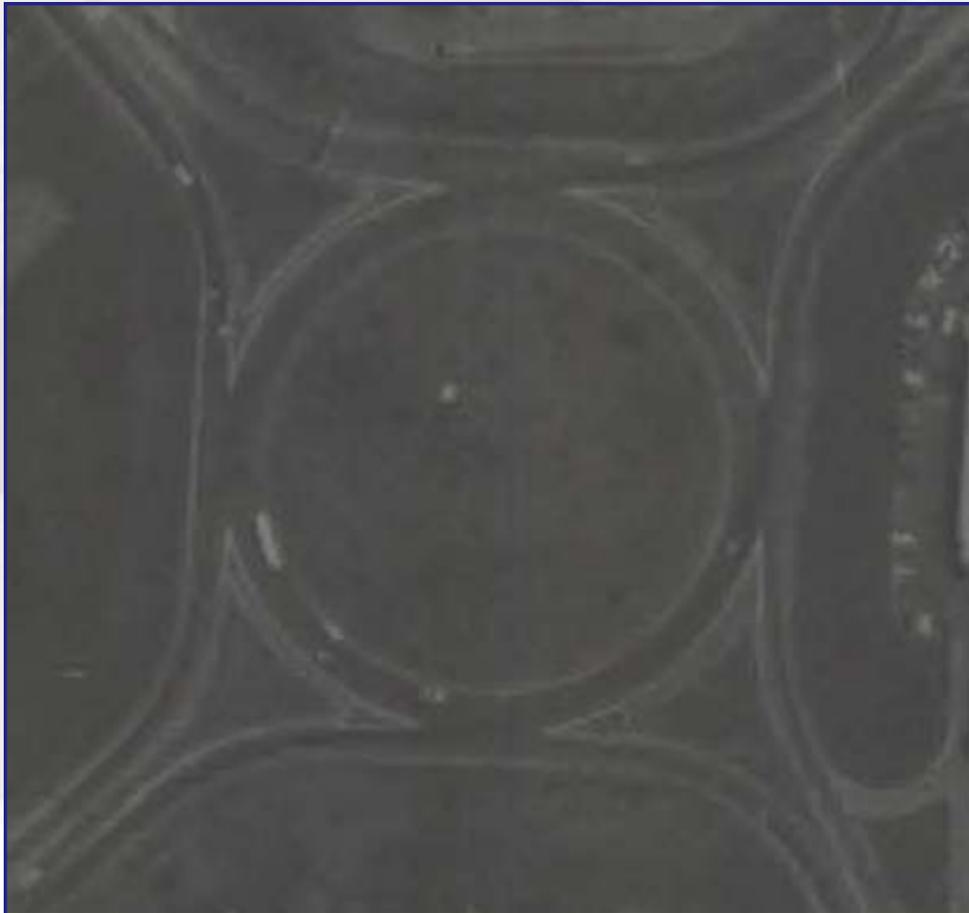
2009 Statewide 1-Meter (NAIP) imagery



*NAIP imagery is
not orthorectified-
limiting location
accuracy*

*Imagery was
collected during
the agricultural
growing seasons
(leaf on)*

1981 Statewide 1" – 400' black and white



*Portsmouth
Traffic Circle
1981*

- **1960-1980 Project specific imagery**



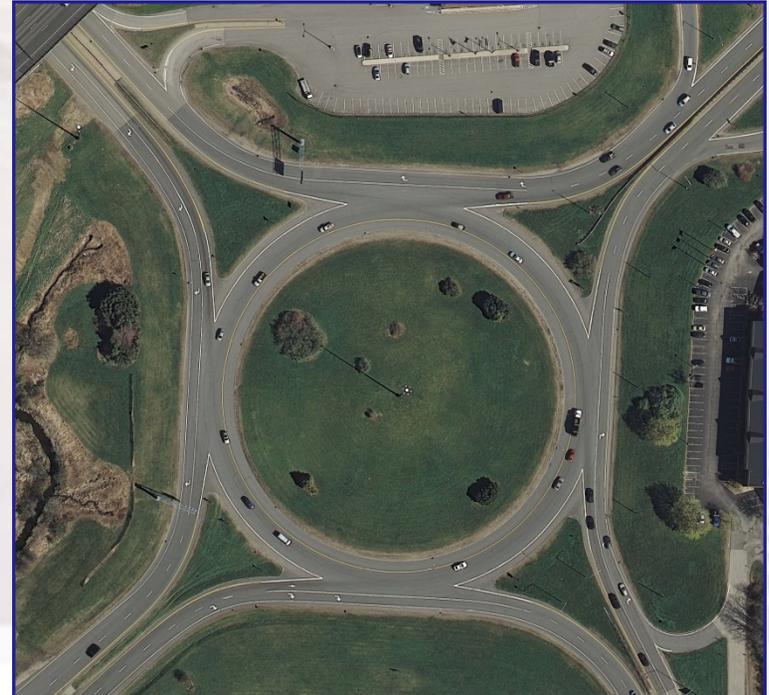
*Portsmouth
Traffic Circle
1972*

We've come a long way!!

1972 Imagery



2010 Imagery

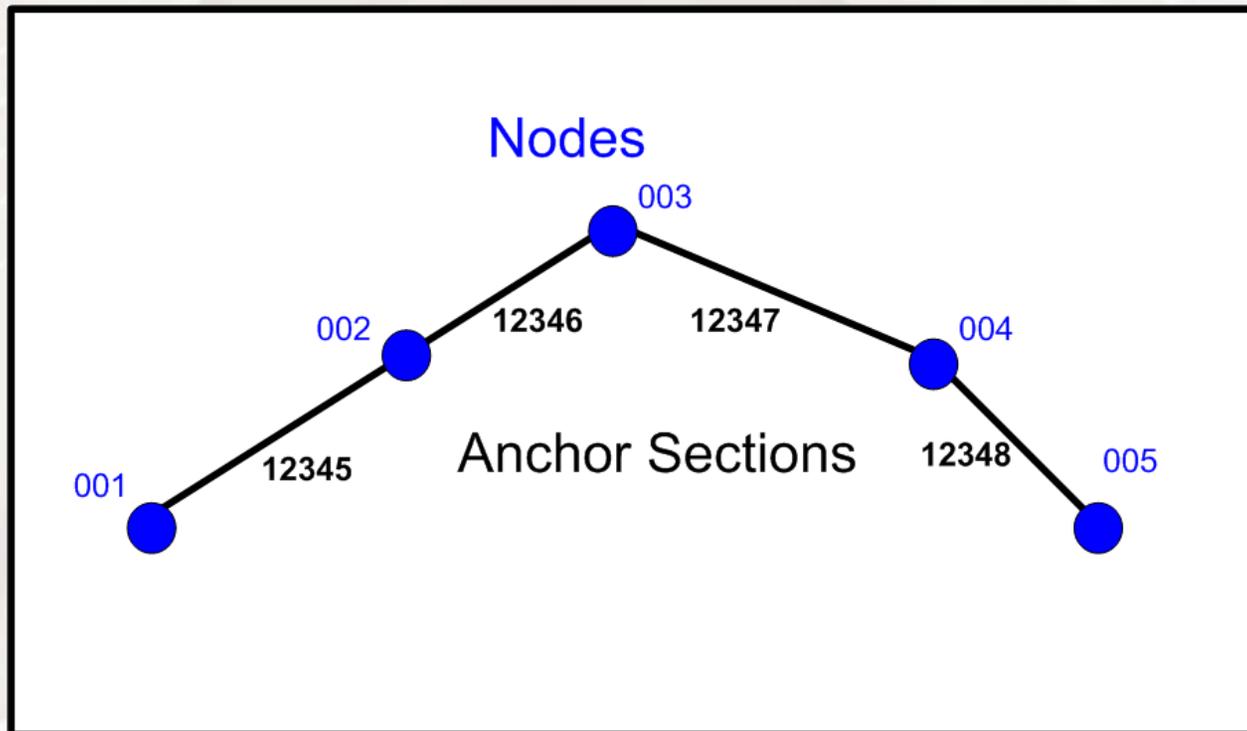


GIS Transportation System

- **Base-Map** - Link Node System
- **Route Systems**
- **LRS** - Linear Referencing Systems

Base-map

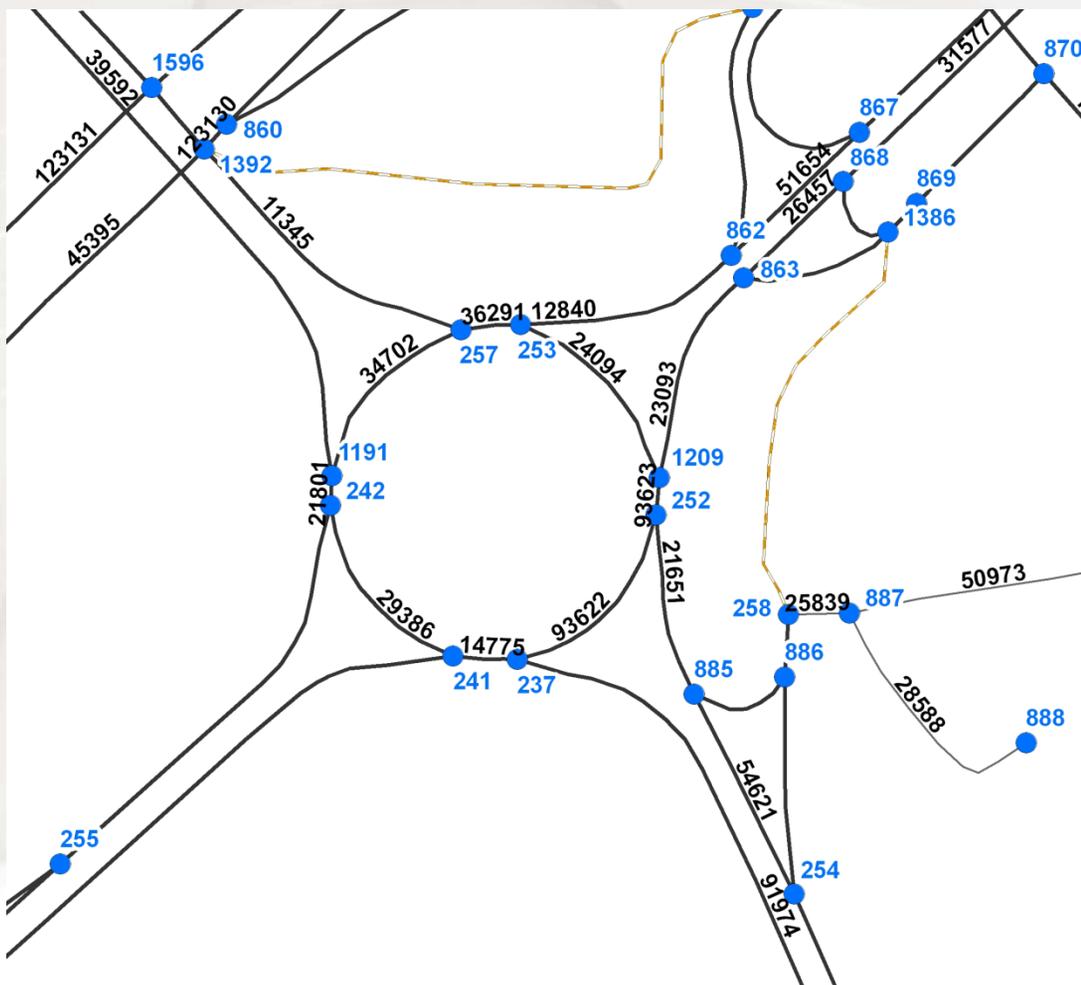
Link Node System



*Each Node and
Anchor Section
(link) have
Unique Ids*

*Typically nodes
break at
intersections and
identifiable
features*

Base-map

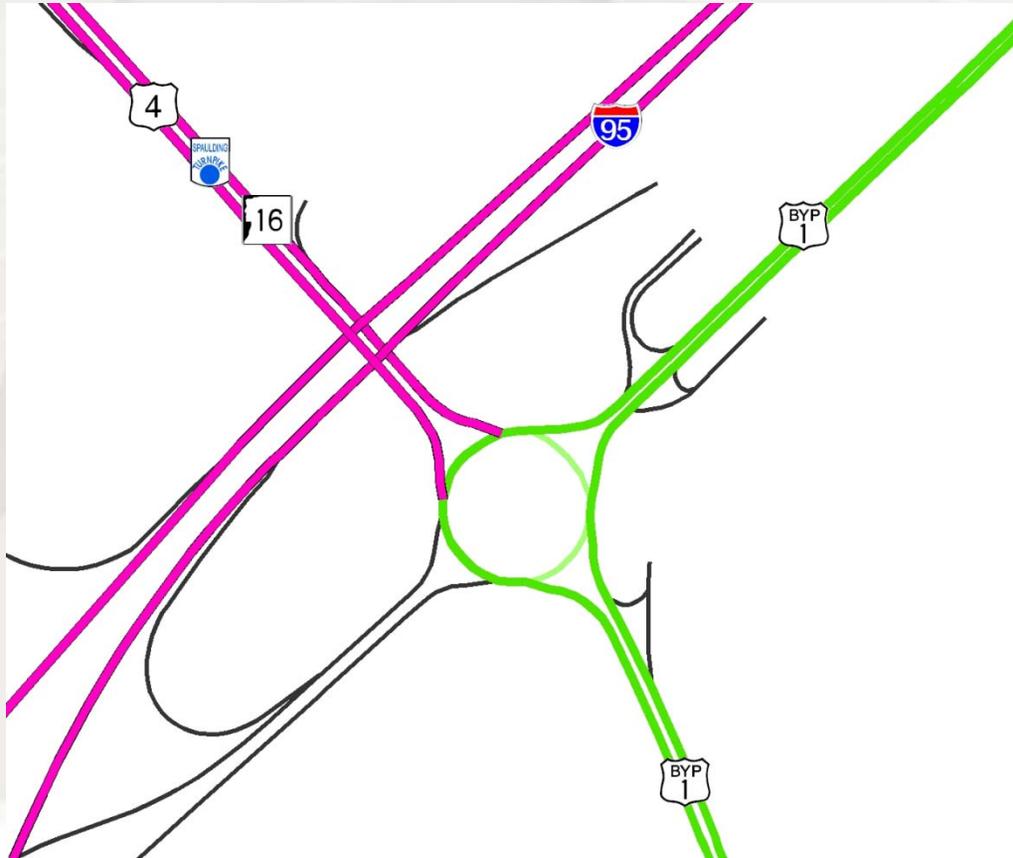


*Base-Map
includes State
and local
roadway
networks plus
federal and
selected private
roads*

GIS Routes

- **GIS Routes sit on top of Anchors Sections**
 - GIS Routes
 - Follow state routes and local roads
 - Run from the beginning a route/road to end
 - Run Concurrent (Example: Turnpike, US-4, NH-16 in Portsmouth)

GIS Routes

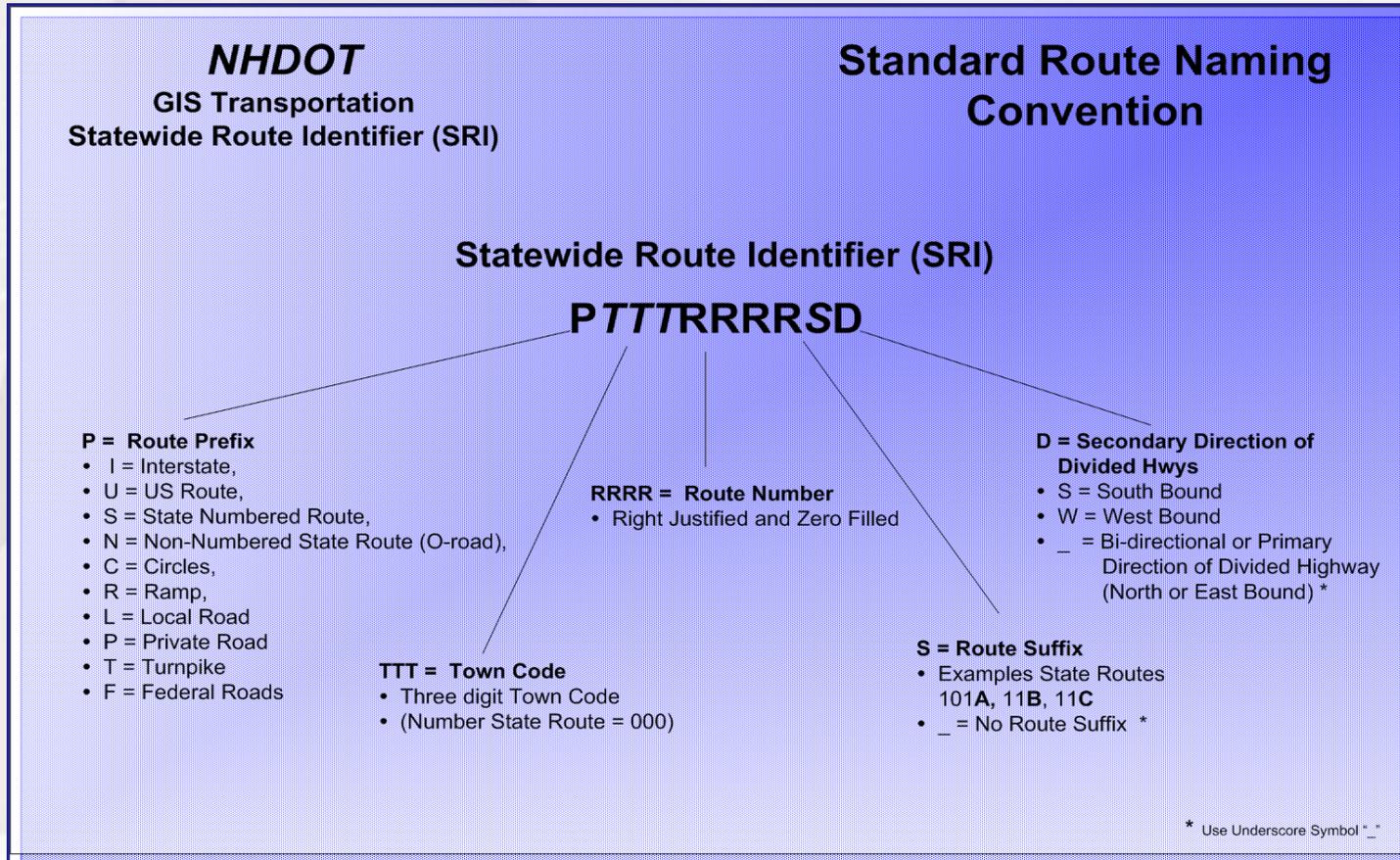


*Example of
Concurrent Routes:*

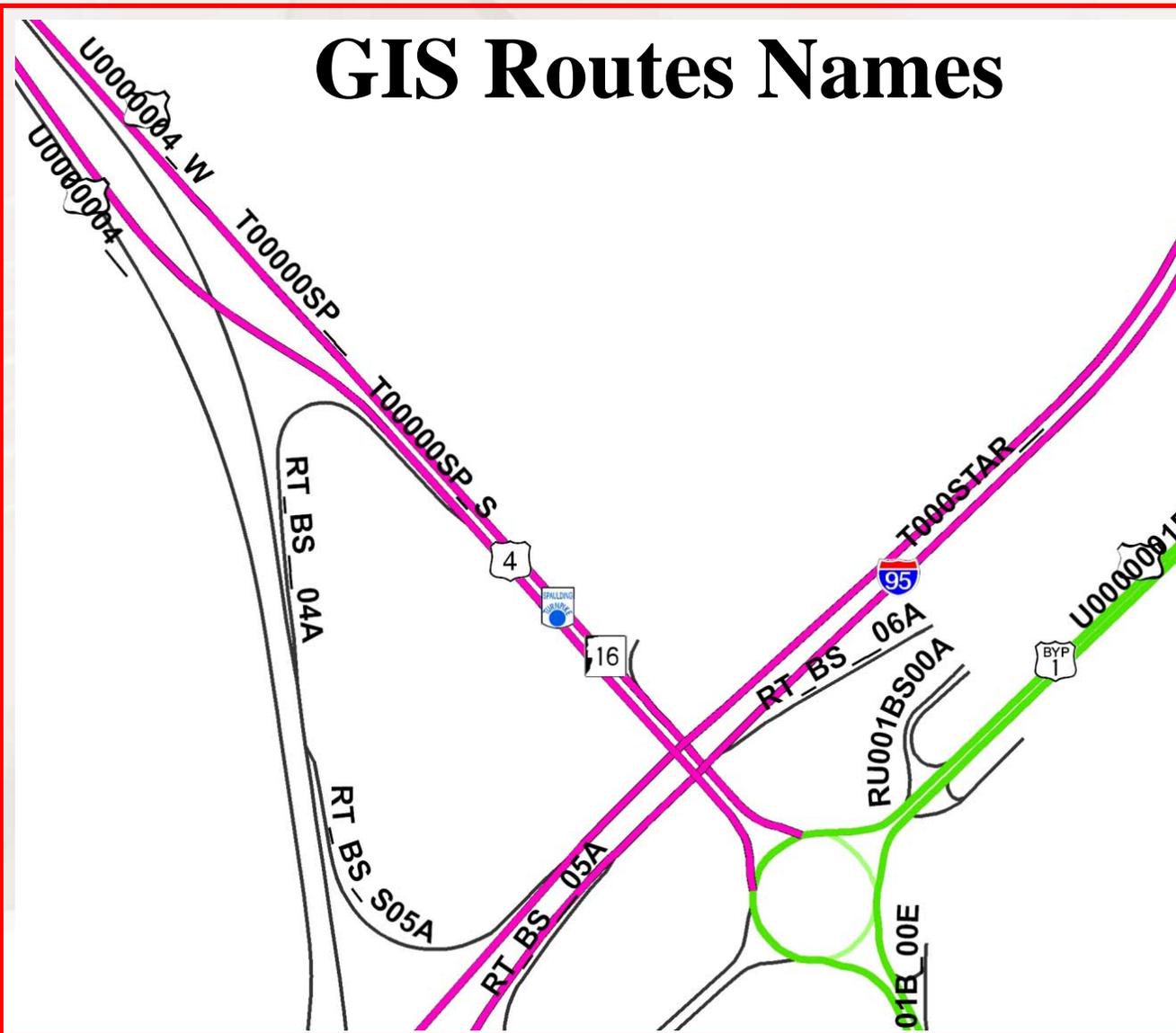
- *Turnpike*
- *US-4*
- *NH-16*

*Portsmouth
traffic circle*

GIS Routes Names

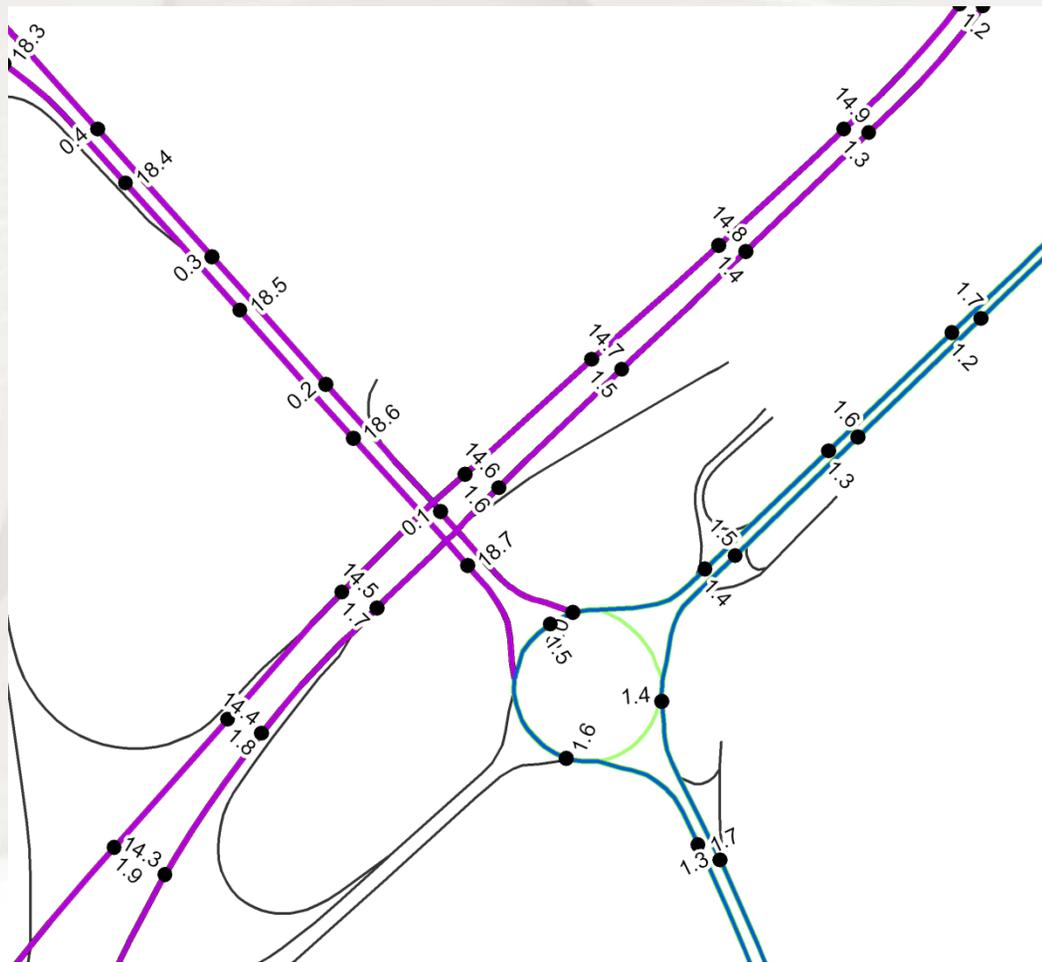


GIS Routes Names



*Ramps have a
slightly
different SRI
naming format*

Route (SRI) and Distance



SRI distance is calculated from geometry length (Flat World)

The Base-map is build on state plan coordinates (X,Y) used by GPS

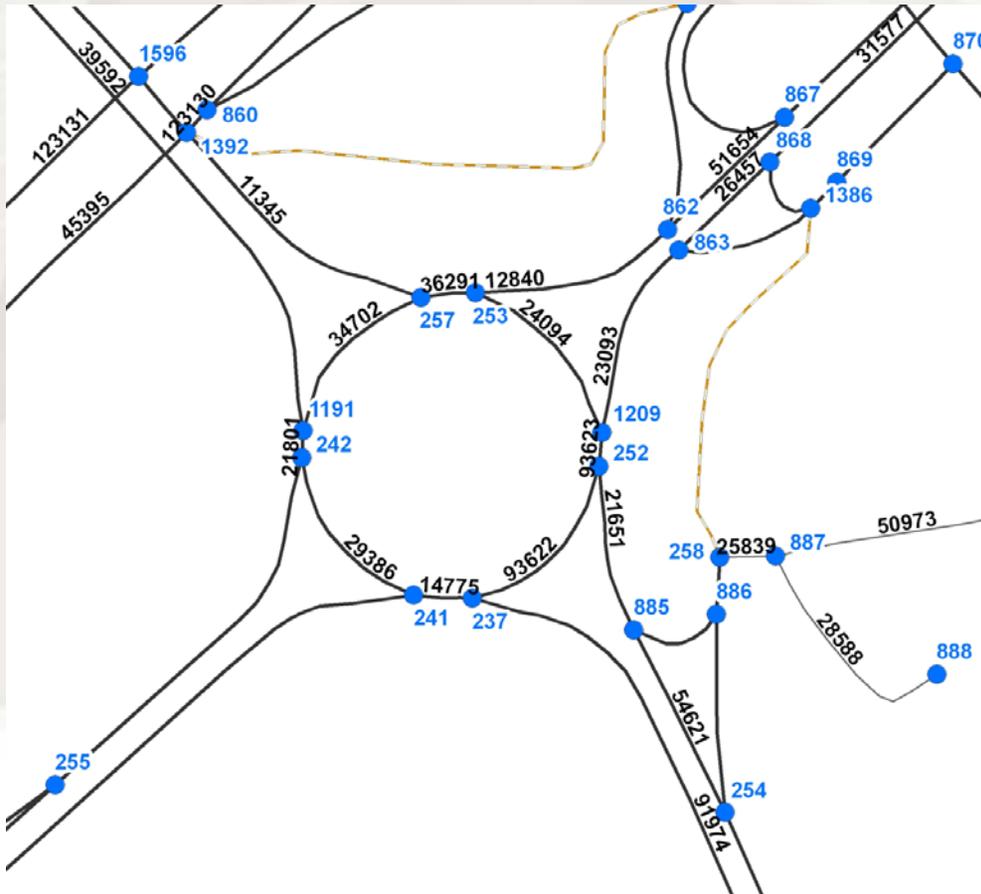
Linear Referencing System (LRS)

NHDOT's GIS Uses 4 LRS to locate Transportation Assets

1. Anchor Sections (links) & Nodes
2. Route (SRI) and Mile Reference
3. Coordinates
 - (X, Y) State Plane
 - (Latitudes & Longitudes)
4. Nodal Reference

Using the LRS to Locate Assets

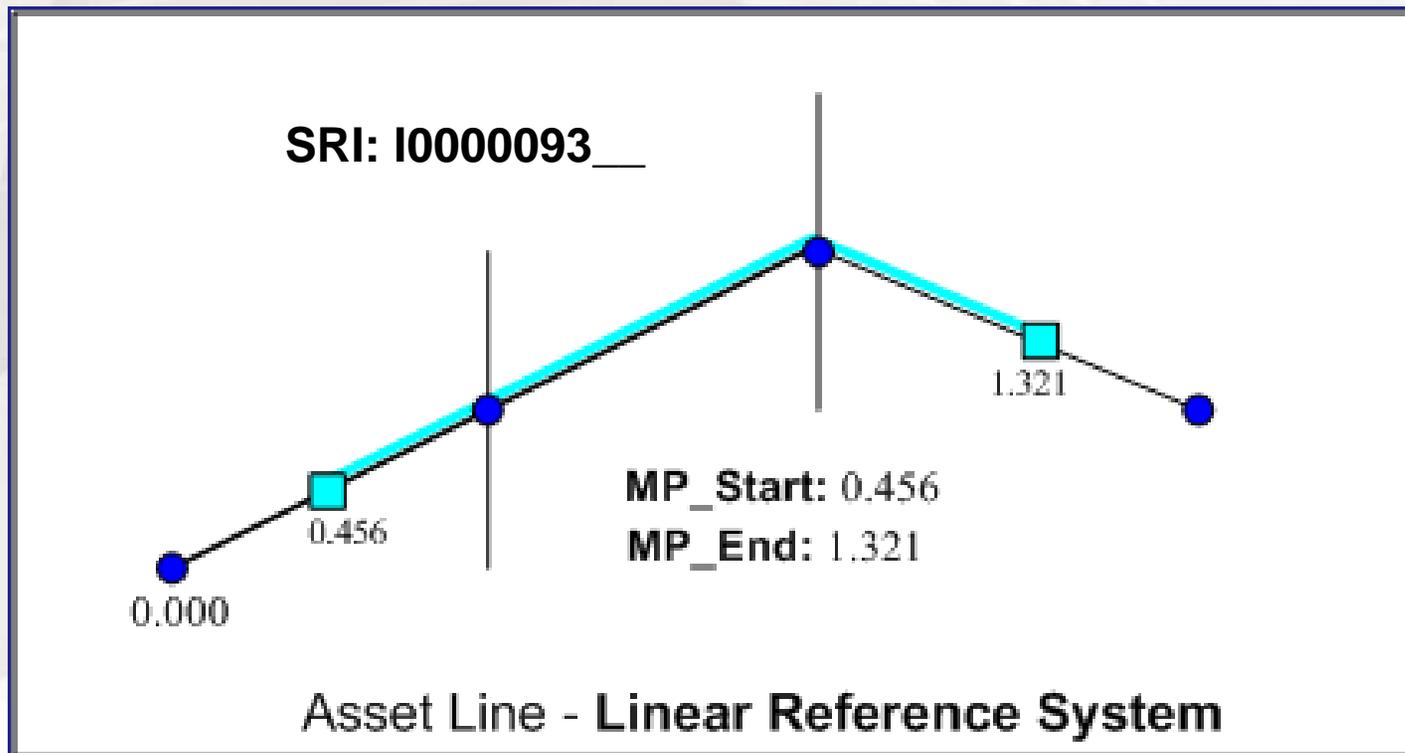
Anchor Sections and Nodes



*Data is Attached to
Anchor Sections
and
Nodes*

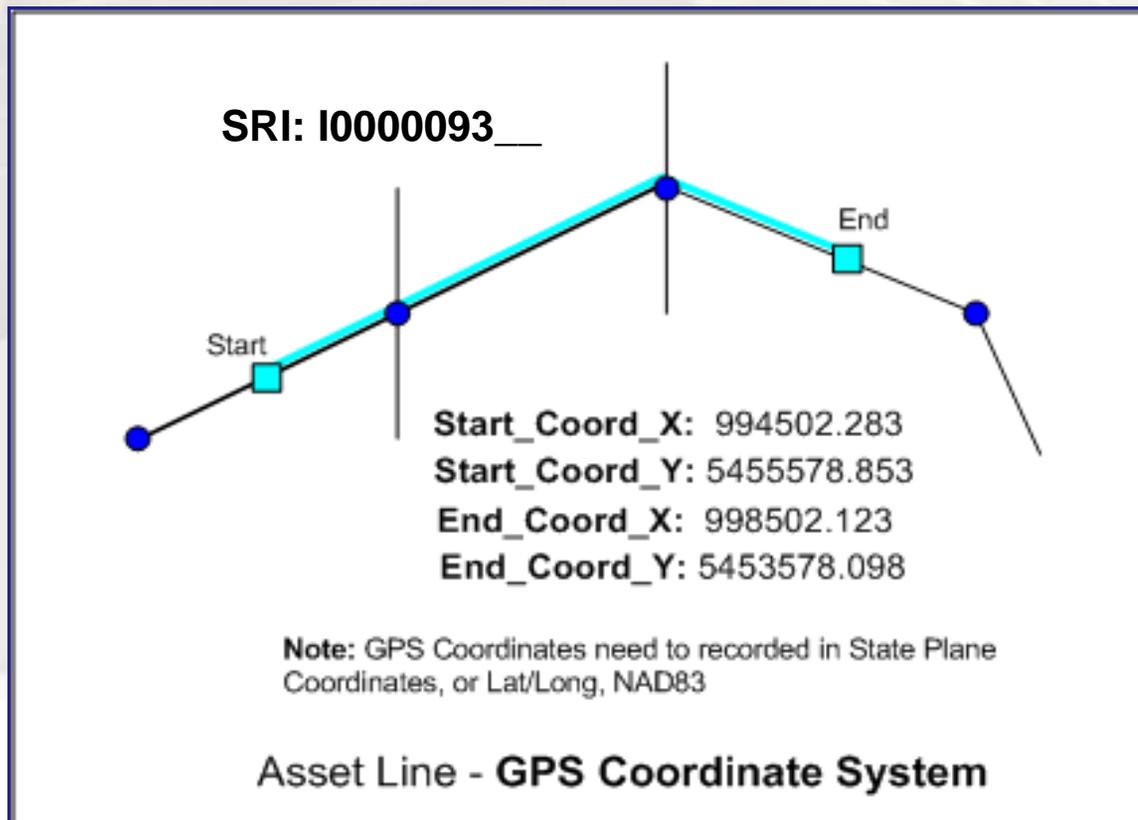
Using the LRS to Locate Assets

Route (SRI) and Mile Reference



Using the LRS to Locate Assets

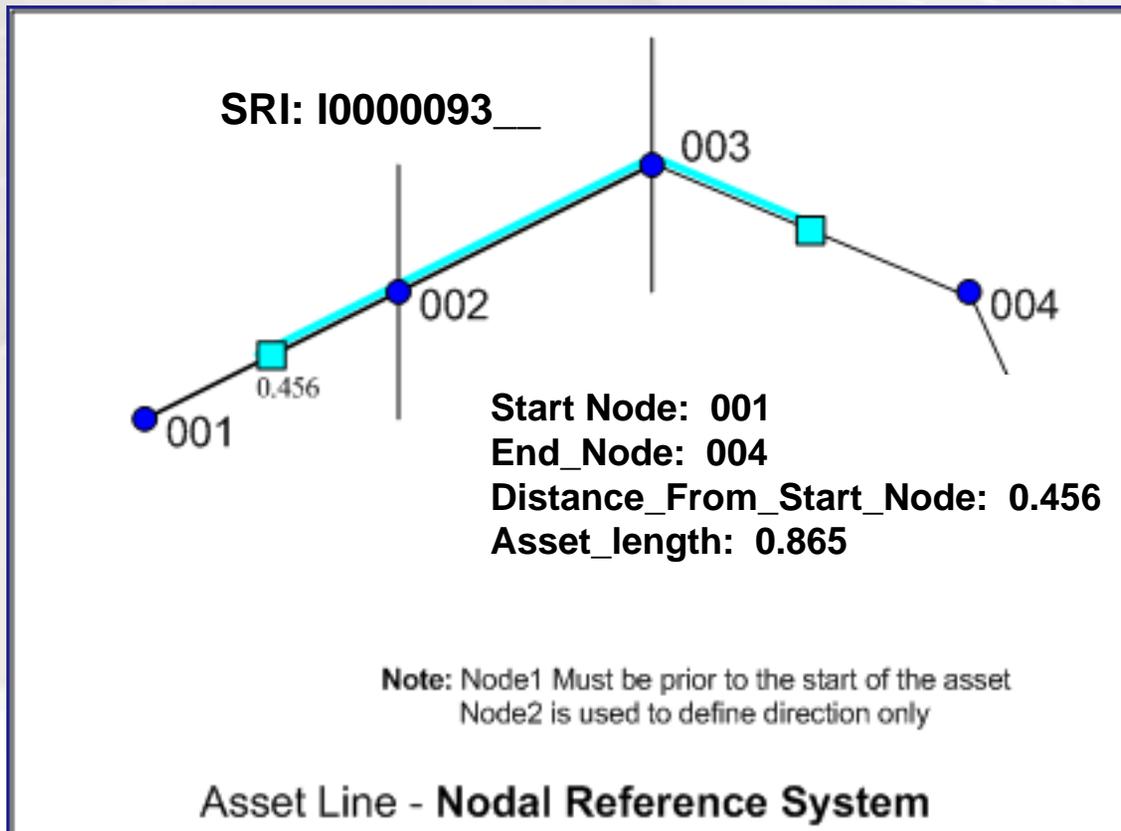
X,Y Coordinates



*GPS units
collect X,Y
coordinates*

Using the LRS to Locate Assets

Nodal Reference



Quick Recap

1. Started with Aerial Imagery as a base
2. Built a base-map with links & nodes
(Anchor Sections and Nodes)
3. Built a route system (SRI)
4. Built Linear Referencing System
(SRI-Mile Ref. – (X,Y) – Nodal Ref.)

GIS Transportation Assets

Transportation assets are located on the base-map using one of the 4 LRS.

State and Local Roads

- Road Inventory
 - Physical Attributes
 - Classifications
- Bridges
- Projects
- Safety – Crashes
- Maintenance Responsibilities

State Roads Only

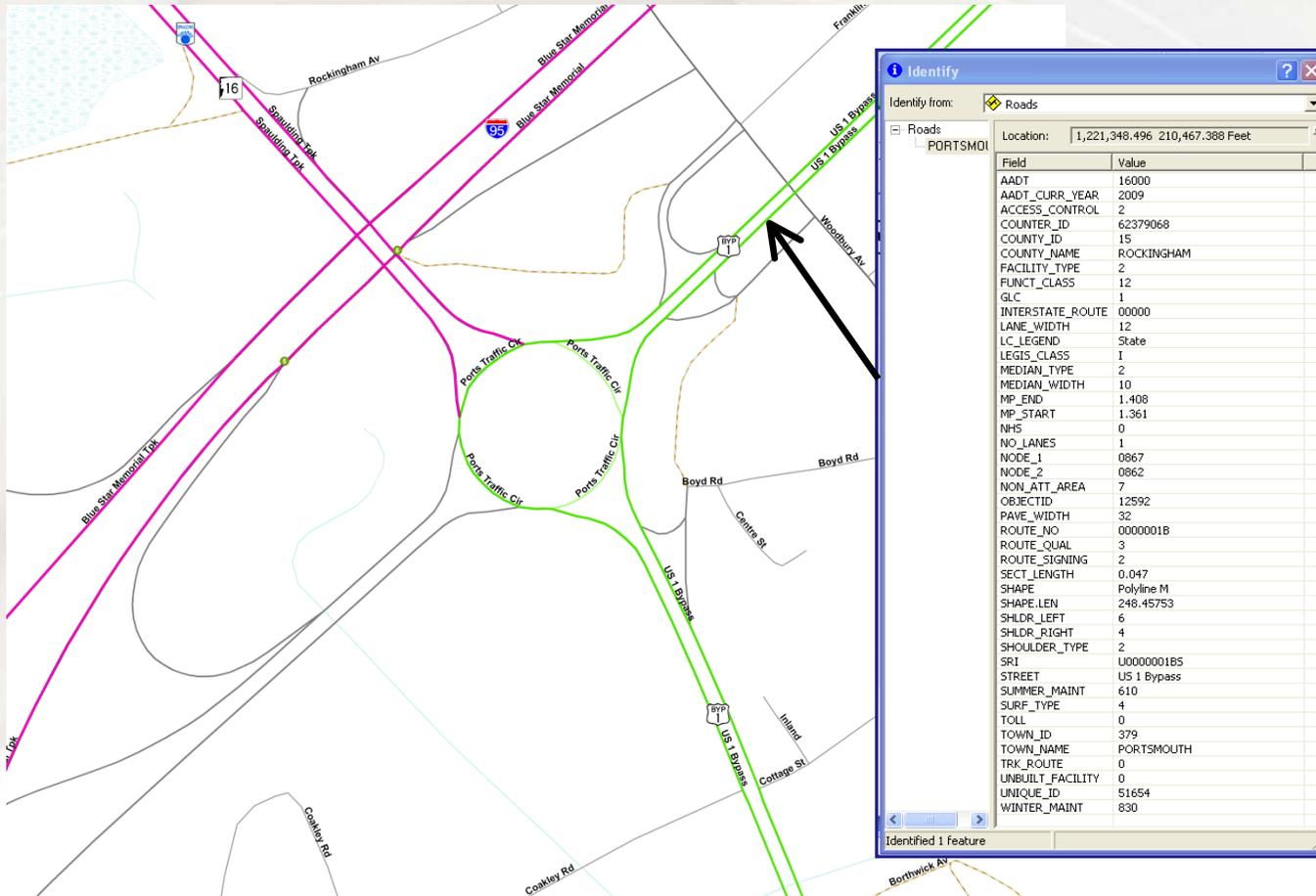
- Drive Permits
- AADT
- Route Markers and Exits
- Pavement Condition
- NHDOT Facilities

GIS Transportation Assets

Road Inventory

- **Approximately 40 Attributes**
 - **Physical Attributes**
Pavement Width, # of Lanes, Lane Width, Shoulders, Pavement Type,
 - **Classifications/Identifiers**
Street name, Legislative Class, Functional Class, NHS, Toll, Maintenance,

GIS Transportation Assets Road Inventory (By anchor sections)



GIS Transportation Assets Bridge

- **Approximately 35 Attributes**
 - Length, Deck Area, NBI Rating, Red list, Service On, Service Under, ...
- **Scouring** – Plan of Action (POA)

GIS Transportation Assets Bridges (By nodes)

New Hampshire
Department of Transportation
CHA
Nobis

New Hampshire
Department of Transportation
**Scour Critical Bridge
Plan of Action (POA) Report**
Dover 123/126

Scour POA Priority:
 Priority
 Countermeasure
 Priority Monitoring

Increased Inspection Frequency
 Fixed Monitoring Devices
 Conceptual Structural / Hydraulic Countermeasures

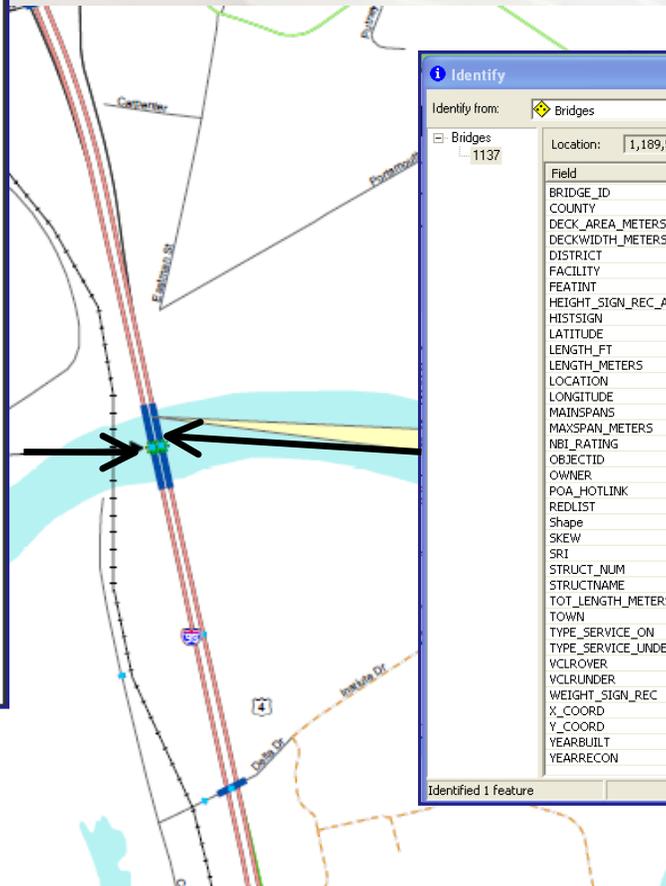
Flood Monitoring Program
 Post Flood Inspection Tasks

Final Recommended Action:
Based on the evidence of fluvial incision, assumed limited entrenchment, the unknown foundation and predicted scour of 8 ft at the pier, CHA recommends the installation of heavily grouted piles (HGP) at the pier. In addition, underwater inspections are recommended on a 2-year cycle and the bridge should be monitored during and after significant flood events until the countermeasures are installed.

Feature Crossed: Cocheco River
Feature Carried: Fourth Street
Owner: Municipality

The Following Materials Are Being Submitted With This Report:

- POA Report
- Attachment A: Photos
- Attachment B: Map Showing Detour Route(s)
- Attachment C: Field Verification Card (FVC)
- Attachment D: Bridge Elevation Summary Showing Existing Streambed, Foundation Depth(s) and Observed and/or Calculated Scour Depths
- Attachment E: Boring Logs and/or Other Subsurface Information
- Attachment F: Survey Cross Sections From Current and Previous Inspection Reports
- Attachment G: Supporting Documentation, Calculations, Estimates, and Conceptual Designs for Scour Countermeasures
- Attachment H: Plan View Showing Location of Scour Holes, Debris, etc.
- Attachment I: Post Flood Inspection Documentation
- Attachment J: Scour / HSH Backup Calculations
- Attachment K: NHDOT Underwater Inspection Report



Identify from: Bridges

Location: 1,189,533.660 256,072.991 Feet

Field Value

BRIDGE_ID	106/125
COUNTY	017
DECK_AREA_METERS	760
DECKWIDTH_METERS	12
DISTRICT	06
FACILITY	TOLEND ROAD
FEATINT	NH 16, SP TPK
HEIGHT_SIGN_REC_AW	-1
HISTSIGN	Possibly eligible
LATITUDE	43.200039
LENGTH_FT	207
LENGTH_METERS	63
LOCATION	1.4 MI FROM JCT. 16
LONGITUDE	-70.896899
MAINSPANS	4
MAXSPAN_METERS	14
NBI_RATING	Not Deficient
OBJECTID	1137
OWNER	Turnpike Bureau, NHDOT
POA_HOTLINK	<null>
REDLIST	Not on the Redlist
Shape	Point
SKEW	28
SRI	L1250064__
STRUCT_NUM	006501060012500
STRUCTNAME	<null>
TOT_LENGTH_METERS	63
TOWN	Dover
TYPE_SERVICE_ON	Highway and Pedestrian
TYPE_SERVICE_UNDER	Highway
VCLROVER	100
VCLRUNDER	6
WEIGHT_SIGN_REC	No Posting Required
X_COORD	1189504.315236
Y_COORD	256073.47005
YEARBUILT	1957
YEARRECON	2003

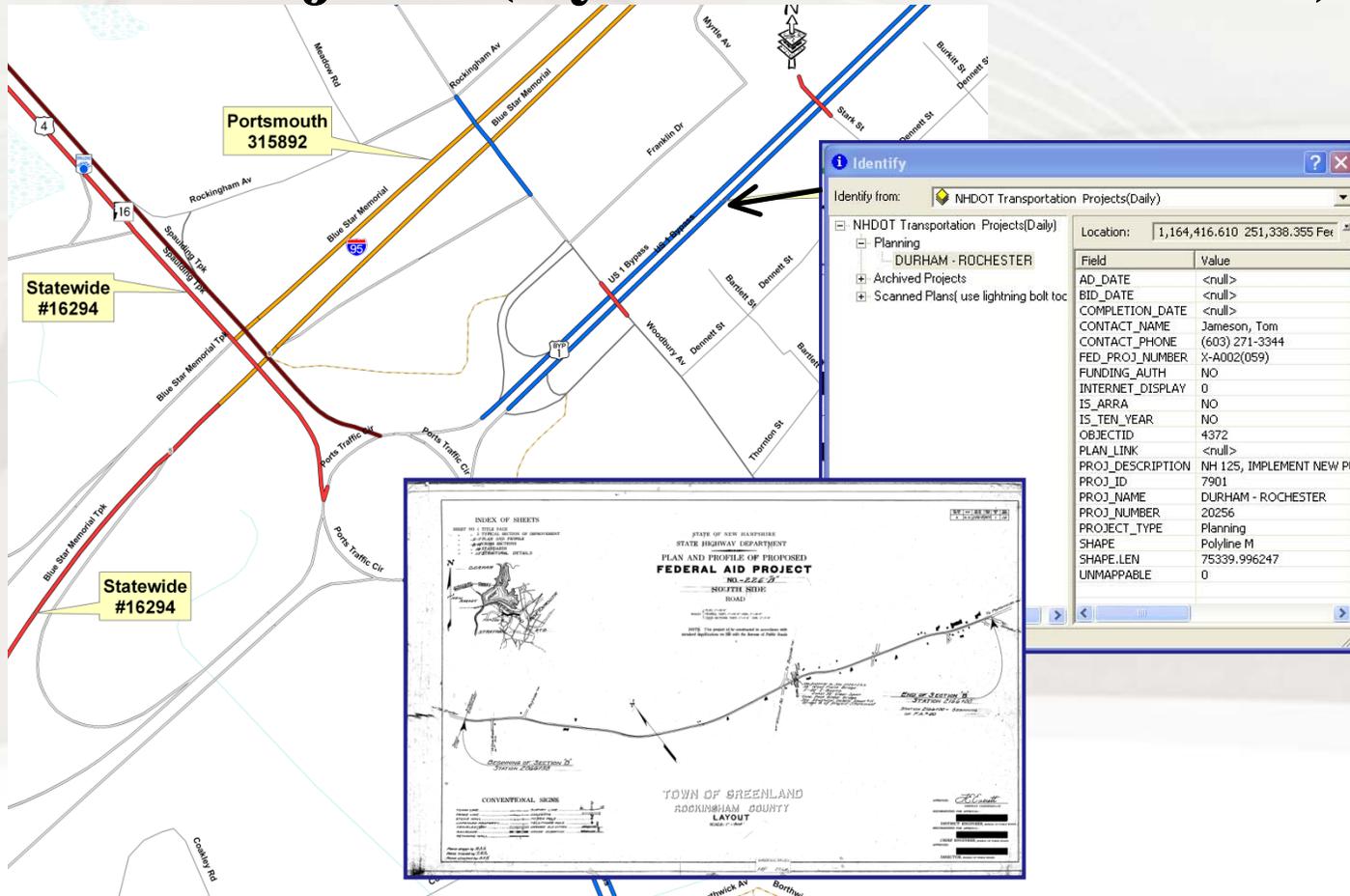
Identified 1 feature

Bridge Scouring Plan Action (POA)

GIS Transportation Assets Construction Projects

- **Types of Projects & Status**
 - Capital Improvement Plan (Ten Year Plan)
 - Planning
 - Design
 - Construction
 - Archive
- **Scanned Design Plans**
- **Attribute Data**
 - Description, Schedule Dates and Contact Info.

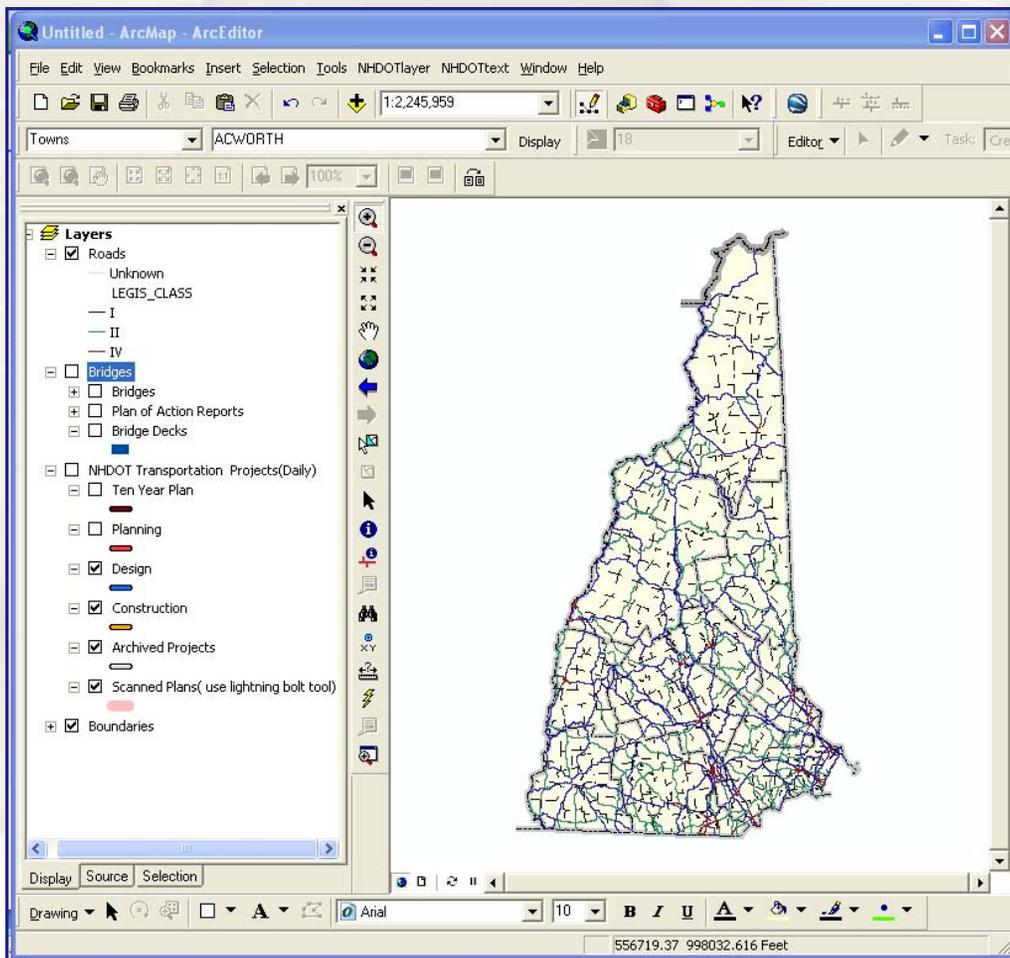
GIS Transportation Assets Projects (By Route and Distance)



GIS Tools

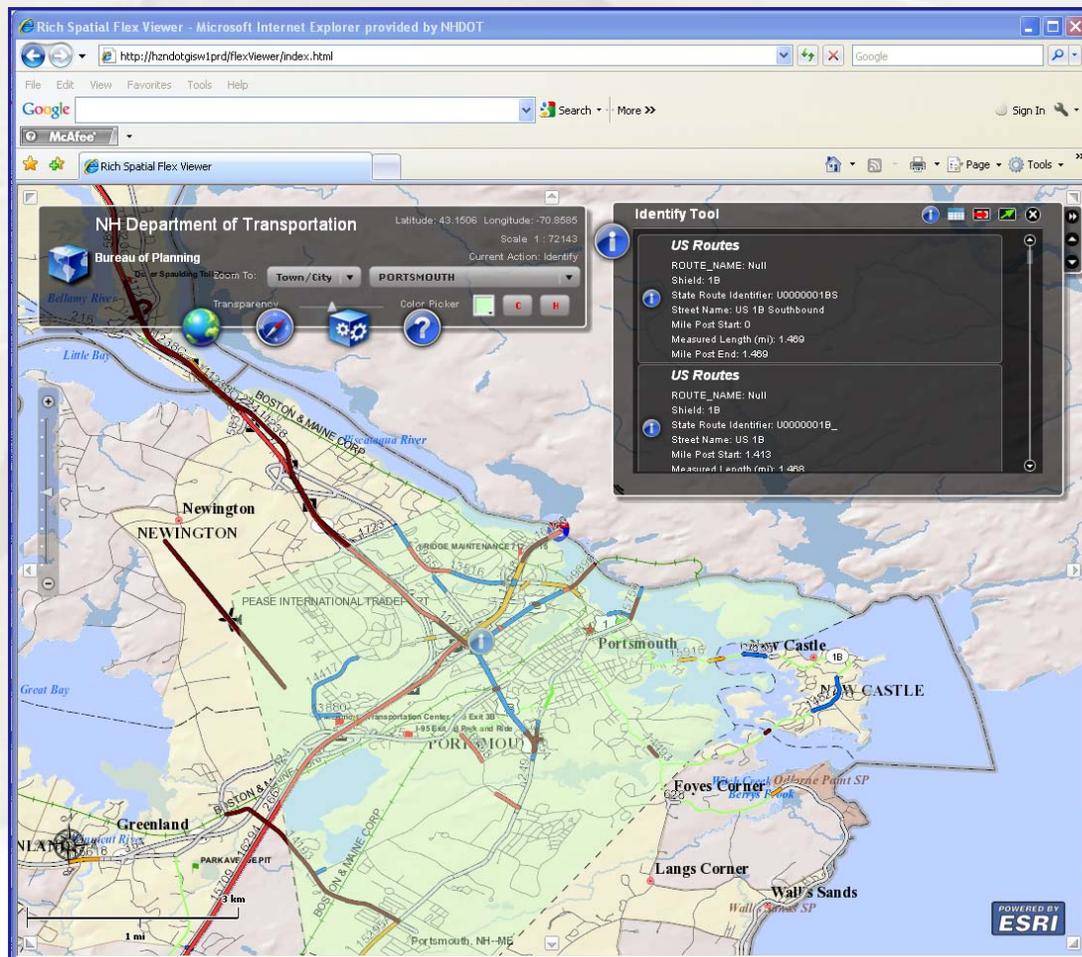
- **4 GIS Tools for Viewing GIS Data**
 - **ArcMap**
 - **Web Roadway Map**
 - **Web Project Viewer**
 - **Map data Catalog**

GIS Tools – ESRI ArcMap



*ESRI ArcMap
Version 9.3
moving to 10
this summer*

GIS Tools - Interactive Web map



*ESRI Arc Server
built in Flex
Builder*

GIS Tools – Project Viewer

New Hampshire DOT Project Viewer (Beta)

PROJECT	DESCRIPTION	CONTACT NAME	AD DATE	COMPLETI
PORTSMOUTH 13455	US 1 BYPASS, REPLACE BRIDGES OVER THE BYPASS: PE & ROW FOR BRIDGES 173/071.183/087, 188/097, 205/116, 211/114, AND 227/112 (Red List)	Vogt, Alex		
NEWINGTON - DOVER 112388	NH 16 / US 4 / SPLDG TPK, FEASIBILITY STUDY FOR INTERIM AND FULL BUILD IMPROVEMENTS FROM DOVER TOLL TO	Waszczuk, Chris		

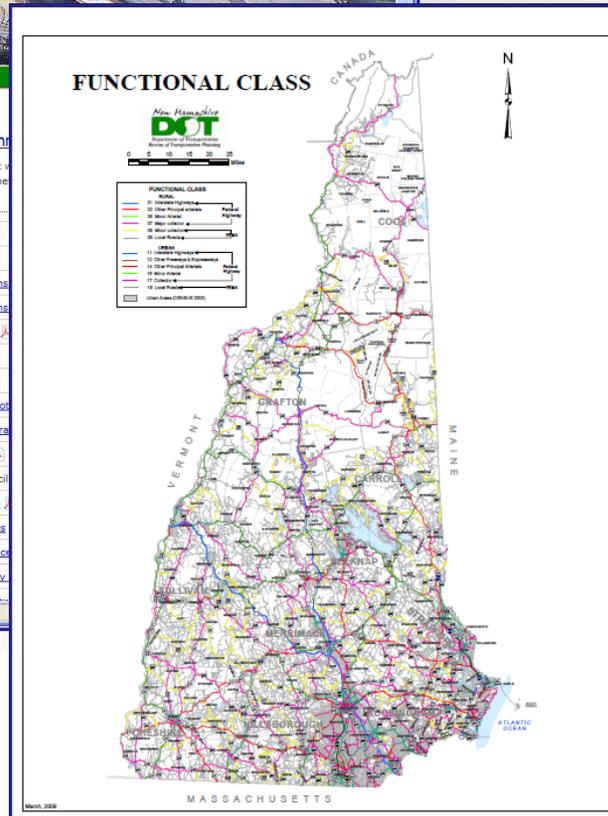
Projects in PORTSMOUTH

Map showing project locations in Portsmouth, Newington, and New Castle. Includes a scale bar (1 mi, 3 km) and a north arrow.

*ESRI Arc Server
built in Flex
Builder*

GIS Tools – Data Map Catalog

Map Title	Map Description
Bicycle Route	Bicycle Route
Bridge Conditions - Municipal	Bridge Conditions
Bridge Conditions - State	Bridge Conditions
Compact Areas	Compact Areas
Congestion	Congestion
County	County
Digital Ortho-Photos	Digital Ortho-Photos
Digital Raster Graphics	Digital Raster Graphics
DOT Facilities	DOT Facilities
Executive Council Districts	Executive Council
Functional Class	Functional Class
Highway Districts	Highway Districts
Mileage Reference	Mileage Reference
National Highway System	National Highway System
NHDOT Radio Towers and Data	NHDOT Radio Towers



Standard Published Maps (PDFs)

- *Highway Map*
- *Bridge*
- *Federal Aid Roads*
- *Mileage*
- *Pavement*
- *others..*

GIS Uses

Turning data into Information

- **Common Uses**
 - **Support business functions**
 - **Decision making**
 - **State and federal reporting**
 - **Presentations**

Common Uses Mileage Reporting

Common Mileage Reporting

- *System Miles*
- *Centerline Miles*
- *Lane Miles*
- *Plow Miles*
- *Salt Miles*

By Classifications

** Block Grant Aid Mileage**

GIS Transportation Asset Data & Mapping Section
Bureau of Planning and Community Assistance

Mileage Calculations and specification

Format	Description	Typical Use
System	Centerline of bi-directional highways, North Bound (NB) and East Bound (EB) highways.	Federal and State Legislative reporting
Barrel Miles	Centerline of bi-directional highways, and both barrels of divided highways.	Salt miles
Lane Miles	Barrel miles multiplied by number of lanes.	Traffic volume analysis and modeling
Equivalent Lane Miles	Barrel miles multiplied by paved surface width (travel way to travel way plus shoulder widths) divided by 12 feet.	Summer Maintenance
Plow Miles	Lane miles plus an additional lane mile for each shoulder greater than or equal to 3 feet.	Plow miles for snow removal

Maintenance Mile - Standard Calculation

Format	Description
Salt Lane Miles	Barrel miles multiplied by number of lanes, including ramps
Plow Miles	Lane miles plus an additional lane mile for each shoulder greater than or equal to 3 feet, including ramps
Maintenance Lane Miles Equivalent	Barrel miles multiplied by paved surface width (travel way to travel way plus shoulder widths) divided by 12 feet, including ramps.
Winter Lane Miles Equivalent (Winter maintenance only)	Barrel miles multiplied by paved surface width (travel way to travel way plus shoulder widths) divided by 12 feet, including ramps
Dirt Lane Miles	Unpaved Roads - 2 lane miles per centerline miles
Maintenance Lanes Miles	Barrel miles multiplied by number of lanes, including ramps.

Highway Classifications and Standard Reports (System, Centerline, & Barrel)

NH Highways (Turnpike, Interstate, Numbered Routes, Non-Numbered)
Legislative Class (Statewide, and By town)
Function Class (Statewide, and By town)
NHS
Truck Routes

NH GIS Highway mileage Calculations and Descriptions.doc

Common Uses Traffic Management Center (TMC)



TMC – Monitor Wall

511 NH

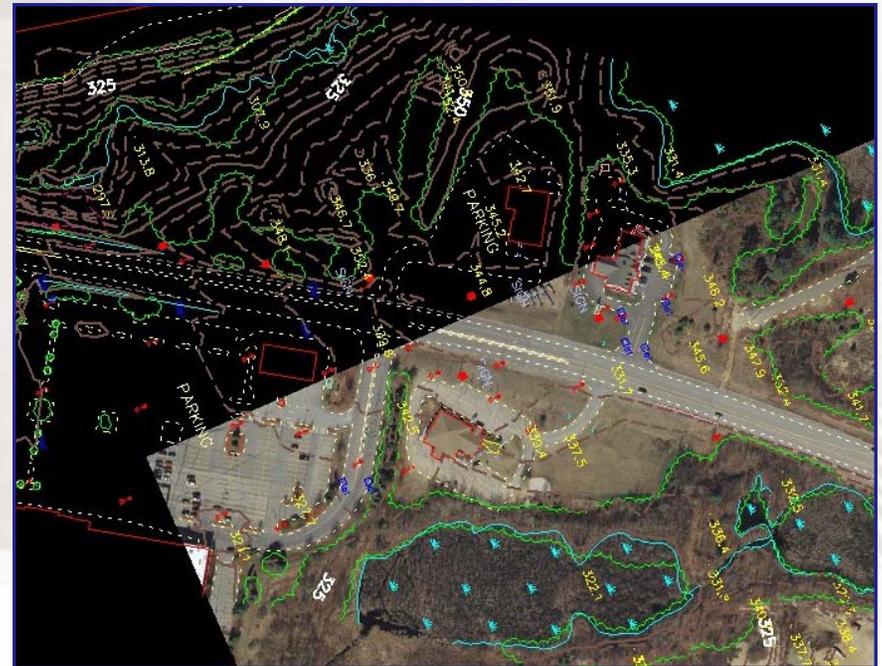


Common Uses Project Development Support



Design Project Overlay

Planimetric Data



Common Uses Federal Reporting

Strategic Highway Safety Plan

State Certified Mileage

New Hampshire
Strategic Highway Safety Plan
2008 Report Update
October 29, 2008
(Revised December 1, 2008)



A Collaborative Effort to Reduce Crashes
On New Hampshire Highways

1

Federal Road Inventory

New Hampshire DOT
Department of Transportation
GEORGE N. CAMPBELL, JR.
COMMISSIONER

THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

JEFF BRILLHART, P.E.
ASSISTANT COMMISSIONER

June 1, 2010

Kathleen O'Leary
Administrator
Federal Highway Administration
Benell Drive, Suite 1
Concord, NH 03301

Ms. Laffey:

As of June 1, 2010, in the State of New Hampshire there were 16,044 miles of public roads as defined in 23 USC, Section 402. c. "Public road" means any road under the jurisdiction of and maintained by a public authority and open to public travel. New Hampshire's mileage includes couleets and excludes ramps that connect highways.

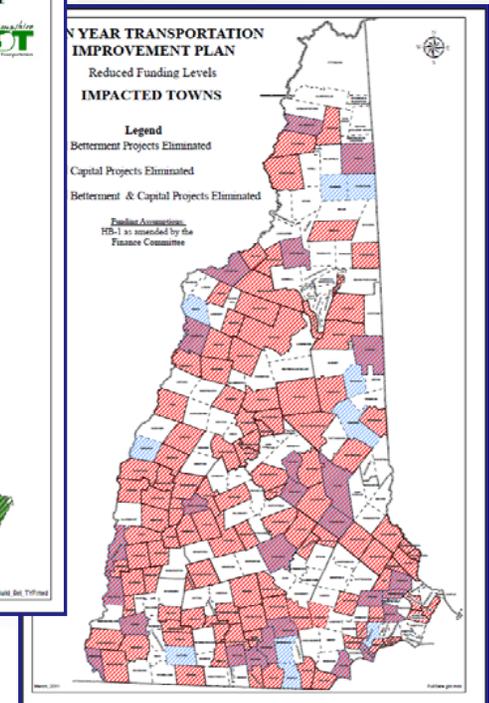
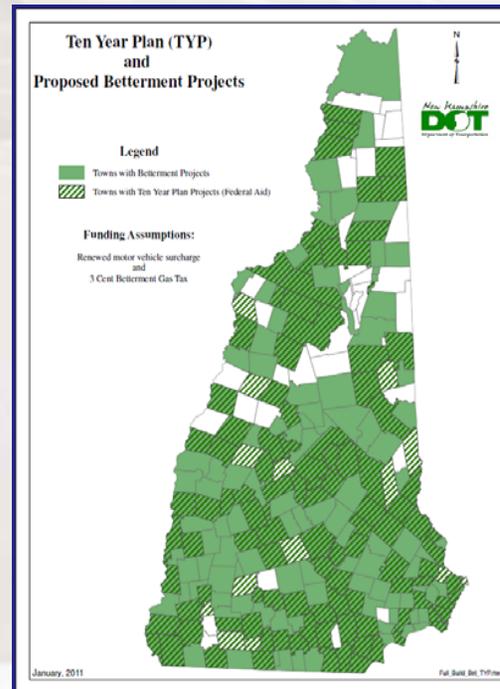
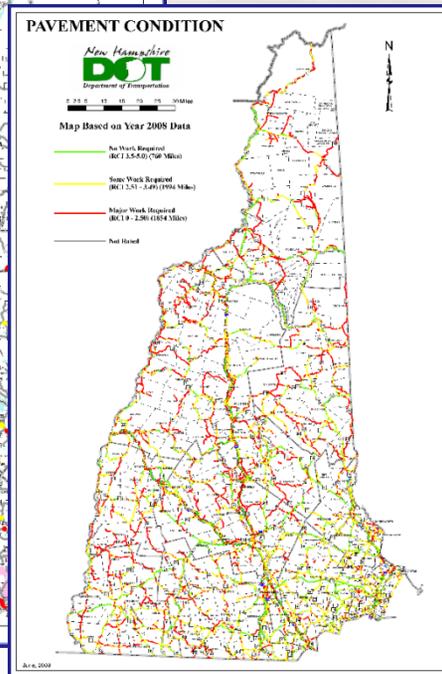
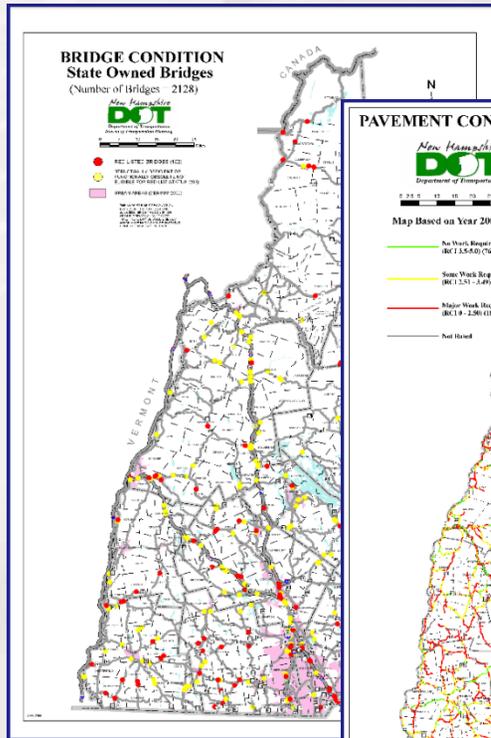
Sincerely,

George N. Campbell, Jr.
Commissioner

David J. Brillhart
William J. Cass
William E. Watson, Jr.
Steve P. DuBois

JOHN D. MORTON BUILDING • 1 HAZEN DRIVE • P.O. BOX 483 • CONCORD, NEW HAMPSHIRE, 03303-0483
TELEPHONE: 603-271-3734 • FAX: 603-271-2914 • TDD ACCESS: RELAYNH 1-800-735-2864 • INTERNET: WWW.NHDOT.NH

Common Uses Budget Planning Support



Questions?

Contact Information

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NH Department of Transportation
7 Hazen Drive
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Email: gdavison@dot.state.nh.us

Steve Homer
NH Department of Transportation
7 Hazen Drive
Concord, NH 03301
Phone: 603-271-6582
Email: shomer@dot.state.nh.us

Visit GRANIT at <http://www.granit.unh.edu>
(New Hampshire GIS Clearing house)

Questions to Audience?

- 1) Do you think our base-map or asset data would help your planning needs?
- 2) If our web tools were available through the internet, would they help your planning needs?
- 3) If we were to expand our transportation asset data or enhance our GIS tools, what suggestions do you have?