GIS and Changes to the Local Highway Inventory
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In 2013, the New York State Department of Transportation (NYSDOT) initiated the Statewide GIS Public Roads Project - a multi-year effort to map New York’s entire 115,000 mile public road system in GIS.* The process for this project involves ensuring that all Local Highway Inventory (LHI) records have accurate lengths that match measurements from aerial photography and GIS mapping.

*Note: A geographic information system (GIS) is a computer application and tool designed to capture, store, analyze, manage, and present all types of spatial or geographical data.
GIS and Changes to the Local Highway Inventory

Topics covered in this presentation:

- **Background**
  - Local Highway Inventory
  - CHIPS

- **GIS project**
  - FHWA & purpose
  - Sources
  - Process
  - Edits
  - Follow-up
  - Tools

- **Issues**
  - Open to Public Roads
  - Roads by Use
  - Elevation changes

- **Details**
  - Measures
    - Centerline to centerline
    - Dead ends & cul de sacs
  - Public vs. Private Use
  - Resolutions
Local Highway Inventory

Listing maintained by NYSDOT of the roads & streets under the responsibility of the towns, cities, villages, and counties of New York State

Used as input to CHIPS* distribution formulas

* Consolidated Local Street and Highway Improvement Program

Note: Changes resulting from the GIS Project will be entered into the Local Highway Inventory but will not be incorporated into the CHIPS distribution formulas until the project is completed statewide.
## Sample Local Highway Inventory (LHI) listing:

**Municipality:** Village of Dering Harbor  
**County:** Suffolk  
**NYSDOT Region:** 10  
**Geocode:** 1130

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**Centerline Miles Total:** 3.21  
**Lane-Miles Total:** 5.64

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Annual LHI update will continue to be distributed

- annual update is still required to capture newer road changes.
Distribution formula
- total dollars is not driven by the mileage
- accurate mileage measures ensures more equitable distribution of CHIPS funds

Inputs
- Centerline mileage of roadways maintained
- Lane-mileage of roadways maintained
- Motor vehicle registrations
- Total amount of funding made available
Project driven by Federal Highway Administration requirement. Linear referencing, or LRS, equates to developing a GIS network.
Purposes

Users/uses of GIS networks:

**Federal**
- Federal Highway Aid
- Census Bureau
- Dept of Interior (Nat Pks, Land Mgmnt)
- Truck routing / freight management

**State**
- Funding allocations & distribution
- Transportation planning
- Highway safety engineering analyses
- Truck routing / freight management

**Local**
- Emergency services / 911
FHWA accuracy requirement is rigid
Lengths that were “good enough” in the past no longer acceptable
Need for consistent, verifiable, and accurate means of measurement
Past problems must be “cleaned up” – duplicates, overlapping, rounding, boundary roads, “private”, missing, inconsistency
Sources

Statewide “Streets”* from GIS Program Office
- System used for E-911, address ranges
- Often used in county tax mapping

Local Highway Inventory

Aerial photography and Geographic Information System (GIS) for editing

*“Streets” is electronic/GIS mapping at a less analytical level produced by the GIS Program Office, another State agency.
Process

Match appropriate arcs from “Streets” to roads from Local Highway Inventory (LHI)

“Build” GIS route (creates mapping against which data attributes can be dynamically attached and analyzed)

Use aerial photography to measure road lengths

Edit GIS Street and/or LHI record to match measured length
Additional items reviewed during the project:

Name - try to match common names, particularly those which can be seen on road signs such as on Google Street View

From/To descriptions – preferably reflect visible features primarily using cross streets

Posted Speed Limits – may cite area wide limit noting where there are exceptions; ignore time-limited school speeds

Length changes – aerial photography used to validate
Follow-up

Note major length changes versus LHI

Note roads that could not be found

Note roads found (exist in photos) but not in LHI

Meetings with county & local governments

- 22 outreach meetings since May 2015
- NYS Assn of Town Hwy Superintendents, Sept 2015
- Tug Hill Annual Conference March 2016
- Misc. other meetings & workshops since 2014
Tools

County highway & other published maps

Commercial Internet-based mapping tools
- Google Earth, Maps, and Street View
- Bing Maps, Birds Eye View, Streetside

NYS aerial photography

Online county tax mapping

NYS planimetric quadrangle mapping
Issues & Details

“Public” roadways
Roads by use
Elevation changes
Measurements
Public versus private
Resolutions
Public Road

Federal Highway Administration
Highway Performance Monitoring System

… any road or street owned and maintained by a public authority … open to public travel … available, except during scheduled periods, extreme weather or emergency conditions, passable by four-wheel standard passenger cars, and open to the general public for use without restrictive gates, prohibitive signs …
Town Roads

Most public roadways are Town roads most of which are loosely defined “roads by use, also known as “highways by use”.

Typically acquired with defined boundaries and unambiguous rights of ownership:
- Purchase of lands
- Eminent domain
- Dedication

Highways by Use – “continuous use and public maintenance for a period of 10 years”
- Section 189 of NYS Highway Law*


Cornell Local Roads Program, New York LTAP Center
Typically acquired with defined boundaries and unambiguous rights of ownership:
- Purchase of lands
- Eminent domain
- Dedication

Streets by Prescription – “…used by the public as a street for ten years or more continuously…”
- NYS Village Law, Article 6, Section 626
- In New York State, elevation changes have virtually no impact on road length at the precision level of 0.01 miles (52.8 feet) as used in the Local Highway Inventory.
- NYSDOT Profiler vehicle with a calibrated Distance Measuring Instrument (0.001 mile accuracy) showed no measurable difference compared to GIS / aerial photography for:
  - NY 23A in Greene County in the Catskill Mountains
  - NY 73 near Lake Placid in the Adirondacks
  - Kelly Station Road (a local road near Schenectady)
  - NY 431 Whiteface Mountain (averages 8% grade)
Engineering drawings show an exaggerated height to illustrate details.

True scale drawing better illustrates minimal length impact of vertical curves.
One mile at a continuous 10% climb yields a total length change of “zero” when using a precision level of 0.01 miles.

- actual “increase” in length is 0.0049 miles, 
  less than 5 one thousandths of a mile.
For this project measurements are centerline to centerline, not curb to curb.

Ellsworth Jones Place
From Maple Ave to Broadway
-0.05 curb to curb
-0.06 cl to cl
Measure to the end of dead ends

“Bulb” at the end of a non-loop cul de sac is not part of measured length
Measurements

Around the loop where center median

-0.03

+0.04
Measurements

Have now established standards for fully paved centers
Boundary roads

Most roads along village or town boundaries are “split” down the center. For this project and in the Local Highway Inventory they are split halfway along the length of the road unless otherwise defined by the involved agencies.

Preferably split at a cross street or other landmark
“Private” roads

- Public-owned does not equal “public road”.
- Roads typically not “open to the public”*:
  - park roads
  - cemetery roads
  - driveways such as at
    - town offices
    - town garages
    - landfills/brush landfills
    - transfer stations

*without restriction
“Private” roads

Maintained by municipality for utility access, but not a “public road” due to restricted access as noted by signs.

This is a common situation on waterfront properties.
“Private” roads

County tax maps as an indicator of public versus private
“Private” roads

Green clearly shown as within a public R.O.W.
“Private” roads

Yellow clearly shown as within private property
“Private” roads

Tax maps may not always be “accurate” with respect to R.O.W. [it’s not their primary purpose]

But we often only have tax maps as “official” documentation

Can “correct” with a resolution from the appropriate governing body (town board, village board, city council)
Resolutions

Required to:
- accept new roads
- add old roads not in inventory
- as acknowledgement that roads that appear to be private are actually public
- to accept more than minor length changes

Roads must exist and currently be open to the public (except for limited construction periods)
Resolutions

Must include local governing body (town or village board) acceptance of all legal and maintenance & repair responsibility for the road

Must include an indication that the resolution has been voted upon and passed

Must mention each road specifically (may do so in an attachment)
Resolutions

May issue a new resolution for an old road
- Original resolutions when the roads were first accepted are not necessary

May use a “blanket” resolution if there is more than one road being added, although all roads must be listed
Resolutions

Even “obvious” roads need a resolution.

- Is it finished?
- Is it approved?
- Is there a dispute?
Recently completed Manual available on web page:

www.dot.ny.gov/highway-data-services
Highway Data Services Bureau
New York State Department of Transportation

50 WOLF ROAD, 4-2, ALBANY, NY 12232
(518) 457-1965

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