

Cornell University
Cornell Local Roads Program
New York LTAP Center

Should We Post Weight Limits?

David P. Orr, PE
Cornell Local Roads Program

No!

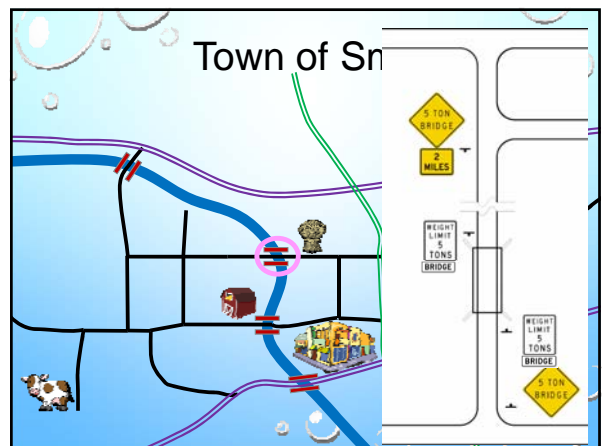
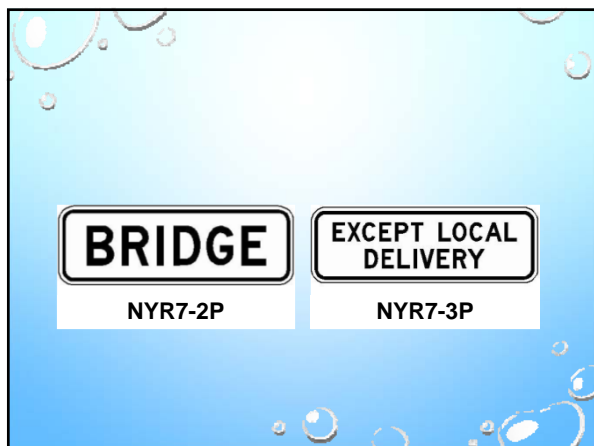
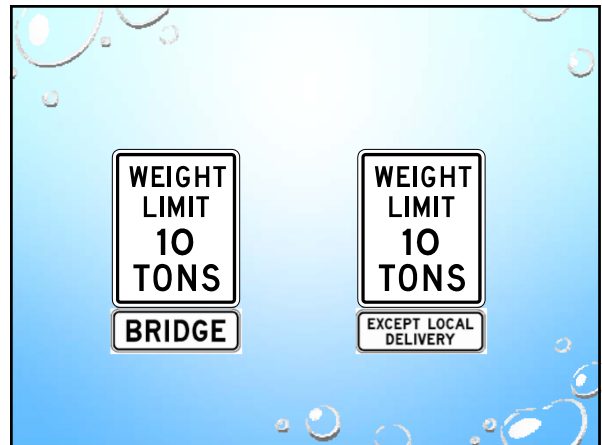
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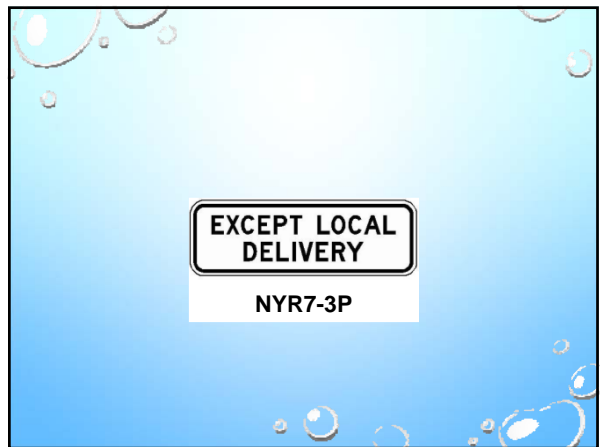
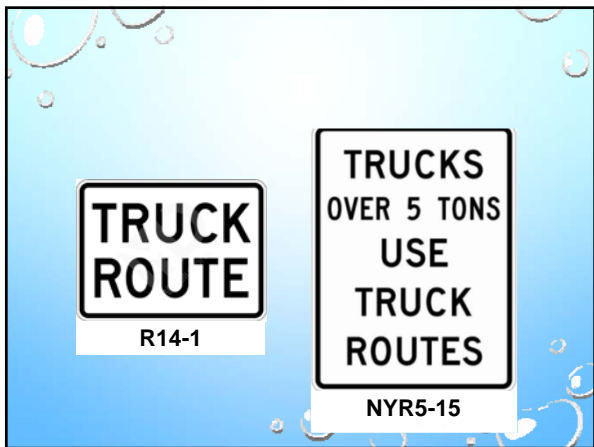
When Should We Post Weight Limits?

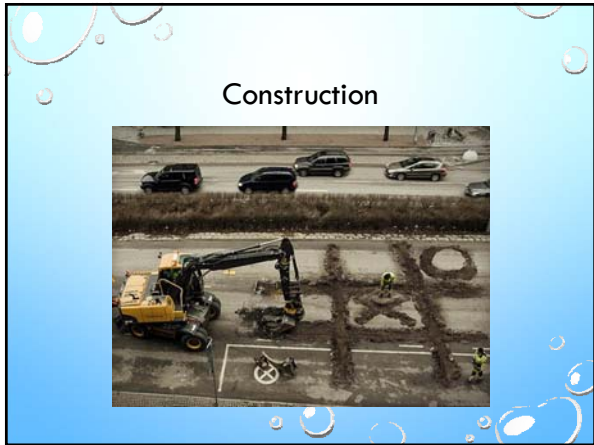
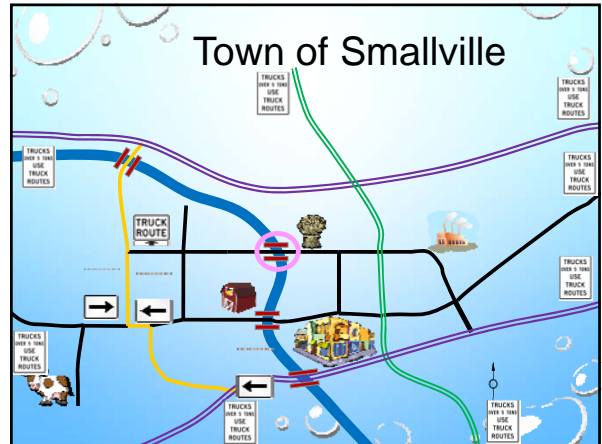


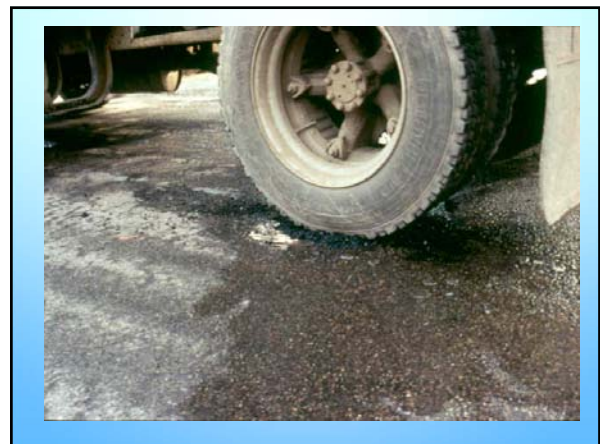
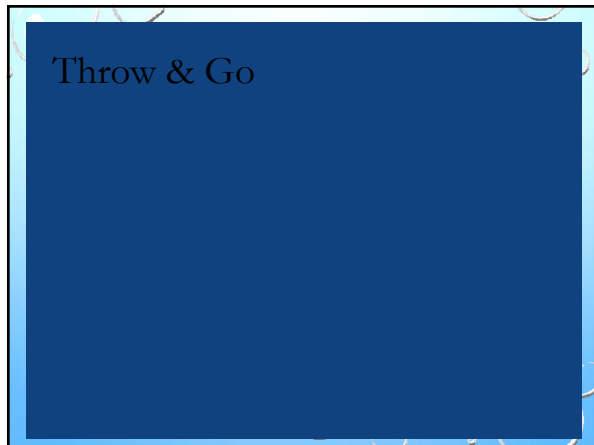
- ### When to Post Weight Limits?
- Seasonal
 - Construction
 - Truck Routes
 - Bridges









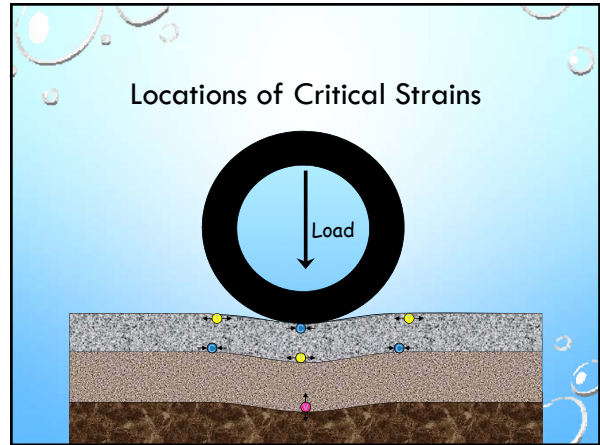




Costs of Deep Repairs

- Full Depth Reclamation: \$150-250 K
- Total Reconstruction: \$500-900 K

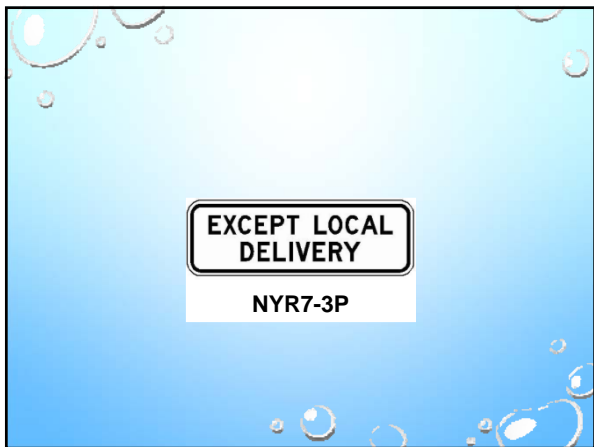
LVR Pavement Design



- 4- 5,000 cars
- Damage is equivalent to:
1 fully loaded truck @
60,000 lbs.

Weather and Loads: The Effect They Have on Roads

○ How Strong are Your Pavements?

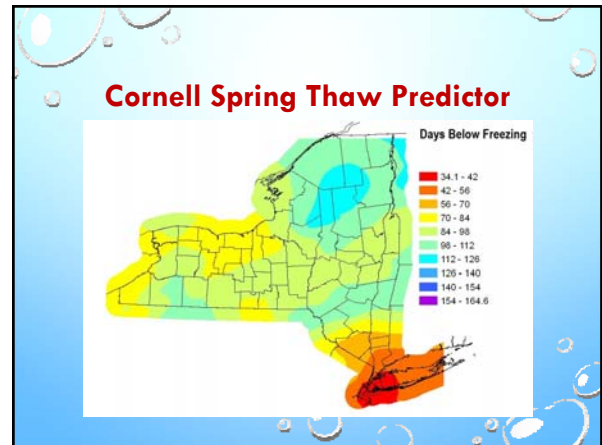




When Should We Post Weight Limits?

Seasonal Posting

- Fixed Dates
- Weather Data Only
- Pavement Frost Model



Enhanced Cornell Pavement Frost Model (CPFM)

Timing of Spring-Thaw Load Restriction Periods on Low-Volume Pavements in New York State

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Objectives:

- Develop User Friendly Spring Load Restriction (SLR) tool
- Improve Spring-Thaw Period Prediction
- Help improve future pavement designs

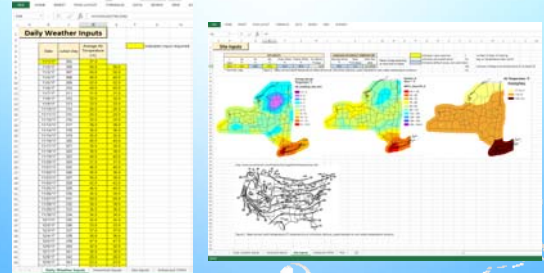
User inputs

- Historic and ten-day forecast
- Daily air temperatures
- Materials used in pavement layers
- Thickness of each pavement layer

Advantages

- Accounts for soils properties & behavior
- Inputs are easily to obtain or determine
- Improves seasonal timing
- Reduces pavement damage

Let's go to the Spreadsheet



Pavement Inputs:

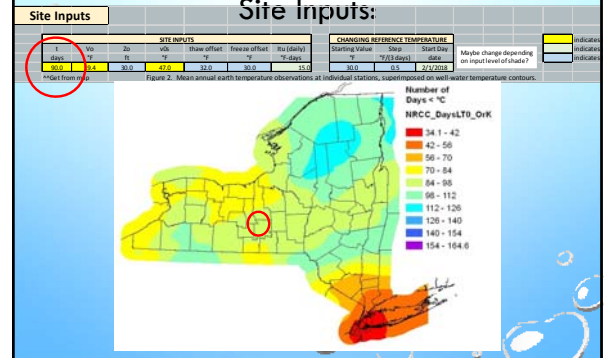
Pavement Inputs

Legend:
 Yellow: indicates input required
 White: indicates calculated value
 Blue: indicates default value, can override

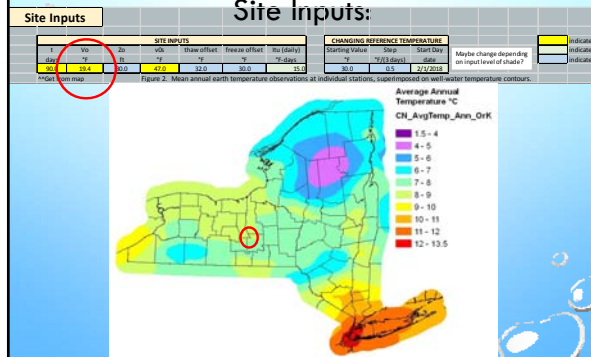
Properties:
 k: Thermal Conductivity
 c: Heat Capacity
 L: Latent heat

LAYER THICKNESSES				THERMAL PROPERTIES				MOISTURE CONTENT AND LATENT HEATS			
Layer #	Layer type	Thickness (in)	Thickness (ft)	k (BTU/(ft·day·°F))	c (BTU/(ft³·°F))	L (BTU/ft³)	Density (lb/ft³)	Drainage Quality	Moisture Cont. during thaw (%)	L, frozen (BTU/ft³)	unfrozen (BTU/ft³)
1	Asphalt concrete (uncracked)	4.00	0.33	55.46	26.90	0.00	130.9	Poor	0%	1000.0	1000.0
2	Crushed gravel base (clean)	12.00	1.00	45.79	37.30	0.00	1610.30		40%	3412.9	6825.8
3	Lime stabilized subgrade	340.00	28.33	40.24	41.00	0.00	2683.90		40%	3412.9	6825.8
4		0.00	0.00	0.0	0.0	0.0	0.0		30%	0.0	0.0

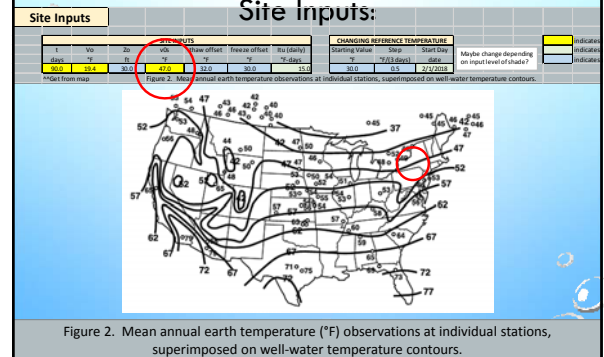
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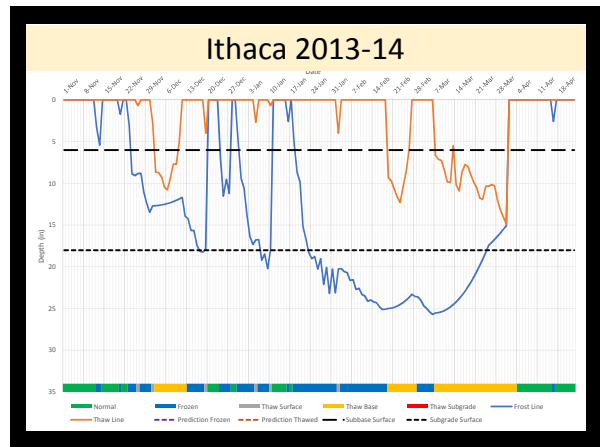
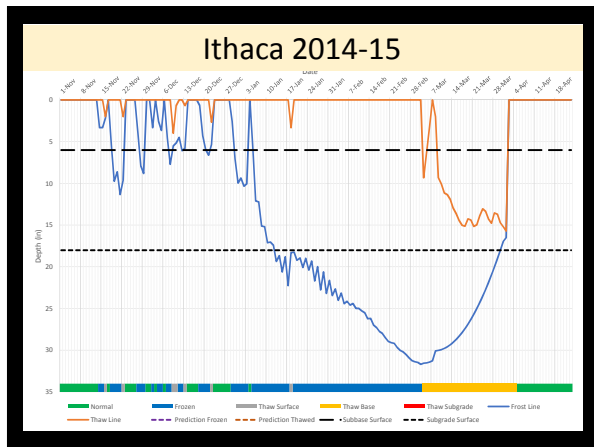
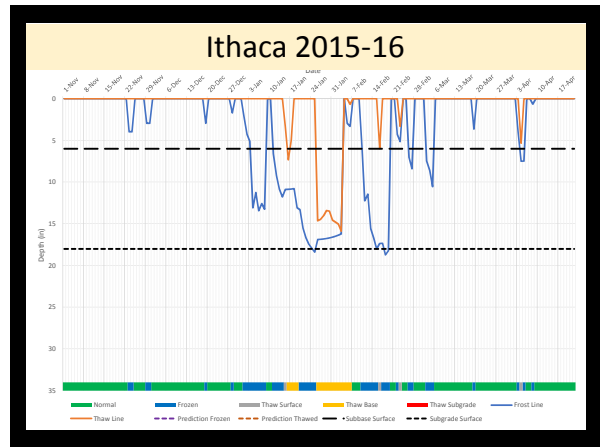
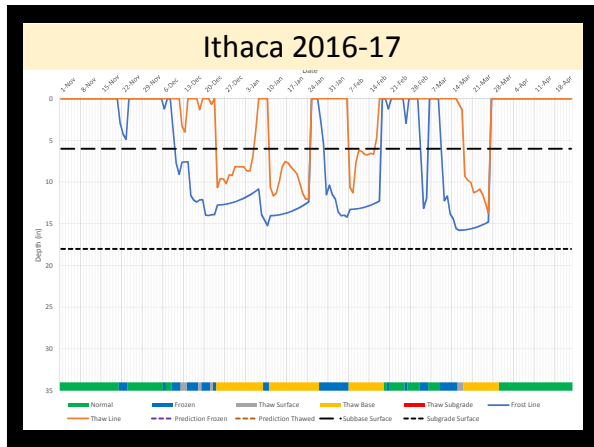
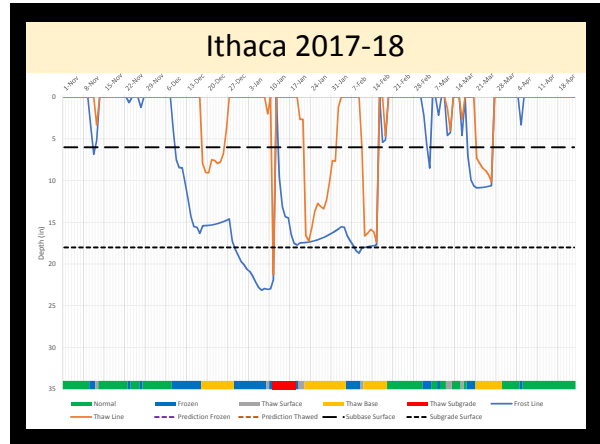
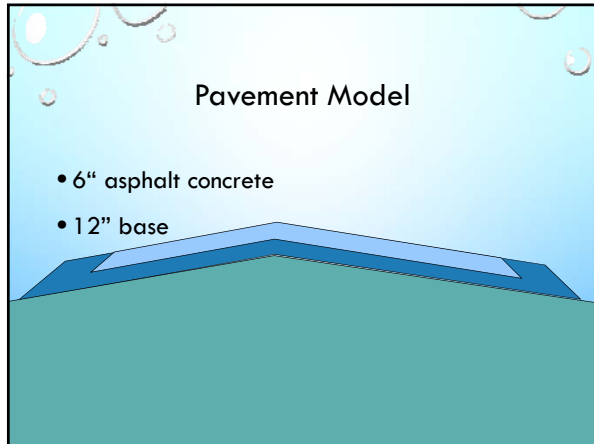


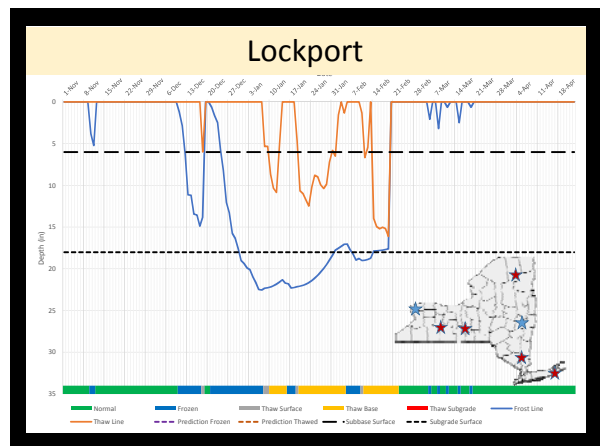
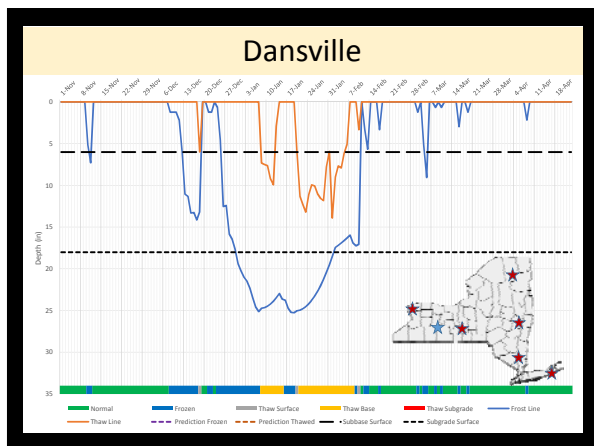
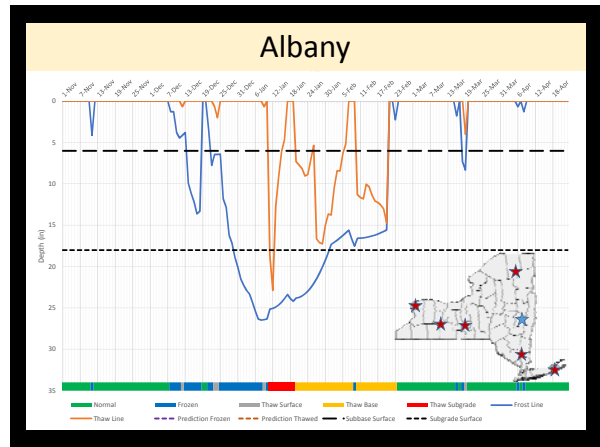
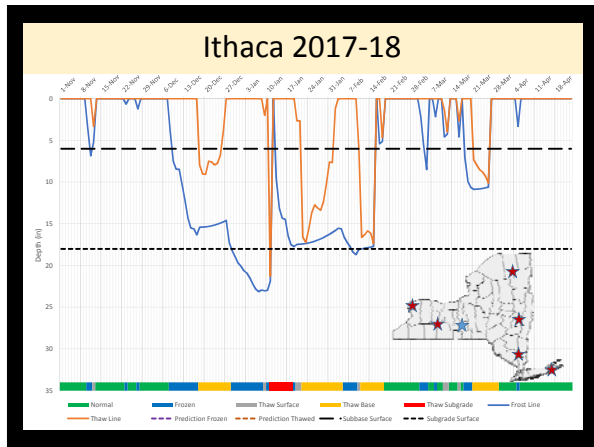
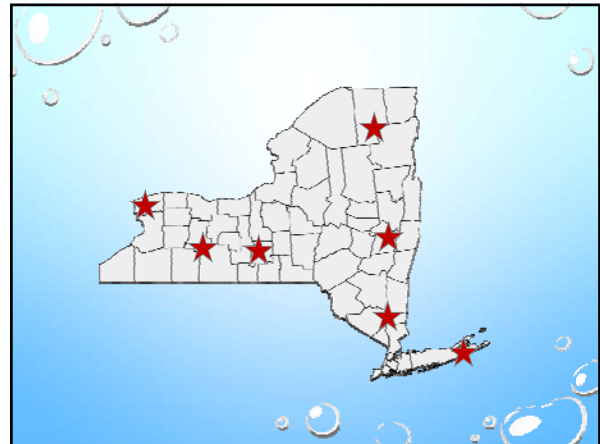
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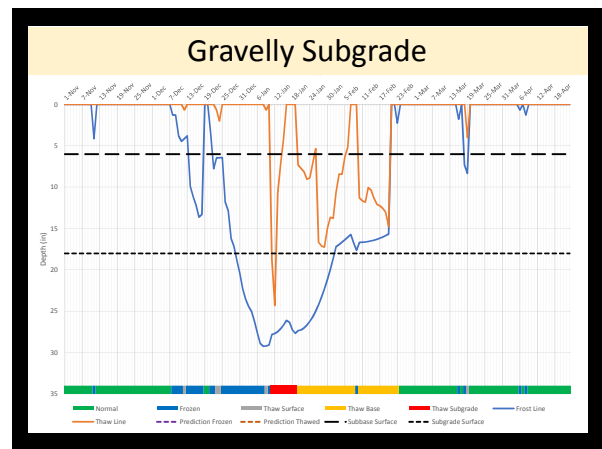
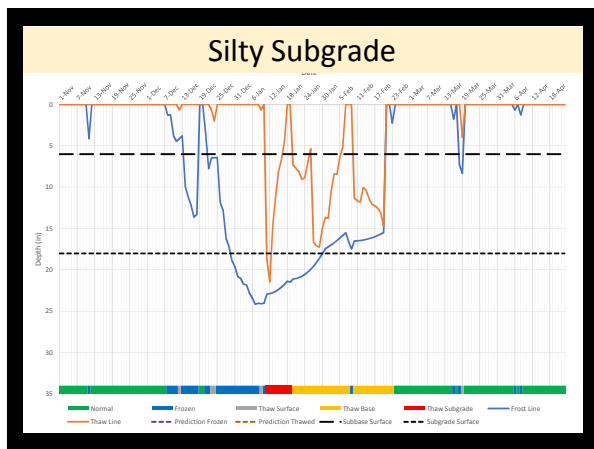
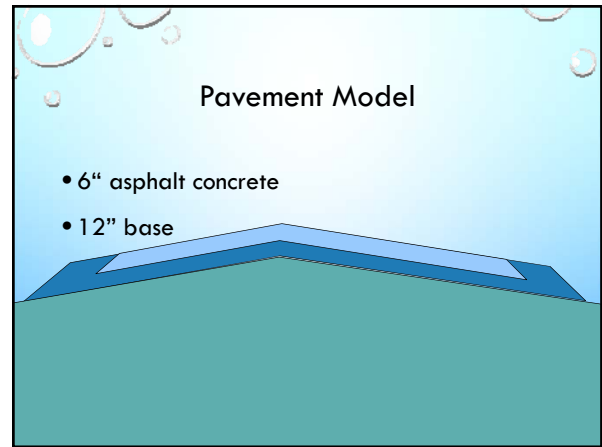
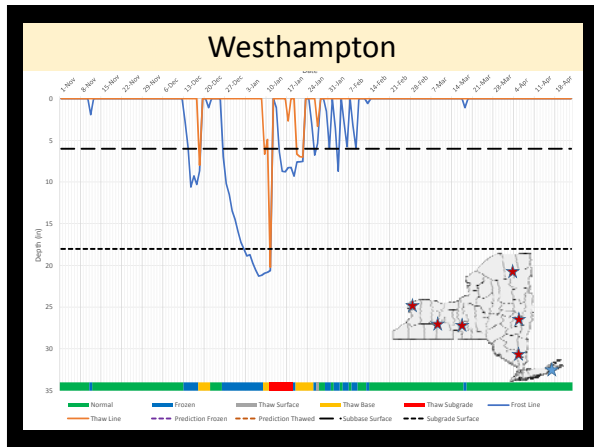
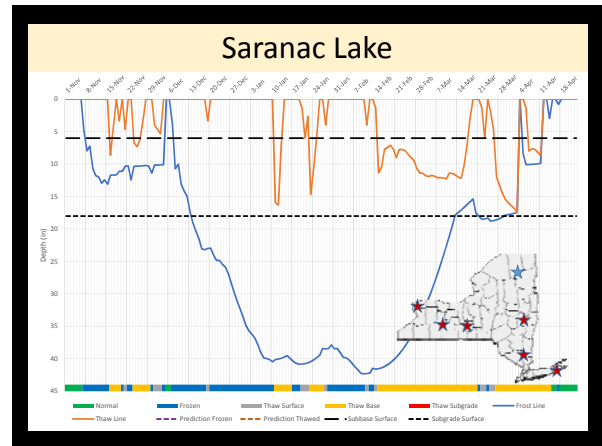
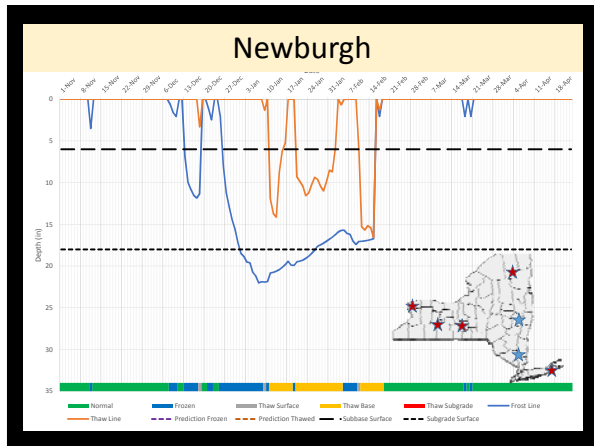


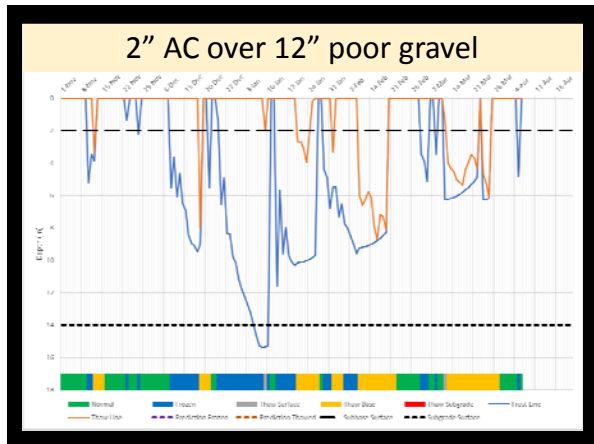
Site Inputs:





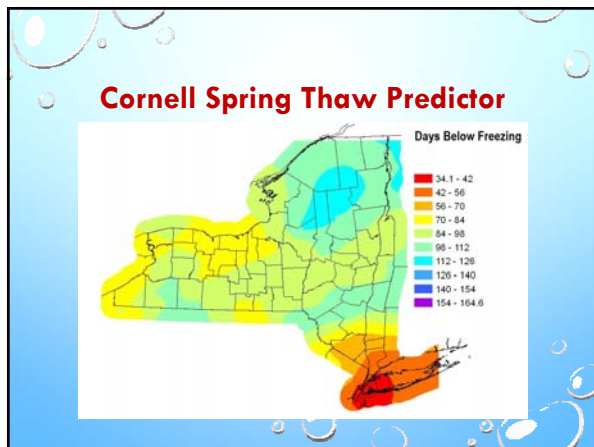






Ithaca Thaw 2017-2018

- Silty Jan. 10 – Feb. 22 (8 weeks)
- Gravel Jan. 10 – Feb. 22 (8 weeks)
- Thin Pavement Jan. 20 – Feb. 21 (4 weeks)
Mar 10 – Apr. 1 (2½ weeks)



When to Post Weight Limits?

- Seasonal
- Construction
- Truck Routes
- Bridges

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PDH Question #1:

How many cars does it take to equal the damage of a single pass of a fully loaded snow plow?

5,000 – 7,000

PDH Question #2:

Truck routes shall provide suitable connection with all state routes entering or leaving such town or village.

True

False

PDH Question #3:

- When is the pavement the weakest?

Spring Thaw



PDH Question #4:

What is not an advantage of the Cornell Spring Thaw Predictor?

1. Accounts for soils properties & behavior
2. Inputs are easily to obtain or determine
3. Improves seasonal timing
4. Improves survivability of patches
5. Reduces pavement damage

PDH Question #5:

Frost and thaw depths are influenced by all the following except?

1. Pavement structure
2. Quality of materials and drainage
3. Location within state (climate)
4. Owner of the highway
5. Changes from year to year (temporal)

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If You Do What You've
Always Done,
You Will Get What You've
Always Got



Thank You

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