
Dave Bergner, M.A., PWLF
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The Impact of Economic, Technological and Environmental Changes on Winter Maintenance Operations Plans and Policies

Learning Objectives:

• Recognize the major factors that significantly influence winter maintenance operations.
• Determine the potential impact of each.
• Develop a plan for addressing these challenges.
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Over 70% of U.S. roads and 70% of population are in the region with 5” or more of annual snow and ice.

Source: FHWA Road Weather Management Program website

Note: Over 65% of roads are maintained by local jurisdictions.
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Effects

- Expectations by public remain high.
- 70% of goods move by truck; delays cost in billions annually.
- Crashes (injuries, fatalities, property damage).
- Hinders emergency services and utilities.
- Disruption of normal life for millions.
Winter road maintenance accounts for:

• 20 percent of state DOT maintenance budgets.
• State and local agencies spend over $2.3B annually on this.
• Millions of dollars spent annually to repair infrastructure damaged by snow and ice.

ref: FHWA Road Weather Management Program, Snow and Ice
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Factors that affect agencies’ winter maintenance operations:

- Climate
- Regulatory Mandates
- Economic conditions
- Workforce
- Technology

Changes create a “New Normal” that agencies must anticipate, assess, adjust, adapt to and act upon.
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Economic

• Maintenance Operations chronically underfunded.
• Great Recession 2007-2013 worsened the situation:
  • much maintenance deferred
  • severe reductions in staffing
  • cut-backs in operating funds
• Uncertainty as to strength of national economy.
• Intra-agency competition for limited funds.
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Workforce Demographics

- Wave of “baby boomer” retirements; loss of knowledge.
- Many younger workers not interested in these jobs.
- Competition from other sectors.
- More stringent screening reduces field of candidates.
- Difficulty achieving diversity.
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Technological

• Improved materials and application knowledge.
• Vehicles and equipment
  • Spreader bodies, applicators and controllers
  • Plow configurations and blade compositions
• Weather forecasting.
• Surface condition monitoring.
• Work Management Systems.
• Communications including AVL/GPS.
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Environmental Influences

- Climate Change
  - Trend of more extreme weather events.
  - Winter events include snow, ice, floods.
  - Periodic anomalies or long-term?
  - Sustainability a concern.

- Regulatory Factors
  - Emphasis on salt and abrasives reduction.
  - Scrutiny of other materials used in winter operations.
  - Fuel, emissions mandates for vehicles.
  - CDL and DOT requirements for operators.
  - Workplace safety and health.
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So What To Do Now?

• Are policies, plans, procedures, processes and practices reflective of current situations?
• Are resources sufficient to meet expectations?
• If there is a shortfall or gap what are the options?
  • Acquire more resources
  • Use existing resources more efficiently
  • Adjust expectations
  • Ignore and continue as always.
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Agencies continue outdated practices due to “institutional inertia”.

- Employees resist change. Lack of good information.
- Management indifference; concerned more with infrastructure.
- Existing plans and manuals incomplete, obsolete or ignored.
- Plans need to be flexible to meet various circumstances.
- Plans should also incorporate Performance Measures.
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“Know Where You Are and How You Got There”

Climate

- typical winter temperature and precipitation ranges.
- historical extremes.
- trend or pattern of last 3-10 years.
- Number of discrete events each year is more important than just total of annual snowfall.
- Include those prepared for but did not occur.
- Categorize according to type, intensity and duration.
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Jurisdictional changes over past 10 years

- Total lane-miles
- Traffic volumes and patterns
- Population (resident and work-day)
- Growth (area) and development (land use)

Routes

- Levels of Service
- Classifications and numbers
- Lane-mileage per route
- Cycle-time
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Expenditures, annual totals:

- **Materials**, amounts used and costs by type
- **Personnel**, hours and pay (regular and OT)
- **Contractor** hours/ costs
- **Vehicle/equipment** miles/hours; rental costs
- **Fuel** and other vehicle operating supplies
- **Equipment** maintenance, repair, replacement
- **Clothing and PPE** issued to employees
- **Facilities** costs for utilities, repairs; temporary lodging
- **Communications** and data services costs and charges
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- **Include costs of:**
  - **cleanup** such as street sweeping after storms.
  - **repairs** to damaged pavement, bridges, sidewalks, traffic control devices, roadway lighting, guardrail, etc.
  - **claims /settlements** paid for damage to private property and injuries to citizens.
  - **worker compensation** payments
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• **Analyze** the information:
  • Accurate
  • Complete
  • Timely

• **Assess** Challenges vs. Capabilities
  • Potential risks, vulnerabilities
  • Current and expected resources
  • Levels of Service
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Goal: Maximize Resource Allocation

• includes personnel, vehicles, equipment, materials, etc.
• assess condition, capability and availability
• match with desired LOS
• based on objective, measurable factors
• adjust to fill gaps
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Achieve Key Objectives:

- Effectiveness
- Efficiency
- Equitability
- Consistency
- Continuity

“Know Where You Want to Go Before You Get There”
Define Level Of Service:

“Desired, normally achievable condition of road surfaces at different times during and after typical winter events.”

- Core of winter operations planning.
- Varies according to priority classifications.
- Dependent upon available resources.
- Contingent upon conditions.
- No standard definitions of LOS.
- Each agency determines its LOS.
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Route Optimization:

Existing routes may be inefficient due to changes in:

- lane-miles
- Cycle-times
- classification and priority of streets
- Levels of Service
- traffic volumes and/or patterns
- traffic control systems
- material selection and application rates
- plowing and spreading methods
- fleet capability
- Major construction, detours, closures
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Plan for Contingencies:
- Ice storm debris clearance
- Intense/ excessive snow rate
- Increased accumulations from successive storms
- Shortage of material
- Shortage of usable vehicles
- Shortage of personnel
- Communications failures
- Loss of facilities
- Flooding caused by ice-jams
- Emergencies
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Summary

• Anticipate—”scan the horizon “ and identify challenges.
• Assess--- determine the impact based on current capabilities.
• adjust --- plans, policies, procedures, processes and practices.
• Adapt--- be flexible as situations dictate. Continually monitor.
• Act---implement changes in operations.
• Resource allocation can improve operational capability.
• Data must be accurate, complete, timely.
• Develop relevant, objective performance measures.
• Document, document, document.
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Dave Bergner, M.A., PWLF
Monte Vista Associates, LLC
dlbergner@gmail.com
480.699.4043

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