Route Optimization
For Snow and Ice Control

OTEC 2015
Agenda

2014-2015 Snow Season Overview
Route Optimization Implementation
Next Season
Does your Snow Plowing Team do a great job?

Can you prove it?
Why Route Optimization?

• Provide department measurables on existing operations
• Allow for comparison of outpost vs. route relationships
• Provide consistent response time across city for residents
• Create equitable service times for City drivers
Metrics

• Vendor
  – Time spent treating (plow and/or salt)
  – Time spent traveling (deadhead)
  – Total Time

• Travel Time Reliability Index (TTRI)
  – ODOT is measuring select primary City routes
  – Time for road to recover within 5 MPH of posted speed
2014 Columbus Snow and Ice Routes

THE CITY OF COLUMBUS
MICHAEL B. COLEMAN, MAYOR
DEPARTMENT OF PUBLIC SERVICE

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Next Season

THE CITY OF COLUMBUS
MICHAEL B. COLEMAN, MAYOR
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Snowfall

Winter Snowfall Amounts
2000-2015

Inches of Snowfall per Winter

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<td>2000-2001</td>
<td>26.3</td>
<td>10.1</td>
<td>50.6</td>
<td>25.1</td>
<td>37.2</td>
<td>12.9</td>
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15-Year Average 31.58 Inches
Snow Operation

• 5 street maintenance outposts
• 100+ employees
  – Equipment operators
  – Dispatchers
  – Additional help from other departments
• 87 Heavy Duty Plows
AVL (Warrior Watch)

• Warrior Watch tracks snow & ice vehicles
  – Plow/spreader status
  – GPS “footprints”
  – Digital Compass

• Internal Warrior Watch

• External (Public) Warrior Watch
What has been treated?

- 50 W Gay Street
- Use my location

Last 6 Hours
Last 12 Hours
Last 24 Hours
Last 72 Hours
City Boundary

Last 6 Hours
Last Treated: 11/6 8:26am
Street: RAMP
Responsibility: Not Columbus
Factors to Consider

• Time to execute project outside of snow season
• Training – GIS staff, field supervisors, and drivers
• Data reliability of centerline
• Devices – installation, size, sound, and delivery
• Driver reticence – another item in the cab telling you how to do your job
Routes
New Priorities

• Primary
  – 1A: heavy traffic arterial
  – 1B: minor arterial

• Secondary
  – 2A: school route
  – 2B: collector

• Tertiary
  – 3: residential
RouteSmart

• Route Optimization software
• ArcGIS extension
• street/address based applications
  – Street layer
  – Service location layer
  – Facility layer
Street Data
Service Location Layer
Territories Balanced by Total Time Driven
Sequencing
Travel Path - Simple
Travel Path - Multiple

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RouteSmart Navigator

- Allows for hazard warnings
  - Steel plates
  - Traffic calming devices
- Enables in-cab reporting
- Can be used to split routes between drivers
- Contains turn-by-turn routing
Refinement

• Improve update process
• Overlapping snow routes
• Checking intersection turning allowance via drivers/ tree on right side
• Driver feedback
  – Day versus Night (traffic conditions)
Next Snow Season

• Model additional scenarios
  – Turn by turn for 1s and 2s?, for 2s and 3s?
  – Emergency Routes
    (Signed No Parking during Snow Emergency)
  – Anti-Ice (inlines, bridge, or valleys roads)

• Re-examine Zones boundaries compared to Maintenance Boundaries

• Integration with other City systems (Lucity, 311, WarriorWatch)
Thank you. Questions?

James D. Young
Cassandra C. Sampeur