STAFF REPORT

To: Honorable Mayor and Members of Town Council

From: Dan Sailer, P.E., Public Works Assistant Director

Title: Discussion / Direction: Snow and Ice Control Program

History of Past Town Council, Boards & Commissions, or Other Discussions

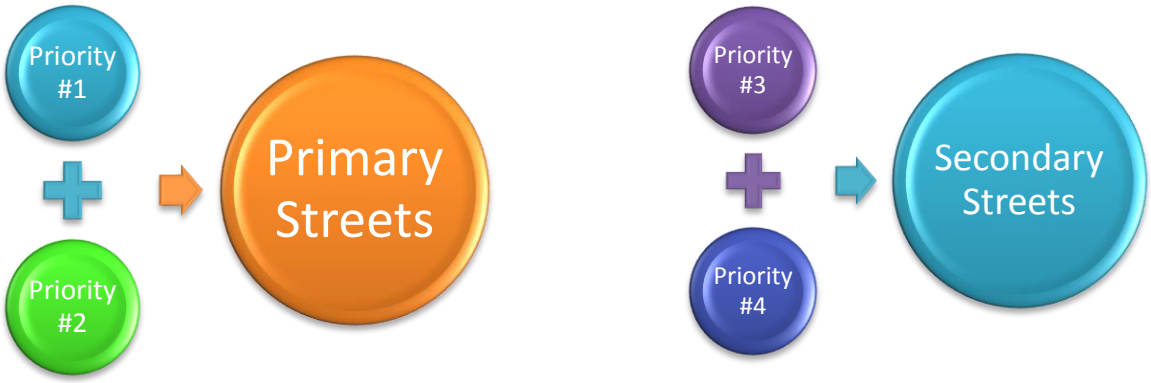
The policy was reviewed with both the Public Works Commission and Town Council in the fall of 2015 at their respective meetings. The Commission felt that the policy is adequately meeting the needs of the community and recommended keeping the policy unchanged. The Town Council concurred with the Commission's feedback.

The Department's goal of having passable conditions on roadways within eight hours after snow has ceased was reviewed with the Commission and Council in 2014. The previous goal of six hours had not been met consistently over 2012 and 2013 primarily as a result of the increase in new lane miles that have been added to the town. Options and costs associated with maintaining the six hour goal were reviewed and the feedback received by both the Commission and Council was to adjust the goal to eight hours.

Discussion

Snow and ice control efforts are a basic responsibility of the Town to provide for travel and emergency service access. Snowplowing and ice control will be completed according to the attached Snow and Ice Control Policy. Snow storm events often cannot be predicted and are frequently of varying lengths and intensity, requiring different levels of resources. The intent of the program is to keep the public streets within the Town passable during adverse weather conditions and in a reasonably safe condition.

The Town has classified Town streets based on the street function, traffic volume and importance to the welfare of the community. Two (2) categories of streets with four (4) priority rankings have been established.



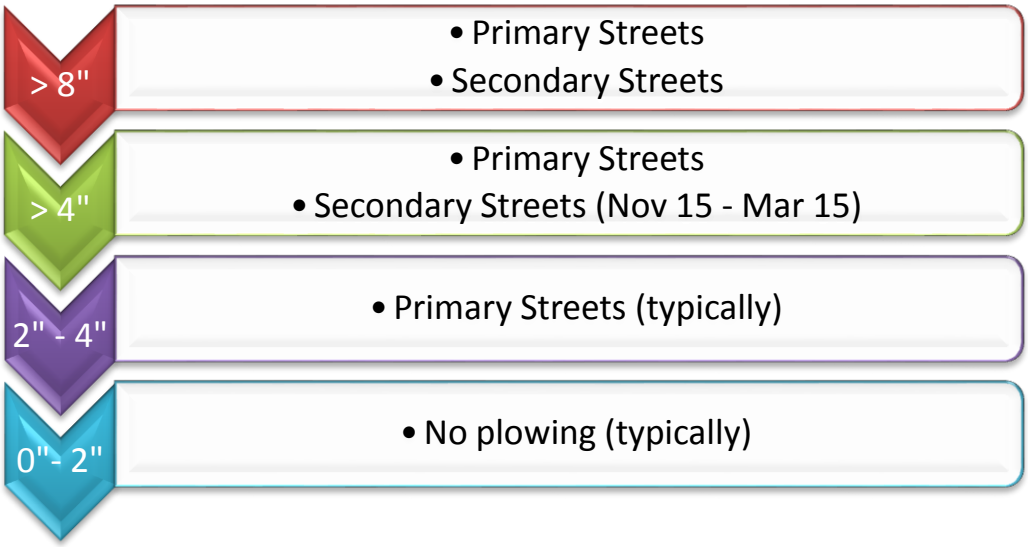
- Priority 1: Those streets classified as arterials, major collectors, commercial/ industrial and commercial business areas. These are typically high volume streets that connect major sections of the Town and provide access for emergency fire, police, and medical services.

- Priority 2: Those streets classified as minor collectors and school bus routes or those roads providing access to schools.

- Priority 3: Low-volume and residential streets.

- Priority 4: Cul-de-sacs and alleys.

The following graphic shows the general policy thresholds utilized to determine when snowplowing operations are commenced as determined by the Town's Street Operations and Maintenance Manager. The scale on the left is predicted snow accumulation in inches.



The policy goal is to have streets "passable" to maintain two-way traffic. Department service level goals in this regard are:

Once snow has stopped:

- Primary Streets: All lanes in each direction within 8-hours, 90% of the time.
- Secondary Streets: One lane in each direction within 8-hours, 90% of the time.

Information on how actual performance compares to these Department goals are provided within the "Performance Goals/Measures" section.

Primary Streets

- The primary streets are divided into seven (7) areas for snow & ice control efforts
- Up to 12 Town personnel will be used to clear these routes
- These are the heavy-duty, big plows & heavy equipment and will focus on clearing the Town's arterials and collectors (Priority 1 and 2 streets)
- Priority 1 and 2 streets make up 373 lane-miles of roadway or 62% of all lane-miles in the Town
- Personnel assigned to these duties typically need a Commercial Driver's License (CDL)

Secondary Streets

- The secondary streets are divided into five (5) areas for snow clearing efforts
- Up to 10 Town personnel will be used to clear these routes,
- Light-duty plows are assigned and will focus on clearing the Town's residential streets (Priority 3 and 4 streets)
- Once the Priority 1 and 2 streets are completed, they may assist the light-duty plows with Priority 3 streets
- Priority 3 and 4 streets make up 228 lane-miles of roadway or 38% of all lane-miles in the Town
- Personnel assigned to these duties do not need a Commercial Driver's License (CDL)
- Personnel will generally plow in tandem to achieve one passable lane in each direction on a street.
- Personnel have been trained to plow cul-de-sacs, so as not to block residential drive ways

When snowplowing and/or ice control operations are initiated, all primary streets (Priorities 1 and 2) will be plowed.

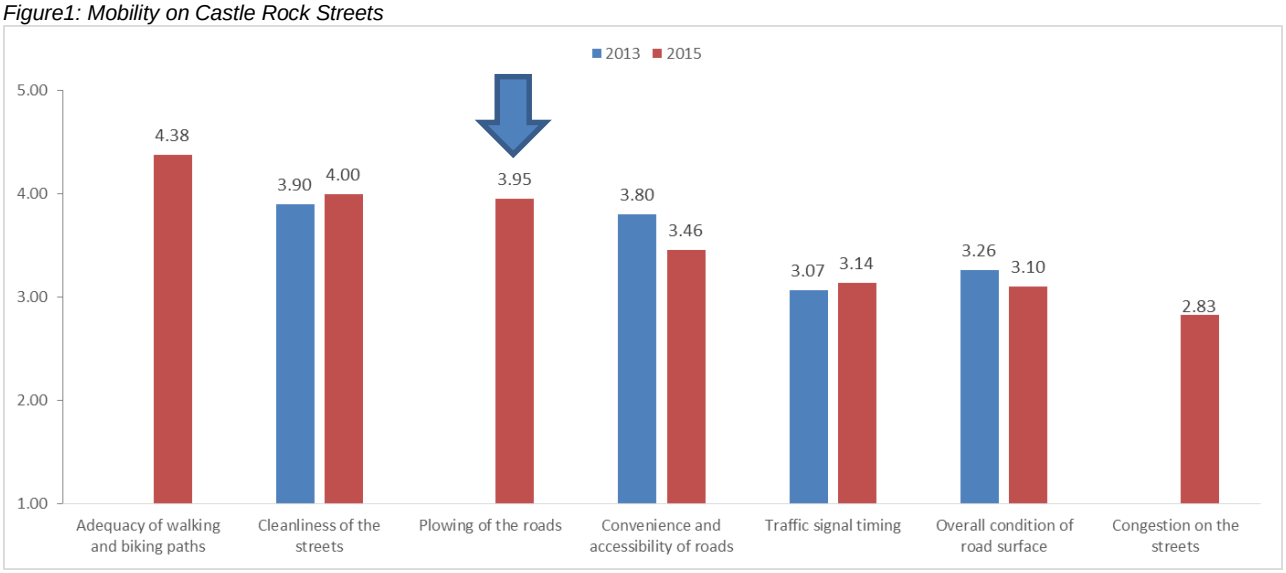
Snowplowing will be completed for each storm event on secondary streets (Priorities 3 and 4) routes when the accumulation of snow or ice in the roadway is predicted to be more than four (4) inches between November 15 and March 15, or when the accumulation of snow or ice in the roadway is predicted to be more than eight (8) inches prior to November 15 or after March 15.

Secondary streets (Priorities 3 and 4) may or may not be plowed when snow and ice control operations are initiated for primary streets. The criteria to initiate snowplowing on secondary streets involve a determination of whether the streets will be passable for vehicles based on the existing storm event. Temperatures and time of year will also be considered. When deployment to secondary streets is warranted, the primary objective during a storm event is to provide a passable lane for emergency response. To stay ahead of storm accumulation, this is accomplished in the most efficient manner possible in the least amount of time to ensure the fastest emergency response times achievable. Therefore, inefficiencies of "custom" plowing operations that would include plowing snow from shady sides to sunny sides, or multiple passes is not achievable during the event.

Plowing operations typically occur at night while it is snowing which does not facilitate operators anticipating where particular areas will be in the sunshine during different parts of the snow season. Also, plowing all snow to a future sunny side during an event may create an impassable depth of snow until such snow melts. In the days following the storm, crews may return to areas where freeze – thaw cycles have caused icing problems and employ ice abatement techniques. These techniques include the use of specialized equipment that can efficiently crush ice allowing it to be plowed to areas where previously plowed snow has melted.

The most recent community survey indicates that residents are satisfied with the current operations. The figure below is from the community survey.

Figure1: Mobility on Castle Rock Streets



While the community as a whole is satisfied with the current program operations, we do receive a mixture of positive and negative feedback during each winter season. Increasing productivity in ice control operations has been an increasing request this past 2015/2016 season.

The Public Works Department is the primary Town department responsible for snow and ice control operations, however, a team of more than 70 staff from the Public Works, Utilities and Parks & Recreation Departments are trained each year to respond

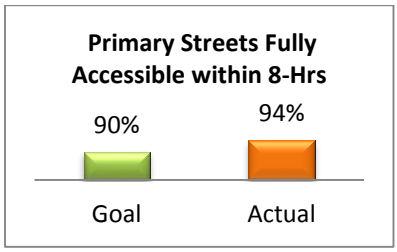
to storm events. Approximately 16 Public Works staff will be used for a "typical" storm event. This additional staff allows for multiple shifts in the case of a blizzard or when "around-the-clock" operations are implemented. During a "typical" 24 hour storm event as many as 26 staff may be needed, and during 24 hour enhanced operations as many as 48 staff are needed.

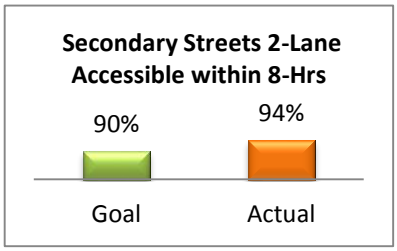
Performance Goals/Measures

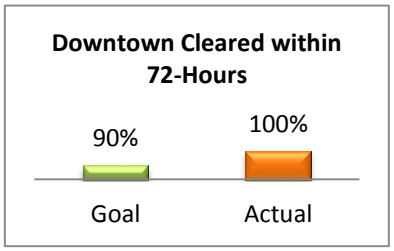
Plowing streets and applying ice control agents supports the Town goal of maintaining safe, functional and accessible infrastructure in a proactive manner. Public Works staff has established some performance measures to quantify service levels:

- Plow snow from primary streets (Priorities 1 & 2) so that all lanes are plowed from within eight hours after snowfall ceases, 90% of the time
- Plow snow from secondary streets (Priorities 3 & 4) so that at least two lanes are passable within eight hours after snowfall ceases, 90% of the time, for applicable storm events between November 15 and March 15
- Remove snow plowed to the center of streets in the downtown area within 72 hours after snow fall ceases, 90% of the time

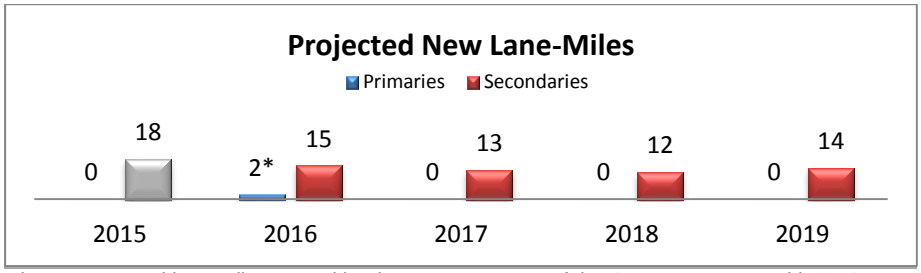
The graphs below depict actual accomplishments during the 2015/2016 season:







With the adjusted Department goals to eight hours, 90% of the time it is anticipated that this service level will be met for the next several years. With the recent increase in development activity over the past several years, the Town has added several new lane-miles of streets. The following indicates the projected number of lane-miles to be added to the network based on current building permit projections:



* These are actual lane miles owned by the Town. As part of the O&M agreement with CDOT associated with the NME project, the Town is responsible for plowing portions of CDOT owned interchange ramps.

Based on these projected new lane miles and additional plowing on CDOT owned right-of-way as part of the North Meadows Extension, Department staff is estimating that an additional employee may be needed in 2019 based on current unit rates to maintain quantified service levels not only in snow removal activities, but also existing street maintenance program areas.

The Department has not received feedback from the Town's transportation stakeholders indicating that the change in service level from 6-hours, 90% of the time, to 8-hours, 90% of the time has been problematic. As a result, staff is recommending that the current service level goal of 8-hours, 90% of the time be maintained. If this is agreeable to Town Council, staff will continue to monitor service level changes and report back to Town Council in future years.

While the overall Town stakeholders are satisfied with the current program services, we do receive a mixture of positive and negative feedback during each winter season. During the most recent 2015/2016 season the majority of negative feedback has been related to ice buildup that occurs once snow melts and freezes for days after a snow event. Ice control operations are currently prioritized in the same manner as snow removal. Higher volume streets and bus routes are prioritized for ice control ahead of lower volume streets. Staff will utilize judgment in areas to maximize ice control operations on lower priority streets if they are in close proximity to an area of a higher priority street where they are working on.

While Staff is currently developing quantified service levels in this area, we do keep data on the number of person-hours averaged each year. Current productivity averages 1,230 person-hours a year in ice control operations. This involves a crew of three staff typically. Staff proposes to double this productivity to increase the total to 2,460 person-hours per average year. If it is desired to increase productivity in this area without decreasing productivity in others, there are two practical options to do this:

- Option #1 (Contracted Services): With this option in-house staff would still be utilized to provide the average 1,230 person-hours of ice control operations. The increased 1,230 person-hours would be contracted. An ice breaker would need to be purchased by the Town that can be attached to the contractor's equipment. Utilizing the existing equipment unit rates from the Town's existing Emergency Snow Removal service contract for the three minimum pieces of equipment, the total estimated cost for this option is $263,000 for the first year, and approximately $224,000 each year following (in today's dollars).

- Option #2 (Increased Full Time Employees): With this option Staff is recommending adding three new employees to the Public Works Department. This would increase productivity to 2,460 person-hours year on average. The Department currently utilizes five seasonal employees during the warmer months of the year to assist primarily in the areas of roadway crack sealing operations. These employees will also assist in other program areas such as right-of-way mowing and pothole patching where available labor hours permit. If three new employees are approved, the number of seasonal employees would be reduced down to two. This net change will increase productivity levels in the warmer weather program areas due to increased overall available labor-hours, while also increasing ice control operations in the winter months. The following table is a summary break out of the approximate costs.

TABLE #1: Summary Cost Increase of Option #2

	2017	**2018**	**2019**	**2020**	**2021**
New Costs					
Full-Time Employees (3)	$249,000	$258,000	$266,000	$276,000	$285,000
Ice Breaker	$39,000				
Grader Rental	$38,000	$40,000	$42,000	$44,000	$46,000
Reductions					
Seasonal Employees (3)	$60,000	$61,500	$63,000	$66,000	$67,000
Net Increase					
	$266,000	**$236,500**	**$245,000**	**$254,000**	**$264,000**

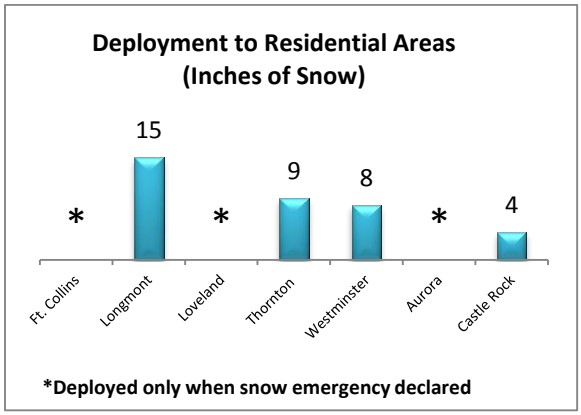
To break down this option a bit further; the net increase in the available labor-hours by replacing three seasonal employees with three full time employees is 3,600 labor-hours. Of this net increase; 1,230 labor-hours (34%) would go toward the increased ice-control productivity, and the remaining 2,370 labor-hours (66%) would be utilized to increase productivity in other program areas (crack sealing, pot-hole patching, street sweeping, etc.). From a cost break down perspective the following table shows the direct cost associated with the increased ice control productivity. The percentage distribution is different than above due to the initial ice breaker purchase in 2017, and the annual grader rental that's necessary.

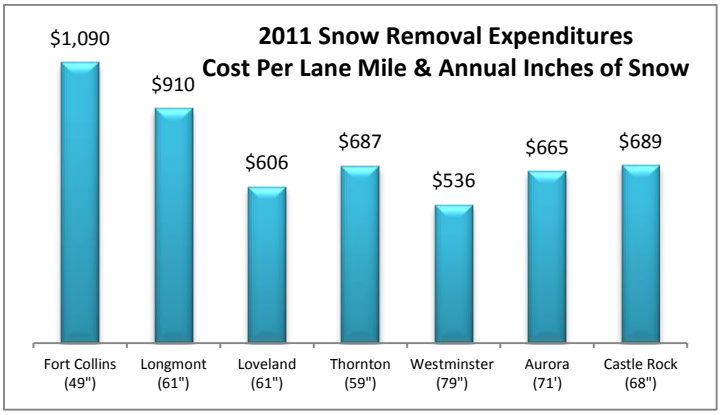
TABLE #2: Summary Breakout of Cost Increases of Option#2 by Program Area

	2017	2018	2019	2020	2021
Ice Control					
Net $ increase	$141,000	$107,000	$111,000	$115,500	$120,000
% of net $ increase	53%	45%	45%	45%	46%
Other Programs					
Net $ increase	$125,000	$129,500	$134,000	$138,500	$144,000
% of net $ increase	47%	55%	55%	55%	54%

Based on the comparable cost increase being close for option #1 and option #2, the Town would additionally benefit from the remaining available labor-hours that can be used in other program areas. If Town Council desires to increase the ice control productivity levels Staff recommends option #2.

Bench Marks: The variation among the jurisdictions shown in the following graphs is based on deployment into residential areas (level of service) and program funding priorities as well as variation in the number and intensity of storms in each part of the State. Cost per lane mile and total annual inches of snow is for the year 2011 as this is the most recent data available from jurisdictions. Since jurisdictions do not routinely post this information it is extremely inefficient to collect.





Public Notification and Outreach Efforts

A critical piece of information for citizens is not only where the plows have been but also when they are expected in a certain area. Therefore, Staff operates a separate web-based map, using the Automatic Vehicle Locator (AVL) System data, to not only show which streets have been plowed but also identify, by sub-area/neighborhood, an expected time frame for when those streets will be plowed. The Town was at the forefront of this recent trend with other entities, and we have been providing this service to the community since 2009. We are presently upgrading the system to be even more user friendly and informative, and to enhance operations management.

- Maps are periodically refreshed on the Town's website during snow events, (every one to two hours), showing which streets have been plowed and when the plows maybe in an area next. These maps do not show the real-time locations of vehicles for security and safety reasons.
- Administrative personnel are able to view the system so that they can respond more accurately and effectively to citizens who call requesting information on whether their street has been plowed or when it will be plowed.
- Supervisory personnel are able to expeditiously relocate the closest available equipment and personnel to respond to emergency requests, or to identify missed streets.
- Snowplow driver safety is also enhanced with this system. Supervisory staff is able to monitor the location of all vehicles and can contact a driver on their cellular phone if a vehicle is immobile for an extended period of time, to ensure that they are safe.

Citizens are able to view the map on the Town's website to determine where the plows have been working and get an approximate time of when their neighborhood will be

plowed. Public Works staff will update the map on a regular basis during the storm event.