

# Town of Plymouth Snow and Ice Removal Plan

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**Town Manager**

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**Assistant Town Manager**

**Jonathan Beder**  
**Director of Public Works**



**January 1, 2015**

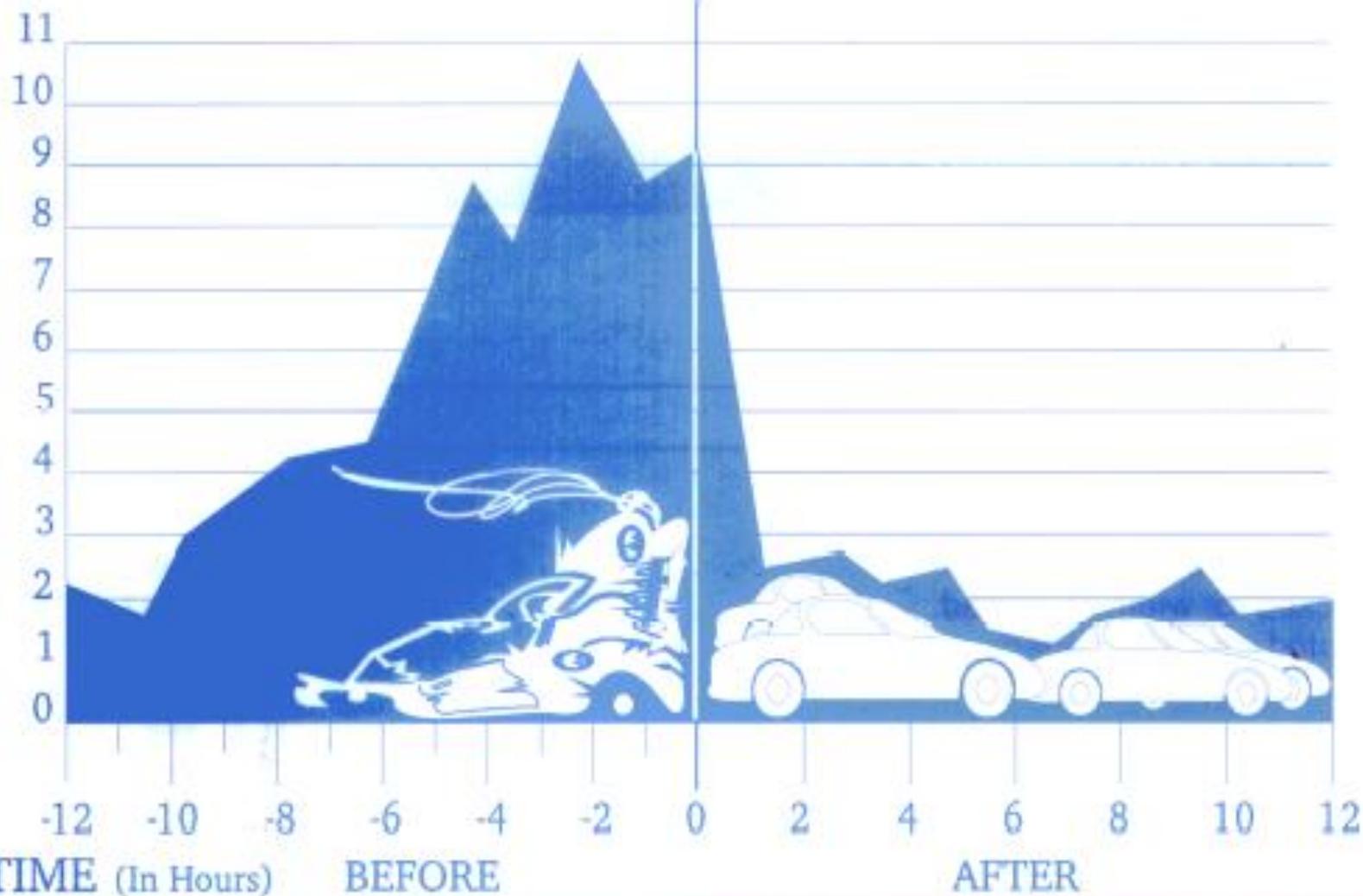
# Introduction

The effectiveness of a snow and ice control plan can have a significant impact on the vitality of a Town during the winter season. Schools which are forced to close due to road conditions cause hardships on working parents who must find alternative care. Commerce and industry suffer when products cannot be shipped or when deliveries aren't made. Recent studies have shown that fuel costs increase significantly if cars must travel through accumulated snow on the pavement. Frequency of accidents, injuries, and deaths will increase without the benefit of a comprehensive snow program. Elderly people who are unable to get out to grocery stores or have deliveries cancelled because of unplowed streets and sidewalks suffer undue hardships.

*An effective snow and ice plan will always outpace the economic and safety hardships caused by ineffective snow removal operations.*

ACCIDENT RATE  
(per 10 million veh. km)

SPREADING TIME



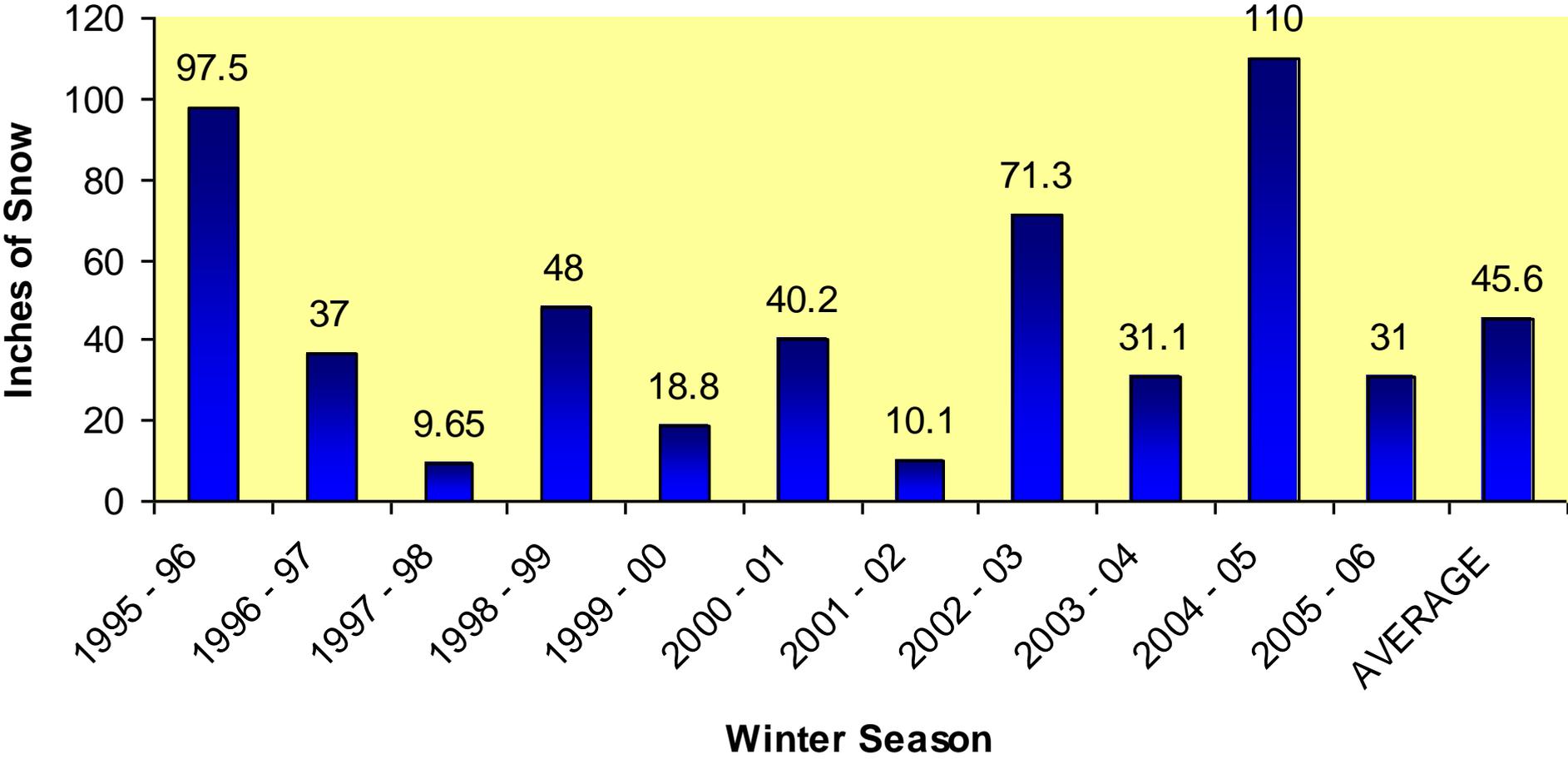
Accident Rate Before and After Salt Spreading

# The Benefits of Winter Maintenance

- **Lower accident rates through safer roads;**
- **Lower associated insurance and liability claims;**
- **Generate time savings from faster (and safer) travel;**
- **Reduce productivity losses due to late days and absenteeism by employees;**
- **Reduce productivity losses due to unavailability of material inputs to production;**
- **Help to avoid lost sales due to inaccessibility of the customer to the marketplace;**
- **Reduce the cost of commodities by reducing the transportation component of costs;**
- **Ensure that emergency and security services can operate efficiently; and**
- **Ensure mobility for people to engage in social activities.**

**How much SNOW does  
Plymouth Receive on an  
Annual Basis?**

# Yearly Snowfall in Plymouth



**Managing  
Snow and Ice  
is both a  
Science and an Art.**

## Type of Precipitation

- **Snow depth alone is not the only judge of how tough a storm can be. Moisture content of snow, timing, duration of storm, freezing rain, blowing snow, and salt usage, all play a major roll in the severity of ice and snow removal.**

# Moisture Content of Snow

- **One only has to shovel a driveway a few times to know that snow has different weights and compaction properties. A rule of thumb is that a 10-inch accumulation of dry, fluffy snow is easier and cheaper to take care of than 5 inches of heavy, wet snow. Additional problems with wet snow include: very slippery conditions, salt usage increases, equipment fatigue, and newly fallen snow freezes.**
- **There is nothing worse for poor snow removal results than heavy, wet snow followed by a hard freeze.**

# Moisture Content of Snow

- If you get up in the morning and the snow blows back in your face when you pick up that first shovel of snow it means we had a pretty good night.
- If you had a hard time picking up that first shovel of snow or the snow is stuck to the pavement, it means we probably had a hard time removing the snow from the roads.

# Timing of Storm

- The worst time for a storm is during the high commuting periods. If it begins snowing at 8:00 in the evening and is over by early morning, snow crews have ample opportunity to prepare the road for the commuting hours. Under best conditions, it takes the Public Works crew about 3-5 hours to mobilize and complete initial salting applications. But when a storm starts at 6:30 in the morning or 3:30 in the afternoon, motorists will need to take extra precaution until crews are able to treat the streets.

# Duration of Storm

- The faster a storm comes in and leaves the better. Three inches of snow that falls in 24 hours may cost twice as much to clear as six inches of snow that falls in 8 hours. Storms of long duration increase salt use, equipment, and employee hours. Storms of extended duration severely tax available resources to keep the roads open over a prolonged period of time.

# Freezing Rain

- Freezing rain on bare pavement can turn a street into a skating rink within 10 minutes. It is recommended that you do not drive on untreated roads until you have seen the street treated with sand or salt.

# Blowing Snow

- **High winds can blow snow that has just been plowed back onto the streets. The motorist needs to be cautious; perfectly dry pavement can turn into a snow-covered road when the wind is blowing. This is especially true in open areas and on ramps leading to the highway.**

# Fall Training Session:

## IV. REVIEW OF WINTER MAINTENANCE POLICY

- ✓ Snow emergency routes
- ✓ Parking ordinances
- ✓ Procedures for helping motorists
- ✓ Importance of personal public relations by maintenance personnel

## V. ON-THE-JOB SAFETY

- ✓ Safety equipment
- ✓ Safety practices

## VI. DISCUSSION, QUESTIONS, and ANSWERS

# Salt Usage

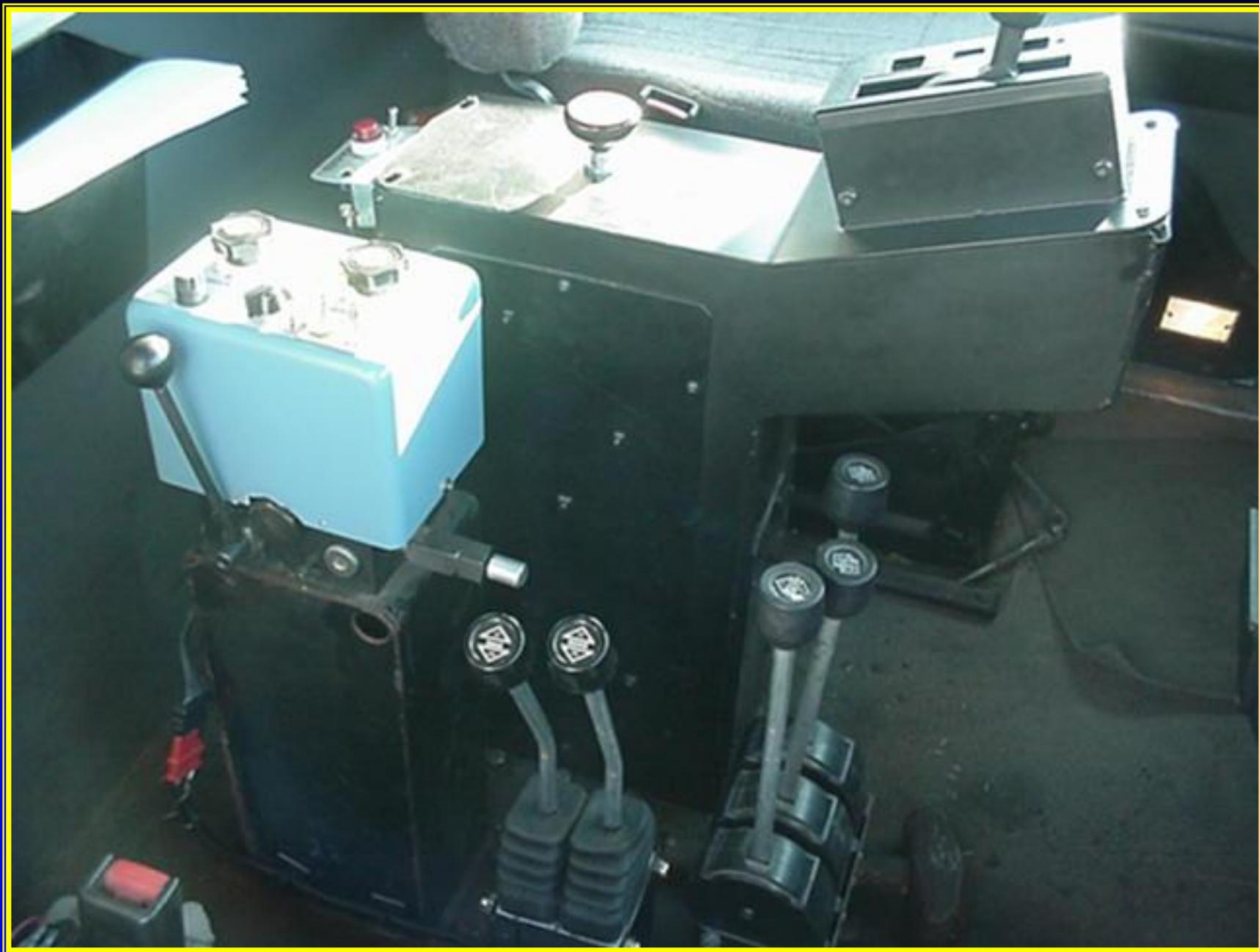
- Temperature, moisture, storm duration, timing of storm, and weather after a storm play a major role on the amount of salt used. Dry, fluffy snow at temperatures below 20°F may require little use of salt. On the other hand, wet, heavy snow at a much lighter accumulation account for heavier salt use. A storm in March with a high sun will aid greatly in melting, whereas the same storm in January will increase our salt usage.

# Pounds of Ice Melted Per Pound of Salt

Temperature °F

1 Pound of Salt  
(NaCl)

30	26.3 lbs. of Ice
25	14.4 lbs. of Ice
20	8.6 lbs. of Ice
15	6.3 lbs. of Ice
10	4.9 lbs. of Ice
5	4.1 lbs. of Ice
0	3.7 lbs. of Ice
- 6	3.2 lbs. of Ice



# Help from Meteorologists

- **A vital service to aid us in our decision-making is the use of meteorologists. The Town uses both the National Weather Services and a consultant. These two combined pay dividends in storm planning.**
- **If a meteorologists can save one hour on a call-out we have saved at least 3-fold on what it costs us for the annual consulting service.**

# **Snow and Ice Plan**

# Snow Management Organization:

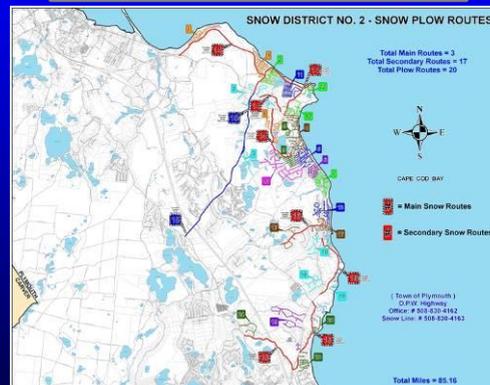
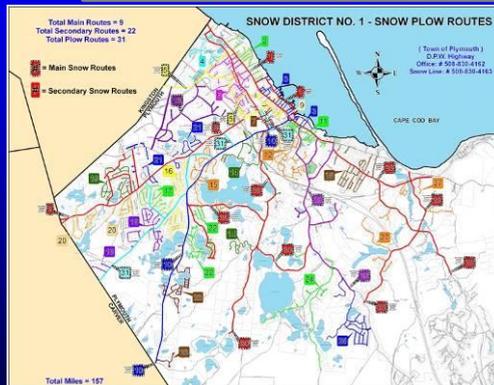
**DPW Director**

**Highway Manager**

**District 1**

**District 2**

**District 3**



# Fall Training Session:

## I. COORDINATION

- ✓ Storm warning system
- ✓ Radio communication
- ✓ Identify plow and spreading routes
- ✓ Working with police, public agencies and the media

## II. EQUIPMENT OPERATION AND MAINTENANCE

- ✓ Plows
- ✓ Spreaders
- ✓ Loaders
- ✓ Emergency repair and refueling stations
- ✓ Preventative maintenance

## III. APPLICATION PROCEDURES

- ✓ How salt works
- ✓ How and when to salt
- ✓ Application rates
- ✓ Special storm conditions
- ✓ Deicing problems (bridges, ramps, intersections, etc.)
- ✓ When to re-apply salt

# Statistics:



**349 Total Miles Plowed**

**~ 35 Town Vehicles**

**76 Private Contractors**



**\$7,200 = Average Hourly Cost of Plowing**

**8 Miles = Average Length of Main Route**

**4 Miles = Average Length of Sub-Route**

**20 Miles = Average Length of Salting & Sanding Route**

# 2007 - 2008 Rate Structure:

## CLASS 1:

**\$57.00/hour**      4 Wheel Drive Pickup Truck - 5,000 - 8,600 GVW  
- Min 7.5' Plow

## CLASS 2:

**\$62.00/hour**      4 Wheel Drive Pickup or 1 Ton Truck greater than  
8,600 GVW - Min 8.0' Plow

## CLASS 3:

**\$82.00/hour**      6 Wheeler - 25,000 GVW or greater - Min 10' Plow  
**\$91.00/hour**      6 Wheeler - 25,000 GVW or greater - Min 10' Plow  
with sander and auto flow control

## CLASS 4:

**\$93.00/hour**      10 Wheeler - 40,000 GVW or greater - Min 10' Plow  
**\$103.00/hour**      10 Wheeler - 40,000 GVW or greater - Min 10' Plow  
with sander and auto flow control

# 2007 - 2008 Rate Structure:

## CLASS 5:

**\$78.00/hour**    **Loader - Less than 2 cubic yard bucket**

**\$93.00/hour**    **Loader - 2 -4 cubic yard bucket**

**\$113.00/hour**    **Loader - over 4 cubic yard bucket**

## CLASS 6:

**\$121.00/hour**    **Grader**

## Options:

**+ \$3.00 Per hour** early signup incentive

**+ \$20.00/hour**    **Wing plow**

**+ \$10.00/hour**    **Sander (more than 10 yards)**

**+ \$5.00/hour**    **Loaders with plow**

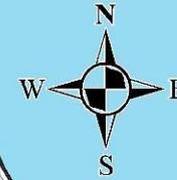
# SNOW DISTRICT NO. 1 - SNOW PLOW ROUTES

Total Main Routes = 9  
Total Secondary Routes = 22  
Total Plow Routes = 31

 = Main Snow Routes

 = Secondary Snow Routes

( Town of Plymouth )  
D.P.W. Highway  
Office: # 508-830-4162  
Snow Line: # 508-830-4163

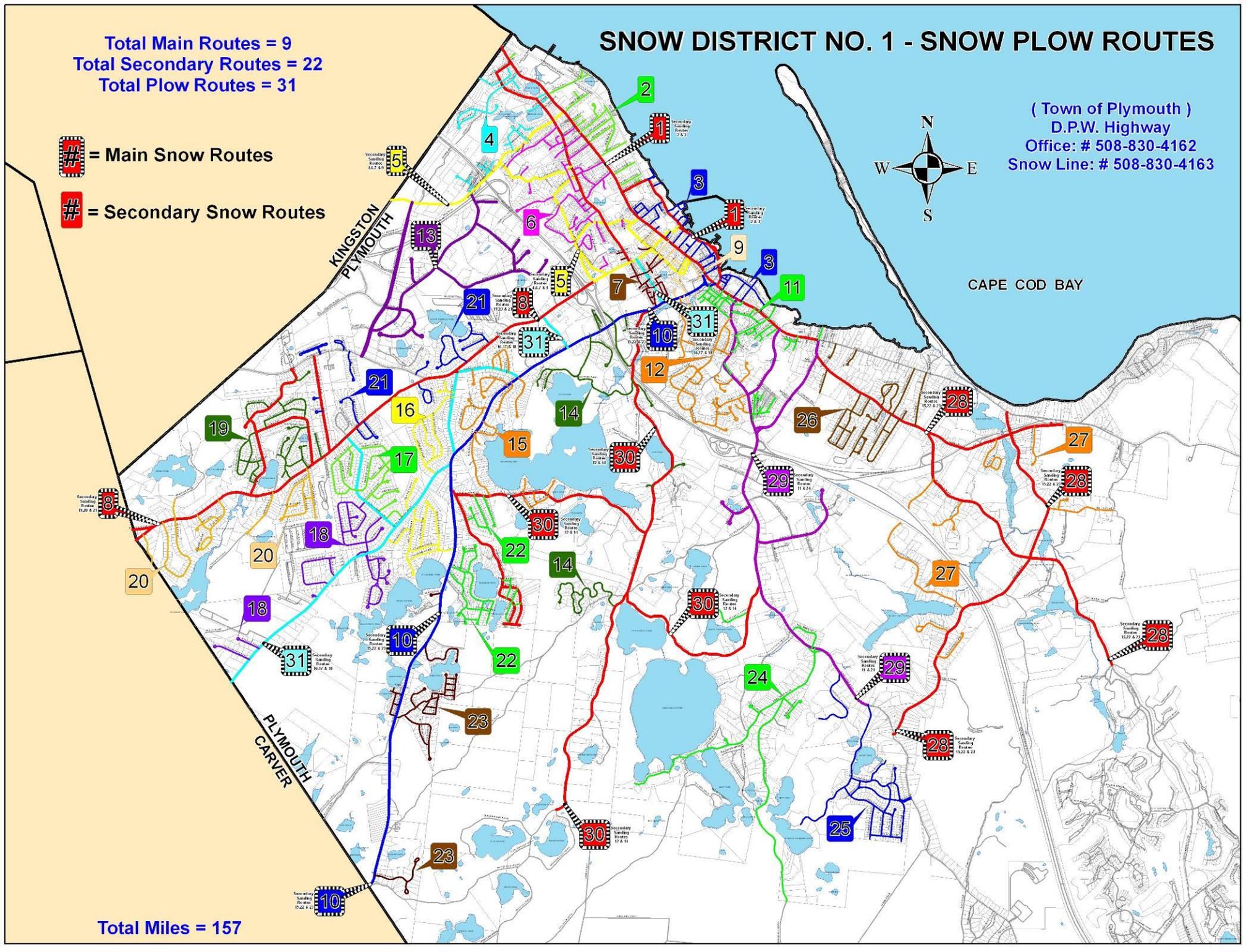


CAPE COD BAY

KINGSTON  
PLYMOUTH

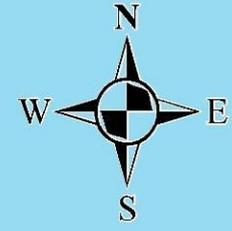
PLYMOUTH  
CARVER

Total Miles = 157



# SNOW DISTRICT NO. 2 - SNOW PLOW ROUTES

Total Main Routes = 3  
 Total Secondary Routes = 17  
 Total Plow Routes = 20

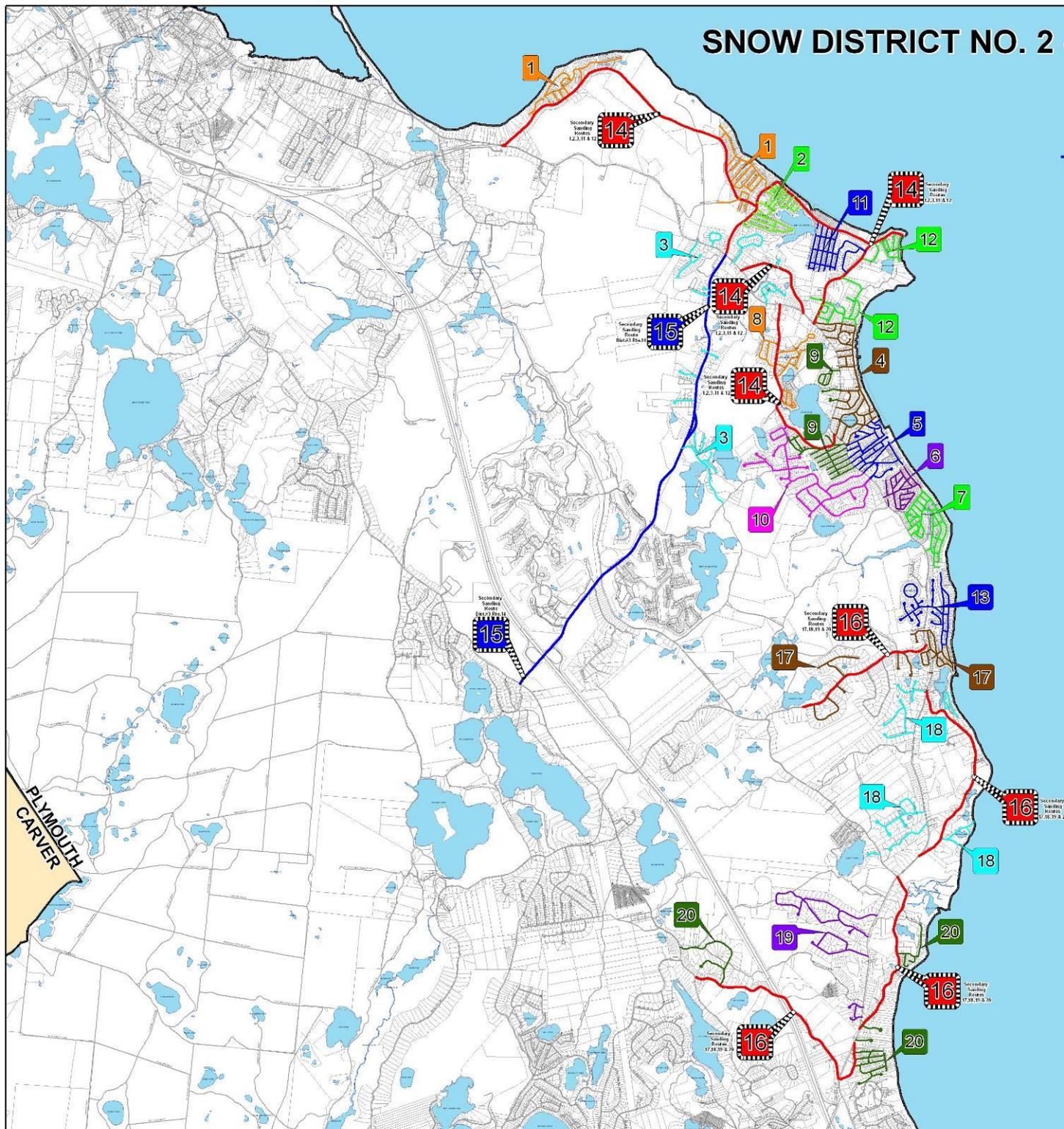


CAPE COD BAY

-  = Main Snow Routes
-  = Secondary Snow Routes

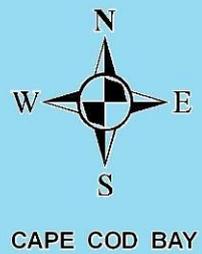
( Town of Plymouth )  
 D.P.W. Highway  
 Office: # 508-830-4162  
 Snow Line: # 508-830-4163

Total Miles = 85.16



# SNOW DISTRICT NO. 3 - SNOW PLOW ROUTES

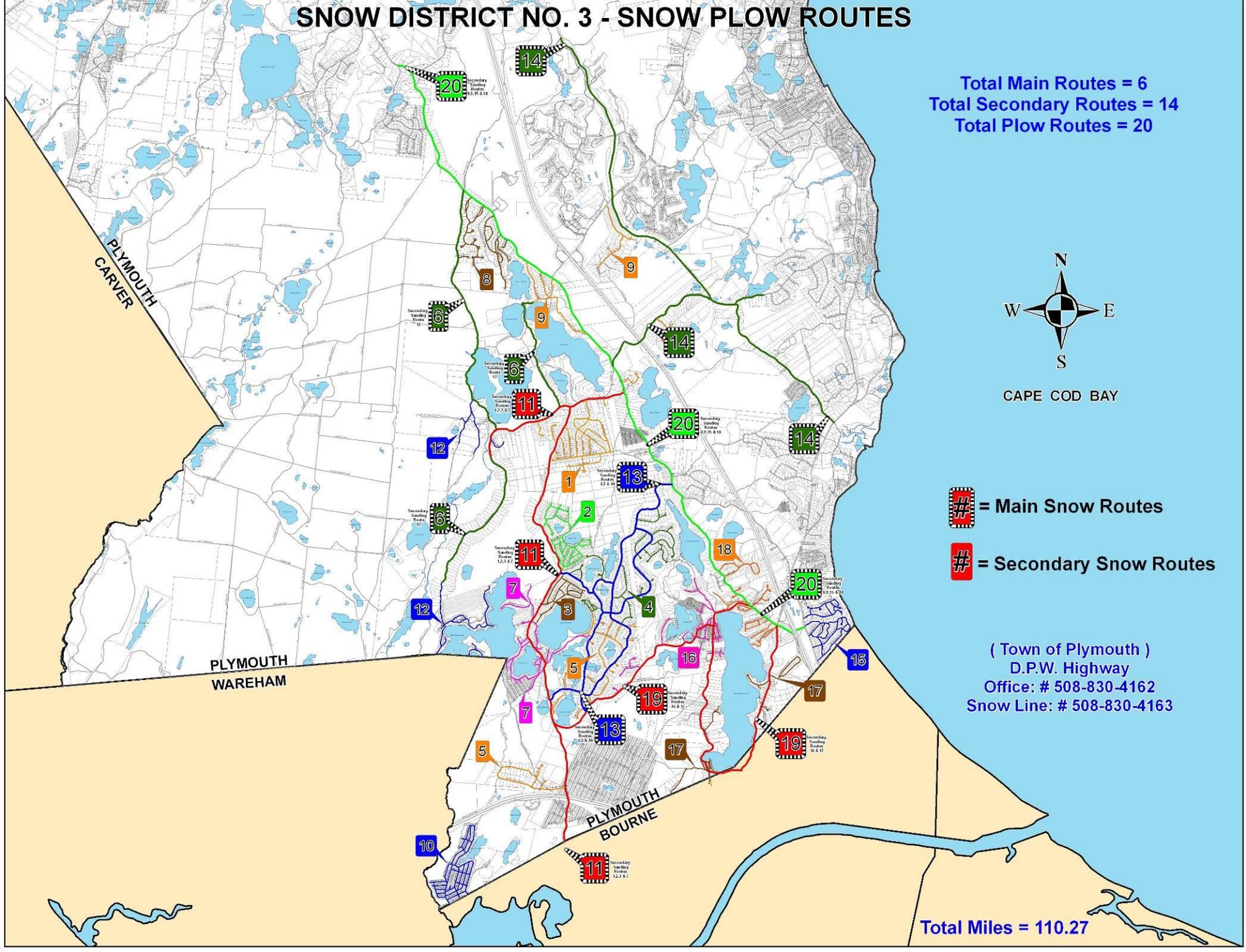
Total Main Routes = 6  
 Total Secondary Routes = 14  
 Total Plow Routes = 20



 = Main Snow Routes  
 = Secondary Snow Routes

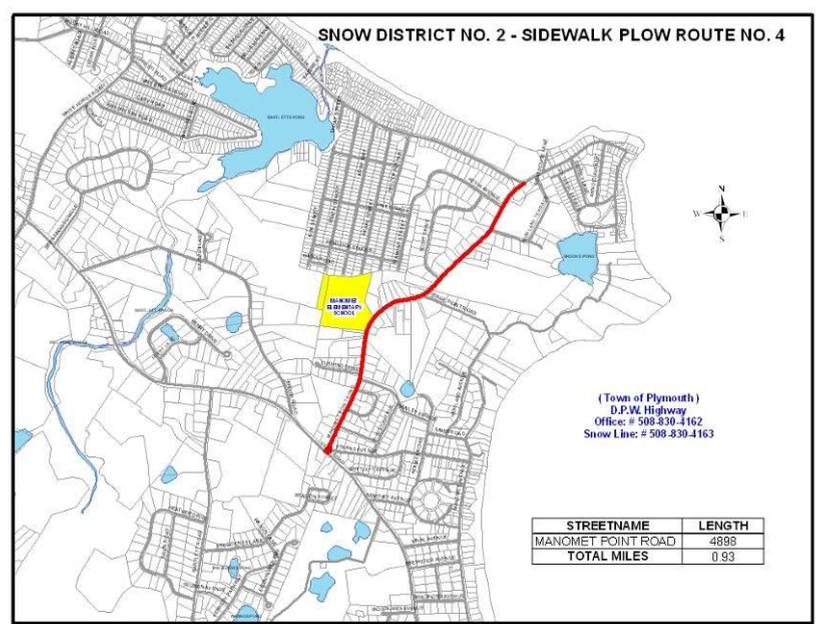
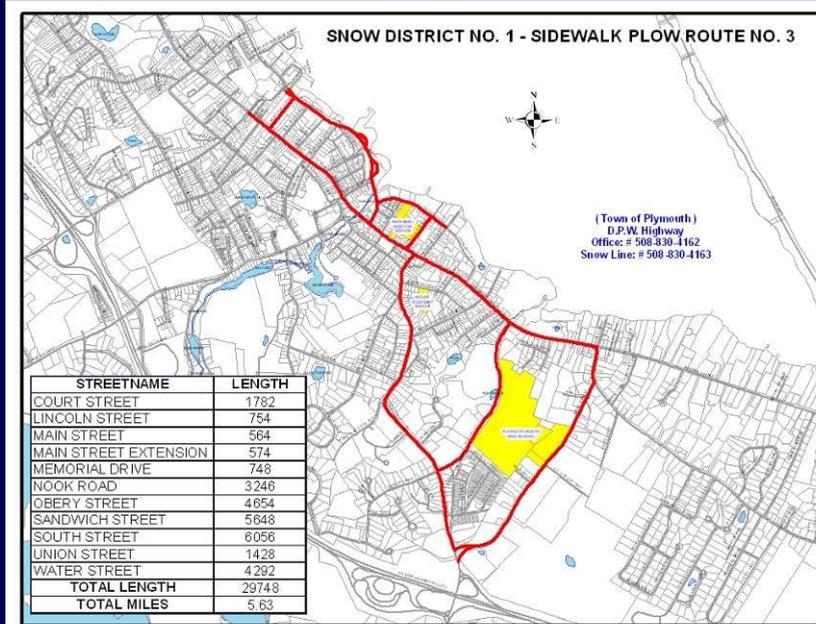
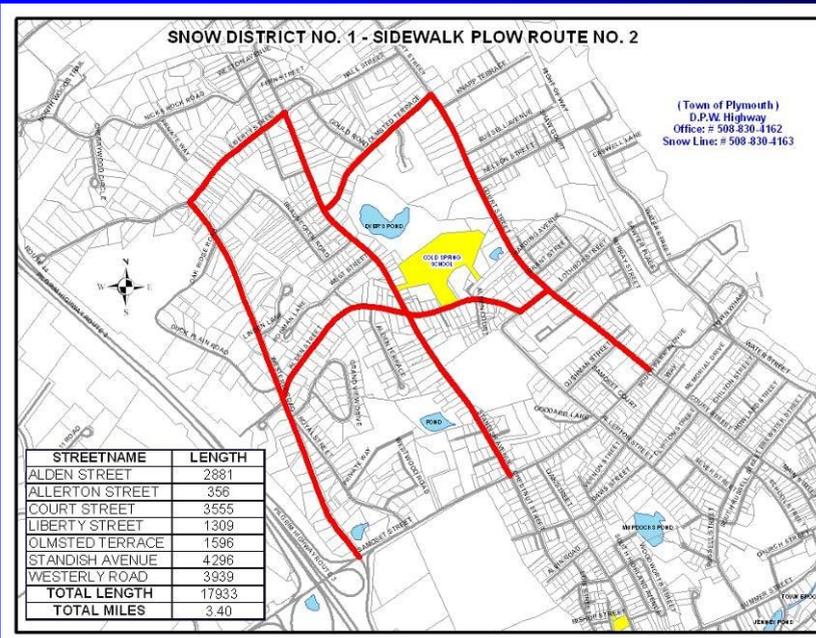
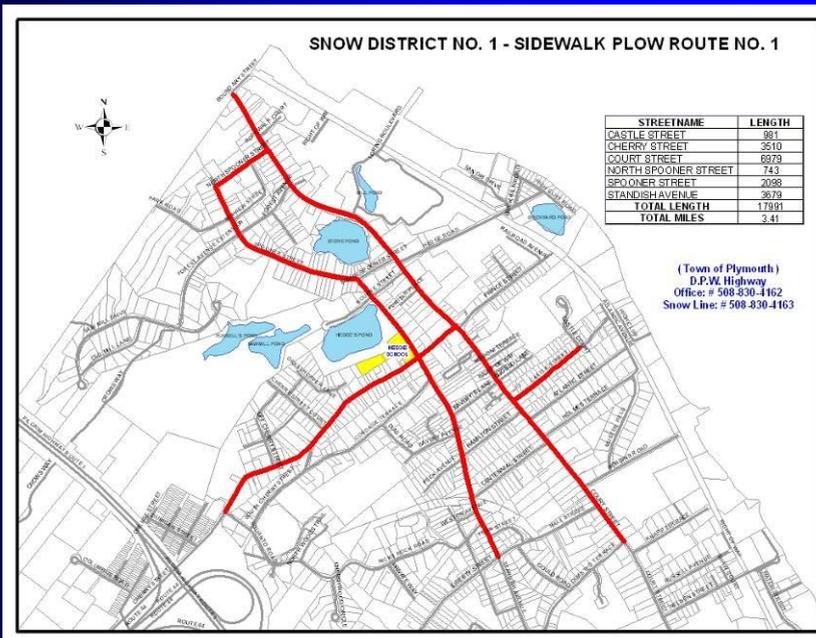
( Town of Plymouth )  
 D.P.W. Highway  
 Office: # 508-830-4162  
 Snow Line: # 508-830-4163

Total Miles = 110.27

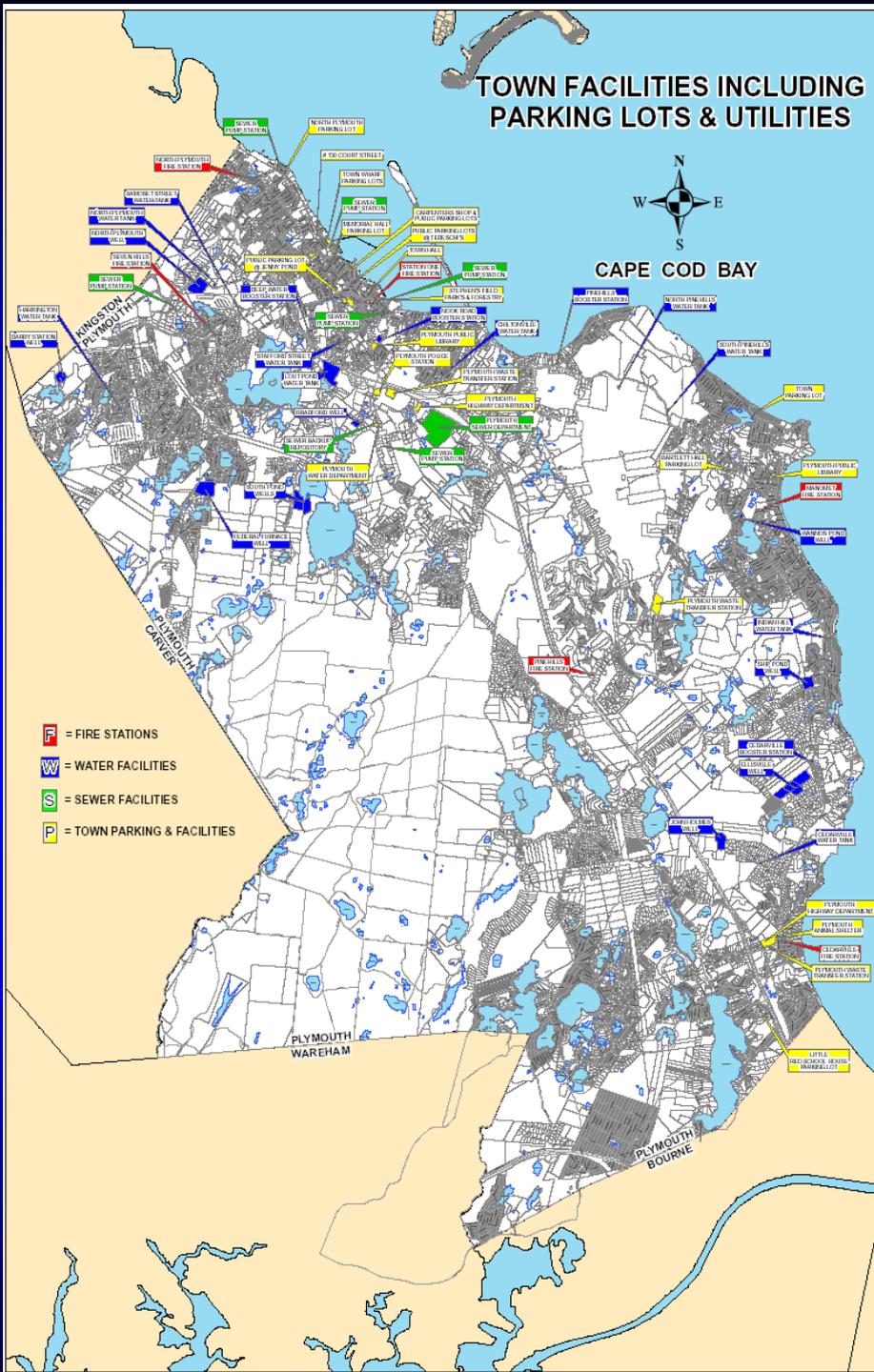


# Sidewalk Routes:

## 4 Routes, Total Length = 13 Miles



# Municipal Facilities:



**6 Fire Stations**

**23 Water Facilities**

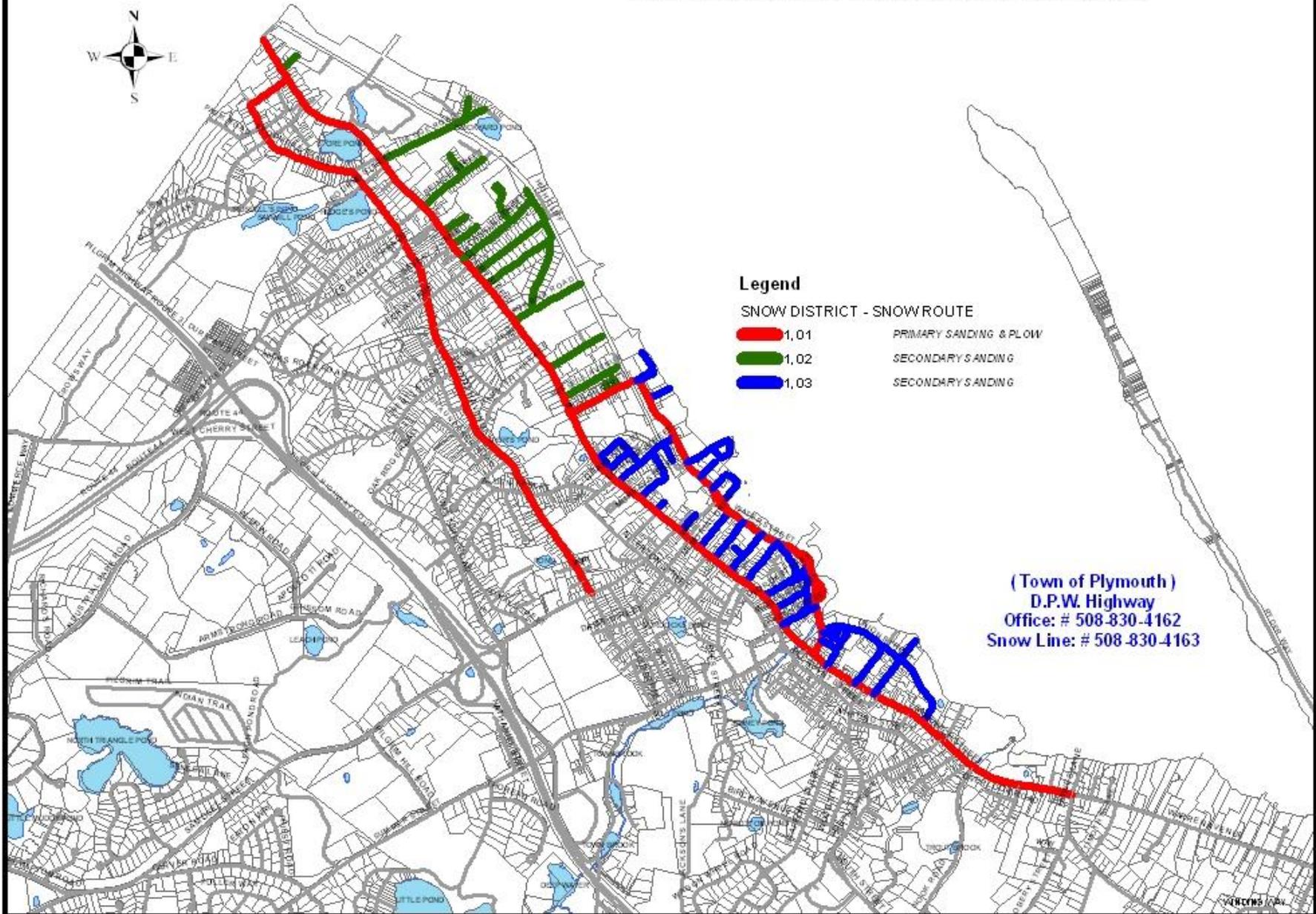
**8 Sewer Facilities**

**22 Town Parking Facilities**

# Sample 1 - Main Route:

Total Miles = 14.14

## SNOW DISTRICT NO. 1 - MAIN SANDING ROUTE NO. 1 SECONDARY SANDING ROUTES 2 & 3



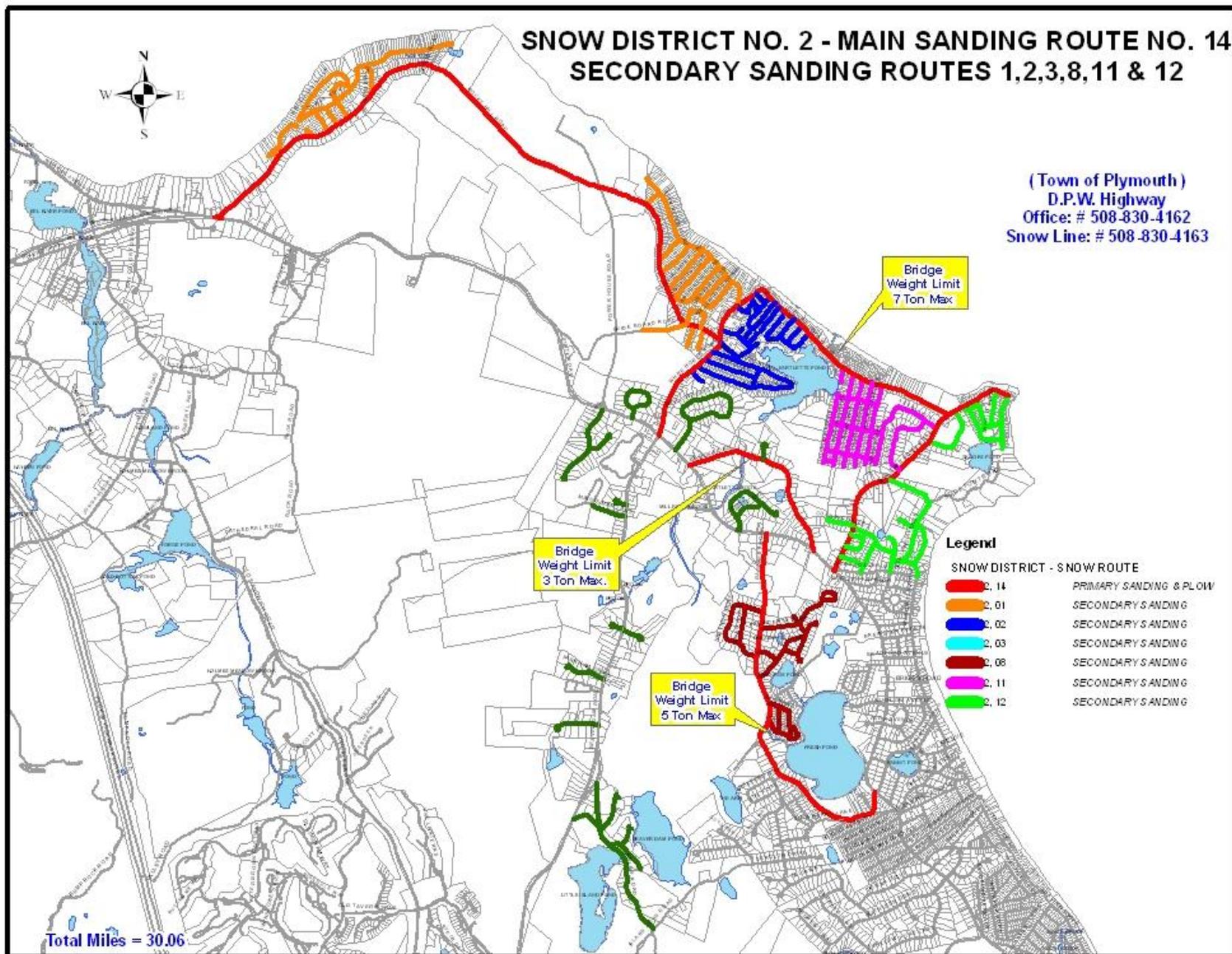
### Legend

SNOW DISTRICT - SNOWROUTE

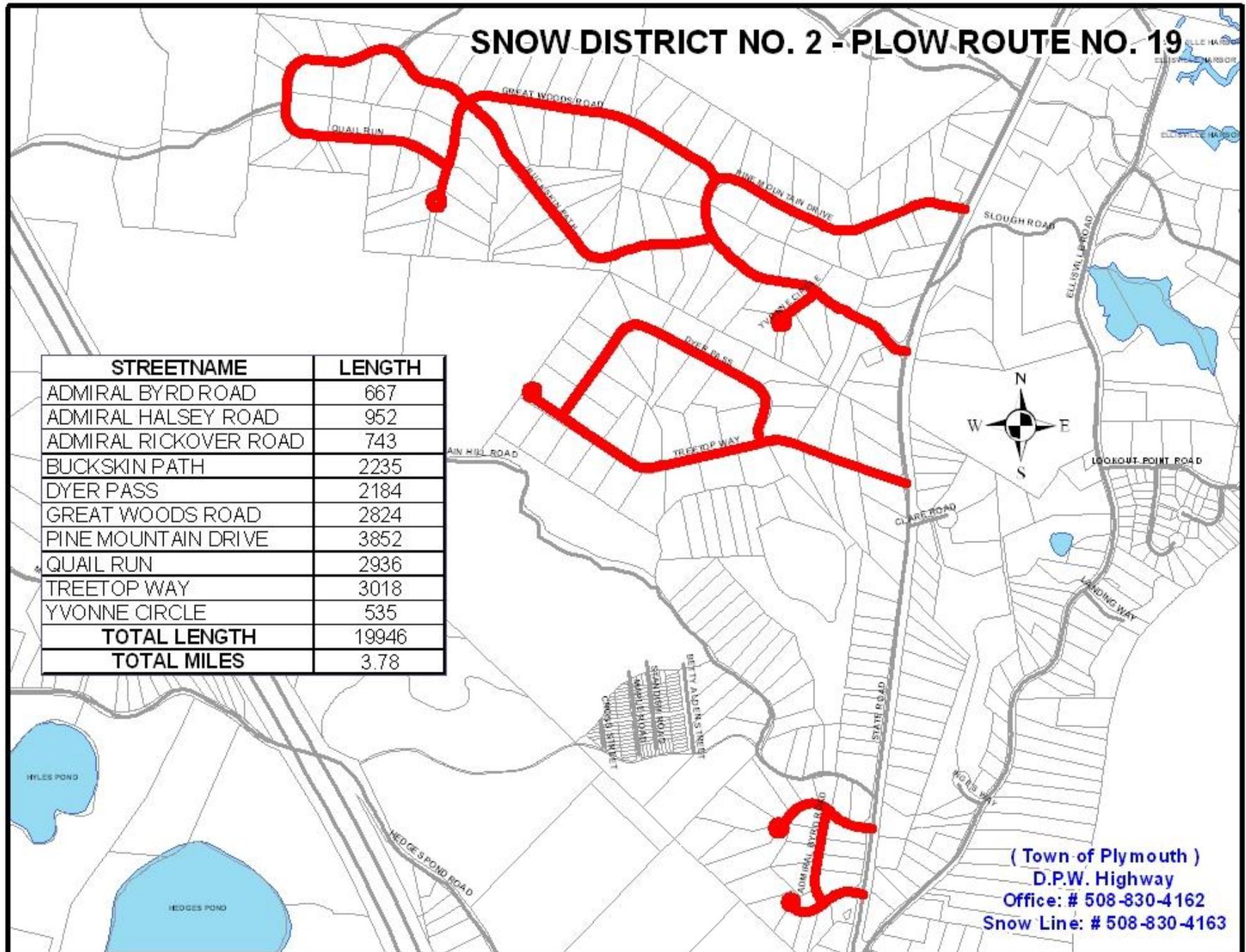
- |   |      |                        |
|---|------|------------------------|
|  | 1,01 | PRIMARY SANDING & PLOW |
|  | 1,02 | SECONDARY SANDING      |
|  | 1,03 | SECONDARY SANDING      |

(Town of Plymouth)  
D.P.W. Highway  
Office: # 508-830-4162  
Snow Line: # 508-830-4163

# Sample 2 - Main Route:



# Sample 1 - Sub-Route:



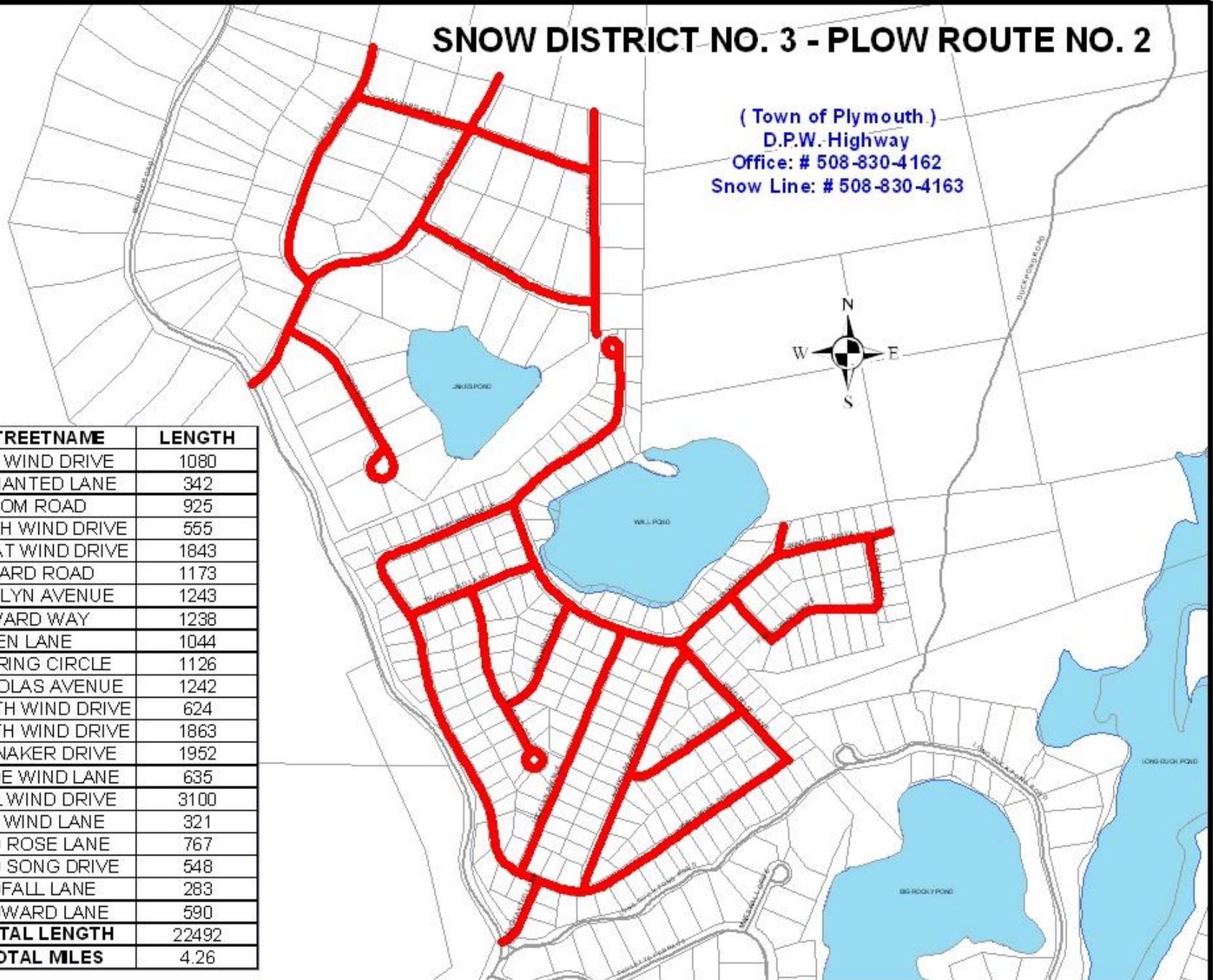
# Sample 2 - Sub-Route:

## SNOW DISTRICT NO. 3 - PLOW ROUTE NO. 2

( Town of Plymouth )  
D.P.W.-Highway  
Office: # 508-830-4162  
Snow Line: # 508-830-4163



STREETNAME	LENGTH
EAST WIND DRIVE	1080
ENCHANTED LANE	342
FATHOM ROAD	925
FRESH WIND DRIVE	555
GREAT WIND DRIVE	1843
HALYARD ROAD	1173
JOCELYN AVENUE	1243
LEEWARD WAY	1238
MIZZEN LANE	1044
MOORING CIRCLE	1126
NICHOLAS AVENUE	1242
NORTH WIND DRIVE	624
SOUTH WIND DRIVE	1863
SPINNAKER DRIVE	1952
TRADE WIND LANE	635
WALL WIND DRIVE	3100
WILD WIND LANE	321
WIND ROSE LANE	767
WIND SONG DRIVE	548
WINDFALL LANE	283
WINDWARD LANE	590
<b>TOTAL LENGTH</b>	<b>22492</b>
<b>TOTAL MILES</b>	<b>4.26</b>



**The following Snow Plans outlined are designed to give an overall summary of how our snow operations are designed. The Department of Public Works reserves the right to change or modify depending on weather conditions and resources available.**

# Plan 1

## GOALS AND OBJECTIVES:

*To place initial application of salt to all main arteries and hills in the Town within 3-5 hours of when snow begins.*

Exceptions include ineffectiveness of the use of salt, time of the day when traffic is very light, or decision made by management staff. Studies show that most accidents occur very early, (1" or less) after a storm begins, and that snow will bond to the pavement if salt is not placed very early on in a storm.

# Plan 1

## OPERATION:

Snow fighting vehicles will be assigned to predetermined routes. Application of salt will be made at 300 lbs., 500 lbs., or 800 lbs. per two-lane mile at the determination of the supervisor in charge. Sand and salt maybe mixed depending on weather conditions. Routes are designed to treat the most traveled roads first.

# Plan 2

## GOALS AND OBJECTIVES:

*To keep main arteries within the Town plowed during early stages of a storm.*

This plan will go into effect between one-half to 3 inches of snow depending on intensity, duration, and time of day. Decision to implement Plan 2 will be made by management.

## Plan 2

**Snowstorms many times come in when traffic is slow and do not necessitate plowing of all Town streets. However, in order to keep essential and emergency traffic moving, main arteries must be kept plowed. It also gives the department the ability to keep employees rested until the storm intensifies, or when traffic is heavy.**

# Plan 2

## OPERATION:

Snow fighting vehicles will be assigned to predetermined main routes. All routes are designed to keep main routes plowed in sequence of most traveled roads first.

# Plan 3

## GOALS AND OBJECTIVES:

*To plow all streets and sidewalks in the Town once a storm of 1 to 3 inches is completed, or continuous plowing of any storm predicted or greater than 3 inches.*

**In order to keep all streets serviceable throughout the winter, all streets must be plowed curb to curb once snow has stopped.**

## Plan 3

**During storms of 3 inches or more, snow must be kept continually plowed to insure travel and emergency vehicle access.**

**Goal: On main arteries this is no more than 1 to 3 inches and on side streets no more than 3 to 5 inches depending on moisture content of snow.**

# Plan 3

## OPERATION:

Snow fighting vehicles and sidewalk plows will be assigned to predetermined routes. All routes are in sequence to carry out the plowing in an effective and controlled fashion.

# Plan 4

## GOALS AND OBJECTIVES:

Once snowplowing is completed, abrasives will be applied to main routes first and to secondary roads on hills, curves, and intersections as required.

## OPERATION:

Snow fighting vehicles will begin with main routes and then complete secondary roadways.

# Plan 5

## GOALS AND OBJECTIVES:

To patrol for drifting snow and ice condition in days following a storm. Normal response is upon request of residents and police reporting these conditions.

## OPERATION:

Dispatch one or more snow fighters to treat specific areas.

# Plan 6

## GOALS AND OBJECTIVES:

To remove snow banks in the center core of the Town, school crossings and bus stops when snow becomes a hazard for sight distance, access of pedestrians, and provide storage for future storms.

# Plan 6

## OPERATION:

Sidewalk blowers, loaders, graders, trucks and street plows will be dispatched. Work may involve plowing snow away from intersections for safety, removing the snow banks on each side of the street, and cutting snow banks for line of sight. This process can go on a number of days after a storm depending on conditions.

# **Snow Ordinances**

**The Management of Vehicles and  
Traffic during Snow Events are  
Regulated under the following By-Laws:**

**Chapter 185  
Vehicles and Traffic**

**Chapter 162  
Streets and Sidewalks**

# Sec 185-1. Vehicles Obstructing Snow Removal

**No person shall permit or allow a motor vehicle to obstruct the removal of snow on any way within the town after having been notified by the Selectmen or their authorized agents to remove the same, and, upon failure of said person to remove said vehicle or in the absence of knowledge of the Selectmen or their authorized agents as to the ownership of said vehicle, said vehicle may be removed without said notice, and, in either event, said vehicle shall be removed at the expense of the owner or operator thereof.**

## Sec 162-7. Snow Removal

- A. The owner or his or her agent having charge of any building or lot of land bordering on any street or public place within one mile from the shoreline from Jabez Corner to the Kingston line, where there is any improved sidewalk in front of the same, shall, after the ceasing to fall of any snow, within 24 hours, cause a passable path or track to be cleared, made or beaten through the snow, and wherever within said limits there may be a Paved sidewalk, the same shall be cleared within six hours of daylight after the ceasing to fall of any snow, so that not more than one inch of ice or snow remains thereon.**
- B. The Selectmen may, from time to time, for periods of not more than one year, grant, in writing, exemptions from the operation of this section for such places as they may think proper.**

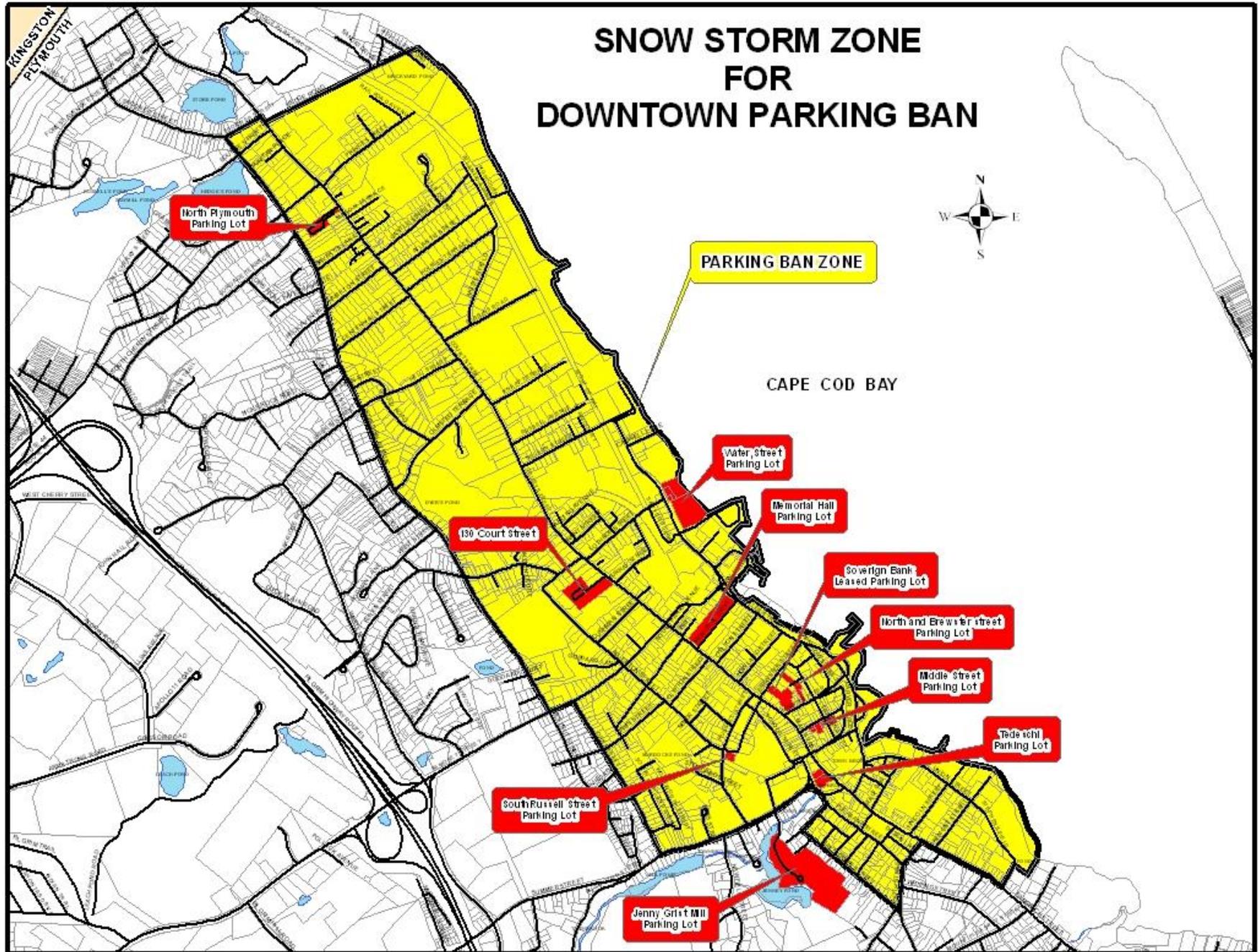
# **Implementation of Snow Ordinance**

## ***Does the Town really need a parking ban ordinance for snow removal?***

**Answer: Yes, snow must be removed and pushed back to the curb. Many streets in the older part of the Town are narrow. In order for a snowplow to have access to the street, cars must be removed. Snow which lies under cars when not pushed to the curb has a tendency to be dragged out into the roadway days after a storm causing slippery conditions. Snow which remains in the street will deter drainage and accelerate road deterioration. Emergency vehicles have a very hard time negotiating the streets.**

***It has been estimated by Public Works officials that plowing costs are doubled when cars remain on the street during plowing operations.***

# Parking Ordinance:



# Introduction:

**From time to time during the winter months there is a need to have vehicles off the public way so that plowing and removal operations can take place.**

**It is recommended that the following policy will be in place for the snow season with approval of the Board of Selectmen.**

# Implementation Steps:

- 1. The Board of Selectmen upon their vote will designate the Town Manager as their authorized agent as outlined in Sec 185-1.**
- 2. The Department of Public Works has determined that the critical no parking zone during snow and ice events would include (see map): Beginning at the most easterly terminus of Hedge Road then westerly on South Spooner Street, south on Standish Avenue to Samoset Street, east on Samoset to Oak Street, south on Oak, east on Summer Street to Pleasant Street, south on Pleasant to Mayflower Street west on Mayflower, south on Mayflower to Stafford Street, east on Stafford to Sandwich Street, south on Sandwich to Stephens Field.**

# Implementation Steps:

- 3. The Town Manager after discussions with the Public Works Director and Chief of Police will declare a no parking ban in the described parking zone as defined above.**
- 4. A snow and ice emergency will be declared no later than 5 p.m. preceding the day in which the snow emergency is declared.**
- 5. Snow emergency notification will be sent to the following two radio stations WATD (95.9FM), WPLM (99.1FM) and PAC-TV for public notification.**

# Implementation Steps:

6. All owners of vehicles parked in the public way in the designated area will be expected to remove their vehicles from 1:30 a.m. to 6 a.m.
7. Any vehicle on the street during this time period can be ticketed with a fine of \$50.00 and their vehicle may also be towed at the owner's expense.
8. Police officers enforcing the parking ban will be paid out of the snow account.

## Implementation Steps:

9. Residents who do not have a place to park their vehicles during a snow and ice event will be able to park their cars in the following parking lots between the hours of 7 p.m. to 7 p.m. in the following locations: North Plymouth Parking Lot, 130 Court Street, Water Street Parking Lot, Memorial Hall Parking Lot, South Russell Street Parking Lot, the Jenny Grist Mill Parking Lot, Middle Street Parking Lot, North and Brewster Street Parking Lot, Sovereign Bank Parking Lot and Tedeschi Parking Lot.
10. The above parking zone declaration does not preclude the Town enforcing Sec 185-1 Vehicles Obstructing Snow Removal in any other part of the community after being notified as outlined in Sec 185-1 Vehicles Obstructing Snow Removal.

# Questions and Complaints Most Often Received During the Winter Season

- *Why is snow pushed into my driveway by sidewalk and street plows?*

- *Answer:*

It's really unavoidable. We know of no other Town of our size in New England which removes snow from residents driveways. It would cost literally hundreds of thousands of dollars to handle such a service. Our crews will move snow back to the curb as soon after the storm as possible.

- *Can I as a resident, push snow from my property onto the sidewalk from street?*

- *Answer:*

**No. Dumping of snow is a very dangerous act that can cause skidding accidents, and may bring you significant liability if an accident is caused by this dumping of snow.**

- *Do some streets get more of a priority during a snowstorm?*

- ***Answer:***

**Yes, Major roadways in our snow plan that receive a higher volume of traffic receive higher service as outlined in our snow plan.**

- *Can I park my car on the street during winter months?*

- *Answer:*

**Under Town Ordinance, no car is allowed to be parked on a Town street from 12:00 midnight to 6 a.m. from December 1st to March 1st. The Town Manager also has the power to declare an emergency parking ban as deemed necessary to clear the streets at other times of the day or year. During the times of a parking ban or an emergency declared by the Town Manager, cars remaining on the street will be ticketed and towed at the owner's expense.**

- *What should I do if I think a snowplow is traveling too fast for safety?*

- **Answer:**

**Our plows are directed to plow between 10 and 20 m.p.h. and sometimes slower; the only exception is on some of the major roadways. If you believe speeds are in excess of safe conditions, please contact us giving us the location, description of vehicle and time. We will investigate accordingly.**

- *What should I do if a snowplow damages my property?*

- **Answer:**

**Please send a letter to the Town Manager's Office at 11 Lincoln Street. Provide the following information: description of vehicle, location, and estimated time of accident. Enclose any pictures or estimates. We then can investigate the position of our vehicles. After investigation, we will get back to you in writing with our position within 14 - 21 days.**

- *Do sidewalks receive the same priority as streets?*

- **Answer:**

**No, but we are making extensive improvements to increase the service on our sidewalks throughout the Town this year.**

- *Do the Town Manager and Selectmen get their streets plowed first?*

- **Answer:**

**No.**

- *Does the Department of Public Works take constructive criticism and input from citizens?*

- **Answer:**

**We certainly do, and encourage it. If a group of citizens would like to meet with us or have suggestions, please do not hesitate to contact us.**

- *Where should I call if I have a question or complaint?*

- **Answer:**

**We would ask that all calls be made Monday through Friday, between the hours of 8 a.m. and 3 p.m. at 508-830-4163. However, if you feel there is an emergency or an issue that can't wait, please call this number at your convenience. If you wish to write a letter, send it to:**

**Dept of Public Works**

**11 Lincoln Street**

**Plymouth, MA 02360**

## Summary:

One of the most important tasks that a Department of Public Works undertakes is the management of snow and ice. This task can not be completed without a strong team of individuals working together. I want to thank our DPW Operations Manager and the GIS STAFF from our Engineering Department who were working on this snow plan during the summer of 2005 when most were enjoying the beach. Special thanks goes to the Union Leadership who have worked with us to improve our snow plan.

I want to especially thank in advance all of our public works employees and private contractors who will work around the clock storm after storm this winter to ensure your road is taken care of. If you get a chance while you are out shoveling to wave to your plow operator it will make a difference in their day.

Thank you.