

NEW SEWICKLEY TOWNSHIP'S SNOW AND ICE CONTROL PLAN

GENERAL INFORMATION GUIDELINES AND OPERATIONAL PROCEDURES FOR THE ROAD DEPARTMENT OPERATIONS MATERIALS MANAGEMENT PLAN

NEW SEWICKLEY TOWNSHIP, PENNSYLVANIA

2021 - 2022



TABLE OF CONTENTS

- I. Introduction
- II. Operational Guidelines
- III. Materials Management





INTRODUCTION

I.A. General

It is **NEW SEWICKLEY'S** goal to provide a transportation system that is passable and reasonably safe as much of the time as possible within the limitations imposed by the natural environment and the availability of equipment, material, and personnel resources. As a result of those limitations, it is recognized that there will be occasions when the pavement and bridge surfaces will be slippery and/or snow and ice covered. During these periods drivers must recognize the conditions and operate their vehicles in an appropriately safe manner.

This manual provides information and guidance to assist **NEW SEWICKLEY** Road Department in conducting snow and ice control operations. It will serve as a basis for training **NEW SEWICKLEY** personnel.

The manual contains information on pre-winter operations and readiness, total storm management and decision making using **NEW SEWICKLEY** information resources, pre-storm preparedness, treatment options, post storm and post season activities. The provisions were developed to provide a reasonable balance among safety, cost, and environmental responsibility. The manual also contains related operational procedures and personnel procedures. The contents of this manual supersede all applicable prior manuals, directives and guidance relating to snow and ice control.

The contents of this manual reflect best practices as determined from a review of the relevant national and international literature and from information obtained from **NEW SEWICKLEY** maintenance personnel through surveys and interviews. It is intended to be a living document that is responsive to new technology and techniques developed within **NEW SEWICKLEY** and elsewhere. Suggestions for change may be submitted at any time to the Road Department Foreman

The words shall, must, should, recommended and may, used in Section II of this manual have the following meanings:

shall and must: a required course of action

should and recommended: a recommended course of action

may: an optional course of action

I.B. Specific Information for Residents and Property Owners

I.B.1. How Residents and Property Owners Can Help Assure the Safety and Efficiency of NEW SEWICKLEY'S Snow and Ice Control Operations

- a. Do not park on township streets, especially during snow or ice events
- b. When possible, do not park cars in driveways within 10 feet of edge of pavement
- c. Do not allow children to build and occupy snow forts and similar creations within 10 feet of the edge of pavement
- d. Do not relocate snow from driveways and sidewalks into the paved street. This is in violation of Pennsylvania law and will cause a hazardous condition on the street (PA C.S., Chapter 55)
- e. Fences should not be within 10 feet of the edge of pavement
- f. Remove all non-permanent seasonal items from within 10 feet of edge of pavement
- g. Trim trees so that branches do not extend beyond the back of the curb and a minimum of 14' in height.
- h. Pile most of the snow from the driveway throat on the traffic downstream side. This will minimize visibility problems

I.B.2. Roads within New Sewickley Township that are NOT maintained by the Township of New Sewickley

Following is a list of roads/plans that are **NOT** maintained by the Township (they are either maintained by the state or receive private maintenance).

Table 1 Roads NOT maintained by NEW SEWICKLEY

State Maintained Roads	Privately Maintained Roads/Developments	
Freedom Road	Patriot Lane	Popular Street
Freedom Crider Road	Pioneer Lane	Cyprus Ave
Crow's Run Road	Old Glory Lane	Deana Way
Lovi Road	Monroe Blvd	Walker Lane
Interstate /PA Turnpike	Madison Blvd	Bud Drive
Harvey Run Road	Lincoln Blvd	Ash Street
Ninth Street Ext	Jackson Blvd	Amy Lane
Route	Jefferson Blvd	Sportsman's Lane
Zeigler Road	Hamilton Blvd	Christine Drive
Ift Road	Franklin Blvd	Coleman Drive
Munz Road	Van Buren Blvd	Boyd Lane
Willoughby Run Road	Roosevelt Blvd	Montrose Drive
Hartzell School Road	Davis Lane	Martin Lane
Mellon Road	Twin Creek Lane	Rinard Drive
Tulip Dr	Climo Lane	Shorty Lane
Brush Creek Road	Meeder Lane	Chevy Lane
Deer Lane Ext	Leibolt Court	Shumsky Lane
Big Knob Road	Royal Drive	Manor Lane
	Skyview Lane	Beagle Club Lane
	Colonial Lane	Arbogast Lane
	Hunter lane	Hardman lane
	Modrak Lane	Ross Drive
	Midway Lane	Youngvalley Lane
	Princeton Place	Vargo Lane
	Yale Circle	Little Deer Creek Drive
	Knobvue Dr	Windy Lane
	Geneva Lane	Dutchman's Run Lane
	Harvard Circle	Power Line Road
	Purdue Dr	Evergreen Lane
	Lynn Drive	Cordes Lane
	Graham Drive	Treesdale Lane
	Panarama Lane	Cook's Lane
	Mandi Lane	Lake lane
	Magnolia Street	Meehan lane

I.B.3. Private Driveways

Township snow removal crews do not clear private driveways or driveway entrances of accumulated snow.

I.B.4. Protection of Driveways

Prior to snow removal season apply a driveway protectant. This will help eliminate the possibility of damage from snow removal materials. The Municipality is not responsible for damage to private driveways, etc. due to snow removal materials or damage by plows.

I.B.5. Plow Trucks with Plows Raised

A truck with a raised plow does not always mean the driver has completed your area. They may be:

- a. Returning for fuel or vehicle service
- b. Returning to the Road Department Garage for additional treatment material
- c. Responding to a call to assist Emergency Services, i.e.:
 - Police Department
 - Volunteer Fire Department
 - Volunteer Ambulance
 - School District Transportation Department

I.B.6. Mailboxes and Mailbox Posts

Each year, the New Sewickley Township Road Department schedules a preliminary run of all Snow Routes to identify obstacles and areas of concern. This allows the Road Department to identify problems that stand in the way of the snow removal.

You can help reduce the possibility of a damaged/broken mailbox or mailbox post. Experience has shown that reduced visibility during a storm makes it difficult for a driver to see a post in time to avoid striking it or pushing it over with plowed snow.

Any installation within the right of way - including a mailbox/post - is placed there at the owner's risk. Owners are encouraged to install mailboxes at the maximum usable distance from the edge of the pavement. Mailboxes and supporting posts must be installed to withstand the rigors of snow removal, including the force of snow pushed from the street onto the roadside.

The New Sewickley Road Department does not repair or replace mailboxes and/or posts that have fallen from the force of plowed snow.

The New Sewickley Township Road Department repairs or replaces mailboxes and/or posts that have been struck by the plow blade, a paint mark or truck tire tracks will supply evidence of a mailbox strike.

Please contact the New Sewickley Road Department at 724-774-7822, to report a plow-damaged mailbox. The Road Department Foreman will investigate.

I.B.7. Contacting the Township during a Snow or Ice Event

Avoid calling municipal offices during a storm except in an emergency. Personnel are extremely busy dealing with storm conditions.

Please keep telephone lines clear for emergencies

Emergency calls during snow removal season should be placed to New Sewickley Township, 724-774-7822, Monday thru Friday 8:00 am to 4: pm. **Weekends and evenings, please call 911.**

I.B.8. Priority of Treatment

Treatment priorities are found in Section II.B of this document

II. OPERATIONAL GUIDELINES

II.A. Goal of Snow and Ice Control Operations

NEW SEWICKLEY will conduct snow and ice control activities that afford customers a reasonably safe and passable (not necessarily bare) road surface as much of the time as possible. To accomplish that, snow and ice accumulations will be removed as soon as possible, consistent with stated priorities and resources. To the extent possible, the bond of snow and ice to the pavement will be prevented by the timely application of anti-skid material and ice control chemicals (anti-icing strategy). All Township roadways will receive a mix of abrasives/road salt and any adjustments to the mix will be made based on roadway conditions and available materials.

Certain conditions such as blizzards, whiteouts, other locally severe snow or ice events, thin ice formation in the absence of or during very light and spotty precipitation, and other conditions unknown to or beyond the control of **NEW SEWICKLEY** maintenance forces may temporarily preclude achieving this goal.

II.B. Operational Priorities and Personnel Policies

II.B.1. Operating Priorities

NEW SEWICKLEY has established a traffic volume and route type classification system for determining the priority of snow and ice control operations. Generally, a lowered level of service will be provided between the hours of 9 PM and 5 AM.

II.B.2. Personnel Policies

II.B.2.a. Hours of Continuous Duty

A driver may be on duty a maximum of 16 hrs followed by a minimum of 8 hrs continuous rest – unless declared emergency by local authorities (ref: PA Bulletin, Doc No. 11-1932; Title 67 Transportation 67 PA Code CH 231– “This emergency regulation is needed to provide State and local governments with the flexibility to ensure that roadways can be cleared of snow... drivers performing roadway maintenance, snow plow operations and traffic control support operations from the hours of service and driver log requirements.”)

II.B.2.b. Call-In Procedures

Drivers are required to report for duty within 60 minutes of notification.

II.B.2.c. Fitness for Duty

- i. Drug and alcohol policy as outlined by the Pennsylvania CDL requirements and New Sewickley Policy
- ii. Other factors

II.B.3. Operational Resource and Responsibilities Equipment

Type and Location:

Type	Attachment(s)	Location
<u>Loaders</u>		
2018 Cat	Bucket	Municipal Lot
<u>Excavator</u>		
Cat 305.5	Bucket	Municipal Lot
<u>Skid Steer</u>		
Cat 259 Skid Loader	Bucket	Municipal Lot
<u>Medium Duty Truck</u>		
2015 Terrastar	Vbox/Plow/Drop	Municipal Lot
2013 Dodge 5500	Vbox/Plow/Drop	Municipal Lot
<u>Heavy Truck</u>		
2020 Mack	Dump/Plow/Broadcast	Municipal Lot
2014 International 7	Dump/Plow/Drop	Municipal Lot
2007 Peterbuilt	Dump/Plow/Drop	Municipal Lot
1996 International	Dump/Plow/Drop	Municipal Lot
<u>Broom/Sweeper</u>		
1994 Brosco	Broom	Municipal Lot
1994 Athey	Street Sweeper	Municipal Lot

Personnel Available:

Road Department:

<u>Personnel</u>	
RJ Kraus	CDL / Road Foreman
Bill Burr	CDL
Paul Moehrle	CDL
Calvin Steffler	CDL
Brad Mutschler	CDL

Budget:

2022 Budget

Salt and Anti-Skid	\$50,000
Snow Removal/Wages	\$17,500
Equipment/Repairs	<u>\$20,000</u>
Total	\$87,500

Salt Storage:

Salt shed capable of storing about 275 tons of material.

About 2,000 tons of Abrasives/Anti-ski material is available. The Road Department will add small amounts of salt as necessary to Abrasives pile to keep materials from freezing.

Number of Assigned Plow Routes: 5

Table 2 – Current Plow Routes

Run 1 - Heavy Duty Truck	Run 2 - Heavy Duty Truck	Run 3 - Medium Duty Truck
Harkins Mill	Miller	Danburry
Glen Rape	Grange	Tri County
Brunner	Pine Run	Fred's Hill
Klein	Spade	Pine
Hoffman	Blackwoods	Robinson
Darlington	Fezell	White Oak
Steel School	Barton Plan	Suzanne
Blank	Brewer	Apple
McElhaney	Paige	Pecky
Jackson		Harvey
Metz Hill		Elm
Landis		Robinson
Baker		Thorne
Wolfe Run		Park Quarry
		Romeigh
Run 4 - Heavy Duty Truck	Run 5 - Medium Duty Truck	
White's Hill	Mellon	
Bonzo	Wall	
Taffy Run	Shaffer Plan	
Rothart	Brown	
Druschel	Willowmere Park	
Powell	Kornman	
Cunning	Ochs	
Burns	Mabel	
Pflug	Fletcher-LaFayette-Penn- Hillman	
Woodrow	Hillside-Highview Park	
Steinbach	Orchard	
Teets	Highland	
	Locust	
	Mengel Heights	
	Pine Run Firehall	

II.B.4 Operators Direct Communication with the Public

Operators are to report all stranded or stuck vehicles to the New Sewickley Township Police Department. Operators may stop to check to see if the vehicles passengers are safe.

If an Operator is being flagged down to stop by a resident, the Operator may stop; however, the Operator should offer that all disputes or concerns be directed to the Administration office. All Operators should have contact info for the Township to hand to the resident.

EMERGENCIES WILL BE REPORTED TO 911

II.C Pre-Winter Activities

II.C.1 Review and revise this manual as necessary

As this is a living document, appropriate changes should be incorporated as soon as possible. Areas that may change include: highway responsibility, technology, procedures, equipment, personnel, staffing, materials and level of service. Sources of changes may include: our customers, individual or work group suggestions, personnel meetings, post-season reviews, and **NEW SEWICKLEY** management.

Levels of service goals should be reviewed for their impact on plow routes and required resources (personnel, equipment, materials, facility, etc.). Those resources should be assigned as necessary.

II.C.2 Equipment Readiness

All of **NEW SEWICKLEY's** snow and ice control related equipment should be inspected; test runs completed, repaired as necessary, and receive scheduled maintenance prior to the snow and ice season.

II.C.2.a Truck Readiness

The prescribed seasonal and use based maintenance service should be completed prior to the winter season. All trucks should be checked with full winter gear (plows and spreaders) well in advance of the first anticipated snow or ice event.

II.C.2.b Material Spreader Readiness

The materials spreaders should receive required maintenance and be lubricated, repaired, test run and calibrated. All ground speed-controlled materials spreaders should have a backup or manual calibration that can be used if the automatic system fails. A calibration procedure is found in Appendix C.

II.C.2.c Plow Equipment

Plow equipment should be inventoried, test mounted, and inspected for proper function, missing parts, structural damage, proper adjustment, and sufficient remaining wear depth on items like shoes and cutting edges. Necessary repairs and replacement should be made. Plows should be stored in a position for easy hookup and have easy-to-read identification to match them to the proper truck.

II.C.2.d Spare Parts

The maximum allowable stock of commonly used spare parts should be acquired prior to the snow and ice season. These include: cutting edges, plow shoes, shear pins, nuts and bolts, filters, bulbs, spreader controller parts, springs. Windshield wipers should be new or near new at the start of the winter maintenance season.

II.C.2.e Individual Tools and Safety Gear

Trucks should be checked for the required compliment of tools and safety gear. These include, for example: shovels, bars, hand tools, tire chains, flashlights, flags, flares, warning devices, gloves, tow chains, ice scrapers, and snow brushes/brooms. Proper stowage for these and other in-cab loose items must be provided.

II.C.3 Personnel Readiness

II.C.3.a Acquisition and Assignment

Specific route assignments should also be made prior to the snow and ice season and added to this document (See Table 2). However, there should be provisions to accommodate the lack of specific employees or equipment.

II.C.3.b Callout and Family Readiness

Callout procedures, impacts of winter maintenance on family life and family responsibilities is reviewed and discussed with applicable **NEW SEWICKLEY** personnel before the snow and ice season.

II.C.3.c Training

Snow and ice control training should be accomplished prior to the snow and ice control season. Training topics include at a minimum: Intra-**NEW SEWICKLEY** communication, cooperation and responsibilities; weather conditions, road conditions, road and weather information systems; safety issues; public relations/information issues; operational issues and procedures; level of service (local and system-wide); equipment readiness; materials management; new technology, new initiatives and procedures; and emergency response issues.

II.C.4 Materials Readiness

II.C.4.a Contracts

NEW SEWICKLEY acquires most snow and ice control materials through the contract process. Given the time required to establish a contract, these requirements and contracts and purchase requisitions should be done early. Typical materials purchased include sodium chloride (salt or rock salt) and abrasives. Individual responsibilities in the contract administration process should be defined. Quality assurance procedures should be established for each material. It is the Township's current practice to coordinate with the Beaver County COG Purchasing Agreement and the PA Co-Stars Purchasing Agreement to purchase salt.

II.C.4.b Materials Storage Structure

Most **NEW SEWICKLEY** snow and ice control chemicals are stored in a structure. This structure and associated run-off containment features, lighting systems, and ventilation systems should be inspected and repaired as necessary. It should be filled to working capacity prior to the snow and ice season.

II.C.5 Emergency Readiness

Staff likely to be involved should review relevant portions of this document. Cooperative agreements within and outside **NEW SEWICKLEY** should be reviewed and reaffirmed with the cooperating groups.

II.C.6 Highway System Readiness

Various elements of **NEW SEWICKLEY'S** highway system should be checked and given necessary attention as required.

II.C.7 Maintenance Facility Readiness

Certain features of **NEW SEWICKLEY'S** maintenance facilities should be inspected and repaired as necessary prior to the snow and ice season. These include: buildings, yard traffic areas, fuel delivery systems, yard and garage lighting, and run-off control features.

II.C.8 Public and Customer Readiness

The traveling public and **NEW SEWICKLEY** residents should receive information to assist them in transitioning and adjusting to winter driving. **NEW SEWICKLEY** has a number of opportunities to deliver

valuable information including newsletters, website, and social media. New Sewickley employees are to be as courteous and helpful to public inquiries as possible.

II.C.9 Communication Systems

New Sewickley has a variety of communications systems including: radio, cell phone, and land-line phone and fax. These systems should be checked prior to winter and any necessary training/retraining provided.

II.C.10 Responsibilities of New Sewickley Police Department Associated with Snow and Ice Events

The police department is responsible for providing the Road Department with timely notification and description of the following snow/ice/weather conditions:

- a. Type and intensity of weather event
- b. Time event started
- c. Location(s) of observations
- d. Amount of snow/ice on road
- e. Locations that are particularly slippery
- f. Traffic flow and accident information

II.D. Decision Making for Snow and Ice Control Operations

NEW SEWICKLEY will use information-based decision making for determining appropriate snow and ice control treatments. That process involves the following:

1. Gathering all available relevant information about recent past, present, and near-term future conditions.
2. Selecting a cost-effective treatment option that best addresses those conditions.
3. Systematically gathering and evaluating data on treatment effectiveness, actual road conditions, and actual weather conditions from operators and other sources.

II.D.1 Elements of Snow and Ice Control Decision Making

II.D.1.a Status of Assets

Assets for snow and ice control operations include personnel, equipment, information systems, and materials inventories. Deficiencies in any of these areas will impact treatment decisions. Loss of truck availability due to mechanical failures or accidents will have an impact on response time and general snow removal operations. Every effort will be made to cover the route(s) by alternative methods.

II.D.1.b Weather Information

II.D.1.b.1 Weather Forecasts

There are a variety of weather forecast products available to **NEW SEWICKLEY's** maintenance forces. Decision-makers will be simultaneously evaluating short-term, mid-term, and long-term forecasts. Information on precipitation should include onset, cessation, type and intensity. Other relevant factors include air temperature, dew point, wind speed, wind direction, and cloud cover.

II.D.1.b.2 Current Weather Data and Observations

Current weather data and observations may be obtained from maintenance patrols, operators, and media outlets.

II.D.1.b.3 Other Weather Information

Other weather data sources include radar and satellite imagery (from DTN, Internet and local TV), NOAA radio, the Weather Channel; computer acquired current condition data from upstream storm locations, local TV and radio, etc.

II.D.1.c Highway and Pavement Information

II.D.1.c.i Accumulations of Snow and Ice on the Pavement

Knowledge of the character and depth of any snow or ice accumulation on the pavement surface prior to treatment is important in the treatment decision process. Relative slipperiness and whether or not the snow or ice is bonded to the pavement are even more important.

II.D.1.c.ii Traffic Characteristics

Traffic data are important to the decision-maker. Relevant characteristics include volume, speed, timing of peak flow, status of any closures and any reduction in available lanes.

II.D.1.c.iii Status of Critical Locations

Traffic flow and pavement condition information for critical locations are important in prioritizing snow and ice control operations. Critical areas include hills, intersections, bridges, cold locations (low, shaded and elevated) locations having mist or fog generation tendencies, high snow and ice accident locations, school bus routes, Pine Run Volunteer Fire Department, Big Knob Volunteer Fire Department and Ambulance Service.

II.D.1.d Assessments of Effectiveness and Efficiency

Systematic after-action assessments of effectiveness and efficiency are important in the decision-making process as they provide a knowledge base for future decisions. Factors to evaluate include cycle times

achieved, materials used, equipment performance, and cooperative procedures. All Township roadways will receive a mix of abrasives/road salt and any adjustments to the mix will be made based on roadway conditions and product availability.

II.E Snow Control

II.E.1 General

For the purpose of this manual snow and ice control operations are separated into two categories 'snow control' and 'ice control'. Snow control is the mechanical removal of accumulations of loose snow from the paved and stabilized portions of the system. This is accomplished primarily with truck-mounted plows. In certain circumstances like cleanup and drift removal, a Wheel-Loader or skid steer could be used.

Ice control is all treatment operations directed toward preventing snow or ice from bonding to the pavement and the chemical and or mechanical removal of bonded snow or ice from the pavement. It also includes providing temporary friction improvement by spreading abrasives mixtures and using no-treatment when appropriate.

Snow control is one of the most difficult and important tasks assigned to **NEW SEWICKLEY** Road Department personnel. Having uniform snow control methods is important for the safety of our customers and our maintenance personnel.

There are some definitions relating to snow control that will help clarify subsequent sections of this manual:

snow plowing - the relatively rapid displacement of snow from paved surfaces with vehicle-mounted plows and wing plows.

snow removal - physically relocating areas of accumulated snow. This is usually a slow operation that may be accomplished with plows, loaders or snow blowers.

berm or windrow - an accumulation of snow cast by plow or other equipment.

tandem plowing -snow plows working together to clear wider areas.

There are some general guidelines for keeping snowplowing operations reasonably uniform on **NEW SEWICKLEY** system:

- a. To the extent possible, traffic should not have to pass through a berm of plowed snow.
- b. All plowing shall be done with trucks moving in the direction of traffic, except in an emergency where the work area is closed to traffic or, backing in the direction of traffic is required to spread material on very slippery surfaces where normal directional travel will not provide sufficient traction for the truck to move and as necessary in the cul-de-sacs.

- c. To the extent possible, plow snow beyond the point where it could melt and run back across the highway. Snow may be cast toward the center of the cul-de-sacs even though it may be higher than the outside.
- d. Plowed snow shall not be cast into traffic.
- e. In the cul-de-sacs and dead ends, cast snow away from the driveways to the extent possible. This is less demanding on the property owners and facilitates more efficient general route plowing.
- f. Within the normal sequences of operations, any time there is enough snow on the road to plow, it should be plowed.
- g. In events where snow is likely to change to freezing rain before ending, consideration should be given to leaving enough unplowed snow on the road to absorb the freezing rain. Plow and treat the road again after the event has ended.
- h. At the end of the storm, push snow back as much as possible to make room for the next snowstorm.

Occasionally snowfall intensity is so severe that operator visibility is reduced to a few feet. With Road Department Foreman approval, operators may drive their trucks to a safe haven that is stable and well off the highway, shut their lights off and wait until visibility improves before continuing.

When low visibility is anticipated, extra caution in operations should be exercised. Vehicles and other obstacles may be anywhere. The Road Department should be prepared to suspend operations and recommend road closure if conditions warrant or recommend temporary road closure so that plowing can be completed.

II.E.2 Safety Restoration and Cleanup Operations (Snow Removal)

After the entire **NEW SEWICKLEY** maintained roadway system is in satisfactory condition, safety restoration and cleanup operations shall begin and continue until complete, or operations are directed to higher priority snow and ice control or emergency work. This work will generally be performed on a regular time basis. Coordination of this work with interfacing agencies and other **NEW SEWICKLEY** units is recommended. Cleanup operations that may impact traffic flow or larger numbers of customers should be performed in lower volume time periods if possible and utilize traffic protection where appropriate.

II.E.3 Drainage Restoration

After safety restoration and cleanup operations are complete, drainage facilities should be inspected and cleared as necessary

II.F Ice Control

Ice control is all treatment operations directed toward preventing snow and ice from bonding to the pavement and the chemical and/or mechanical removal of bonded snow or ice from the pavement. It also includes providing temporary friction improvement by spreading abrasives and abrasives/chemical mixtures and using delayed or no-treatment options when appropriate.

II.F.1 Ice Control Strategies

There are three basic ice control strategies used by **NEW SEWICKLEY**: temporary friction improvement, de-icing with temporary friction improvement, and delayed or no treatment. When conditions are favorable for success and resources permit, de-icing with temporary friction shall be the strategy of choice. All Township roadways will receive a mix of abrasives/road salt and any adjustments to the mix will be made based on roadway conditions if resources are available.

II.F.1.a Temporary Friction Improvement

Temporary friction improvement is an immediate short-term improvement in surface friction that is achieved by spreading abrasives or abrasives/chemical mixtures on the snow or ice surface. There will be times when this is an appropriate strategy usually in very cold conditions. A major disadvantage of this strategy is that its effectiveness degrades very quickly with traffic. If sufficient ice control chemical is spread with abrasives, it can be part of de-icing strategies.

II.F.1.b De-Icing with temporary friction improvement

De-icing with temporary friction improvement is a traditional strategy for dealing with snow or ice that has already bonded to the pavement surface. De-icing is most effectively accomplished by spreading a coarse graded solid mixed with Sodium Chloride on the surface of the bonded snow. The coarse particles will melt through the snow and ice and break the bond across the pavement surface.

II.F.1.c Delayed or Non-Treatment

Conditions where this tactic should be considered include light precipitation events, where pavement temperature is likely to remain above freezing and dry snow and blowing snow events where pavement surface temperature is below about 10° F and there is no residual ice control chemical on the pavement.

II.F.2 Terms Relating to Precipitation, Road Conditions, Ice Control Chemicals, and Operational Procedures

II.F.2.a Precipitation Terms

Light Rain - Small liquid droplets falling at a rate such that individual drops are easily detectable splashing from a wet surface. Include drizzle in this category.

- Moderate Rain - Liquid drops falling are not clearly identifiable and spray from the falling drops is observable just above pavement or other hard surfaces.
- Heavy Rain - Rain seemingly falls in sheets; individual drops are not identifiable; heavy spray from falling rain can be observed several inches over hard surfaces.
- Freezing Rain - When rain freezes upon impact and forms a glaze on the pavement or other exposed surfaces.
- Sleet (Ice Pellets) - Precipitation of transparent or translucent pellets of ice, that are round or irregular in shape.
- Light Sleet - Scattered pellets that do not completely cover an exposed surface regardless of duration. Visibility is not affected.
- Moderate Sleet- Slow accumulation on ground. Visibility is reduced by ice pellets to less than 7 miles.
- Heavy Sleet - Rapid accumulation on ground. Visibility is reduced by ice pellets to less than 3 miles.
- Light Snow - Snow alone is falling and the visibility is greater than 2 mile.
- Moderate Snow- Snow alone is falling and the visibility is greater than 3 mile but less than or equal to 2 mile.
- Heavy Snow - Snow alone is falling and the visibility is less than or equal to 3 mile.
- Blowing Snow - When fallen snow is raised by the wind to a height of 6 feet or more and is transported across a road.
- None - No precipitation or blowing snow.

II.F.2.b Road Condition Terms

- Dry - No wetting on the pavement surface
- Damp - Light coating of moisture on the pavement resulting in slight darkening of surface, but with no visible water drops.
- Wet - Road surface saturated with water from rain or melt-water, whether or not resulting in puddling or run-off.

- Slush - Accumulation of snow on the pavement that is saturated with water. It will not support any weight when stepped or driven on but will not squish until the base support is reached.
- Loose Snow - Unconsolidated snow that can be blown by the wind into drifts or off of a surface, or blown by traffic into non-traffic areas or off of a surface.
- Packed Snow - Snow-pack or pack that result from compaction of wet snow by traffic or by alternate surface melting and re-freezing of the water.
- Frost - Also called hoarfrost. Ice crystals in the form of white scales, needles, feathers, or fans deposited on pavement and other surfaces cooled by radiation or by other processes.
- Thin Ice - A very thin coating of clear, bubble-free, homogeneous ice which forms on a pavement; sometimes called black ice.
- Thick Ice - A coating of ice thicker than black ice or frost that is formed from freezing rain, or from freezing of ponded water or poorly drained melt-water. It may be clear or milky in appearance, and generally is smooth though it sometimes may be somewhat rough.

II.F.2.C Ice Control Chemical Terms

- Form - The physical state of the chemical usually solid or liquid
- Gradation - The distribution of particle sizes for solid chemicals and abrasives; (a characterization) fine, coarse, percent passing various sieve sizes, etc.
- Concentration - The percent (by weight) of the ice control chemical in the liquid or solid product
- Eutectic Temperature - The lowest temperature a concentrated (near saturated) solution begins to freeze or the lowest temperature it will melt ice.
- Eutectic Concentration - The solution concentration that produces the eutectic temperature

II.F.2.d Operational Procedure Terms

Pre-treating -Applying an ice control chemical mixed with abrasives to the road before a snow or ice event begins

Application Rate- The amount (weight or volume) of ice control chemical applied per mile or lane mile of highway

II.F.3 Ice Control Chemicals

NEW SEWICKLEY uses a solid ice control chemical.

The important properties of ice control chemicals include the lowest (eutectic) temperature it will melt ice, how much ice will be melted at various temperatures, and the relationship between solution concentration and freezing point. The lowest (eutectic) ice melting temperatures appear in Table 3.

The temperatures above are pavement surface temperatures. Other chemicals have similar relationships where their effectiveness decreases with decreasing pavement temperature.

Table 3 Ice Control Chemical Comparison

CHEMICAL		TEMPERATURE, F		CORROSION POTENTIAL		CONCRETE DAMAGE POTENTIAL	HANDLING CONCERNS	ENVIRONMENTAL CONCERNS
Formula Name	Form	Effective to *	Eutectic	Vehicles	Structure			
NaCl (Road Salt)	Solid	15	-6	Yes	Yes	Some **	Dust	Water, Plants

* Pavement Surface Temperature

** If concrete is non-air entrained or has utilized poor materials or procedures

II.F.5 Factors that Impact the Choice of Ice Control Treatments and the Application Rates of Snow and Ice Control Materials

II.F.5.a Pavement Surface Temperature

Pavement temperature is one of the most important factors that impacts treatment decisions. Several factors influence this temperature and understanding them will aid in making treatment decisions.

SOLAR RADIATION OR SUNSHINE

Solar radiation can warm surface temperatures significantly above air temperature. The darker the surface, the more pronounced this effect will be. It is not uncommon to have surface temperatures 30 to 40 Fahrenheit degrees above the air temperature early in the afternoon. As the angle of the sun above the horizon increases, solar warming increases. The lowest sun angles occur at the winter solstice and at sunrise and sunset of each day.

CLEAR NIGHT SKY RADIATION

Just as the sun warms surfaces through radiation, clear night skies, with little or no wind, cool surfaces. This can result in pavement surface temperature being colder than the adjacent air temperature. This condition often allows black ice or frost to form on the pavement surface. This cooling is also related to the subsurface temperatures and the time of the year.

GEO-THERMAL EFFECTS

Subsurface temperature influences pavement surface temperature primarily through thermal conduction. In the fall, when the earth is still warm and short-term air temperature drops below freezing, absent radiational effects will probably not cause the pavement surface to fall below freezing. During the spring, at the end of the season, pavement surface temperatures will remain cold although the air temperature is warmer (absent radiational effects). Bridge decks may freeze quicker than adjacent road surfaces in the fall due to the lack of thermal conduction provided by the earth. However, in the spring bridge decks can warm more quickly than surrounding surfaces for the same reason.

AIR TEMPERATURE AND WIND

Absent radiational and geo-thermal effects, the pavement surface temperature will always be moving toward the adjacent air temperature. The rate of temperature change is usually slower than changes caused by radiational or geo-thermal effects. However, with increasing wind speed, the rate of pavement temperature change due to air temperature will increase.

TRAFFIC

Traffic can slightly increase pavement surface temperature as a result of tire-road friction and the radiant effects of engine and exhaust systems.

II.F.5.b Dilution of Ice Control Chemical

There are several factors that influence how quickly an ice control chemical reaches a critical dilution or the freezing point.

WATER OR SNOW AND ICE ON THE PAVEMENT AT THE TIME OF TREATMENT

This is largely due to the effectiveness of the plowing operation or accumulation on the road if there is no plowing prior to the chemical treatment. The more water or snow/ice on the pavement at the time of treatment, the more quickly it will dilute the ice control chemical.

ICE OR WATER CONTENT OF THE EVENT

The ice content of snow and ice events varies dramatically. Light, fluffy dry snow has an ice or water content in the range of 5%. Wetter heavier snow may be as high as 80% ice or water. Rain, freezing rain, and sleet all have nearly 100% water or ice. Higher ice content events will dilute ice control chemicals more rapidly.

EVENT INTENSITY

The more intense the precipitation rate, the quicker it will dilute an ice control chemical.

CYCLE TIME OF CHEMICAL TREATMENTS

The longer the time between treatment cycles, the greater the opportunity for dilution, however, cycle times should be long enough to allow the chemicals to work.

CLEARING ABILITY OF PLOWS

The more snow and ice mechanical equipment removes, the less dilution will occur in the following chemical treatment.

ICE-PAVEMENT BOND AT THE TIME OF TREATMENT

This may be the single most important factor effecting chemical dilution. If there is ice-pavement bond, more ice control chemical will usually be required to be effective. The thickness of the bonded ice is also important. Very thin ice will require little or no additional ice control chemical while thick ice and snowpack will require significantly more. The following are indications that there is ice pavement bond:

- i. A spray of water will be produced by moving vehicle tires.
- ii. On loose snow or slush-covered roads, the track created by moving tires will appear bare.
- iii. There will be many bare spots on freshly plowed pavement.
- iv. Scraping the snow or ice on a pavement with a plow (or shovel) will easily expose the pavement surface.
- v. The plow will make a louder noise if there is no bond

TRAFFIC

Traffic can have positive and negative effects on ice control efforts. Mechanical agitation helps break up snow and ice that have been weakened by the ice control chemicals. Traffic can also remove ice control

chemicals from surface and consolidated snow to form pack. Vehicle generated wind and natural wind can displace solid chemicals and cause tire spray to leave the pavement environment.

II.F.5.c Ice-Pavement Bond at the Time of Treatment

If there is ice-pavement bond at the time of treatment, more ice control chemical will be required to penetrate the ice, break the bond and remain above critical dilution until the next treatment. Very thin ice would be an exception to this.

II.F.6 Deciding on an Ice Control Treatment

Every time a snow or ice treatment is being designed, as much of the following information as possible should be on hand or estimated:

- a. The level of service prescribed by **NEW SEWICKLEY** policy
- b. Is the remaining snow or ice before treatment bonded to the surface?
- c. Traffic volume and timing

Once some determination of the items above and other operational considerations has been made, a decision on treatment can be made.

Table 4 (Recommended Ice Control Treatment) summarizes the most recent available guidance for ice control. Here the factors that relate to pavement surface temperature and ice-pavement bond are displayed in a fairly simple matrix. The ice -pavement bond characteristic determination can be made by operators or supervisors in the field using the guidance in II.F.5.b.

Table 4 Recommended Ice Control Treatments

Pavement Temperature (F)	Ice Pavement Bond	Application Material Rate
		Cinders/Rock Salt
Over 32	No	Mix 30% Salt - 70% Abrasive
	Yes	Mix 30% Salt - 70% Abrasive
30 to 32	No	Mix 30% Salt - 70% Abrasive
	Yes	Mix 30% Salt - 70% Abrasive
25 to 30	No	Mix 30% Salt - 70% Abrasive
	Yes	Mix 30% Salt - 70% Abrasive
20 to 25	No	Mix 30% Salt - 70% Abrasive
	Yes	Mix 30% Salt - 70% Abrasive
15 to 20	No	Mix 25% Salt - 75% Abrasive
	Yes	Mix 25% Salt - 75% Abrasive
Below 15		Mix 20% Salt - 80% Abrasive

II.F.7 Application of Ice Control Chemicals and Abrasives

II.F.7.a Application Techniques for Solid Ice Control Chemicals

After the ice control treatment for prevailing conditions has been decided, the final step is to get the designed treatment in the right location at the right time. There are a number of techniques for spreading solid chemicals/abrasives that can optimize treatment effectiveness:

TRAVEL LANES

Try to place solid ice control chemicals in a fairly narrow band near the high edge of each lane on two lane highways. On multi-lane highways, a more general distribution may be used in spreading on more than one lane.

STRONG CROSS WINDS AND BLOWING AND DRIFTING SNOW

When spreading in strong cross winds, try to keep the spreader upwind of the intended spread location. If the wind is too strong, and the pavement temperature is low, spreading may not be appropriate.

BANKED OR ELEVATED CURVES

Try to keep the spread pattern on the high side of elevated curves.

PARKING AREAS AND WALKWAYS

Spreading ice control chemicals as evenly as possible over the entire paved area is recommended for parking areas.

THE WORST CASE SCENERIOS

The worst cases usually occur when the chemical treatment is quickly overwhelmed (diluted) by excessive amounts of water or ice. Blizzard conditions (intense snowfall, wind, very cold temperatures) quickly dilute ice control chemicals and render them virtually useless. If the pavement temperature going into and coming out of a blizzard is expected to be low, then plowing only is probably the best strategy. After the blizzard if it is still very cold, use abrasives as necessary until warmer temperatures will allow chemical de-icing to work.

Rapidly accumulating freezing rain is a major maintenance concern. The best strategy here is to apply solid ice control chemicals/abrasives mix, at a high rate, in very narrow bands in the high side wheel path of each lane. Usually, this will provide a location in each lane that will have enough friction to allow vehicles to stop and steer.

GETTING THE APPLICATION RATE RIGHT

11.F.8 Materials Spreading Equipment

Materials spreading equipment is most efficient and effective when associated with plow trucks. Independent plowing and spreading operations require almost impossible coordination. By spreading chemicals on freshly plowed surfaces, the chemicals will dilute less and last longer. Most chemicals need time to work. Uncoordinated plowing that removes chemicals from the surface too soon is wasteful.

There are a variety of solid material spreader types used by **NEW SEWICKLEY**. These include broadcast spreaders and drop spreaders.

II.F.8.a Calibration

Whatever materials distribution system is used, it must be calibrated. This will assure that the proper amount of material is being applied. Over-application is wasteful and under-application will not achieve the desired results. Solid material spreaders are usually calibrated by capturing and weighing material dispensed at various speeds, control settings and gate openings. A calibration procedure for solid materials appears below.

II.F.8.b Spread Pattern Control

Most commercial materials spreaders have the capacity of adjusting the spread pattern they deliver. The most common device for spreading solid materials is a vaned spinner plate. The distance material is cast is controlled by the speed of the spinner plate. The faster the spinner plate rotates the farther it will cast material.

The direction of cast from spinner plate is controlled by the direction of rotation of the spinner and the location of the point where the material drops onto the spinner plate. Material dropped on one side of the spinner plate is generally discharged on the opposite side. Deflectors or skirts that divert the cast material downward provide additional control.

The proper spread pattern adjustments should be determined on the floor of the chemical storage facility. By pushing the discharged material into a windrow that runs parallel to the back of the spreader, a good indication of spread pattern can be obtained. Spread patterns determined by this method should be field verified by observing the distribution under actual operating conditions and adjusting as necessary.

II.F.8.c Spreading Speed

The potential for solid ice control chemicals to bounce and scatter increases with increasing truck speed. Spreading speed should be as slow as possible, consistent with maintaining a safe speed in traffic.

II.G Post-Storm Activities

II.G.1 Post-Storm Evaluations

Post-storm evaluations should be conducted at the crew level. The following should be discussed:

- a. Personnel issues
- b. Materials and materials management issues
- c. Equipment issues
- d. Safety issues
- e. Weather and information system accuracy
- f. Observed storm conditions
- g. Treatment effectiveness and pavement conditions

- h. Motorist response issues
- i. Coordination and cooperation issues
- j. Effectiveness and efficiency of safety restoration activities.
- k. Any relevant information will be shared with the Township Manger.

II.G.2 Post-Storm Operational Tasks

The following is a partial list of post-storm operational tasks that should be accomplished:

- a. Asset inventory (number and operational status)
 - i Personnel
 - ii Materials
 - iii Equipment
 - iv Information system
- b. Treat Persistent Snow and Ice Conditions
 - i Road Foreman will determine exploratory procedure.
 - ii Blow-over areas
 - iii Freeze-back areas
 - iv Areas with snowpack or ice
- c. Road Maintenance Activities
 - i Pothole patching and repair
 - ii Brush and tree work
 - iii Sign and delineator work
- d. Equipment repair, cleaning, maintenance, and re-calibration
- e. Maintenance and inventory of ice control materials
- f. Yard and facility clean up
- g. Repair of damaged safety appurtenances, signs, etc.
- h. Parts and fuel inventories

II.H Post Season Activities

II.H.1 Evaluation of All Elements of Snow and Ice Control Operations During the Past Season

The following is a partial list of topics that should be discussed, evaluated, and discussed with the Road Department, and **NEW SEWICKLEY**-wide levels following the winter season:

- a. Personnel
- b. Materials & availability, management, problems, etc.
- c. Equipment
- d. Maintenance of equipment
- e. Safety
- f. Treatment effectiveness
- g. Weather and other information systems

- h. Routing and response
- i. Level of service
- j. Roadway design issues that may have impacted snow and ice control
- k. Cooperative agreements and inter-agency cooperation
- l. Contracts
- m. Emergency response/management
- n. Media and public information

II.H.2 Cleanup of Abrasives from Township Roadway

After the last expected ice or snow events will take place for the season, the Road Department will begin the cleanup up the abrasives from the Township roadways. The Township uses two pieces of equipment to broom the streets. Weather and roadway conditions will determine the best time to run the sweeper and/or broom. The optimal conditions are a wet roadway; a heavy rain can make the aggregate too difficult to pick up. Abrasives that are captured by the Street Sweeper will be added to the abrasives pile for the next winter season.

II.H.3 Post Season Equipment Maintenance

The following equipment should be repaired, given use or time-based maintenance, and prepared for storage as required:

- a. Material spreaders
- b. Storage tanks and pumps
- c. Plow equipment
- d. Trucks, loaders, etc.

II.H.4 Materials, Equipment and Parts Inventory and Acquisition Activities

With the long lead-time required to acquire commodities, the inventory and purchase activities for next season should begin for:

- a. Abrasives
- b. Ice control chemicals
- c. Plow equipment
- d. Safety equipment
- e. Spare parts

II.H.5 Continuous Improvement Activities

NEW SEWICKLEY is committed to continuous improvement of all its operations. Snow and ice control is no exception. Forums available at all levels of **NEW SEWICKLEY** include:

- a. Direct communication with the Road Department and Administration
- b. Task specific employee meetings;
- c. Suggestion program;
- d. Customer interaction;
- e. Transfer of best practices or successful innovations (internal and/or external to **NEW SEWICKLEY**); and
- f. Training.

III. MATERIALS (ROAD SALT) MANAGEMENT PLAN

III.A. Background

Road salt (sodium chloride) can have adverse environmental, infrastructure and vehicle effects. Potential environmental effects have been identified in the areas of:

1. Surface water
2. Ground water
3. Soils
4. Vegetation
5. Wildlife

However, these effects have been only observed in situations where:

1. Roadway salting was excessive
2. Uncovered stockpiles of salt and sand/salt mixtures were allowed to remain exposed to the elements
3. Unique wind patterns and earth geology permitted a rapid departure of salt from the highway or stockpile environment

Vehicle and infrastructure effects are well known and are generally accommodated in the design of these elements.

Salt is the most common and least expensive ice control chemical and is likely to be the material of choice well into the future. Current limitation to use of salt are related to storage capacity and budget. All Township roadways will receive a mix of abrasives/road salt and any adjustments to the mix will be made based on roadway conditions.

With the above in mind, it is **NEW SEWICKLEY'S** policy to create a reasonable balance among cost, safety (**NEW SEWICKLEY** plow operators and the traveling public) and environmental responsibility with its snow and ice control operations.

III.B. Situational Analysis

NEW SEWICKLEY is not aware of any locations within the zone of influence of roadway salting where road salt is creating severe negative environmental effects.

III.C. Salt Management Plan

NEW SEWICKLEY will utilize best practices as the primary tool in salt management.

III.C.1. Roadway Use

NEW SEWICKLEY will do the following in support of this salt management plan:

- a. Use only the amount of salt necessary to provide a satisfactory level of service for individual combinations of weather and road conditions
- b. Calibrate all materials spreading equipment to allow the proper application rates of salt
- c. Upgrade equipment over time to include ground speed materials application rate control
- d. Acquire technology to assist in better defining weather and road conditions
- e. Conduct operations in an efficient and effective manor
- f. Train New Sewickley employees in the use of appropriate snow and ice control procedures and the importance of salt management
- g. Use the principles of **CONTINUOUS IMPROVEMENT**

III.C.2. Non-Highway Considerations

- a. **NEW SEWICKLEY** stores all its salt under structural cover
- b. Loading salt on to trucks will be done within the salt storage structure to the extent possible
- c. Trucks will be loaded only to a point below where spillage is likely to occur
- d. All trucks and spreaders will be washed in the wash bay where appropriate wastewater controls are in place
- e. All salt spillage in the yard will be cleaned up ASAP or after every snow event.
- f. The salt storage area shall be lit during all nighttime operations
- g. The salt storage area shall be kept clear of all stored equipment and materials to not interfere or cause a hazard during loading and unloading of salt.