

ROAD MAINTENANCE POLICY

LOWER SAUCON TOWNSHIP

PURPOSE

The purpose of this document is to provide an overview of the road maintenance policies employed by the Lower Saucon Township Public Works Department to maintain township roads.

Lower Saucon Township desires to maintain the rural character of its roadways by preserving the natural and scenic elements that make them attractive features of the community. To this end, the Township Public Works Department will employ only those road maintenance procedures that are necessary to preserve the rural nature of a specific roadway.

DISCLAIMER

The Township reserves the right to deviate from this policy at any time due to weather conditions, manpower shortages, material shortages, equipment failure, CDL restrictions, or any other unforeseen problem.

SCOPE

There are approximately 86.94 miles of Township maintained roads, and approximately 30.23 miles of State maintained roads in Lower Saucon Township. Roads that are state maintained are:

- Route 378
- Route 412
- Lower Saucon Road between Easton Road and Williams Township Line
- Seidersville Road from Hickory Hill Road west to the Salisbury Twp Line
- Easton Road from Cherry Lane to Williams Township Line
- Riverside Drive between Shimersville and Redington Roads
- Friedensville Road between Bingen Road and Hellertown Line
- Hickory Hill Road between Seidersville and Friedensville Roads
- Applebutter Road between Lower Saucon, City of Bethlehem line and Shimersville Roads
- Bingen Road between Black River and Friedensville Roads
- Black River Road between 378 and Bingen Road
- Redington Road between Lower Saucon Road and Riverside Drive
- Flint Hill Road between 412 and Springfield Township Line

PERSONNEL

The Township Department of Public Works is staffed by nine (9) full-time employees under the direction of the Director of Public Works and the supervision of the Roadmaster. Eight of the nine employees are Class A Commercial Driver Licensed (CDL) operators and are subject to random drug and alcohol testing.

EQUIPMENT

The Department of Public Works utilizes the following equipment for road maintenance operations:

1. Trucks:
 - a. Single axle dump truck up to #12,000 GVW (1)
 - b. Single axle dump truck up to #17,500 GVW (3)
 - c. Single axle dump truck up to #36,000 GVW (1)
 - d. Single axle dump truck up to #39,000 GVW (2)
 - e. Dual axle dump truck up to #64,000 GVW (6)
 - f. Specialty boom mower vehicle 21' reach (1)
 - g. Specialty street sweeper vacuum truck #32,000 GVW (1)
 - h. Specialty 42' aerial truck with utility body #26,000 GVW (1)

2. Heavy Equipment:
 - a. 2.75 cubic yard loader (1)
 - b. 1.3 cubic yard backhoe/loader (2)
 - c. Skid steer tool carrier with various attachments (1)
 - d. Asphalt paving machine 8' to 16' (1)
 - e. Asphalt paving roller #21,000 lbs static (1)
 - f. Asphalt finishing roller #6,500 lbs static (1)
 - g. Motorized surface treatment machine (chip spreader) (1)
 - h. Motorized road grader (1)
 - i. 17" brush chipper (1)
 - j. Tow behind air compressor (1)
 - k. Motorized forklift (1)
 - l. Equipment trailers #10,000 GVW up to 70,000 GVW (4)

SAFETY

Inadequate safety design, longer emergency vehicle response times, and increased travel speed all contribute to the traffic fatality rate on rural roads. Rural roads design safety problems include limited sight distances, sharp curves, narrow lanes, inadequate shoulders, exposed hazards, pavement drop-offs, steep slopes, and limited roadside clear-zones. Unfortunately, improving road safety conditions often results in increased traffic speeds and the resulting increase in the severity of accident damage and injury.

One concern with the design of rural roads is the consistency of roadway geometry. Abruptly narrowing lanes, roadside obstructions, or constricted sight distances can surprise motorists, and can create conditions conducive to accidents. If inconsistencies in geometry can be eliminated, the safety on rural roads will be improved. Some of the most cost effective methods of improving rural road safety are increased signage, improved lane markings, improved sight distances, roadside clearing, upgrading guide rails, and developing effective pavement maintenance procedures and programs. Traffic calming improvements can also be used as a cost effective method of improving safety along rural roads.

SIGNAGE

Traffic control and advisory signs are maintained in good working repair and are replaced as they lose reflectivity. Road identification signs are important in helping emergency response and important in allowing motorists, unfamiliar with the area, to reduce driver confusion.

All signs on Township roads must meet PennDOT sign standards

TOWNSHIP POLICY ON ERECTING STREET SIGNS ON PRIVATE PROPERTY

Requests for the erection of street signs (such as stop signs on private roads) will be handled as follows:

- A traffic study must be conducted to determine if sign is warranted. The cost of the traffic study will be billed to the resident or organization requesting the sign
- If the study determines that the sign is warranted, approval will be requested from the Township Council
- If approved by Council, the Public Works Department will order and erect the sign and will bill the cost to the resident or organization requesting the sign

POLICY ON REQUESTS FOR SPECIAL PURPOSE SIGNS

Special purpose signs are signs that are not required to be provided by the Township or PennDOT for general traffic purposes to provide for the safe and efficient movement of traffic. These signs are usually requested by individuals or groups and benefit only a limited group of residents. Examples of special purpose signs are: Crime Watch, Drug Free Zone, Special Events, Deaf Child Area, Children Playing, Duck Crossing, etc.

- Request for sign is forwarded to Township Council for approval with recommendations from Public Works and Police Department
- If approved by Council, Public Works orders sign and erects it and bills cost to requesting party

ROAD MARKINGS

The Township contracts out our line painting needs through the Lehigh Valley Cooperative Purchasing Council because it is too costly for Public Works to purchase and maintain line painting equipment for the amount of roads that need marking, and it saves the Township from having to advertise for bids for these services.

For the 7-12 miles of roads that are oil & chipped or paved each year, because our paving projects are typically completed in the fall, we request the contractor to come into the Township to line these roads; however, the paint that is used is water based and the weather sometimes turns too cold before they are able to paint them, in which case the roads are marked the following spring.

Each spring, Public Works schedules the contractor to paint approximately 37 miles of township roads with double-yellow lines. Roads selected for painting must be at least 16 feet wide and through roads. In addition, painting is done on stop bars, "only", "arrows", "Ped xing", "Stop Ahead", and "No Left Turn" markings on roads.

ROAD SHOULDERS

The road shoulder is the reserved area alongside the roadway typically 12-18 inches wide to be used in the event of an emergency or breakdown. Not all Township roads have shoulders, but where present, road shoulders are normally unpaved. The Public Works Department works to keep road shoulders in the right of way lower than the road surface by cutting the gutters/swales to allow water to drain away from the road surface.

STORMWATER DRAINAGE

Efficient roadway and shoulder drainage is important to minimize road flooding, minimize icing (during cold weather conditions) and important for the preservation of the structural support of the road surface.

Stormwater runoff from the paved surface of the road and from gutter/swale collection of stormwater from the uphill side of the road should be directed and drained away from the road to serve road safety and the integrity of the road surface and shoulder surface.

Also, groundwater trapped under the road surface should be drained away from the road in those cases where subsurface water is creating road surface deterioration.

These drain or runoff locations should be provided in as many places as possible throughout the length of the road. Where the road and shoulder is higher in elevation, then the adjacent properties, stormwater should be allowed to leave the road and shoulder surface continuously along the entire length of the road. This flow pattern is known as "sheet flow". Sheet flow conditions minimizes the concentration of stormwater runoff at one location or another and promotes an even distribution of stormwater. This distribution of flow allows stormwater to be recharged into the ground over a broad area.

Roadside development of homes, driveways, or other forms of development should not be allowed to disrupt this sheet flow condition. Property owners should not be allowed to regrade their property in such a way as to block this stormwater runoff.

In many cases this sheet flow runoff not only allows stormwater from the center line of the road, toward the low side of the road, to runoff uniformly, but also allows overflow stormwater from extremely heavy storms to cross the center line of the road, from the high side of the road, and distribute water to the low side of the road. This condition occurs when the gutter/swale on the uphill side of the road cannot control the runoff from large storm events.

In cases where the shoulder of the road is lower than the adjacent property, stormwater will collect along the edge of the road and travel parallel to the road until a point of collection or point of discharge off the road. The Township should utilize every opportunity to discharge stormwater away from this gutter/swale condition, utilizing and maintaining every existing stormwater roadside swale, crossing pipe and/or discharge point and not allowing closure or diversion of these discharge points.

The overall goal of stormwater management in rural road conditions is to provide drainage away from the road in such a way as to minimize runoff damage to adjacent downhill properties and minimize the risk of pollution of waters of the Commonwealth.

Both these goals are achieved by increasing the number of locations that stormwater is discharged from the public road. The distribution of storm flows to multiple discharge points allows for better distribution of flows, better respect for natural conditions, and less negative impact from any one point of discharge.

The Second Class Township Code, PL350, Number 60, Section 2320, provides for the following:

Section 2320. Power to Open Drains and Ditches.

- (a) The board of supervisors (Council in Lower Saucon Township) or its agents may enter any lands or enclosures and cut, open, maintain and repair drains or ditches through the property when necessary to carry the water from the roads.
- (b) Any person who damages or diverts any drain or ditch without the authority of the board of supervisors (Council in Lower Saucon Township) commits a summary offense and is liable for the cost of restoring the drain or ditch. All fines and moneys so recovered shall be paid to the township treasurer (Finance Director in Lower Saucon Township).

The Township should minimize the rise of erosion at each point of discharge by utilizing any one of many techniques of vegetated swales, riprap, or other energy dispersion devices. Flow velocity from the discharge points should be minimized.

ROAD INSPECTIONS

The existing Township Annual Road Program has provided regular maintenance and improvements to the Township's network of rural roads. On average, nationally, approximately 60% of all funds budgeted on roads, streets and highways are spent on pavements. Decisions are constantly made by the Township as to how and where to use funds that are budgeted for road maintenance and improvements.

The Road Management System consists of many components. The Township must evaluate existing conditions and evaluate user requirements. On the basis of these evaluations, the Township must develop various program elements. These components are outlined below:

A. EVALUATE EXISTING CONDITIONS

1. Safety Conditions, including:
 - Widths
 - Shoulders
 - Sight Distance
 - Curves
 - Intersection Geometry
 - Obstructions
2. Roadside Vegetation
3. Roadside Drainage
4. Curb and Gutter Conditions
5. Road Subgrade
6. Road Underdrainage
7. Road Subbase
8. Road Base
9. Surface Paving (Pavement Maintenance System (PMS))
10. Skid Resistance
11. Line Striping and Pavement Markings
12. Signage
13. Slope, Curves, and Superelevations

14. Winter Conditions, including:
 - Icing
 - Drifting of Snow
 - Snow Plowing

B. EVALUATE USER REQUIREMENTS

1. Traffic Volume (if needed)
2. Accident History
3. Traffic Congestion (if needed)
4. Vehicle Weight
5. Vehicle Speed
6. Parking Requirements
7. Driveway Interruptions

C. PROGRAM ELEMENTS

1. Priorities
2. Engineering Studies (if needed)
3. Legal Agreements (if needed)
4. Funding
5. Scheduling

For many years, Lower Saucon Township has used a "Road Management System" (RMS) to help determine the most efficient use of the Township Road Budget. The RMS outlines pavement rehabilitation activities through use of a ranking system and provides a list of the following year's projects which is re-evaluated every year.

The Township RMS includes five major steps: Data Collection, Analysis, Programming, Budgeting, and Implementation.

The first step in using the RMS is data collection. Every road in the Township is first evaluated to determine the present condition of each. The second phase of the RMS includes analyzing the collected data. The collected data is evaluated and decisions are reached using certain standards and sensible judgment. It is important to correctly identify the cause(s) of each specific deficiency in order to effectively remedy it.

For example, during the data evaluation, it is important to limit surface treatments to pavements that are still in good enough condition that such treatments will be effective. There would be no point to seal coating a road that ultimately needs reconstruction. Once the deterioration of pavement begins, the structural integrity of the pavement will be lost quickly. Consequently, the cost of pavement rehabilitation increases in a relatively short period of time. An illustration of this time vs. cost relationship has been included in Appendix C.

The recommended maintenance or improvement for each road is then combined with several other factors in the next step of Programming. The purpose of this analysis is to develop a prioritized list based on the type of rehabilitation needed, functional classification, daily traffic volumes, as well as reasonable projections of the future condition of the Township roads. Using this analysis, the Township develops a complete prioritized list of projects that include both routine maintenance and reconstruction procedures. This list of projects can then be broken up into segments, identifying

which projects will be completed in which year. The road program is extremely flexible in that tentative project dates can be manipulated in conjunction with budgets or emergency repairs to allow for the most efficient implementation plan.

After the initial priorities are established, some improvement and/or maintenance projects may be of a type that needs an engineering design or of a type that needs some special legal agreement or Ordinance. For example, if a major storm drainage improvement is identified as a high priority, the Township would need an engineering design and possibly Stormwater Management Facility easements on private property. For larger projects, the Township may need to prepare specifications and schedule a project for bidding by outside contractors. Also, certain projects will need permits from the Pennsylvania Department of Transportation or the Pennsylvania Department of Environmental Protection.

Once priorities and project cost estimates are available, the Township must identify its source of funding for projects that fall into the higher priority category. Funding sources would include Liquid Fuel Tax payments from the State, Township general revenue and, in rare occasions, may also include State Grants and/or developer contributions.

By using the Road Management System, the Township is able to recognize road maintenance deficiencies and respond to those deficiencies by adjusting the road program and budget over several years. This system allows the Township to recognize when maintenance is, or is not adequately occurring so that program and budget adjustments can be implemented at the appropriate times. Planning and adequate budgeting will make it possible to maintain the integrity of every Township road.

REPORTING PROBLEMS ON PENNDOT ROADS

To report problems on PennDOT roads, Public Works will telephone and email the PennDOT District 5-5 Maintenance Office and report the problem.

ROAD DISTRESS

Since the majority of the roads within the Township are classified as flexible pavements, the problems associated with this type of material will be discussed in detail. Some signs of distress/fatigue in flexible pavements include, but are not limited to: surface deterioration, alligator cracking, potholes, surface deformation, and other various types of cracking. (Refer to Representative Photos in Appendix B.)

Surface deterioration consists of several problems related to an aging pavement. Two of the most common signs of surface deterioration are "weathering" and "raveling." Over time, sunlight will dry out the liquid asphalt binder that holds the pavement together, making the pavement brittle. This process makes the pavement more susceptible to cracking from vehicular traffic. Once cracking occurs, water can penetrate the pavement surface, and the freeze-thaw cycle will ultimately ruin the roadway. Raveling occurs when the asphalt binder is so dry that it is no longer able to hold the aggregate in place, and the aggregate is literally ripped out of the asphalt surface, leaving small holes and pockets.

Some roads in the Township show the initial stages of weathering and raveling. Certain roads are developing a very gray color on their surface, indicating that the binder is drying out. A healthy

pavement will have a rich black color. A variety of sealcoats can be used to rejuvenate the pavement, and close some of the voids.

“Polishing” occurs when the aggregate contained in the mix is worn smooth by traffic. This condition can present a hazard to motorists because the skid resistance of the road is reduced. Typical remedies include surface treatments and overlay wearing course paving to help the surface regain its texture.

A problem called “Bleeding” can occur when too much liquid asphalt is incorporated in the hot-mix asphalt. In this situation, the excess asphalt binder will work its way to the surface and create a film on the roadway. This condition generates complaints from local motorists due to “tracking.” Fortunately, this problem is not prevalent on the Township roads. The problem can be reduced by installing a stone surface treatment with a highly absorptive stone. Essentially the stone will soak up the excess binder.

“Alligator Cracking” is one of the more common signs of surface deterioration, and can be seen on a variety of Township roads. This type of cracking will, as the name implies, resemble an alligator’s skin, with series of interconnecting cracks. When observed in isolated pockets, this is usually the result of structural failure within the base or sub-grade of the road. In this case, it is usually coupled with areas of isolated settling. This condition is a direct result of the pavement being unable to adequately distribute wheel loads into the base and subgrade. Typically the subgrade has softened as a result of initial cracking and moisture penetrating into the subsoils. This particular problem is fairly common on the Township roads. Usually drainage improvements and a full depth base and pavement patch are required to remediate this problem.

Base failure can be caused by a variety of factors. One of the most common is water that is unable to escape the road surface, and begins to pond. Eventually this water will work its way into the base and sub-grade of the roadway causing sub-soils to become soft. It is extremely important to keep water off the road surface. Many sections of the roads in the Township are susceptible to this condition because:

- Many road sections are not provided with stormwater drainage improvements.
- Many road sections are not provided with road shoulders.
- Many road sections are not provided with roadside swales or slopes that allow stormwater to drain away from the edge of the road.
- Traffic wheel loads have caused pavement rutting and/or loss of good crown slope.
- Some sections of road are very flat (parallel to the road centerline). Road profile slopes of less than 1% (1’ per 100’) create conditions where surface water would tend to puddle (“birdbath”) if crown slopes or superelevation is not provided.
- Many sections of road are shaded with tree canopies in the growing season. It is difficult for direct sunlight to reach the road surface, so free standing water does not evaporate quickly. On a positive note, because of shady conditions the asphalt binder in the road surface is less likely to “dry out”.

The most recognizable type of surface distress is potholes. When not repaired, alligator cracks loosen pieces of the existing pavement surface. Eventually they are worn out by traffic, leaving a hole in the pavement. Excessive potholes on any road are obvious, and draw complaints from motorists. Unfortunately, by the time the road reaches this stage of deterioration, little can be done short of a full depth patch to repair the base and pavement.

Surface deformation is another major type of pavement distress. Rutting, corrugations, and shoving are all some degree of warping of the pavement surface.

Ruts are depressions made along the length of the roadway, usually caused by vehicle tires. Generally, they are caused by over-consolidation of the pavement material, or lateral movement of the material under traffic. They do not have much effect on ride comfort because the depressions follow the direction of traffic, and sometimes are not even noticeable except during rain. During wet weather, water may collect along the ruts. This could result in a dangerous hydroplaning situation for motorists. This condition also increases the risk of structural problems relating to standing water.

Corrugations are also a result of a lack of stability in the pavement. Corrugations develop a "washboard-like" feel when riding over them, and in turn, greatly affect ride quality. They represent a significant concern for safety, particularly in instances of heavy braking or turning, because tires on vehicles passing over them will lose a significant portion of contact with the road surface.

Shoving consists of large, isolated bulges of the pavement surface. Once again, this is caused by a relative instability in the asphalt mix. Corrugations and shoving should be repaired by full or partial depth milling and repaving. These two problems are not very common on roads within the Township.

Some of the more notable signs of pavement fatigue are different types of cracking. One type of cracking, alligator cracking, has already been discussed. However, several other types of cracking exist and are very common on the roads within Lower Saucon Township. Among these are block cracking, edge cracking, reflective cracking, and longitudinal and transverse cracking.

Cracks that interconnect to form large, somewhat rectangular blocks are known as block cracks. This condition is caused by shrinkage of the asphalt pavement. Block cracking is sometimes referred to as "shrinkage cracking". It is not related to the load on the pavement and is actually the most common on roads with little or no traffic. Usually crack sealing will remedy the problem.

Edge cracking is one of the more common problems noticed around the Township, and is represented by longitudinal cracks along the edge of the pavement. Typically these cracks are caused by poor drainage and a lack of lateral support. Depending on the severity of the situation, corrective actions can range anywhere from crack sealing to full depth patching if the base is completely compromised. Shoulder grading, storm sewer systems and/or perforated underdrain piping can be used to improve drainage problems. Concrete curbing and/or stone and paved shoulders can be added to provide lateral support.

Reflective cracking is cracking that occurs in overlays caused by cracks in the pavement beneath it. They are typically caused because of the underlying pavement flexing due to shifting of the ground beneath. This occurrence is responsible for the majority of the "transverse cracking". Other areas of transverse cracking are caused by pavement shrinkage and/or asphalt hardening. Reflective cracking can be minimized by the multi-year seal coat and overlay program or by way of the installation of a fabric "bond breaker" between pavement layers.

Longitudinal cracking is cracking parallel to the center line of the roadway and can also be reflective. If for example, an old paving seam or widening seam is underneath an overlay, it will reflect up through the new pavement in the form of a longitudinal crack. It can also be due to poor drainage on shoulders, or paving seams when paving different lanes. These can typically be temporarily repaired by crack sealing.

ROAD MAINTENANCE

The most important concept with regard to maintaining pavement integrity and safety is Preventative Maintenance. Many of the more serious problems mentioned above can be avoided or delayed when procedures are undertaken on a regular basis to ensure the health of the roadway. Regular roadside shoulder and drainage improvements, crack-sealing, and seal-coating can all be combined to achieve long-term pavement performance.

Cracks will ultimately develop in any pavement, regardless of its condition. The sub-base is constantly shifting underneath a road surface and even the best asphalt mixes will be susceptible to some degree of shrinkage in cold weather. Once surface water is able to penetrate into the base of the roadway, many problems have the potential to develop and, unfortunately at that point, are substantially irreversible.

Many varieties of seal-coats are available for use, and one of these seal-coats should be applied regularly to ensure proper bituminous content in the asphalt binder. A freshly paved road can last anywhere from five to eight (5-8) years without ever needing a seal-coat. However, when cracks begin to develop, or the road begins to "gray", a fresh seal-coat should be applied every two to three (2-3) years to maintain the integrity of the surface. Not only does a seal-coat help ensure proper bituminous content within the asphalt, it also reduces the amount of water that would seep into the base. In the long run, this practice helps save the Township thousands of dollars in potential reconstruction that might otherwise be caused by road neglect.

It is important to note that seal-coats do not provide improved structural capacity for the road paving. They are simply intended to maintain the structural integrity of the original road construction. Many types of seals exist, and each has specific advantages and disadvantages.

Single and double seal-coats are very popular with several municipalities around the area. This procedure consists of an application of liquid asphalt followed immediately by a layer of coarse aggregate. These two treatments are commonly referred to as "tar and chip." There is one main difference between the two treatments. A single seal-coat consists of only a layer of liquid asphalt followed by a layer of aggregate. A double seal-coat is slightly different in that a layer of liquid asphalt and aggregate is placed first, followed by a second layer liquid asphalt and aggregate.

These two types of treatments are very advantageous for several reasons. First, they are extremely cost effective when compared to thin overlays. They also have a fairly long service life when compared to other seals, and can typically last anywhere from five to seven (5-7) years. Some typical problems with the treatment include loss of surface aggregate and streaking. Unfortunately, this method of surface maintenance is unpopular with local motorists, as many find the loose cover aggregate associated with such treatments to be a nuisance, when it is first installed.

A final option when considering an adequate seal-coat is micro-surfacing. This is a process that has become popular over the last ten to fifteen (10-15) years in the paving community. It is an extremely tough and durable thin overlay material that can restore original service properties to worn out pavements, provided that the roadway is structurally sound. The material consists of a chemical formulation asphalt cement and select aggregate mix including cationic emulsifiers, adhesives, and natural latex. This unique blend of materials enables micro-surfacing to act as one of the leaders in remedial pavement technologies. Such treatments can be more expensive than common double seal-coats.

The useful life of surface treatments, such as these, can be prolonged through the use of other preventative maintenance procedures. Roadside improvements are extremely important maintenance procedures that often are overlooked by municipalities. Cutting back roadside vegetation and maintaining adequate roadside swales are probably two of the most effective ways to extend the life of Township roads.

It is important that all newly constructed or reconstructed roads have an appropriate crown and slope, to direct storm water away from the road surface. In many instances where storm water problems cannot be avoided, underdrain can be placed under the road surface to alleviate any potential problems. Any time excess water is continually lying on a pavement, it is almost certain that some form of surface deterioration and/or base damage will occur. Less water on the road ultimately means that less money will have to be spent in the future.

The PennDOT term for the process the Township Public Works Department follows to resurface township roads is called "Reverse Seal Coat". The purpose of the seal coat is simply what the name implies: it seals the surface of the pavement, repelling water as water is the primary cause of pavement distress. The Township Public Works Department begins resurfacing township roads by applying a surface treatment (oil and chip) to the road to seal all the cracks in the old surface. They then level the road with a thin layer of blacktop. Then they come back the following year and apply a second surface treatment (oil and chip) to keep water from penetrating the new blacktop. Using this process, the Township is able to get an average life of about seven to ten (7-10) years out of this surface, at a cost much less than that required for a complete resurfacing. To resurface a road using just blacktop as the final surface, we would have to apply over three times the amount of blacktop that is used for the reverse seal coat process in order for it to hold up. The life expectancy using this process is about ten to fifteen (10-15) years again at a much reduced cost. One of the benefits of the oil and chip process is the natural "anti-skid" properties of the chips which provide a much better traction surface than blacktop during the winter months. Another benefit is that by applying less material we are not changing the height of the roadway as much as would placing blacktop by itself. This is especially helpful in areas that have curbs, but even without curbing, changing the height is less than desirable as it causes problems with gutters, driveways and drainage swales.

In the fall preceding the road resurfacing, the Public Works Department begins this work by cutting the gutters and swales in the right of way to restore proper drainage to the road. Next the crew begins to remove brush and tree limbs that protrude into the road way. This work is performed to restore proper sight distances on curves and at intersections and also to improve safety to pedestrians and motor vehicle drivers who walk and drive on Township roads. After the brush has been removed, the Public Works Director conducts an on site inspection of all pipes and inlets on the road to be resurfaced and the crew replaces any of them that are substandard or in poor condition. When all the pipes have been completed, the Public Works crew begins the actual reconstruction of the road. This work is performed in three stages beginning with:

1. Surface Treatment: All cracks on the road surface are filled with tar (E3M-Oil) and covered with either #10 or #8 stone (tar & chip). This is done for three reasons:
 - a. To keep ground water from filtering up through the cracks and forming a thin layer of water between the old road surface and the new surface. If this condition is not prevented, this water will freeze during the winter months causing the new road surface to crack and break-up thus forming potholes.

- b. To stop or slow down "Reflective Cracking." ID2 Super Pave (black top) is reflective, meaning any cracks present in the old road surface would quickly reflect or break through to the new road surface. By sealing these cracks with tar (E3M-Oil) and stone, this possibility is greatly reduced.
 - c. Tacker: While sealing the cracks, the tar (E3M-Oil) adheres to the old road surface. When the leveling course of ID2 Super Pave (black top) is applied, the tar (E3M-Oil) melts, forming a bond between the old surface and the new surface. This bond prevents the new ID2 Super Pave (black top) from slipping or raveling (separating) from the old surface, especially on steep hills and curves.
2. Leveling Course: This task is performed to level the road way, removing wheel ruts and bumps in the old road surface by spreading a new layer of ID2 Super Pave (black top) over the freshly sealed road surface.
3. Surface Treatment: (oil and chip) This task is performed for three reasons.
- a. By surface treating the newly applied ID2 Super Pave surface with E3M-Oil and #8 (1/2" stone), water is prevented from filtering down to the old surface. This prevents premature breakup of the new surface due to the freeze thaw cycle during the winter months.
 - b. By surface treating the newly applied ID2 Super Pave surface with E3M-Oil and #8 (1/2" stone), the road has a natural no slip surface, thereby reducing the amount of anti-skid material that needs to be applied in the winter while still providing a traction surface for motorists.
 - c. In order for ID2 Super Pave to stay in place, a minimum thickness of 2" to 2 1/2" needs to be applied. The approximate cost for a 2" cap on one mile of road is \$50,000.00 and the life expectancy is about 15 years. By surface treating the newly applied ID2 Super Pave surface, the amount of ID2 Super Pave wearing can be decreased to 1/2", while still maintaining a good life expectancy of about 10 years at a cost of about \$16,000.00 per mile. By comparing the cost per mile divided by the life expectancy, it becomes apparent that the surface treatment process is the most cost effective means of maintaining Lower Saucon Township's infrastructure of roadways.

BERMS

The placement of paved berms is discretionary and they are placed as needed. Unfortunately, during the snow removal process, berms may be damaged if they are hit by snow plows. If this happens, Public Works will replace them, if needed, in the early spring. Quite often, a berm that was put in several years ago may no longer be needed once the new road stabilizes and the shoulders vegetate. Public Works looks at each berm individually and replaces them as needed. Almost every road in the Township has in some area, some sort of berm, blacktop swale, paved gutter, curbing, directional paving or other special items that are placed as needed.

GUTTERS/SWALES

The Township policy is to use vegetated gutters/swales wherever possible along Township roads. Vegetated gutters/swales are shallow, vegetated depressions designed to convey runoff. The

vegetation in the gutter/swale slows the flow of runoff water, which allows sediment to settle out and water to infiltrate the soil. However, vegetated gutters/swales are typically ineffective in, and vulnerable to, large storms, because high-velocity flows can erode the vegetated cover. In addition, gutters/swales are also subject to erosion during winter when the vegetation is dormant. Wherever erosion problems make vegetated gutters/swales impractical, the Public Works Department will pave the gutters/swales.

TREE AND SHRUB TRIMMING

The trimming of roadside vegetation has two major benefits. Primarily, it keeps the roadside swales already installed functioning properly, allowing water to flow alongside the road, and not on top of it. By doing this, a portion of the storm water is allowed to work its way back into the ground, thereby decreasing direct runoff. Secondly, trimming of roadside vegetation in many instances reduces the amount of shade that a road receives throughout the course of the day. This is important to the health of the pavement because more sun increases the evaporation rate of water that wets, or sometimes inevitably lies on the pavement. The downside of this is that more sun also means that the pavement surface will be more prone to dry out, causing the gray color discussed earlier. However, this potential problem is much easier and less expensive to correct than the many problems that an over-saturated road base can cause.

It is also noted that tree and shrub clearing is regulated by the Second Class Township Code, P.L. 350 – No. 60 Section 2325 and 2326, as quoted below:

Section 2325. Saving Trees and Shrubbery.—

- (a) The board of supervisors (Council in Lower Saucon Township) or its agents shall not remove any shrub or tree growing within the right-of-way of any township road or street except those shrubs and trees the board of supervisors (Council in Lower Saucon Township) finds to constitute a hazardous or dangerous condition to the use of the highway or those which impair the use or maintenance of the public road or street. No tree having a trunk diameter in excess of six inches shall be removed without notice of the proposed removal having first been given to the abutting property owner. The township supervisors (Council in Lower Saucon Township) shall determine by resolution the form of notice to property owners.
- (b) All logs, cordwood, branch wood or other forms of wood derived from the destruction or removal of any trees growing along the highways shall be surrendered to and remain the property of the abutting owners.
- (c) The board of supervisors (Council in Lower Saucon Township) may clear out brush and other refuse along the sides of the road to the legal width thereof. All clearing and removal of brush and refuse shall be confined to growth that is within the right-of-way and to the removal of branches that in any way interfere with public travel. No other injury by fire, cutting, abrasion or otherwise shall be done to the standing timber.
- (d) Any person who violates the provisions of this section commits a summary offense. All fines shall be paid into the general township fund.

- (e) Nothing in this section prevents the board of supervisors (Council in Lower Saucon Township) or roadmasters or other persons in their employ from removing roadside trees which may be thrown down by wind or lodged in a position as to be a menace to public travel or which, by reason of any other cause, may become a source of danger to the public.

Section 2326. Obstructions and Nuisances – Any person who obstructs any public road or commits any nuisance thereon by felling trees, making fences, turning the road, diverting water onto or in any other way and who does not, on notice given by the board of supervisors, immediately remove the obstruction or nuisance and repair the damages done to the road commits a summary offense. Nothing in this section shall debar a prosecution for any nuisance as in cast of misdemeanor at common law.

Fallen Trees – If base of fallen tree is outside the Township right-of-way, Public Works will remove the tree from the roadway and place it on the homeowner's property for their disposal. Fallen trees in utility wires will not be touched by Public Works until utility comes and clears wires.

Public Works Tree/Shrub Trimming Procedures

1. Provide property owner with adequate notice
2. Give the property owner an opportunity to do the trimming
3. Minimize cutting and trimming to only that work necessary
4. Ornamental shrubs and bushes are trimmed back about 3 feet from the edge of the roadway
5. Undesirables such as thorn bushes, stickers, poison and weeds are cleared from the right-of-way
6. Overhanging tree branches are trimmed back from the roadway about 3 feet and to a height of at least 14 feet. (When trimming branches Public Works always takes into account the welfare and ascetics of the tree and always cuts higher than 14 feet and further back then 3 feet to achieve this goal)
7. Trees that are less than 6 inches in diameter that are diseased, damaged or leaning into the roadway are removed
8. Trees that are over 6 inches in diameter that are diseased, damaged or leaning into the roadway are "tagged" with plastic tape for inspection by the Director of Public Works. If in the opinion of the Director the tree should be removed, the property owner is then contacted either in person or by letter to allow input in the removal process
9. If the trimming of evergreen trees such as pine or spruce would leave the tree substantially disfigured, offer the property owner trimming around the tree to a uniform height
10. Minimize broken ends by making clean cuts
11. Stack cut wood at edge of property for owner
12. Remove cut branches and debris not wanted as firewood
13. Chip and recycle trimmed material
14. All underbrush, branches and small trees removed are chipped and made available to property owner. If property owner not interested the material is taken to the Public Works yard.

ROADSIDE VEGETATION MANAGEMENT

MOWING

1. Public Works mows the shoulders of each and every Township road at least twice a year during the growing season
2. Vegetation along curves and intersections is mowed back to provide sight distance
3. Public Works will not mow vegetation that is over 1" in diameter