

POLICY TITLE: Comprehensive Urban Forestry Management Plan

POLICY STATEMENT:

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Section 1: Introduction

A. Purpose:

To serve as a comprehensive plan to coordinate the management of the Village of Howard's urban forest in a productive and efficient manor that serves the public's needs and provides guidance for the administration of the Village of Howard.

B. Mission Statement:

To preserve and enhance the quality of life in Howard through prudent management of our community's natural resources.

C. History & Background:

The Village of Howard is located in Northeastern Wisconsin and is part of the Green Bay Metropolitan Area. The Village is located northwest of the City of Green Bay, along the Bay of Green Bay. Before settlement and development of the Duck Creek area (now part of the Village of Howard), the land that is within the Village boundaries was very diverse. The Village is set on land that has many different eco-types. This is due to the fact that its eastern border is the Bay of Green Bay and its western border extends well into the upland glacial till areas. This diversity gives a land that from east to west, goes from wetlands/marsh areas proceeding to a lowland alluvial plain (lowland forest cover type) onto a series of ridges or benches (grassland/savanna cover type) that increase in elevation heading to the west and finally ending in a ridge (southern hardwood - oak/beechn/hickory cover type), which marks the start of a rolling upland area in the west (upland mixed northern hardwoods/conifer cover types) which is dotted with wetlands. All these areas are bisected by streams that feed into Duck Creek and then the Bay of Green Bay.

Having this much diversity within the Village of Howard gives us a very unique natural resources base. The ongoing challenge is laying a community infrastructure and increasing human population over this area and still preserving the diversity and integrity of the Village's natural resources.

The Village of Howard's population continues to grow rapidly, currently the population is 13,849. The Village of Howard is one of the fastest growing communities in the state. With this rapid growth comes more concerns over the environment and the urban forest. Each time a new expansion project comes up it is under greater scrutiny from the general public on its overall impact on the natural resources. This awareness continues to grow leading to greater involvement of the forestry department in the planning process. This involvement should continue to grow as the population increases.

The urban forestry program is relatively young and has grown rapidly. This is probably a reflection of not only the growing concern over the natural resources, but also the extremely rapid growth of the population within the Village. The establishment of a Tree Board occurred in 1992. From this board came the adoption of the first Urban Forestry Plan. This called for the creation of a Management Plan, Forestry Program, Arboricultural Specifications Manual, park and street tree inventories, and many other initial goals. With the aid of Wisconsin Department of Natural Resource Grants, Wisconsin Public Service Grants, Small Business Association Grants, and others the Tree Board started to achieve these goals rapidly. In 1993, to aid the Tree Board, a summer internship program was started. These interns conducted inventories, worked on plans, answered resident calls, and other forestry tasks. Then in 1997 the Village of Howard jointly contracted for a forester with the neighboring Village of Ashwaubenon. From this position came a full-time forester

and the establishment of a forestry budget for 1998. With this came the completion of all the major forestry goals of the first management plan. In just seven years the Tree Board, Parks & Recreation Director, and many other volunteers brought about a forestry program. This also, brought about the need to have a totally new management plan that will continue these positive trends and take on a whole new focus, which goes beyond just looking at trees on public property. This new focus moves toward approaching the management of the Village's urban forest through the management of the entire forest, public and private. This will rely greatly on educating the general public on tree care and the benefits of trees. It will also require educating developers, builders, and businesses within the Village. Changing people's perceptions will take time and persistence.

D. Function of the Forestry Division

The Howard Forestry Division resides under the Park and Recreation Department. This division not only serves this department, but also Public Works, Engineering, Planning, and other departments. The Forestry Divisions current responsibilities are as follows:

Parks, Golf Course, and Village Building Sites

- Tree Planting
- Tree Maintenance (staking, watering, mulching, etc...)
- Tree Pruning
- Tree & Stump Removal
- Design & Landscaping
- Manage Timber and Conduct Timber Sales on Specific Village Properties

Street Right-of-Ways

- Tree Planting
- Tree Maintenance (staking, watering, mulching, etc...)
- Tree Pruning
- Tree & Stump Removal
- Clearance Pruning (signs, lights, sidewalks, etc...)
- Christmas & Flag Decorations

Public Awareness and Education

- Assist and Do House Calls to answer homeowners questions that relate to trees and their landscapes.
- Oak Wilt Education and Control Program
- Enforcement of All Tree Related Ordinances
- Arbor Day Program (school education)
- Tree Care Seminars

Programs and Other Project Coordination

- Neighborhood Tree Planting Program
- Resident Firewood Sales
- Applying for and Implementing Grants
- Planting, Pruning, and Removal Permits
- Overseeing Contract Planting, Pruning, and Removal of Trees
- Reviewing and On-Site Advising of All Construction Projects that Involve Trees

E. Benefits of the Urban Forest

The urban forest provides many benefits to individuals and the community as a whole. Trees and related vegetation provide aesthetic beauty and help to maintain community pride. This in turn leads to long term benefits when looking at the quality of life that is provided to the residence of the community. Urban Forestry helps to maintain the communities overall value as it can be seen in property value tax base.

Trees benefit the individual homeowner greatly. Properly planted trees around homes provide saving in cooling costs in the summer and heating costs in the winter. They provide privacy and screening from neighbors. Provide areas for wildlife in the yard. Trees and the landscape provide 2 - 10% of a home's total property value.

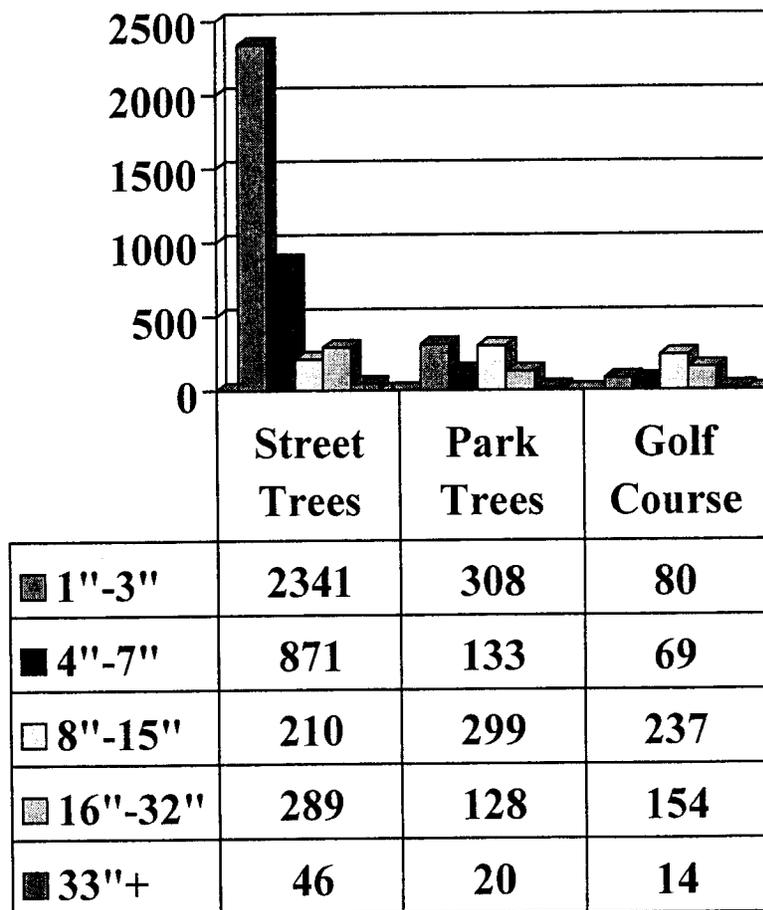
The benefits to the community as a whole are much greater in number. Trees that are properly placed along streets help divert and slow rainwater run-off. Trees and other related vegetation act as a filter cleaning the air. They filter out gases and small particulates and provide screening from the drift of large particulates, such as road de-icing salts, and dirt. They of course provide us with the oxygen that we need to live. Trees planted to shade roof tops, asphalt, and other dark surfaces provide relief from the urban heat island effect. This keeps urban air temperature similar to those of surrounding rural areas. In some cases the urban heat island effect can raise the temperature 10 degrees or more. Trees and other vegetation provide protection from erosion. Trees and other related vegetation can provide a sound barrier, in reducing noise pollution. Parks and greenspace provide recreational opportunities and provide people with a place to relax, as trees and water are shown to relieve stress. These areas also preserve native habitats and serve to educate the public on how the land was before people and development changed the landscape. In addition they provide educational opportunities for people to learn about the environment and its importance to our existence.

Section 2: Evaluation and Discussion of the Current Urban Forest

A. Street Tree Inventory

The Village of Howard has a street tree population of 3,757 this compares with 1,824 on the last inventory that was done in 1997. This shows a rapid population increase, which has doubled in less than four years. This rapid pace can be seen with the bar graph below (Fig. 1), which shows the size distribution based on dbh (diameter at breast height). Being a relatively young community, overall the street tree population has very few trees in the larger size classes. The majority of the population is under 6" dbh.

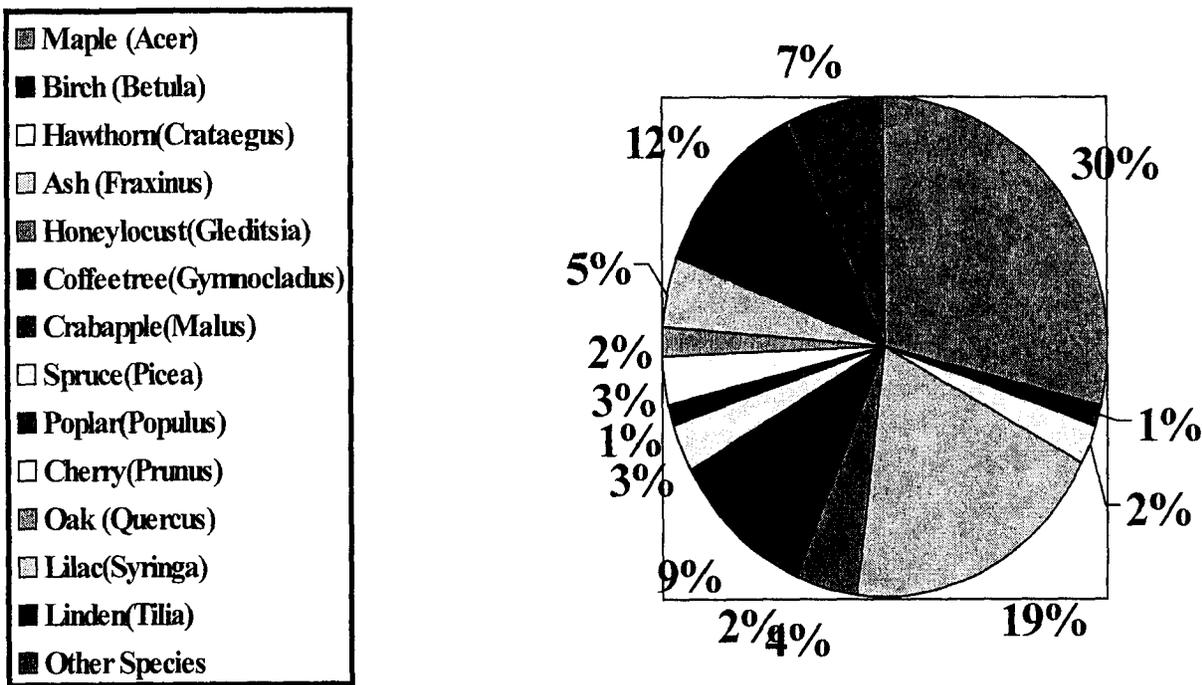
Fig. 1 – Size Distribution of Trees



Using species distribution information from the inventory is also an important management tool. The amount of trees in each genus (example: *Acer*, *Fraxinus* & *Tilia*) are reflected in the pie graph below (Fig. 2). Overall there is still too high of percentages in the largest genus, which is the maples (*Acer*). The goal of species distribution is to have no more than 20% of any given genus and 10% of any given species. This is important from many standpoints from managing tree health to diversifying longevity of street trees. The pie chart is unable to show that this distribution is already beginning to change, as the numbers of the following tree genus are all increasing in use.

Buckeye (<i>Aesculus</i>)	Hackberry (<i>Celtis</i>)	Ornamental Pear (<i>Pyrus</i>)
Serviceberry (<i>Amelanchier</i>)	Filbert (<i>Corylus</i>)	Mountain-Ash (<i>Sorbus</i>)
Catalpa (<i>Catalpa</i>)	Coffeetree (<i>Gymnocladus</i>)	Hybrid Elm (<i>Ulmus</i>)

Fig. 2 - Species Distribution of Street Trees



Since the starting of the current forestry program the Village of Howard has almost completed the first phase of managing the current street tree population. This phase involved eliminating all current hazards, pruning the entire street tree population and completely assessing the population through an inventory. This has been completed in all areas, with the exception of some older residential areas that do not have curb and gutter. During this period the overall health and safety of the street tree population has greatly benefited from this management.

Observation of newly planted trees have shown a difference between street trees that are given supplemental watering by the homeowner and trees that are left to rely on mother nature. Newly planted street trees that are in poor to critical condition are often not watered by the homeowner. The Village waters trees at the time of planting and during periods of drought for the first three years. As a result of the amount of plantings that have been done in the past four years have made it difficult to impossible for the Village to keep up with watering. This has resulted in greater stress on newly planted trees and has increased the mortality rate of these trees.

Residents are also damaging newly planted street trees with string trimmers and lawnmowers. In addition to this damage, residents create less than ideal growing conditions for the tree by removing the mulch ring, adding landscape fabric around the tree, and/or laying a thick layer of landscape stone around the tree. Many homeowners improperly stake the newly planted street trees, even when the tree doesn't need staking.

In the new subdivisions where trees have been planted throughout the whole subdivision, trees are sometimes planted in lots before the house is built, or trees are planted at a house before the owner resides there. The problem that can result is a tree that is planted before the house is built will likely be subject to more stress. While the house is built soil may be piled right next to the tree compacting the soil around the tree. Additionally, after the concrete is poured the water used to wash out the concrete truck is often dumped near the tree, which creates a higher soil pH. These trees are also less likely to be watered because the owner isn't around to water the tree. Restructuring how and when new street trees are planted needs to be done in the near future.

B. Park & Other Village Properties Tree Inventory

The Village of Howard has 888 trees that are in maintained landscape areas within Village Parks & Greenspace. In addition to the parks other Village properties, including public works, Village Hall, Well #2 and Fire Station #2 have 91 total maintained trees. This doesn't account for any areas that are not maintained on these properties. All total there are 290 acres of parkland that the Village maintains. Of this land 114 acres would be classified as highly maintained. The remainder is natural areas and undeveloped parkland. This compares with 102 acres of parkland & 66 acres of highly maintained areas in 1993. Overall, parkland has tripled and highly maintained areas have nearly doubled in size in less than 10 years. This demonstrates the rapid growth this community has been experiencing in the past decade.

Of course, this growth has made it difficult to keep a high level of maintenance with the same sized work force. Many trees in the parks have been damaged by lawnmowers. Some string trimmer damage has also been found. The largest problem with park trees is vandalism. On average, each year between 15-20 recently planted trees are damaged as a result of vehicle or physical damage to the tree. Complete destruction or disfigurement to the point of the need for replacement is necessary in most of these cases. All of these factors combined lead park trees to be the shortest lived trees the Village maintains. Typically, street trees are the shortest-lived trees in most communities. Efforts have already been started in preventing lawnmower and string trimmer injury. All park trees are being mulch with large rings to keep this equipment away from trees. To date only one park and the Village Hall have been completed. The problem with vandalism still needs to be addressed.

C. Golf Course Tree Inventory

The Village Green Golf Course was purchased by the Village in 1997. At that time it had very little if any tree maintenance done on the course. This is exemplified by the fact that there were standing dead trees on the course. A majority of the trees consist of three genera *Acer* (Maple), *Pinus* (Pine), and *Thuja* (Cedar). These three genera account for 60% of the trees on the golf course. In addition to that only a handful of trees had been planted in the past twenty years. This demanded the starting of a planting program and pruning cycle. The immediate hazards have been removed and under planting has begun to remove some of the declining trees.

Fig. 3 – Composition of Trees on the Golf Course

Genus	Common Name	Total	Percentage
Acer	Maple	129	23.3%
Thuja	Cedar	107	19.3%
Pinus	Pine	96	17.3%

Fraxinus	Ash	68	12.3%
Populus	Poplar	55	9.9%
All Other Species		99	17.9%
Total Trees		554	

The inventory revealed there are 554 total trees on the golf course. This is near full stocking, representing approximately 85% of available planting sites. Besides the remaining planting sites, many trees will need replacing soon. This is due to decline, mainly attributed to species longevity. The three shortest lived species that are represented on the course are paper birch (*Betula papyrifera*), willow (*Salix spp.*) and poplar (*Populus spp.*) all being very short lived trees and accounting for 18.5% (103 trees) of the trees on the course. These trees are in many cases declining or beginning to decline.

In addition to species decline, decline due to mechanical damage from lawn mover injury and trimming is a significant problem. Many young trees are repeatedly damaged year after year and this damage decreases the longevity of these trees. The golf course also has a specimen white oak (*Quercus alba*), that should have every measure possible taken to ensure its long-term health. Outside of these two concerns and concerns with the short longevity of many of the species of trees on the golf course, the overall health of the trees is fair to good.

D. Plant Health Care

As with many smaller programs our plant health care was very minimal in the beginning. Most of the time trees have been left to fend for themselves. If they did not survive on their own they were then removed. Since 1998 plant health care practices have grown and expanded to include more than just some supplemental watering. In areas where the pH is extremely high, sulfur amendments have been made to bring down the pH in the soil. In addition to the sulfur, micronutrients have been applied to some of these trees (Pawn Drive/Sugar Maple Problem). One-time fertilizer applications have also been started on plantings that have been in the ground for one/two years.

In addition to trying to increase the vigor of existing trees, steps to manage pest problems have also been started. The two major problems are oak wilt and gypsy moth. Oak wilt is isolated to one small neighborhood east of Hwy.41 along the first five blocks of Memorial Drive. With the cooperation of the neighboring residents, trenches were place with a vibratory plow and residents were educated on when to prune their trees to prevent the possible spread. This is an on going effort and because of an untimely storm in the spring of 1999, it will need continued monitoring. Gypsy Moth is our next challenge and will become our most challenging pest problem. To date we have been monitoring populations from trap counts and our Village Tree Board has been going out and scouting for egg masses. Education of homeowners on what to look for is also an important part of keeping the population at a manageable level. Treating of egg masses with emulsified soybean oil has also begun.

Although our current level of preventative plant health care has increase some in the last few years, we will need to continue to do more in the future to manage our ever growing and rapidly changing urban forest. More time and money spent on maintaining what we have will save a great deal of time and money removing and replacing our existing trees.

E. Construction Damage

This is a major problem and although some headway has been made in recent years, more needs to be done. Currently, there is no requirement that the forester have a check off or review all reconstruction plans. Often the forester is brought into the process once the plans are in place. Then it becomes an evaluation of what has a chance of surviving and what must go because the damage planned will be too extensive for the tree to remain. In some cases the only way the forester learns of reconstruction projects is by going and asking or by happening upon the project once it is underway. An example of this from the current year, was a project where a handful of trees that had only been in the ground two years were marked for removal on a reconstruction project. Upon seeing this in the field, the trees were immediately spaded out and moved before they were destroyed. Not only is this a prime example of the lack of communication, it is an example of how little importance or value is placed on these trees by other departments. This example was caught in time, how many have not been in the past. This senseless waste of money and our resource must be stopped.

An attempt has also been made to lesson the impacts of construction damage on new home sites within the Village. The first attempt has been to voluntarily work with the developers and homebuilders to prevent construction damage. For two reasons this has not been successful. First, of all the education of the homeowners has definitely made them realize the importance of protecting the trees, but it is not reinforced by the builders and other contractors on these sites. They come on site and ignore the protection zone (including removing the fencing) and say that it is all right and that what they are doing is not detrimental to the tree's health. The second reason that this process has failed is that the forester or other employees do not have the time to visit the site on a regular basis, which usually means daily, to make sure the protection zones are left in place and no damage has occurred. Ultimately, under the current program the forester has no authority to enforce protection. For these reasons the program has not been successful and damage continues to occur. In some cases the homeowner has taken to enforcing protection of the trees, but in viewing these sites damage is still occurring. This is because the homeowner often does not have a full understanding of the process and how trees are damaged, in addition to the fact that they usually can not be there everyday either. In some cases where the future homeowner has taken an interest damage has been lessened, but without enforcement of some kind trees will continue to die as a result of improper planning and protection during construction.

F. Howard's Urban Ecosystem

1. Soils -

When discussing soils, it is often difficult to talk broadly and group large areas together. In this municipality as in many, the soil is constantly being altered, manipulated and mixed. If you are able to identify the original soil type it is often under a couple of feet of fill or the upper layers of it have been removed and the subsoil layers are now the surface soils. Managing plant health is often difficult under such conditions. The next four paragraphs will try to summarize the major or unique soil areas that lie within the Village of Howard. Then talking about the manipulation and the effects it is having and finally hitting on things that are incorporated into the soil during grading and filling processes that negatively effect plant health.

The intent of this section is to give an overview of our soils within the Village. The Eastern edge of the Village, along the bay of Green Bay, consists of primarily outwash plain loamy fine sand. This soil type covers most of the area east of Highway 41 and along the mouth of the Duck Creek as it approaches the bay. These soils are primarily undevelopable wetlands. Areas that can be developed are stripped of topsoil to create stable building sites. These sites are highly disturbed and create difficult when trying to establish plant material on these sites.

From these outwash soils heading west the next area of soils consist of glacial till plains. These soils are primarily silt loams and sandy loams. The silt loam soils are quite fertile, but have very shallow layers of topsoil before reaching heavier clay sub-layers below. The sandy loam soils are quite infertile having a shallow topsoil layer as well before the clay content begins to increase. These are the soils found primarily between Velp Avenue and Hillcrest Heights. This area has been the most intensively developed part of the Village. These shallow surface layers of topsoil are stripped off during the development process. They are often transport off site and used as fill or topsoil on other projects. The so called topsoil that is used to replace them is usually put down in a much thinner layer and has a much lower organic content then the original soil. This creates many nutrient deficiency problems and soil chemistry problems that are not easily fixed. The sandy soils of this area are low in fertility and would require organic amendment more regularly to keep nutrient holding capacity at a high enough level for any plant material that does not natural grow in low fertility sites

The next area west of this is from approximately Hillcrest Heights to Greenfield Avenue. This area consists of a mixture of glacial till plains and glacial lake plains. The soils in this area range from silt loam to fine sandy loam soils. They differ from the previous area in the fact that the surface layers are much deeper before reaching clay sub-layers. This is the area that is beginning to be developed more as the area above becomes completely developed. Due to the fact that these soils are much deeper some of the problems seen in the previous area should be lessened and can be more easily avoided. These soils, where greatly manipulated, will still see similar problems. Road right of ways and building foundations will still be impacted by the high level of disturbance. Due to the deeper depth of these soils upper horizons and other less disturbed areas should not be effected as greatly. Again, the sandy soils of this area are low in fertility and would require organic amendment more regularly to keep nutrient holding capacity at a high enough level for any plant material that does not natural grow in low fertility sites.

The final area is from Greenfield Avenue west to the Village limits. This area consists of glacial till plains, with the predominant soil type being loams. These soils are characterized by having thicker surface horizons with sandy layers under the loam surface layer and then the clay in the lower horizons. These soils have moderate fertility. Most of this land will remain in agricultural use or is to wet for tilling and is in pasture or natural wooded areas now.

These are the soils that are here to begin with, but unfortunately these are not the soils that are left to work with after the constructions. What is left to work with is often compacted and poor quality sub soils, that lack fertility. This is due to the fact that these soils have very little organic matter in them. In addition to these problems the soils that are left after construction usually have asphalt, concrete and other foreign materials that can be toxic or detrimental to plant growth.

2. Climate -

The Village of Howard is situated along Lake Michigan's Bay of Green Bay, which is on its east side and extends west to the Brown County line. The Village of Howard is located on the edge of Zone 4b/5a for hardiness. Many years can go by without seeing lows below Zone 5 temperatures, but sooner or later the cycle comes around. Because of this great length from east to west, this makes the Village of Howard very unique in the fact that weather can be greatly different from one end of the Village to the other. Early in winter it will often remain warmer near the bay until it freezes over. Then late in winter and into early spring it reverses and is often cooler near the bay compared to inland. Overall, these differences are minimal as far as hardiness goes, by the middle of winter, temperatures are uniform. Our summer temperatures are also greatly effected by our proximity to the Bay of Green Bay. Some summers, when our prevailing winds are more easterly the

temperatures are very cool and other summers, when prevailing winds are from the southwest the temperatures can be very hot. Below are two tables summarizing our averages and extremes in temperature and precipitation.

Table 1: Temperature Ranges in Green Bay, WI

	Ave. High Temperature	Ave. Low Temperature	Highest	Lowest
Annually	53.3 degrees F	34.2 degrees F		
Winter	25.9 degrees F	9.3 degrees F		-33 degrees F
Summer	77.8 degrees F	56.4 degrees F	104 degrees F	
Warmest Month - July	80.5 degrees F	58.9 degrees F		
Coldest Month - Jan.	22.8 degrees F	5.8 degrees F		

Current data collected from Austin Straubel Airport, Green Bay, WI. Source: Midwest Regional Climate Center. Homepage. Climatic Summary for Green Bay, WI. 20 November 2000 < <http://mcc.sws.uiuc.edu/Summary/Data/473269.txt> >

Table 2: Precipitation Data Summary from Green Bay, WI

	Average Total Precipitation	Highest	Lowest
Annually	28.83 "		
Maximum, 1985 / Minimum, 1930		38.36 "	16.31 "
Wettest Single Day - June 22, 1990		4.90 "	
Wettest Month - June, 1990		10.29 "	
Highest Snowfall Total - 1985		101.0 "	

Current data collected from Austin Straubel Airport, Green Bay, WI. Source: Midwest Regional Climate Center. Homepage. Climatic Summary for Green Bay, WI. 20 November 2000 < <http://mcc.sws.uiuc.edu/Summary/Data/473269.txt> >

G. Greenspace Distribution/Use

Greenspace distribution within the Village of Howard is of great importance in maintaining a balance between developed land and undeveloped land. These areas serve many purposes from stormwater detention areas to general recreational areas. Without these important areas we would not have the community we have today. They are not only blocks of land, but also represented by corridors or greenspace strips that follow streams or roadways. The benefits of these areas are many fold and serve much greater purpose than their initial appearance may lead people to believe.

Within the Village of Howard, 14.5% of the total land is in publicly owned greenspace. This is land owned by the Village, Brown County and various agencies within the State of Wisconsin. This is mostly in parkland, but there are a large number of smaller parcels of land, all-totaling over 1,650

acres. Based on the total land area this is a significant amount in public ownership, but it does not represent all native cover types, such as upland prairie or upland mixed hardwood forest cover types. The large majority of this land is undevelopable wetlands. These areas are important buffering areas for the Bay of Green Bay and for the streams and their tributaries that feed into the bay. Not only do they serve to maintain surface water quality, they also serve as filtering areas for groundwater recharge and slow stormwater runoff, which lessens the potential for flash flooding. Given the importance of these areas, it is important that these areas continue to be preserved and encroachment is minimized. The Village must continue to find ways to preserve other important cover types and maintain a good balance in the urban ecosystem of undeveloped land.

Section III. - Future Management Goals and Objectives

A. Street Trees

The existing population of street trees will continue to grow rapidly for the next two years. Then the current slow down in the number of new subdivisions being started will take effect. This should result in our current population increasing to approximately 5,750 – 6,250 street trees in the next five years. This will represent a tripling of the population in a 10-year period. This represents an extremely rapid population increase that was more aggressive than desired. It is of course a product of the extremely good economy of the 1990's. People want the trees planted soon after their street is developed and if this is not done they will often plant their yards full of trees leaving little and often no space for street trees. Without establishing a uniform street tree planting down the street, the benefits of street trees will be limited. It is the combined result of the canopy over the road surfaces that create the greatest benefits. That is why establishment of these plantings immediately is critical in their long-term effectiveness. In the near future this will not be as much of an issue as new subdivision development has slowed and will continue to be slow until the economy turns upward again. A realistic level of planting is between 400 to 450 street trees per year. Anything greater than that level makes it difficult to maintain a high level of follow-up care, which leads to decreased longevity and in some cases mortality. During drought periods it has been impossible to water all the street trees adequately because of the amount of newly planted trees. To help in the water deficit problem the Village has begun expanding to large mulch rings around all trees that are in front of public property in the right-of-way. This is being done as an effort to increase watering holding capacity around the tree, since these trees are not in front of residential homes and no one else is going to water them. This should help to extend the time between watering.

Sidewalks are going to start to be installed on all major thoroughfares and collector streets coming out of subdivision. This can be planned for in new areas, but where sidewalks are going to be retro fitted in existing areas a plan of action needs to be developed to address minimizing damage to

existing street trees. Another great concern regarding trees and infrastructure is street reconstruction of rural roads that have ditches to urban streets with curb and gutter. On all the recent projects the quality of backfill used in the terrace area and the amount of topsoil has been poor and inadequate. It can easily be seen during drought periods in a distinct line at the back of right-of-way. All the grass within the right-of-way is brown and people's yards are still green, regardless of the amount of watering they do. This issue must be addressed with the engineering department when they spec future reconstructions.

The Village has already begun to address many of the other issues found during the inventory. It has become standard practice to place an 18" tree guard around the base of all street trees, to prevent damage from animals and humans. To address many of the other problems regarding homeowner improper treatment of new street trees doorhangers are now being placed at the time of planting. These efforts should improve the overall condition of newly planted street trees.

Our existing population of larger street trees is on a regular pruning cycle and the Village is now entering the second rotation, which should bring these trees back to a good maintained state. The first rotation raised crowns over roads and took out major deadwood. This rotation is raising the crown over the house side of the tree and doing structural pruning to two-inch diameter branches. The next major effort will need to be maintaining a high quality-training program on all the newly planted trees. This is essential in preventing many of the structural problems that are shortening the life of the existing larger street trees.

Diversification is the last key to the health of the urban forest. Right now Acer and Fraxinus are right at the limits of 20% of each genus. There are so many different species of maple and they are quite tolerant of urban conditions that it will be difficult to keep the numbers down. Ideally, with continued diversification getting the maximum of a single genus to 15% should be the next goal. In the past few years the available palette of trees from the local nurseries has increased, but it has done so slowly. Diversity within each genus and more importantly within each species is critical. Diversity within each species is difficult, since most trees are cultivars, meaning clones of a single tree (same genetics). Genetic diversity maybe even more important than species diversity in ensuring forest health. If a new insect or disease problem arises or a tree's tolerance to certain stress factors is poor, that particular cultivar may not show it for some time. That is why the use of as much genetic diversity as possible is critical to the urban forest health. Using different cultivars and trees from seed where possible is crucial to ensuring we do not have a monoculture with no genetic diversity. Currently there is no single cultivar that accounts for over 5% of the total street tree population. This is a good maximum percentage as currently it would mean no single cultivar has a street tree population of over 175 trees.

B. Park Trees

This is another area where the Village of Howard is headed in the right direction, but there is a lot of work to be done. Three years ago a pruning cycle was started. Each year one or two parks have been pruned. To date Spring Green, Barney Williams, Lehner Parks have been completed. Pinewood, Pinecrest and Meadowbrook Parks have been partially completed and Howard Memorial Park needs to be done. The first rotation should be completed during the 2002/2003 winter. This will be the first step in improving the overall condition of the park trees.

The other major project in improving the health of the park trees is a mulching program that was started in 2000. Pinewood Park is the only park that has been completed. The Village Hall has also been done and Spring Green has been started. A great effort from both Village staff and volunteer groups will be needed in the next few years to get this project completed. The benefits to tree health

can already be seen where it has been completed. There has been no new wounding from lawnmowers and string trimmers.

The only other major problem with the park trees is vandalism. This has become the number one problem, resulting in significant mortality and damage to the Village's park trees. The worst park has become Pinecrest Sports Complex. In total, just in the last year 16 trees were killed or damaged to the point of needing replacement. This adds up to more than \$3,000.00 in replacement costs. This kind of annual investment goes along toward paying for this park to be fenced off and eliminating the opportunity for this annual destruction. The requests for more shade at this park will never be met if the Village is replacing all the trees every couple of years. In other parks the use of deterrents, such as boulders around trees or leaving stakes in place longer by trees that are located in vulnerable locations, needs to be employed. Using larger trees is effective in prevent manual damage from individual using their hands or hand tools, but this is not the answer to the great majority that result from vehicular damage. Initial investments in developing parks to prevent vehicle from enter some areas needs to be employed. A larger initial investment will payoff in the long run in saving of plant material, including turf and a much more important savings in time. Time is the largest problem with a small staff and saving time always repairing damage means other more important projects get completed sooner.

C. Golf Course Trees

Before last year pruning had been done on an as needs basis. Starting last winter a pruning cycle was started. The first time through the rotation it will be completed in three years. After that the rotation will be done over a five-year period. The development of a planting plan will be done next as the Village has an initial idea of how the Hwy.29 corridor will be reconstructed in the future. In addition to the tree plantings, there will be a continued effort to work around the course over next few years installing landscape beds by tee boxes and around the clubhouse, maintenance building and new sign.

Unlike in the parks mulch can not be used in all areas on the golf course, as it would get dragged all over the course by mowers and golfers. Although certain areas, such as behind tees and other off the beaten path locations could be mulched, this is not the answer everywhere on the course. A plan is needed to address improving overall tree health, including preventing mower and string trimmer injury to trees on the golf course.

D. Green Space / Other Public Properties

The importance of greenspace whether publicly owned or privately owned can not be understated. Current research is showing the importance of these areas beyond their natural beauty and recreational value. These areas serve as pollution sinks and are very important buffering areas. Not only buffering noise and sight, but also serving as cleansing buffers before surface waters reach our ever increasingly precious surface freshwater supplies. Current research is just beginning to give us an understanding of the importance of these natural areas. Looking at the trends in larger urban areas should serve as wake up call that developing urban areas need to preserve more greenspace now. Many larger urban areas are removing hardspace features and re-establishing them as greenspace areas. Even though land costs are high now, they are still much cheaper than rehabilitating land in the future.

Increasing greenspace does not necessarily mean the Village of Howard needs to purchase these lands. Currently, 1,650 acres is publicly owned. Increasing the amount of forestland by an additional 300 to 500 acres and some addition to other greenspace would bring publicly owned

greenspace to 20% of total land within the Village. This is an aggressive goal for the future, but one that would provide partial funding of the forestry program in the future. Alternatives such as requiring more greenspace on developments, narrowing road width on residential streets and cooperative agreement with property owners in the form of covenants on the deed to the property are just a few examples of way to increase greenspace remaining in the Village after development has occurred. These ideas may seem drastic or pushing the realm of a reasonable balance, but many widely accepted management ideas start in this manner. Forward thinking and planning take time to become accepted on a widespread level.

What is the correct balance of greenspace and tree cover? Both of these numbers can not be plucked from the air. As for greenspace, without a complete urban ecosystem analysis of Brown County it is difficult to give an exact amount, however the Green Bay area is feed by a relatively small aquifer. This is in relation to the small surface water area and the more development that occurs in this area the more it impacts groundwater recharge. Due to the current need for American to live in single family sprawling suburbs it may not be possible to maintain any true balance between hardscape and greenspace. A realistic approach is to take advantage of ever opportunity possible to impact the percentage of greenspace.

As for tree cover 20 years of research has yielded some recommendation as to the amount of canopy cover needed to maintain a health balance in urban areas. Overall this number should be 40%, ranging anywhere from 15% in commercial areas to 60% in suburban areas. Being that the Village of Howard is primarily suburban to rural our target range should be near 50%. The Village doe not have any accurate numbers regarding tree cover. Using current aerial photos this information could be determined. Breaking it down by cover type would also be useful. This would be a good project for an intern and a strong grant candidate. Having this information would help improve the accuracy or show the need for landscaping requirements for each zoning class. It would be a useful planning tool in determining where to target programs to increase awareness and understanding of the importance of tree cover. There are many more useful ways that this data can be used.

Taking 25% of this projected publicly owned greenspace and intensively managing it for timber management would provide long term and permanent funding for the forestry program. The Village currently owns 110 acres that is forested and no plans are in place to use this property for any other use. These areas would be managed for timber production, but would also serve as recreational areas. Hiking, hunting, x-country skiing are just some of the compatible use for these areas. In most cases these areas would be managed with the use of uneven-aged management, meaning there would be different size classes present at all times (i.e. no clearcutting). Although there are already some forested areas that are primarily covered with poplar and clearcutting is the best management technique for regeneration of these stands. These clearings would create more interest for wildlife viewing and different hunting cover types.

To make this work it may take two thinning cycles, under planting and other techniques to get some of these stands headed in the right direction. This is a long-term goal and could take 50 years or more to establish. However, once established this program could provide substantial funding for the forestry program. That funding in the future could come at a time when there is no more growth in tax base or there are economically down times. As an example, if the Village were managing 250 acres now, this forestland would be providing approximately 20% of the forestry budget annual. Ideally, 500 acres would be both a manageable and realistic goal. Obtaining land in a minimum of 10-acre parcels would make for easier management, but reality is that this may not be feasible. Appendix F details a management plan of our current forestland and identifies properties the Village should pursue purchase of to obtain 50% of the goal and 100% of the goal. The actual site

prep, thinning, harvesting and other management techniques can be done in-house or contracted. In winters where there is little snow, all work can be done in-house maximizing the profitability of this project. In other years the Village may have to contract the work to keep up. Although this will cut into the profit, long term profitability of timber management will be accomplished, since the management and other site work can be done in-house.

E. Village of Howard's Overall Urban Forest Program

With the dramatic increase in the street tree population, amount of parks to maintain and overall greenspace to manage, shared help from within the Parks Department and from Public Works Department is reaching its limits already. These departments continue to grow and can only offer a limited amount of help. In 2001 the help from public works is near $\frac{3}{4}$ of a full-time individual. Full time Park Department personnel add up to $\frac{1}{3}$ of a position. The demand will continue to grow for help and each department will be able to offer less and less as they grow. As help is taken away this leaves a decision to be made regarding additional personnel. In addition to personnel decision in the next five years, equipment upgrades and additions are needed. The biggest of these is the addition of a bucket truck to address training of trees in the 4" - 10" class. All the young newly planted street trees are now entering this stage.

Besides staffing and equipment issues, the other large issue is the overall direction of the program. What are the goals and objectives for the forestry program? Where should it be heading? These are the bigger and more important questions facing this community's forestry program. In this section all of these issues will be addressed. In reality, this plan must look beyond just urban forestry; the goals and objectives that are set must be reasonable and obtainable for the community as a whole. They must not only continue to move the program toward its mission, but fit into the context of the rest of the community's services and accomplish these tasks without being an unreasonable burden on the citizens who fund the forestry program.

1. Budgetary Needs/Objectives

Objective 1: Addition of a forestry Level 1 - Lead Arborist:

This position would be a union position heading up all field operations in forestry. In some cases working individually and in other cases leading parks, public works and/or summer seasonals on forestry projects. Why is this position needed? The workload in the forestry department continues to grow. Each year forestry is using outside personnel for more and more time. In 2001 forestry used the equivalent of 70% of one public works personnel. In 1999 it was approximately 20% of one position. This trend in increased work volume will continue to grow. In addition to the public works personnel, the park department personnel are used to complete many of the other forestry assignments. Their time adds up to 30 % of one park's personnel. Since forestry continues to grow and parks continue to be added this balance of workload between these two has reached a limit. Many projects in both parks & forestry go unfinished or are put off because of limited time resources. This will continue to worsen with each year. Combined with these two factors the workload for the forester continues to increase and maintaining a balance between office and field is becoming more and more difficult. As the maintained tree population grows, winter pruning cycles are taking longer each year and the remainder of the year fieldwork and job coordination has increased to well over 50% of that time. From mid-April to mid-November in 2001, the forester had to maintain an average of a 10-hour day to just to stay ahead of crews and try to maintain a reasonable response time to office work, including house calls for residents. This already has the forester working 1.2 of a full-time position. As with the other positions working in the forestry

division, this will continue to increase. The following table gives a breakdown of amount of time spent on forestry for each department.

By 2003 one full-time position will be needed to help alleviate the need for relying on other departments personnel to complete all forestry work. Without this position maintenance of trees, such as pruning, watering, mulching etc... is not completed. Taking the existing assets the Village has in its tree resources and making them liabilities. On young trees this means early mortality, stunting, poor structure, etc... All of these things are leading to a great loss of investment, expense in removal and replacement. On larger trees this lack of care can result in liabilities of persons or personal property. Spending more on trees when they are young results in longer lived, healthier trees that are true assets to the community. Care given in the first 15 years of a tree's life can significantly impact both the cost of maintaining the tree for the rest of its life as well as extending the tree's life. As an example of the investment the Village has already made in trees, from fall of 1997 to fall of 2000, over 2000 street trees were planted. Just these trees alone have an estimated value of over \$400,000 today. Investments in trees such as these must be maintained, or in time much of this value is lost due to early mortality and replacement.

Of course there are always alternatives, in this case it would be contracting. The Village's past experience with contracting is unless constantly supervised contractors cut corners and try to increase their profit margin. Since the Village lacks the manpower for constant supervision. This makes this alternative less attractive. More over, cost is greater when work is contracted. An example is pruning of the large Silver Maple street trees in the Garden City Subdivision. The Village is currently pruning these trees in-house at an average cost per tree of \$120.43. This includes personnel, rental of bucket truck and fuel costs. Equipment maintenance was not included in this estimate. Contracted the average cost per tree was quoted at \$240.00. Since the Village has the manpower in the winter months to do this work, our cost in personnel is only increasing by approximately \$35.00 per tree to add a highly skilled professional to lead this crew. Adding this position should also increase productivity, since this position can be on sight 100% of the time when needed to train and guide our current employees. This should intern offset some of the increase in adding this position.

Objective 2: Adding a bucket truck to the capital budget and replacement of other vehicles:

Currently the Village of Howard has worked out an agreement with the Village of Ashwaubenon for rental of their bucket truck. This arrangement is working, but as both communities continue to grow our needs will continue to overlap. This truck is not only used for pruning, maintenance & removal of trees; it is also used for Christmas decorations, flags, lighting & sign work. Demand for all of these items continues to increase in each community. Estimation is that by 2004 the village will need a unit of its own. This is based off of current use and reasonable time to incorporate it into the capital improvement budget. Since the majority of the Village's trees will be in the smaller size classes and the need to use the unit for other projects besides tree work, this unit will only need to have a working height of 40' or slightly more. This means it is a smaller unit and will cost the community less than a full sized bucket truck. This truck would be able to service over 90% of the tree population for the next 30 years, which would be well beyond its projected life span of 20 years. The cost of this unit will be approximately \$70,000. When projected over 20 years this is a cost of \$3,500/year. Maintenance and inspections will add \$750/year. Maintenance will increase in the latter half of the bucket truck life. This is an extremely small investment for a tool that will not only allow the Village to do all of the above uses more efficiently, but more importantly it will allow them to be done in a safer manner, exposing the Village to less liability of employee injury. For the remainder of the tree population that is larger, the Village will still be able to maintain an agreement to use the Village of Ashwaubenon's larger unit for these special situations.

Replacement of both forestry trucks will need to be done soon, as they are old and in the case of the forester's truck, very limited in usefulness. The one ton dump body will be replaced in the 2006 budget and the small sized pick-up will be replaced with a $\frac{3}{4}$ ton 4x4 pick-up in 2003 budget. Currently our one ton dump body is 13 years old, with a project service life of 18 years. If our capital improvement budget is lean the truck maybe able to be extend an additional year or two. This will have to be determined as this time approaches. Currently the forester uses a small sized pick-up, which is currently 15 years old. This truck can move people around, but that is its only real useful function. The replacement of this truck is needed in 2003, as it will give the forestry department more versatility. Replacing this truck with a larger truck that can pull trailers will make the truck more useful. This will bring all of the forestry fleet vehicles on to a normal rotation. There should not be a need to add any vehicles for a considerable amount of time in the future. The only challenge will remain to be managing the distribution of summer seasonal employees to job sites. This will require cooperation between forestry and parks as well as other departments within the Village.

Outside of vehicles the only additional large item that may arise is the need to purchase a large tri-axle trailer. The forestry department needs for a trailer of this type and the park departments needs overlap, making it difficult to carry out spring planting. The optimal trailer would be a camelback which is higher as the bed is level with the top of the wheels. This eliminates fenders, which are constantly in the way for tree hauling. This height is also a good working height eliminating bending over, for such things as mulching off the trailer. Of course this is a much more expensive trailer. Another option for solving this problem, maybe rental of a trailer for this one month period. This maybe more cost effective as the remainder of the year other trailers serve the forestry departments needs.

Objective 3: Advancing the impact that the forestry department has on its community and the citizens that live within it, through increased awareness, education and understanding of the functions and importance that urban forestry has on the community:

This maybe more than one single objective, but it all ties together and keeping it together will keep the management plan objectives to a number that can be accomplished. This objective is on going and probably never complete. Education and public relations are the cornerstone of any forestry program. Without these two it does not matter how many things get accomplished or how great of a job is done managing the public property of the Village. If the public does not follow suit with the forestry department's lead or understand what the forestry department is trying to accomplish all the effort in the world will have little impact. This can be seen in the fact that over 80% of the land in the village is privately owned. In the past ten year the Village of Howard has done a great job of bring the public lands under better management. Now the objective is to begin to educate the private landowners on the importance of what has been laid out as an example on the Village's public lands. This is probably the greatest challenge of any forestry program, but it is the one that has the greatest impact on a community. This is not something that will be accomplished in the scope of this management plan or the following. This is an ongoing and evolving process that will continue indefinitely.

The goal of the management plan is to bring out the points of the objective and the justification for its importance. How this objective is accomplished and planned out is the purpose for meetings and planning sessions. In stating this the following is a framework for a starting point not necessarily encompassing all aspects of the program and what should be accomplished.

Education & Public Relations:

- Proper tree care
 - How site selection, tree selection, planting, pruning should be done
 - Why the forestry department uses or does the following
 - When is it time to hire a professional arborist
- Integrated Pest Management
 - What are the pests to be concerned about
 - Does the Village have any bans regarding this pest
 - How and/or What is the Village doing to manage this pest problem
 - What are the alternatives to typical control measures
- Value of Trees
 - How they impact air quality
 - How much trees and landscaping account of property value
 - What are the indirect benefits of trees
- Importance of Greenspace within the Village
 - What are the many different ways that greenspace act to buffer our community
 - How these areas have more of a benefit than just the direct and immediate benefit to the area that surrounds them
 - The economical benefits of greenspace
- Peoples overall Effect on the Environment and the Effect the Environment Has on People
 - What is the balance of nature and how do we as humans impact it
 - How nature around us can impact human lives

Although some of points outlined go beyond factual based science, it is important that they are brought into the consciousness of the public. If for no other reason than to gauge the publics level of understanding of these topics or assess what level they see these issues in there importance in this community. Each year as public relations tools are implemented and planned, this outline will serve, as a starting point to determine what should be accomplished for that year. By no means does this mean they will all be accomplished and there are not other points that need to be added.

If these three objectives are accomplished, then all the smaller objectives and goals outlined in this section should be obtainable. This means improving the care of our existing tree population (streets, parks and golf course), improving the overall appearance of the Village of Howard, improving our IPM both on public and private properties, increase greenspace/public property (including managed forestland) and improving the overall care/appearance of the golf course.

C. Emergency Procedures Plan

I. Storm/Natural Disaster Plan

The Village of Howard has been fortunate when it comes to natural disasters. Other than flooding from heavy rains, very little significant damage has occurred from any given storm to date. The following plan is put in place to ensure that if such a storm/natural disaster strikes, the Village will have procedures in place to take action and recover from this event. Being located in the Northern Wisconsin takes us out of the main tornado paths and north of the usual ice storm belt of the lower Midwest. The most common serve storm damage that occurs in the Northern Wisconsin area is from straight-line winds. The width of these wind-damaged areas varies greatly and can exceed one

mile in width and travel, much as tornadoes do, for many miles before the path of destruction stops. In the spring of 1999 a storm hit the neighborhood just east of Highway 41 with these types of winds, creating a lot of damage in a small area. Many trees were uprooted or damaged from the winds. Property damage was also significant in this area, most of it a result of the mature oak trees in this neighborhood. The Village did not have any damage occur on the street right-of-way, since the majority of the trees in this neighborhood were newly planted within a couple of years. The only park in that area did have a lot of damaged. A couple of trees had to be removed and many needed extensive pruning to make the park safe for residents to use. This was just a small taste of how these storms have the potential to be as devastating as tornadoes.

Village of Howard – Forestry Divisions – Storm Damage/ Natural Disaster Plan

A. Early Warning

➤ Supervision of Forestry Divisions – Storm Damage/Natural Disaster Control

The Village Forester will be in charge of storm clean up efforts, related to forestry. In all cases, due to the limited forestry staff, help will be needed from the Parks Department and the Public Works Department. Upon approval from the Park & Recreation Director and/or the Public Works Director all available staff will be designated to storm clean up efforts. In the case of the Parks Department all other departmental functions will be delayed until Class I thru III damage has been abated. In the case of the Public Works Department all available personnel that are not involved in Class I or II functions that do not involve tree related damage will be designated to the Village Forester for assignment to storm clean up that is related to forestry.

➤ Weather Warning

I. Immediate Reaction

➤ Tree Damage Clean up Priorities

Class I First, all life threatening situations should be given priority. The Village Forester, Park & Recreation Director or Public Works Director should make an on-site visit to determine the severity of the damage in the event of multiple hazardous situations. The Village Forester will have a list of current contacts (including utility line clearance personnel) in the event of multiple hazards, that have the specialized forestry skills required to abate life-threatening situations. Under no circumstances will any other Village personnel perform Class I priorities, without direct supervision from the forester or a contracted company trained with the proper skills needed to perform these abatements. Crews should remedy the situation to a point where it is no longer life threatening before proceeding to the next location. Class I may include any of the lower classes if that work is needed to allow emergency vehicles access to an emergency call or situation. Final clean-up should wait until all other Class I thru III priorities have been cleared.

Class II Second, all major property damage instances, where the potential for the situation to develop into a life threatening situation or for additional property damage to occur must be remedied to a point where the crisis is abated. The Village Forester, Park & Recreation Director or Public Works Director should make an on-site visit to determine the severity of the damage in the event of multiple hazardous situations and determine the priority of the Forestry Division

response. Again, final clean-up at those sites should wait until all Class II and III priorities have been cleared.

Class III Third, all streets should be cleared of fallen trees and debris in an order of preference that follows: Clearing all major streets, (starting from Public Safety locations and radiating out through the Village including all major thoroughfares and arterials). This should be followed by clearing all remaining residential streets. This order assumes that the county will be clearing all state and county roads within the Village. Because the specialized forestry skills required to abate Class I & II would be utilized immediately, the street clearance work (in the case of widespread and severe damage) may not be undertaken by Forestry Division personnel until well after the storm has passed. In these situations, the Village Forester should recommend to the Public Works Director that all other available Public Works crews be considered to assist in street clearance work. Immediate supervision of these supplementary crews would be under the direction of their respective divisions.

Class IV The final classification is for all other Village Properties (including municipal building locations, parks, and other municipal facilities. These are the last areas to be cleared after Class I – III have been completely cleared and cleaned-up. In the event of widespread and severe damage, help will be requested from all available personnel within the Public Works Department, to clear and clean-up these areas.

Forestry Division & Public Works Department Communications

In all emergency situations being in constant communication is vital. All municipal vehicles should be equipped with a two-way radio. If any vehicles do not or rental vehicles are employed, there are a number of handheld radios available. To contact outside personnel, such as police & fire, utility crews and contract crews employed for storm clean-up, other devices must be available. Since normal line of communication may have been disabled by the storm, back-up devices must be available. These should include cellular phones, communication devices from other government agencies and ham radios.

Available Equipment &

- Storm Calls - Priority Trimming: Consideration of safety to life and property is of prime importance, when trees have been damaged by storms.
 - * 1st Priority - calls involving people in danger.
 - * 2nd Priority - calls involving obstruction of major streets.
 - * 3rd Priority - calls involving obstruction of local streets.
 - * 4th Priority - calls involving obstruction of sidewalks.
 - * 5th Priority - calls involving other public property.
1. Only authorized personnel will be used on storm calls. The Department of Public Works personnel are first on call.
 2. No work will be performed on the site where electrical wires are down, damaged or broken.

3. The appropriate utility company must be called if any wires are damaged or broken.
4. If damage has occurred to private property, report it to the proper authorities before leaving the scene.
5. After dark calls require special caution. Climbing should be held at a minimum and only done when absolutely necessary.
6. Communication with the Park Department, Police Department and the Department of Public Works can greatly improve the priority in storm damage incidents. (Radio communication)
7. Employees will be subject to call at any time for special assignments and/or emergency work.
8. All limbs, branches, twigs, wood, and other debris should be neatly piled so that no interference with sidewalk, driveway, or gutter occurs. Notice to adjoining property owners must be given, so they know when job is to be completed.

D. Adverse Conditions Plan (Drought or Flood Conditions)

The Village of Howard as with most communities is at the mercy of the weather and how it cycles. Drought conditions frequently occur and localized flooding is also becoming more common, due to our geographic location in our watershed basin and the increase in stormwater runoff. Droughts are more likely to occur and need greater attention. In any given year at least one time during the growing season, we are likely to experience drought conditions. They may not be very severe, but as we continue to learn more about plant health, it is becoming more apparent that water availability plays a much greater roll in a tree's ability to ward off insect and disease problems, not to mention maintaining vigor and normal growth. This places a great importance on drought management. The following plan outlines our procedures for monitoring and managing supplemental watering of our landscape plants.

Drought Plan

Response to drought condition will follow stages based on the severity of the drought. Each stage will be managed by the use of our personnel and by public relations messages that ask homeowners to help with watering. In the final, most severe condition, it will also call on the Village to use contracted services to keep up with the watering schedule (when deemed necessary). Following are the three stages of drought severity. The ranges of these stages vary based on soil type. Within the Village soil types vary greatly. The majority of the soil types are heavy clay types, with a few clay loams and a number of areas of sandy soils.

Stage I. -

This stage is reached when available soil moisture reaches 15 centibars in sandy soils, 40 centibars in medium textured soils and 70 centibars in clay soils. Once this is reached at more than one test location within similar soil types, watering of all new plantings that are in their first growing season, which includes trees planted in the spring of the current year and trees planted the



any and all options should be explored and employed to minimize mortality and/or lower long term problems associated with drought conditions.

This stage will employ all of our equipment capable of watering and keeping this equipment going sun up to sun down, in an effort to minimize loses. It will also require contracting with companies who have watering equipment to aid in this process. If this severity is reached in drought conditions our crews will have difficulty keeping up with young planting and the Village will need help in minimizing damage and mortality. The demand is based on our current levels of planting.

