



## Nutrient Management Plan

### Part 3 – Municipal

**Prepared For:**  
City of Salem  
Jeff Ceaser, City Horticulturist  
114 North Broad Street • PO Box 869  
Salem, VA 24153  
Office: (540)375-3028 jaceaser@salemva.gov

**Prepared By:**  
Five Oaks Agronomy Consulting  
Robert Habel, CNMP  
192 Briarherst Drive  
Amherst, Virginia 24521  
Cell: 434-665-2813 habelrf@gmail.com  
Certification Code: 654

<b>Acreage - 13 Common Area, 13 locations, 13 soil samples</b> (Breakdown on Page 5)	
---	--

Total:	12.2877
--------	---------

<b>County:</b>	City of Salem
<b>Watershed:</b>	RU09 – 10.7977 – Sawmill Hallow, Mason Creek, Upper Roanoke RU10 – 2.09 – Mason Creek, Upper Roanoke

**Plan Written:** April 15, 2024

**Plan Expires:** April 15, 2027

Planner Signature

# Table of Contents

---

<b>1. Narrative.....</b>	<b>4</b>
<b>1.1. Statement of Compliance.....</b>	<b>4</b>
<b>1.2. Plan Overview.....</b>	<b>4</b>
<b>1.3. Location .....</b>	<b>5</b>
<b>1.4. Nutrient Management Principals .....</b>	<b>7</b>
<b>1.5. Best Management Practices for Water Quality Protection .....</b>	<b>10</b>
<b>1.6. Application Equipment Calibration .....</b>	<b>10</b>
<b>1.7. Season of Fertilization.....</b>	<b>11</b>
<b>2. Management Areas .....</b>	<b>12</b>
<b>2.1. City Hall and Health Clinic .....</b>	<b>12</b>
<b>2.2. Fire Department Administration .....</b>	<b>14</b>
<b>2.3. Library .....</b>	<b>16</b>
<b>2.4. Police Academy .....</b>	<b>17</b>
<b>2.5. Salem Court House, Police and Fire Departments .....</b>	<b>19</b>
<b>2.6. Senior Center .....</b>	<b>21</b>
<b>2.7. Electric Company .....</b>	<b>23</b>
<b>2.8. Medians .....</b>	<b>34</b>
<b>3. Soil Test Summaries .....</b>	<b>40</b>
<b>4. Nutrient Application Worksheets.....</b>	<b>42</b>
<b>5. Fertilizer Application Records .....</b>	<b>44</b>
<b>6. Reference Material.....</b>	<b>45</b>
<b>7. Fertilizer Labels.....</b>	<b>61</b>
<b>8. Soil Test Results.....</b>	<b>62</b>

**Sources:**

Maps – Maps are produced using Google Earth or provided by client.

Photos/Logos – Obtained from client, clients website, or taken by planner.

Site information – Obtained from client or clients website.

**Technical Information –**

*Agronomy Handbook – A&L Labs – 2001*

*Best Golf Course Management Practices – McCarty – 2001*

*Environmental Best Management Practices for Golf Courses – Virginia GCSAA – January 2012*

*Golf Course Management and Construction, Environmental Issues – Balogh, Walker, USGA – 1992*

*Soil Fertility and Fertilizers 6<sup>th</sup> Ed. – Havlin, Beaton, Tisdale, Nelson – 1999*

*Spectrum Analytic Agronomic Library – [www.spectrumanalytic.com](http://www.spectrumanalytic.com)*

*Sports Turf Management in the Transition Zone – Goatley, Askew, Ervin, Mcall, VSTMA, Etc. – 2008*

*Turf Management for Golf Courses 2<sup>nd</sup> Ed. – Beard, USGA – 2002*

*Turfgrass Soil Fertility and Chemical Problems – Carrow, Waddington, Rieke – 2001*

*Urban Nutrient Management Handbook – VA DCR, Virginia Tech, Virginia State Uni. – May 2011*

*Virginia Nutrient Management Standards and Criteria – Commonwealth of Virginia – July 2014*

**Disclaimer:** *Statements and recommendations made within this document based on published research data and experience.*

*Recommendations are based on the soil tests included in this document and not intended for use on any other facility. Products suggested are used in methods suggest by label guidelines when available, be sure to read label before using products as labels can change. Maximum rates are provided by Virginia Department of Conservation and Recreation Standards and Criteria and are not to be exceeded even when product label suggests otherwise. No guarantee or warranty is made, expressed or implied, concerning crop performance as a result of using the contents of this document.*

**Definitions:**

*M = 1000 FT<sup>2</sup>*

*# = Pounds of product*

*N = Nitrogen*

*P = Phosphorus*

*K = Potassium*

*NMP = Nutrient Management Plan*

*MS4 = Municipal Separate Storm Sewer System*

## **1. Narrative**

### **1.1. Statement of Compliance**

The City of Salem is required to have and follow this Nutrient Management Plan according to the Rules and Regulations of the Code of Virginia. According to 9VAC25-890-40 MS4 General Permit, permittees are required under the “Turf and Landscape Management” section of the permit (GP Section II.B.6.c) to develop NMPs on “all lands owned or operated by the MS4 operator where nutrients are applied to a contiguous area greater than one acre.” Thus, the City of Salem agrees to comply with all requirements set forth in the Nutrient Management Training and Certification Regulations, 4VAC50-85-10 et seq., and to follow recommendations for turf fertilization and management as described in the Virginia Nutrient Management Standards and Criteria, Revised July 2014. This includes implementing this Department of Conservation and Recreation reviewed Nutrient Management Plan and maintaining fertilization records. All nutrient applications to City of Salem properties, performed by City of Salem staff or other contractors, shall comply with the provisions of this Nutrient Management Plan as of April 15, 2024. This plan is affective for three years (until April 15, 2027) or until major renovations or major changes to maintenance occurs. The planner should be alerted if this occurs or if new soil tests are taken within the three-year period, a minor revision may be needed if tests show major differences. The process of updating this plan for a new three-year cycle should begin no later than 6 months prior to plan expiration.

### **1.2. Plan Overview**

Salem was founded in 1802, and the first charter was granted in 1806 to "The Town of Salem in the County of Botetourt." The present charter was granted by the General Assembly in 1968, upon petition of the now City of Salem, to reflect the necessary change since Salem has become a City. Situated in the Shenandoah Valley between the Allegheny and Blue Ridge Mountains on the Roanoke River, in Roanoke County, Salem possesses all the beauty and grandeur that nature can bestow.

This NMP is maintained by the Department of Street and General Maintenance's Beautification Division led by City Horticulturalist Laura Reilly. This Division improves the quality of life, encourages economic vitality, and instills civic pride in the City of Salem through visual and environmental improvement of city owned properties and rights-of-way.

They maintain and improve existing landscape plantings around public buildings, in the parks, and along roadways. They also manage the city's urban forest by providing services such as maintenance pruning, hazard removal, replacement planting, new tree installation, fertilization, and pest control.

The 13 locations that will be covered in this plan cover 12.2877 acres. This includes 13 common areas represented by 13 soil samples. Each location will be discussed separately.

### **1.3. Location**

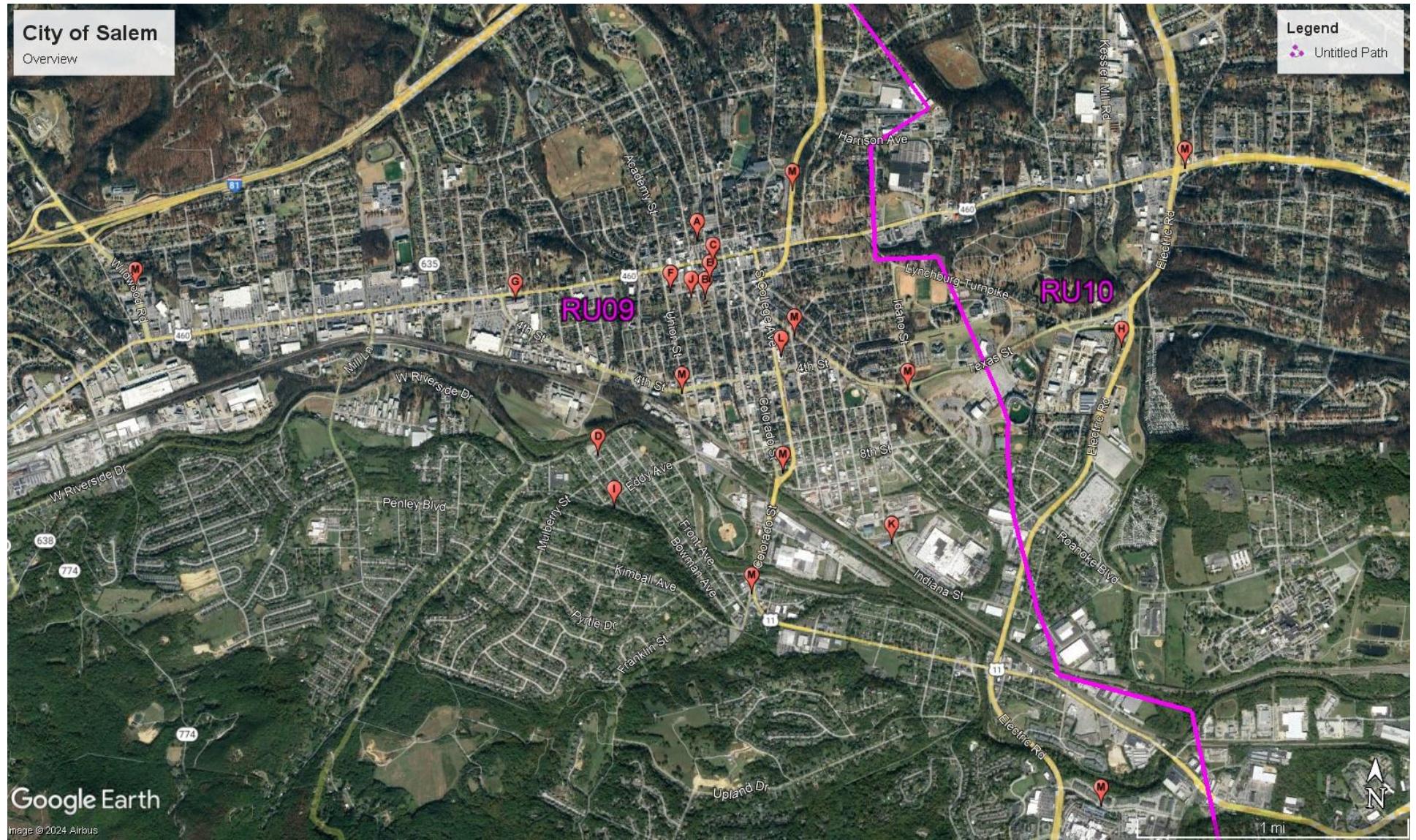
The Roanoke Valley is located in Southwest Virginia. The valley includes the following areas: Botetourt County, City of Roanoke, City of Salem, Craig County, Franklin County, Roanoke County, and Town of Vinton.

Roanoke County is located in the southernmost end of the Shenandoah Valley, between the Allegheny and Blue Ridge Mountains. The independent cities of Roanoke and Salem (incorporated as such in 1884 and 1968 respectively) are located within the boundaries of Roanoke County, but are not a part of the county. The City of Salem is approximately 14 sq miles and averages an elevation of 1,075.

<b>Location/Acreage/Watershed Code Breakdown</b>				
<b>Location</b>	<b>Acres</b>	<b>Irrigation</b>	<b>Grass</b>	<b>Watershed Code</b>
A. City Hall/Health Clinic/Registrar	1.17		Cool	RU09
B. Fire Dept Admin	0.67		Cool	RU09
C. Library	0.36		Cool	RU09
D. Police Academy	0.17		Cool	RU09
E. Salem Court House, PD, FD 1	0.2		Cool	RU09
F. Senior Center	0.13		Cool	RU09
G. Electric Company	0.41		Cool	RU09
H. Fire Station 2	1.37		Cool	RU 10
I. Fire Station 3	0.103		Cool	RU09
J. Rescue Squad	0.281		Cool	RU09
K. Animal Shelter	0.689		Cool	RU09
L. School Board	0.258		Cool	RU09
M. Medians	5.7567		Cool	RU09
N. Medians	0.72		Cool	RU10
<b>Total</b>	12.2877			<b>RU09 – 9.8377 RU10 – 2.09</b>

## City of Salem

## Overview



## **1.4. Nutrient Management Principles**

Nutrient Management Plans focus on two primary objectives healthy plants and clean water. The *Standards and Criteria* are based upon many years of scientific research and the rates suggested are optimal for plant health within the intended usage. Low input areas, like home lawns, require some fertilizer to maintain plant vigor thus maintaining turf cover and preventing erosion. High use areas, like sports fields, require frequent fertilizer input to help maintain plant health and to aid in recovery from stress. Clean water is maintained by applying fertilizer in a responsible manner ensuring minimum movement away from the intended site.

There are four different types of elements essential for plant health. Non-mineral, Primary and Secondary elements are all considered Macronutrients. The fourth is Micronutrients. Non-mineral elements consist of carbon, hydrogen, and oxygen; these elements are obtained from air and water. The Primary nutrients are nitrogen, phosphorus, and potassium. Secondary elements are calcium, magnesium, and sulfur. Micronutrients are iron, manganese, boron, zinc copper molybdenum, chlorine, cobalt, and nickel. All of these elements are obtained from the soil and must be supplemented with fertilizer, lime or other soil amendments when a soil test shows a deficiency. In high maintenance situations, some elements are spray applied and absorbed through the leaf tissue.

Nitrogen and Phosphorus are the focus of a nutrient management plan, as these nutrients cause ecological problems. Lime is also important because having improper pH can make applied fertilizers unavailable to the plant and more likely to leach or runoff. While nitrogen and phosphorus are the focus, other nutrients are also discussed in the plan, these nutrients are beneficial to plant health, but do not cause water quality problems.

**Nitrogen (N)** – This element is responsible for green color, shoot growth and density, root growth, carbohydrate reserves, recuperative potential, heat, cold, drought hardiness, wear tolerance, and disease susceptibility. Nitrogen has a very complex cycle and only certain forms are available to the plant. It leaches through the soil rapidly and does not accumulate thus you cannot soil test for N. Due to these factors, nitrogen management is a large part of nutrient management. Nitrogen management includes but is not limited to using slow release materials, timing the applications in accordance with plant growth, and making multiple applications so that the element is available when it is needed by the plant.

3.5 #/M yearly N used in this plan for general turf. Max rate per month is 0.9 if using at least 15% slow release. If using less than 15% slow release, max rate per month is 0.7. Please see each section and nutrient application worksheets for specifics.

Slow release products were used exclusively in this plan. If making changes, please continue to use slow release fertilizers or contact your planner for help determining the proper rates.

**Phosphorus (P)** – Phosphorus controls the establishment rate of newly seeded turf, plant maturation, root growth, and seed production. Like nitrogen, P also has a complex cycle. The major difference is that P readily attaches soil, it can be quantified by a soil test and only leaches when it completely saturates the soil. Phosphorus moves away from the application site when it is improperly applied to compacted soil or other impervious surfaces, when applied in excess, and since it attaches to the soil, with sediment rich runoff. Phosphorus management

is also important to nutrient management. It should only be applied when called for by a soil test, to soils that are not compacted to prevent runoff and only applied to actively growing turf with sufficient turf cover/rooting to hold the soil in place.

Maximum P rates are outlined in application worksheets. Do not exceed this number.

**Potassium (K)** - Potassium is responsible for root growth, heat, cold, and drought hardiness, wear tolerance, and disease susceptibility. While the *Standards and Criteria* do regulate the application of K, but in some cases, K input may exceed recommended levels, as it does not have the same detrimental effects on the health of Virginia's waters as N and P. Potassium is considered the plant nutrient most responsible for turf quality. It helps plants respond to stresses like drought, extreme heat/cold, and insect/disease pressure. The plants increased ability to respond to stress in a positive manner can help reduce the need for increased N and P fertility and reseeding caused by stress. In addition to the benefits of K, it is difficult to limit the amount of K used as most modern slow release fertilizers contain both N and K while limiting or completely removing P. Nitrogen only products are not readily available in slow release form and custom blended fertilizers are expensive.

Potassium levels have been exceeded in most of areas of this plan. As discussed above, K helps the plant deal with stress. Sports fields and common areas are generally stressed be it from excessive use, compaction, improper pH, or lack of proper care due to budget and personnel restraints.

**Lime** - Liming is a critical management practice for maintaining soil pH at optimal levels for plant growth. Liming supplies the essential elements Calcium and/or Magnesium, reduces the solubility and potential toxicity of Aluminum and Manganese, and increases the availability of essential nutrients. Many soil elements change form because of chemical reactions in the soil due to pHs that are either too acidic or too basic. Plants may not be able to use elements in some of these forms making some elements essential to plant health unavailable. Most plants grow well in the pH range 5.8 to 6.5.

Buffer pH is used to provide an indication of the soil's total (active + reserve) acidity and ability to resist a change in pH. This buffer measurement is the major factor in determining the amount of lime to apply. The Buffer pH starts at 7 (no lime needed) and goes lower as the soil's total acidity increases and more lime is needed to raise the soil pH. As an example, a clay soil with a pH of 6.1 could have a buffer pH of 6.8 and need 1 ton/A of lime in order to maintain/increase that pH around 6.2. A sandy soil could have a much lower pH but have the same buffer pH thus, needing the same amount of lime to change the pH to 6.2. This is because sandy soils have a lower cation exchange capacity thus, less storage for reserve acid.

Attempting to change the pH in the deep rooting zone of an established turf is difficult at best. One method of getting lime somewhat deeper in established turf areas is to apply lime in conjunction with aeration. Applying lime in the fall and winter months is recommended because the freeze/thaw cycle aids in mixing lime throughout the root zone.

Lime provides the essential nutrients Calcium and Magnesium. Calcium is the main component of plant cell walls while magnesium is the atom upon which chlorophyll is built. It is important that these elements be present in the soil not only to help regulate the soil's acidity but to

insure plant health. When a soils pH is acidic, these elements can be added with lime. Calcitic lime should be used when calcium is deficient and magnesium is high. Dolomitic lime, which is more common, is used when the both are deficient or balanced. If pH does not need to be adjusted, calcium levels can be raised with gypsum and magnesium is raised with Epsom salts. The *Standards and Criteria* provide guidance on adjusting soil pH levels but do not include any recommendations for Ca or Mg, as they do not affect water quality.

Not all liming materials are the same, if the liming material chosen does not equate to 100% Calcium Carbonate Equivalent (CCE% should be listed on bag) see chart on page 60 to adjust the required amount of lime.

**Sulfur (S)** - Sulfur is responsible for the plants green color, shoot growth and density, root growth, carbohydrate reserves, and disease susceptibility. Elemental sulfur applications should be avoided unless you are attempting to acidify (lower pH) the soil and should be applied at no more than 5#/M and watered in due to the turf burn potential. Unless called for by a soil test, the occasional use of sulfur containing fertilizers and micro nutrient packages should be the only S input needed to supplement the soil S content. This element is not included in the *Standards and Criteria*.

**Iron (Fe)** – Iron contributes to the plants green color, shoot growth and density, root growth, carbohydrate reserves, heat, cold and drought hardiness and wear tolerance. Iron is often included in fertilizer and micronutrient blends because it produces a faster greening of turf than nitrogen. According to the *Standards and Criteria*, Fe applications can be occasionally substituted for N applications because it produces greening. This is a good strategy, but Fe apps cannot replace N. While Fe is used inside the plant, the greening created by Fe is superficial and caused by the iron rusting on the plants surface. Fe should be used as an N replacement only when the plant is healthy and greening is desired without increased growth.

**Micros** – Other micronutrients are not mentioned by the *Standards and Criteria*. These elements are very important to plant growth, but regular input is not needed unless you are managing a sand based soil with low nutrient holding capacity. Most soils contain all the necessary micros and they will be available for the plant as long as the proper pH is maintained.

## **1.5. Best Management Practices for Water Quality Protection**

The following list comes from the *Urban Nutrient Management Handbook* page 8-12 and details steps that can reduce the impact of nutrient management practices on water quality. A PDF of the complete handbook can be found online through ext.vt.edu, on the CD provided with the plan or a printed copy can be obtained from DCR.

- Base fertilization practices on a soil test.
- Supplement the soil test with a plant tissue test when necessary.
- Aerate compacted soil to reduce runoff and aid phosphorus and lime in entering the soil.
- Minimize fertilizer rates on slopes and sandy soils. If using quickly available sources of nitrogen on deep, sandy soils or near shallow water tables, use no more than 0.25 to 0.50 pound of nitrogen per 1,000 square feet per application.
- Establish and maintain a buffer zone of reduced- to zero-input vegetation around bodies of water. In some cases, native vegetation might be appropriate, but whatever plant material is selected, it must persist indefinitely to serve as a functional buffer zone.
- Consider using iron as a supplement to nitrogen for greening response.
- Use at least 50 percent slowly available sources of nitrogen on soils subject to leaching.
- Time applications carefully. Do not apply fertilizer before a heavy rainfall.
- Irrigate lightly (0.10 to 0.25 inch) after each application of quick-release fertilizer so it is washed off the foliage and moved into the soil. (Wait to irrigate if foliar activity is desired)
- Avoid over irrigation.
- Return grass clippings to the turf to improve nutrient cycling and reduce the amount of fertilizer needed to produce healthy plants. Use a mulching mower whenever possible and consider that a mulching mower can even be used to manage fall leaves (Goatley 2006).
- When collected, compost grass clippings rather than disposing of them in landfills.
- Use a drop (gravity) spreader near bodies of water or impenetrable areas to lessen the chance of spreading material on these surfaces.
- Perhaps the most important best management practice toward improving water quality is to simply sweep or blow fertilizers and clippings off hardscape surfaces and back into the turf.

## **1.6. Application Equipment Calibration**

An agronomically and environmentally sound fertilizer program can be negated by improperly calibrated equipment. It is important to calibrate your equipment prior to every application. Even moving from one location to another can knock your application equipment out of adjustment so once you have your equipment calibrated for a particular product write down the setting. Use that setting to check the calibration for every site and adjust if necessary. The next time you use that product, use your records as a starting point and not a final calibration as equipment can wear over time thus changing the calibration point. For more information on how to calibrate your equipment see the *Urban Nutrient Management Handbook* Chapter 10 (ext.vt.edu) or visit your equipment manufacturer's website. Please remember that the number on the bag is not sufficient, every spreader and every application is different, and that the bag number only serves as a calibration starting point.

## **1.7. Season of Fertilization**

Per the Virginia Nutrient Management Standards and Criteria, Revised July 2014, fertilizers must be applied in between the following dates.

- These are guidelines and averages, in warmer years, fertilizer could be applied earlier and in cooler years, fertilizer should be applied later.
- Fertilizers should not be applied to frozen ground or to grass that is not actively growing. For warm season grasses please wait for green up to occur.
- For warm season grasses that are overseeded, follow the cool season application window. If overseeding is skipped, please revert to warm season window.

Data for frost date comes from the Southeast Regional Climate Center using 50% probability of frost at 32.5 degrees at the Roanoke WSO Airport Station.

<http://www.sercc.com/cgi-bin/sercc/cliMAIN.pl?va7285>

	Average Frost Dates	Cool Season Applications	Warm Season Applications
Spring	April 11	February 28	April 11
Fall	October 21	December 2	September 21

**Maps** – Maps showing fertilized areas and flood prone areas were provided by City of Salem, other satellite and topo maps created using Google Earth are to scale as shown in bottom left of each map. For all maps, unless otherwise indicated, North is oriented towards top of page. Additional Flood maps created by Web Soil Survey.

**Flooding Frequency Class Designations** – Several areas are indicated as flood prone by Web Soil Survey. Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

While the maps provided by City of Salem do indicate flood risk, Web Soil Survey Maps will be provided as well.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

	"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.
	"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.
	"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.
	"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.
	"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.
	"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

## 2. Management Areas

### 2.1. City Hall, Health Clinic and Registrar

The lawn areas around City Hall, Health Clinic and Registrar are all located in the same block.

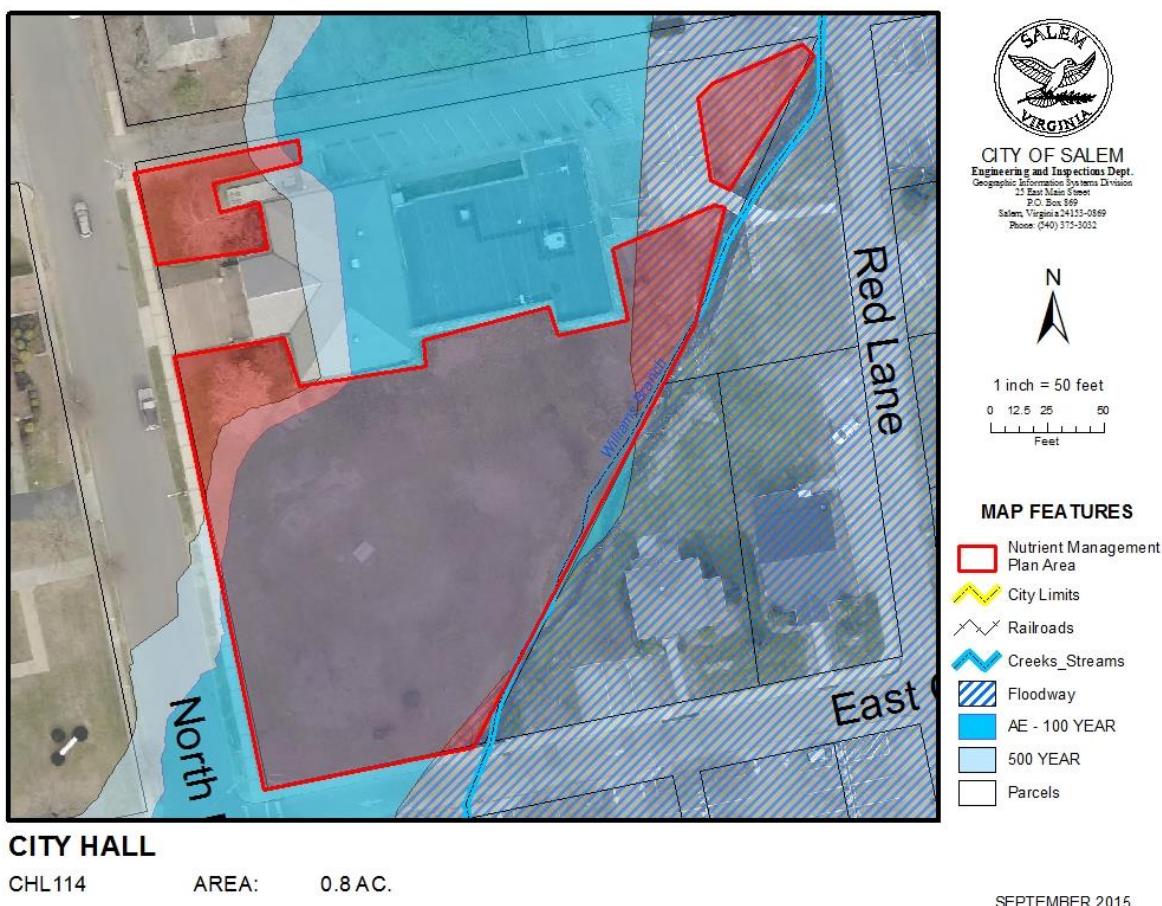
#### Location

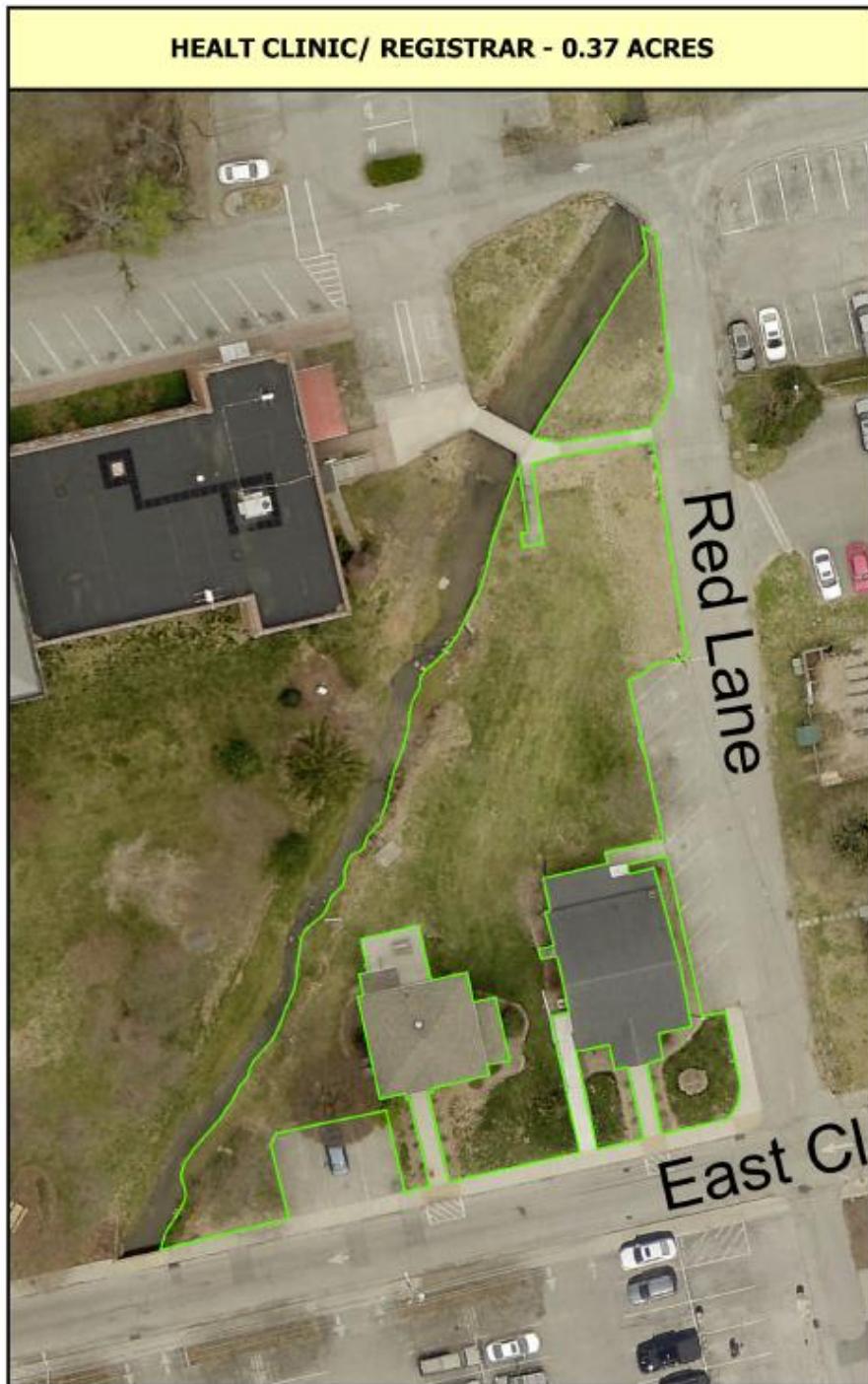
From Main Street (RT 11) turn north onto N. Broad Street. City Hall is on the right.

Address: 114 N. Broad St.  
Salem, VA 24153  
GPS Coordinates: 37.294116, -80.059108

#### Areas Managed

The cool season lawns in this area are fertilized. They are unirrigated and total 1.17 acres.





**Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- A stream is cuts through this area.
- There is no flood risk in this area according to Web soil Survey, but the maps provided by the City of Salem GIS show potential for flooding in the area of City Hall. Be cautious when applying fertilizers prior to heavy rain.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.

## **2.2. Fire Department Administration**

The lawn around the Fire Department Administration building is fertilized.

### Location

From Main Street (RT 11) turn south onto S. Broad Street. Admin Building is on the left.

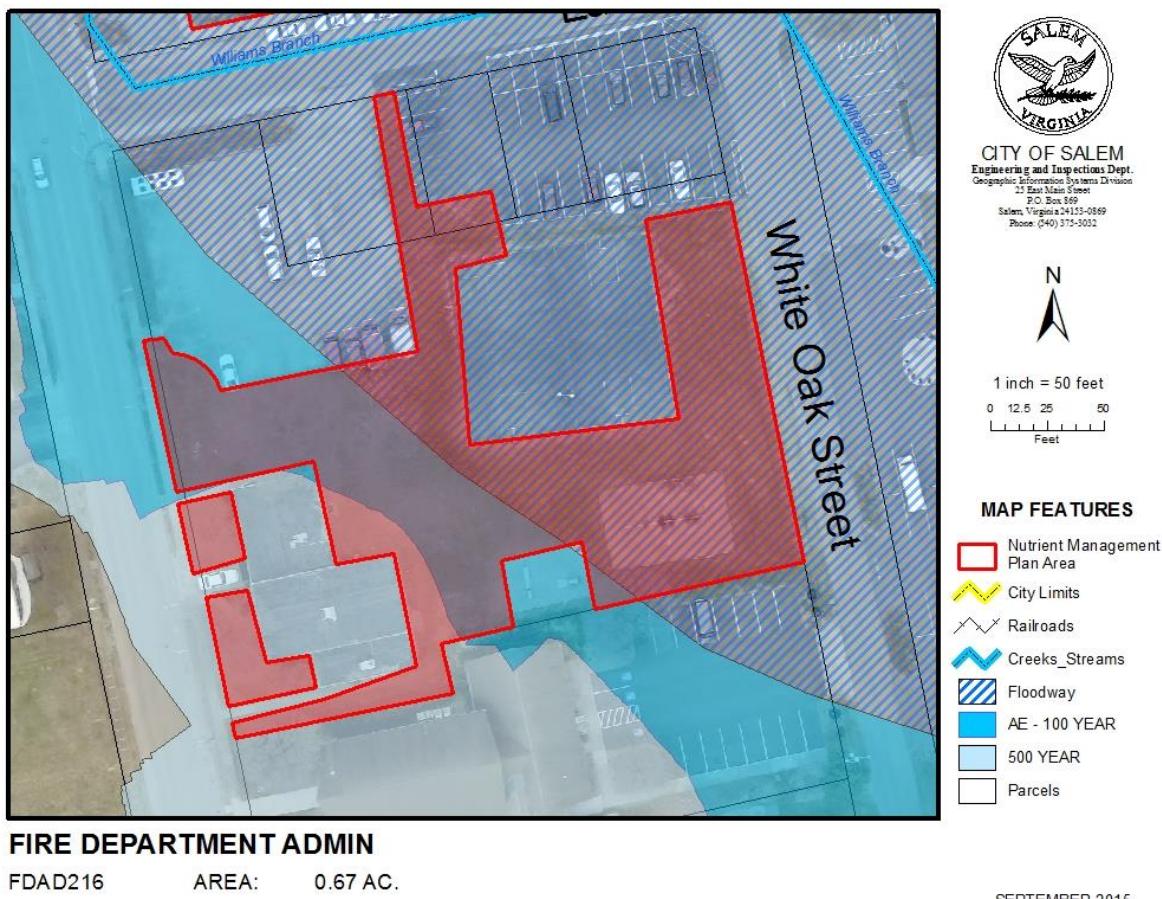
Address: 216 S. Broad Street

Salem, VA 24153

GPS Coordinates: 37.290706, -80.058183

### Areas Managed

The cool season, unirrigated, 0.67-acre lawn is fertilized.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- There is a creek to the East of this site.
- According to Web Soil Survey, there is a rare risk of flooding in this area. Please refrain from making fertilizer applications when heavy rains are expected.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.



## 2.3. Library

The Salem Public Library is a 15,000 square foot facility located in the center of downtown. The library has a collection of 140,000 items, including books, movies, audio books, magazines, and newspapers.

### Location

Located on Main Street between Market and Broad Streets

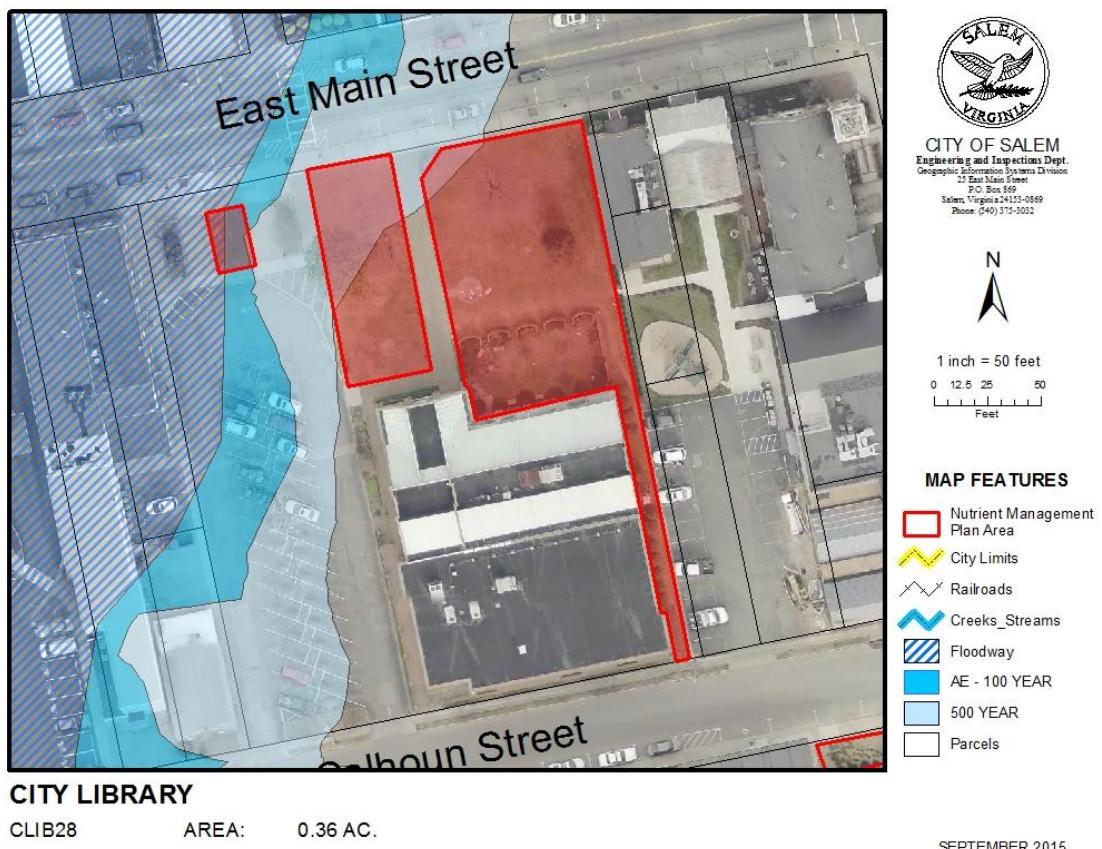
Address: 28 East Main St.

Salem, VA 24153

GPS Coordinates: 37.292814, -80.057513

### Areas Managed

The cool season, unirrigated turf is 0.36 acres.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- There is no flood risk in this area according to Web soil Survey, but the maps provided by the City of Salem GIS show potential for flooding in the area. Be cautious when applying fertilizers prior to heavy rain.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.

## 2.4. Police Academy

The Salem Police Department is one of the original founding member agencies of the Cardinal Criminal Justice Academy. The Academy functions to provide state mandated entry level and in-service training to 39 law enforcement agencies throughout the western region of Virginia.

### Location

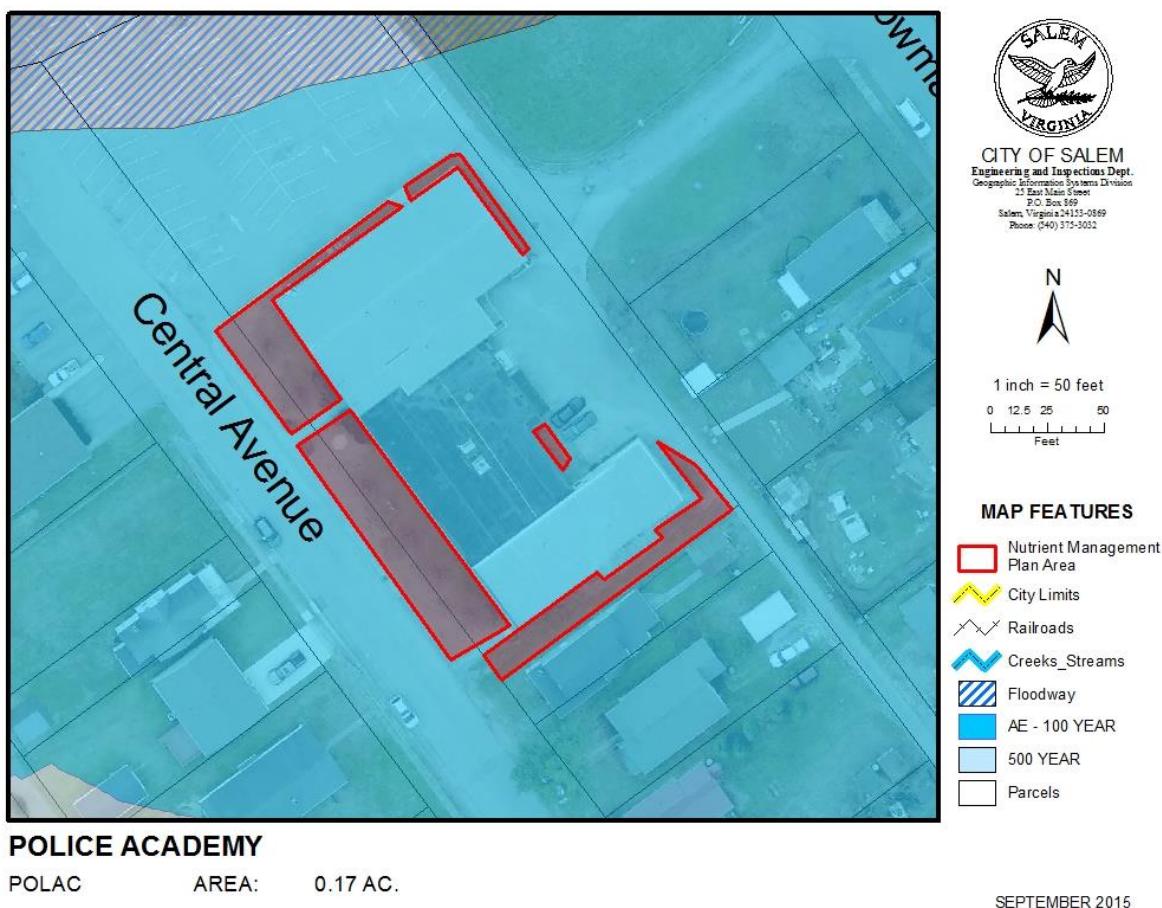
From Main Street (RT 11/460) head south on Union St. for about 0.7 miles. After crossing the railroad, bear right onto Eddy Ave. Central Ave will be on Right in about a 0.25 miles. Academy is located at end of Central Ave.

Address: 917 Central Avenue  
Salem, VA 24153

GPS Coordinates: 37.282178, -80.064959

### Areas Managed

The cool season turf areas around the office are fertilized. They are unirrigated and total 0.17 acres. This area is general turf.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, there is an occasional risk of flooding in this area. Please refrain from making fertilizer applications when heavy rains are expected.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.



## 2.5. Salem Court House, Police and Fire Department 1

The block between Calhoun, Burwell, Broad and Market Streets is home to the Salem General District Court House, the Salem Police Department and Salem Fire House 1.

### Location

From Main Street (RT 11/460) head south on S. Market St. Take first right onto Calhoun.

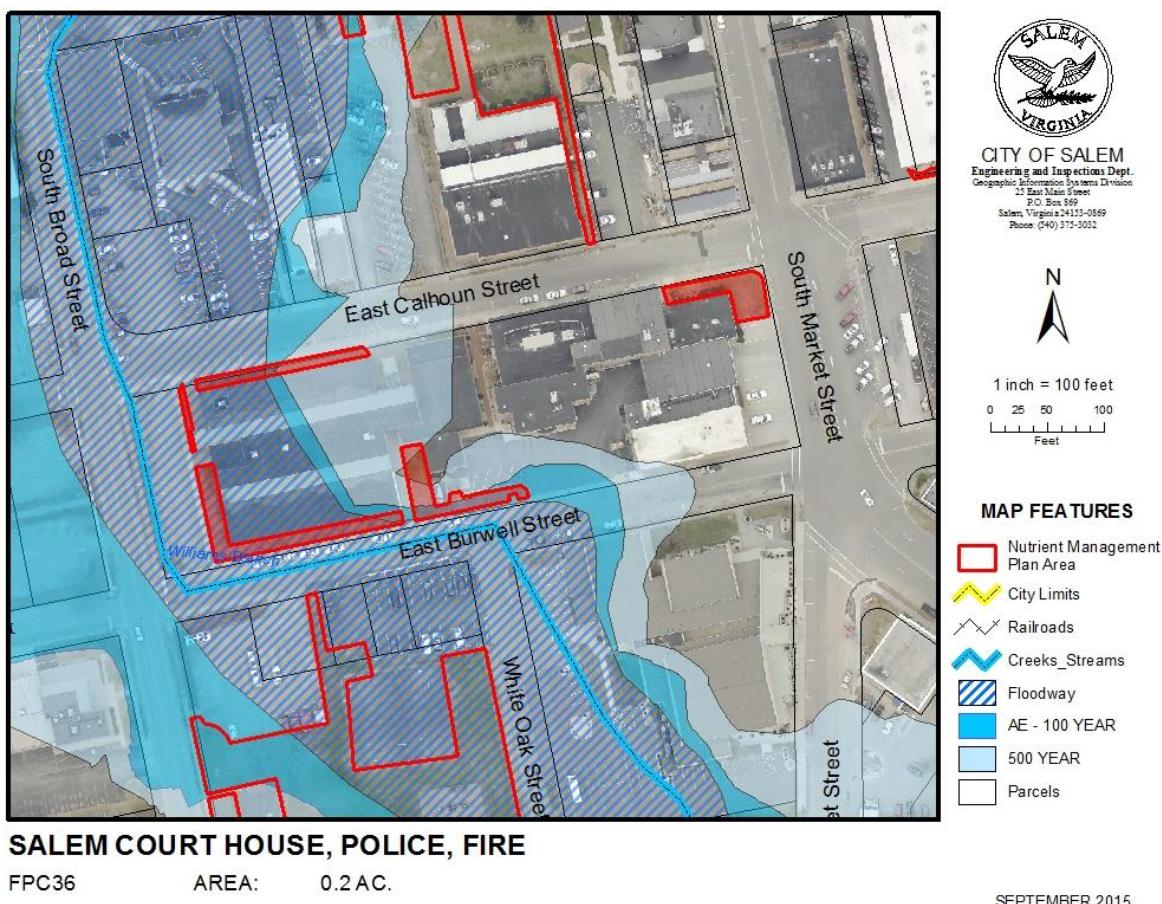
Address: 36 E Calhoun St

Salem, VA 24153

GPS Coordinates: 37.292042, -80.057221

### Areas Managed

The cool season, unirrigated areas are 0.2 acres.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, there is a rare risk of flooding to the south of this area. Please refrain from making fertilizer applications when heavy rains are expected.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.



## **2.6. Senior Center**

The Senior Center provides recreation and educational opportunities for the senior citizens of Salem.

### Location

From Main Street (RT 11/460) head south on Union Street, Senior Center will be on left.

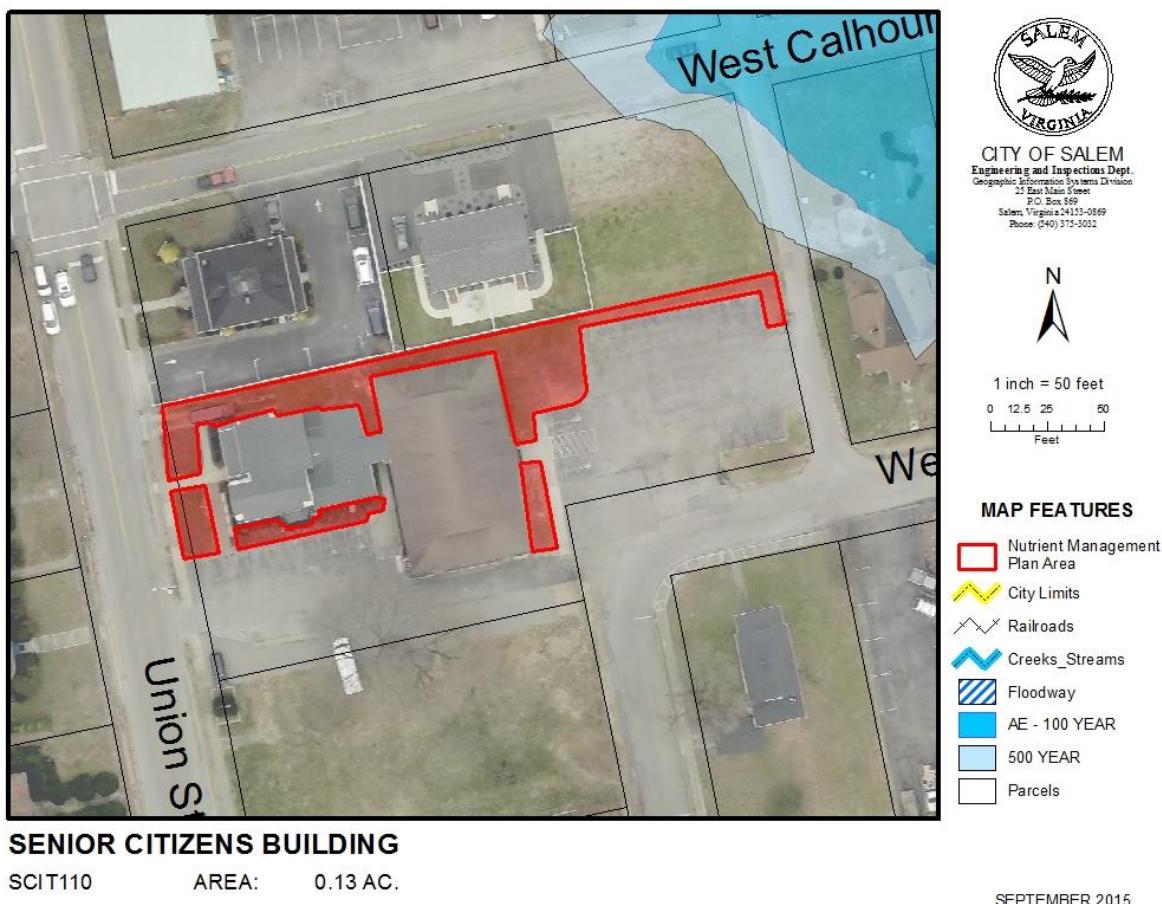
Address: 110 Union Street

Salem, VA 24153

GPS Coordinates: 37.291051, -80.060443

### Areas Managed

There is approximately 0.13 acres of cool season, unirrigated turf areas that are fertilized. This area is general turf.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, there is a rare risk of flooding in this area. Please refrain from making fertilizer applications when heavy rains are expected.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.



## 2.7. Electric Company

The City of Salem owns and operates its own electricity distribution system. The Electric Department was established in 1892.

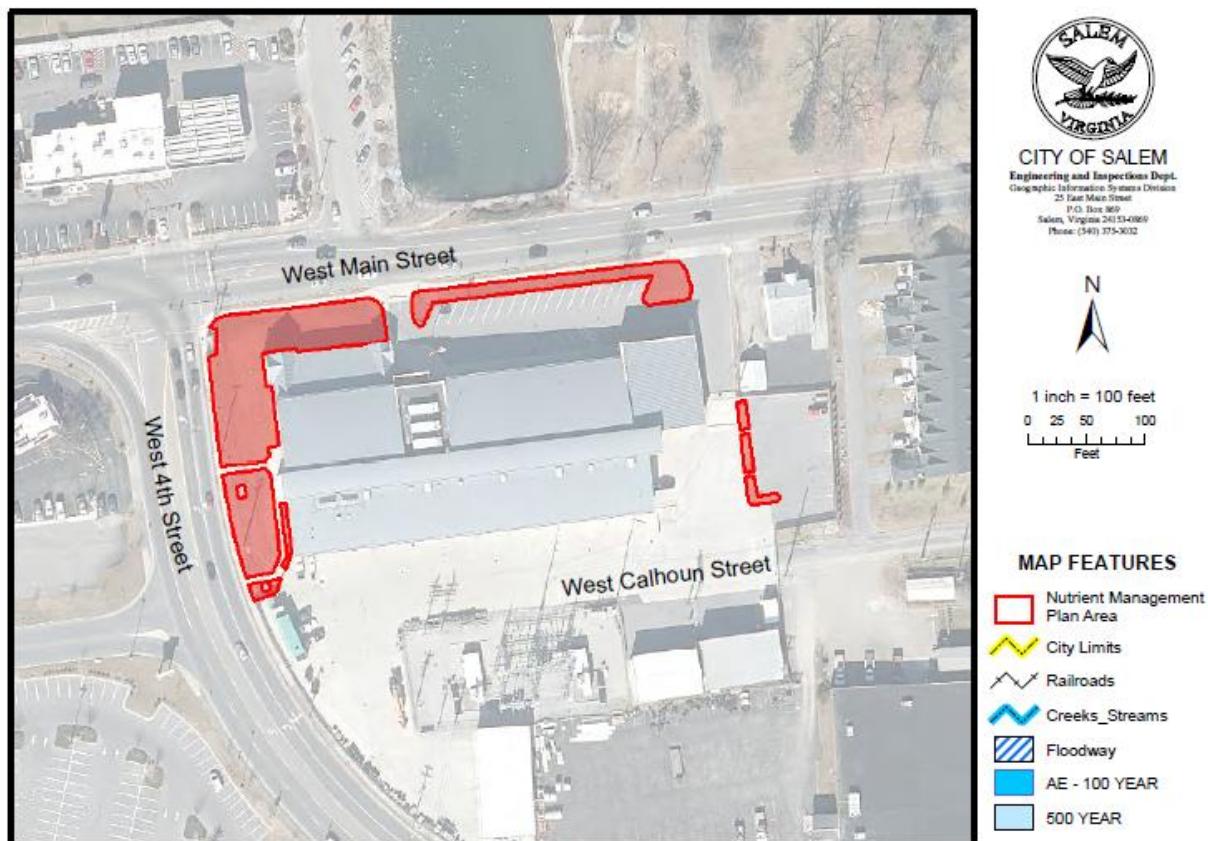
### Location

From Main Street (RT 11/460) head west from Downtown towards Glenvar. The electric company will be on the left at the intersection of Main and 4th.

Address: 730 West Main Street  
Salem, VA 24153  
GPS Coordinates: 37.290389, -80.071049

### Areas Managed

There is approximately 0.41 acres of cool season, unirrigated turf areas that are fertilized. This area is general turf.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, there is no risk of flooding in this area.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.

## **2.8. Fire Station 2**

Station 2 is located on the East side of Salem between Main Street and Apperson Drive. Vehicles located at Station 2 include Engine 2, Medic 802, HTR 2 (Technical Rescue Response Vehicle) Technical Rescue equipment and trailers, and our Swift Water Rescue boats. Aside from fire suppression, Engine 2 has a wide variety of tools and equipment. The specialties for Engine 2 and its personnel include Motor vehicle extractions and machinery/equipment entrapments.

### Location

From Main Street (RT 11/460) head south on Electric Road/419. Fire station will be on right in about  $\frac{3}{4}$  miles.

Address: 415 Electric Rd  
Salem, VA 24153

GPS Coordinates: 37.288790, -80.030025

### Areas Managed

There is approximately 1.37 acres of cool season, unirrigated turf areas that are fertilized. This area is general turf.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, this area has an occasional/rare chance of flooding. Do not apply fertilizers if heavy rain is expected.
- Do not apply fertilizer to frozen or snow-covered ground.
- Fertilizer shall not be used as ice melt.



## **2.9. Fire Station 3**

Station 3 is located on the South side of Salem on Eddy Avenue near Riverside Drive. This is a single Engine / Medic Truck company that has numerous capabilities and specialties. Station 3 houses our Engine 3, Medic 803, and HazMat trailer/equipment. Many of our HazMat team members are highly trained personnel that can use various HazMat suits, Chlorine cylinder kits, patch kits, a spill trailer and foam trailer, train derailments, propane tank ruptures, leaks, etc. The Salem Hazardous Materials team is also a part of the Division 6 team allowing the team to be deployed in various parts of the state for incidents.

### Location

From Main Street (RT 11/460) head West on 4<sup>th</sup> Street. In about a mile turn right onto Union St. Union St. turns slightly right and becomes Eddy Ave. Destination will be on the left in 0.4 mi.

Address: 1900 Eddy Ave  
Salem, VA 24153

GPS Coordinates: 37.279698, -80.064020

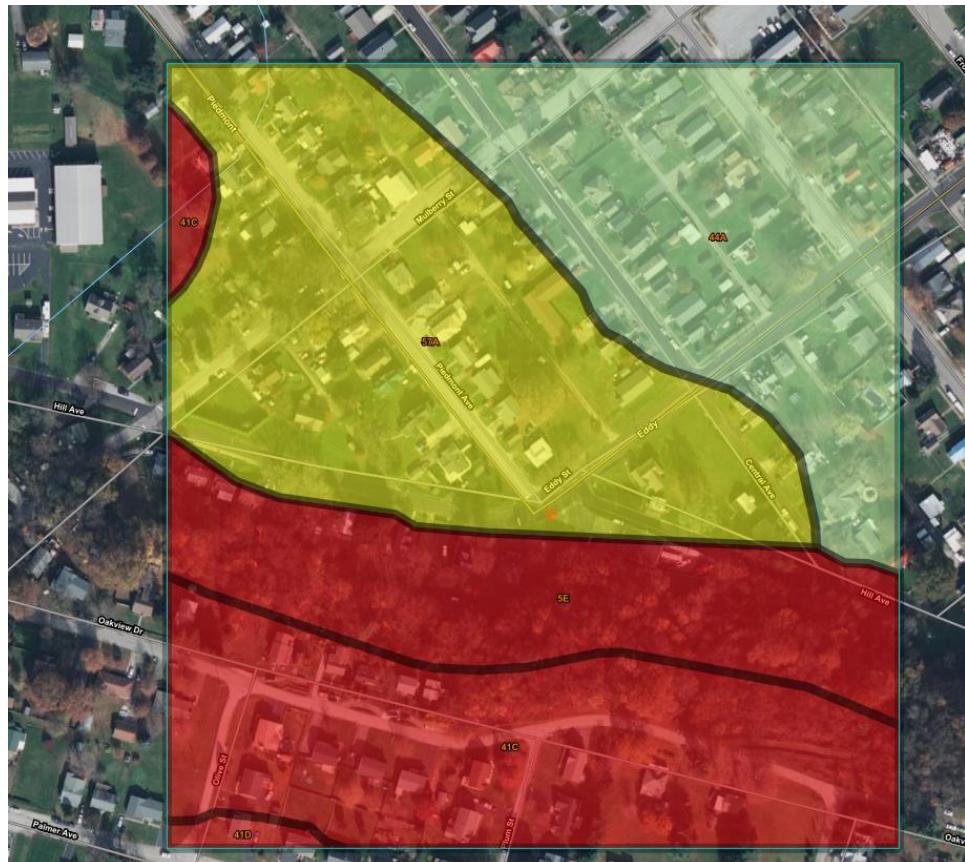
### Areas Managed

There is approximately 0.103 acres of cool season, unirrigated turf areas that are fertilized. This area is general turf.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, the fire station is located along the edge of rare and no flood risk. Do not apply fertilizer if heavy rainfall is expected.
- Do not apply fertilizer to frozen or snow-covered ground.
- Fertilizer shall not be used as ice melt.



## **2.10. Rescue Squad**

The Salem Rescue Squad was organized on the 15th of November 1932. Even though it was called the Salem Life Saving Crew when it was first established, the Salem Rescue Squad was patterned after the Roanoke Life Saving and First Aid Crew, organized in 1928. In our third building now and more than 80 years later, the Salem Rescue Squad continues its all-volunteer tradition of giving the best pre-hospital health care to the citizens of Salem and surrounding Roanoke Valley.

### **Location**

From Main Street (RT 11/460) head south on S. Broad St. Rescue Squad will be on Right just past Court House.

Address: 201 South Broad Street  
Salem, VA 24153

GPS Coordinates: 37.291120, -80.058904

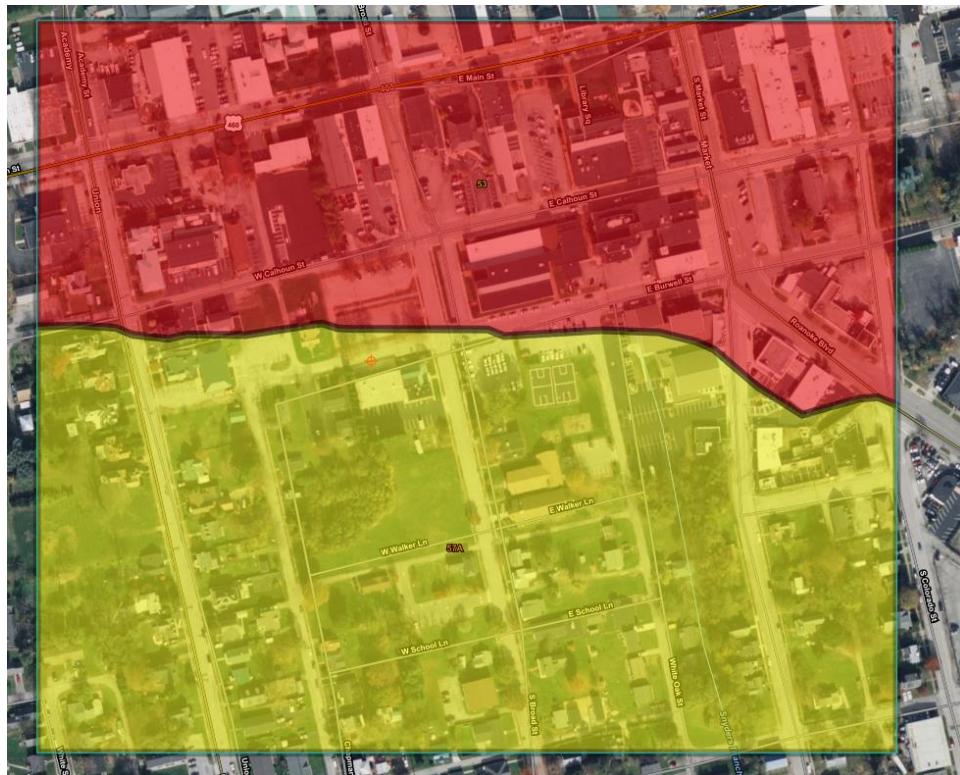
### **Areas Managed**

There is approximately 0.281 acres of cool season, unirrigated turf areas that are fertilized. This area is general turf.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, this area has a rare chance of flooding. Do not apply fertilizers if heavy rain is expected.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.



## **2.11. Animal Shelter**

The Salem Animal Shelter has been caring for and finding homes for the City of Salem's homeless dogs and cats for over 30 years. On August 20, 2001, they opened a state-of-the-art Animal Shelter and Adoption Center. Prior to this facility they operated in a building that was only 3,823 square feet with a total of only 4 rooms for animals. The current building is 11,683 square feet.

### **Location**

From Main Street (RT 11/460) head south on S. College Ave. In about 1 mile turn left onto 8<sup>th</sup> Street. In 0.3 miles turn right onto Indiana Street. Animal Shelter will be on Right in 0.3 miles.

Address: 1301 Indiana Street  
Salem, VA 24153

GPS Coordinates: 37.278321, -80.044924

### **Areas Managed**

There is approximately 0.689 acres of cool season, unirrigated turf areas that are fertilized. This area is general turf.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, this area has an occasional chance of flooding. Do not apply fertilizers if heavy rain is expected.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.



## **2.12. School Board**

The Salem School Administration offices and School Board meeting room are housed at this location.

### Location

From Main Street (RT 11/460) head South on S. College Ave. The school administration offices are located 0.4 miles on the left at the corner of S. College and 4<sup>th</sup> Street.

Address: 510 S College Ave  
Salem, VA 24153

GPS Coordinates: 37.287489, -80.052834

### Areas Managed

There is approximately 0.258 acres of cool season, unirrigated turf areas that are fertilized. This area is general turf.



### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- According to Web Soil Survey, there is a rare risk of flooding in this area. Do not apply fertilizer if heavy rains are expected.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.



## **2.13.Medians**

The grassy areas between lanes of many streets throughout the city are fertilized.

### Location

Thompson Memorial Drive – Fertilized between 81 and Main Street.

GPS Coordinates: 37.299233, -80.051678

Roanoke Blvd – Fertilized from 4<sup>th</sup> Street to South College Ave.

GPS Coordinates: 37.289083, -80.052019

4<sup>th</sup> St./Union St Triangle

GPS Coordinates: 37.285737, -80.059325

S. Colorado/Apperson Dr Triangle

GPS Coordinates: 37.275243, -80.054162

S Colorado/Shanks Cross St.

GPS Coordinates: 37.298620, -80.025059

419 – Fertilized from 81 to Main Street.

GPS Coordinates: 37.300554, -80.026908

Texas St./Roanoke Blvd. Triangle

GPS Coordinates: 37.286223, -80.044121

Wildwood Rd – Fertilized from 81 to 460

GPS Coordinates: 37.290896, -80.096164

Braeburn Drive – Fertilized from Electric Road to Keagy Rd.

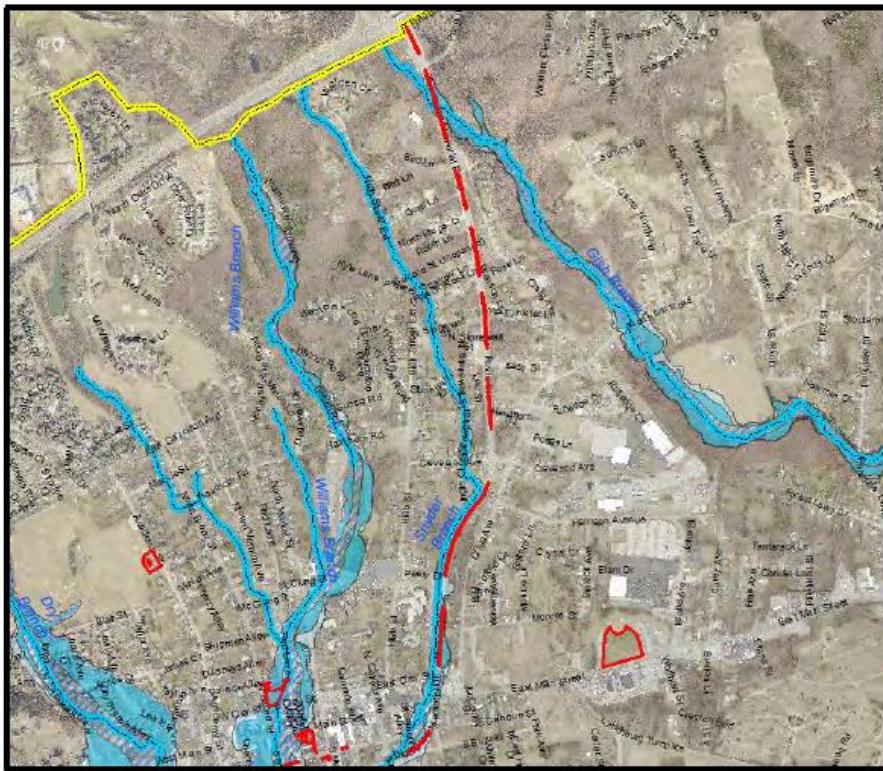
GPS Coordinates: 37.264379, -80.030133

### Areas Managed

There are 6.4767 acres of fertilized medians throughout the city. These are areas of cool season, unirrigated turf. This area is general turf.

### **Environmentally Sensitive –**

- There are many roads, sidewalks and storm water drains throughout the area. Be cautious when making fertilizer applications near these areas and always clean up any fertilizers accidentally spread on pavement and sidewalks.
- Due to the size of most of these areas, a fertilizer spreader with a side shutoff should be used to keep fertilizer from being spread on impervious surfaces.
- It should be assumed that runoff will occur in these areas due to the water flowing from surrounding impervious surfaces. Fertilizer should not be applied if rain is expected.
- Do not apply fertilizer to frozen or snow covered ground.
- Fertilizer shall not be used as ice melt.



### THOMPSON MEMORIAL

THMPSON

AREA: 1.71 AC.



#### CITY OF SALEM

Community Development Department  
Geographic Information Systems Division  
21 South Bradley Street  
Salem, Virginia 24153-0809  
Phone: (540) 375-3032



1 inch = 1,200 feet  
0 600 1,200  
Feet

#### MAP FEATURES

- Nutrient Management Plan Area
- City Limits
- Railroads
- Creeks\_Streams
- Floodway
- AE - 100 YEAR
- 500 YEAR



### ROANOKE BOULEVARD

RKEBLVD

AREA: 0.36 AC.



CITY OF SALEM  
Community Development Department  
Geographic Information Systems Division  
21 South Bradley Street  
P.O. Box 809  
Salem, Virginia 24153-0809  
Phone: (540) 375-3032



1 inch = 200 feet  
0 50 100 200  
Feet

#### MAP FEATURES

- Nutrient Management Plan Area
- City Limits
- Railroads
- Creeks\_Streams
- Floodway
- AE - 100 YEAR
- 500 YEAR

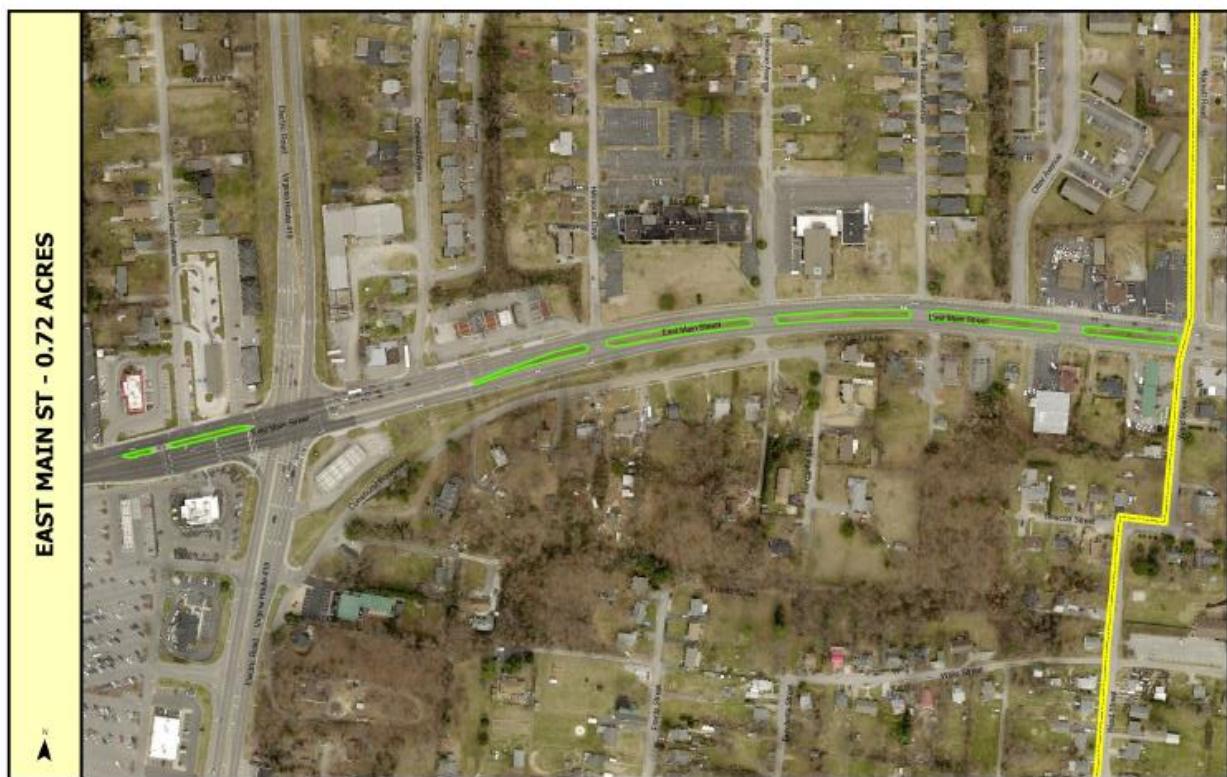
May 2018

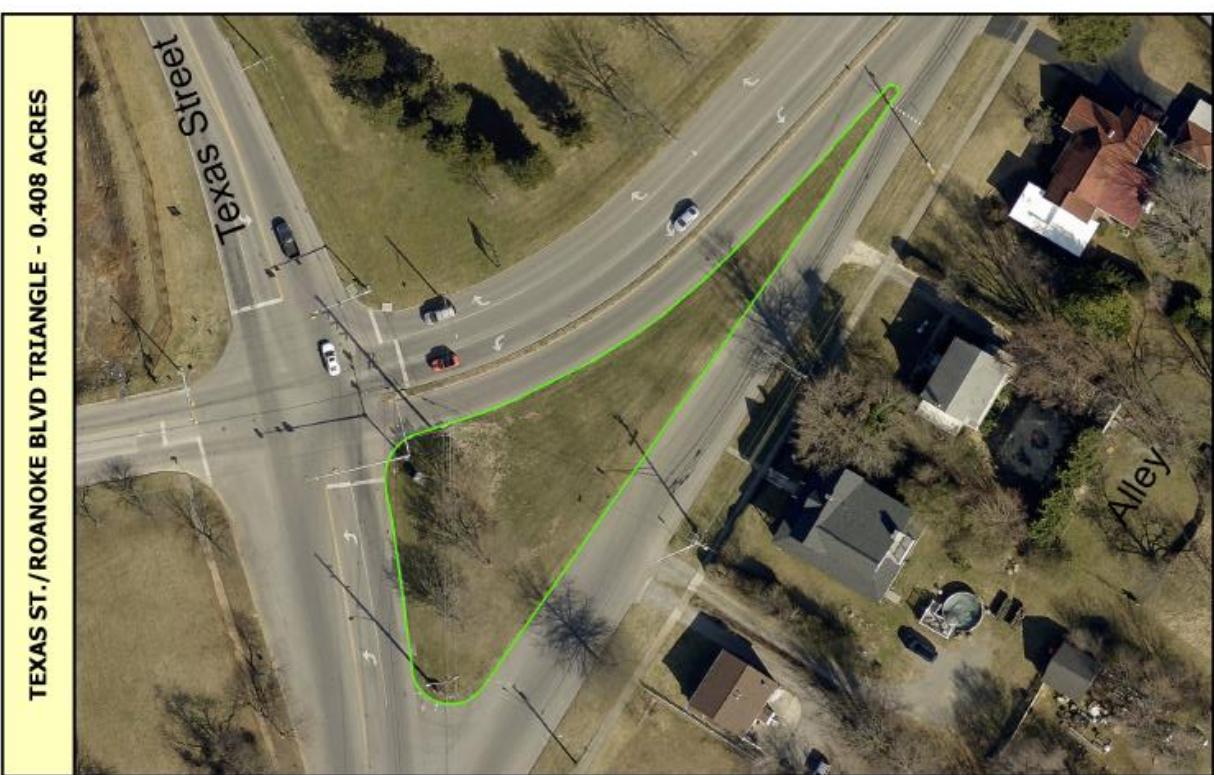
4th ST./UNION ST - 0.062 ACRES



S COLORADO/APPERSON DR TRIANGLE - 0.06 ACRES









### **3. Soil Test Summaries**

*Discussion of soil test results and allowable nutrient inputs. Specific applications details can be found in Nutrient Application Worksheet.*

*Soil samples were taken by Robert Habel on 3/13/24 and tested by Waypoint Analytical on 3/21/24.*

*Soil tests are rated in terms of Very Low to Very High. In order to comply with Virginia Nutrient Management Standards and Criteria, Revised July 2014, no phosphorus or potassium may be applied if a soil test rates that element Very High. In economic terms, nutrients are not necessarily needed if they test above a medium rating; plant response is not guaranteed if soils already test above medium and therefore money can be saved by using a nitrogen only fertilizer. (See plant response chart page 46)*

- All areas in this plan are general turf and will be fertilized with the same plan.
- Limiting Results will be used to determine phosphorus input. This means the lowest input allowed was chosen for each group of results.
- Plan will be written for maximum nitrogen input. The grounds manager will decide if all applications are needed.
- Application plans and Application Record sheets are grouped together. Additional blank record forms are available on included CD.

#### **General Turf –**

These locations are all fertilized common areas.

Soil test limiting results are high (H-) levels of phosphorus and high (VH) levels of potassium. 1 #/M of phosphorus is allowed. Soil tests call for 0 #/M of potassium, but more can be applied as it does not pose a threat to water quality and helps protect the plant from stresses.

Regulations allow for up to 3.5 lbs/M of nitrogen per year. If using 100% water-soluble nitrogen .7 lbs may be applied every 30 days. If using slow release materials, .9 lbs may be used every 30 days. Do not exceed stated per year total.

Lime is not needed on any of these areas.

## Soil Test Summary

Customer Name:	City of Salem							
Testing Lab:	Waypoint Analytical							
Sample Date:	3/13/2024							
Analysis Date:	3/21/2024							
Planner Name	Five Oaks Agronomy Consulting, LLC							
Certification Number	654							
Managed Area ID	Soil pH	Buffer pH	Lab P (ppm)	VT P (ppm)	VT (H/M/L)	Lab K (ppm)	VT K (ppm)	VT (H/M/L)
Soil Test ID#								
SP3 01	City Hall/Health Clinic/Registrar Office	6.70		41	15.5	M	306	217.3
SP3 02	Fire Dept Admin	6.60		30	10.5	M-	257	182.5
SP3 03	Library	7.00		56	22.4	H-	213	151.2
SP3 04	Police Academy	6.90		35	12.8	M	142	100.8
SP3 05	Salem Court House, PD, Fire	7.10		66	27.0	H-	237	168.3
SP3 06	Senior Center	7.00		57	22.8	H-	216	153.4
SP3 07	Electric Company	7.10		29	10.0	M-	134	95.1
SP3 08	Medians	7.10		30	10.5	M-	199	141.3
SP3 09	Fire Station 2	6.20		47	18.3	H-	165	117.2
SP3 10	Rescue Squad	6.70		62	25.1	H-	184	130.6
SP3 11	Animal Shelter	7.10		15	3.6	L	131	93.0
SP3 12	Fire Station 3	6.90		33	11.9	M	165	117.2
SP3 13	School Board	7.00		36	13.2	M	289	205.2
<b>Average Results</b>				<b>27.0</b>	<b>H-</b>		<b>217.30</b>	<b>VH</b>

#### **4. Nutrient Application Worksheets**

*The following worksheets detail specific fertilizer applications using the previously discussed soil test information. All nutrient input level recommendations come from the Department of Conservation and Recreation's Nutrient Management Standards and Criteria, this document is part of the Code of Virginia and thus is law for those required to have a Nutrient Management Plan. While applications do not have to be followed specifically, it is important to note that per month nitrogen levels shall not be exceeded and per year phosphorus levels shall not be exceeded. In some cases, potassium input may exceed recommended levels, as it does not have the same detrimental effects on the health of Virginia's waters as nitrogen and phosphorus. Potassium is considered the plant nutrient most responsible for quality. It helps plants respond to stresses like drought, extreme heat/cold, and insect/disease pressure. The plants increased ability to respond to stress in a positive manner can help reduce the need for increased N and P fertility and reseeding caused by stress.*

NUTRIENT APPLICATION WORK SHEET													
Name:	City of Salem			Management Area:				Municipal Buildings - NMP Part 3					
Prepared:	4/15/2024			Area:	12.2877		Turf Type:			Cool Season			
Expires:	4/15/2027												
Total Yearly Nutrient Needs	Application Month/Day	Analysis N - P - K	Interval (days)	Fertilizer Description	Rate/M	Ibs/app	% Slow Release N	Total/M N - P - K			Lime	Gypsum	Ibs/app lime/gyp
Nitrogen	No applications before February 28							0.80	-	0.22	-	0.44	
3.5	April	18 - 5 - 10	30	70% Meth X; Micros	4.44	2379	83	0.90	-	0.11	-	0.17	
Phosphorus													
1	September	16 - 2 - 3	30	50%CRN, 20%NB, 15%AS, 2%FE, Micros	5.63	3011	50	0.90	-	0.11	-	0.17	
Potassium													
0	October	16 - 2 - 3	30	50%CRN, 20%NB, 15%AS, 2%FE, Micros	5.63	3011	50	0.90	-	0.11	-	0.17	
	November	16 - 2 - 3	30	50%CRN, 20%NB, 15%AS, 2%FE, Micros	5.63	3011	50	0.90	-	0.11	-	0.17	
	No applications after December 2												
	Lime												
	No lime needed at this time.						Total used:	3.50	-	0.56	-	0.95	
				Do not exceed yearly maximum allowed by Regulation:				3.5	-	1	-	0	

**Notes:**

- Limiting results are H- in Phosphorus and VH Potassium.
- 3.5 #/M nitrogen allowed per year on this common cool season turf. If using 100% water-soluble nitrogen 0.7 #/M may be applied every 30 days. If using slow release materials, 0.9 #/M may be used every 30 days. Do not exceed stated per year total.

## **5. Fertilizer Application Records**

## Fertilizer Application Records

## 6. Reference Material

Nutrient Availability According to pH

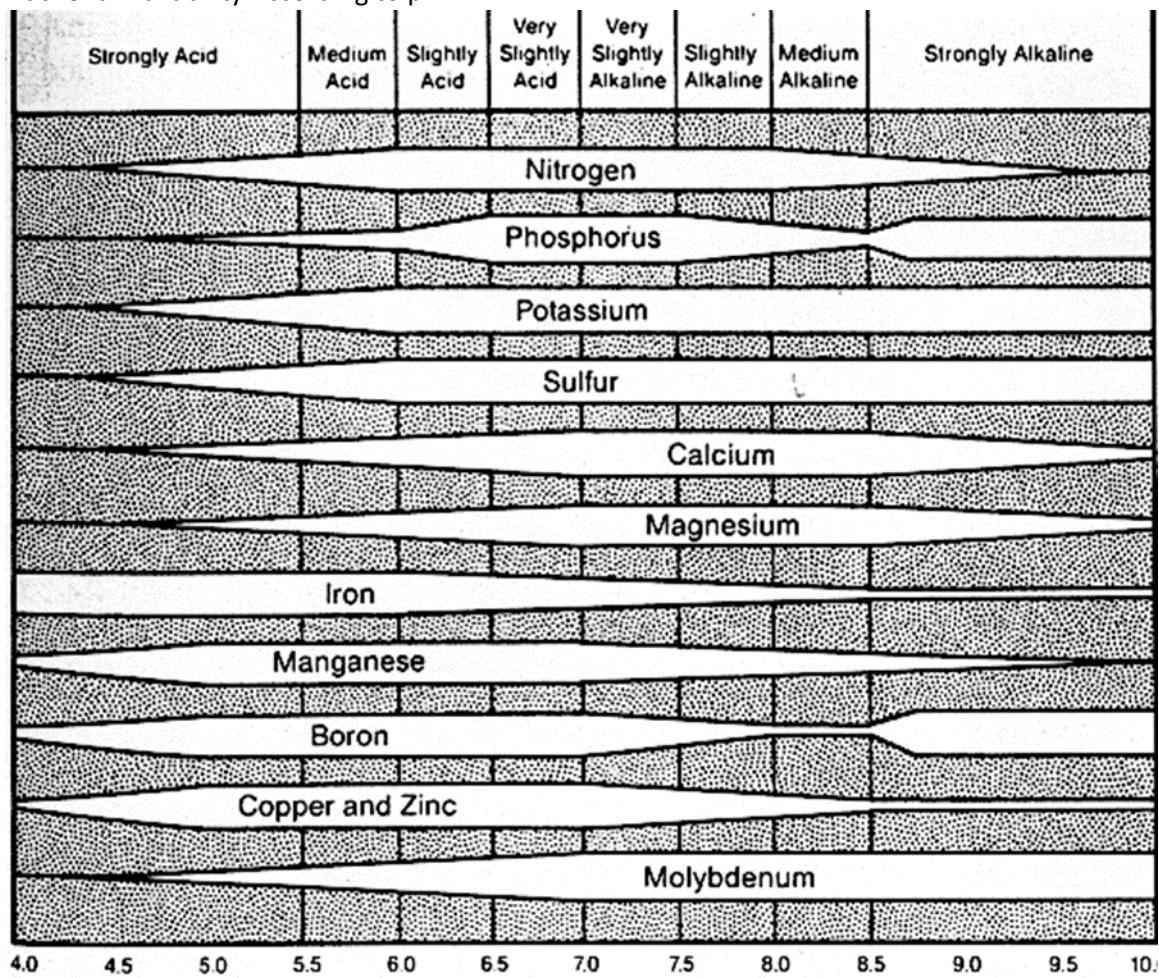


Figure 1: Nutrient Availability at pH

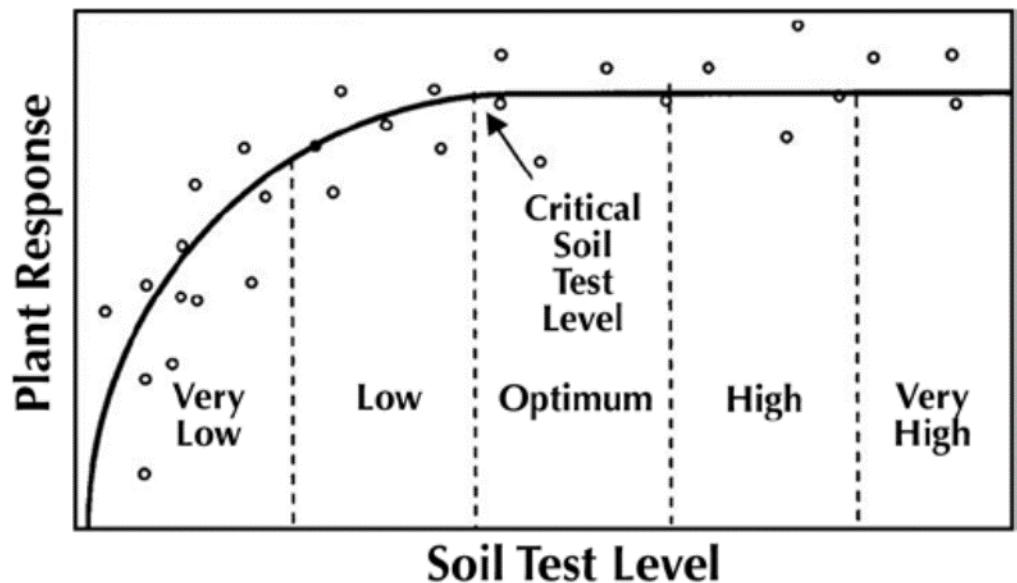


Figure 2: Plant Response Chart

**Very low:** A plant response is most likely if the indicated nutrient is applied. A large portion of the nutrient requirement must come from fertilization.

**Low:** A plant response is likely if the indicated nutrient is applied. A portion of the nutrient requirement must come from fertilization.

**Medium:** A plant response may or may not occur if the indicated nutrient is applied. A small portion of the nutrient requirement must come from fertilization.

**High:** Plant response is not expected. No additional fertilizer is needed.

**Very high:** Plant response is not expected. The soil can supply much more than the turf requires. Additional fertilizer should not be added to avoid nutritional problems and adverse environmental consequences.

## **Standards and Criteria**

### **Section VI. Turfgrass Nutrient Recommendations for Home Lawns, Office Parks, Public Lands and Other Similar Residential/Commercial Grounds**

#### **Definitions**

For the purposes of this section, the following definitions, as presented by the Association of American Plant Food Control Officials (AAPFCO), apply:

“Enhanced efficiency fertilizer” describes fertilizer products with characteristics that allow increased plant nutrient availability and reduce the potential of nutrient losses to the environment when compared to an appropriate reference product.

“Slow or controlled release fertilizer” means a fertilizer containing a plant nutrient in a form which delays its availability for plant uptake and use after application, or which extends its availability to the plant significantly longer than a reference “rapidly available nutrient fertilizer” such as ammonium nitrate, urea, ammonium phosphate or potassium chloride. A slow or controlled release fertilizer must contain a minimum of 15 percent slowly available forms of nitrogen.

“Water soluble nitrogen”, “WSN”, or “readily available nitrogen” means: Water soluble nitrogen in either ammonical, urea, or nitrate form that does not have a controlled release, or slow response.

#### **Recommended Season of Application For Nitrogen Fertilizers - Applies to all Turf**

A nitrogen fertilization schedule weighted toward fall application is recommended and preferred for agronomic quality and persistence of cool season turfgrass; however, the acceptable window of applications is much wider than this for nutrient management. The nutrient management recommended application season for nitrogen fertilizers to cool season turfgrasses begins six weeks prior to the last spring average killing frost date and ends six weeks past the first fall average killing frost date (see Figures 6-1 & 6-2). Applications of nitrogen during the intervening late fall and winter period should be avoided due to higher potential leaching or runoff risk, but where necessary, apply no more than 0.5 pounds per 1,000 ft<sup>2</sup> of water soluble nitrogen within a 30-day period. Higher application rates may be used during this late fall and winter period by using materials containing slowly available sources of nitrogen, if the water soluble nitrogen contained in the fertilizer does not exceed the recommended maximum of 0.5 pounds per 1,000 ft<sup>2</sup> rate. Do not apply nitrogen or phosphorus fertilizers when the ground is frozen.

The acceptable nitrogen fertilizer application season for non-overseeded warm season turfgrass begins no earlier than the last spring average killing frost date and ends no later than one month prior to the first fall average killing frost date (see Figures 6-1 & 6-2).

Figure 6-1

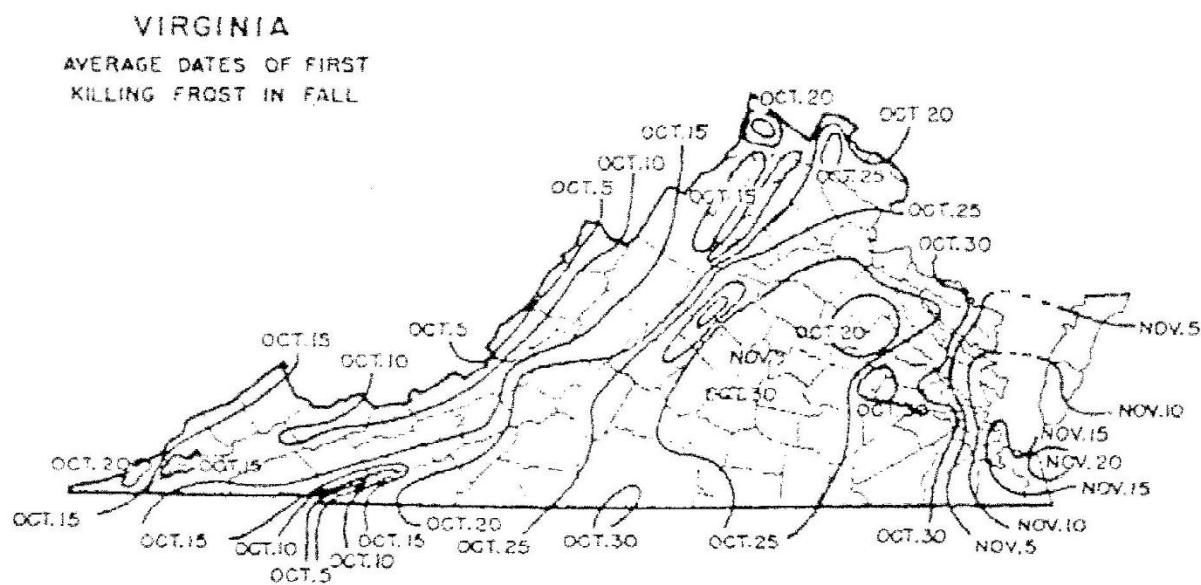
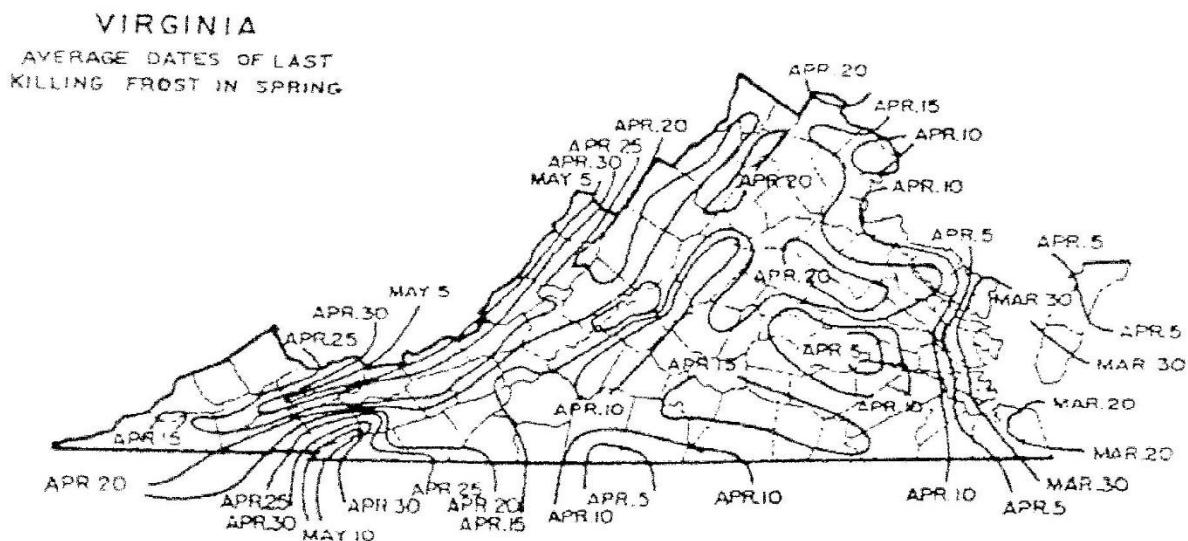


Figure 6-2



## **Per Application Rates**

Do not apply more than 0.7 pounds of water soluble nitrogen per 1,000 ft<sup>2</sup> within a 30-day period. For cool season grasses, do not apply more than 0.9 pounds of total nitrogen per 1,000 ft<sup>2</sup> within a 30-day period. For warm season grasses, do not apply more than 1.0 pounds of total nitrogen per 1,000 ft<sup>2</sup> within a 30-day period. Lower per application rates of water soluble nitrogen sources or use of slowly available nitrogen sources should be utilized on very permeable sandy soils, shallow soils over fractured bedrock, or areas near water wells.

## **Annual Application Rates for Home Lawns and Commercial Turf**

Up to 3.5 pounds per 1,000 ft<sup>2</sup> of nitrogen may be applied annually to cool season grass species or up to 4 pounds per 1,000 ft<sup>2</sup> may be applied annually to warm season grass species using 100 percent water soluble nitrogen sources. Lower rates of nitrogen application may be desirable on those mature stands of grasses that require less nitrogen for long-term quality. As a result, lower application rates will probably be more suited to the fine leaf fescues (hard fescue, chewings fescue, creeping red fescue, and sheep fescue) and non-overseeded zoysiagrass. Lower rates should also be used on less intensively managed areas.

## **Use of Slowly Available Forms of Nitrogen**

For slow or controlled release fertilizer sources, or enhanced efficiency fertilizer sources, no more than 0.9 pounds of nitrogen per 1,000 ft<sup>2</sup> may be applied to cool season grasses within a 30-day period and no more than 1.0 pounds of nitrogen per 1,000 ft<sup>2</sup> may be applied to warm season grasses within a 30-day period.

Provided the fertilizer label guarantees that the product can be used in such a way that it will not release more than 0.7 pounds of nitrogen per 1,000 ft<sup>2</sup> in a 30-day period, no more than 2.5 pounds of nitrogen per 1,000 ft<sup>2</sup> may be applied in a single application. Additionally, total annual applications shall not exceed 80 percent of the annual nitrogen rates for cool or warm season grasses.

## **Phosphorus and Potassium Nutrient Needs (Established Turf)**

Apply phosphorus (P<sub>2</sub>O<sub>5</sub>) and potassium (K<sub>2</sub>O) fertilizers as indicated necessary by a soil test using the following guidelines:

<u>Soil Test Level</u>	<u>Nutrient Needs (pounds per 1,000 ft<sup>2</sup>)*</u>	
	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
L	2-3	2-3
M	1-2	1-2
H	0.5-1	0.5-1
VH	0	0

\* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range. (For example the recommendation for a P<sub>2</sub>O<sub>5</sub> soil test level of L- would be 3 pounds per 1,000 ft<sup>2</sup>.)

Do not use high phosphorus ratio fertilizers such as 10-10-10 or 5-10-10, unless soil tests indicate phosphorus availability below the M+ level.

## **Recommendations for Establishment of Turf**

These recommendations are for timely planted turfgrass, that is, the seed or vegetative material (sod, plugs, and /or sprigs), are planted at a time of the year when temperatures and moisture are adequate to maximize turfgrass establishment. These recommended establishment periods would be late summer to early fall for cool-season turfgrasses and late spring through mid-summer for warm-season turfgrasses.

### **Nitrogen Applications**

At the time of establishment, apply no more than 0.9 pounds per 1,000 ft<sup>2</sup> of total nitrogen for cool season grasses or 1.0 pounds per 1,000 ft<sup>2</sup> of total nitrogen for warm season grasses, using a material containing slowly available forms of nitrogen, followed by one or two applications beginning 30 days after planting, not to exceed a total of 1.8 pounds per 1,000 ft<sup>2</sup> total for cool season grasses and 2.0 pounds per 1,000 ft<sup>2</sup> for warm season grasses for the establishment period. Applications of WSN cannot exceed more than 0.7 pounds per 1,000 ft<sup>2</sup> within a 30-day period.

### **Phosphorus and Potassium Recommendations for Establishment**

<u>Soil Test Level</u>	<u>Nutrient Needs (pounds per 1,000 ft<sup>2</sup>)</u> *	
	<u>P<sub>2</sub>O<sub>5</sub></u>	<u>K<sub>2</sub>O</u>
L	3-4	2-3
M	2-3	1-2
H	2-1	0.5-1
VH	0	0

\* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range.

## Nutrient Recommendations for Golf Courses

### Nitrogen Timing

The beginning and ending dates for application of nitrogen shall be determined using guidance and frost date maps contained in the Season of Application for Nitrogen section, Figures 6-1 and 6-2.

If the full rate or the highest rate of the recommendation range for a monthly application is applied in a single application, then the interval of application for nitrogen shall be at least 30 days to allow turf to utilize previous nitrogen applications. If several applications are to be made for the monthly nitrogen rate, then the timing of the applications shall be at approximately even intervals, with the rate per application to be evenly divided between each application with the total nitrogen applied not to exceed the maximum monthly rate. Use of Water Insoluble Nitrogen forms of Nitrogen is encouraged.

### Nitrogen Rates

	Grass Type	Maximum WSN Rate Per Application - pounds per 1,000 ft <sup>2</sup>	Total Annual Nitrogen Rate - pounds per 1,000 ft <sup>2</sup> <sup>a</sup>
Greens		0.7 <sup>(b)</sup>	3-6
Tees		0.7 <sup>(b)</sup>	2-5
Fairways	Cool Season	0.7 <sup>(c)</sup>	2-3
	Warm Season	0.7 <sup>(c)</sup>	3-4
Fairways – Intensive Management	Cool Season	0.5 <sup>(d)</sup>	3-4
	Warm Season	0.5 <sup>(d)</sup>	3.5-4.5
Overseeding Warm Season Fairways		.5	1.25
Roughs		0.7 <sup>(e)</sup>	1-3

### Fairways-Overseeding Warm Season Fairways

- For warm season grasses, up to 0.7 pounds of nitrogen per 1,000 ft<sup>2</sup> in a 30-day period may be applied in the Fall after perennial ryegrass overseeding is well established. An additional nitrogen application of 0.7 pounds per 1,000 ft<sup>2</sup> may be made in February-March to overseeded perennial ryegrass if growth and color indicate need. Applications using WSN may not exceed 0.7 pounds per 1,000 ft<sup>2</sup> within a 30-day period.
- Soluble nitrogen rates of 0.25 pounds per 1,000 ft<sup>2</sup> or less which may be a component of a pesticide or minor element application, may be applied any time during the application windows described in Recommended Season of Application for Nitrogen Fertilizers of this section, but must be considered with the total annual nitrogen application rate.
  - (a) Use higher rates for intensively used turf where accelerated growth and/or rapid recovery are required, use lower rates for maintenance of lesser used areas; do not exceed total annual nitrogen levels as stated above.

- (b) Greens and Tees – Per application timing must be a minimum of 30 days between applications. A rate of 0.9 pounds per 1,000 ft<sup>2</sup> of total nitrogen may be applied for cool season grasses or 1.0 pounds per 1,000 ft<sup>2</sup> of total nitrogen may be applied for warm season grasses using a material containing slowly available forms of nitrogen.
- (c) Fairways-Normal Management (Non-Irrigated or Irrigated) - Per Application timing must be a minimum of 30 days between applications. Total nitrogen application rates of 0.9 pounds per 1,000 ft<sup>2</sup> of total nitrogen may be applied for cool season grasses or 1.0 pound per 1,000 ft<sup>2</sup> of total nitrogen may be applied for warm season grasses using a material containing slowly available forms of nitrogen.
- (d) Fairways-Intensive Management (Irrigated)- Per Application timing must be a minimum of 15 days between applications. This option requires optimized timing of more frequent applications of nitrogen with lesser rates per application. Alternatively, a maximum application rate of 0.9 pounds per 1,000 ft<sup>2</sup> of total nitrogen for cool season grasses or 1.0 pounds per 1,000 ft<sup>2</sup> of total nitrogen for warm season grasses using a material containing slowly available forms of nitrogen may be applied with a minimum of 30 days between applications.
- (e) Foliar fertilizer may be applied to warm season grasses within 30 days prior to the first killing frost in the fall, at a rate not to exceed 0.1 pounds per 1,000 ft<sup>2</sup> of nitrogen per application. This application must be accounted for in the total annual nitrogen rate.

#### **Phosphorus and Potassium Recommendations for Established Golf Courses**

Apply phosphorus (P<sub>2</sub>O<sub>5</sub>) and potassium (K<sub>2</sub>O) fertilizers as indicated by a soil test using the following guidelines:

<u>Soil Test Level</u>	<u>Nutrient Needs (pounds per 1,000 ft<sup>2</sup>)*</u>	
	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
L	2-3	2-3
M	1-2	1-2
H	0.5-1	0.5-1
VH	0	0

- \* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range.
- For irrigated turf grown on Naturally Occurring and Modified Sand Based soils only, up to 0.5 pounds of P<sub>2</sub>O<sub>5</sub> per 1,000 ft<sup>2</sup> may be applied, if needed, to aid in recovery of damaged turf during times of extreme use. No phosphorus applications shall be made when the soil phosphorus test level is above 65% saturation, based on the soil test phosphorus values and region as listed in Table 4-1 of Section IV.
- Avoid the general use of high phosphorus ratio fertilizers such as 10-10-10 or 5-10-10, unless soil tests indicate phosphorus availability below the M+ level.

#### **Nitrogen Management on Athletic Fields - Cool Season Grasses**

- This program is intended for those fields which are under heavy use.
- Nitrogen recommendations are based on the assumption that there is adequate soil moisture to promote good turf growth at the time of application. If no rainfall has occurred since the last application, further applications should be delayed until significant soil moisture is available.

Cool Season Grasses	Maintenance Program <sup>a</sup>	
	Normal	Intensive
When to Apply <sup>b</sup>	Pounds per 1,000 ft <sup>2</sup> Nitrogen	
After August 15	----	0.5
September	0.7	0.7 <sup>c</sup>
October	0.7 <sup>c</sup>	0.7 <sup>c</sup>
November	0.5	0.7 <sup>c</sup>
April 15 - May 15	0.5	0.5
June 1 - June 15	----	0.5

**Notes:**

- Soluble nitrogen rates of 0.25 pounds per 1,000 ft<sup>2</sup> or less which may be a component of a pesticide or minor element application may be applied any time the turf is actively growing, but must be considered with the total annual nitrogen application rate.
- WSN = water soluble nitrogen; WIN = water insoluble nitrogen
  - (a) Intensive managed areas must be irrigated.
  - (b) The beginning and ending dates for application of nitrogen shall be determined using guidance and frost date maps contained in the preceding Season of Application for Nitrogen section, using Figures 6-1 and 6-2.
  - (c) Rates up to 0.9 pounds per 1,000 ft<sup>2</sup> of total nitrogen can be applied using a material containing slowly available forms of nitrogen, with a minimum of 30 days between applications.
  - (d) Make this application only if turf use warrants additional nitrogen for sustaining desirable growth and /or color.

**Nitrogen Management on Athletic Fields - Warm Season Grasses**

The following comments apply to both Naturally Occurring or Modified Sand based Fields and Predominantly Silt/Clay Soil Fields:

- Annual nitrogen rates for warm season grasses shall not exceed **4 pounds** in areas which have the average first killing frost on or before October 20, and shall not exceed **5 pounds** in areas which have the average first killing frost after October 20 as shown in Figure 6-1. Nitrogen rates and timings for overseeding warm season grasses are not included in these rates.
- April 15 - May 15 applications should not be made until after complete green-up of turf.
- Nitrogen applications June through August should be coordinated with anticipated rainfall if irrigation is not available.
- Use the lower end of the ranges for non-irrigated fields and the higher end of the ranges should be used on fields with irrigation.

- Nitrogen rates towards the higher end of the ranges may be applied on heavily used fields to accelerate recovery, however per application and annual rates cannot be exceeded.

<b>Bermudagrass - Predominantly Silt/Clay Soil Fields <sup>a</sup></b>		
<b>When to Apply<sup>b</sup></b>	<b>Pounds per 1,000 ft<sup>2</sup> Nitrogen<sup>c</sup></b>	<b>First Fall Killing Frost Date<sup>b</sup></b>
April 15 - May 15	0.5- 0.7 <sup>(c)</sup>	Before Oct. 20
June	0.7	
July	0.5 – 0.7 <sup>(d)</sup>	
August	0.5 - 0.7 <sup>(d)</sup>	
Sept 1 - Sept 15	0.5 -0.7 <sup>(c)</sup>	After Oct. 20
If overseeded with perennial ryegrass		
Oct - Nov	0.5 <sup>(e)</sup>	
Feb-Mar	0.5 <sup>(e)</sup>	

<b>Bermudagrass - Naturally Occurring or Modified Sand based Fields <sup>a</sup></b>		
<b>When to Apply<sup>b</sup></b>	<b>Pounds per 1,000 ft<sup>2</sup> Nitrogen</b>	<b>First Fall Killing Frost Date<sup>b</sup></b>
April 15 - May 15	0.5 -0.7 <sup>(c)</sup>	Before Oct. 20
June 1	0.7 <sup>(c)</sup>	
July	0.7 <sup>(c)</sup>	
August	0.7 <sup>(c))</sup>	
Sept 1 - Sept 15	0.7 <sup>c</sup>	After Oct. 20
If overseeded with perennial ryegrass		
Oct - Nov	0.5 <sup>(e)</sup>	
Feb - Mar	0.5 <sup>(e)</sup>	

The following notes apply to both of the Bermudagrass tables above:

- In the Piedmont and the Ridge and Valley areas of Virginia, the existing native soil will normally be comprised predominantly of clay and/or silt and these soils have inherently lower water infiltration and percolation rates and greater nutrient holding capacity. However, most areas of the Coastal Plain have existing native soils that are predominantly sandy textured soils and other facilities throughout the state may choose to install modified soil root zones that are predominantly sand (>50%) in order to maximize drainage and reduce compaction tendency. If subsurface drain tile surrounded by sand and/or gravel has been installed under the playing surface of any of these fields, their nitrogen programs should be managed as predominantly sand-based systems to minimize nutrient leaching.
- The beginning and ending dates for application of nitrogen shall be determined using guidance and frost date maps contained in the Season of Application for Nitrogen section, Figures 6-1 and 6-2.
- WSN must be applied as two applications not to exceed 0.35 pounds per 1,000 ft<sup>2</sup> each with a minimum of 15 days between applications. Alternatively, using a material that contains slowly available nitrogen sources, split applications of 0.5 pounds per 1,000 ft<sup>2</sup> may be applied with a minimum of 15 days between applications.

- (d) If a material containing slowly available forms of nitrogen is used, rates up to 1.0 pounds of nitrogen per 1,000 ft<sup>2</sup> may be applied in a single application with a minimum of 30 days between applications.
- (e) For overseeded warm season grasses, an additional 0.7 pounds per 1,000 ft<sup>2</sup> of WSN may be applied in the Fall after the perennial ryegrass overseeding is well established. The WSN must be applied as two applications not to exceed 0.35 pounds per 1,000 ft<sup>2</sup> of nitrogen each, with a minimum of 15 days between applications. Additional WSN application of 0.5 pounds per 1,000 ft<sup>2</sup> may be made in February-March to overseeded perennial ryegrass if growth and color indicate need. Alternatively, split applications of 0.5 pounds of nitrogen per 1,000 ft<sup>2</sup> each with a minimum of 15 days between applications may be applied using a material containing slowly available nitrogen sources.

#### **Phosphorus and Potassium Recommendations Athletic Fields**

Apply phosphorus (P<sub>2</sub>O<sub>5</sub>) and potassium (K<sub>2</sub>O) fertilizers as indicated by a soil test using the following guidelines:

<u>Soil Test Level</u>	<u>Nutrient Needs (pounds per 1,000 ft<sup>2</sup>)*</u>	
	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
L	2-3	2-3
M	1-2	1-2
H	0.5-1	0.5-1
VH	0	0

- \* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range.
- For irrigated turf grown on Naturally Occurring and Modified Sand Based soils only, up to 0.5 pounds of P<sub>2</sub>O<sub>5</sub> per 1,000 ft<sup>2</sup> may be applied, if needed, to aid in recovery of damaged turf during times of extreme use. No phosphorus applications shall be made when the soil phosphorus test level is above 65% saturation, based on the soil test phosphorus values and region as listed in Table 4-1 of Section IV.
- Avoid the general use of high phosphorus ratio fertilizers such as 10-10-10 or 5-10-10, unless soil tests indicate phosphorus availability below the M+ level.

**Establishment/Grow-In Recommendations for Golf Courses, Athletic Fields,  
and Sod Production**

(These rates replace normal maintenance fertilizer applications that would have occurred during these time periods.)

**Warm Season Grasses:**

**Predominantly Silt/Clay Soils**

- ◆ Plant Date - late May -June for sprigs, plugs, sod, or seeding.
- ◆ Apply P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O as needed based on soil test recommendations, incorporate into the top 2 inches if possible.
- ◆ At Planting - Up to 1.0 pounds of nitrogen per 1,000 ft<sup>2</sup> using a material containing slowly available forms of nitrogen may be applied as one application or lesser amounts applied at regular intervals, through the first 4 weeks, not to exceed a total of 1.0 pounds of nitrogen per 1,000ft<sup>2</sup>.
- ◆ Four weeks after planting - 0.25 pounds.of WSN per 1,000 ft<sup>2</sup> per week for the next 4 weeks.

**Naturally Occurring or Modified Sand Based Soils**

- ◆ Plant Date - late May -June for sprigs, plugs, sod, or seeding.
- ◆ Apply P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O as needed based on soil test recommendations, incorporate into the top 2 inches if possible.
- ◆ At Planting - Up to 1.0 pounds of nitrogen per 1,000 ft<sup>2</sup> using a material containing slowly available forms of nitrogen may be applied as one application or lesser amounts at regular intervals through the first 4 weeks, not to exceed a total of 1.0 pounds of nitrogen per 1,000 ft<sup>2</sup>.
- ◆ Four weeks after planting - 0.25 pounds per1,000 ft<sup>2</sup> using a material containing slowly available forms of nitrogen per week for the next 4 weeks.

**Cool Season Grasses:**

**Predominantly Silt/Clay Soils**

- ◆ Plant Date - August - September (preferred)
- ◆ Apply P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O as needed based on soil test recommendations, incorporate into the top 2 inches if possible.
- ◆ At Planting - up to 0.9 pounds of nitrogen per 1,000 ft<sup>2</sup> using a material containing slowly available forms of nitrogen may be applied; 30 days after planting, apply up to 0.5 pounds of nitrogen per 1,000 ft<sup>2</sup> every week for the next 4 weeks.

**Naturally Occurring or Modified Sand Based Soils**

- ◆ Plant Date - August -September (preferred)
- ◆ Apply P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O as needed based on soil test recommendations, incorporate into the top 2 inches if possible.
- ◆ At Planting - up to 0.9 pounds of nitrogen per 1,000 ft<sup>2</sup> using a material containing slowly available forms of nitrogen may be applied.
- ◆ Apply up to 0.25 pounds of nitrogen per 1,000 ft<sup>2</sup> per week after germination is complete, for the next 8 weeks. If using a material that contains slowly available forms of nitrogen, up to 0.5 pounds of nitrogen per 1,000 ft<sup>2</sup> every two weeks may be applied after germination is complete for the next 8 weeks.

### **Sod Installations:**

Site preparation should include a soil test, which can be done several months before the project begins in order to have time to get test results back. Phosphorus, potassium and lime applications should be based on soil test analysis to increase the likelihood of a successful installation. Shallow incorporation of material into the top 2 inches of the soil is preferred prior to sod installation, especially if lime is required.

No more than 0.7 pounds of nitrogen per 1,000 ft<sup>2</sup> of WSN may be applied before sod is installed. Alternatively, using a material with slowly available forms of nitrogen, 0.9 pounds of nitrogen per 1,000 ft<sup>2</sup> for cool season grasses or 1.0 pounds of nitrogen per 1,000 ft<sup>2</sup> for warm season grasses may be applied before sod is installed.

After installation apply adequate amounts of water to maintain sufficient soil moisture (i.e. to prevent visible wilt symptoms). Excessive water will limit initial root development. After roots begin to establish (as verified by lightly tugging on the sod pieces), shift irrigation strategy to a deep and infrequent program in order to encourage deep root growth. Apply approximately 1 inch of water per week (either by rainfall or irrigation), making sure that the water is being accepted by the soil profile without running off. This will insure thorough wetting of the soil profile.

After sod has completed rooting and is well established, initiate the normal nitrogen management program as described for the appropriate use shall be recommended.

### **Phosphorus and Potassium Recommendations for Establishment/Grow-In/Installation**

<b>Soil Test Level</b>	<b>Nutrient Needs (pounds per 1,000 ft<sup>2</sup>)*</b>	
	<b>P<sub>2</sub>O<sub>5</sub></b>	<b>K<sub>2</sub>O</b>
L	3-4	2-3
M	2-3	1-2
H	2-1	0.5-1
VH	0	0

\* For the lower soil test level within a rating, use the higher side of the range and for higher soil test level within a rating use the lower side of the recommendation range.

## **Other Turf Management Considerations for Golf Courses, Athletic fields, and Home Lawns**

### **Lime Recommendations**

Lime should be recommended based on a soil test to maintain soil pH within an agronomic range for turfgrass.

For new seedings where lime is recommended, incorporate the lime into the topsoil for best results.

### **Returning Grass Clippings**

Recycling of clippings on turf should be encouraged as an effective means of recycling nitrogen, phosphorus, and potassium. Proper mowing practices that ensure no more than 1/3 of the leaf blade is removed in any cutting event will enhance turf appearance and performance when clippings are returned. Return all leaf clippings from mowing events to the turf rather than discharging them onto sidewalks or streets. Rotary mulching mowers can further enhance clipping recycling by reducing the size of clippings being returned to the turfgrass canopy.

### **Management of Collected Clippings**

If clippings are collected they should be disposed of properly. They may be composted or spread uniformly as a thin layer over other turf areas or areas where the nutrient content of the clippings can be recycled through actively growing plants. They should not be blown onto impervious surfaces or surface waters, dumped down stormwater drains, or piled outside where rainwater will leach out the nutrients creating the potential for nutrient loss to the environment.

### **Use of Iron**

Iron applications (particularly foliar applications) may periodically be used for enhanced greening as an alternative to nitrogen. These applications are most beneficial if applied in late spring through summer for cool season grasses and in late summer/fall applications for warm-season grasses.

### **Impervious Surfaces**

Do not apply fertilizers containing nitrogen or phosphorus to impervious surfaces (sidewalks, streets, etc.). Remove any granular materials that land on impervious surfaces by sweeping and collecting, and either put the collected material back in the bag, or spread it onto the turf and /or using a leaf blower etc. to return the fertilizer back to the turfgrass canopy.

**Table 3-1**  
**Lime Recommendations for Virginia Crops (tons/acre)**  
Lime Rates based on Va Tech Soil buffer pH

Buffer pH	Target Soil pH					Acidity meq/100g
	5.2	5.8.	6.2	6.5	6.8	
6.60	0.00	0.00	0.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00	0.00	0.00	0.03
6.40	0.00	0.00	0.00	0.00	0.50	0.06
6.38	0.00	0.00	0.25	0.25	0.50	0.12
6.36	0.00	0.00	0.25	0.25	0.75	0.24
6.34	0.00	0.00	0.25	0.50	0.75	0.36
6.32	0.00	0.00	0.50	0.50	0.75	0.48
6.30	0.00	0.00	0.50	0.75	1.00	0.59
6.28	0.00	0.25	0.75	0.75	1.00	0.71
6.26	0.00	0.25	0.75	1.00	1.25	0.83
6.24	0.00	0.25	0.75	1.00	1.25	0.95
6.22	0.00	0.50	1.00	1.00	1.50	1.07
6.20	0.00	0.50	1.00	1.25	1.50	1.19
6.18	0.00	0.75	1.25	1.25	1.75	1.30
6.16	0.00	0.75	1.25	1.50	1.75	1.42
6.14	0.25	0.75	1.50	1.50	2.00	1.54
6.12	0.25	1.00	1.50	1.75	2.00	1.66
6.10	0.50	1.00	1.50	1.75	2.25	1.78
6.08	0.50	1.25	1.75	2.00	2.25	1.90
6.06	0.50	1.25	1.75	2.00	2.25	2.02
6.04	0.75	1.25	2.00	2.00	2.50	2.13
6.02	0.75	1.50	2.00	2.25	2.50	2.25
6.00	1.00	1.50	2.00	2.25	2.75	2.37
5.95	1.00	1.75	2.25	2.50	3.00	2.67
5.90	1.25	2.00	2.50	3.00	3.25	2.96
5.85	1.50	2.25	2.75	3.25	3.50	3.26
5.80	1.75	2.50	3.25	3.50	3.75	3.56
5.75	2.00	2.75	3.50	3.75	4.25	3.85
5.70	2.25	3.00	3.75	4.00	4.50	4.15
5.65	2.50	3.25	4.00	4.25	4.75	4.45
5.60	2.75	3.50	4.25	4.50	5.00	4.74
5.55	3.00	3.75	4.50	4.75	5.25	5.04
5.50	3.25	4.00	4.75	5.25	5.50	5.34
5.40	3.75	4.50	5.25	5.75	6.25	5.93
5.30	4.25	5.00	5.75	6.25	6.75	6.52

Lime recommendations in the table above are based on the use of a liming material equivalent in neutralizing power to 100% CaCO<sub>3</sub>. For application rates of liming material that is less than 100% neutralizing power of CaCO<sub>3</sub> (pure calcium carbonate) use the table in this section, Lime Rate Adjustment for CCE.

## Lime Recommendations Using Other Testing Labs

For approved labs other than Virginia Tech, use the lime recommendations given by the lab. IF there are no recommendations with the soil analysis, use the table below for A&L Agricultural, Spectrum Analytical, and Brookside Laboratories.

**Table 3-2**  
**Lime Application Rate<sup>1</sup> (tons/acre) to achieve desired pH based on SMP Buffer Test**

Soil- Buffer pH	Target Soil pH				
	5.2	5.8	6.2	6.5	6.8
6.9	0	0.25	0.50	0.50	0.75
6.8	0.50	0.75	1.00	1.00	1.25
6.7	1.00	1.50	1.50	1.75	2.00
6.6	1.50	1.75	2.00	2.25	2.50
6.5	2.00	2.25	2.50	3.00	3.25
6.4	2.75	3.00	3.25	3.75	4.00
6.3	3.25	3.50	4.00	4.50	5.00

<sup>1</sup> Ag-ground lime of 90% plus total neutralizing power (TNP) or CaCO<sub>3</sub> equivalent., and fineness of 40% < 100 mesh, 50% < 60 mesh, 70% < 20 mesh and 95% < 8 mesh. Adjustments in the application rate should be made for liming materials with different particle sizes, or neutralizing value.

**Waters Agricultural Laboratories** uses the Adams and Evans single buffer method which uses a different table for recommendations than the Mehlich or the SMP tables supplied here. In the event you would have lab reports from Waters Lab, which do not have lime recommendations, contact the lab for recommendations based on their analysis procedure.

## Lime Rate Adjustment for CCE

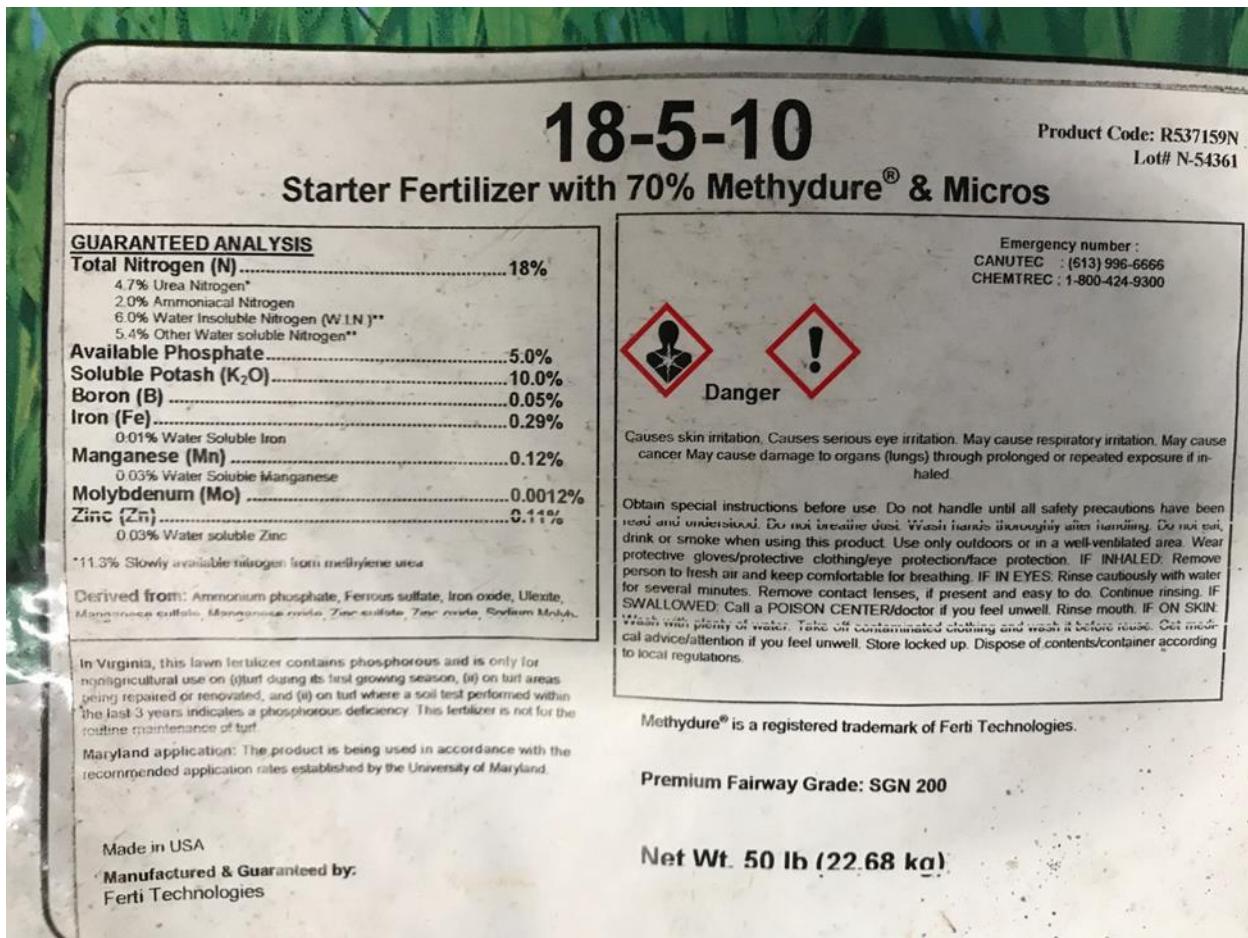
Using the lime application rate to achieve the desired target pH based on the soil test buffer pH, use the table below to adjust that rate based on the % CCE of the liming material to be applied.

**Table 3-3**  
**Lime Application Rate Adjustment Based on % CCE of Material**

T/ac*	% CCE of Your Liming Material										
	50	60	70	80	90	100	110	120	130	140	150
0.5	1.00	0.75	0.75	0.75	0.50	0.50	0.50	0.50	0.50	0.25	0.25
1.0	2.00	1.75	1.50	1.25	1.00	1.00	1.00	0.75	0.75	0.75	0.75
1.5	3.00	2.50	2.25	2.00	1.75	1.50	1.25	1.25	1.25	1.00	1.00
2.0	4.00	3.25	2.75	2.50	2.25	2.00	1.75	1.75	1.50	1.50	1.25
2.5	5.00	4.25	3.50	3.25	2.75	2.50	2.25	2.00	2.00	1.75	1.75
3.0	6.00	5.00	4.25	3.75	3.25	3.00	2.75	2.50	2.25	2.25	2.00
3.5	7.00	5.75	5.00	4.50	4.00	3.50	3.25	3.00	2.75	2.50	2.25
4.0	8.00	6.75	5.75	5.00	4.50	4.00	3.75	3.25	3.00	2.75	2.75

\* Lime recommendation to adjust pH as determined from soil test analysis.

## 7. Fertilizer Labels



**16-3-8 50%XCU 20%Biosolids  
15%AS 2%Fe 0.2%B 0.5%Zn Mn Mg Cu**

**GUARANTEED ANALYSIS**

Total Nitrogen (N) ..... 16.00%  
3.90% Urea Nitrogen\*  
3.2% Ammoniacal Nitrogen  
0.80% Water Insoluble Nitrogen  
8.10% Slowly Available Water Soluble Nitrogen

Available Phosphate (P<sub>2</sub>O<sub>5</sub>) ..... 3.00%

Soluble Potash (K<sub>2</sub>O) ..... 8.00%

Iron (Fe) ..... 2.00%

Derived From: \*8.00% slow release nitrogen derived from XCU

CONTAINS: EXCEPTIONAL QUALITY BIOSOLIDS

THIS FERTILIZER IS INTENDED ONLY FOR NONAGRICULTURAL  
USE ON (A) TURF DURING ITS FIRST GROWING SEASON (B) TURF BEING  
RENOVATED OR REPAIRED (C) OR WHERE A SOIL TEST INDICATES A  
PHOSPHOROUS DEFICIENCY

**Net Weight 50 lbs (22.70 kg)**

**APPLY ONLY AS DIRECTED**

**MFG FOR LANDSCAPE SUPPLY, INC Roanoke, Va. 24016**

**By TIMAC USA, INC. Reading, Pa.**

**8. Soil Test Results**

See attached file.