The Town of Lincoln Massachusetts
Parks and Recreation Department

Athletic Field Use and Condition Study

October 25, 2016

Stantec

October 20, 2016
File: 210801402

Attention: Mr. Daniel Pereira
Lincoln Parks and Recreation Department
Ballfield Road
Lincoln, MA 01773

Dear Dan,

Reference: Athletic Field Use and Condition Study

Please find the attached study to review the existing athletic fields in Town. The following is an Athletic Field Use and Condition Study of the Fields listed below:

- Brooks Field
- Paddock Field
- Smith Field
- Codman Field
- Town Office Field

Stantec was tasked with gathering information on the existing fields and did so by visiting the fields and observing the current playing conditions. Stantec made note of the natural grass turf condition, turf coverage, soil condition, and took soil samples to have them sent out for testing.

Stantec compiled the collected information and made recommendations on maximizing field use programs, improving maintenance, and overall athlete safety. By compiling the information, we were able to create a scheduled field use matrix and seasonal calendar.

The following report is a summary of the tasks mentioned above.

Regards,

Stantec's Sport Group
David Nardone, RLA
Sport Lead/Principal
Phone: (617) 654-6007
david.nardone@stantec.com

Stantec's Sport Group
Josh Atkinson, RLA
Landscape Architect Associate
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What's Inside

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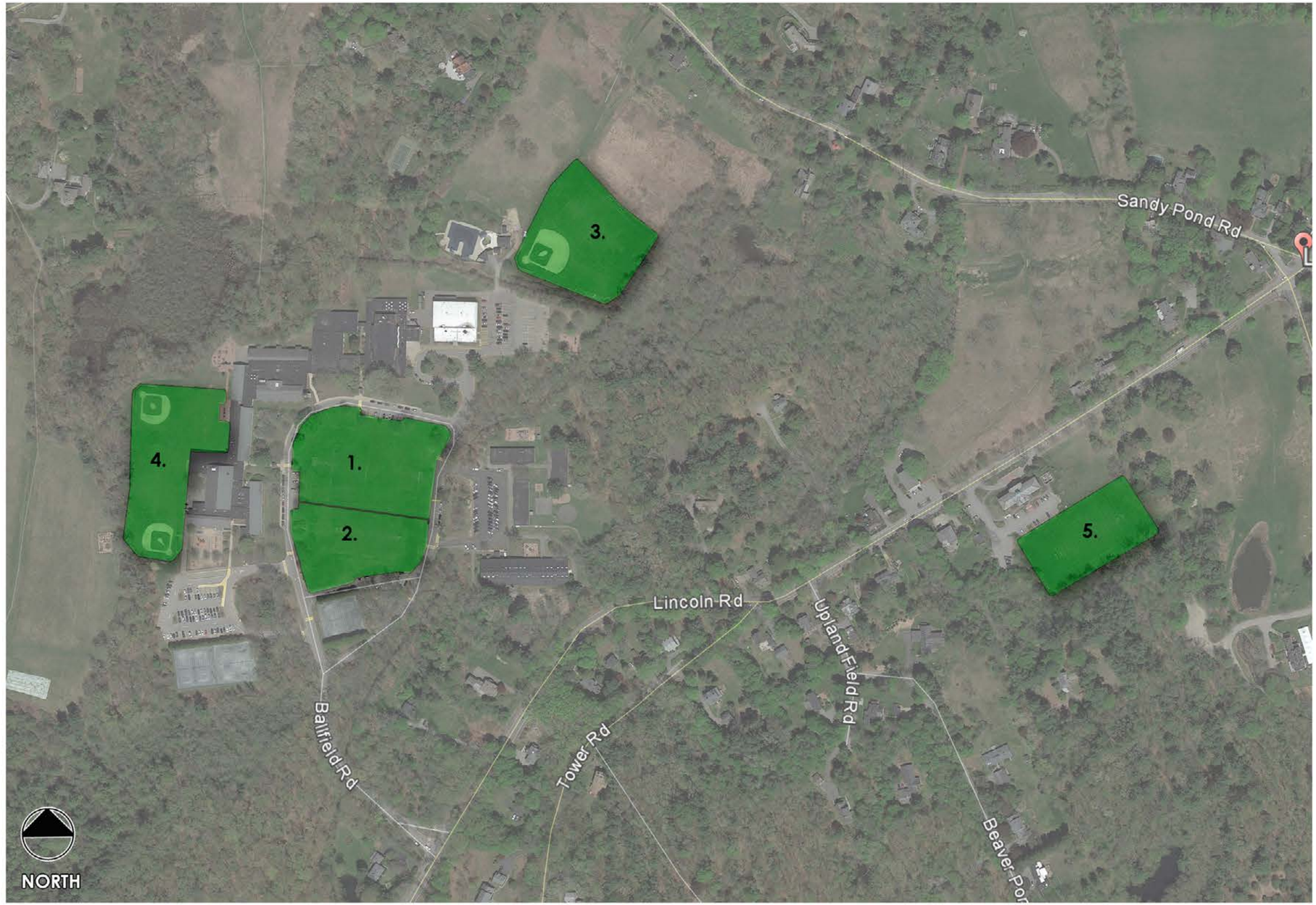
Field Map

LINCOLN, MA
FIELD USE STUDY

MAP KEY

1. BROOKS FIELD
2. PADDOCK FIELD
3. CODMAN FIELD
4. SMITH FIELD
5. TOWN OFFICE FIELD



Plan View Aerial Photograph

Field Map - Overview

Stantec

Project:
210801402
Date:
August 17, 2016

October 4, 2016
File: 210801402

Attention: Mr. Daniel Pereira
Lincoln Parks and Recreation Department
Ballfield Road
Lincoln, MA 01773

Dear Dan,

Reference: Athletic Field Use and Condition Study

The Town of Lincoln contacted the Stantec Sport Group to conduct a study to review the existing athletic fields in Town. The following is an Athletic Field Use and Condition Study of the Fields listed below:

- Brooks Field
- Paddock Field
- Smith Field
- Codman Field
- Town Office Field

Stantec was tasked with gathering information on the existing fields and did so by visiting the fields and observing the current playing conditions. Stantec made note of the natural grass turf condition, turf coverage, soil condition, and took soil samples to have them sent out for testing.

Stantec compiled the collected information and made recommendations on maximizing field use programs, improving maintenance, and overall athlete safety. By compiling the information, we were able to create a scheduled field use matrix and seasonal calendar.

The following report is a summary of the tasks mentioned above.

Regards,

Stantec Sport Group
Josh Atkinson, RLA
Landscape Architect
Associate
Phone: (617) 654-6003
Fax: (617) 523-4333
josh.atkinson@stantec.com

BROOKS FIELD

Brooks Field

General Overview

Brooks Field, also referred to as Center Field, is located in the center of the Ballfield Road loop off of Lincoln Road. The open natural grass field area is used for multiple sports, but is typically painted for soccer with the field size of 198'x300'.

The field is not irrigated, and as a Town standard broadcast weed and pest control is discouraged. The Town has a current contract with a turf maintenance company that core aerates the field two times annually.

The initial observations from Stantec's site visit are that the grass condition and coverage are poor. This is very likely due to a high level of soil compaction and dry soils.

The following is a brief summary of our more specific observations:

Turf Condition

The site visit was August 17th, 2016 and at the time of visit, dry conditions were observed as a result of not having an irrigation system and several weeks of little to no rain. The areas that were investigated within the natural grass playing fields indicate very poor turf conditions and show signs of significant use. Very little active or thriving Athletic Field Turf Grass was observed. Every area that was observed as "green" in the field was a weed. These weeds are specifically prevalent in highly compacted areas. In particular, the mouse-ear chickweed can cause tripping hazards for athletes as they form low spreading clumps that can catch on cleats. There were many bare, exposed soil areas, but the soccer goal mouths had the most significant worn areas. These areas are typical on a natural grass field.

There was evidence of slice seeding, but it appeared to only be in one direction. At the time of application, this may have been all that was necessary.

Turf Condition Analysis

- No thriving Kentucky Blue Grass or Ryegrass. These were dormant, dead, or bare soil were observed.
- Weeds observed included Crabgrass, Dandelions, Mouse-Ear Chickweed, Spurge, and Broadleaf Plantain. (These cover the majority of the "green" areas of field.)

Site turf characteristics

Soil Condition

During our site visit, we made a preliminary evaluation of the existing soils. These investigations were limited to the upper 14". To better understand the soil properties, samples were taken to a soil testing lab for additional tests on particle size, organic matter content, and nutrient content (Refer to Appendix B). Deeper soil testing may also be needed to determine if drainage problems are caused by deeper layers of poorly drained subsoils and/or to confirm the feasibility of subsurface infiltration (trenches or gravel beds) below the athletic playing surface.

There appeared to be sand visible, but the sand was not incorporated into the soil rootzone profile enough to provide de-compaction

Soil Probe Analysis

- High compaction is prevalent in many areas.
- 4"-14" typical topsoil depth. Most areas had 4" average.
- Poor soils - high silt, low moisture holding capacity. Lab test results show low amounts of coarse/medium sand.
- Lab results show high levels of Iron.

Site soil characteristics and depth

Drainage

The field slopes at a relatively flat pitch, but there appears to be a slight slope towards the south edge of field. This assumption should be confirmed by surveying of the field with a registered surveyor.

The field's surface undulates irregularly, creating isolated depressions that may hold standing water for extended periods.

There were no drainage structures or stone drainage trenches observed relating to the field.

Puddles observed off of the field and along the road indicate low spots where field stormwater run-off may collect.

LINCOLN, MA
FIELD USE STUDY
AT BROOKS FIELD

High Area — H

Low Area (Poor Drainage) — L

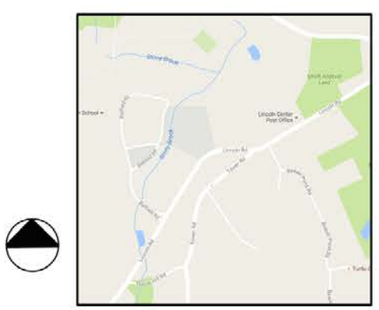
Existing Utility Structure — U

Apparent Drainage Pattern

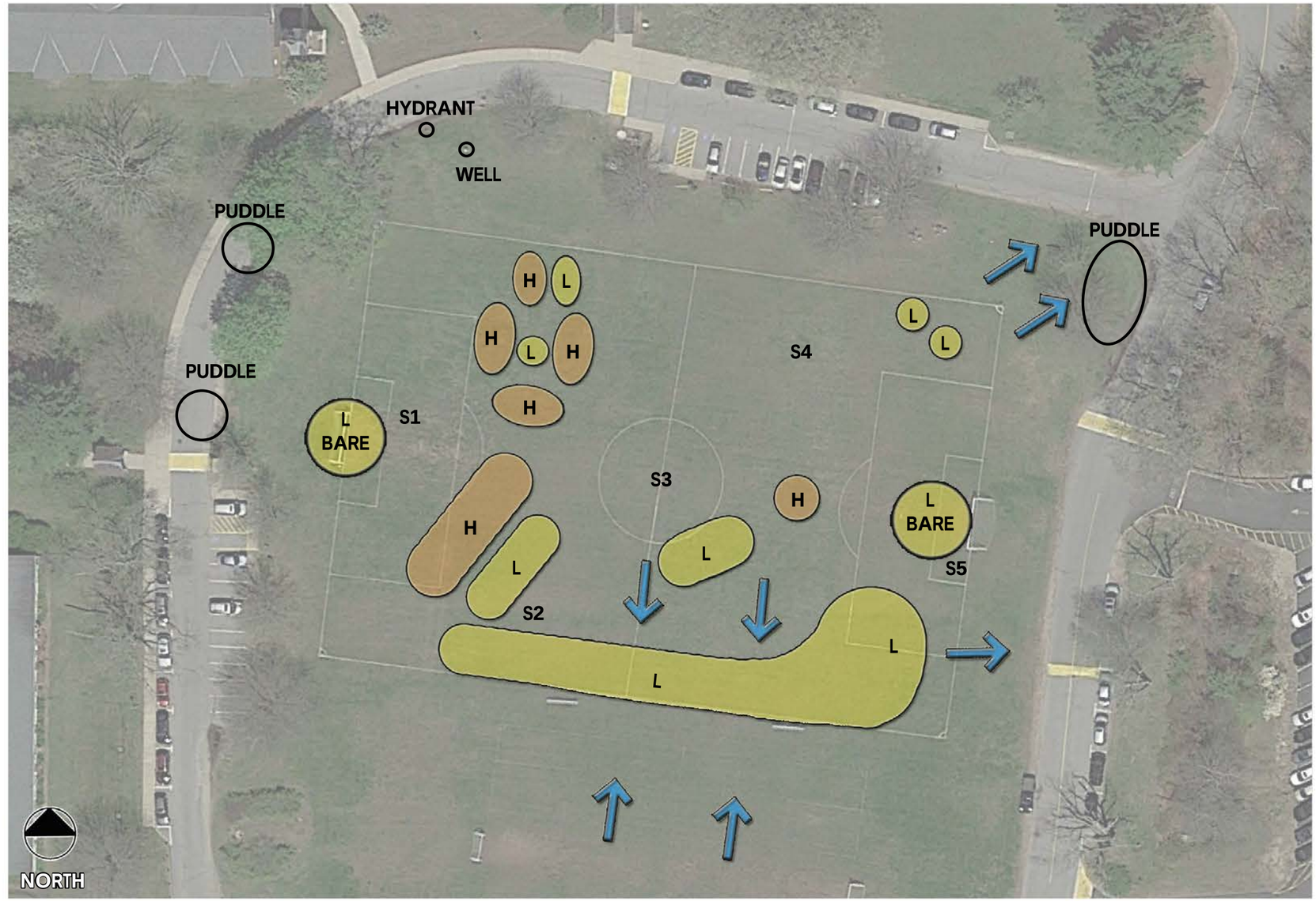
Soil Sample Location — S1

TOPSOIL SAMPLE OF ROOT ZONE:

S1. 4” Avg. Depth
S2. 4” Avg. Depth
S3. 4” Avg. Depth
S4. 11” Avg. Depth
S5. 14” Avg. Depth



Context Map (not to scale)



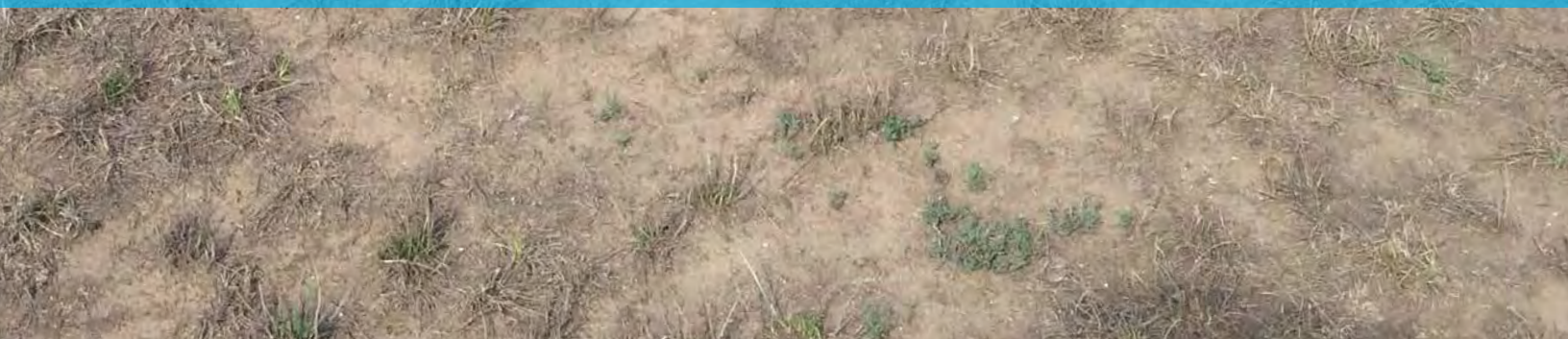
Plan View Aerial Photograph

Site Analysis - Overview

NOTES:
HIGH SILT AND FINES, EVIDENCE OF SAND, EVIDENCE OF SPLICE SEEDING.
ATHLETIC FIELD WEEDS TYPICAL FROM COMPACTION, PROVIDES ONLY GREEN SEEN ON FIELDS.
LITTLE GRASS COVERAGESILTY.

Project:
210801402
Date of Visit:
August 17, 2016

PADDOCK FIELD



Paddock Field

General Overview

Paddock Field is located adjacent to Brooks Field in the center of the Ballfield Road loop off of Lincoln Road. The open natural grass field area is used for multiple sports, but is typically painted for a 120'x180' soccer field. From our understanding this field sits on top of a septic system.

The field is not irrigated, and as a Town standard broadcast weed and pest control is discouraged. The Town has a current contract with a turf maintenance company that core aerates the field two times annually.

Similar to Brooks Field, initial observations are that the grass condition and coverage are poor. This is very likely due to a high level of soil compaction and dry soils.

The following is a brief summary of our more specific observations:

Turf Condition

At the time of site visit, dry conditions were observed as a result of not having an irrigation system and several weeks of little rain. The areas that were investigated within the natural grass playing fields indicate very poor turf conditions, a result of significant use. It was observed that very little Athletic Field Turf Grass is active or thriving. Every area that was observed as "green" in the field was a weed. These weeds are specifically prevalent in highly compacted areas. The mouse-ear chickweed, in particular, can cause tripping hazards for athletes as they form a low spreading clumps that can catch on cleats. There were many bare exposed soil areas, but specifically the soccer goal mouths had the most significant bare areas. These areas are typical on a natural grass field.

There was evidence of slice seeding, although it appeared in only one direction, which at the time of application, may have only been necessary.

Turf Condition Analysis

- » No thriving Kentucky Blue Grass or Ryegrass. These were dormant, dead, or bare soil were observed.
- » Weeds observed included Crabgrass, Dandelions, Mouse-Ear Chickweed, Spurge, and Broadleaf Plantain. (These cover the majority of the "green" areas of field.)

Site turf characteristics

Soil Condition

During our site visit, we made a preliminary evaluation of the existing soils. These investigations were limited to the upper 14". To better understand the soil properties, samples were taken to a soil testing lab for additional tests on particle size, organic matter content, and nutrient content (Refer to Appendix B). Deeper soil testing may also be needed to determine if drainage problems are caused by deeper layers of poorly drained subsoils and/or to confirm the feasibility of subsurface infiltration (trenches or gravel beds) below the athletic playing surface.

There appeared to be sand visible, but the sand was not incorporated into the soil rootzone profile enough to provide de-compaction.

Soil Probe Analysis

- » High compaction is prevalent in many areas.
- » 2"-11" typical topsoil depth. Most areas had 6" average.
- » Evidence of sand, but not incorporated into soil rootzone.
- » Poor soils - high silt, low moisture holding capacity. Lab test results show low amounts of coarse/medium sand.
- » Lab results show high levels of Iron.

Site soil characteristics and depth

Drainage

The field slopes at a noticeable pitch. A high point on the west end forms an off-center ridge that runs east to west. Paddock field is approximately 1.5'-2.5' higher than Brooks field and approximately 3'-4' higher than the road elevation. This assumption should be confirmed by surveying the field with a registered surveyor.

The field's surface undulates irregularly. This creates isolated depressions that may hold standing water for extended periods.

The fact that this field is built over a leaching field and also the sleep pitch may cause the field to dry out quickly after rain events.

There were no drainage structures or stone drainage trenches observed relating to the field.

LINCOLN, MA
FIELD USE STUDY
AT PADDOCK FIELD

High Area — H

Low Area (Poor Drainage) — L

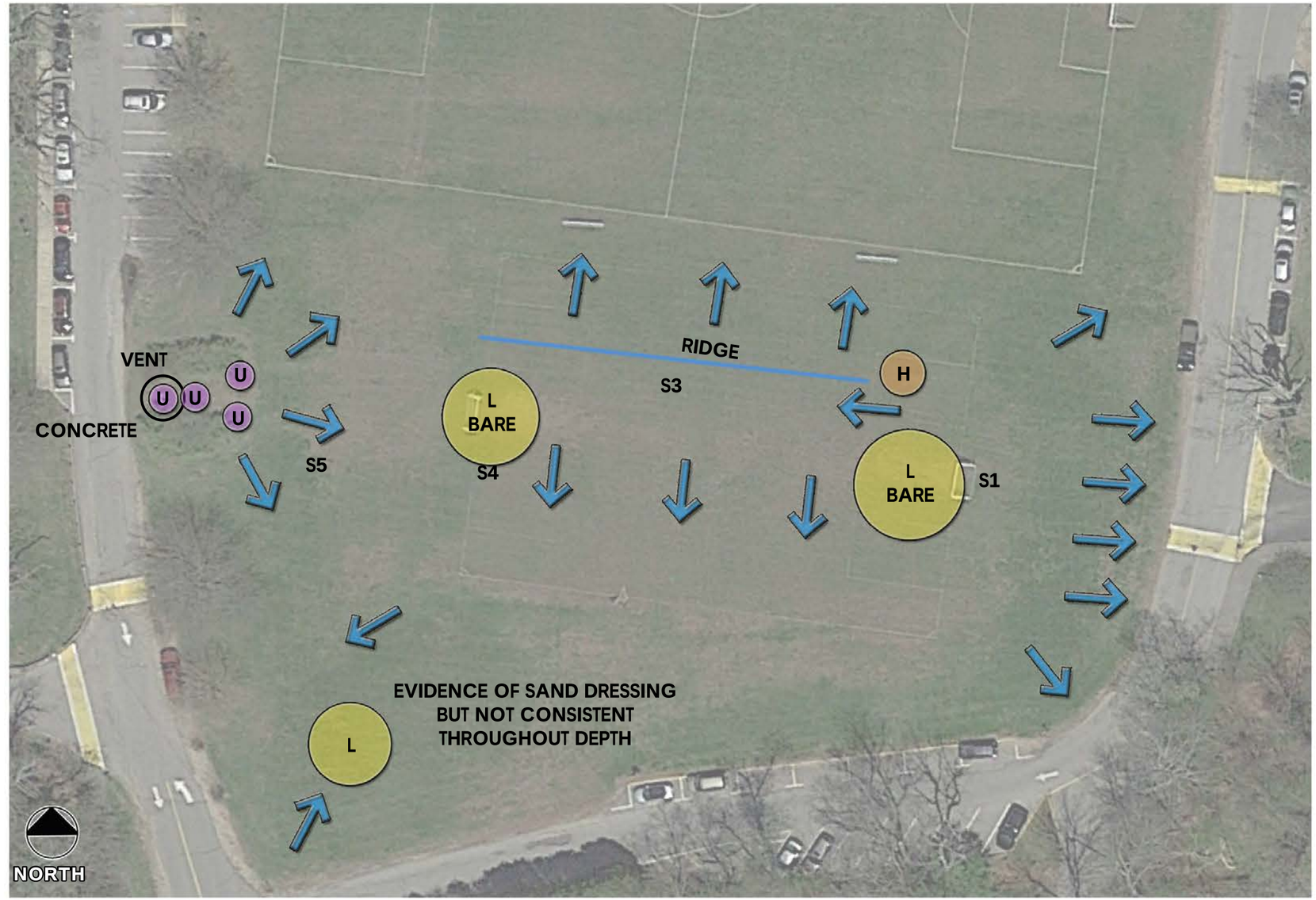
Existing Utility Structure — U

Apparent Drainage Pattern

Soil Sample Location — S1

TOPSOIL SAMPLE OF ROOT ZONE:
S1. 7” AVG DEPTH
S2. 5” AVG DEPTH
S3. 11” AVG DEPTH
S4. 4” AVG DEPTH
S5. 2” AVG DEPTH
S6. 6” AVG DEPTH

Context Map (not to scale)



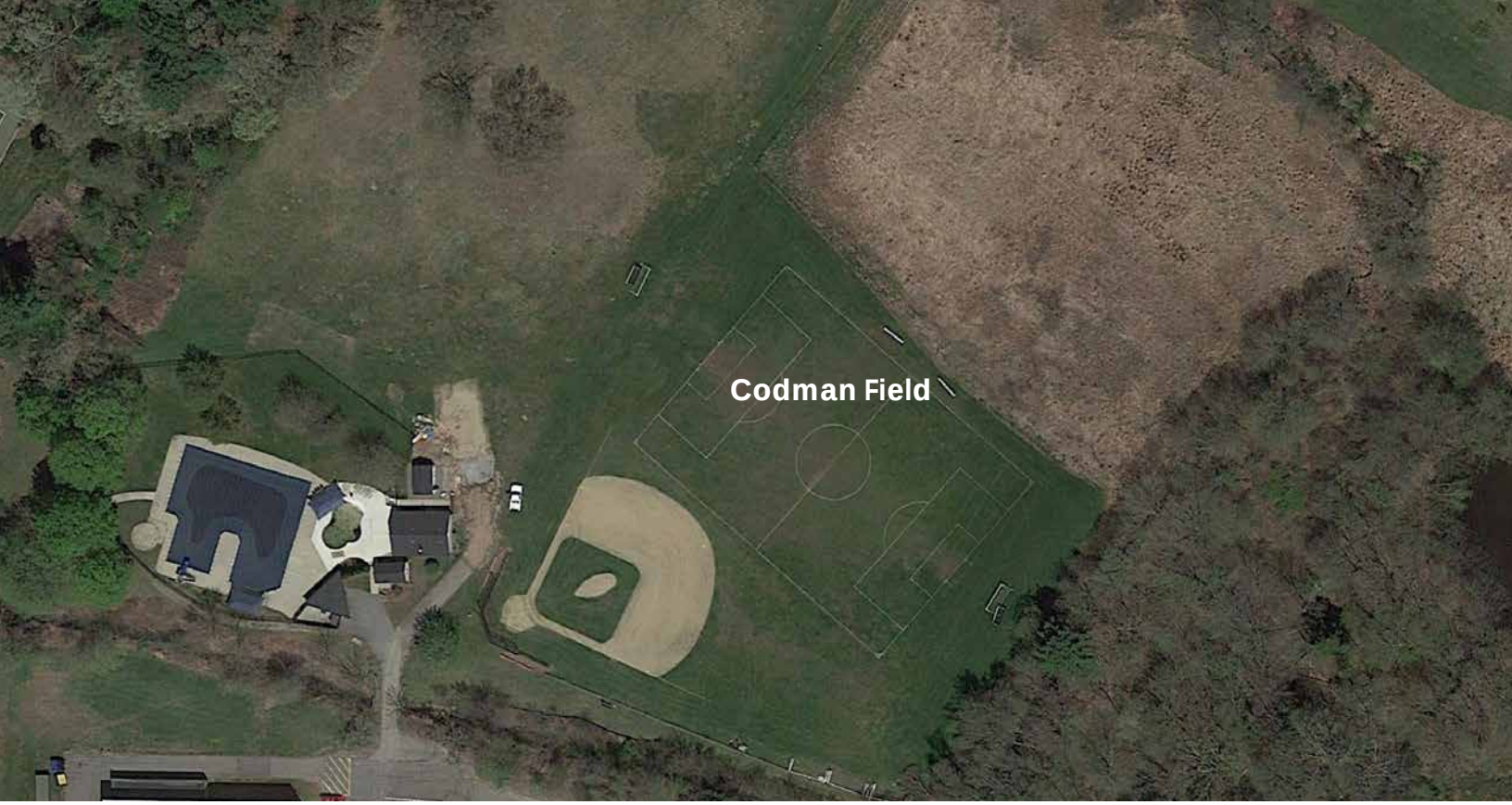
Plan View Aerial Photograph

Site Analysis - Overview

NOTES:
HIGH SILTS AND FINES, LITTLE GRASS COVERAGE, EVIDENCE OF SLICE SEED
EVIDENCE OF SAND BUT NOT CONSISTENT THROUGHOUT DEPTH OF ROOT ZONE.
WEEDS TYPICAL FROM COMPACTION AND PROVIDE ONLY GREEN SEEN ON FIELD.

Project:
210801402
Date of Visit:
August 17, 2016

CODMAN FIELD



Codman Field

General Overview

Codman Field is located behind The Brooks School on Ballfield Road, off of Lincoln Road. The natural grass field area is used for multiple sports, including baseball and soccer. The field was not painted during our site visit, however it is typically painted for a soccer field with a 150'x210' dimension. The baseball field dimensions are approximately 325' (left field), 349' (center field), and 300' (right field.)

The field is not irrigated, and as a Town standard broadcast weed and pest control is discouraged. The Town has a current contract with a turf maintenance company that core aerates the field two times annually.

The initial observations from Stantec's site visit are that the grass condition and coverage are poor. This is very likely due to a high level of soil compaction and dry soils. The home plate and pitcher's mound appear to be misaligned, and the home plate area was dangerously uneven.

The following is a brief summary of our more specific observations:

Turf Condition

From the information the Town has supplied, the fields are not currently irrigated and during the time of the site visit there was little rain in the previous weeks, causing dry conditions. The areas that were investigated within the natural grass playing fields indicate very poor turf conditions, which have experienced significant use. It was observed that very little Athletic Field Turf Grass is active or thriving. A majority of the areas that was observed as "green" in the field was a weed, mostly mouse-ear chickweed. However, in the far areas of the outfield, Kentucky Bluegrass were still active. These areas exist in low spots and in the shade of the surrounding trees. Within these areas, dense patches of white clover were thriving, indicating low nitrogen fertility. There were many bare, exposed soil areas, but specifically at the soccer goal mouths, the baseball left, center, and right field, and the entire infield had the most significant bare areas. There are several rock outcroppings outside of the field of play. However, an outcropping was noted (inside the field of play) in left field that could pose a hazard. There was evidence of slice seeding near the infield area.

Turf Condition Analysis

- » Minimal thriving Kentucky Blue Grass or Ryegrass. Most areas were dormant, dead, or bare soil was observed. Shady areas in outfield had a better stand of grass.
- » Weeds observed included White Clover, Crabgrass, Dandelions, Mouse-Ear Chickweed, and Broadleaf Plantain. These cover the majority of the "green" areas of field.

Site turf characteristics

Soil Condition

During our site visit, we made a preliminary evaluation of the existing soils. These investigations were limited to the upper 14". To better understand the soil properties, samples were taken to a soil testing lab for additional tests on particle size, organic matter content, and nutrient content (Refer to Appendix B). Deeper soil testing may also be needed to determine if drainage problems are caused by deeper layers of poorly drained subsoils and/or to confirm the feasibility of subsurface infiltration (trenches or gravel beds) below the athletic playing surface.

Soil Probe Analysis

- » High compaction is prevalent in many areas.
- » 4"-9" typical topsoil depth. Most areas had 6.5" average.
- » Rock outcropping observed.
- » Poor soils - high silt, low moisture holding capacity. Lab test results show low amounts of coarse/medium sand.
- » Lab results show high levels of Iron.

Site soil characteristics and depth

Drainage

The field appears to slope towards the wetland in the outfield. This assumption should be confirmed by surveying of the field with a registered surveyor.

The field's surface undulates irregularly, creating isolated depressions that may hold standing water for extended periods.

There were no drainage structures or stone drainage trenches observed relating to the field.

LINCOLN, MA
FIELD USE STUDY
AT CODMAN FIELD

High Area — H

Low Area (Poor Drainage) — L

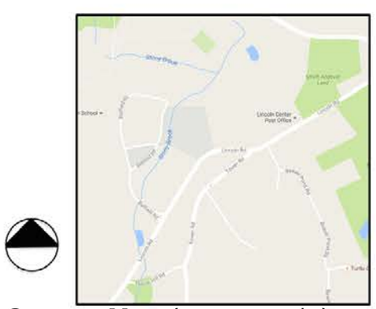
Existing Utility Structure — U

Apparent Drainage Pattern

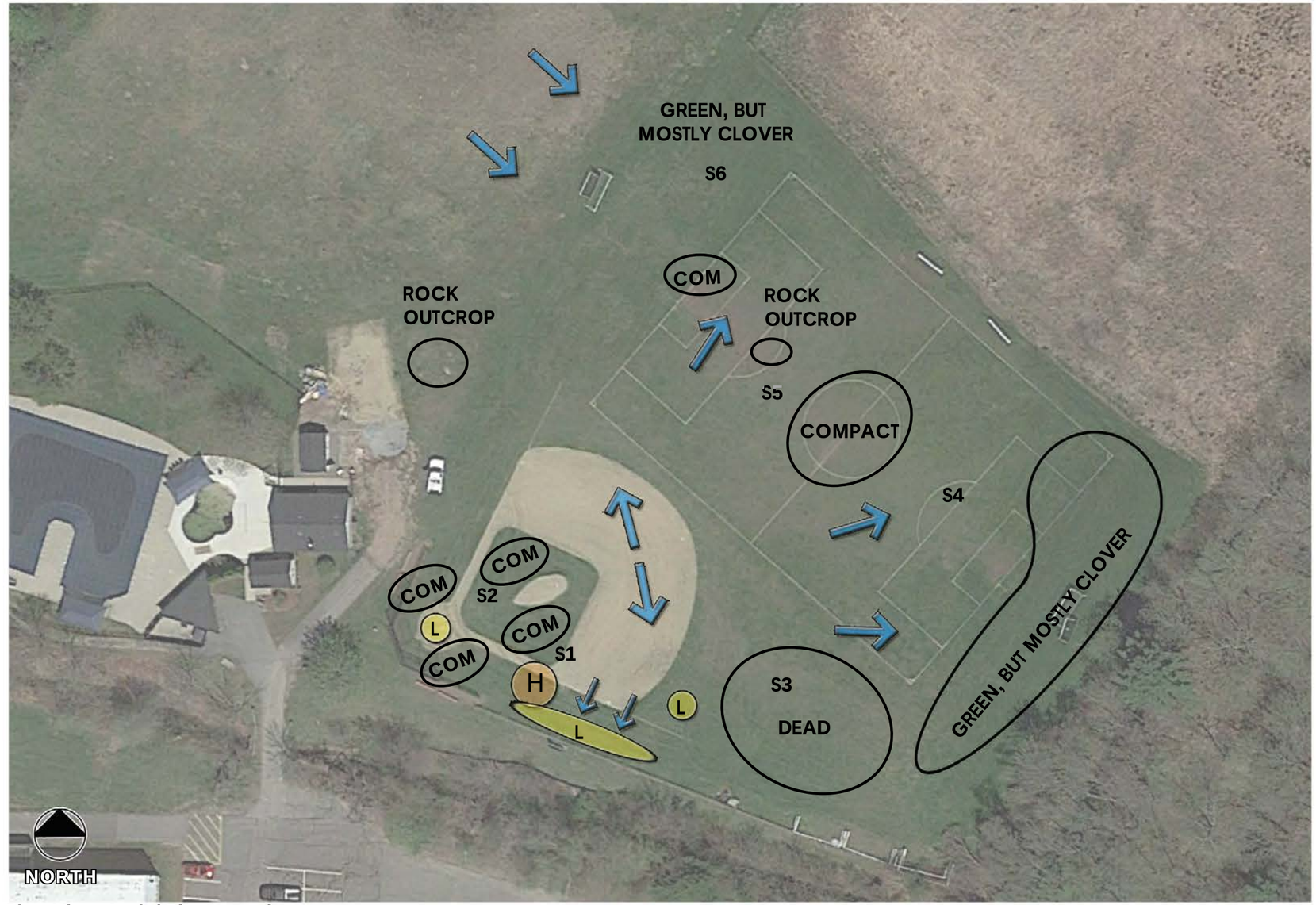
Soil Sample Location — S1

TOPSOIL SAMPLE OF ROOT ZONE:

S1. 7” AVG DEPTH
S2. 6” AVG DEPTH
S3. 6” AVG DEPTH
S4. 4” AVG DEPTH
S5. 7” AVG DEPTH
S6. 9” AVG DEPTH



Context Map (not to scale)



Plan View Aerial Photograph

Site Analysis - Overview

NOTES:
HOME AND PITCHERS MOUNT NOT ALIGNED. EVIDENCE OF SLICE SEED.
FLAT/NO CLEAR DEFINITION OF GRADING OR DRAINAGE. APPEARS TO DRAIN TO WETLAND
WEEDS TYPICAL FROM COMPACTION PROVIDE ONLY GREEN SEEN ON FIELD.
POOR DEFINITION OF INFIELD MIX AND GRASS. LITTLE GRASS COVERAGE. HIGH SILT AND FINES.

Stantec

Projectt:
210801402
Date of Visit:
AUGUST 17, 2016

SMITH FIELD

Smith Field

General Overview

Smith Fields are located behind the Smith School, on Ballfield Road, off of Lincoln Road. The natural grass field area is used for multiple sports, including baseball and soccer. The field was not painted during our site visit, although the field is usually painted for a soccer field with the approximate size of 120'x180'. The south baseball field is approximately 126' to left field, 196' to center field, and 200'+ to right field.

The north baseball field dimensions are 244' (left field), 222' (center field), and 200'+ (right field.)

The field is not irrigated, and as a Town standard broadcast weed and pest control is discouraged. The Town has a current contract with a turf maintenance company that core aerates the field two times annually.

The initial observations from Stantec's site visit are that the grass condition and coverage are poor. This is very likely due to a high level of soil compaction and dry soils.

The following is a brief summary of our more specific observations:

Turf Condition

At the time of site visit, dry conditions were observed as a result of not having an irrigation system and several weeks of little rain. The areas that were investigated within the natural grass playing fields indicate very poor turf conditions and show signs of significant use. Very little active or thriving Athletic Field Turf Grass was observed. Every area that was observed as "green" in the field was a weed. These weeds are specifically prevalent in highly compacted areas. In particular, the mouse-ear chickweed can cause tripping hazards for athletes as they form low spreading clumps that can catch on cleats. There were many bare, exposed soil areas, but the soccer goal mouths had the most significant worn areas. These areas are typical on a natural grass field.

Turf Condition Analysis

- » No thriving Kentucky Blue Grass or Ryegrass. These were dormant, dead, or bare soil was observed.
- » Weeds observed included Crabgrass, Dandelions, Mouse-Ear Chickweed, Spurge, and Broadleaf Plantain . These cover the majority of the "green" areas of field.

Site turf characteristics

Soil Condition

During our site visit, we made a preliminary evaluation of the existing soils. These investigations were limited to the upper 14". To better understand the soil properties, samples were taken to a soil testing lab for additional tests on particle size, organic matter content, and nutrient content (Refer to Appendix B). Deeper soil testing may also be needed to determine if drainage problems are caused by deeper layers of poorly drained subsoils and/or to confirm the feasibility of subsurface infiltration (trenches or gravel beds) below the athletic playing surface.

Soil Probe Analysis

- » High compaction is prevalent in many areas.
- » 2"- 4" typical topsoil depth. Most areas had 3.5" average.
- » Poor soils - high silt, low moisture holding capacity. Lab test results show low amounts of coarse/medium sand.
- » Lab results show high levels of Iron.

Site soil characteristics and depth

Drainage

The field slopes at a relatively flat pitch, but there appears to be a slight slope towards the south edge of field. This assumption should be confirmed by surveying of the field with a registered surveyor.

The field's surface undulates irregularly, creating isolated depressions that may hold standing water for extended periods.

There were no drainage structures or stone drainage trenches observed relating to the field.

Puddles observed off of the field and along the road indicate low spots where field stormwater run-off may collect.

LINCOLN, MA
FIELD USE STUDY
AT SMITH FIELD

High Area — H

Low Area (Poor Drainage) — L

Existing Utility Structure — U

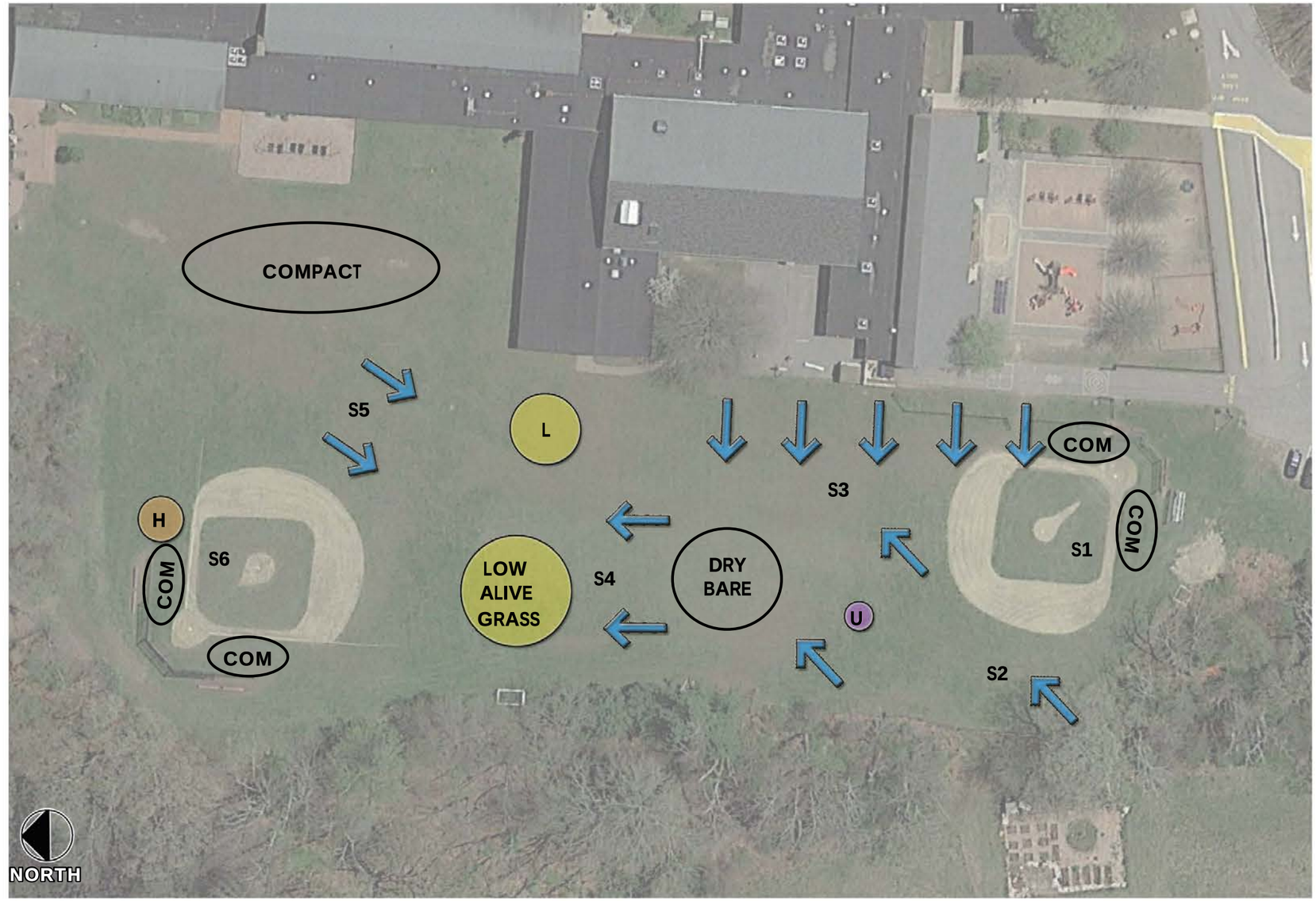
Apparent Drainage Pattern

Soil Sample Location — S1

TOPSOIL SAMPLE OF ROOT ZONE:

S1. 4" AVG DEPTH
S2. 4" AVG DEPTH
S3. 4" AVG DEPTH
S4. 4" AVG DEPTH
S5. 2" AVG DEPTH
S6. 2.5" AVG DEPTH

Context Map (not to scale)



Plan View Aerial Photograph

Site Analysis - Overview

NOTES:
HIGH SILTS AND FINES,
WEEDS TYPICAL FROM COMPACTION AND PROVIDE ONLY GREEN SEEN ON FIELD.
POOR DEFINITION OF INFIELD MIX AND GRASS. LITTLE GRASS COVERAGE.

Project:
210801402
Date of Visit:
August 17, 2016

TOWN OFFICE FIELD

Town Office Field

General Overview

Town Office Field is located behind the Town Office off Lincoln Road. The natural grass field area is used primarily for soccer and is painted for two fields; one with the dimension of 150'x210' and a smaller field inside that field is painted for a 120'x180' field.

It is our understanding that irrigation was installed to establish initial turf grass but was abandoned due to excessive wet conditions. It is understood that the existing irrigation system was tied to main controls at the Town Hall, but was removed during renovations. The field is not currently irrigated, and as a Town standard broadcast weed and pest control is discouraged. The Town has a current contract with a turf maintenance company that core aerates the field two times annually.

The initial observation from Stantec's site visit is that the grass is in fair condition, given it is not irrigated.

The following is a brief summary of our more specific observations:

Turf Condition

From the information the Town has supplied, the fields are not currently irrigated and during the time of the site visit there was little rain in the previous weeks, causing dry conditions. The areas that were investigated within the natural grass playing fields indicate fair turf conditions. There were several dry grass areas, but overall the grass was a thick mat and had better grass coverage than the other fields in Town.

There were few bare exposed soil areas, but the soccer goal mouths had the most significant bare areas. These areas are typical on a natural grass field.

Turf Condition Analysis

- The majority of field was patches of thriving grass mixed with patches of dormant grass.
- Bare soil was observed at soccer goal mouths.
- Weeds observed included Crabgrass, White Clover and Broadleaf Plantain. These are scattered in select areas of field.

Site turf characteristics

Soil Condition

During our site visit, we made a preliminary evaluation of the existing soils. These investigations were limited to the upper 14". To better understand the soil properties, samples were taken to a soil testing lab for additional tests on particle size, organic matter content, and nutrient content (Refer to Appendix B). Deeper soil testing may also be needed to determine if drainage problems are caused by deeper layers of poorly drained subsoils and/or to confirm the feasibility of subsurface infiltration (trenches or gravel beds) below the athletic playing surface.

Soil Probe Analysis

- High compaction is prevalent in many areas.
- 3"-7" typical topsoil depth. Most areas had 5" average.
- Poor soils - high silt, low moisture holding capacity. Lab test results show low amounts of coarse/medium sand.
- Lab results show high levels of Iron.

Site soil characteristics and depth

Drainage

The field slopes at a relatively flat pitch, but there appears to be a slight slope towards the south edge of the field. This assumption should be confirmed by surveying the field with a registered surveyor. In the spring, this low area along the tree line would remain wet because of the shade, snow melt, and nearby wetland.

There were no drainage structures or stone drainage trenches observed relating to the field.

LINCOLN, MA
FIELD USE STUDY
AT TOWN OFFICE FIELD

High Area — H

Low Area (Poor Drainage) — L

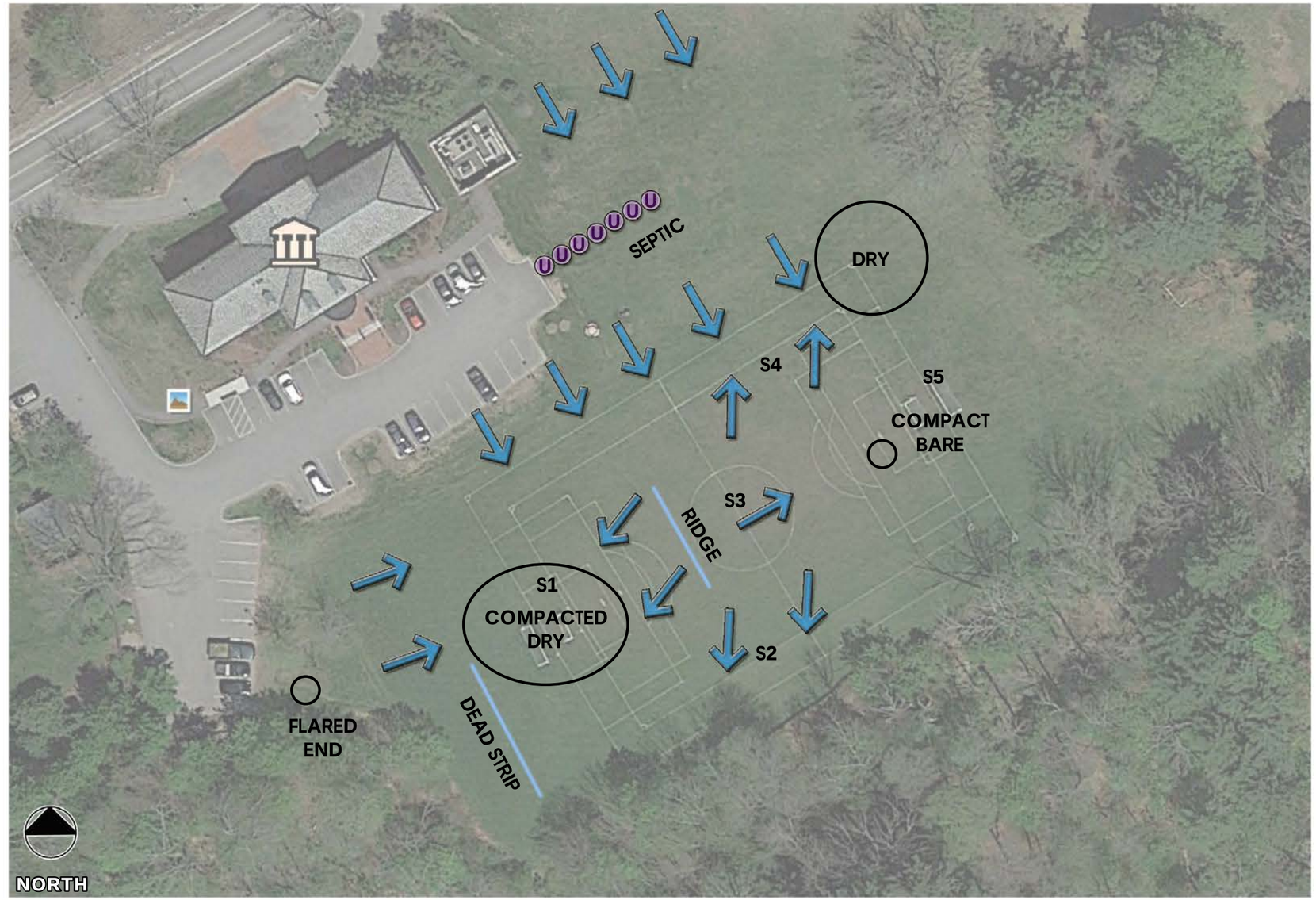
Existing Utility Structure — U

Apparent Drainage Pattern

Soil Sample Location — S1

TOPSOIL SAMPLE OF ROOT ZONE:
S1. 5” AVG DEPTH
S2. 6” AVG DEPTH
S3. 4” AVG DEPTH
S4. 4” AVG DEPTH
S5. 3” AVG DEPTH
S6. 7” AVG DEPTH

Context Map (not to scale)



Plan View Aerial Photograph

Site Analysis - Overview

NOTES:
THICK DRY GRASS, BUT FAIR COVERAGE
MINIMAL EXPOSED BARE SPOTS EXCEPT GOAL AREAS

Project:
210801402
Date of Visit:
August 17, 2016

FIELD USE MATRIX

In addition to maintenance practices, the field usage is a key factor to the health of a natural grass field. To help gauge how often the fields are used, we gathered the information from Town and Lincoln Youth Soccer to input the data on an approximate Field Use Schedule. The following is a summary of the findings for individual field use for Fall, Winter, Spring, and Summer seasons on a weekly basis. For more information showing the complete detailed field use, please refer to Appendix A: Field Use Schedule.

FALL ATHLETICS

VARSITY, INTRAMURAL, and RECREATIONAL FIELD USAGE

Town of Lincoln

Hours of Use Matrix

Field	Surface Type	Hours of Use - Weekly (5 10 15 20 25 30 35 40 45 50 55 60)
Town Office Field	Natural grass	8hrs
Smith Field	Natural grass	37.5hrs
Codman Field	Natural grass, infield mix	58.5hrs
Brooks Field	Natural grass, infield mix	50.5hrs
Paddock Field	Natural grass, infield mix	20hrs

Color Key: = 15 hrs or less = 15-25 hrs

Recommended Natural Grass Weekly Use (15-20 hours maximum) Depending on Root Zone Structure and Maintenance Practices

Map Key	FIELD	USER GROUP	SUMMARY OF USE
1	***Town Office Field***	Youth Soccer	Youth Soccer on weekday evenings, games throughout the day Saturday
2	***Smith Field***	Youth Soccer, Phys Ed/Recess/Outdoor Classes	Youth Soccer on weekday evenings, games throughout the day Saturday, Phys Ed/recess/outdoor classes weekdays morning through mid-afternoon
3	***Codman Field***	Youth Soccer, Phys Ed/Recess/Outdoor Classes, Middle School Sports, Adult Softball	Youth Soccer on weekday evenings, middle school sports weekday afternoons, Phys Ed/recess/outdoor classes weekdays morning through mid-afternoon, games throughout the day Saturday, Adult Softball Sundays
4	***Brooks Field***	Youth Soccer, Phys Ed/Recess/Outdoor Classes, Middle School Sports	Youth Soccer on weekday evenings, middle school sports weekday afternoons, Phys Ed/recess/outdoor classes weekdays morning through mid-afternoon, games throughout the day Saturday
5	***Paddock Field***	Youth Soccer, Phys Ed/Recess/Outdoor Classes	Youth Soccer on weekday evenings, Phys Ed/recess/outdoor classes weekdays morning through mid-afternoon. Less extensive use due to poor condition.

Note: These are approximate based on the schedules provided by the Town and Lincoln Youth Soccer. Weather and Holidays were not considered.

WINTER ATHLETICS

VARSITY, INTRAMURAL, and RECREATIONAL FIELD USAGE

Town of Lincoln

Hours of Use Matrix

Field	Surface Type	Hours of Use - Weekly (5 10 15 20 25 30 35 40 45 50 55)
Town Office Field	Natural grass	0hrs
Smith Field	Natural grass	33hrs
Codman Field	Natural grass, infield mix	0hrs
Brooks Field	Natural grass, infield mix	33hrs
Paddock Field	Natural grass, infield mix	15hrs

Color Key: = 15 hrs or less = 15-25 hrs = Over usage

Recommended Natural Grass Weekly Use (15-20 hours maximum) Depending on Root Zone Structure and Maintenance Practices

Map Key	FIELD	USER GROUP	SUMMARY OF USE
1	***Town Office Field***	None	None
2	***Smith Field***	Phys Ed/Recess/Outdoor Classes	Phys Ed/Recess/Outdoor Classes on weekdays
3	***Codman Field***	None	None
4	***Brooks Field***	Phys Ed/Recess/Outdoor Classes	Phys Ed/Recess/Outdoor Classes on weekdays
5	***Paddock Field***	Phys Ed/Recess/Outdoor Classes (minimal use)	Phys Ed/Recess/Outdoor Classes on weekdays. Less extensive use due to poor condition.

SPRING ATHLETICS

VARSITY, INTRAMURAL, and RECREATIONAL FIELD USAGE

Town of Lincoln

Hours of Use Matrix

Field	Surface Type	Hours of Use - Weekly
Town Office Field	Natural grass	10.5hrs
Smith Field	Natural grass	84hrs
Codman Field	Natural grass, infield mix	56.5hrs
Brooks Field	Natural grass, infield mix	39hrs
Paddock Field	Natural grass, infield mix	31hrs

Color Key: = 15 hrs or less = 15-25 hrs = Over usage

Recommended Natural Grass Weekly Use (15-20 hours maximum) Depending on Root Zone Structure and Maintenance Practices

Map Key	FIELD	USER GROUP	SUMMARY OF USE
1	***Town Office Field***	Youth Soccer, Lacrosse	Youth Soccer during the week and on Saturdays, ocasioanl Lacrosse clinics
2	***Smith Field***	Phys Ed/Recess/Outdoor Classes, Middle School Sports, Youth Baseball	Phys Ed/Recess/Outdoor Classes during the day on weekdays, Middle School sports in the afternoon on weekdays, youth baseball in the evening on weekdays, and on Saturdays and Sundays throughout the day
3	***Codman Field***	Phys Ed/Recess/Outdoor Classes, Middle School Sports, Youth Baseball, Youth Soccer	Phys Ed/Recess/Outdoor Classes during the day on weekdays, Middle School sports in the afternoon on weekdays, youth baseball in the evening on weekdays and throughout the day on Sundays
4	***Brooks Field***	Phys Ed/Recess/Outdoor Classes, Middle School Sports, Youth Soccer	Phys Ed/Recess/Outdoor Classes during the day on weekdays and Youth Soccer weekday afternoons and weekends
5	***Paddock Field***	Phys Ed/Recess/Outdoor Classes, Middle School Sports, Youth Soccer	Phys Ed/Recess/Outdoor Classes during the day on weekdays. Soccer on evenings and weekends. More use because Smith is not avaiable for soccer.

Note: These are approximate based on the schedules provided by the Town and Lincoln Youth Soccer. Weather and Holidays were not considered.

SUMMER ATHLETICS

VARSITY, INTRAMURAL, and RECREATIONAL FIELD USAGE

Town of Lincoln

Hours of Use Matrix

Field	Surface Type	Hours of Use - Weekly
Town Office Field	Natural grass	0hrs
Smith Field	Natural grass	0hrs
Codman Field	Natural grass, infield mix	64hrs
Brooks Field	Natural grass, infield mix	18hrs
Paddock Field	Natural grass, infield mix	0hrs

Color Key: = 15 hrs or less = 15-25 hrs = Over usage

Recommended Natural Grass Weekly Use (15-20 hours maximum) Depending on Root Zone Structure and Maintenance Practices

Map Key	FIELD	USER GROUP	SUMMARY OF USE
1	***Town Office Field***	None	None
2	***Smith Field***	Baseball, Parking	Baseball during the week Parking on 4th of July
3	***Codman Field***	Coed Softball, Summer Camp	Coed Softball at night on weekdays and Sundays, Summer camp throughout the day on weekdays
4	***Brooks Field***	Lacrosse, Ultimate Frisbee, Parking	Lacrosse in the afternoon on weekdays, Ultimate Frisbee on Wednesday evenings Parking on 4th of July
5	***Paddock Field***	Parking	Parking on 4th of July

Note: These are approximate based on the schedules provided by the Town and Lincoln Youth Soccer. Weather and Holidays were not considered.

RECOMMENDATIONS

Suggested General Maintenance Program For Typical Natural Grass Fields

There are many factors involved in maintaining the quality of an athletic field natural grass surface. These factors are different for every field as soil conditions, climate, irrigation, sport, and athlete type and usage vary for each field.

Suggested Irrigation Program

In the New England area, the normal watering/ growing season is generally from May 1st to September 30th. Annual variations can swing this period two to three weeks or more in either direction.

Athletic fields require regular watering throughout the growing season to insure a safe, healthy and attractive playing surface. The Town should have a full head to head automatic irrigation system. However, keeping the field properly irrigated is not as simple as setting the irrigation clocks and walking away. The system must be carefully observed, adjusted and maintained based on soil and microclimatic conditions to determine the irrigation quantity and timing needs of the turf.

How much water and how often it is applied depends on the amount of rainfall, evapotranspiration rates, and the ability of the soil profile to retain moisture. Athletic fields typically require between 1 " of water a week including rainfall. Slightly more water will be required during the first year while the seed or sod begins to establish and root. More water will also be required during periods of high evapotranspiration - when the weather is hot and dry and perhaps windy. Quick coupling valves will be provided to augment automatic cycles in localized dry spots, or to cool the turf during periods of high heat stress (±85 F and above) with light syringing.

Irrigation should be applied evenly throughout the growing season to augment rainfall and can take place at any time of the day or night. However, due to field use schedules, weather conditions and the needs of the turfgrass, watering most often occurs during the early morning hours. Night irrigation as stated can occur, but is not recommended as it creates greater potential for the occurrence of fungal turf diseases. Ideally, irrigation cycles should not take place immediately prior to an athletic event with the exception of a light syringe cycle which helps to stabilize the field surface.

Initially, the newly established field will require a few light irrigation cycles on a daily basis until the seed or sod begins to root. This is also typical of early season irrigation. As the season continues, cycles should become deeper and less frequent. At the onset of and during particularly moist periods, irrigation should be applied cautiously, as too much water is as bad or worse than too little. An exceptionally wet field profile is more susceptible to compaction and better suited for the onset of fungal turf disease. Excess water also leads to faster breakdown of fertilizer resulting in the leaching of nutrients and loss of money.

Suggested Mowing Program

Mowing has a dramatic effect on the appearance and playability of an athletic field. It is also directly related to the general health of the turf. It is not uncommon for a field to be severely damaged by mowing mistakes such as mowing too low, too infrequently, or using a dull mower.

In New England, an athletic field consisting of Kentucky bluegrass and perennial ryegrass should be mowed to a height 2-2.5" during the summer and extended periods of inactivity and 1 -1.5" during the playing season. The height of the turf should be gradually reduced beginning approximately three weeks prior to the first athletic event.

The frequency of mowing also is very important. Too often, turf is mowed too infrequently and then mowed too low. This usually results in damage to the turf crown rendering the turf incapable of recovery during periods of stress. For best appearance and health of the turf, fields should be mowed at least 3 times per week during the heavy growing period and at least two times per week when the field is not under heavy use or during periods of slower growth. Care should be taken to avoid having to mow more than 1/3 of the leaf blade surface at any one time. Generally, this means that a turf maintained at 1.5" should be cut before it reaches 2", and turf maintained at 2.5" should be cut before it reaches 3.25".

A common mowing problem which can lead to poor appearance and increased susceptibility to disease is mowing turf with a dull rotary mower. It is assumed that the Town either owns or will purchase a three to five gang reel type mower for the maintenance of athletic facilities. Each individual mowing unit should have as many blades as possible, usually 5 to 7. The units should be steam cleaned and back-lapped after each mowing and should be sharpened and adjusted by a professional at least once every 3 to 4 cuts and more frequently after aeration or topdressing operations.

Suggested Overseeding Program

Generally, an athletic field can handle between 20 and 25 events before it begins to exhibit wear. Between 30 and 50 events, the field will exhibit significant wear with the exposed surface turning muddy after rain and irrigation events. More than 50 events will result in an unstable playing surface and severe loss of turf over the majority of the field. The frequency of the overseeding program will therefore vary based on the amount of use the facility receives during a particular season. Overseeding is best accomplished by using a slice seeding machine which cuts into the soil 1/4" to 3/4" and deposits the seed in a single operation. To ensure maximum coverage, overseeding should occur at half rates in at least two passes at directions perpendicular to one another. In addition to slice seeding, overseeding can be done by broadcasting the seed across the surface followed by a light topdressing with sand based soil medium similar or identical to the existing medium.

As part of a normal program, the entire facility should be overseeded once in early May and again in mid September using a slice seeder with a seed mix consisting of 20% perennial ryegrass and 80% Kentucky bluegrass. The seed should be applied at a rate of 2-3 lbs./1000 s.f. followed by a broadcast application at the rate of 2-3 lbs/1000 s.f.

Overseeding also can and should be performed at any point during the growing season in spots which exhibit thin or poor growth or wear such as goal areas, sidelines and players' bench areas. A slice seeder should be used in thin areas to apply 2-3 lbs of seed per 1000/s.f. followed by a broadcast application at the rate of 2-3 lbs/1000 s.f.

If goal mouth areas exhibit critically poor turf conditions during the playing season, thick sod replacement should be considered as an alternative to overseeding. Sod blocks should be cut from the area behind the goal (within the limits of the field construction) to a thickness of 6", placed, top-dressed, rolled or tamped and followed by a thorough hand watering. The thickly cut sod will provide greater stability during play than washed or thin cut sod.

Suggested Aeration Program

Depending on the intensity of use, it can be expected that each field will need aeration to reduce compaction at least once and more likely two to three times per year. The first operation should occur in late May following the spring season and the second in November following the fall season. Methods of reducing compaction will vary based on the nature of the compaction. Compaction on newly established fields is generally limited to the top 2-3" and can be alleviated using hollow core or thin tine aeration methods.

The spring aeration should consist of two passes at opposite directions with 1/4" hollow core tines penetrating 3-5" into the soil profile. The fall aeration should consist of three passes at overlapping directions with 1/4" hollow core tines penetrating 3-5" into the soil profile. Aeration should occur when the soil is moist but not saturated. The cores should be shattered in place and dragged or swept back into the turf to control thatch. If desired the cores may also be removed and the field top-dressed with sand or sandy loam. If the field drains on average too slowly, the topdressing should contain a higher percentage of sand. If it is draining on average too quickly, the top dressing should contain a higher percentage of soil and organic matter.

In-season aeration is good cultural practice, and is recommended whenever feasible. It should be accomplished with a solid thin tine aeration method to reduce disruption to the playing surface. The depth of solid tine aeration is similar to core type, but should be performed when the soil is somewhat drier for a greater overall effect. Ideally, the timing of the operation should allow for the facility to rest for 2-3 days prior to the nest athletic event.

After several seasons, as fines begin to migrate to the lower portion of the field profile, it may be advisable to break up subsurface compaction using a deep drill or deep tine aeration method. These methods re-mix the profile and allow for better rooting and increased subsurface drainage. In fields that are constructed with a gravel drainage blanket, care should be taken not to aerate so deep as to mix the gravel base and root zone mix.

Suggested Fertilization Program

With the exception of wetland resource areas/ sensitive environmental receptors, the following program in conjunction with a proper liming program, which keeps the soil pH between 5.8 and 7.5, is applicable.

Initial Growing Season

- April 1-15
  Depending on weather conditions apply a starter fertilizer with an NPK ratio of approximately 1:2:1. Apply micronutrient fertilizer if necessary. The rate will vary based upon the manufacturer's normal rate calibrated for the particular spreader used.

- May 1-30
  After receiving soil test analysis and recommendations, apply a slow release, polymer-coated fertilizer product with an NPK ratio of approximately 6:1:2. Application timing and rate will be based upon timing of initial starter fertilizer application, weather conditions since application, and manufacturer's normal rate calibrated for the particular spreader used.

- June
  Approximately 6-8 weeks after May feeding, or as needed based upon visual observation of turf conditions, apply a slow release, polymer-coated fertilizer product with an NPK ratio of approximately 6:1:2 at one half the manufacturer's normal rate calibrated for the particular spreader used.

- August
  Approximately 6-8 weeks after June feeding, or as needed based upon visual observation of turf conditions, apply a slow release, polymer-coated fertilizer product with an NPK ratio of approximately 6:1:2 at one half the manufacturer's normal rate calibrated for the particular spreader used.

- Late September/Early October
  After receiving soil test analysis and recommendations, apply a slow release, polymer-coated fertilizer product with an NPK ratio of approximately 6:1:2. Apply micronutrient fertilizer if necessary. Application timing and rate will be based upon timing of previous fertilizer application, weather conditions since application, and manufacturer's normal rate calibrated for the particular spreader used.

Subsequent Seasons

- May 1-30
  Apply a slow release, polymer-coated fertilizer product with an NPK ratio of approximately 6:1:2. Apply micronutrient fertilizer if necessary. Application timing and rate will be based upon visual

observations, weather conditions, and manufacturer's normal rate calibrated for the particular spreader used. The application of a selective pre-emergent crabgrass control may be considered at this time. (Note: Research by B.J. Johnson at the University of Georgia indicates that decreasing the application rate in successive years to ½ and then ¼ rate can prove as effective as full rate applications by year 3 and beyond.)

» Late June/Early July
Approximately 6-8 weeks after May feeding, or as needed based upon visual observation of turf conditions, apply a slow release, polymer-coated fertilizer product with an NPK ratio of approximately 6:1:2 at one half the manufacturer's normal rate calibrated for the particular spreader used.

» Mid-Late August
Approximately 6-8 weeks after June/July feeding, or as needed based upon visual observation of turf conditions, apply a slow release, polymer-coated fertilizer product with an NPK ratio of approximately 6:1:2 at one half the manufacturer's normal rate calibrated for the particular spreader used. Selective broad leaf weed control may be considered at this time, perhaps in conjunction with the fertilizer as a weed and feed application.

» Late September/early October
Apply a slow release, polymer-coated fertilizer product with an NPK ratio of approximately 6:1:2. Apply micronutrient fertilizer if necessary. Application timing and rate will be based upon visual observations, the timing of previous fertilizer application, weather conditions since application, and manufacturer's normal rate calibrated for the particular spreader used. .

» Organic Fertilizer (if applicable)
Areas where fertilization, pesticides and other mechanical techniques may alter or effect ground conditions within a defined wetland, buffer zone, rare species habitat or sensitive environmental resource area, management techniques should be altered to conform to applicable state, local and federal code for protection of these resource areas.

Organic fertilizer can be a good alternative to feed an athletic field since it is animal or plant waste that feeds both the grass and the soil. It releases nutrients slowly which is considered a natural time release. Unfortunately organic fertilizer has a very low nitrogen level which is essential for the lush green foliage. This means that there will need heavy application of organic material to get the proper levels of nitrogen. Organic fertilizer can more expensive than traditional chemical fertilizer since you need large quantities of material and it also can only be effective at temperatures above 50 degrees Fahrenheit.

Field Rest / Rotation

A significant factor in the success of a natural grass field is the amount of use it gets and the amount of time it has to recover from the use. Different sports wear out in different areas. Soccer shows significant wear at the goal mouths and halfway line, Lacrosse has the most wear at the goal creases, and Football sees the most play between the hash marks. Having this knowledge allows the field manager and coaches to predict how the field will wear and can prevent damage caused by repetitive use. Rotation of these areas should be encouraged by coaches as much as possible during practice to reduce wear in these certain locations. If possible where field size permits, shift the field line layout a couple times a year. Field use after an extreme weather event can be enough to decimate the field condition, making it unsafe for the rest of the season. A common practice is to restrict use of the field after a rain event to prevent destruction of the field. The athletes and parents may not be happy about the decision initially, but long term, it's best for the field and safest for the athletes. The grass is a living organism and when stressed, needs time to recuperate to get back to optimum health.

Benefits of Infilled Synthetic Turf

Synthetic turf fields have a hire initial cost but can pay for themselves based on the benefits over natural grass. To keep a natural grass field maintained properly requires resources, water and nutrients, and demanding work by the field maintenance crew.

An alternate consideration for the Town, since they see this intensive use and required field care would be the option of having an infilled synthetic turf field. Although this is not maintenance free, it requires much less upkeep than natural grass. Synthetic turf fields do not require watering and fertilization. They can also be used for many more hours each week. When you compare the cost per use, synthetic turf fields are less cost than natural grass. It should be noted that in order to compare the performance of a good synthetic turf surface should be compared to a well maintained natural grass field. Also, although we call it 'natural grass' the condition of lawns or sports fields, this is a manmade conditions that as stated above requires recourses.

The synthetic turf field is considered all season because it can be used in rain/sleet/snow and still perform just as good as it would in the middle of the summer. The need to worry about wearing out the grass or puddling after a significant rain event is eliminated. This benefit can allow for rest on the natural grass fields during these weather events as the sports can play on the synthetic turf during or right after the rain event without any effects to the field playability or athlete safety.

There are many different systems of infilled synthetic turf that would require a sit down discussion with the Town to review the options that are available that would make the most sense for the towns usage, dominant sport, and budget. A typically infilled synthetic turf field requires grooming every 3-6 weeks depending on manufacturer and field intensity of use.
Also, depending on the infill choice, requires replenishment of infill when it gets to a level that is considered dangerous to the athlete or would void the turf warranty. Typically an infilled synthetic turf carpet has an 8 year warranty that protects the owner from manufacturer defects, however does not protect against normal wear and tear from typically athletic use. Since infilled synthetic turf is a system of products, it allows for a more precise maintenance program that can keep the field at a safe playing surface.

Recent news articles have suggested linking synthetic turf to potential health concerns. The news articles do not always differentiate synthetic turf system from the recycled rubber infill. Most are concerned with the infill, but none of the 50

plus studies on the this topic have linked crumb rubber to serious elevated human health or environmental risk. Should this topic become an issue with the Town, there are alternative infills that are on the market such as TPE or Organic infills that perform just as good as crumb rubber, if not more like a high performance natural grass field. One thing that has been known, and is being addressed by the turf industry, is the build up of heat from the typical sand and rubber system. With recent technological advances and with the help of hiring an experienced designer with knowledge of the systems, the temperature of the fields can be controlled better than previous generations of turf.

Over the last 5-8 years, the field systems has evolved to a certain standard with much more emphasis on athlete safety. There has been a push in the industry to strive to mimic the playability of natural grass, but reduce injury such as concussions. Our turf system specifications achieve this goal.

Town of Lincoln Suggested Field Recommendations

For the overall field condition improvements, the ideal situation would be to have irrigation and at least one field sit a season with limited to no use. This will give the grass time to regenerate and form a stronger root zone which can with stand higher level of foot traffic.

Field Use

The Field Use Matrix reflects the average hours of use in the Fall, Winter, Spring, and Summer weekly basis. As indicated in the Matrix, these fields see a tremendous amount of play, making it extremely difficult to keep up with proper maintenance to ensure athlete safety. With the limited amount of fields and the intense use, there is no time for the fields to rest and recuperate. Since none of these fields are irrigated, it hinders their ability to be resilient. The combination of excessive wear, compaction, no down time, and no irrigation provides an unhealthy environment for the grass growth and can lead to athlete injuries.

Additional Reference:

A complete field usage schedule for Fall, Winter, Spring, and Summer can be found in Appendix A : Field Use Schedule.

The USDA has established a system that divides soil into 12 textural classes. These are grouped by the structure and are a percentage of sand, silt, and clay. The soil diagram in *Figure A* shows the range of particle sizes. High performance fields that get maintained at the Collegiate or Professional level typically are classified as sand to sandy loam range and will have irrigation and underdrains. For The Town of Lincoln, the fields were tested and are considered a Sandy Loam at Codman, Town Office Field, and Paddock Field with high gravel and minimum medium course sand. At Brooks the soil was a silt loam and at Smith the field was classified as a Loam. Loamy soils retain water and nutrients well, but tend to be prone to compaction.

The fertility of a field is also an important role in athletic field maintenance and included in the testing is a nutrient test that helps indicate what the field is lacking and what is over applied. The test results indicate that the fields in general are high in iron. The full soil analysis report can be found in Appendix B : Soil Analysis.

As part of the study to understand the larger environmental characteristics of the fields, we reviewed the GIS maps showing information on the local streams and wetlands. These maps can be found in Appendix C : GIS Information.

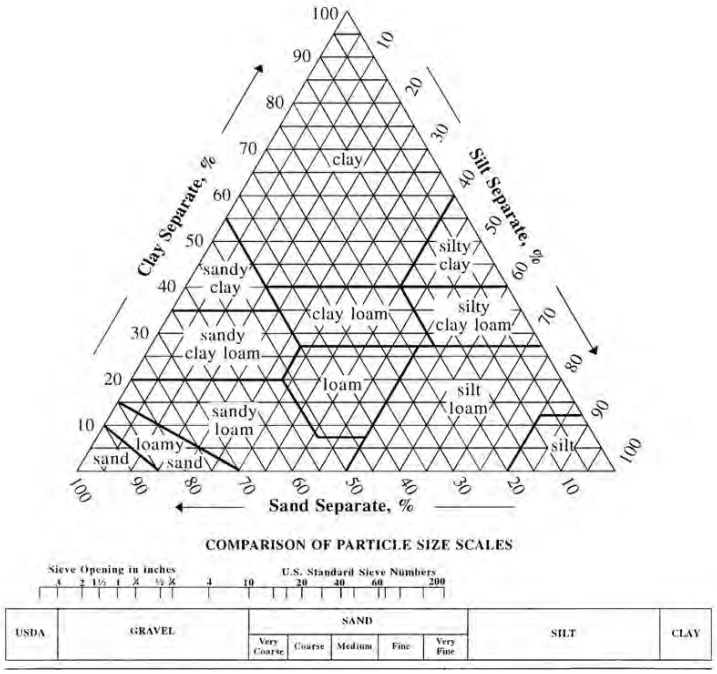


Figure A: Soil Diagram. For larger image, refer to Appendix B

Brooks Field and Paddock Field

At Brooks Field, we understand it was once a baseball field which was then covered in topsoil at the infield areas. These areas have serious uneven settlement that may indicate subsoils with a high percentage of organic matter that are particularly prone to freeze-thaw heaving. Geotechnical borings could determine the cause of the irregular settlement.

Since Paddock field sits on top of an existing septic system, there needs to be special attention to this area and the contractor would need to be careful with what equipment they use to ensure they protect and maintain the existing septic system. The profile of the field above the septic system may make this field more susceptible to dying out as there is typically a layer of sand and layer of stone above septic systems.

In terms of restoring both Brooks and Paddock Field to alleviate over-compaction and allow for better grass coverage, we recommend for field restoration to include remove and stock pile topsoil in areas within the field of play (to incorporate soil amendments and to de-compact the top layer of soil). As indicated in the soil tests many of the fields have a high percentage of fines (silt/clay/fine sand) and a very low coarse/ medium sand content. To balance out the percentages, adding more course and medium sand is needed as part of the amendments. The subgrade would need to be machine graded to crown the fields and better accommodate field use. Once the soil amendments are mixed in, respread the new mix and laser grade the field. Then the field should be seeded or sodded with athletic field seed /sod mix.

Assuming the recommendation of irrigation, if this field is seeded, it will need to have at least two growing seasons to establish before use which means no use for those two seasons. If the field is sodded with irrigation, it could establish and be in use within 6-8 weeks.

Codman Field

Codman Field had a similar amount of total fines and lack of course/medium sand as Brooks and Paddock Field but because of field grades, could be restored in place. To balance out the percentages, this field should receive an aggressive core aeration in both directions with a heavy topdressing of coarse/medium sand should be applied and should be enough to fill in the core holes. Then an overseeding treatment over the entire field to provide a consistent coverage of grass.

There is one particular area where bare rock is exposed. This rock should be removed or jackhammered down to allow for at least 12" inches of root zone for the grass to grow properly. Cost effective drainage improvements could be made by a combination of limited strategic grading, additional drainage structures and/or infiltration trenches. These drainage strategies ideally eliminate surface water ponding, or at the very least greatly reduce the amount of time water is allowed to pond on the surface of the playing field. The specific methods to be employed at the fields would be chosen based on what is best balances drainage needs, field playability and budget constraints.

Assuming the recommendation of irrigation, if this field is seeded, it will need to have at least two growing seasons to establish before use which means no use for those two seasons. If the field is sodded with irrigation, it could establish and be in use within 6-8 weeks.

Smith Field

The fields here are used heavily by recess. Since children typically wear flat soled shoes, this can actually be worse for a natural grass field than an athlete with cleats. The flat soles compact the soil a considerable amount. This area should be aerated more frequently to de-compact the soil.

These fields had areas of very little topsoil in a majority of the field and would require strategic soil additions. The soil tests show a high percentage of fines (silt/clay, fine sand) content and a very low coarse/medium sand content. Similar to Brooks and Paddock, to alleviate over-compaction and allow for better grass coverage, we recommend for field restoration to include remove and stock pile topsoil in areas within the field of play (to incorporate soil amendments and to de-compact the top layer of soil). As indicated in the soil tests many of the fields have a high percentage of fines (silt/clay/fine sand) and a very low coarse/medium sand content.

To balance out the percentages, adding more course and medium sand is needed as part of the amendments. Since Smith Field had a very shallow root zone, additional topsoil will be needed with the amendments. The subgrade would need to be machine graded. Once the soil amendments are mixed in, respread the new mix and laser grade the field. Then the field should be seeded or sodded with athletic field seed /sod mix.

Assuming the recommendation of irrigation, if this field is seeded, it will need to have at least two growing seasons to establish before use which means no use for those two seasons. If the field is sodded with irrigation, it could establish and be in use within 6-8 weeks.

Town Office Field

The field at Town Office was in fair condition, however the goal mouths were worn which is typical of a soccer field. The Town and Youth Soccer should be moving the goals around to reduce the amount of wear. For soccer practice, the goals should be moved around in a different location for each practice and the goals should only be placed at the actual goal painted area only during game play.

The field has a dense thatch and should have a de-thatch treatment to allow for new growth to fill in.

Since the grade is pitched in one direction towards the edge along the wooded area, all the water from the field collects here and can stay wet for long periods of time. To eliminate the standing water, a stone drainage trench with pipe is recommended along the edge to infiltrate the water and allow a place for the water to collect below the surface and out of the field of play. This field should also be core aerated at least 2 times a year with a top dressing of sand every time to allow for standing surface water to percolate through the soil. We understand the field has irrigation system in place, but was abandoned. We recommend this system be restored to a proper working order.

APPENDIX A: FIELD USE SCHEDULE

Town of Lincoln
Field Use Table - FALL

	Town Office Field	Smith	Codman	Brooks	Paddock
Sunday					
8:00am					
9:00am					
10:00am					
11:00am					
12:00pm					
1:00pm					
2:00pm			Adult Softball 5 games in Sept		
3:00pm					
4:00pm					
5:00pm					
6:00pm					
7:00pm					
8:00pm					
Monday					
8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
9:00am					
10:00am					
11:00am					
12:00pm					
1:00pm					
2:00pm					
3:00pm		Lax Clinic	MS Sports 3:00-4:30	MS Sports 3-4:30	
4:00pm					
5:00pm	Youth Soccer 5:00-6:00	Youth Soccer 5:00-6:30	Youth Soccer 5:00-6:30	Youth Soccer 5:30-7:00	
6:00pm					

Town of Lincoln
Field Use Table - FALL

		Town Office Field	Smith	Codman	Brooks	Paddock
	7:00pm					
	8:00pm					
Tuesday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm			MS Sports 3-4:30	MS Sports 3-4:30	
	4:00pm					
	5:00pm	Youth Soccer 5:00-6:30				
	6:00pm					
	7:00pm					
	8:00pm					
Wednesday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm			Youth Soccer 3:00-4:30		
	4:00pm				Youth Soccer 4:00-6:00	

Town of Lincoln
Field Use Table - FALL

		Town Office Field	Smith	Codman	Brooks	Paddock
	5:00pm					
	6:00pm	Youth Soccer 6:20-7:35			Youth Soccer 5:30-7:00	Youth Soccer 5:30-7:00
	7:00pm					
	8:00pm					
Thursday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm			MS Sports 3-4:30	MS Sports 3-4:30	
	4:00pm					
	5:00pm		Youth Soccer 5:00-6:15	Youth Soccer 5:00-6:15		
	6:00pm				Youth Soccer 5:30-7:00	Youth Soccer 5:30-7:00
	7:00pm					
	8:00pm					
Friday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					

Town of Lincoln
Field Use Table - SPRING

	Town Office Field	Smith	Codman	Brooks	Paddock
Sunday					
8:00am					
9:00am					
10:00am		Youth Baseball - use varies			
11:00am					
12:00pm					
1:00pm			Youth Baseball - use varies		
2:00pm					
3:00pm					
4:00pm					
5:00pm					
6:00pm					
7:00pm					
8:00pm					
Monday					
8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
9:00am					
10:00am					
11:00am					
12:00pm					
1:00pm					
2:00pm					
3:00pm		MS Sports 3-4:30	MS Sports 3-4:30		
4:00pm					
5:00pm	Youth Soccer 5:00-6:30	Youth Baseball - use varies	Youth Baseball - use varies	Youth Soccer 5:30-7:00	
6:00pm					

Town of Lincoln
Field Use Table - SPRING

		Town Office Field	Smith	Codman	Brooks	Paddock
	7:00pm					
	8:00pm					
Tuesday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm		MS Sports 3-4:30	MS Sports 3-4:30		
	4:00pm					
	5:00pm	Youth Soccer 5:00-6:30	Youth Baseball - use varies			
	6:00pm					
	7:00pm					
	8:00pm					
Wednesday						
	8:00am					
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm		Youth Baseball - use varies			
	2:00pm					
	3:00pm					
	4:00pm				Youth Soccer 4:00-6:00	

Town of Lincoln
Field Use Table - SPRING

		Town Office Field	Smith	Codman	Brooks	Paddock
	5:00pm	Youth Soccer 5:00-6:30				
	6:00pm				Youth Soccer 5:30-7:00	Youth Soccer 5:30-7:00
	7:00pm					
	8:00pm					
Thursday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm		MS Sports 3-4:30	MS Sports 3-4:30		
	4:00pm					
	5:00pm	Youth Soccer 5:00-6:30	Youth Baseball - use varies	Youth Baseball - use varies		
	6:00pm				Youth Soccer 5:30-7:00	Youth Soccer 5:30-7:00
	7:00pm					
	8:00pm					
Friday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys Ed	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					

Town of Lincoln
Field Use Table - SUMMER

		Town Office Field	Smith	Codman	Brooks	Paddock
			*used for parking on July 4th		*used for parking on July 4th	*used for parking on July 4th
Sunday						
	8:00am					
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm					
	4:00pm					
	5:00pm			COED Softball		
	6:00pm					
	7:00pm					
	8:00pm					
Monday						
	8:00am			Lincoln Summer Camp		
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm				Lax Clinic wk in June, wk in July	
	4:00pm					
	5:00pm					

Town of Lincoln
Field Use Table - SUMMER

		Town Office Field	Smith	Codman	Brooks	Paddock
	7:00pm					
	8:00pm					
Tuesday						
	8:00am			Lincoln Summer Camp		
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm				Lax Clinic wk in June, wk in July	
	4:00pm					
	5:00pm					
	6:00pm			COED Softball		
	7:00pm					
	8:00pm					
Wednesday						
	8:00am			Lincoln Summer Camp		
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm				Lax Clinic wk in June, wk in July	
	4:00pm					

Town of Lincoln
Field Use Table - SUMMER

		Town Office Field	Smith	Codman	Brooks	Paddock
	5:00pm					
	6:00pm			COED Softball	Ultimate Frisbee	
	7:00pm					
	8:00pm					
Thursday						
	8:00am			Lincoln Summer Camp		
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm				Lax Clinic wk in June, wk in July	
	4:00pm					
	5:00pm					
	6:00pm			COED Softball		
	7:00pm					
	8:00pm					
Friday						
	8:00am			Lincoln Summer Camp		
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					

Town of Lincoln
Field Use Table - WINTER

	Town Office Field	Smith	Codman	Brooks	Paddock
Sunday					
8:00am					
9:00am					
10:00am					
11:00am					
12:00pm					
1:00pm					
2:00pm					
3:00pm					
4:00pm					
5:00pm					
6:00pm					
7:00pm					
8:00pm					
Monday					
8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
9:00am					
10:00am					
11:00am					
12:00pm					
1:00pm					
2:00pm					
3:00pm					
4:00pm					
5:00pm					
6:00pm					

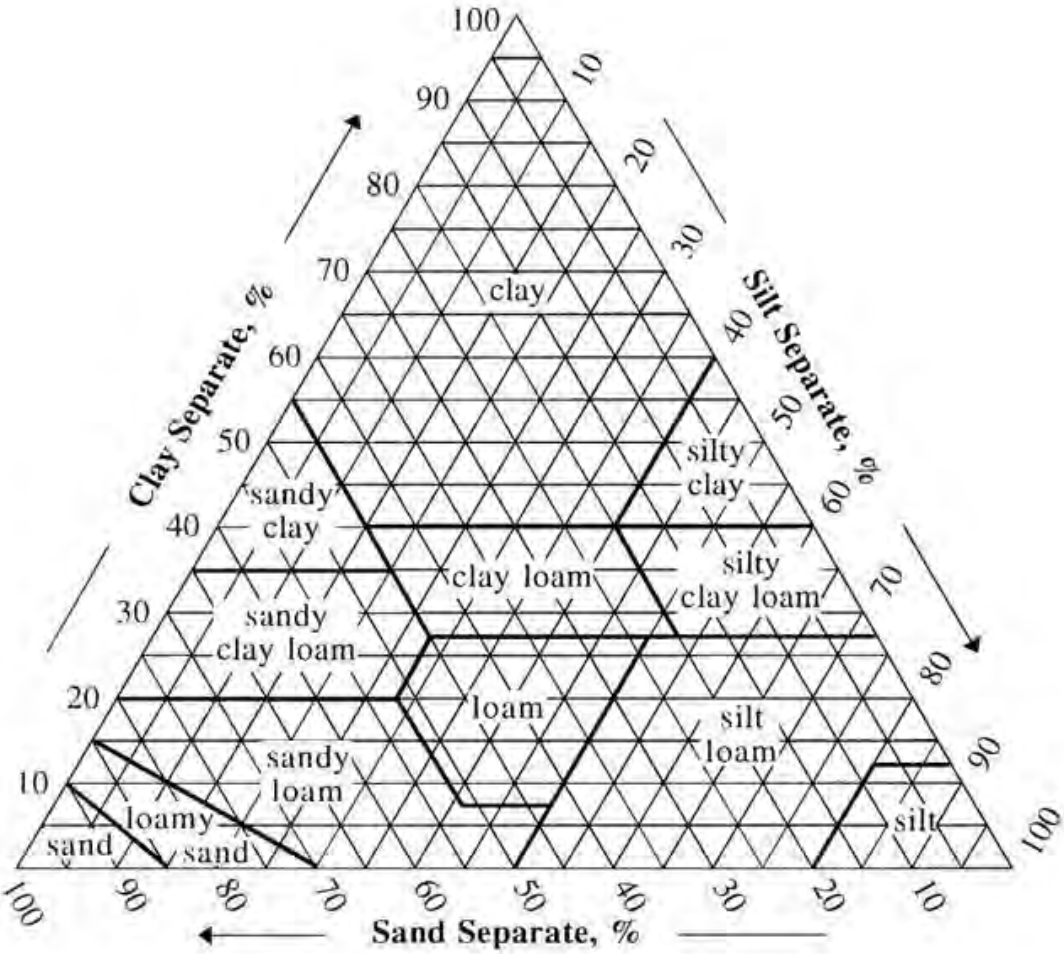
Town of Lincoln
Field Use Table - WINTER

	Town Office Field	Smith	Codman	Brooks	Paddock
7:00pm					
8:00pm					
Tuesday					
8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
9:00am					
10:00am					
11:00am					
12:00pm					
1:00pm					
2:00pm					
3:00pm					
4:00pm					
5:00pm					
6:00pm					
7:00pm					
8:00pm					
Wednesday					
8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
9:00am					
10:00am					
11:00am					
12:00pm					
1:00pm					
2:00pm					
3:00pm					
4:00pm					

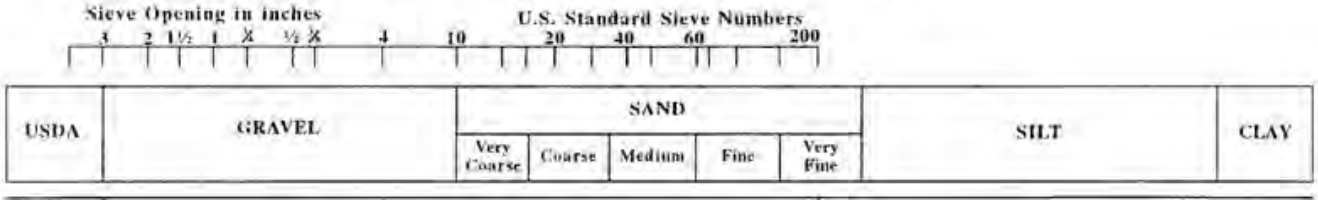
Town of Lincoln
Field Use Table - WINTER

		Town Office Field	Smith	Codman	Brooks	Paddock
	5:00pm					
	6:00pm					
	7:00pm					
	8:00pm					
Thursday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					
	1:00pm					
	2:00pm					
	3:00pm					
	4:00pm					
	5:00pm					
	6:00pm					
	7:00pm					
	8:00pm					
Friday						
	8:00am		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade		Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade	Phys ed, outdoor classes, and recess. Recess is approximatley 30 min each @ 3 times a day for K-4th grade and 30 mins for 5-8th grade
	9:00am					
	10:00am					
	11:00am					
	12:00pm					

APPENDIX B: SOIL ANALYSIS



COMPARISON OF PARTICLE SIZE SCALES



Turf & Soil Diagnostics

ACCREDITED TESTING Cert #0797.02

MATERIALS TEST REPORT FOR
Town of Lincoln Field Study

REPORT TO: Stantec Consulting Services
Josh Atkinson
226 Causeway St, 6th Floor
Boston, MA 02114

DATE RECEIVED: Aug-19-2016
REPORT DATE: Aug-23-2016
CONDITION OF SAMPLE: Normal

PARTICLE SIZE (ASTM F1632)

		Gravel %			Soil Separate* %			Sieve Size / Sand Fraction Sand Particle Diameter % Retained				
Lab ID#	**Sample Name**	**1/4" 6.3 mm**	**No. 5 4.0 mm**	**No. 10 2.0 mm**	**Sand**	**Silt**	**Clay**	**No. 18 V. Coarse 1.0 mm**	**No. 35 Coarse 0.50 mm**	**No. 60 Medium 0.25 mm**	**No. 140 Fine 0.10 mm**	**No. 270 V. Fine 0.05 mm**
41906-1	Codman Field	2.6	2.8	5.0	54.0	38.6	7.4	6.5	7.9	9.5	13.9	16.3
41906-2	Town Office Field	2.5	1.0	4.8	54.5	37.9	7.6	6.6	9.3	10.8	13.5	14.1
41906-3	Brooks Field	0.9	0.9	1.8	40.2	53.3	6.4	2.7	4.4	6.2	9.3	17.4
41906-4	Paddock Field	1.8	1.5	3.7	49.2	44.4	6.4	4.8	8.5	10.8	10.6	14.1
41906-5	Smith Field	2.0	2.2	2.4	42.9	49.5	7.6	4.6	6.8	7.6	9.2	14.5

ORGANIC MATTER / TEXTURAL CLASS

Lab ID#	**Sample Name**							**Organic Matter[2] %**	**Textural Class**
41906-1	Codman Field							5.42	Sandy Loam
41906-2	Town Office Field							6.61	Sandy Loam
41906-3	Brooks Field							6.87	Silt Loam
41906-4	Paddock Field							5.21	Sandy Loam
41906-5	Smith Field							7.15	Loam

*ASTM F1632 Method B
[2] ASTM F1647 Method A
Data reported using USDA definitions of soil classification
Samples were tested as received and comments pertain only to the samples shown.
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Samples were received with a transmittal letter.

Reviewed by Sam Ferro

35 King Street, Trumansburg NY 14886 ■ Phone: 855-769-4231
E-mail: lab@turfdiag.com ■ Website: http://www.turfdiag.com

Turf & Soil Diagnostics

August 23, 2016

Stantec
Town of Lincoln
TSD File #41906

Comments Five soil samples were tested as received. We have no specifications for this project, but our understanding is that the soil is from non-irrigated sports fields.

The results of the particle size analyses show that the Codman Field, Town Office Field, and Paddock Field samples are classified as sandy loam, per the U.S. Department of Agriculture Soil classification system. There is a significant amount of gravel in the samples.

The particle size analyses show that the Brooks Field sample is classified as silt loam. There is a small amount of gravel present.

The Smith Field sample is classified as loam. There is a moderate amount of gravel present.

Organic matter is another component of topsoil quality. For soils such as these, organic matter content of 3 to 8% by weight are typically recommended. These soils have organic levels within this range.

Loamy soils typically provide good water and nutrient retention. They don't supply significant internal drainage, and may be prone to excess compaction. Care should be taken during any renovation or construction work to prevent excessive compaction. The soils shouldn't be handled when wet. Only equipment with low ground pressure should be used to spread and grade the soil.

Samples were forwarded to Waypoint for soil and plant nutrient testing. We will send the results when received.

If you have any questions or are in need of further assistance, please contact us. Samples are generally kept on the premises for 45 days after report date. Thank you for using Turf & Soil Diagnostics, Inc.

Sincerely,

Sam Ferro

Digitally signed by Sam Ferro
DN: cn=Sam Ferro, o=Turf & Soil Diagnostics, ou, email=sam@turfdiag.com, c=US
Date: 2016.08.23 18:38:08 -04'00'

Sam Ferro
President

Turf & Soil Diagnostics
35 King St. Trumansburg, NY 14886 USA
Phone: 1-855-769-4231 Web: www.turfdiag.com

Waypoint ANALYTICAL
7621 Whitepine Road, Richmond, VA 23237
Main 804-743-9401 º Fax 804-271-6446
www.waypointanalytical.com

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SOIL ANALYSIS

Client :	Grower :	
Turf & Soil Diagnostics - NY 35 King Street Trumansburg NY 14886	Stantec 41906 Town Of Lincoln MA Field Study	Report No: 16-239-0545 Cust No: 40751 Date Printed: 08/31/2016 Date Received : 08/26/2016 PO: Page : 1 of 5

Lab Number : 12697 **Field Id :** **Sample Id :** Codman Field

Test	Method	Results
Soil pH	1:1	5.9
Buffer pH	SMP	6.81
Phosphorus (P)	M3	50 ppm
Potassium (K)	M3	97 ppm
Calcium (Ca)	M3	846 ppm
Magnesium (Mg)	M3	173 ppm
Sulfur (S)	M3	19 ppm
Boron (B)	M3	0.4 ppm
Copper (Cu)	M3	2.0 ppm
Iron (Fe)	M3	127 ppm
Manganese (Mn)	M3	6 ppm
Zinc (Zn)	M3	2.9 ppm
Sodium (Na)	M3	5 ppm
Soluble Salts		
Organic Matter	LOI	5.9 % ENR 126
Nitrate Nitrogen		

SOIL TEST RATINGS

Calculated Cation Exchange Capacity: **7.1** meq/100g

%Saturation

	%sat	meq
K	3.5	0.2
Ca	59.6	4.2
Mg	20.3	1.4
H	16.9	1.2
Na	0.3	0

K/Mg Ratio: 0.14

Ca/Mg Ratio: 2.94

SOIL FERTILITY GUIDELINES

Crop : Athletic Field **Yield Goal :** 0 **Rec Units:** LB/1000 SF

(lbs)	LIME	(tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
25			3.5	1.0	5.0	0	0.36	0	0	0.07	0	0
Crop :									**Rec Units:**			

Comments :

Athletic Field

Limestone application is targeted to bring soil pH to 6.2.

· Apply the amount of lime recommended in first page to raise pH

· For a more in depth explanation of the soil test and recommendations, go to our website www.aleastern.com and select the "Lawn and Garden" tab at the top of home page. Under the "How to Understand a Soil Test Report" header you will find the link to the article "Soil Test Report & Fertilizer Recommendation Explained".

· The amount of fertilizer recommended in the first page is the total amount needed for the entire growing season. Split into 3-4 applications to keep the atheletic field green and prevent fertilizer loss. Custom blend is best to meet exactly the requirement, if this is impossible, the above specific fertilizer application is a general guideline, if the specified grades can not be found, replace with fertilizer having similar N:P:K ratio. The best time to apply fertilizer for cool season grass (bluegrass, fescue, ryegrass) is in the Fall when grass is growing. For Mid-Atlantic region the time is from late August to November. For Northeast region the time is from mid August to October. Fall application should start as soon as the day time high temperature is below 80-85F, apply with the interval of one month. If you start late in the Fall, apply the remaining in the Fall of next year. Spring application can start as soon as the grass starts to grow in April. In the case of exceptional warm Spring, or the grass look pale, the application can be made earlier.

M3 - Mehlich 3 SMP - SMP Buffer pH LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Virginia, Inc.

Waypoint ANALYTICAL
7621 Whitepine Road, Richmond, VA 23237
Main 804-743-9401 º Fax 804-271-6446
www.waypointanalytical.com

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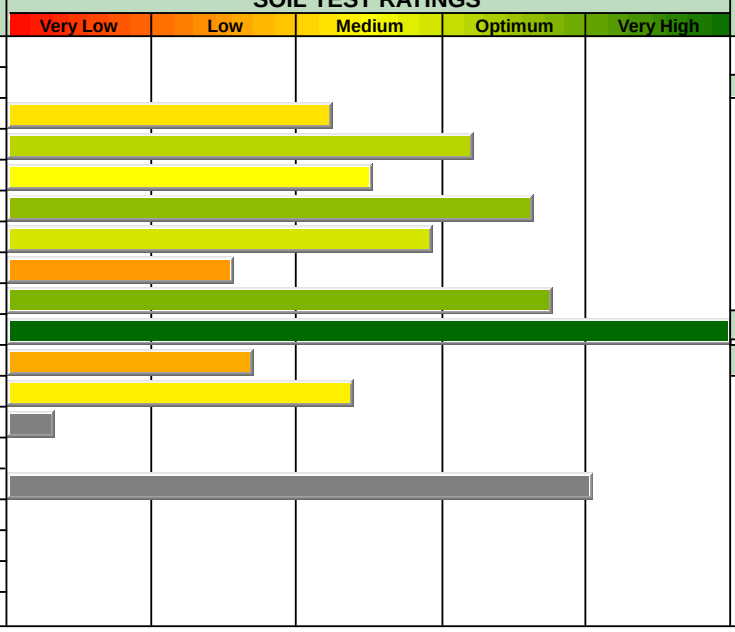
SOIL ANALYSIS

Client :	Grower :	
Turf & Soil Diagnostics - NY 35 King Street Trumansburg NY 14886	Stantec 41906 Town Of Lincoln MA Field Study	Report No: 16-239-0545 Cust No: 40751 Date Printed: 08/31/2016 Date Received : 08/26/2016 PO: Page : 2 of 5

Lab Number : 12698 **Field Id :** **Sample Id :** Town Office Field

Test	Method	Results
Soil pH	1:1	6.1
Buffer pH	SMP	6.80
Phosphorus (P)	M3	36 ppm
Potassium (K)	M3	130 ppm
Calcium (Ca)	M3	1164 ppm
Magnesium (Mg)	M3	239 ppm
Sulfur (S)	M3	25 ppm
Boron (B)	M3	0.5 ppm
Copper (Cu)	M3	2.7 ppm
Iron (Fe)	M3	168 ppm
Manganese (Mn)	M3	8 ppm
Zinc (Zn)	M3	2.8 ppm
Sodium (Na)	M3	6 ppm
Soluble Salts		
Organic Matter	LOI	7.3 % ENR 146
Nitrate Nitrogen		

SOIL TEST RATINGS



Calculated Cation Exchange Capacity: **9.5** meq/100g

%Saturation

	%sat	meq
K	3.5	0.3
Ca	61.3	5.8
Mg	21.0	2.0
H	13.7	1.3
Na	0.3	0

K/Mg Ratio: 0.15

Ca/Mg Ratio: 2.92

SOIL FERTILITY GUIDELINES

Crop : Athletic Field **Yield Goal :** 0 **Rec Units:** LB/1000 SF

(lbs)	LIME	(tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
20			3.5	1.5	3.0	0	0.20	0	0	0.07	0	0
Crop :									**Rec Units:**			

Comments :

Athletic Field

Limestone application is targeted to bring soil pH to 6.2.

· Apply the amount of lime recommended in first page to raise pH

· For a more in depth explanation of the soil test and recommendations, go to our website www.aleastern.com and select the "Lawn and Garden" tab at the top of home page. Under the "How to Understand a Soil Test Report" header you will find the link to the article "Soil Test Report & Fertilizer Recommendation Explained".

· The amount of fertilizer recommended in the first page is the total amount needed for the entire growing season. Split into 3-4 applications to keep the atheletic field green and prevent fertilizer loss. Custom blend is best to meet exactly the requirement, if this is impossible, the above specific fertilizer application is a general guideline, if the specified grades can not be found, replace with fertilizer having similar N:P:K ratio. The best time to apply fertilizer for cool season grass (bluegrass, fescue, ryegrass) is in the Fall when grass is growing. For Mid-Atlantic region the time is from late August to November. For Northeast region the time is from mid August to October. Fall application should start as soon as the day time high temperature is below 80-85F, apply with the interval of one month. If you start late in the Fall, apply the remaining in the Fall of next year. Spring application can start as soon as the grass starts to grow in April. In the case of exceptional warm Spring, or the grass look pale, the application can be made earlier.

M3 - Mehlich 3 SMP - SMP Buffer pH LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Virginia, Inc.

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SOIL ANALYSIS

Client :	Grower :	
Turf & Soil Diagnostics - NY 35 King Street Trumansburg NY 14886	Stantec 41906 Town Of Lincoln MA Field Study	Report No: 16-239-0545 Cust No: 40751 Date Printed: 08/31/2016 Date Received : 08/26/2016 PO: Page : 3 of 5

Lab Number : 12699 **Field Id :** **Sample Id :** Brooks Field

Test	Method	Results
Soil pH	1:1	5.9
Buffer pH	SMP	6.79
Phosphorus (P)	M3	46 ppm
Potassium (K)	M3	140 ppm
Calcium (Ca)	M3	964 ppm
Magnesium (Mg)	M3	176 ppm
Sulfur (S)	M3	22 ppm
Boron (B)	M3	0.4 ppm
Copper (Cu)	M3	1.1 ppm
Iron (Fe)	M3	82 ppm
Manganese (Mn)	M3	5 ppm
Zinc (Zn)	M3	2.3 ppm
Sodium (Na)	M3	9 ppm
Soluble Salts		
Organic Matter	LOI	6.8 % ENR 139
Nitrate Nitrogen		

SOIL TEST RATINGS

Calculated Cation Exchange Capacity: **8.1** meq/100g

%Saturation

	%sat	meq
K	4.4	0.4
Ca	59.5	4.8
Mg	18.1	1.5
H	17.3	1.4
Na	0.5	0

K/Mg Ratio: 0.27

Ca/Mg Ratio: 3.29

SOIL FERTILITY GUIDELINES

Crop : Athletic Field **Yield Goal :** 0 **Rec Units:** LB/1000 SF

(lbs)	LIME	(tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
30			3.5	1.0	3.0	0	0.28	0	0	0.07	0	0
Crop :									**Rec Units:**			

Comments :

Athletic Field

Limestone application is targeted to bring soil pH to 6.2.

· Apply the amount of lime recommended in first page to raise pH

· For a more in depth explanation of the soil test and recommendations, go to our website www.aleastern.com and select the "Lawn and Garden" tab at the top of home page. Under the "How to Understand a Soil Test Report" header you will find the link to the article "Soil Test Report & Fertilizer Recommendation Explained".

· The amount of fertilizer recommended in the first page is the total amount needed for the entire growing season. Split into 3-4 applications to keep the atheletic field green and prevent fertilizer loss. Custom blend is best to meet exactly the requirement, if this is impossible, the above specific fertilizer application is a general guideline, if the specified grades can not be found, replace with fertilizer having similar N:P:K ratio. The best time to apply fertilizer for cool season grass (bluegrass, fescue, ryegrass) is in the Fall when grass is growing. For Mid-Atlantic region the time is from late August to November. For Northeast region the time is from mid August to October. Fall application should start as soon as the day time high temperature is below 80-85F, apply with the interval of one month. If you start late in the Fall, apply the remaining in the Fall of next year. Spring application can start as soon as the grass starts to grow in April. In the case of exceptional warm Spring, or the grass look pale, the application can be made earlier.

M3 - Mehlich 3 SMP - SMP Buffer pH LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Virginia, Inc.

Waypoint ANALYTICAL
7621 Whitepine Road, Richmond, VA 23237
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www.waypointanalytical.com

"Every acre...Every year®"

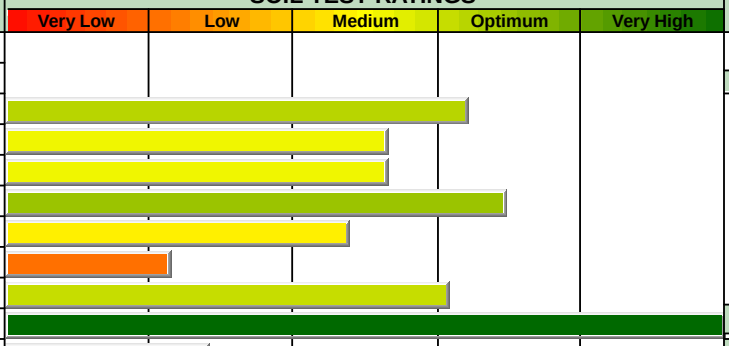
SOIL ANALYSIS

Client : Turf & Soil Diagnostics - NY 35 King Street Trumansburg NY 14886	Grower : Stantec 41906 Town Of Lincoln MA Field Study	Report No: 16-239-0545 Cust No: 40751 Date Printed: 08/31/2016 Date Received : 08/26/2016 PO: Page : 4 of 5

Lab Number : 12701 **Field Id :** **Sample Id :** Paddock Field

Test	Method	Results
Soil pH	1:1	6.1
Buffer pH	SMP	6.83
Phosphorus (P)	M3	64 ppm
Potassium (K)	M3	112 ppm
Calcium (Ca)	M3	935 ppm
Magnesium (Mg)	M3	180 ppm
Sulfur (S)	M3	20 ppm
Boron (B)	M3	0.4 ppm
Copper (Cu)	M3	1.8 ppm
Iron (Fe)	M3	116 ppm
Manganese (Mn)	M3	6 ppm
Zinc (Zn)	M3	2.4 ppm
Sodium (Na)	M3	5 ppm
Soluble Salts		
Organic Matter	LOI	6.2 % ENR 130
Nitrate Nitrogen		

SOIL TEST RATINGS



Calculated Cation Exchange Capacity: **7.5** meq/100g

%Saturation

	%sat	meq
K	3.8	0.3
Ca	62.3	4.7
Mg	20.0	1.5
H	13.3	1.0
Na	0.3	0

K/Mg Ratio: 0.20

Ca/Mg Ratio: 3.12

SOIL FERTILITY GUIDELINES

Crop : Athletic Field **Yield Goal :** 0 **Rec Units:** LB/1000 SF

(lbs)	LIME	(tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
15			3.5	0.5	4.0	0	0.33	0	0	0.07	0	0

Crop : **Rec Units:**

Comments :

Athletic Field

Limestone application is targeted to bring soil pH to 6.2.

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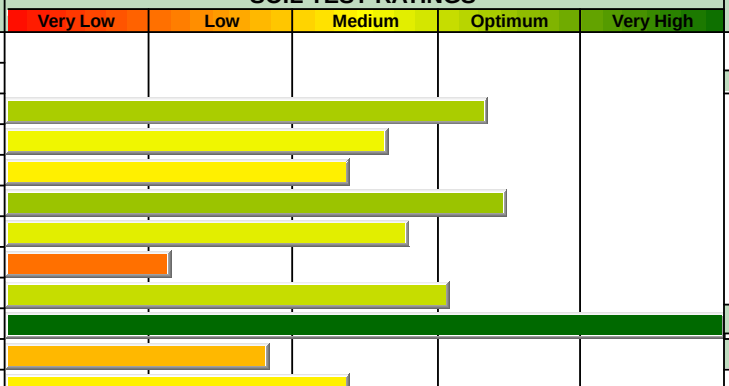
SOIL ANALYSIS

Client : Turf & Soil Diagnostics - NY 35 King Street Trumansburg NY 14886	Grower : Stantec 41906 Town Of Lincoln MA Field Study	Report No: 16-239-0545 Cust No: 40751 Date Printed: 08/31/2016 Date Received : 08/26/2016 PO: Page : 5 of 5

Lab Number : 12702 **Field Id :** **Sample Id :** Smith Field

Test	Method	Results
Soil pH	1:1	5.8
Buffer pH	SMP	6.76
Phosphorus (P)	M3	69 ppm
Potassium (K)	M3	110 ppm
Calcium (Ca)	M3	1018 ppm
Magnesium (Mg)	M3	217 ppm
Sulfur (S)	M3	24 ppm
Boron (B)	M3	0.4 ppm
Copper (Cu)	M3	1.6 ppm
Iron (Fe)	M3	123 ppm
Manganese (Mn)	M3	9 ppm
Zinc (Zn)	M3	2.8 ppm
Sodium (Na)	M3	3 ppm
Soluble Salts		
Organic Matter	LOI	8.2 % ENR 150
Nitrate Nitrogen		

SOIL TEST RATINGS



Calculated Cation Exchange Capacity: **8.9** meq/100g

%Saturation

	%sat	meq
K	3.2	0.3
Ca	57.2	5.1
Mg	20.3	1.8
H	19.1	1.7
Na	0.1	0

K/Mg Ratio: 0.17

Ca/Mg Ratio: 2.82

SOIL FERTILITY GUIDELINES

Crop : Athletic Field **Yield Goal :** 0 **Rec Units:** LB/1000 SF

(lbs)	LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
30		3.5	0.5	4.0	0	0.23	0	0	0.07	0	0
Crop :								**Rec Units:**			

Comments :

Athletic Field

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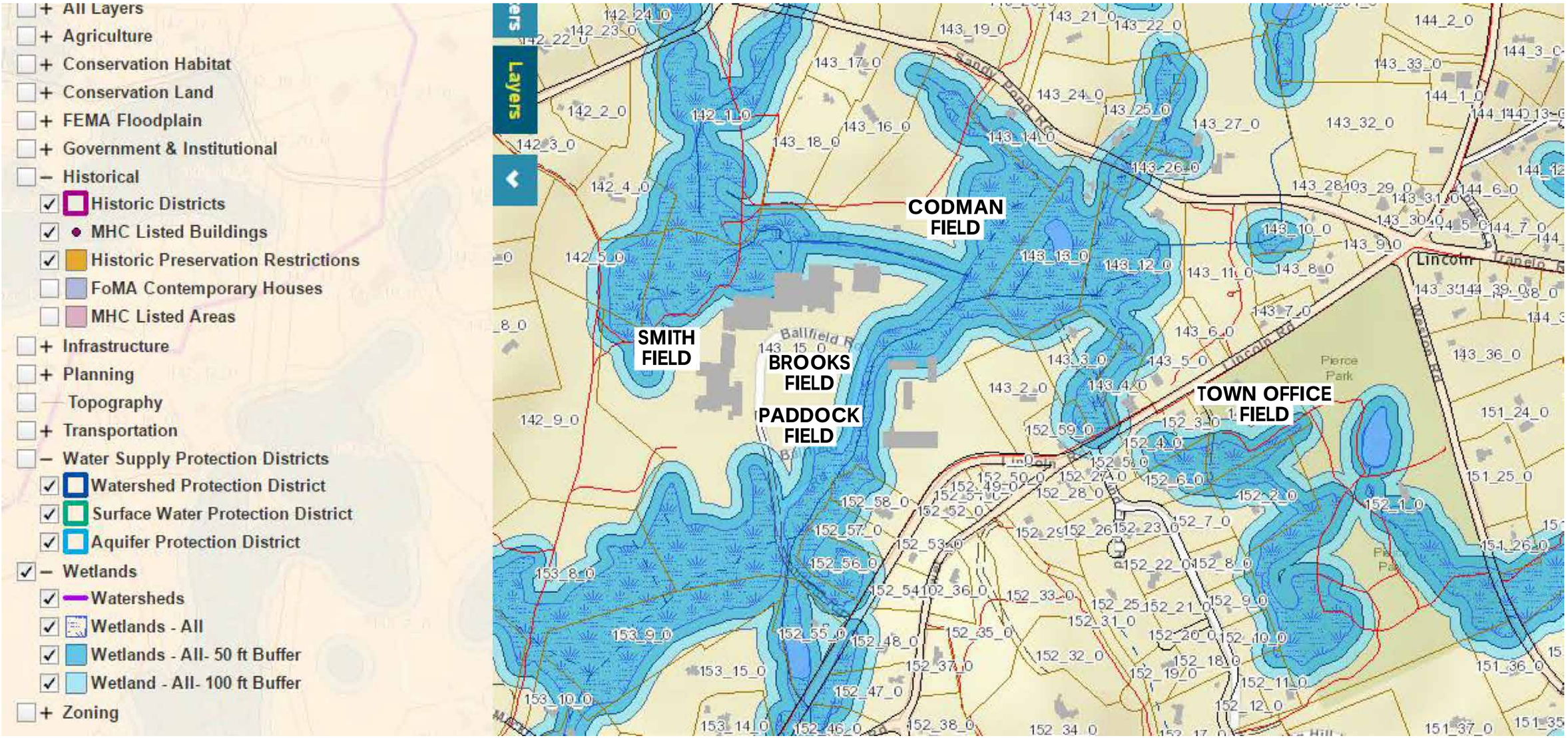
APPENDIX C: GIS INFORMATION


All Layers
Agriculture
Conservation Habitat
Conservation Land
FEMA Floodplain
Government & Institutional
Historical
Historic Districts
MHC Listed Buildings
Historic Preservation Restrictions
FoMA Contemporary Houses
MHC Listed Areas
Infrastructure
Planning
Topography
Transportation
Water Supply Protection Districts
Watershed Protection District
Surface Water Protection District
Aquifer Protection District
Wetlands
Watersheds
Wetlands - All
Wetlands - All- 50 ft Buffer
Wetland - All- 100 ft Buffer
Zoning
Layers
CODMAN FIELD
SMITH FIELD
BROOKS FIELD
PADDOCK FIELD
TOWN OFFICE FIELD
Lincoln
Pierce Park

Field 2 - Lincoln Road
Lincoln, MA

Created by: zye
Filename: V:\2108\promotion\GIS\2016\Massachusetts\Lincoln - Sport\24x36_Massachusetts_LincolnRoad-2.mxd

Site Constraints
8/25/2016

Data Source: "Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division" and Aerial 2014

Stantec
226 Causeway St., 6th Floor
Boston, MA 02114

0 30 60 120 Feet

N

Field 1 - Lincoln Road
Lincoln, MA

Created by: zye
Filename: V:\2108\promotion\GIS\2016\Massachusetts\Lincoln - Sport\24x36_Massachusetts_LincolnRoad-1.mxd

Site Constraints
8/18/2016

Data Source: "Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division" and Aerial 2014

Stantec
226 Causeway St., 6th Floor
Boston, MA 02114

0 30 60 120 Feet

N

Field 3 - Lincoln Road
Lincoln, MA

Created by: zye
Filename: V:\2108\promotion\GIS\2016\Massachusetts\Lincoln - Sport\24x36_Massachusetts_LincolnRoad-3.mxd

Site Constraints
8/25/2016

Data Source: "Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division" and Aerial 2014

Stantec
226 Causeway St., 6th Floor
Boston, MA 02114

0 30 60 120 Feet

N