

TURFGRASS MAINTENANCE BEST PRACTICES MATRIX

Prepared for the Mississippi Watershed Management Organization by Fortin Consulting, Inc.

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USING THE BEST PRACTICES MATRIX:

The Best Practices Matrix offers ecologically sound advice without compromising turfgrass quality expectations. It is a concise summary of maintenance recommendations. The Best Practices Matrix (available on the Minnesota Pollution Control Agency's web site (www.pca.state.mn.us/programs/summermaintenance.html)) offers practical guidelines based on your turfgrass quality expectations (minimal, average, high). It offers straightforward advice for cultural practices, fertilizing, and other typical turfgrass maintenance activities. It is divided into six sections, each with custom recommendations based on soil type and sun exposure. The Best Practices Matrix is not intended to take the place of the training or the manual, rather it is intended to be used as a tool after completing the class.

To use the Best Practices Matrix in the field, download this file from the MPCA website (see Resources section of the Turfgrass manual). Print it on colored paper (we recommend a different color for each site condition) for easy reference, laminate each sheet and connect them by punching a hole in the upper left corner and inserting a metal ring.

The Best Practices Matrix is a default scheme to be used when soil test data is not available. It is highly recommended that each site's soil be tested to get site-specific fertilizer recommendations. The Matrix fertilizer recommendations are based on the University of Minnesota Extension recommendations, given the following assumptions: The soils have medium to high organic matter, and grass clippings are not removed.

To use the Matrix, identify your turfgrass quality expectations from the choices below and use the table for the appropriate site conditions (sun or shade; and compacted soils, rich soils or sandy soils).

Use a soil probe or small shovel to take a sample of the soil and feel its texture to help determine if it is sandy or rich. If you can feel mostly individual soil particles, it is sandy. Rich soils will be darker and feel more smooth and silky compared with the grittier sandy soils. Compacted soils are common. Try to insert a screwdriver or soil probe into the ground to determine if the soils are compacted. If you can only push it in a couple of inches, they are likely compacted.

Turfgrass Quality Expectations:	MINIMAL: Minimal quality lawns are dominated by typical cool season lawn grasses. They are mowed at higher heights throughout the year, clippings returned, no supplemental irrigation provided – some browning to summer dormancy allowed, little to no weed control except to keep weed levels to less than 50% of the lawn surface. AVERAGE: Average quality lawns are dominated by typical cool season lawn grasses. They may be mowed at different heights depending upon time of year and use, clippings returned, irrigation may or may not be provided, and some weed control is provided, but some weeds are tolerated. HIGH: High quality lawns are dominated by Kentucky Bluegrass. They are mowed at different heights depending upon time of year and use. They may be mowed more frequently and are regularly irrigated. Weeds are controlled so that very few weeds exist.
Abbreviations:	N= nitrogen, P= phosphorus, K= potassium, sq ft= square feet, lb= pound, ~ = approximately
Some general notes:	Grass does not need to be lush and extremely dark green to be considered healthy. Pale green turfgrass often needs nitrogen (N). Avoid applying N when soils are cold (less than 45 degree F). It is harder for plants to absorb soil N in these very cold soils thus making unused N more vulnerable to leaching losses while not providing a plant benefit. Water flows readily through sandy soils into our groundwater making groundwater especially vulnerable to dissolved nutrients and toxins. Be extra careful to not over-apply fertilizers and pesticides, including herbicides. Prevent spills of lawnmower gas, oil, solvents and other chemicals that may be on site. Mow less frequently or not at all during long dry spells. Mowing extremely dry brittle grass causes stress and harm where tires run and any soil particles kicked up by the mower sandblasts the grass plant and the equipment. This results in potentially severe injury to the turfgrass as well as increasing equipment maintenance. Concentrate on growing healthier turfgrass, which reduces the need for herbicides and naturally allows for better recovery from damage caused by insects or diseases. Healthy turfgrass chokes weeds.
For more information:	For more information on turfgrass maintenance or to print copies of this matrix, go to www.pca.state.mn.us/programs/summermaintenance.html
Credits:	Copyright © 2010 Mississippi Watershed Management Organization. All rights reserved. Permission granted to reproduce and distribute for non-commercial purposes only, provided the content is not changed or altered in any way. Suggested Citation: Mississippi Watershed Management Organization. 2010. Turfgrass Maintenance Best Practices Matrix. 20 p. Created by Fortin Consulting for the Mississippi Watershed Management Organization as a part of the MPCA Voluntary Certification Program. Advised by technical expert committee members from: University of Minnesota Extension, Minnesota Department of Agriculture, Wayzata Schools, University of Minnesota Property Services, City of White Bear Lake, TruGreen Corporation, Heidi's Lifestyle Gardens, Organic Bob, Minneapolis Park and Recreation Board, City of Saint Anthony Village, Tessman Seed Inc., Circuit Training and Assistance Program, Quercus Landscapes, Minnesota Pollution Control Agency, Mississippi Watershed Management Organization and Fortin Consulting Inc.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Compacted Soils¹ in Sun**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
WATER²	During 1 st growing season after seeding or sodding.	▪ ½–¾ inch of water or rain per week. ▪ 1 inch per week for extreme or long hot and/or dry conditions. ▪ During first growing season after seeding or sodding.	▪ 1 inch of water or rain per week. Can be less where lawns contain more than 50% fine fescue. ▪ During first growing season after seeding or sodding.
CONSERVE WATER	Non-irrigated	▪ Calibrate irrigation systems. ▪ Water slowly or at shorter intervals to aid water infiltration into soil. These soils are more prone to water runoff that can also carry pollutants. ▪ Adjust sprinkler. Do not let any water land on hard surfaces. ▪ If footsteps show or if grass turns blue-gray color, it's time to water.	▪ Calibrate irrigation systems. ▪ Water slowly or at shorter intervals to aid water infiltration into soil. These soils are more prone to water runoff that can also carry pollutants. ▪ Adjust sprinkler. Do not let any water land on hard surfaces. ▪ If footsteps show or if grass turns blue-gray color, it's time to water.
MOWER HEIGHT	3 inches with sharp blade.	3 inches most of year with sharp blade.	▪ 2–2½ inches spring & fall. ▪ 3 inches better during hot and/or dry summer conditions. Use sharp blade.
CLIPPINGS	Leave on lawn, sweep off street and sidewalks. ³	Leave on lawn, sweep off street and sidewalk. ³	Leave on lawn, sweep off street and sidewalk. ³
FALL LEAVES	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.
CORE AERATE	None or every few years.	▪ Once near Labor Day. More often will help reduce compaction & will improve soil permeability. ▪ 20–40 holes per sq ft.⁴	▪ 2 times per year. Around April & Labor Day for 2 or 3 seasons. Then reassess or aerate annually under high traffic conditions. ▪ April aeration requires broadcast of pre-emergent herbicide application with spring fertilizer application. ▪ 20–40 holes per sq ft.⁴
SEED TYPE	Sunny mix of perennial fine fescues & (~65%) bluegrasses.	Sunny mix of perennial fine fescues & (~65%) bluegrasses.	Sunny mix of perennial fine fescues & (~65%) bluegrasses.
SEEDING TIME	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.
TRAFFIC TOLERANCE	Medium	Medium	High

¹ Compacted soils: Compacted soils are the most common type in metro areas. A soil probe/screwdriver cannot easily penetrate the soils beneath the sod layer.

² Watering frequency may need to increase with hot temperatures, particularly during dry periods.

³ Leave clippings on lawn except in the case of certain diseases or the grass is very long and thick or in wet clumps. This will provide the equivalent of one (1) lb N per 1,000 sq ft per year, or about 1 application of a complete fertilizer per year when phosphorus and potassium are also included.

⁴ Core aeration will require more than one pass to get 20–40 holes per sq ft.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Compacted Soils¹ in Sun**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
WEED CONTROL⁵	None	- Follow pesticide labels. It's the law. - Restrict use of weed/feed mixes to only those times when a uniform blanket application of an herbicide is required. - Control annual grassy weeds (crabgrass) in the spring with a pre-emergent herbicide; apply when soil temperatures rise to 50–55 °F. - Control annual broadleaf weeds in June with a broadleaf herbicide – target young plants. Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial broadleaf weeds in the fall with a broadleaf herbicide (dandelions). Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial grassy weeds in the fall with a non-selective herbicide.⁶	- Follow pesticide labels. It's the law. - Restrict use of weed/feed mixes to only those times when a uniform blanket application of an herbicide is required. - Control annual grassy weeds (crabgrass) in the spring with a pre-emergent herbicide; apply when soil temperatures rise to 50–55 °F. - Control annual broadleaf weeds in June with a broadleaf herbicide – target young plants. Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial broadleaf weeds in the fall with a broadleaf herbicide (dandelions). Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial grassy weeds in the fall with a non-selective herbicide.⁶
FERTILIZER TIPS	None	- Calibrate equipment. - Granular: Use rotary spreader. Make sure to use shield along edges. - Fill spreader on dry hard surface. Spills can be swept up. - Liquid: fill on grassy area. Dilute spills on grass with a thorough watering. - Apply in an overlap pattern. Apply at ½ rate for a 50% overlap. - Law requires 0% phosphorus (P) fertilizer.⁷	- Calibrate equipment. - Granular: Use rotary spreader. Make sure to use shield along edges. - Fill spreader on dry hard surface. Spills can be swept up. - Liquid: fill on grassy area. Dilute spills on grass with a thorough watering. - Apply in an overlap pattern. Apply at ½ rate for a 50% overlap. - Law requires 0% phosphorus (P) fertilizer.⁷
CORRECT FERTILIZER	Test soil. Follow recommendations for fertilizer use.	Test soil. Follow recommendations for fertilizer use.	Test soil. Follow recommendations for fertilizer use.

⁵ Most problem grasses are annual grasses. A spring application of a pre-emergent herbicide will prevent the seeds from growing. However, treating the entire turfgrass area with a pre-emergent is rarely needed. Most problem areas are near driveway edges, curb edges and areas where turfgrass is not healthy and thick. Always try to determine why turfgrass is not growing well before relying solely on herbicides to control weeds and then try to (re)create favorable growing conditions for the turfgrass so it successfully competes with weed invaders.

If using a pre-emergent with an early fertilizer, wait until soils approach 55 ° F, otherwise the pre-emergent herbicide may not be effective since seeds of annual weedy grasses, such as crabgrass, do not germinate in cold soils.

⁶ Re-seeding or re-sodding will be necessary, as all of the vegetation will be killed in the treated area.

⁷ Minnesota law requires 0% P fertilizers on lawns unless a soil test shows a need or when new turf is being established.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Compacted Soils¹ in Sun**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
NEXT BEST FERTILIZER	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. $\frac{1}{2}$–1 lb N per 1,000 sq ft annually.⁸ Apply near Labor Day: $\frac{1}{2}$ lb per 1,000 sq ft (50% slow-release⁹)	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. Irrigated Sites: $1\frac{3}{4}$–2 (1.75–2) lb N per 1,000 sq ft annually Application timing: - Near Labor Day: 1 lb N per 1,000 sq ft (50% slow-release⁹) - Near Mother's Day: $\frac{3}{4}$–1 (0.75–1) lb N per 1,000 sq ft. (50% slow-release⁹) Non-irrigated Sites: 1–$1\frac{1}{2}$ (1–1.5) lb N per 1,000 sq ft annually Application timing:⁸ - Labor Day: 1 lb N per 1,000 sq ft (50% slow-release⁹)	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. 2–$2\frac{1}{2}$ (2–2.5) lb N per 1,000 sq ft annually Application timing: - Near Labor Day: 1 lb N per 1,000 sq ft (50% slow-release⁹) - Near Mother's Day: $\frac{1}{2}$–1 (0.5–1) lb N per 1,000 sq ft. (50% slow-release⁹) - Near July 4: $\frac{1}{2}$ (0.5) lb N per 1,000 sq ft (50% slow-release⁹)

⁸ Weather conditions, such as a very wet, cool spring, may dictate an additional fertilizer application to sustain healthy growth ($\frac{1}{2}$ lb N per 1,000 sq ft at first mowing (shady sites) or Mothers to Memorial Day (sunny sites).

⁹ Use slow-release N fertilizers, as they provide a more even supply of available plant N and hence turfgrass growth is more uniform, which in turn reduces mowing and plant water demands. Slow-release N might be labeled under any of these names: sulfur-coated urea, polymer coated urea, polymer sulfur coated urea, isobutylidene diurea (IBDU), methylene ureas, ureaformaldehyde and organic or natural sources of N (such as activated sewage sludge, animal manures, corn gluten meal), water insoluble N. Slow-release N also limits the amount of N released at one time into the soil and hence reduces potential N loss due to leaching—a good water quality protection practice.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Rich Soils in Sun**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
WATER¹⁰	During first growing season after seeding or sodding.	½ inch per week of rain or water for normal summer weather. 1 inch for extreme or prolonged heat. - If footsteps show or if grass turns a blue-gray color, it's time to water. - Supplemental watering may be needed in prolonged hot dry periods. - During first growing season after seeding or sodding.	¾ inch per week of rain or water for normal summer weather. 1½ inches of water for extreme or prolonged heat. - If footsteps show or if grass turns a blue-gray color, it is time to water. - Supplemental watering may be needed during prolonged hot dry periods. - During first growing season after seeding or sodding.
CONSERVE WATER	None	- Calibrate irrigation systems. - Mid-summer water more frequently with less volume. Spring and fall water less frequently with higher volume. - Adjust sprinklers. Do not let any water land on hard surfaces. - If footsteps show or if grass turns blue-gray color, it's time to water.	- Calibrate irrigation systems. - Mid-summer water more frequently with less volume. Spring and fall water less frequently with higher volume. - Adjust sprinklers. Do not let any water land on hard surfaces. - If footsteps show or if grass turns blue-gray color, it's time to water.
MOWER HEIGHT	3 inches with sharp blade.	2–3 inches, shorter when grass is growing fast. Taller is to your benefit. - Taller during hot summer. Use sharp blade.	2–3 inches, shorter when grass is growing fast. Taller is to your benefit. - Taller during hot summer. Use sharp blade.
CLIPPINGS	Leave on lawn, sweep off street and sidewalks. ¹¹	Leave on lawn, sweep off street and sidewalks. ¹¹	Leave on lawn, sweep off street and sidewalks. ¹¹
FALL LEAVES	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.
CORE AERATE	None	- Every few years, near Labor Day. 20–40 holes per sq ft.¹²	- Once per year, near Labor Day. 20–40 holes per sq ft.¹²
SEED TYPE	Sunny mix of fine fescues, (~65%) Kentucky bluegrasses, perennial ryegrasses.	Sunny mix of fine fescues, (~65%) Kentucky bluegrasses, perennial ryegrasses.	Sunny mix of fine fescues, (~65%) Kentucky bluegrasses, perennial ryegrasses.
SEEDING TIME	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.
TRAFFIC TOLERANCE	Medium	High	High

¹⁰ Watering frequency may need to increase with hot temperatures, particularly during dry periods.¹¹ Leave clippings on lawn except in the case of certain diseases or the grass is very long and thick or in wet clumps. This will provide the equivalent of One (1) lb N per 1,000 sq ft per year, or about 1 application of a complete fertilizer per year when phosphorus and potassium are also included.¹² Core aeration will require more than one pass to get 20–40 holes per sq ft.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:

Rich Soils in Sun

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
WEED CONTROL¹³	None	- Follow pesticide labels. It's the law. - Avoid use of weed/feed mixes. - Control annual grassy weeds (crabgrass) in the spring with a pre-emergent herbicide when soil temperatures rise to 50–55 °F. - Control annual broadleaf weeds in June with a broadleaf herbicide – target young plants. Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial broadleaf weeds in the fall with a broadleaf herbicide (dandelions). Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial grassy weeds in the fall with a non-selective herbicide.¹⁴	- Follow pesticide labels. It's the law. - Avoid use of weed/feed mixes. - Control annual grassy weeds (crabgrass) in the spring with a pre-emergent herbicide when soil temperatures rise to 50–55 °F. - Control annual broadleaf weeds in June with a broadleaf herbicide – target young plants. Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial broadleaf weeds in the fall with a broadleaf herbicide (dandelions). Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial grassy weeds in the fall with a non-selective herbicide.¹⁴
FERTILIZER TIPS	None	- Calibrate equipment. - Granular: Use rotary spreader. Make sure to use shield along edges. Fill spreader on dry, hard surface. Spills can be swept up. - Liquid: fill on grassy area. Dilute spills on grass with a thorough watering. - Apply in an overlap pattern. Apply at ½ rate for a 50% overlap. - Law requires 0% phosphorus (P).¹⁵	- Calibrate equipment. - Granular: Use rotary spreader. Make sure to use shield along edges. Fill spreader on dry, hard surface. Spills can be swept up. - Liquid: fill on grassy area. Dilute spills on grass with a thorough watering. - Apply in an overlap pattern. Apply at ½ rate for a 50% overlap. - Law requires 0% phosphorus (P).¹⁵
CORRECT FERTILIZER	Test soil. Follow recommendations for fertilizer use.	Test soil. Follow recommendations for fertilizer use.	Test soil. Follow recommendations for fertilizer use.

¹³ Most problem grasses are annual grasses. A spring application of a pre-emergent herbicide will prevent the seeds from growing. However, treating the entire turfgrass area with a pre-emergent is rarely needed. Most problem areas are near driveway edges, curb edges and areas where turfgrass is not healthy and thick. Always try to determine why turfgrass is not growing well before relying solely on herbicides to control weeds and then try to (re)create favorable growing conditions for the turfgrass so it successfully competes with weed invaders.

If using a pre-emergent with an early fertilizer, wait until soils approach 55 ° F, otherwise the pre-emergent herbicide may not be effective since seeds of annual weedy grasses, such as crabgrass, do not germinate in cold soils.

¹⁴ Re-seeding or re-sodding will be necessary, as all of the vegetation will be killed in the treated area.

¹⁵ Minnesota law requires 0% P fertilizers on lawns unless a soil test shows a need or when new turf is being established.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:

Rich Soils in Sun

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
NEXT BEST FERTILIZER	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. Apply near Labor Day: $\frac{1}{2}$–1 (0.5–1) lb of N per 1,000 sq ft.¹⁶	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. Irrigated sites: $1\frac{1}{4}$–$1\frac{1}{2}$ (1.25–1.5) lb N per 1000 sq ft annually Application timing: - Near Labor Day: 1 lb N per 1,000 sq ft (50% slow-release¹⁷) - Near Mother's Day: $\frac{1}{4}$–$\frac{1}{2}$ (0.25–0.5) lb N per 1,000 sq ft (50% slow-release¹⁷) Non-irrigated sites: $\frac{1}{2}$–1 (0.5–1) lb N per 1000 sq ft annually Application timing:¹⁶ - Labor Day: $\frac{1}{2}$ (0.5) lb N per 1,000 sq ft (50% slow-release¹⁷)	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. $1\frac{3}{4}$–2 (1.75–2) lb N per 1,000 sq ft annually Application timing: - Labor Day (most important): 1 lb N per 1,000 sq ft (50% slow-release¹⁷) - Near Mother's Day: $\frac{3}{4}$ (0.75) lb N per 1,000 sq ft (50% slow-release¹⁷)

¹⁶ Weather conditions such as a very wet, cool spring may dictate an additional fertilizer application to sustain healthy growth ($\frac{1}{2}$ lb N per 1,000 sq ft at first mowing (shady sites) or Mothers to Memorial Day (sunny sites).

¹⁷ Use slow-release N fertilizers, as they provide a more even supply of available plant N and hence turfgrass growth is more uniform, which in turn reduces mowing and plant water demands. Slow-release N might be labeled under any of these names: sulfur-coated urea, polymer coated urea, polymer sulfur coated urea, isobutylidene diurea (IBDU), methylene ureas, ureaformaldehyde and organic or natural sources of N (such as activated sewage sludge, animal manures, corn gluten meal), water insoluble N. Slow-release N also limits the amount of N released at one time into the soil and hence reduces potential N loss due to leaching—a good water quality protection practice.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:

Sandy Soils in Sun

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
WATER¹⁸	During first growing season after seeding or sodding.	½ inch per week water or rainfall for normal weather. 1 inch per week (prolonged heat) including rainfall. - Water in small applications to reduce leaching. - During first growing season after seeding or sodding. - If footsteps show or if grass turns a blue-gray color, it's time to water.	1–1½ inches per week of rain or water. - Water in small applications to reduce leaching. - During first growing season after seeding or sodding. - If your footsteps show or if grass turns a blue-gray color, it's time to water.
CONSERVE WATER	None	- Calibrate irrigation systems. - Water moves fast in sandy soils, so water at shorter intervals to avoid wasting water that moves beyond root zone. - Adjust sprinklers. Do not let any water land on hard surfaces. - Grass does not need to be dark green to be healthy. If footsteps show or if grass turns a blue-gray color, it's time to water.	- Calibrate irrigation systems. - Water moves fast in sandy soils, so water at shorter intervals to avoid wasting water that moves beyond root zone. - Adjust sprinklers. Do not let any water land on hard surfaces. - Grass does not need to be dark green to be healthy. If footsteps show or if grass turns a blue-gray color, it's time to water.
MOWER HEIGHT¹⁹	3+ inches with sharp blade.	3+ inches with sharp blade.	2–3 inches with sharp blade. 3 inches during hot summer. 2 inches early spring, gradually up to 3 inches for hot summer, 2.5 inches for fall.
CLIPPINGS	Leave on lawn, sweep off street and sidewalks. ²⁰	Leave on lawn, sweep off street and sidewalks. ²⁰	Leave on lawn, sweep off street and sidewalks. ²⁰
FALL LEAVES	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.
CORE AERATE	None	- Once every few years, in fall. 20–40 holes per sq ft.²¹	- Once every few years, in fall. 20–40 holes per sq ft.²¹
SEED TYPE	Sunny mix of fine fescues & (~65%) Kentucky bluegrasses.	Sunny mix of fine fescues & (~65%) Kentucky bluegrasses.	Sunny mix of fine fescues & (~65%) Kentucky bluegrasses.
SEEDING TIME	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.

¹⁸ Watering frequency may need to increase with hot temperatures, particularly during dry periods. Sandy soils require more frequent irrigation but with less water each time. Irrigate enough to help the plant but not so much that excess drains past the root zone and becomes unavailable.

¹⁹ Sandy soils dry out fast in hot, dry months. Leave grass longer to provide shade and keep moisture in.

²⁰ Leave clippings on lawn except in the case of certain diseases or the grass is very long and thick or in wet clumps. This will provide the equivalent of one (1) lb N per 1,000 sq ft per year, or about 1 application of a complete fertilizer per year when phosphorus and potassium are also included.

²¹ Core aeration will require more than one pass to get 20–40 holes per sq ft.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:

Sandy Soils in Sun

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
TRAFFIC TOLERANCE	Medium	High	High
WEED CONTROL²²	None	- Avoid use of weed/feed mixes. - Control annual grassy weeds (crabgrass) in the spring with a pre-emergent herbicide when soil temperatures rise to 50–55 °F. - Control annual broadleaf weeds in June with a broadleaf herbicide—target young plants. Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial broadleaf weeds in the fall with a broadleaf herbicide (dandelions). Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial grassy weeds in the fall with a non-selective herbicide.²³	- Avoid use of weed/feed mixes. - Control annual grassy weeds (crabgrass) in the spring with a pre-emergent herbicide when soil temperatures rise to 50–55 °F. - Control annual broadleaf weeds in June with a broadleaf herbicide—target young plants. Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial broadleaf weeds in the fall with a broadleaf herbicide (dandelions). Spot-treat, do not apply to entire lawn if not needed. Only effective if it touches a broadleaf plant. - Control perennial grassy weeds in the fall with a non-selective herbicide.²³
FERTILIZER TIPS²⁴	None	- Calibrate equipment. - Granular: Use rotary spreader. Make sure to use shield along edges. - Fill spreader on dry hard surface, spills can be swept up. - Liquid: fill on grassy area. Dilute spills on grass with a thorough watering. - Apply in an overlap pattern. Apply at ½ rate for a 50% overlap. - Law requires 0% phosphorus (P).²⁵	- Calibrate equipment. - Granular: Use rotary spreader. Make sure to use shield along edges. - Fill spreader on dry hard surface, spills can be swept up. - Liquid: fill on grassy area. Dilute spills on grass with a thorough watering. - Apply in an overlap pattern. Apply at ½ rate for a 50% overlap. - Law requires 0% phosphorus (P).²⁵
CORRECT FERTILIZER	Test soil. Follow recommendations for fertilizer use.	Test soil. Follow recommendations for fertilizer use.	Test soil. Follow recommendations for fertilizer use.

²² Most problem grasses are annual grasses. A spring application of a pre-emergent herbicide will prevent the seeds from growing. However, treating the entire turfgrass area with a pre-emergent is rarely needed. Most problem areas are near driveway edges, curb edges and areas where turfgrass is not healthy and thick. Always try to determine why turfgrass is not growing well before relying solely on herbicides to control weeds and then try to (re)create favorable growing conditions for the turfgrass so it successfully competes with weed invaders.

If using a pre-emergent with an early fertilizer, wait until soils approach 55 ° F, otherwise the pre-emergent herbicide may not be effective since seeds of annual weedy grasses, such as crabgrass, do not germinate in cold soils.

²³ Re-seeding or re-sodding will be necessary, as all of the vegetation will be killed in the treated area.

²⁴ Caution: Do not over apply N on sandy soils. N is water soluble, and when applied on sandy soils, extra N that the plants do not use will leach into groundwater. High N levels in groundwater cause human health problems.

²⁵ Minnesota law requires 0% P fertilizers on lawns unless a soil test shows a need or when new turf is being established.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:

Sandy Soils in Sun

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH
NEXT BEST FERTILIZER	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. Apply near Labor Day: $\frac{1}{2}$–1 (0.5–1) lb N per 1,000 sq ft.²⁶	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. Irrigated sites: 1–1½ (1–1.5) lb N per 1000 sq ft annually Application timing: - Near Labor Day: 1 lb N per 1000 sq ft (50% slow-release²⁷) - Near Mothers' Day: $\frac{1}{4}$–$\frac{1}{2}$ (0.25–0.5) lb N per 1000 sq ft (50% slow-release²⁷) Non-irrigated sites: $\frac{1}{2}$–1 (0.5–1) lb N per 1,000 sq ft annually Application timing:²⁶ - Labor Day: $\frac{1}{2}$ (0.5) lb N per 1,000 sq ft (50% slow-release²⁷) Do not over apply N on sandy soils.	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. 2 lb N per 1,000 sq ft annually Application timing: - Near Labor Day 1 lb N per 1,000 sq ft (50% slow-release²⁷) - Near Mother's Day: $\frac{1}{2}$ (0.5) lb N per 1,000 sq ft (50% slow-release²⁷) - Near July 4: $\frac{1}{2}$ (0.5) lb N per 1,000 sq ft (50% slow-release²⁷) Do not over apply N on sandy soils.

²⁶ Weather conditions such as a very wet, cool spring may dictate an additional fertilizer application to sustain healthy growth ($\frac{1}{2}$ lb N per 1,000 sq ft at first mowing (shady sites) or Mothers to Memorial Day (sunny sites).

²⁷ Use slow-release N fertilizers, as they provide a more even supply of available plant N and hence turfgrass growth is more uniform, which in turn reduces mowing and plant water demands. Slow-release N might be labeled under any of these names: sulfur-coated urea, polymer coated urea, polymer sulfur coated urea, isobutylidene diurea (IBDU), methylene ureas, ureaformaldehyde and organic or natural sources of N (such as activated sewage sludge, animal manures, corn gluten meal), water insoluble N. Slow-release N also limits the amount of N released at one time into the soil and hence reduces potential N loss due to leaching—a good water quality protection practice.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Compacted Soils²⁸ in Shade**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ²⁹
WATER³⁰	During first growing season after seeding or sodding.	▪ ½ inch per week of rain or water. ▪ Water slowly or at shorter intervals to aid water infiltration into soil. (These soils are more prone to water runoff that likely carries pollutants.) ▪ If footsteps show or if grass turns a blue-gray color, it's time to water. ▪ During first growing season after seeding or sodding.	Not practical
CONSERVE WATER	None	▪ Calibrate irrigation system. ▪ Adjust sprinklers. Don't let water land on hard surfaces. ▪ Follow city watering bans. ▪ Water during coolest part of the day. Early morning is best. This is especially true for shaded areas. ▪ Water with large drops close to ground to reduce evaporation. ▪ Install rain & soil moisture sensors on irrigation systems.	Not practical
MOWER HEIGHT	3+ inches with sharp blade.	3+ inches with sharp blade.	Not practical
CLIPPINGS	Leave on lawn, sweep off street and sidewalks. ³¹	Leave on lawn, sweep off street and sidewalks. ³¹	Not practical
FALL LEAVES³²	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Not practical
CORE AERATE	None or occasionally.	▪ Once in fall. More often will help reduce compaction & create more permeable soils. ▪ 20–40 holes per sq ft.³³ ▪ Avoid aerification inside the drip-line of trees to minimize injury to surface roots or damage to equipment. ▪ No aeration when ground is dry, grass is stressed or temps are hot or predicted hot within a week.	Not practical
SEED TYPE	Shady mix of (~65%) perennial fine fescues & shade tolerant bluegrasses.	Shady mix of (~65%) perennial fine fescues & shade tolerant bluegrasses.	Not practical

²⁸ Compacted soils: Compacted soils are the most common type in metro areas. A soil probe/screwdriver cannot easily penetrate the soils beneath the sod layer.

²⁹ High quality expectations for shaded areas should be viewed with caution. Depending on intensity and duration of shade, it may or may not be practical to grow turfgrass at all. Where shade is filtered as from trees and some sunlight actually reaches the ground, it is possible to maintain an average to minimally acceptable lawn cover. However, the thick dense nature of a lawn grown in full sunlight is not achievable under shady conditions.

³⁰ Watering frequency may need to increase with hot temperatures, particularly during dry periods.

³¹ Leave clippings on lawn except in the case of certain diseases or the grass is very long and thick or in wet clumps. This will provide the equivalent of one (1) lb N per 1,000 sq ft per year, or about 1 application of a complete fertilizer per year when phosphorus and potassium are also included.

³² Mow and mulch leaves on site as long as at least 50% of the turfgrass is visible after mulching. Remove leaves as needed to expose turfgrass to available sun coming through the tree canopy during the fall; grasses capture more sunlight in the fall than almost any other time of the year, especially in shady conditions.

³³ Core aeration will require more than one pass to get 20–40 holes per sq ft.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Compacted Soils²⁸ in Shade**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ²⁹
SEEDING TIME	Best time mid-August to mid-September, next best time early spring. Avoid mid-May through July when the shade canopy will be fullest, making it most difficult to grow turfgrass. Be sure to remove leaves as needed to maintain full exposure of grass plants to all available sun coming through the tree canopy during the fall.	Best time mid-August to mid-September, next best time early spring. Avoid mid-May through July when the shade canopy will be fullest, making it most difficult to grow turfgrass. Be sure to remove leaves as needed to maintain full exposure of grass plants to all available sun coming through the tree canopy during the fall.	Not practical
TRAFFIC TOLERANCE	Low	Low	Not practical
WEED CONTROL	None. Where turfgrass is very thin, mix in other shade-loving plants ³⁴ to help prevent soil erosion. Mow to make weeds less obvious.	- Follow pesticide labels. It's the law. - Minimal, spot treatment if any. Herbicides can cause bare spots that often fill in with more weeds due to the poor conditions for growing turf. - Bare spots: Light shade, re-seed with a shady lawn mix. For heavier shade, consider mulches or adding shade-loving plants³⁴ for a better adapted & often more dense ground cover. Turfgrass is poorly adapted to dense shade. - Avoid use of weed/feed mixes. The needs & timing for weed control may be different from that of supplying nutrients. This will also reduce potential herbicide injury to nearby, desirable plants. - Minimize broadleaf herbicide use due to the possibility of injury to trees, shrubs & other desirable broadleaf plants. - Option: Mow to make weeds less obvious.	Not practical
FERTILIZER TIPS	None	- Granular: Use rotary spreader. Make sure to use shield along edges. Fill spreader on dry hard surface. Spills can be swept up. - Liquid: Fill on grassy area, dilute spills with watering. - Apply in an overlap pattern. Apply at ½ rate for a 50% overlap.	Not practical
CORRECT FERTILIZER	Test soil. Follow recommendations for fertilizer use.	Test soil. Follow recommendations for fertilizer use.	Not practical

³⁴ Shade-loving ground cover plants: Native plants (such as woodland strawberry, violets, woodland geranium, Virginia waterleaf, Jacob's ladder, sedges)

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Compacted Soils²⁸ in Shade**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ²⁹
NEXT BEST FERTILIZER³⁵	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN $\frac{1}{2}$–1 (0.5–1) lb N per 1,000 sq ft annually.³⁶ Apply near Labor Day: $\frac{1}{2}$ (0.5) lb N per 1,000 sq ft (50% slow-release³⁷)	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. Irrigated sites: $\frac{3}{4}$–1$\frac{1}{4}$ (0.75–1.25) lb N per 1,000 sq ft annually Application timing: - Near Labor Day: $\frac{1}{2}$–$\frac{3}{4}$ (0.5–0.75) lb N per 1,000 sq ft (50% slow-release³⁷) - At First Mowing: $\frac{1}{4}$–$\frac{1}{2}$ (0.25–0.5) lb N per 1,000 sq ft (50% slow-release³⁷) Non-irrigated sites: $\frac{1}{2}$–1$\frac{1}{4}$ (0.5–1.25) lb N per 1,000 sq ft annually Application timing:³⁶ - Near Labor Day: $\frac{1}{2}$–$\frac{3}{4}$ (0.5–0.75) lb N per 1,000 sq ft (50% slow-release³⁷) Law requires 0% phosphorus (P).³⁸	Not practical
TREES	No action	- Leaf trees: Often best recommendations for tree health conflicts with best recommendations for turfgrass health. - For turfgrass health: Thin branches to gain sunlight. Remove lower branches to promote air circulation near ground & ease mowing. Consider mulching under tree canopy to keep mowers away from trunk & exposed roots. - Needle trees: To preserve attractiveness of tree form, do not remove lower branches unless diseased or dead. Mow around branch perimeter. Consider mulching under tree branches.	Not practical

³⁵ Dominant grasses are likely fine fescues, which require less N.³⁶ Weather conditions such as a very wet, cool spring may dictate an additional fertilizer application to sustain healthy growth ($\frac{1}{2}$ lb N per 1,000 sq ft at first mowing (shady sites) or Mothers to Memorial Day (sunny sites).³⁷ Use slow-release N fertilizers, as they provide a more even supply of available plant N and hence turfgrass growth is more uniform, which in turn reduces mowing and plant water demands. Slow-release N might be labeled under any of these names: sulfur-coated urea, polymer coated urea, polymer sulfur coated urea, isobutylidene diurea (IBDU), methylene ureas, ureaformaldehyde and organic or natural sources of N (such as activated sewage sludge, animal manures, corn gluten meal), water insoluble N. Slow-release N also limits the amount of N released at one time into the soil and hence reduces potential N loss due to leaching—a good water quality protection practice.³⁸ Minnesota law requires 0% P fertilizers on lawns unless a soil test shows a need or when new turf is being established.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:

Rich Soils in Shade

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ³⁹
WATER⁴⁰	During first growing season after seeding or sodding.	½ inch per week of rain or water. - If footsteps show or if grass turns a blue-gray color, it's time to water. - During first growing season after seeding or sodding.	Not practical
CONSERVE WATER	None	- Calibrate irrigation system. - Water during coolest part of day. Early morning is best. - Water with large drops, close to the ground. - Install rain sensor & soil moisture sensor on irrigation systems. - Adjust sprinklers. Do not allow water to land on hard surfaces. - Follow city watering bans.	Not practical
MOWER HEIGHT	3+ inches with sharp blade.	3+ inches with sharp blade.	Not practical
CLIPPINGS	Leave on lawn, sweep off street and sidewalks. ⁴¹	Leave on lawn, sweep off street and sidewalks. ⁴¹	Not practical
FALL LEAVES⁴²	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Not practical
CORE AERATE	None	- None or every few years. If it is difficult to push a screwdriver into dry ground, core aeration can help. 20–40 holes per sq ft.⁴³ - Not when ground is dry, grass is stressed, or temps are hot or predicted hot within a week.	Not practical
SEED TYPE	Shady mix of (~65%) perennial fine fescues & shade-tolerant bluegrasses.	Shady mix of (~65%) perennial fine fescues & shade-tolerant bluegrasses.	Not practical
SEEDING TIME	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Not practical
TRAFFIC TOLERANCE	Low	Low	Not practical

³⁹ High quality expectations for shaded areas should be viewed with caution. Depending on intensity and duration of shade, it may or may not be practical to grow turfgrass at all. Where shade is filtered as from trees and some sunlight actually reaches the ground, it is possible to maintain an average to minimally acceptable lawn cover. However, the thick dense nature of a lawn grown in full sunlight is not achievable under shady conditions.

⁴⁰ Watering frequency may need to increase with hot temperatures, particularly during dry periods.

⁴¹ Leave clippings on lawn except in the case of certain diseases or the grass is very long and thick or in wet clumps. This will provide the equivalent of one (1) lb N per 1,000 sq ft per year, or about 1 application of a complete fertilizer per year when phosphorus and potassium are also included

⁴² Mow and mulch leaves on site as long as at least 50% of the turfgrass is visible after mulching. Remove leaves as needed to expose turfgrass to available sun coming through the tree canopy during the fall; grasses capture more sunlight in the fall than almost any other time of the year, especially in shady conditions.

⁴³ Core aeration will require more than one pass to get 20–40 holes per sq ft.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:

Rich Soils in Shade

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ³⁹
WEED CONTROL	None. Where turfgrass is very thin, mix in other shade-loving plants ⁴⁴ to help prevent soil erosion. Mow to make weeds less obvious.	- Follow pesticide labels. It's the law. - Minimal, spot treatment if any. Herbicides can cause bare spots that fill in with more weeds due to the poor conditions for growing turfgrass. - For bare spots, re-seeding with a shady lawn mix may be possible in lighter shade. For heavier shade, consider mulches or adding shade-loving plants⁴⁴ for a better adapted & often more dense ground cover. Turfgrass is poorly adapted to dense shade. - Avoid use of weed/feed mixes as the needs & timing for weed control may be different from that of supplying nutrients. This will also help avoid herbicide injury to nearby desirable plants. - Minimize broadleaf herbicide use due to the possibility of injury to trees, shrubs & other desirable broadleaf plants. - Option: Mow to make weeds less obvious.	Not practical
FERTILIZER TIPS	None	- Granular: Use rotary spreader. Be sure to use shield along edges, - Fill spreader on dry hard surface, spills can be swept up. - Liquid: fill on grassy area. Dilute spills on grass with a thorough watering. - Apply in an overlap pattern. Apply at ½ rate for a 50% overlap.	Not practical
CORRECT FERTILIZER	Test soil. Follow recommendations for fertilizer.	Test soil. Follow recommendations for fertilizer.	Not practical
NEXT BEST FERTILIZER⁴⁵	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. ½ (0.5) lb N per 1,000 sq ft annually. Apply near Labor Day: ½ lb N per 1,000 sq ft (50% slow-release⁴⁶)	Typically a N-P-K ratio of 4-0-2 or 4-0-3 is OK for MN. Irrigated sites: 1–1½ lb N per 1,000 sq ft annually Application timing: - Near Labor Day: ¾–1 (0.75–1) lb N per 1,000 sq ft (50% slow-release⁴⁶) - At First Mowing: ¼–½ (0.25–0.5) lb N per 1,000 sq ft (50% slow-release⁴⁶) Non-irrigated sites: ¾–1 (0.75–1) lb N per 1,000 sq ft annually Application timing: - Near Labor Day: ¾–1 (0.75–1) lb N per 1,000 sq ft. (50% slow-release⁴⁶) Law requires 0% phosphorus (P).⁴⁷	Not practical

⁴⁴ Shade-loving ground cover plants: Native plants (such as woodland strawberry, violets, woodland geranium, Virginia waterleaf, Jacob's ladder, sedges)

⁴⁵ Dominant grasses are likely fine fescues, which require less N.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Rich Soils in Shade**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ³⁹
TREES	No action	Leaf trees: Often best recommendations for tree health conflict with best recommendations for turfgrass health.	Not practical

⁴⁶ Use slow-release N fertilizers, as they provide a more even supply of available plant N and hence turfgrass growth is more uniform, which in turn reduces mowing and plant water demands. Slow-release N might be labeled under any of these names: sulfur-coated urea, polymer coated urea, polymer sulfur coated urea, isobutylidene diurea (IBDU), methylene ureas, ureaformaldehyde and organic or natural sources of N (such as activated sewage sludge, animal manures, corn gluten meal), water insoluble N. Slow-release N also limits the amount of N released at one time into the soil and hence reduces potential N loss due to leaching—a good water quality protection practice.

⁴⁷ Minnesota law requires 0% P fertilizers on lawns unless a soil test shows a need or when new turf is being established.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Sandy Soils in Shade**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ⁴⁸
WATER⁴⁹	During first growing season after seeding or sodding.	▪ ½ inch per week of rain or water. ▪ Sandy soils lose water fast. Water more often & with less water to reduce water loss through the soils. ▪ Do not over water after applying pesticides or fertilizers. These can be dissolved & directed through the soils into the groundwater. ▪ If footsteps show or if grass turns a blue-gray color, it's time to water. ▪ During first growing season after seeding or sodding.	Not practical
CONSERVE WATER	None	▪ Calibrate irrigation systems. ▪ Watering in sandy soils requires more watering events with less water each time. Try to get enough water to help the plant but not too much to soak into the soils beyond the plants roots and be lost. ▪ Avoid creating constantly damp or wet soils. Let soil dry out slightly between waterings. ▪ Water during coolest part of day. Early morning is best. ▪ Water with large drops, close to the ground to reduce evaporation. ▪ Install rain & soil moisture sensor on irrigation systems. ▪ Adjust sprinklers. Do not allow water to land on hard surfaces. ▪ Follow city watering bans.	Not practical
MOWER HEIGHT⁵⁰	3+ inches with sharp blade.	3+ inches with sharp blade.	Not practical
CLIPPINGS	Leave on lawn, sweep off street and sidewalks. ⁵¹	Leave on lawn, sweep off street and sidewalks. ⁵¹	Not practical
FALL LEAVES⁵²	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Mow and disperse leaves. At least 50% of the turfgrass should be visible after mowing.	Not practical

⁴⁸ High quality expectations for shaded areas should be viewed with caution. Depending on intensity and duration of shade, it may or may not be practical to grow turfgrass at all. Where shade is filtered as from trees and some sunlight actually reaches the ground, it is possible to maintain an average to minimally acceptable lawn cover. However, the thick dense nature of a lawn grown in full sunlight is not achievable under shady conditions.

⁴⁹ Watering frequency may need to increase with hot temperatures, particularly during dry periods. Sandy soils require more frequent irrigation but with less water each time. Irrigate enough to help the plant but not so much that excess drains past the root zone and becomes unavailable.

⁵⁰ Sandy soils dry out fast in hot, dry months. Leave grass longer to provide shade and keep moisture in.

⁵¹ Leave clippings on lawn except in the case of certain diseases or the grass is very long and thick or in wet clumps. This will provide the equivalent of one (1) lb N per 1,000 sq ft per year, or about 1 application of a complete fertilizer per year when phosphorus and potassium are also included.

⁵² Mow and mulch leaves on site as long as at least 50% of the turfgrass is visible after mulching. Remove leaves as needed to expose turfgrass to available sun coming through the tree canopy during the fall; grasses capture more sunlight in the fall than almost any other time of the year, especially in shady conditions.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Sandy Soils in Shade**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ⁴⁸
CORE AERATE	None	▪ Every few years in fall. ▪ 20–40 holes per sq ft.⁵³ ▪ Not when ground is dry, grass is stressed or temps are hot or predicted hot within a week. ▪ Aeration is not as important in sandy soils yet still a good practice for managing thatch buildup.	Not practical
SEED TYPE	Shady mix of (~65%) perennial fine fescues & shade tolerant Kentucky bluegrasses.	Shady mix of (~65%) perennial fine fescues & shade tolerant Kentucky bluegrasses.	Not practical
SEEDING TIME	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Best time mid-August to mid-September, next best time early spring. Avoid seeding mid-May through July.	Not practical
TRAFFIC TOLERANCE	Low	Low	Not practical
WEED CONTROL	None. Where turfgrass is very thin, mix in shade-loving plants ⁵⁴ to prevent soil erosion. Mow to make weeds less obvious.	▪ Follow pesticide labels. It's the law. ▪ Sandy soils can direct dissolved pesticides through the soils into our groundwater. Be extra careful to not over-apply herbicides. Also take care with lawnmower gas, oil, solvents & chemicals. ▪ Minimal, spot treatment if any. Herbicides cause bare spots that may fill in with weeds due to the poor conditions for growing turfgrass. ▪ Bare spots: Light shade, re-seed with a shady lawn mix. Heavier shade, consider mulches or add shade plants⁵⁴ for a better adapted & often dense groundcover. Turfgrass is poorly adapted to dense shade. ▪ Avoid use of weed/feed mixes, as the needs & timing for weed control may be different from that of supplying nutrients. This will also help avoid herbicide injury to nearby desirable plants. ▪ Minimize broadleaf herbicide, reduce injury to trees, shrubs & desirable plants. ▪ Option: Mow to make weeds less obvious.	Not practical
FERTILIZER TIPS⁵⁵	None	▪ Granular: Use rotary spreader. Make sure to use shield along edges. Fill spreader on dry hard surface, spills can be swept up. ▪ Liquid: fill on grassy area. Dilute spills with thorough watering. ▪ Apply in an overlap pattern. Apply at ½ rate for a 50% overlap.	Not practical

⁵³ Core aeration will require more than one pass to get 20–40 holes per sq ft.⁵⁴ Shade-loving ground cover plants: Native plants (such as woodland strawberry, violets, woodland geranium, Virginia waterleaf, Jacob's ladder, sedges)⁵⁵ Caution: Do not over apply N on sandy soils. N is water soluble, and when applied on sandy soils, extra N that the plants do not use will leach into groundwater. High N levels in groundwater cause human health problems.

Environmentally Sound Practices for:

Soil Types & Light
Conditions:**Sandy Soils in Shade**

Turfgrass Quality Expectations	MINIMAL	AVERAGE	HIGH ⁴⁸
CORRECT FERTILIZER	Test soil. Follow recommendations for fertilizer use.	Test soil. Follow recommendations for fertilizer use.	Not practical
NEXT BEST FERTILIZER⁵⁶	Typically a N-P-K ration of 4-0-2 or 4-0-3 is OK for MN. $\frac{1}{2}$ (0.5) lb N per 1,000 sq ft annually. Apply near Labor Day: $\frac{1}{2}$ (0.5) lb N per 1,000 sq ft (50% slow-release⁵⁷)	Typically a N-P-K ration of 4-0-2 or 4-0-3 is OK for MN. Irrigated sites: $\frac{3}{4}$–$1\frac{1}{4}$ (0.75–1.25) lb N per 1,000 sq ft annually Application timing: - Near Labor Day: $\frac{1}{2}$–$\frac{3}{4}$ (0.5–0.75) lb N per 1,000 sq ft (50% slow-release⁵⁷) - At First Mowing: $\frac{1}{4}$–$\frac{1}{2}$ (0.25–0.5) lb N per 1,000 sq ft (50% slow-release⁵⁷) Non-irrigated sites: $\frac{1}{2}$–$\frac{3}{4}$ (0.5–0.75) lb N per 1,000 sq ft annually Application timing: - Near Labor Day: $\frac{1}{2}$–$\frac{3}{4}$ (0.5–0.75) lb N per 1,000 sq ft (50% slow-release⁵⁷) Law requires 0% phosphorus (P).⁵⁸	Not practical
TREES	No action	- Leaf trees: Often best recommendations for tree health conflict with best recommendations for turfgrass health. - For turfgrass health: Thin branches to gain sunlight. Remove lower branches to promote air circulation near ground & ease mowing. Consider mulching under tree canopy to keep mowers away from trunk & exposed roots. - Needle trees: To preserve attractiveness of tree form, do not remove lower branches unless diseased or dead. Mow around branch perimeter. Consider mulching under tree branches.	Not practical

⁵⁶ Dominant grasses are likely fine fescues, which require less N.⁵⁷ Use slow-release N fertilizers, as they provide a more even supply of available plant N and hence turfgrass growth is more uniform, which in turn reduces mowing and plant water demands. Slow-release N might be labeled under any of these names: sulfur-coated urea, polymer coated urea, polymer sulfur coated urea, isobutylidene diurea (IBDU), methylene ureas, ureaformaldehyde and organic or natural sources of N (such as activated sewage sludge, animal manures, corn gluten meal), water insoluble N. Slow-release N also limits the amount of N released at one time into the soil and hence reduces potential N loss due to leaching—a good water quality protection practice.⁵⁸ Minnesota law requires 0% P fertilizers on lawns unless a soil test shows a need or when new turf is being established.