APPENDIX Q

Nutrient Management Plan (NMP), SWPPP Special Provision, Construction Form C-45

NMP - Roadside Development Sheets

Roadside Development Seeding Worksheet – Mountain Region
Roadside Development Seeding Worksheet – Coastal Region
Roadside Development Seeding Worksheet – Piedmont Region
Nutrient Management for Active Construction
Nutrient Management for Roadside Maintaince
Roadside Development NMP Summary
Roadside Development Sheet- Lime and Fertilizer Calculations
Record of Actual Applications for Nutrient Management

NMP - Other Tools for Implementation

Fertilizer Guidance for Active Construction Projects
Fertilizer Guidance for Roadside Maintenance
Agricultural Liming Material Registration
Quick Chart for Active Construction
Quick Chart for Roadside Maintenance

VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: ROADSIDE DEVELOPMENT	NUMBER: IIM-LD-122.13
SPECIFIC SUBJECT: ROADSIDE DEVELOPMENT SHEET; COORDINATION; COMPUTING QUANTITIES/SUMMARIZATION	DATE: APRIL 27, 2009
	SUPERSEDES: IIM-LD-122.12
DIVISION ADMINISTRATOR APPROVAL:	Mohammad Mirshahi, P.E. State Location and Design Engineer Approved April 27, 2009

Changes are shaded.

CURRENT REVISION

- The typical fertilizer application rate has been revised in accordance with the 2007 Road and Bridge Specifications. An application rate of 300 pounds per acre is to be estimated unless otherwise specified by the Maintenance Division.

EFFECTIVE DATE

- These instructions are effective upon receipt.

POLICY

- The Roadside Development Sheet and the Erosion Control Summary Sheet are to be included in project plan assemblies.
- The Roadside Development Summary will indicate the Maintenance Division's recommended seed mixtures, and estimated quantities for Topsoil, Seeding (Regular and Legume), Fertilizer and Lime.
- Seed additives (e.g. foxtail millet) are paid for as Regular Seeding except Crown Vetch, Sericea Lespedeza and Birdsfoot Trefoil
- Seed mixture recommendations may at times deviate from the seed mixture guidelines on the Roadside Development Sheet. The District Roadside Manager will provide recommendations for the application of seed mixtures (core mix and additives), fertilizer, lime, etc.

SPECIAL INSTRUCTIONS

- The approximate area (hectares or acres) to be disturbed will be shown under “Notes” on the Roadside Development Sheet. This area is not to be expanded for estimating purposes.

- Notes on the Roadside Development Sheet marked by a star are for the use of field forces only. The Designer is not to use any percentages shown under “Notes” on the Roadside Development sheet when computing quantities.

MULCH

- Roadside Development involves two categories of mulch as follows:

  - Seeding Mulch, Type I or II is applied in the field with the seed mixture. This mulch is included in the price for the regular seeding and is not summarized in the plans.

  - Erosion Control Mulch is summarized on the Erosion Control Summary Sheet when recommended by the Maintenance Division. This material is estimated at the rate of 0.25 acres (1,210 S.Y.) per 100 feet of alignment or 0.332 hectares (3,319 m2) per 100 meters of roadway alignment) and is to be paid for as follows:

PAY ITEM	UNIT	ITEM CODE
Erosion Control Mulch	Acres (Hectare)	27288
Erosion Control Mulch	S.Y. (m2)	27284

LEGUME SEEDING

- The seed mixes available for roadside development include three “Legume” seeds, Crown Vetch, Sericea Lespedeza and Birdsfoot Trefoil specified as additives “E, F. and G” on the Roadside Development Sheet.

- These Legume seeds are used only on slopes 3:1 or greater and are not used on shoulders or other locations to be mowed.

- Legume Seed, and Legume Overseeding are to be summarized for separate payment.

- Whenever the Maintenance Division specifies any of these Legume seeds, the mowable areas on the project (slopes flatter than 3:1) and non-mowable areas (slopes 3:1 and greater) must be measured separately in order to accurately summarize the seeding requirements.

ESTIMATING QUANTITIES

- If the lime application rate is not provided by the Maintenance Division, the Designer should estimate the Normal Lime Quantity based on 2 tons per acre (5 metric tons per hectare).

- If the fertilizer application rate is not provided by the Maintenance Division, the Designer should estimate the Normal Fertilizer Quantity based on 300 pounds per acre (336 kilograms per hectare).

- The seed mixtures (core mix plus additives) shown on the Roadside Development Sheet are weights per acre (or hectare) of disturbed area. These quantities may vary for each construction season.

- The Designer is advised to:

  1. Determine the disturbed area to be seeded.

  2. Determine the application rate for the sloped and mowed areas shown for each construction season.

     Example for Seed Mix 2E:
     100 lbs. Core Mix + 20 lbs. Additive =120 lbs.

  3. The greatest seeding rate is assumed to be the “Normal” Seeding rate.

     Example for 10 acre area:

MIX REQUIREMENTS ON THIS PROJECT

PROJECT NUMBERS	SLOPES	MOWED	SLOPES	MOWED	SLOPES	MOWED
	SPRING & FALL		SUMMER		LATE FALL & WINTER	
0123-123-103	2E	2B	3A	3A	4B	4B
	120 LBS.	120 LBS.	110 LBS	110 LBS.	120 LBS.	120 LBS.

The Normal Seeding rate = 120 lbs. per acre.
120 lbs. x 10 acres of disturbed area = 1200 lbs. “Normal” Seeding Quantity

- When a legume seed additive is specified (Crown Vetch, Sericea Lespedeza or Birdsfoot Trefoil) the sloped areas and mowed areas must be measured separately when summarizing seeding quantities.

  1. Determine the flat (less than 3:1) areas and sloped (3:1 and greater) areas to be seeded.

     Example: 10 acres of mowed areas; 5 acres of sloped areas.

  2. Determine the application rate for the mowed areas.

Example for “Seed Mix 2B”:100 lbs. Core Mix + 20 lbs. Additive = 120 lbs.

3. Determine the application rate for the sloped areas:

   Example for Seed Mix 2E: Core Mix “2” = 100 lbs.; Additive E” = 20 lbs.

4. Determine the quantities of Regular Seed and Legume Seed.

   Example for mowed area (Seed Mix 2B):
   Core Mix 100 lbs. + 20 lbs. = 120 lbs. x 10 acres = 1200 lbs. Regular Seed

   Example for sloped areas (Seed Mix 2E):
   100 lbs. x 5 acres = 500 lbs. Regular Seed
   20 lbs. x 5 acres = 100 lbs. Legume Seed

- The “Normal” quantities for lime, fertilizer, and seeding are based on the actual area to be disturbed. The “Normal” quantities are to be increased by the following percentage factors to obtain the quantity to show in the summary:

  - Lime = Normal Quantity increased by 90%
  - Fertilizer (15-30-15)= Normal Quantity increased by 90%
  - Regular Seed = Normal Seeding Quantity increased by 60%
  - Overseeding=100% of Normal Seeding Quantity (no mulch or fertilizer)
  - Legume Seed = Normal Seeding Quantity increased by 60%
  - Legume Overseeding = 100% of Normal Seeding Quantity (no mulch or fertilizer)

  Examples for determining quantities to summarize:

  20 tons “normal” Lime x 1.90 (or 190%) = 38 tons Lime
  3 tons “normal” Fertilizer x 1.90 (or 190%) = 5.7 or 6 tons Fertilizer
  1700 lbs.“normal”Seeding x 1.60 (or 160%) = 2720 lbs. Regular Seeding
  1700 lbs. “normal” Seeding (@ 100%) = 1700 lbs. Overseeding
  100 lbs. “normal” Legume Seeding x 1.60 (or 160%)= 160 lbs. Legume Seed
  100 lbs. “normal” Legume Seeding (@ 100%) = 100 lbs. Legume Overseeding

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PAY ITEMS

• Lime	Metric Ton/Ton	27250
• Fertilizer	Metric Ton/Ton	27215
• Regular Seed	kg/lbs.	27102
• Overseeding	kg/lbs.	27103
• Legume Seed	kg/lbs.	27104
• Legume Overseeding	kg/lbs.	27105
• Topsoil Class A	ha/acres	27012
• Topsoil Class B	ha/acres	27022
• Erosion Control Mulch	ha/acres/m2/S.Y.	27288

REVIEW BY MAINTENANCE DIVISION

- The Roadside Development Sheet is to be reviewed by the Maintenance Division prior to submission of the plan assembly for construction.

- Anytime the current Roadside Development Sheet is replaced by a revised Roadside Development Sheet, the District Roadside Manager should be requested to determine the need for any changes in seed mixes, quantities, etc.

INSERTABLE SHEETS

- The Imperial Roadside Development Sheet may be accessed from the **sheet2000.cel** library in Microstation.

  - A-4 Roadside Development Sheet (RDSDEV)

- The Metric Roadside Development Sheet may be obtained through the insertable sheet directory on Falcon DMS.

  - Special Design Section Drawing No. MA-4 (Metric)

- The Imperial Erosion Control Summary Sheet may be accessed from the **sheet2000.cel** library in Microstation.

  - A-5 Erosion Control Summary Sheet (ECSUM)

- The Metric Erosion Control Summary Sheet may be obtained through the insertable sheet directory on Falcon DMS

  - Special Design Section Drawing No. MA-5 (Metric)

VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: STORMWATER POLLUTION PREVENTION PLAN	NUMBER: IIM-LD-246.2
SPECIFIC SUBJECT: STORMWATER POLLUTION PREVENTION PLAN DOCUMENTS AND COMPONENTS	DATE: MARCH 19, 2010
	SUPERSEDES: IIM-LD-246.1
DIVISION ADMINISTRATOR APPROVAL:	Mohammad Mirshahi, P.E. State Location and Design Engineer Approved March 19, 2010

Changes are shaded.

CURRENT REVISION

- Instructions for the development of the Stormwater Pollution Prevention Plan, General Information Sheets and Certification Form LD-445E have been revised to clarify the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (VSMP Construction Permit) requirements.

EFFECTIVE DATE

- These instructions are effective upon receipt.

ACRONYMS

- ESC – Erosion and Sediment Control
- RLD – Responsible Land Disturber
- R&B – Road and Bridge
- SWM – Stormwater Management
- SWPPP – Stormwater Pollution Prevention Plan
- VDOT – Virginia Department of Transportation
- VSMP – Virginia Stormwater Management Program

1.0 BACKGROUND

1.1 Section 107.16 (e) of the 2007 VDOT R&B Specifications requires all land disturbance activities that disturb 10,000 square feet or greater (2500 square feet or greater in the area defined as Tidewater, Virginia in the Chesapeake Bay Preservation Act) (see the latest version of IIM-LD-11) to have a SWPPP.

1.2 The VSMP General Permit for the Discharge of Stormwater from Construction Activities (hereafter referred to as the VSMP Construction Permit) also requires a SWPPP for activities covered under that permit. While a SWPPP is an important component of the VSMP Construction Permit, it is only one of the many requirements that must be addressed in order to be in full compliance with the conditions of the permit. Those persons who oversee or perform activities covered by the VSMP Construction Permit must review and understand all of the conditions and requirements contained within that permit.

2.0 SWPPP APPLICABILITY AND REQUIREMENTS

2.1 A SWPPP identifies potential sources of pollutants which may reasonably be expected to affect the stormwater discharges from land disturbing activity sites and any off site support areas and describes and ensures implementation of practices which will be used to reduce pollutants in such discharges.

2.2 The required contents of a SWPPP for those land disturbance activities requiring coverage under the VSMP Construction Permit are found in Section II D. of the General Permit section of the VSMP Regulations (4VAC50-60-1170).

2.3 Except for the items dealing with the post construction stormwater management requirements, the majority of the items that must be addressed in the SWPPP for land disturbance activities requiring VSMP Construction Permit coverage must also be addressed for those land disturbance activities that do not require VSMP Construction Permit coverage but do require an ESC Plan in accordance with the requirements of the Virginia ESC Law and Regulations.

2.4 When the land disturbing activity requires coverage under the VSMP Construction Permit, the SWPPP must also include a copy of the VSMP Construction Permit, the VSMP Construction Permit Registration Information form LD-445, the SWPPP Certification form LD-445E and the VSMP Construction Permit coverage letter received from DCR showing a project specific registration number.

2.5 The SWPPP is to include any off site support facilities used exclusively for the land disturbance activity (e.g., borrow and disposal sites, the contractor's storage and fueling areas, etc.).

2.6 For those land disturbance activities requiring coverage under the VSMP Construction Permit, Section II B.1. of the General Permit section of the VSMP Regulations (4VAC50-60-1170) requires the SWPPP to be signed by a person so identified in Section III K.2 of that same document. For a State Agency, that person is the principal executive officer or his designee.

2.7 Many of the items required in the SWPPP are typically contained in the construction plans (or other such documents) by means of the erosion and sediment control plans, post construction stormwater management plans, etc. and in other VDOT documents such as the R&B Standards and Specifications which can be incorporated into the SWPPP by reference.

3.0 LD-445E

3.1 For those land disturbance activities requiring coverage under the VSMP Construction Permit, the Permit requires that the SWPPP for any covered off site support facilities to be developed and included with the SWPPP for the primary land disturbance activity prior to issuance of permit coverage.

3.2 On most VDOT land disturbing activities, it is the responsibility of the contractor or other such person performing the land disturbance activity to identify the location of the off site support facilities and provide the stormwater pollution prevention plan for such to the project engineer/RLD for review and approval.

3.3 Since the VSMP Construction Permit coverage for VDOT land disturbance activities is normally obtained prior to the identification of the off site support areas, a mechanism is required whereby the project files can be documented and DCR can be assured that all of the information for the off site support facilities, as well as other required information not available at the time the VSMP Construction Permit coverage is applied for, has been or will be included in the SWPPP for the land disturbance activity. The mechanism to be used for this purpose will be SWPPP Certification Form LD-445E.

3.3.1 Form LD-445E is also to be used to identify the VDOT person responsible for the inspection of the erosion and sediment control facilities.

3.3.2 The DCR has approved the signature of the RLD on the LD-445E form as meeting the SWPPP signatory requirements contained in Section II B.1. of the General Permit section of the VSMP Regulations (4VAC50-60-1170).

3.3.3 Form LD-445E is to be completed by the RLD for **all** regulated land disturbing activities requiring VSMP Construction Permit Coverage and/or an ESC Plan/SWPPP.

3.3.4 A copy of completed form LD-445E is to be retained with the other SWPPP documents for the land disturbance activity.

3.3.5 For those land disturbing activities requiring coverage under the VSMP Construction Permit, the completed LD-445E form is to be forwarded to the District VSMP Construction Permit Coordinator for inclusion with other VSMP Construction Permit data that is forwarded monthly to the Central Office VSMP Construction Permit Coordinator.

4.0 SWPPP GENERAL INFORMATION SHEETS

4.1 In order to provide a clear understanding of what is required in a SWPPP and to provide a reference as to where those items are located within the contract/construction documents, a set of SWPPP General Information Sheets has been developed. The SWPPP General Information Sheets provide a summary of the information required in Section II D. of the General Permit section of the VSMP Regulations (4VAC50-60-1170) and, where not included on the General Information Sheets, provide a reference to where that information can be found within the contract/construction documents for the land disturbance activity (e.g., the construction plans or other such documents, the VDOT R&B Standards and/or Specifications, contractor supplied documents, etc.).

4.2 The SWPPP General Information Sheets incorporate many of the notes previously included in the ESC General Notes as well as those necessary to identify and describe the post construction stormwater management plan for the land disturbance activity (if applicable).

4.3 The SWPPP General Information Sheets are to be included in the plan set (or other such documents) for all land disturbance activities requiring a VSMP Construction Permit and/or an erosion and sediment control plan. Completion and inclusion of the SWPPP General Information Sheets in the contract documents satisfies one of the many requirements contained in the VSMP Construction Permit. Those persons who oversee or perform activities covered by the VSMP Construction Permit must review and understand all of the conditions and requirements contained within that permit.

4.4 The SWPPP General Information Sheets are updated from time to time to clarify and/or include additional requirements as a result of changes to the VSMP Construction Permit and/or the VDOT's Approved ESC and SWM Standards and Specifications. Prior to finalization of the construction plans or other such documents for a proposed land disturbance activity, the Project Manager or other such project authority is to verify that the most recent SWPPP General Information Sheets are included.

4.5 The SWPPP General Information Sheets have been developed in two formats as follows:

4.5.1 Available in the CADD sheet 2000 cell library (referenced as SWPPP1, SWPPP2 & SWPPP3) for use with those land disturbance activities that have a formal set of construction plans (i.e., those developed under a Minimum (M) Plan or Complete (C) Plan Process).

4.5.2 Available in Falcon under the Engineering Services' eng-scr directory (No Plan sub-directory) as an 8.5 X 11 word document for use with those land disturbance activities developed under a No (N) Plan Process or for maintenance activities.

4.6 The SWPPP General Information Sheets are to be completed by the ESC Plan Designer, the Hydraulic Engineer or other such person who has the responsibility for developing the ESC and post construction SWM Plan (if applicable) for the land disturbance activity.

4.7 Information required by those notes on the SWPPP General Information Sheets designated with an asterisk is to be supplied/completed by the contractor or the VDOT RLD, as appropriate.

4.8 All information/notes in Sections I through VI of the SWPPP General Information Sheets are applicable to land disturbance activities requiring coverage under the VSMP Construction Permit.

4.9 For land disturbance activities not requiring coverage under the VSMP Construction Permit but requiring an ESC Plan, some information noted on the SWPPP General Information Sheets, specifically that in Section IV (notes 2 through 6) and Sections V and VI, may not be required. Those notes/information not applicable to a specific land disturbance activity should be noted as "Not applicable to this land disturbance activity".

4.10 For those activities requiring coverage under the VSMP Construction Permit, Section V of the SWPPP General Information Sheets requires a location map that **clearly** identifies the project location and all surface waters (including names where applicable), such as rivers, streams, lakes, ponds, etc., within a one mile radius of the project site.

4.10.1 Instructions for placing a location map in Section V can be found at the following web address:

4.10.1.1 For projects with a formal set of construction plans:
http://www.virginiadot.org/business/locdes/LDHydraulics.asp

4.10.1.2 For No Plan projects or maintenance activities:
http://www.virginiadot.org/business/locdes/LDHydraulics.asp

4.10.2 Those unable to access the noted sites should contact the District or Central Office Hydraulics Section, as appropriate.

4.10.3 Other methods that produce the desired map may be used in lieu of those noted.

4.11 Except for the “In Service Date”, the permanent BMP information (when applicable) in Section VI is to be completed by the Hydraulic Engineer (or other such person developing the post construction SWM Plan) and is to be based on the pre-construction design. This information is to be updated if, and as, any changes to the post construction SWM Plan are authorized during the construction phase of activity. Such changes are to be made as a formal revision to the plans. When submitting a request for termination of the VSMP Construction Permit coverage, the RLD is to add the date that the facility was placed into service as a permanent BMP to the other information in the Permenant BMP table and attach a copy of this table to the LD-445D form.

4.12 Some of the notes on the General Information Sheets require project specific user input. Some examples of the information required are as follows:

4.12.1 Section I General

4.12.1.1 Note 1 - Activity Description (Examples)

- This roadway construction project consists of adding two additional parallel lanes to an existing two lane rural roadway facility.
- This roadway construction project consists of improving an existing urban roadway intersection by adding left turn and right turn lanes.
- This roadway construction project consists of replacement of an existing bridge with a new bridge and improvements to the existing roadway approaches.
- This roadway construction project consists of widening an existing urban street and adding additional turn lanes.
- This roadway maintenance project consists of re-grading and enlarging the roadside ditches and replacing drainage pipes along an existing rural roadway.
- This roadway maintenance project consists of re-grading the roadside ditches and replacing deteriorated drainage pipes along an existing rural roadway in order to reestablish original grade and/or hydraulic capacity.

4.12.1.2 Note 6 - Critical Areas (Example)

- There is one farm pond located 1500’ north of Station 29+00 Route 602 and an existing perennial stream located 1000’ east of and parallel to Route 55 between Stations 204+00 and 212+00.

4.12.2 Section II Erosion and Sediment Control

4.12.2.1 Note 1 - Variances (Example)

- A variance to decrease the height of silt fence to 26” approved by letter from the Department of Conservation and Recreation’s Abingdon Office dated July 15, 2006.

5.0 SWPPP DOCUMENTS

5.1 For VDOT land disturbance activities, the required documents for a SWPPP shall include, but are not limited to:

1. The construction plans/documents.
2. The SWPPP General Information Sheets (with all notes completed with appropriate information).
3. The ESC Plan.
4. The post construction SWM Plan (if applicable).
5. The VDOT R&B Standards and Specifications, Supplemental Specifications, Special Provisions and Special Provision Copied Notes.
6. A copy of the VSMP General Permit For Discharges Of Stormwater From Construction Activities (Construction Permit) (when applicable).
7. A copy of the VSMP Construction Permit coverage letter received from DCR (when applicable).
8. A copy of the VSMP Construction Permit Registration Information form LD-445, (when applicable).
9. A copy of the SWPPP Certification form LD-445E
10. Documents required to be developed by the contractor for erosion and sediment control and stormwater pollution prevention associated with any support facilities.
11. All ESC inspection reports.
12. All ESC and SWM design computations and supporting data.

5.2 All documents related to the SWPPP for a land disturbance activity (except for the ESC and SWM design computations and supporting data) shall be maintained at the activity site and shall be readily available for use by those with SWPPP implementation responsibilities. All documents related to the SWPPP for a land disturbance activity shall be readily available for review by others upon request during normal working business hours. SWPPP related information not included in the construction plans/documents, the VDOT R&B Standards, Specifications, Supplemental Specifications, Special Provisions or Special Provision Copied Notes and the ESC and SWM design computation files is to be kept in a separate paper and/or electronic file. Where no facilities are available at the activity site to maintain the SWPPP documents, they are to be kept at a location convenient to the activity site where they will be readily available for use by those with SWPPP implementation responsibilities and would be available for review by others upon request during normal business working hours. Where the SWPPP documents are not stored on-site, a copy of such documents, except for the ESC and SWM engineering calculations and documentation, shall be in the possession of those with day to day operational control over the implementation of the SWPPP (e.g. the RDL, ESC Inspector, etc.) whenever they are on site.

6.0 SWPPP COMPONENTS

6.1 The following includes the major components of a SWPPP, the person(s) responsible for ensuring that the component is addressed in the SWPPP for a specific land disturbing activity and how that component is addressed in the construction plans or other such documents for a VDOT land disturbing activity.

6.1.1 A copy of the VSMP Construction Permit registration statement and coverage letter (when applicable).

- The designated RLD ensures that a copy of the VSMP Construction Permit Registration Information form LD-445, a copy of the SWPPP Certification Form LD-445E and the VSMP Construction Permit coverage letter received from DCR is maintained in the SWPPP file.

6.1.2 A copy the VSMP Construction Permit (when applicable).

- The designated RLD ensures that a copy is maintained in the SWPPP file.

6.1.3 A narrative description of the nature of the construction activity, including the function of the project.

- The ESC Plan Designer incorporates project specific information into appropriate note(s) on the SWPPP General Information Sheets.

6.1.4 The intended sequence and timing of activities that disturb soils at the site (e.g., grubbing, excavation, grading, utilities and infrastructure installation).

- The Contractor or other such person develops/supplies project specific information. The designated RLD ensures that the information is maintained in the SWPPP file.

6.1.5 A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated.

- The Contractor or other such person develops/supplies project specific information. The designated RLD ensures that the information is maintained in the SWPPP file.

6.1.6 Estimates of the total area expected to be disturbed by excavation, grading, or other construction activities including off-site borrow and fill areas.

- The ESC Plan Designer obtains the information and incorporates it into the appropriate note on the SWPPP General Information Sheets.

6.1.7 A description of any other potential pollutant sources, such as vehicle fueling, storage of fertilizers or chemicals, sanitary waste facilities, etc.

- The Contractor or other such person develops/supplies project specific information. The designated RLD ensures that the information is maintained in the SWPPP file.

6.1.8 Identification of the nearest receiving waters at or near the construction site that will receive discharges from disturbed areas of the project.

- The ESC Plan Designer determines the information and incorporates it into the appropriate note on the SWPPP General Information Sheets.

6.1.9 The location and description of any discharge associated with industrial activity other than construction at the site. This includes stormwater discharges from dedicated asphalt plants and dedicated concrete plants that are covered by the VSMP Construction Permit for the project.

- This information is covered by a standard note on the SWPPP General Information Sheets.

6.1.10 A legible general location map (e.g., USGS quadrangle map, a portion of a city or county map, or other map) with sufficient detail to identify the location of the construction activity and surface waters within one mile of the construction activity.

- The ESC Plan Designer or the Hydraulic Engineer develops and incorporates the location map into Section V of the SWPPP General Information Sheets.

6.1.11 A legible site map/plan identifying the following:

6.1.11.1 Directions of stormwater flow and approximate slopes anticipated after major grading activities.

- The ESC Plan Designer ensures that the appropriate information (e.g., grading contours, typical sections, profiles and/or cross sections) is included in the construction plans or other such documents.

6.1.11.2 Areas of soil disturbance and areas of the site which will not be disturbed.

- The ESC Plan Designer ensures that the appropriate information (e.g., plan view construction limits and/or typical sections/cross sections) is included in the construction plans or other such documents.

6.1.11.3 Locations of major structural and nonstructural control measures identified in the SWPPP, including those that will be permanent after construction activities have been completed.

- The ESC Plan Designer ensures that the appropriate information is included in the construction plans or other such documents.

6.1.11.4 Locations where stabilization practices are expected to occur.

- The ESC Plan Designer ensures that the appropriate information (e.g., plan view construction limits and/or typical sections/cross sections) is included in the construction plans or other such documents.

6.1.11.5 Locations of surface waters.

- The ESC Plan Designer ensures that the appropriate information is included in the construction plans or other such documents.

6.1.11.6 Locations where concentrated stormwater discharges from the construction site.

- The ESC Plan Designer ensures that the appropriate information is included in the construction plans or other such documents.

6.1.11.7 Locations of off-site material, waste, borrow or equipment storage areas covered by the SWPPP.

- The Contractor or other such person supplies project specific information. The designated RLD ensures that the information is maintained in the SWPPP file.

6.1.11.8 Locations of other potential pollutant sources, such as vehicle fueling, storage of chemicals, concrete wash-out areas, sanitary waste facilities, including those temporarily placed on the construction site, etc.

- The Contractor or other such person supplies project specific information. The designated RLD ensures that the information is maintained in the SWPPP file.

6.1.11.9 Areas where final stabilization has been accomplished.

- The Contractor or other such person supplies project specific information. The designated RLD ensures that the information is maintained in the SWPPP file.

6.1. 12 The SWPPP shall include a description of all control measures that will be implemented as part of the construction activity to minimize pollutants in stormwater discharges. For each major construction activity identified, the SWPPP shall clearly describe appropriate control measures, the general sequencing during the construction process in which the control measures will be implemented, and which operator is responsible for the control measure's implementation.

- The ESC Plan Designer develops ESC Plan and SWPPP for inclusion in the construction plans/documents. The Contractor or other such person provides proposed revisions to ESC Plan and SWPPP as necessary to meet differing field conditions or construction sequencing. The VDOT ESC Inspector reviews and the RLD approves any changes to ESC Plan and SWPPP. The RLD ensures that all required information is maintained in the SWPPP file in accordance with Section 107.16(e) of the 2007 Road and Bridge Specifications.

6.1.13 The SWPPP shall include a description of, and all necessary calculations supporting, all erosion and sediment control measures that will be installed during the construction process to control pollutants in stormwater discharges from the construction site.

- The ESC Plan Designer develops ESC Plan and required calculations. The ESC Plan is incorporated into the construction plans/documents. The ESC calculations are maintained in the project hydraulic files and the location of such files is documented by the ESC Plan Designer in the appropriate note on the SWPPP General Information Sheets.

6.1.14 The SWPPP shall describe measures to prevent the discharge of solid materials, including building materials, garbage, and debris to state waters, except as authorized by a Clean Water Act § 404 permit.

- This information covered by a standard note on the SWPPP General Information Sheets.

6.1.15 The SWPPP shall describe control measures used to comply with applicable state or local waste disposal, sanitary sewer or septic system regulations.

- This information covered by a standard note on the SWPPP General Information Sheets.

6.1.16 The SWPPP shall include a description of construction and waste materials expected to be stored on-site with updates as appropriate. The SWPPP shall also include a description of controls including storage practices, to minimize exposure of the materials to stormwater, and for spill prevention and response.

- The Contractor or other such person develops/supplies project specific information. The designated RLD reviews and approves the information and ensures that copies of such are maintained in the SWPPP file.

6.1.17 The SWPPP shall include a description of, and all necessary calculations supporting, all post-construction stormwater management measures that will be installed prior to the completion of the construction process to control pollutants in stormwater discharges after construction operations have been completed.

- The Hydraulic Engineer develops the post construction SWM Plan and required calculations. The post construction SWM Plan is incorporated into the construction plans/documents. The post construction SWM calculations are maintained in the project hydraulic files and the location of such files is documented by the Hydraulic Engineer in the appropriate note on the SWPPP General Information Sheets.

6.1.18 The SWPPP shall include a description of pollutant sources from off-site support areas and a description of control measures that will be implemented at those sites to minimize pollutant discharges.

- The Contractor or other such person develops/supplies project specific information. The designated RLD reviews and approves the information and ensures that copies of such are maintained in the SWPPP file.

6.1.19 The name and phone number of qualified personnel conducting the ESC inspections shall be included in the SWPPP.

- The VDOT RLD provides the appropriate information on SWPPP Certification form LD-445E and ensures a copy is maintained in the SWPPP file.

6.1.20 A report summarizing the scope of the ESC inspections, names and qualifications of personnel making the inspections, the dates of the inspections, major observations relating to the implementation of the SWPPP, and any actions taken.

- The Contractor's Erosion and Sediment Control Contractor Certified (ESCCC) person conducts initial inspections and completes the Construction Runoff Control Inspection Form C-107. The VDOT Certified ESC Inspector verifies inspection information on Form C-107 and the RLD ensures that all of the C-107 forms are maintained in the SWPPP file.

6.1.21 The pollutant identified in a Waste Load Allocation (WLA) as of the effective date of the VSMP Construction Permit must be specified in the SWPPP. The SWPPP shall include strategies and control measures to ensure consistency with the assumptions and requirements of the Total Maximum Daily Load (TMDL) WLA that apply to the operator's discharge.

- The ESC Plan Designer incorporates pollutant information into the appropriate note on the SWPPP General Information Sheets and ensures that the ESC and post construction SWM Plans consider requirements of the TMDL WLA.

7.0 FORMS

7.1 LD-445	VSMP Construction Permit Registration Information
7.2 LD-445D	VSMP Construction Permit Termination Notice
7.3 LD-445E	Stormwater Pollution Prevention Plan (SWPPP) Certification
7.4 C-107	Construction Runoff Control Inspection Form

ROADSIDE DEVELOPMENT SEEDING FOR ACTIVE CONSTRUCTION - MOUNTAIN REGION - WorkSheet for Roadside Managers

PROJECT:

PPMS#

DATE:
ISSUED BY:

Seed Selection within Nutrient Management Guidelines:**Step 1**. Determine if the site will be seeded in the Dormant or Growing Period. Seeding of CORE MIX will be most effective if completed from March 15 to May 31 and Aug 1 through Oct 31, as these are periods of optimal establishment for cool season grasses. Over-seeding should be completed during this time of optimal establishment. If the project schedule dictates regular seeding during the Dormant Period or June - July than the establishment of the turf may be hindered. A Dormant Period Temporary Seeding mix should be used during the dormant period and may be used in the August through October period , based on weather and field conditions.

Approximately _____ Acres will be disturbed on this project and will require the establishment of **persistent and perennial grasses and/or legumes.**

Dormant Period

NOV	DEC	JAN	FEB	MARCH
1-30	1-31	1-31	1-29	1-15

Growing Period

MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT
15-31	1-30	1-31	1-30	1-31	1-31	1-30	1-31

Step 2. Determine if the site will be seeded with a Permanente Seed Mix or Temporary Seed Mix within each Period (Shading indicates best time of year to plant).

Temporary Seed Mix

Dormant Period Seeding

Code	lbs/A	Description
D-1	100	20% Barley, Cereal Rye(Secale Cerial) or Winter Wheat & 80% Certified Tall Fescue
D-2	10	100% Barley, Cereal Rye(Secale Cerial) or Winter Wheat
D-3		

Growing Period Seeding

Code	lbs/A	Description
G-1	100	20% Foxtail Millet & 80% Certified Tall Fescue
G-2		

NOTE: The temporary seed, as directed by the Engineer, is to be used only on areas that are to be regraded, later disturbed or left dormant for more than 15 days.

Lime may be applied, fertilizer can be applied at 50% of Nutrient Management Rate. Fertilizer shall **NOT** be applied when the ground is frozen.

Erosion Control Mulch, as directed by the Engineer, is to be used on areas that are to be left dormant for more than 15 days between Dec 1 and February 29.
Erosion Control Mulch, as listed on the "VDOT Approved Product List," shall be applied in accordance with the manufacture's recommendations.
Erosion Control Mulch (or approved method) shall provide 100% coverage of all denuded areas of land.

Permanent Seed Mix for Regular Seeding and Over Seeding (Core Mix)

Code	lbs/A	Description
1	70	100% Certified Fine Fescue (Chewings, Creeping Red, Hard or Sheep)
2	100	100% Certified Tall Fescue
3	100	50% Certified Fine Fescue (Chewings, Creeping Red, Hard or Sheep) & 50% Certified Tall Fescue
4	20	100% Orchardgrass
5	0	No Natives
6		
7		

Over Seeding Note: Use 100% of seed mixture supplied. The Engineer will require the contractor to perform over seeding when the density of the persistent perennial cover is between 50-75%. Recommendations for the application of seed mixtures, fertilizer, lime, etc are to be obtained from the District Roadside Manager if less than 50% ground cover density of a persistent perennial cover as specified in the seeding mixture is obtained.

Nurse and Companion Species (Additives)

Code	lbs/A	Description
A	10	100% Barley, Cerial Rye (Secale cereal) or Winter Wheat (Dormant Period Nurse Crop)
B	10	100%Foxtail Millet (Growing Period Nurse Crop)
C	30	**100% Crown Vetch* (Companion)
D	10	**100% Sericia Lespedeza* (Companion)
E	10	100% Birdfoot Trefoil* (Companion)
F	10	100% White Clover
G		
H		

A **Nurse** crop is annual species such as rye and millet are temporary varieties and are not considered permanent vegetative cover.

A **Companion** species is perennial grass and/or legumes added to the Permanente Seed Mix to enhance the probability of establishing a vegetative cover.

*Legumes should be planted in the spring, and fertilizer should be applied at the Nutrient Management Rate. Legume seed shall be inoculated with the appropriate strain and rate of bacteria. For hydroseeding, use three times the dry seeding rate of inoculant. Sericia lespedeza seed must be hulled if planted in the Growing period, and un-hulled if planted in the Dormant period.

**To be seeded on sites with greater than 3:1 slope and other area that is designated as an area that will not be mowed. Other legumes or listed companion species can be seed on non-mow and mow areas.

ROADSIDE DEVELOPMENT SEEDING FOR ACTIVE CONSTRUCTION - MOUNTAIN REGION - Worksheet for Roadside Managers

PROJECT:

Step 3. The District Roadside Manager completes the Seeding Schedule and Seeding Summarys.

PPMS#

DATE:
ISSUED BY:

Seeding Schedule

Assign Permanant Seed Mix with Nurse and Companion Species

Project Number	Project Area	NON-MOW	NOW	NON-MOW	NOW	NON-MOW	NOW
		Dormant Period Nov 1 - March 15		Growing Period Cool Season Feb 15* - May 31 Aug 1 - Oct 31		Growing Period Warm Season June 1 - July 31	
** Fine Fescue Type							

* Seed that is expected to lay dormant on site may be planted outside the cool and warm season Growing Period.
**Specify type as Chewings, Creeping Red, Hard and/or Sheep Fescue. May mix types.

Seeding Summary

Project Number	Topsoil 2" Class		Seeding				
	A	B	Regular Seeding	Temporary Seeding ɭ	Over Seeding	Legume Seeding	Legume Over Seeding
	Acres		lbs	lbs	lbs	lbs	lbs
0							
0							
0							
0							
0							
0							
Total			0	0			
Pay Item Quantities	0	0	0		0	0	0

ɭ **Temporary Seeding** quantities are included with Regular Seeding pay quantities.

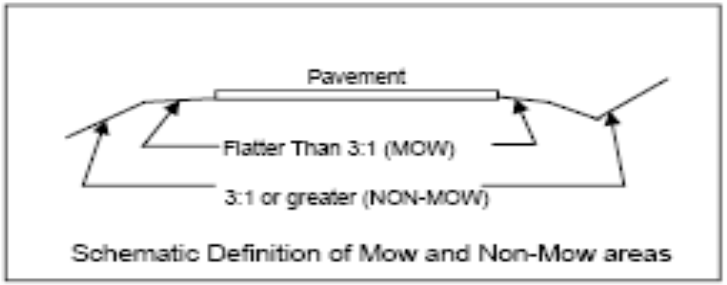
Note: All seed must be in conformance with the current Nutrient Management Plan and with VDOT seed specifications for Grasses and Legumes and be provided at the project site in bags labeled and not opened for use on VDOT projects with a green tag certifying inspection of the Virginia Crop Improvement Association.

Mulch and Topsoil Specifications

Type I mulch (Straw) to be used on newly seeded areas adjacent to all waterways, wetlands, swamps, sinkholes, or any area in which drainage flows toward areas under the jurisdiction of the environmental regulatory agencies. Type I shall be applied to provide a minimum of 90% coverage. Type I mulch shall be tacked with Fiber mulch at the rate of 750 lbs per acre and/or mulch tackifier.

Type II mulch (Wood Fiber Mulch) may be substituted for Type I mulch at the recommendation of the District Roadside Manager. Type II mulch shall be applied at a rate of 1500 (net dry weight) per acre to provide a minimum of 90 percent coverage, and shall be applied over the seed in a separate application.

All topsoil is to be free of hard lumps, clods, rocks and foreign debris, and is to be hand raked to tie into existing lawns.



Schematic Definition of Mow and Non-Mow areas

ROADSIDE DEVELOPMENT SEEDING FOR ACTIVE CONSTRUCTION - COASTAL PLAIN REGION - WorkSheet for Roadside Managers

Seed Selection within Nutrient Management Guidelines: **Step 1**. Determine if the site will be seeded in the Dormant or Growing Period. Seeding of CORE MIX will be most effective if completed from March 15 to May 31 and Aug 1 through Oct 31, as these are periods of optimal establishment for cool season grasses. Over-seeding should be completed during this time of optimal establishment. If the project schedule dictates regular seeding during the Dormant Period or June - July then the establishment of the turf may be hindered. A Dormant Period Temporary Seeding mix should be used during the dormant period and may be used in the August through October period , based on weather and field conditions.

PROJECT:

PPMS#

DATE:

ISSUED BY:

Approximately _____ Acres will be disturbed on this project and will require the establishment of **persistent and perennial grasses and/or legumes.**

← Dormant Period →				← Growing Period →								
NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV
15-30	1-31	1-31	1-29	1--31	1-30	1-31	1-30	1-31	1-31	1-30	1-31	1-15

Step 2. Determine if the site will be seeded with a Permanent Seed Mix or Temporary Seed Mix within each Period (Shading indicates best time of year to plant).

Temporary Seed Mix

Dormant Period Seeding

Code	lbs/A	Description
D-1	100	20% Barley, Cereal Rye(Secale Cerial) or Winter Wheat & 80% Certified Tall Fescue
D-2	10	100% Barley, Cereal Rye(Secale Cerial) or Winter Wheat
D-3		

Growing Period Seeding

Code	lbs/A	Description
G-1	100	20% Foxtail Millet & 80% Certified Tall Fescue
G-2		

NOTE: The temporary seed, as directed by the Engineer, is to be used only on areas that are to be regraded, later disturbed or left dormant for more than 15 days.

Lime may be applied, fertilizer can be applied at 50% of Nutrient Management Rate. Fertilizer shall **NOT** be applied when the ground is frozen.

Erosion Control Mulch, as directed by the Engineer, is to be used on areas that are to be left dormant for more than 15 days between Dec 1 and February 29.
Erosion Control Mulch, as listed on the "VDOT Approved Product List," shall be applied in accordance with the manufacture's recommendations.
Erosion Control Mulch (or approved method) shall provide 100% coverage of all denuded areas of land.

Permanent Seed Mix for Regular Seeding and Over Seeding (Core Mix)

Code	lbs/A	Description
1	70	100% Certified Fine Fescue (Chewings, Creeping Red, Hard or Sheep)
2	100	100% Certified Tall Fescue
3	100	50% Certified Fine Fescue (Chewings, Creeping Red, Hard or Sheep) & 50% Certified Tall Fescue
4		
5	0	No Natives
6	40	*100% Bermuda hulled or un-hulled
7		

Over Seeding Note: Use 100% of seed mixture supplied. The Engineer will require the contractor to perform over seeding when the density of the persistent perennial cover is between 50-75%. Recommendations for the application of seed mixtures, fertilizer, lime, etc are to be obtained from the District Roadside Manager if less than 50% ground cover density of a persistent perennial cover as specified in the seeding mixture is obtained.

*Must be hulled if planted in the Growing Period, and un-hulled if planted in the Dormant Period.

Nurse and Companion Species (Additives)

Code	lbs/A	Description
A	10	100% Barley, Cerial Rye (Secale cereal) or Winter Wheat (Dormant Period Nurse Crop)
B	10	100%Foxtail Millet (Growing Period Nurse Crop)
C	30	**100% Crown Vetch* (Companion)
D	10	**100% Sericia Lespedeza* (Companion)
E	10	100% Birdfoot Trefoil* (Companion)
F	10	100% White Clover* (Companion)
G	20	**100% Weeping Lovegrass
H		

A **Nurse** crop is annual species such as rye and millet are temporary varieties and are not considered permanent vegetative cover.

A **Companion** species is perennial grass and/or legumes added to the Permanent Seed Mix to enhance the probability of establishing a vegetative cover.

*Legumes should be planted in the spring, and fertilizer should be applied at the Nutrient Management Rate. Legume seed shall be inoculated with the appropriate strain and rate of bacteria. For hydroseeding, use three times the dry seeding rate of inoculant. Sericia lespedeza seed must be hulled if planted in the Growing period, and un-hulled if planted in the Dormant period.

**To be seeded on sites with greater than 3:1 slope and other area that is designated as an area that will not be mowed. Other legumes or listed companion species can be seed on non-mow and mow areas.

ROADSIDE DEVELOPMENT SEEDING FOR ACTIVE CONSTRUCTION - COASTAL PLAIN REGION - Worksheet for Roadside Managers

PROJECT:

PPMS#

DATE:

ISSUED BY:

Step 3. The District Roadside Manager completes the Seeding Schedule and Seeding Summarys.

Seeding Schedule

Assign Perminante Seed Mix with Nurse and Companion Species

Project Number	Project Area	NON-MOW	NOW	NON-MOW	NOW	NON-MOW	NOW
		Dormant Period Nov 15 - Feb 28/29		Growing Period Cool Season Feb 1* - May 14 Aug 16 - Nov 14		Growing Period Warm Season May 15 - Aug 15	
** Fine Fescue Type							

* Seed that is expected to lay dormant on site may be planted outside the cool and warm season Growing Period.
**Specify type as Chewings, Creeping Red, Hard and/or Sheep Fescue. May mix types.

Seeding Summary

Project Number	Topsoil 2" Class		Seeding				
	A	B	Regular Seeding	Temporary Seeding ι	Over Seeding	Legume Seeding	Legume Over Seeding
	Acres		lbs	lbs	lbs	lbs	lbs
0							
0							
0							
0							
0							
0							
Total			0	0			
Pay Item Quantities	0	0	0		0	0	0

ι **Temporary Seeding** quantities are included with Regular Seeding pay quantities.

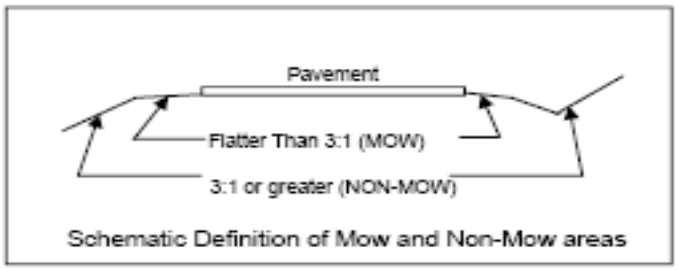
Note: All seed must be in conformance with the current Nutrient Management Plan and with VDOT seed specifications for Grasses and Legumes and be provided at the project site in bags labeled and not opened for use on VDOT projects with a green tag certifying inspection of the Virginia Crop Improvement Association.

Mulch and Topsoil Specifications

Type I mulch (Straw) to be used on newly seeded areas adjacent to all waterways, wetlands, swamps, sinkholes, or any area in which drainage flows toward areas under the jurisdiction of the environmental regulatory agencies. Type I shall be applied to provide a minimum of 90% coverage. Type I mulch shall be tacked with Fiber mulch at the rate of 750 lbs per acre and/or mulch tackifier.

Type II mulch (Wood Fiber Mulch) may be substituted for Type I mulch at the recommendation of the District Roadside Manager. Type II mulch shall be applied at a rate of 1500 (net dry weight) per acre to provide a minimum of 90 percent coverage, and shall be applied over the seed in a separate application.

All topsoil is to be free of hard lumps, clods, rocks and foreign debris, and is to be hand raked to tie into existing lawns.



Schematic Definition of Mow and Non-Mow areas

ROADSIDE DEVELOPMENT SEEDING FOR ACTIVE CONSTRUCTION - Piedmont REGION - WorkSheet for Roadside Managers

Seed Selection within Nutrient Management Guidelines: **Step 1**. Determine if the site will be seeded in the Dormant or Growing Period. Seeding of CORE MIX will be most effective if completed from March 15 to May 31 and Aug 1 through Oct 31, as these are periods of optimal establishment for cool season grasses. Over-seeding should be completed during this time of optimal establishment. If the project schedule dictates regular seeding during the Dormant Period or June - July then the establishment of the turf may be hindered. A Dormant Period Temporary Seeding mix should be used during the dormant period and may be used in the August through October period , based on weather and field conditions.

PROJECT:

PPMS#

DATE:

ISSUED BY:

Approximately _____ Acres will be disturbed on this project and will require the establishment of **persistent and perennial grasses and/or legumes.**

← Dormant Period →				← Growing Period →								
NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV
15-30	1-31	1-31	1-29	1--31	1-30	1-31	1-30	1-31	1-31	1-30	1-31	1-15

Step 2. Determine if the site will be seeded with a Permanent Seed Mix or Temporary Seed Mix within each Period (Shading indicates best time of year to plant).

Temporary Seed Mix

Dormant Period Seeding

Code	lbs/A	Description
D-1	100	20% Barley, Cereal Rye(Secale Cerial) or Winter Wheat & 80% Certified Tall Fescue
D-2	10	100% Barley, Cereal Rye(Secale Cerial) or Winter Wheat
D-3		

Growing Period Seeding

Code	lbs/A	Description
G-1	100	20% Foxtail Millet & 80% Certified Tall Fescue
G-2		

NOTE: The temporary seed, as directed by the Engineer, is to be used only on areas that are to be regraded, later disturbed or left dormant for more than 15 days.

Lime may be applied, fertilizer can be applied at 50% of Nutrient Management Rate. Fertilizer shall **NOT** be applied when the ground is frozen.

Erosion Control Mulch, as directed by the Engineer, is to be used on areas that are to be left dormant for more than 15 days between Dec 1 and February 29.
Erosion Control Mulch, as listed on the "VDOT Approved Product List," shall be applied in accordance with the manufacture's recommendations.
Erosion Control Mulch (or approved method) shall provide 100% coverage of all denuded areas of land.

Permanent Seed Mix for Regular Seeding and Over Seeding (Core Mix)

Code	lbs/A	Description
1	70	100% Certified Fine Fescue (Chewings, Creeping Red, Hard or Sheep)
2	100	100% Certified Tall Fescue
3	100	50% Certified Fine Fescue (Chewings, Creeping Red, Hard or Sheep) & 50% Certified Tall Fescue
4		
5	0	No Natives
6	40	*100% Bermuda hulled or un-hulled
7		

Over Seeding Note: Use 100% of seed mixture supplied. The Engineer will require the contractor to perform over seeding when the density of the persistent perennial cover is between 50-75%. Recommendations for the application of seed mixtures, fertilizer, lime, etc are to be obtained from the District Roadside Manager if less than 50% ground cover density of a persistent perennial cover as specified in the seeding mixture is obtained.

*Must be hulled if planted in the Growing Period, and un-hulled if planted in the Dormant Period.

Nurse and Companion Species (Additives)

Code	lbs/A	Description
A	10	100% Barley, Cerial Rye (Secale cereal) or Winter Wheat (Dormant Period Nurse Crop)
B	10	100%Foxtail Millet (Growing Period Nurse Crop)
C	30	**100% Crown Vetch* (Companion)
D	10	**100% Sericia Lespedeza* (Companion)
E	10	100% Birdfoot Trefoil* (Companion)
F	10	100% White Clover* (Companion)
G	20	**100% Weeping Lovegrass
H		

A **Nurse** crop is annual species such as rye and millet are temporary varieties and are not considered permanent vegetative cover.

A **Companion** species is perennial grass and/or legumes added to the Permanent Seed Mix to enhance the probability of establishing a vegetative cover.

*Legumes should be planted in the spring, and fertilizer should be applied at the Nutrient Management Rate. Legume seed shall be inoculated with the appropriate strain and rate of bacteria. For hydroseeding, use three times the dry seeding rate of inoculant. Sericia lespedeza seed must be hulled if planted in the Growing period, and un-hulled if planted in the Dormant period.

**To be seeded on sites with greater than 3:1 slope and other area that is designated as an area that will not be mowed. Other legumes or listed companion species can be seed on non-mow and mow areas.

ROADSIDE DEVELOPMENT SEEDING FOR ACTIVE CONSTRUCTION - PIEDMONT REGION - Worksheet for Roadside Managers

PROJECT:

Step 3. The District Roadside Manager completes the Seeding Schedule and Seeding Summarys.

PPMS#

DATE:

ISSUED BY:

Seeding Schedule

Assign Perminante Seed Mix with Nurse and Companion Species

Project Number	Project Area	NON-MOW	NOW	NON-MOW	NOW	NON-MOW	NOW
		Dormant Period Nov 1 - March 15		Growing Period Cool Season Feb 15* - May 31 Aug 1 - Oct 31		Growing Period Warm Season June 1 - July 31	
** Fine Fescue Type							

* Seed that is expected to lay dormant on site may be planted outside the cool and warm season Growing Period.
**Specify type as Chewings, Creeping Red, Hard and/or Sheep Fescue. May mix types.

Seeding Summary

Project Number	Topsoil 2" Class		Seeding				
	A	B	Regular Seeding	Temporary Seeding ι	Over Seeding	Legume Seeding	Legume Over Seeding
	Acres		lbs	lbs	lbs	lbs	lbs
0							
0							
0							
0							
0							
0							
Total			0	0			
Pay Item Quantities	0	0	0		0	0	0

ι **Temporary Seeding** quantities are included with Regular Seeding pay quantities.

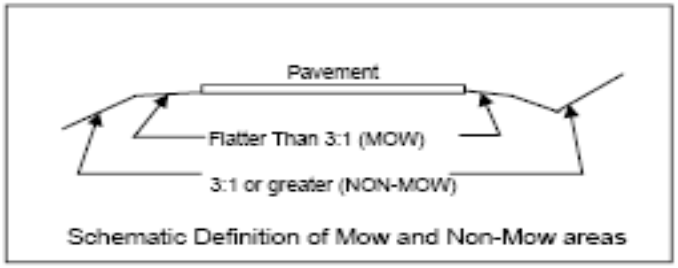
Note: All seed must be in conformance with the current Nutrient Management Plan and with VDOT seed specifications for Grasses and Legumes and be provided at the project site in bags labeled and not opened for use on VDOT projects with a green tag certifying inspection of the Virginia Crop Improvement Association.

Mulch and Topsoil Specifications

Type I mulch (Straw) to be used on newly seeded areas adjacent to all waterways, wetlands, swamps, sinkholes, or any area in which drainage flows toward areas under the jurisdiction of the environmental regulatory agencies. Type I shall be applied to provide a minimum of 90% coverage. Type I mulch shall be tacked with Fiber mulch at the rate of 750 lbs per acre and/or mulch tackifier.

Type II mulch (Wood Fiber Mulch) may be substituted for Type I mulch at the recommendation of the District Roadside Manager. Type II mulch shall be applied at a rate of 1500 (net dry weight) per acre to provide a minimum of 90 percent coverage, and shall be applied over the seed in a separate application.

All topsoil is to be free of hard lumps, clods, rocks and foreign debris, and is to be hand raked to tie into existing lawns.



Schematic Definition of Mow and Non-Mow areas

NUTRIENT MANAGEMENT for ACTIVE CONSTRICTION

Project No. :	PPMS No. :	NMP Issued by :	Date :

INTRODUCTION:

- In accordance with the provisions of the Nutrient Management Plan (NMP) all fertilizer may be applied between applied between March 15th and November 1st. In the Fredericksburg, Hampton Roads and Richmond Districts, fertilizer may be applied from March 1st and November 15th. When the Engineer determines that fertilization must be completed outside the NMP fertilization window, the fertilizer must be applied at the Temporary Seeding fertilizer rate.
- The N fertilizer rate is limited to 45 lbs/acre of nitrogen (1 lbs/1000 ft^2) at each application and separated by at least 30 days. A maximum of 90 lbs/acre (2 lbs/1000 ft^2) of 100% water soluble nitrogen (WSN) may be applied per year. Phosphorus, potassium and lime rates are based on soil test results.
- All fertilizer ratios are given on an N-P_2O_2-K_2O basis.
- There is a difference between the words "pounds of fertilizer per acre" and "pounds of nutrients per area." For example, 98 lbs/acre of 46-0-0 contains 45 lbs/acre of elemental nitrogen (N).
- In order to maximize fertilizer effectiveness and uptake efficiency, soil pH **must be adjusted** to the optimal range of 6.0 to 6.5 whenever fertilizers are applied. For normal soil materials, liming recommendations will be based upon standard agronomic criteria to maintain soil pH between 6.0 and 6.5. Lime rates are based on Tables 3-1 and 3-3 in the Virginia Nutrient Management Standards and Criteria, Revised October 2005. Lime rates supplied by the District Roadside Manager are based on liming materials at 100% CCE. Liming rates for materials that are not 100% CCE (± 10%) must be adjusted accordingly.
- VDOT will recognize environmentally sensitive sites as defined in Section 1A of the 2005 Virginia Nutrient Management Standards and Criteria and limit N and P applications appropriately. Nutrient application setbacks as set forth in Section 1B (e.g. 100 feet from wells or springs, 50 feet from surface water, 50 feet from sinkholes, 50 feet from naturally occurring limestone outcrops and 25 feet from all other naturally occurring rock outcrops) will be rigorously adhered to. However, this plan was developed such that the rate and timing of nutrient applications safeguards water quality and the plan is appropriate for use in environmentally sensitive areas. Nutrients may be applied closer to surface waters when appropriate erosion and sediment control BMP's are in place.
- Soil sampling and testing shall be executed prior to lime and nutrient application for new construction (any time the subsoil is disturbed) or repair of previously vegetated areas, AND the area is greater than 2 acres. (Soil samples should be collected as stated in the current Nutrient Management Plan.)

Type of Seeding	Area Acres	Fertilizer Ratio Lbs. /Ac	Lime Tons/Ac.		Fertilizer Tons	Lime Tons
Seeding on 2" of Class A or B Topsoil						

The Contractor shall submit soil samples for Class A or Class B topsoil analyzed by a Department of Conservation and Recreation approved laboratory; A&L Eastern Agricultural Laboratories, Brookside Laboratories, Spectrum Analytical Laboratories, Virginia Tech Soil Testing Laboratory, or Waters Agricultural Laboratories. **Soil analysis** of topsoil shall including pH, extractable nutrients, soluble salts, mechanical analysis (composition), salinity, percentage of organic content, and USDA soil texture class.

Since the soil sample cannot be submitted by the Contractor until after the project is awarded, the NMP derived fertilizer ratio and lime rate for the Topsoil, will be specified after the start of the project. The District Roadside Manager will determine the amount and ratio of fertilizer that can be applied based on the soil test report and NMP.

Regular Seeding Fertilizer Rate						
Only one application of fertilizer may be applied for the life of the project and will be applied with the Regular Seeding (core mix). The rate and type of fertilizer applied must conform to the NMP for Active Construction (Chapter 10). When the Engineer determines that additional seeding and fertilization is required, a new soil sample must be taken and tested, and the fertilizer rates and type must be applied in accordance with the NMP for Active Construction (Chapter 10). For over-seeding, use Over-seeding Fertilization Rate below. When the Engineer determines that regular seeding and fertilization must be completed outside the NMP fertilization window, fertilizer and lime must be applied at the Temporary Seeding rate. This rate is defined as 50% of the lbs/acre of the fertilizer ratio as specified for Regular Seeding and the lime at the rate of 1 tons/acre with 100% CCE (± 10%). The balance of the fertilizer and the lime (difference between the Regular Seeding and the Temporary Seeding fertilizer and lime rates) may be applied as directed by the Engineer to the same area after the fertilization window has once again opened.						
Temporary Seeding Fertilizer Rate						
The Temporary Fertilizer rate is defined as 50% of the lbs/acre of the fertilizer ratio ($N\text{-}P_2O_2\text{-}K_2O$) specified for Regular Seeding and lime at the rate of 1 tons/acre with 100% CCE (± 10%). The rate of fertilizer ($N\text{-}P_2O_2\text{-}K_2O$), applied after construction resumes, is based on whether or not the site is regraded to expose subsoil materials. 1. If the area receiving the Temporary Seeding fertilizer rate **is** regraded to expose subsoil, apply the Regular Seeding rate of fertilizer and lime. 2. If the area receiving the Temporary Seeding fertilizer rate **is not** regraded then apply only 50% of the Regular Seeding rate of $N\text{-}P_2O_2\text{-}K_2O$ and lime, no sooner than 30 days after previous fertilizer application.						

Over-seeding Fertilizer Rate						
The Engineer will require the contractor to over-seed an area when the existing stand of the permanent vegetative cover, as specified by the Roadside Development Sheet for that job (grass and/or legumes), covers between 50 and 75 percent of the ground. Nurse crop annual species such as rye and millet are temporary varieties and are not considered permanent vegetative cover. If less than 50% of the ground for the site is covered with permanent vegetation, the District Roadside Manager should be contacted to collect a soil sample. Recommendations for the application of seed mixtures, and a new NMP based fertilizer/lime recommendation will be developed based on the soil test report. Over-seeding should always be accompanied by the application of fertilizer and lime as specified in the NMP. The nitrogen application rate is limited to 45 lbs/acre (1 lbs/1000 ft^2) at each application and separated by at least 30 days, therefore over-seeding can be completed only when more than 30 days have passed since Regular Seeding. A maximum of 90 lbs/acre (2 lbs/1000 ft^2) of 100% water soluble nitrogen (WSN) may be applied per year. No additional phosphorus may be applied unless a new soil sample is taken and new NMP recommendations are developed based on the soil test report.						

ROADSIDE DEVELOPMENT NMP SUMMARY						
PROJECT NUMBERS	Fertilizer Ratio (46-0-0)	Fertilizer Ratio (5-10-10)	Fertilizer Ratio (10-10-10)	Fertilizer Ratio (15-30-15)	Fertilizer Ratio (0-46-0)	LIME
	TON	TON	TON	TON	TON	TON

⊗ DENOTES ITEM(S) TO BE PAID FOR ON BASIS OF PLAN QUANTITIES IN ACCORDANCE WITH CURRENT ROAD AND BRIDGE SPECIFICATIONS.

ROADSIDE DEVELOPMENT SHEET - NMP Lime And Fertilizer Calculations

Fertilizer Guidance for Active Construction

Suggested Fertilizer Analysis based on NMP and soil tests

This table provides guidance for the amount of fertilizer that can be applied according to the NMP. These are examples of fertilizers and their rates (lb/A) that can be used to meet each N-P-K ratio as indicated from laboratory soil test levels. Other ratios may be used as long as the desired pounds of nutrients per acre of **N** and P_2O_5 applied are the same. There is no restriction on the amount of **K_2O and lime** that can be applied in addition to the quantity specified. No additional P_2O_5 can be applied **for the term of the project** without a new soil sample and calculation of the desired pounds of nutrients per acre are based on the soil test and this table.

P_2O_5 Level*	Suggested Fertilizer Analysis	Desired Pounds of Nutrients per Acre (N-P_2O_5-K_2O)					Lime
		45-0-0	45-45-45	45-90-45	45-90-90	45-170-90	
Exception**	5-10-10				900 lb/A**		2 ton/A of lime at 100% CCE (±10%)
L- to L	5-10-10 Plus 0-46-0					900 lb/A of 5-10-10 plus175 lb/A of 0-46-0	Soil Test Rate****
L+ to M-	15-30-15			300 lb/A			Soil Test Rate****
M to M+	10-10-10		450 lb/A				Soil Test Rate****

Nitrogen (N) application is limited to 45 lb/A of N (1 lbs/1000 ft²) at each application and separated by at least 30 days with a maximum of 90 lb/A (2 lbs/1000 ft²) **per year**. Contact the District Roadside Manager if fertilizer with a N source with at least 30% Water Insoluble Nitrogen (WIN) is to be used.

Organic Sources of nutrients may be used for only for Active Construction. They should be applied to supply 45-50 lbs/A of plant available nitrogen (PAN).

Nutrient application **set-backs** as set forth in Section 1B (e.g. 100 feet from wells or springs, 50 feet from surface water, 50 feet from sinkholes, 50 feet from naturally occurring limestone outcrops and 25 feet from all other naturally occurring rock outcrops) will be rigorously followed. However, nutrients may be applied closer to surface waters when appropriate erosion and sediment control BMP's are in place.

* These indicate the level of P_2O_5 reported in the soil test, ie. L=Low, M=Medium, H=High, and VH=Very High. When the soil test level of P_2O_5 is at H- or greater, no P may be applied.

** The only time this rate is applied is if the total disturbed area for the project is less than 2 acres AND the subsoil is exposed. This amount of N and P_2O_5 may be applied without a soil test as a one time application.

*** This ratio may be used when P_2O_5 may not be applied OR when a soil test is not taken, but when N is required to improve turf quality.

**** Lime quantities will be calculated based on soil test buffer pH.

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Table 3-1 Lime Recommendations (tons/acre)
Target Soil pH 6.2
Lime Rates based on VA Tech Soil buffer pH (Buffer meq/100g)

Buffer pH	Tons/Acre
6.60	0.00
6.50	0.00
6.40	0.00
6.38	0.25
6.36	0.25
6.34	0.25
6.32	0.50
6.30	0.50
6.28	0.75
6.26	0.75
6.24	0.75
6.22	1.00
6.20	1.00
6.18	1.25
6.16	1.25
6.14	1.50
6.12	1.50
6.10	1.50
6.08	1.75
6.06	1.75
6.04	2.00
6.02	2.00
6.00	2.00
5.95	2.25
5.90	2.50
5.85	2.75
5.80	3.25
5.75	3.50
5.70	3.75
5.65	4.00
5.60	4.25
5.55	4.50
5.50	4.75
5.40	5.25
5.30	5.75

Lime recommendations in the table above are based on the use of a liming material equivalent in neutralizing power to 100% CaCO3. For application rates of liming material that is less than 100% neutralizing power of CaCO3 (pure calcium carbonate) use the table in this section, Lime Rate Adjustment for CCE.

Lime Recommendations Using Other Testing Labs

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

Table 3-2

Lime Application Rate [1] (tons/acre) to achieve desired pH of 6.2 based on SMP Buffer Test

Target Soil pH

Soil-Buffered pH	**Tons/Acre**
6.9	**0.50**
6.8	**1.00**
6.7	**1.50**
6.6	**2.00**
6.5	**2.50**
6.4	**4.00**
6.3	**4.00**

[1] Ag-ground lime of 90% plus total neutralizing power (TNP) or CaCO3 equivalent., and fineness of 40% < 100 mesh, 50% < 60 mesh, 70% < 20 mesh and 95% < 8 mesh. Adjustments in the application rate should be made for liming materials with different particle sizes, or neutralizing value.

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

Lime Rate Adjustment for CCE All Labs

Liming rates (tons/acre) for materials that are not 100% CCE (+ 10%) must be adjusted based on table 3-3. Using the lime application rate to achieve the desired target pH based on the soil test buffer pH, use the table below to adjust that rate based on the % CCE of the liming material to be applied.

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

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

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

ROADSIDE DEVELOPMENT SHEET - NMP Lime And Fertilizer Calculations

Fertilizer Guidance for Active Construction

Suggested Fertilizer Analysis based on NMP and soil tests

This table provides guidance for the amount of fertilizer that can be applied according to the NMP. These are examples of fertilizers and their rates (lb/A) that can be used to meet each N-P-K ratio as indicated from laboratory soil test levels. Other ratios may be used as long as the desired pounds of nutrients per acre of **N** and P_2O_5 applied are the same. There is no restriction on the amount of **K_2O and lime** that can be applied in addition to the quantity specified. No additional P_2O_5 can be applied **for the term of the project** without a new soil sample and calculation of the desired pounds of nutrients per acre are based on the soil test and this table.

P_2O_5 Level*	Suggested Fertilizer Analysis	Desired Pounds of Nutrients per Acre (N-P_2O_5-K_2O)					Lime
		45-0-0	45-45-45	45-90-45	45-90-90	45-170-90	
Exception**	5-10-10				900 lb/A**		2 ton/A of lime at 100% CCE (±10%)
L- to L	5-10-10 Plus 0-46-0					900 lb/A of 5-10-10 plus175 lb/A of 0-46-0	Soil Test Rate****
L+ to M-	15-30-15			300 lb/A			Soil Test Rate****
M to M+	10-10-10		450 lb/A				Soil Test Rate****

Nitrogen (N) application is limited to 45 lb/A of N (1 lbs/1000 ft^2) at each application and separated by at least 30 days with a maximum of 90 lb/A (2 lbs/1000 ft^2) **per year**. Contact the District Roadside Manager if fertilizer with a N source with at least 30% Water Insoluble Nitrogen (WIN) is to be used.

Organic Sources of nutrients may be used for only for Active Construction. They should be applied to supply 45-50 lbs/A of plant available nitrogen (PAN).

Nutrient application **set-backs** as set forth in Section 1B (e.g. 100 feet from wells or springs, 50 feet from surface water, 50 feet from sinkholes, 50 feet from naturally occurring limestone outcrops and 25 feet from all other naturally occurring rock outcrops) will be rigorously followed. However, nutrients may be applied closer to surface waters when appropriate erosion and sediment control BMP's are in place.

* These indicate the level of P_2O_5 reported in the soil test, ie. L=Low, M=Medium, H=High, and VH=Very High. When the soil test level of P_2O_5 is at H- or greater, no P may be applied.

** The only time this rate is applied is if the total disturbed area for the project is less than 2 acres AND the subsoil is exposed. This amount of N and P_2O_5 may be applied without a soil test as a one time application.

*** This ratio may be used when P_2O_5 may not be applied OR when a soil test is not taken, but when N is required to improve turf quality.

**** Lime quantities will be calculated based on soil test buffer pH.

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ISSUED BY:

Table 3-1 Lime Recommendations (tons/acre)
Target Soil pH 6.2
Lime Rates based on VA Tech Soil buffer pH (Buffer meq/100g)

Buffer pH	Tons/Acre
6.60	0.00
6.50	0.00
6.40	0.00
6.38	0.25
6.36	0.25
6.34	0.25
6.32	0.50
6.30	0.50
6.28	0.75
6.26	0.75
6.24	0.75
6.22	1.00
6.20	1.00
6.18	1.25
6.16	1.25
6.14	1.50
6.12	1.50
6.10	1.50
6.08	1.75
6.06	1.75
6.04	2.00
6.02	2.00
6.00	2.00
5.95	2.25
5.90	2.50
5.85	2.75
5.80	3.25
5.75	3.50
5.70	3.75
5.65	4.00
5.60	4.25
5.55	4.50
5.50	4.75
5.40	5.25
5.30	5.75

Lime recommendations in the table above are based on the use of a liming material equivalent in neutralizing power to 100% CaCO3. For application rates of liming material that is less than 100% neutralizing power of CaCO3 (pure calcium carbonate) use the table in this section, Lime Rate Adjustment for CCE.

Lime Recommendations Using Other Testing Labs

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

Table 3-2

Lime Application Rate [1] (tons/acre) to achieve desired pH of 6.2 based on SMP Buffer Test

Target Soil pH

Soil-Buffered pH	**Tons/Acre**
6.9	**0.50**
6.8	**1.00**
6.7	**1.50**
6.6	**2.00**
6.5	**2.50**
6.4	**4.00**
6.3	**4.00**

[1] Ag-ground lime of 90% plus total neutralizing power (TNP) or CaCO3 equivalent., and fineness of 40% < 100 mesh, 50% < 60 mesh, 70% < 20 mesh and 95% < 8 mesh. Adjustments in the application rate should be made for liming materials with different particle sizes, or neutralizing value.

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

Lime Rate Adjustment for CCE **All Labs**

Liming rates (tons/acre) for materials that are not 100% CCE (+ 10%) must be adjusted based on table 3-3. Using the lime application rate to achieve the desired target pH based on the soil test buffer pH, use the table below to adjust that rate based on the % CCE of the liming material to be applied.

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

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

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

Fertilizer Guidance for Active Construction

Suggested Fertilizer Analysis based on NMP and soil tests

This table provides guidance for the amount of fertilizer that can be applied according to the NMP. These are examples of fertilizers and their rates (lb/A) that can be used to meet each N-P-K ratio as indicated from laboratory soil test levels. Other ratios may be used as long as the desired pounds of nutrients per acre of **N** and **P_2O_5** applied are the same. There is no restriction on the amount of **K_2O and lime** that can be applied in addition to the quantity specified. No additional P_2O_5 can be applied **for the term of the project** without a new soil sample and calculation of the desired pounds of nutrients per acre are based on the soil test and this table.

P_2O_5 Level*	**Suggested Fertilizer Analysis**	**Desired Pounds of Nutrients per Acre (N-P_2O_5-K_2O)**					**Lime**
		45-0-0	**45-45-45**	**45-90-45**	**45-90-90**	**45-170-90**	
Exception**	5-10-10				900 lb/A**		2 ton/A of lime at 100% CCE (±10%)
L- to L	5-10-10 Plus 0-46-0					900 lb/A of 5-10-10 plus175 lb/A of 0-46-0	Soil Test Rate****
L+ to M-	15-30-15			300 lb/A			Soil Test Rate****
M to M+	10-10-10		450 lb/A				Soil Test Rate****

Nitrogen (N) application is limited to 45 lb/A of N (1 lbs/1000 ft^2) at each application and separated by at least 30 days with a maximum of 90 lb/A (2 lbs/1000 ft^2) **per year**. Contact the District Roadside Manager if fertilizer with a N source with at least 30% Water Insoluble Nitrogen (WIN) is to be used.

Organic Sources of nutrients may be used for only for Active Construction. They should be applied to supply 45-50 lbs/A of plant available nitrogen (PAN).

Nutrient application **set-backs** as set forth in Section 1B (e.g. 100 feet from wells or springs, 50 feet from surface water, 50 feet from sinkholes, 50 feet from naturally occurring limestone outcrops and 25 feet from all other naturally occurring rock outcrops) will be rigorously followed. However, nutrients may be applied closer to surface waters when appropriate erosion and sediment control BMP's are in place.

* These indicate the level of P_2O_5 reported in the soil test, ie. L=Low, M=Medium, H=High, and VH=Very High. When the soil test level of P_2O_5 is at H- or greater, no P may be applied.

** The only time this rate is applied is if the total disturbed area for the project is less than 2 acres AND the subsoil is exposed. This amount of N and P_2O_5 may be applied without a soil test as a one time application.

*** This ratio may be used when P_2O_5 may not be applied **OR** when a soil test is not taken, but when N is required to improve turf quality.

**** Lime quantities will be calculated based on soil test buffer pH.

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Fertilizer Guidance for Roadside Maintenance

Suggested Fertilizer Analysis based on NMP and soil tests

This table provides guidance for the amount of fertilizer that can be applied according to the NMP. These are examples of fertilizers and their rates (lb/A) that can be used to meet each N-P-K ratio as indicated from laboratory soil test levels. Other ratios may be used as long as the percentages of **N** and **P_2O_5** applied are the same. There is no restriction on the amount of **K_2O and lime** applied. Please remember that up to 90lb of N per acre can be applied in a year, but applications have to be more than 30 days apart. Once sampled, soil test data for a given location may be used for all remaining years under the NMP, and the same amount of fertilizer may be applied yearly. Remember to report all fertilizer and lime applications on a worksheet similar to that attached to the NMP.

P_2O_5 Level*	**Suggested Fertilizer Analysis**	**Desired Pounds of Nutrients per Acre (N-P_2O_5-K_2O)**				**Lime**
		45-0-0	**45-45-45**	**45-90-45**	**45-90-90**	
Exception**	5-10-10				900 lb/A**	2 ton/A of lime at 100% CCE (±10%)
L- to M-	15-30-15			300 lb/A		Soil Test Rate****
L- to M-	15-30-15 with 30% WIN			400 lb/A		Soil Test Rate****
M to M+	10-10-10		450 lb/A			Soil Test Rate****
M to M+	20-20-20		225 lb/A			Soil Test Rate****
H- to VH	46-0-0	98 lb/A***				Soil Test Rate****

N application is limited to **90 lb/A per year**. May use 120lb/A in a year if the N source contains at least 30% Water Insoluble Nitrogen (WIN).

Organic Sources may **not** be used for Roadside Maintenance.

Nutrient application **set-backs** as set forth in Section 1B (e.g. 100 feet from wells or springs, 50 feet from surface water, 50 feet from sinkholes, 50 feet from naturally occurring limestone outcrops and 25 feet from all other naturally occurring rock outcrops) will be rigorously followed. However, nutrients may be applied closer to surface waters when appropriate erosion and sediment control BMP's are in place.

*These indicate the level of P_2O_5 reported in the soil test, ie. L=Low, M=Medium, H=High, and VH=Very High. When the soil test level of P_2O_5 is at H- or greater, no P may be applied.

**If subsoil is exposed and site is less than 2 acres, then use this rate of N and P. If the subsoil is not exposed and the site is to be over-seeded, then a soil test must be taken prior to P_20_5 application.

*** This ratio may be used when P_2O_5 may not be applied **OR** when a soil test is not taken, but when N is required to improve turf quality.

**** Lime quantities will be calculated based on soil test buffer pH.

Version 11/10/07

Determining Lime Requirement by On-Site Soil Testing with pH Indicator Strips

Introduction

The current VDOT Nutrient Management Plan allows Roadside Managers to forgo soil testing if the size of the area to be vegetated is less than 2 acres and subsoil materials are exposed. The amount of lime allowed is set at 2 tons/A. However, in some areas this amount of lime may be not needed if the soil pH is between 6.0-6.5. Applying additional lime to soils with adequate pH will force the pH above the recommended level which can also be harmful to plant uptake of certain nutrients, and is costly.

It is easy to test soil pH on-site and to calculate how much lime to apply. This protocol will explain how this is done.

Background Information

The soil pH is the amount of “active” acidity in the water that surrounds soil particles. It is a direct measure of the hydrogen ion concentration in a soil:water slurry. This is referred to as “Water pH,” and it is determined by suspending soil into distilled water on a 1:1, volume to volume ratio. This is what you will be measuring when you perform an on-site pH test.

However, you should be aware that when you send soil to an approved soil testing laboratory, they will perform both the “Water pH” test as well as “Buffer pH” tests*. The latter test measures the total acidity that is in the soil solution, which includes “active” and “residual” acidity, but the pH value itself is meaningless with respect to actual soil pH. The Buffer pH test is a more exact predictor of how much lime is required to neutralize the hydrogen ions. This test also “self-adjusts” for different types of soil texture. When doing an on-site pH test using indicator strips with distilled water, you are performing the “water” pH test. The next step is to calculate the amount of lime required by the use of two tables which account for soil texture and different liming agents.

For more information, check out these sites:

http://www.uky.edu/Ag/ukturf/pubs.htg/Lawn%20Care/id72.htm
http://extension.agron.iastate.edu/soilfertility/presentations/soilphliming04.pdf

* *As a side note, some labs use a Mehlich buffer solution to perform this test.*

Supplies Needed for On-Site Soil Water pH Test

1) **Small Paper Cup**

2) **1/8th Cup Dry Measure & 1 Cup Wet Measure**

Dry Measure

Wet Measure

3) **Jug of Distilled Water from Grocery Store or Pharmacy**

4) **Disposable Straw or Coffee Stir Straw**

5) **pH Indicator Strips - Wide Range**
Whatman 53280 (4.5-10) Color-Bonded pH Strips 100 for $19 (do not need to use this if you use the ColorpHast brand)

6) **pH Indicator Strips - Narrow Range**
ColorpHast by Merck comes in various ranges, but buy the narrow range 4-7. They cost around $18/100 strips. With this brand you do not need the broad range (1-14).
http://www.sanitationtools.com/Products.asp?Product=1438&Category=65

Whatman 53283 Integral Comparison Strips 3.8-5.5 range, 0.2 pH units
53284 Integral Comparison Strips 5.2-6.8 range, 0.2 pH units
200 strips for $30
http://www.labsafety.com/search/pH+indicator+strips/34548/
These are more accurate, but need to use the wide range strips to determine the range to decide which narrow range strip to use.

Protocol for On-Site Soil Water pH Test

1. Sample the area to be seeded in the prescribed zig-zag pattern as described in the Nutrient Management Plan. Take all 20 sub-samples and mix them in a bucket (paint bucket works well). Remove rocks, vegetation, bark, debris. From the well-mixed soil, remove a scoop with the 1/8th cup dry measuring cup. Pack down the soil with light pressure and take a knife to level off the top.
2. Add the soil to the disposable cup. Pour 1/8th of a cup of ***Distilled*** water into the wet measuring cup. Add this to the cup and use the stir straw to mix for about 30 seconds or until all soil is wet.
3. The solid should sink to the bottom. The liquid may be brown, but that is fine. Take a wide range strip (unless you are using the colorpHast brand) and dip the color end into the solution. You may need to tilt the cup gently to have enough liquid to submerge the strip. Count to 10 and pull out. If the tape is covered in dirt, use a tissue to gently wipe off the dirt. Then compare the colors on the tape to that on the box. If you do not feel confident with the result, dip a new strip.
4. Now you should have a ball-park estimate of the water pH of the soil. Test the solution with the narrow-range strip to get a more accurate reading.
5. The next step is to calculate how much lime is required to raise the pH between 6.0-6.5.

Calculating The Lime Rate

1. You need two pieces of information to do this part. You need the WATER pH that you determined prior to this part, and you need to know the soil's texture which is then used to estimate soil charge or CEC.
2. Soil texture can be determined in a soil testing laboratory, but also can be done by the feel of the soil in your hand. If you have never done this before, find someone who has and ask them for a lesson. Once you do this a couple of times, you will readily be able to estimate the general soil texture class for this purpose. Generally, soils with sand, loamy sand, coarse sandy loam have CEC between 2-5 meq/100g soil. The CEC of soils with fine sandy loam, loam, silt loam is between 5-15. And the CEC of soils with clay, clay loam will be greater than 15. In other words, the finer the soil particles, the higher the CEC, and more lime will be required to satisfy the total acidity present.
3. Use Tables 1 & 2 on the next two pages to determine how much lime must be applied to raise the pH between 6.0-6.5.
4. Lime will remain active in the soil for 2 to 3 years. If lime was previously applied to the soil with in this period and the pH is close to 6.0 (+/- 0.2) there is no need to apply more at this time.

Table 1. Amount of Lime (assume CCE at 100%)* to Raise Soil pH to 6.5 by Soil Texture and Water pH			
Sandy Texture			
Water pH**	**lb/1000 sq ft**	**lb/A**	**T/A**
4.8***	135	5,880	2.94
5.0	120	5,230	2.61
5.5	80	3,480	1.74
6.0	45	1,960	0.98
Loamy Texture			
Water pH	**lb/1000 sq ft**	**lb/A**	**T/A**
4.8	180	7,8401	3.92
5.0	145	6,316	3.16
5.5	85	3,703	1.85
6.0	60	2,614	1.31
Clayey Texture			
Water pH	**lb/1000 sq ft**	**lb/A**	**T/A**
4.8	200	8,712	4.36
5.0	170	7,405	3.70
5.5	110	4,792	2.40
6.0	70	3,049	1.52

*Not all liming materials are the same. Pure calcium carbonate (calcite, CaCo3) is the standard agricultural limestone product and its calcium carbonate equivalent (CCE) and its “Neutralizing Value” (NV) are both 100%. Most liming products NV is between 85-90%.

Some products such as dolomitic limestone contains both calcium carbonate and magnesium carbonate. Its NV is between 108-195%, and less dolomite is needed compared to pure calcite . Therefore, it is necessary to know the “Neutralizing Value” of the product because you may need to apply more or less than indicated in Table 1.

**There are gaps between water pH values in this chart. If the water pH value is between numbers, round the pH down. For example, if the water pH value you measured with the pH indicator strip is 5.2 in Clayey soil, then apply 3.70 tons/A of limestone with NV of 100%.

*** If the pH value is **less than 4.0**, then this may be **sulfidic materials** you are dealing with. Liming recommendations must be based of reactive potential acidity on acid-base accounting. Consult Lee Daniels at Virginia Tech for more information (http://www.cses.vt.edu/revegetation/remediation.html)

Calculating Amount of Lime to Apply When the CCE/NV is Not 100%

Table 2 is from DCR's Nutrient Management Standards and Criteria (2005) and provides an easy way to calculate how much lime based on NV/CCE to apply. The left hand column provides the amount of lime (T/A) needed as directed in Table 1. In the top row, find the NV or CCE of your lime. Now you can determine in T/A how much of your specific lime product to apply.

Table 2.Lime Applications Rate Adjustment Based on % CCE (NV) of Material

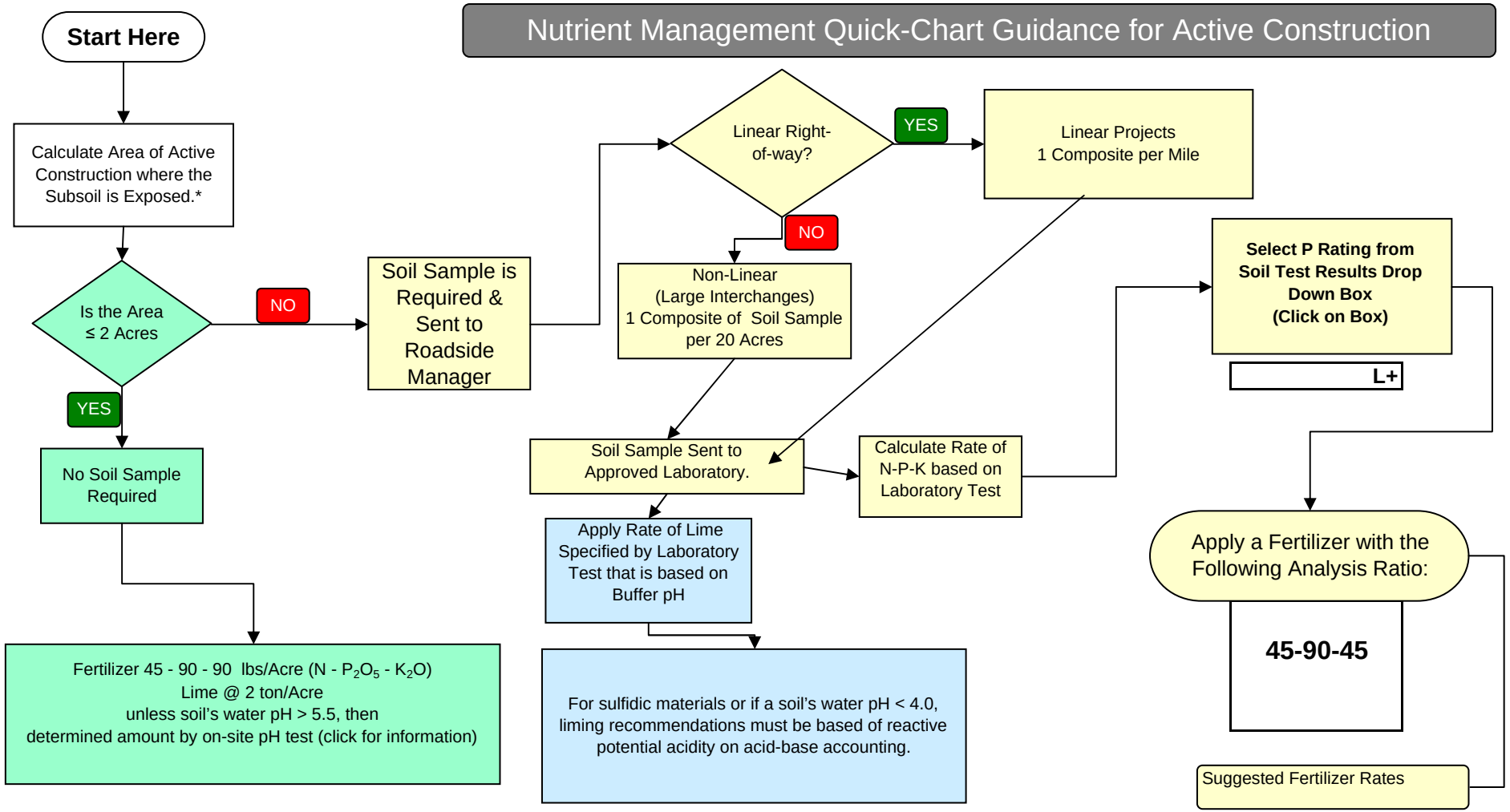
	% CCE of Liming Material										
T/A lime from Table 1	50	60	70	80	90	100	110	120	130	140	150
0.5	1.00	0.75	0.75	0.75	0.50	0.50	0.50	0.50	0.50	0.25	0.25
1.0	2.00	1.75	1.50	1.25	1.00	1.00	1.00	0.75	0.75	0.75	0.75
1.5	3.00	2.50	2.25	2.00	1.75	1.50	1.25	1.25	1.25	1.00	1.00
2.0	4.00	3.25	2.75	2.50	2.25	2.00	1.75	1.75	1.50	1.50	1.25
2.5	5.00	4.25	3.50	3.25	2.75	2.50	2.25	2.00	2.00	1.75	1.75
3.0	6.00	5.00	4.25	3.75	3.25	3.00	2.75	2.50	2.25	2.25	2.00
3.5	7.00	5.75	5.00	4.50	4.00	3.50	3.25	3.00	2.75	2.50	2.25
4.0	8.00	6.75	5.75	5.00	4.50	4.00	3.75	3.25	3.00	2.75	2.75

Conclusion

At this point you should know how much lime should be added to adjust the pH of the soil to the desired level. You should know how much of the specific liming agent to use based on CCE/NV.

If you have questions, please contact W. Lee Daniels at Virginia Tech, Dept CSES - 540-231-7175 or wdaniels@vt.edu

Nutrient Management Quick-Chart Guidance for Active Construction



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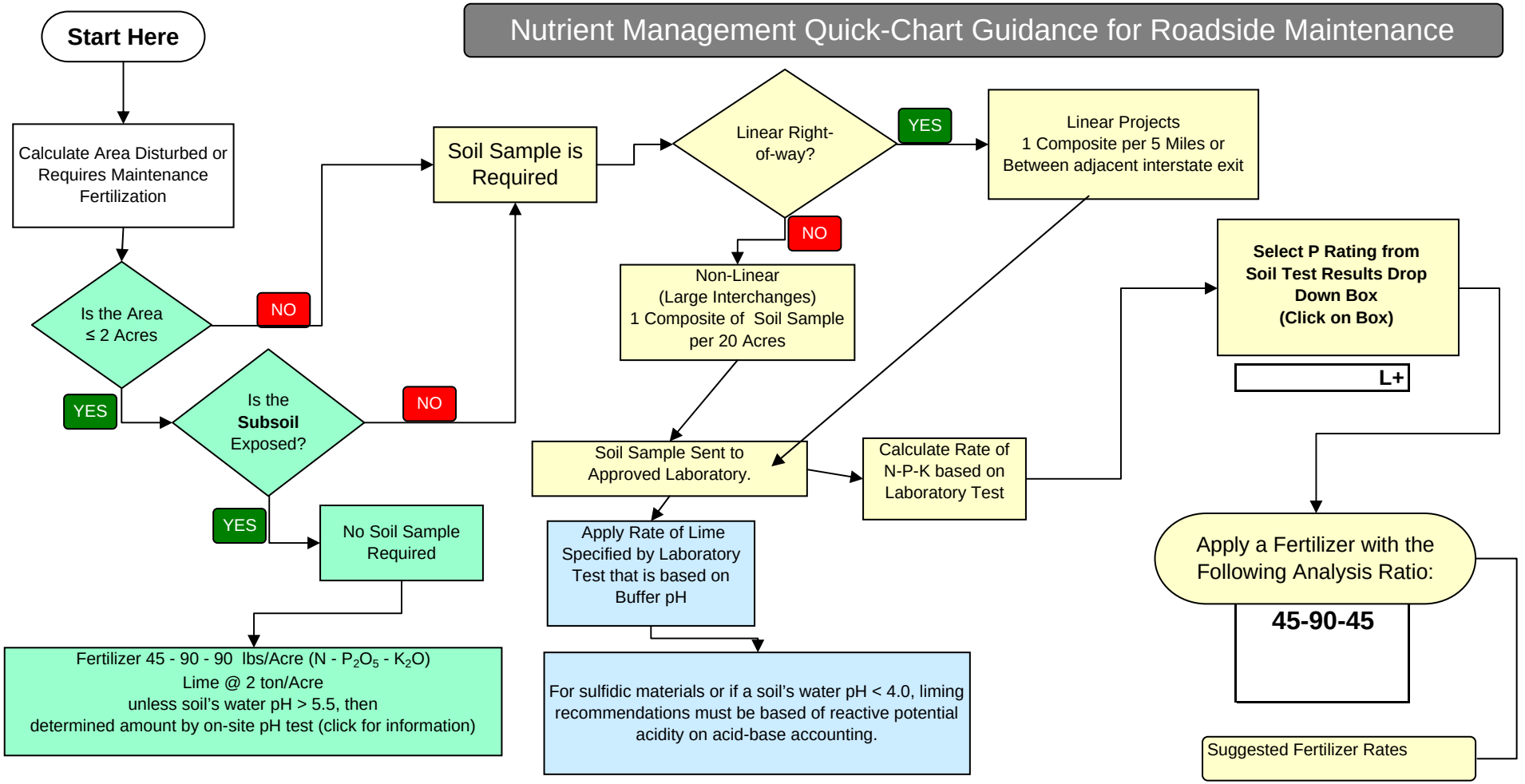
Nutrient Management Quick-Chart Guidance for Roadside Maintenance



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