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SECTION 02410 - SUBGRADE PREPARATION, WITH COVER MATERIAL

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**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. Work Included

Work under this SECTION covers requirements for materials, tools, equipment and services necessary to complete the subgrade preparation for this project. The work shall include, but is not necessarily limited to, completion of the following work:

1. Field engineering
2. Soil testing
3. Lime application
4. Incorporation of the applied lime material
5. Wetland subgrade preparation

**1.2 QUALITY ASSURANCE**

A. Contractor shall use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of work of this SECTION.

B. Contractor shall use equipment adequate in size, capacity, and numbers to accomplish work in a timely manner.

C. In addition to complying with requirements of governmental agencies having jurisdiction, Contractor shall comply with directives of Engineer and Division.

D. Applicable Standard

1. Iowa Agricultural Liming Material Act
2. Trees to remain shall be protected as described by Iowa State University (ISU) Extension Service at [https://naturalresources.extension.iastate.edu/forestry/care\\_maintenance/construction.html](https://naturalresources.extension.iastate.edu/forestry/care_maintenance/construction.html)

**1.3 DELIVERY, HANDLING, AND STORAGE**

A. Storage of materials on job site must be approved in writing by Engineer.

B. Materials approved for storage on site which are being degraded due to storage must be removed and replaced at no additional cost to Division.

C. Deliver packaged materials to site in supplier's original unopened containers; each container to bear certification as specified.

D. Store packaged materials off ground and protect from moisture.

#### 1.4 SUBMITTALS

- A. Agricultural lime
  - 1. Contractor shall submit vendor's certified analysis for ECCE (Effective Calcium Carbonate Equivalent) in minimum pounds of ECCE per ton of material, fineness of agricultural lime, and supplier's name and location.
- B. Weight Tickets
  - 1. Contractor shall submit weight tickets and/or shipping tickets of all materials delivered to the site for the work in this SECTION to Engineer for payment purposes.
- C. Soil Tests
  - 1. Soil tests to determine the applicable liming rate shall be taken by the Engineer with assistance from Construction Observer and Contractor. Test results will be submitted to the Contractor and Division when received by Engineer. Payment for these tests will be made by Engineer.

#### 1.5 SITE DISTURBANCES

- A. Contractor shall take precautions to insure that equipment and vehicles do not unnecessarily disturb or damage existing grading or other site improvements. Any areas identified by Engineer or Division as becoming excessively disturbed shall be repaired at Contractor's own expense.

### PART 2 - PRODUCTS

#### 2.1 AGRICULTURAL LIME

- A. Agricultural lime shall be ground calcitic limestone conforming to the current requirements of the Iowa Agricultural Liming Material Act. The liming material shall contain calcium in the carbonate, oxide or hydroxide form, or a combination thereof. The lime shall have a minimum fineness of fifty-five percent (55%) and shall contain at least one-thousand (1000) pounds ECCE per ton of lime to be applied.
- B. If agricultural lime with at least one-thousand (1000) pounds ECCE per ton is not locally available, Contractor may submit a proposal for use of equivalent material based upon the minimum pounds required of ECCE per acre.
- C. Lime sludge salvaged from water treatment plants or other industrial operations can be used for agricultural lime provided that it can be uniformly distributed over the site. Moisture content and ECCE tests results shall be provided to Engineer and Division to determine application rates. Moisture tests will be taken by the Engineer during placement and application rates will be adjusted as appropriate.

#### 2.2 WETLAND FERTILIZER

- A. Fertilizer shall be a standard commercial product which, when applied at the proper rate, will supply the quantity of total nitrogen (N) at a rate of thirty (30) pounds per acre.

- B. Fertilizer shall be uniform in composition, liquid or dry, and shall be free flowing. Fertilizer may be delivered in bulk from the supplier or in its original unopened containers. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.

### **2.3 WETLAND MULCH**

- A. Mulch materials shall consist of oats, rye, hay, corn stalks, grass cut from native grasses or other plants approved in writing by Division.
- B. Mulch shall be of air dry mulch that has been properly cured and harvested. Mulch harvested after a killing frost or during dormant periods will not be acceptable.
- C. Mulch shall be free of noxious weeds as published by the local County Weed Commissioner and other weeds deemed undesirable by Engineer, such as foxtail, etc.
- D. Each load of mulch shall be subject to inspection and acceptance by Engineer or Construction Observer prior to unloading.
- E. Wetland mulch shall be applied at a rate of five (5) tons per acre into the spoil material and incorporated prior to placement of cover material.
- F. Additional mulch will be placed in the wetland areas after the cover material is in place at the standard seeding mulching rate of two (2) tons per acre as required in SECTION 02700 – SEEDING. Mulch placed in wetland areas during seeding will be incorporated into the soil instead of only being crimped. The placement and incorporation of mulch in the cover material will be paid for under SECTION 02700- SEEDING.

## **PART 3 - EXECUTION**

### **3.1 TIMING**

- A. No cover material shall be placed over untreated spoil material. All agriculture lime placement and incorporation shall be completed in areas designated to receive cover material.
- B. No cover material shall be placed in created wetland areas as shown on the plans until the agricultural lime, fertilizer, and mulch have been placed and properly incorporated.
- C. If cover material is placed inadvertently prior to placement of agriculture lime to neutralize the soils, Contractor shall remove and replace the cover material as needed at his own cost to allow for the lime to be placed and incorporated.

### **3.2 TESTING**

- A. As the Contractor is nearing final subgrade in portions of the site to prepare for placement of select borrow material, the Contractor shall contact and schedule soil sampling with the Engineer. The Engineer is to collect the samples, assisted by the Construction Observer and Contractor, and submit them for testing.
  - 1. Engineer and Contractor shall collect composite samples of not less than ten (10) well-distributed individual soil cores from any contiguous area of ten (10) acres or less. Soil cores shall be three-quarter (3/4) inch to one (1) inch diameter to a depth of about twelve (12) inches. Areas having observable differences in material types or surface

- conditions (soil types) shall be handled as different samples, even if less than (10) ten acres.
2. Engineer shall combine soil cores to form composite samples for each (10) ten acres of contiguous area and/or observable different soil types by mixing well and placing in sample bag to be sent to laboratory. (e.g. If total area is 30 acres and has two distinctly different soil types of 15 acres each, then there should be four (4) composite samples containing ten (10) soil cores each – two (2) composite samples from each soil type.)
- B. Engineer shall deliver each composite soil sample to an approved soil testing laboratory. Each sample should be tested for the properties listed below. It should be noted by Contractor that test results for Item #3 below can often take up to four (4) weeks or longer to receive. The Engineer cannot be held responsible for delays in schedule due to Contractor scheduling of sampling or the time it takes for the laboratory to complete the tests.
1. pH
  2. Buffer pH
  3. Acid/Base Accounting based on pyritic sulfur with total sulfur
- C. Engineer shall obtain liming recommendations to achieve a pH of 6.5 for spoil from the laboratory and submit the results to Division. The cost of all services required from the testing laboratory for initial liming recommendations shall be the responsibility of Engineer.
- D. Soil test results and laboratory recommendations shall be used by Engineer and Division in determining the amount of lime to be applied. The final rate determined by Division and Engineer shall be applied by Contractor and this rate may be more or less than that recommended by the laboratory.

### 3.3 LIME APPLICATION

- A. Application Rates
1. Agricultural Lime, Subgrade - Contractor shall plan to apply lime (tons ECCE per acre) at the rate listed on the plans or as provided in the Supplemental Specifications unless a different rate is specified based on the results of soil tests taken after rough grading is completed as described in Item 3.2.D. The application rate provided in these documents is based on limited information available and is for bidding purposes. Actual application rate will vary depending on the recommendation of the soil tests.
- B. Incorporation
1. Engineer and Division shall approve the final grades and the lime application rates based on the spoil test results prior to the application and incorporation of the lime by Contractor. Contractor shall request approval to initiate the lime application on areas of at least five (5) acres in size.
  2. Contractor will obtain Engineer and Division's approval of site conditions prior to application of lime. Application will not be permitted during adverse conditions such as high winds, surface frost to a depth greater than one (1) inch, excessive moisture in the surface to be treated, or if rain is predicted within the time Contractor estimates will be required for application and incorporation of the lime within the area approved.

3. After receiving Engineer and/or Division approval, Contractor shall evenly apply agricultural lime directly on the surface to be treated. Contractor shall incorporate the lime into the upper twelve (12) inches of material the same day the lime is applied, using the agreed upon method per 3.3.B.1 above. Incorporation shall be done on the contour and compaction shall be kept to a minimum. This may require multiple passes in order to thoroughly mix the lime in the upper twelve (12) inches.
- C. Contractor shall use means necessary to prevent dust from becoming a nuisance to public, to neighbors, and to other work being performed on or near site.
- D. No lime shall be applied on site if that load of lime is not accompanied by an appropriate weight ticket. All lime weight tickets for material applied on site shall be submitted to the Construction Observer or Engineer upon arrival of the material on site. If Contractor applies lime prior to Construction Observer or Engineer receiving appropriate weight ticket for that material, or in the absence of the Resident, Division may require additional lime be applied to the site at Contractor's expense to assure that Contract specified amounts are achieved.

### 3.4 WETLAND AREAS

- A. Subgrade Preparation
  1. Contractor shall establish the final grade, less the depth of cover, in the areas where constructed wetlands are shown on the plans. The Engineer and Division shall approve the final grades in the wetland areas prior to incorporation of lime materials by Contractor as described in 3.3 *Lime Application* above.
- B. Application Rates – Prior to Cover Placement
  1. Agricultural Lime –Agricultural lime (tons ECCE per acre) shall be applied at the same rate as that determined from the soil tests taken for the rest of the site prior to placement of cover material.
  2. Fertilizer – Nitrogen (N) shall be applied at a rate of thirty (30) pounds per acre prior to placement of cover material or as otherwise indicated in the Supplemental Specifications.
  3. Mulch – Mulch shall be applied at a rate of five (5) tons per acre prior to placement of cover material or as otherwise indicated in the Supplemental Specifications.
- C. Incorporation – Prior to Cover Placement
  1. After final grade acceptance and before placement of cover material, Contractor shall apply and incorporate the lime, fertilizer, and mulch over the entire wetland areas as designated on the plans. The depth of incorporation shall extend at least into the upper nine (9) inches of spoil material and shall be completed with an acceptable method as approved by the Engineer. Cover material can then be placed over the wetland treated subgrade as shown on the plans.
  2. Application will not be permitted during adverse conditions, such as high winds, surface frost to a depth of greater than one (1) inch, excessive moisture in the surface to be treated, or if rain is predicted within the time Contractor estimates will be required for application and incorporation of the mulch and fertilizer within the approved wetland area(s).

D. Application Rates and Incorporation – After Cover Placement

1. After placement of cover material, areas within the wetland areas will receive the additional lime and fertilizer, as established in SECTION 02700- SEEDING. Additional mulch shall also be applied at a rate of two (2) tons per acre on the cover material within the wetland areas shown on the plans. These materials shall be incorporated into the cover material as soon as conditions allow and prior to impoundment of water. Care shall be taken to not mix the spoil material into the cover material during this disking.

**3.5 MEASUREMENT AND PAYMENT**

Construction cost of all work included in this SECTION of the Construction Specifications shall be included in Contractor's unit prices set forth in Proposal and Schedule of Prices (*Document C*) for work items described below. Unit price for each of these several items shall include its pro rata share of overhead so that sum of products obtained by multiplying unit prices so set forth by amount of work actually constructed, measured as described herein, shall constitute full payment to Contractor for performance of work included in this SECTION.

Measurement and payment for each work item in this SECTION shall be in accordance with following:

- A. *Agricultural Lime, Subgrade:* Contractor's unit price for limestone used in rough grade preparation work, including constructed wetland areas, shall represent full payment furnishing, delivery, application, and incorporation of lime in accordance with specifications. Submittals required under Item 1.5 *Submittals* of this SECTION shall accompany each shipment of agricultural limestone for payment. Actual application rate will vary, except in the wetland areas, pending recommendations of spoil tests conducted in accordance with Item 3.2 *Testing*, of this SECTION.

Measurement for payment purposes shall be actual number of tons of ECCE, based on a dry unit weight, applied by Contractor in complying with requirements of this SECTION.

- B. *Wetland Fertilizer:* Payment for wetland fertilizer, Nitrogen (N), furnished, delivered, applied and incorporated into wetland areas, per requirements of this SECTION, shall be made in accordance with Contractor's unit prices for wetland fertilizer. Weigh tickets must accompany each shipment of fertilizer and shall form the basis for measurement and payment. Measurement for payment purposes shall be the actual weight to the nearest pound of active ingredient for the nutrient.

- C. *Wetland Mulch:* Contractor's unit price for Wetland Mulch shall represent full payment for all materials, application, mixing, plowing, disking, and all incidental work pertaining to the delivery, placement and incorporation of mulch as a part of the wetland subgrade preparation prior to placement of the cover material and the additional mulch placed after the cover material is in place.

The wetland mulch area will be based upon the areas as shown on the plans rounded to the nearest tenth (0.1) acre. Any field adjustments made will be measured jointly by Contractor and Engineer. The total area for payment is only counted once. Delivery receipts showing certified weight will be used to confirm required tons for incorporation of mulch.

D. *Summary:* Proposal bid items applicable to work covered by this SECTION are as follows:

<u>Description</u>	<u>Unit</u>
Agricultural Lime, Subgrade	Ton (ECCE)
Wetland Fertilizer	Pound (active ingredient)
Wetland Mulch	Acre

**END OF SECTION 02410**