INDEX

PART 1 - GENERAL

1.1 DESCRIPTION

Work Included

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

A. Water quality testing of existing water bodies to be discharged.

B. Development of the Neutralization and Dewatering Plan.

C. Neutralization of acid water.

D. Water quality verification tests.

E. Discharge of neutralized impounded water bodies.

1.2 REFERENCE SPECIFICATIONS

A. The following specifications or applicable standards are incorporated by reference into this SECTION:

1. National Pollutant Discharge Elimination System (NPDES) Parameters

2. Storm Water Pollution Prevention Plan (SWPPP)

3. ANSI/AWWA B202-93

4. SETION 02120 – SEDIMENT AND EROSION CONTROL

5. SECTION 02200 – EARTHWORK, ROUGH GRADING

6. SECTION 02700 – PERMANENT SEEDING

B. Above-mentioned references, which do not appear printed with the Contract Documents, can be provided to Contractor upon request.

1.3 QUALITY ASSURANCE

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

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

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

1.4 PERMITS

Division and hence Contractor must comply with the requirements of a NPDES permit for discharge of water off the site. The water quality standards for discharged water are specified in this SECTION.

1.5 JOB CONDITIONS

A. The site requires dewatering of impounded water bodies to complete the required grading. The anticipated water bodies to be dewatered are indicated on the Plans. However, depending on weather conditions prior to and during construction, the number of water bodies required to be dewatered may be more or less than the number shown on the Plans.

B. Some sites have water bodies that are not to be disturbed and shall remain at the site. These water bodies, if any, are identified on the plans. Care should be taken to minimize disturbance to the areas surrounding these water bodies and minimize the amount of sediment delivered to them. Appropriate measures shall be taken to protect from sediment as shown on the SWPPP or as directed by the Engineer and Division.

C. Water quality evaluations of the water bodies at the site have been taken during project development. Those water bodies anticipating treatment prior to discharge are noted on the Plans. Water quality can change over time and new tests of all water bodies requiring discharge off site must be taken during construction and prior to discharge to determine if treatment is required and to what extent. It is also possible that water quality can change during discharging operations, requiring cessation of discharging operations and additional treatment before discharging can continue.

D. Water that does not meet the NPDES parameters may not be discharged off site until acceptable neutralization is obtained. Contractor may not proceed with liming treatment(s) without the approval of Engineer.

E. The materials used to neutralize acidic water are caustic and Contractor shall take appropriate precautionary measures when handling hydrated lime. See Item 3.2 in this SECTION.

F. It may be feasible to discharge impoundments on the site depending upon a number of factors. Approval is required from Engineer and Division before an impoundment may be discharged on site. Neutralization of acid water is not required if approval is granted and the on-site discharge is properly executed.

1.6 SUBMITTALS

A. Neutralization and Discharge Plan for Impounded Water

The Neutralization and Discharge Plan shall be submitted by the Contractor to Engineer and Division prior to commencement of any dewatering or discharge. The plan should include as a minimum:

1. Anticipated start date for treatment and/or discharge.

2. Sequence and general description of discharge (i.e. on site or off-site)

3. Methodology for incorporation of hydrated lime to neutralize acid water if this is anticipated.

4. Copy of Site Plan with discharge locations identified, including any erosion protection measures needed.

B. Laboratory Approval

Contractor shall select a testing laboratory to provide testing required under this SECTION. The name and address of the testing laboratory used in this work shall be submitted to and must be approved by Engineer prior to start of this work.

The testing laboratory may perform the required testing on site provided the work plan describing the proposed treatment, equipment, and the field methods of testing have been accepted by Engineer prior to start of this work. Field testing equipment must meet the minimum resolution capabilities and be able to provide measurements within the minimum ranges listed below:

MINIMUM FIELD TESTING EQUIPMENT REQUIREMENTS

Parameter	Units	Range	Increments
pH	unit	4.0-10.0	0.1 units
total iron	mg/l	0.5-10.0	0.1 mg/l
suspended solids	mg/l	0-500	5.0 mg/l
acidity/alkalinity	mg/l	As needed	5.0 mg/l

C. Certification and Receipts

1. Submit certification that liming agents meet the minimum criteria of this SECTION.

2. Submit receipts and weigh tickets of liming agents delivered to the project site.

D. Test Results

Submit results of water quality test results for both before and after neutralization, neutralization determinations, and field quality tests taken during discharge operations.

PART 2 - PRODUCTS

2.1 LIME MATERIALS

Hydrated lime [$Ca(OH)_2$] shall meet requirements of ANSI/AWWA B202-93 and shall not have less than sixty-two (62) percent available calcium oxide which is equivalent to eighty-one and nine-tenths (81.9) percent calcium hydroxide.

2.2 DELIVERY, STORAGE AND HANDLING

A. Deliver liming agents to the site in their original containers with all labels or certificates intact and legible for Engineer's inspection.

B. Contractor shall use all means necessary to protect materials from the elements during storage and handling.

C. In the event of damage or rejection, Contractor shall immediately make all replacements necessary to the approval of Engineer at no additional cost to Division.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work of this SECTION will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PRECAUTIONS

Hydrated lime is a caustic material. Sustained and unprotected exposure to hydrated lime may be hazardous to workers. Contractor shall instruct workers in the proper handling of bulk lime and lime slurry and shall take all necessary steps to protect working personnel and the general public.

3.3 DISCHARGING ON SITE

A. Discharging impounded water on site is allowed provided all of the following requirements are met.

1. Engineer and Division are in agreement that this method of discharge is feasible.

2. Water can be released onto the site in a controlled manner either through pumps or careful breaching of dikes.

3. Designated release areas can absorb the water without exiting the site either by direct runoff or through groundwater by observable seeps.

B. If the Engineer and/or Division determines that discharging operations on site are having a negative impact on the overall project or cannot be contained on site, Contractor shall immediately discontinue discharging operations and develop alternative plan. If it is determined that on site discharge is not feasible, then the water shall be sampled, treated with lime as needed, and discharged off site. No additional compensation, other than the cost of lime to neutralize the water will be added to the contract.

3.4 WATER SAMPLING AND TESTING (ALL IMPOUNDED WATER BODIES)

A. Contractor shall obtain composite samples of all impounded water to be discharged off site. This round of composite samples from each impounded water body shall be used to determine if treatment is necessary or not. If test results indicate treatment is not necessary, the impounded water may be discharged off site with periodic field testing during discharge. If treatment is necessary, the test results shall be used to evaluate the amount of lime required to neutralize the acid water.

B. Contractor shall collect composite samples and submit for testing as follows:

1. At least one (1) composite water sample shall be taken from each impoundment. Impoundments containing more than ten (10) acre-feet of water shall have one (1) additional sample shall be taken for every ten (10) acre-feet of water or fraction thereof.

2. A composite sample shall consist of equal parts of four (4) surface samples taken throughout the area the composite sample represents. The location of all sampling points shall be such that when all the composite samples are obtained for a given impounded water body, they are representative of the entire impounded water body area insofar as practical.

3. Obtain sample bottles of proper type and size with appropriate preservatives, as well as sample gathering and delivery procedures, directly from the laboratory. Store and ship samples refrigerated (under ice) as required by laboratory.

4. Each composite sample shall be delivered to the approved laboratory within twenty-four (24) hours of collection. Each composite sample shall be tested for pH, total acidity/alkalinity as Calcium Carbonate (mg/l), total iron (mg/l), and total suspended solids (mg/l).

5. Contractor shall submit copies of the laboratory results to Engineer and Division prior to the meeting at the site to develop the neutralization or discharge plan.

6. Contractor shall pay all costs associate with sampling and testing.

3.5. NEUTRALIZATION AND DEWATERING PLANNING MEETING

Contractor, Engineer, and Division shall meet at the site to discuss and develop the neutralization and dewatering plan. The Contractor foreman or other personnel who will be responsible for this portion of the work must be in attendance at this meeting. The minutes of this meeting shall be prepared by Engineer and distributed to all parties prior to initiating this portion of the work. The neutralization and dewatering plan shall at a minimum include the following:

A. Schedule for completion of neutralization if necessary, and dewatering for all impounded water along with a list of personnel planned to complete this work.

B. In the case of multiple acidic impounded water bodies, the proposed order in which the impounded water bodies will be neutralized and dewatered will be identified in the Neutralization and Discharge Plan. Water may be moved within the site from one impounded water body to another before neutralizing or discharging off site. This can be done by pumping or gravity flow, provided that all three of the conditions listed below are met.

   1. The receiving impounded water body is structurally sound and has adequate capacity to contain the discharge.

   2. There is no significant transfer of soft sediment (muck) into the receiving impounded water body.

   3. There is no outflow of water off the project site.

C. Laboratory approval information as required in Paragraph 1.6B., Laboratory Approval of this SECTION.

   1. Method(s) to be used to neutralize the water, including the number and types of equipment to be used. If multiple methods are used, it shall be determined which method will be used on each impounded water body.

   2. Proposed water sampling methods used to ensure that neutralized water meets NPDES discharge limits as outlined in Item 3.7 DISCHARGE OF IMPOUNDMENTS found in this SECTION.

   3. A copy of the site plan(s) showing the routes of discharge for each impounded water body and location of any constructed basins or modified impounded water bodies used for neutralization of acidic water on site.

4. Erosion protection to be used on discharge routes.

5. Safety precautions to be used to ensure workers will be protected from the caustic effects of hydrated lime.

3.6 WATER TREATMENT (IMPOUNDED WATER BODIES REQUIRING NEUTRALIZATION PRIOR TO DISCHARGE)

A. Hydrated lime for neutralization of acid impoundments shall not be applied during periods where the temperature is anticipated to be below freezing or when ice is present on the surface of the untreated water body.

B. Applications of lime as a dry powder directly to the water surface over the entire impounded water body shall not be permitted. The hydrated lime shall be mixed with the impounded water and applied as a slurry.

C. The impounded water shall be continuously circulated during application of the slurry to assure thorough mixing of the lime slurry and impounded water.

D. After impounded water bodies requiring treatment are neutralized with a pH of between six (6.0) and nine (9.0), a second round of composite samples shall be obtained. If this second round test results indicate unacceptable pH, total iron, or total suspended solids, the water shall be retreated if necessary, remixed, or any other action as may be required. Retests are required until acceptable laboratory results are obtained.

E. Timing is critical for this task. Samples must be analyzed and discharge must be initiated as soon as possible when results are within NPDES parameters. If a rainfall event occurs that creates runoff into the impoundments between the time samples are collected and tested and prior to discharge, new samples must be taken and tests performed.

F. No acidic spoil material may be placed in the water body after the water samples are taken and prior to discharge.

G. If it is determined that Contractor's actions have caused treated water to no longer meet the NPDES discharge parameters, Contractor shall retreat the water as needed at no additional cost to Division.

3.7 DISCHARGE OF IMPOUNDMENTS

A. Impounded water, whether treated or untreated, shall not be discharged off-site unless Engineer or Division is present, and not until the testing performed by Contractor indicates the discharge effluent is within the following NPDES parameters:

1. pH between 6.0 and 9.0
2. Total iron content less than 7.0 mg/l
3. Total suspended solids less than 70 mg/l

B. The impoundment shall be discharged immediately after the water meets the discharge parameters and has been accepted by Engineer. New samples and tests shall be required if discharging the water is delayed by Contractor, acidic seeps into the impounded water body are discovered, significant precipitation occurs, or the field tests indicate a change in pH outside the acceptable discharge limits.

C. Once favorable laboratory results have been obtained and discharge commences, Engineer shall periodically test the discharge for pH. If the pH of the discharge changes to below six (6.0) or above nine (9.0), Contractor shall cease discharging, retreat as appropriate, and obtain a satisfactory test result prior to further discharge.

D. Contractor shall prevent soil erosion in the area downstream of the discharging facility. Silt fences, or other silt collectors may be necessary to contain erosion of acid soils.

E. Contractor shall take appropriate actions to prevent further accumulation of surface runoff or seepage immediately after the impounded water is discharged. Contractor shall be responsible for testing, treating, and discharging any water that is impounded due to surface runoff or seepage after the initial discharge has been completed at no cost to Division.

3.8 TREATMENT AND DISCHARGE SUMMARY

A. The table provided in the Supplemental Specifications or Plans presents data from samples taken at the time field investigations were conducted to assist Contractor in estimating the amount of lime that could be needed to neutralize impounded water bodies. The table includes acidity and the estimated volume of water which existed at the time of those investigations and needs to be discharged.

B. The table also presents the expected number of first and second round composite samples for the water bodies at the site. Further rounds of composite samples may be necessary if satisfactory discharge parameters are not achieved after initial treatment and testing or if conditions change during discharge.

C. The information in the table is provided for Contractor's use. Actual field conditions at time of construction are subject to variation depending upon rainfall events and other causes. While lime used in accordance with this Section will be paid for, all sampling, testing, and discharge of all water shall be included in the lump sum bid for Impoundment Discharge.

PART 4 - MEASUREMENT AND PAYMENT

4.1 UNIT PRICES

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

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

1. *Hydrated Lime:* This unit price shall include all costs for liming materials, application, and circulation. The payment quantity for lime neutralization of acid water shall be the actual number of tons of hydrated lime incorporated into the acid water as validated by weight tickets furnished to Engineer during neutralization operations.

   Lime neutralization treatment required for acid water which has been allowed by Contractor to accumulate in depressions caused by Contractor's work, or in impoundment basins previously treated and discharged off-site shall be performed by Contractor at no cost to Division.

2. *Impoundment Discharge:* Contractor shall be paid at the lump sum price for this item. This amount shall be full compensation for attending the neutralization and dewatering planning meeting, for all water sampling and testing, and for discharge of all impoundments. Contractor will only be reimbursed once for discharge of all impoundments. The lump sum price for this work item shall include full payment for all work as required to complete all impoundment discharge in accordance with the requirements of this SECTION.

   Any further impoundment discharge required resulting from groundwater seeps, precipitation or other reasons shall be incidental. Any resulting water sampling/testing or further acid water treatment, including lime, shall be incidental. The cost associated with any extra handling or soil material and impounded water while discharging impoundments on site shall be treated like SECTION 02200 – 3.6 CARE OF WATER and is incidental to excavation.

4.2 SUMMARY – UNITS OF MEASUREMENT

Units of measurement for bid items applicable to work covered by this SECTION are as follows:

Description	**Unit**
Hydrated Lime	Ton
Impoundment Discharge	Lump Sum

END OF SECTION 02110