

**ADDENDUM NO. THREE**  
**GRAVEL LAKES RIPRAP**  
**PROJECT NO. 23-124**  
**CITY OF THORNTON, CO**

TO: Prospective Bidders and all others concerned

DATE: January 19, 2023

PURPOSE: To provide additional information and clarification to the solicitation documents for the above-referenced Project.

1. The following shall Add to, Modify, and/or Delete portions of the Invitation for Bid Proposals and Drawings for the Project-noted above.
  - A. The Invitation for Bid Proposals shall be modified as follows:
    - a. Sealed Bid Proposals for Construction will now be received until **2:00 p.m., Tuesday, January 31, 2023**. At that time, the bids will be publicly opened and read aloud.
    - b. Thornton will stake out the top of slope for the Project by the close of business on Tuesday, January 24th. Contractors interested in a site visit may contact the Contract Administrator to schedule.
    - c. There is an existing fence at the existing grouted rip rap that the new rip rap will tie into. Contractors will be required to roll back the fabric of the fence, tie into the existing rip rap and resecure the fabric to the existing posts.
    - d. There is an existing gauge on the slope of the reservoir for water levels, Contractor shall protect during construction.
    - e. The attached specifications shall become part of the Project requirements.
2. The Pre-Bid Conference Sign-In Sheet is attached for general information.
3. This Addendum becomes part of the Contract Documents. All other conditions and requirements of the Contract Documents will remain unchanged. Receipt of this Addendum must be acknowledged in the space provided on the Bid Proposal Form in the Project Manual.

**END OF ADDENDUM NO. THREE**

DocuSigned by: <i>Jim Jensen</i> E057D2700999405...	1/20/2023
Jim Jensen Contracts Manager	Date

**SECTION 31 23 13  
SUBGRADE PREPARATION****PART 1 GENERAL****1.1 1.1 WORK INCLUDES**

- A. Preparing the finished excavated surface for placement of overlying fill or riprap bedding.
- B. Protection of subgrade until foundation preparation is completed and placement of overlying fill, backfill, or riprap bedding begins.

**1.2 REFERENCES**

- A. The following is a list of standards which may be referenced in this Section:
  - 1. American Society for Testing and Materials (ASTM):
    - a. D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-16/ft<sup>3</sup>).

**1.3 DEFINITIONS**

- A. Refer to applicable definitions of Section 31 23 16: EXCAVATION, and Section 31 23 23: FILL.
- B. Prepared Foundation: Subgrade surface after completion of foundation preparation activities as specified prior to placement of overlying fill, backfill, riprap bedding or structure.
- C. Subgrade: Ground surface after completion of required clearing, grubbing, stripping, and excavation prior to placement of fill or structure.
- D. Temporary Cover: Native material left in place over final foundation subgrade to protect subgrade from damage by wetting, drying, freezing, erosion, and physical disturbance by construction equipment traffic and personnel until the time of final foundation excavation and preparation.

**1.4 QUALITY CONTROL**

- A. THORNTON will conduct visual observation of the excavated foundation surface before placement of fill or riprap bedding. Provide 24 hours' notice to THORNTON when final foundation excavation is to be performed for a particular area so that THORNTON can make arrangements for visual observation.
- B. Notify THORNTON when excavation has reached the designated subgrade elevation.
- C. Notify THORNTON when soft, loose, or wet subgrade zones are detected.

**1.5 SEQUENCING AND SCHEDULING**

- A. Perform foundation preparation only when subgrade is unfrozen, and free of ice, snow, and surface water. Perform foundation preparation only during daylight hours.
- B. Coordinate foundation preparation with related work in Section 31 23 16: EXCAVATION, and Section 31 23 23: FILL.

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Not used.

**PART 3 EXECUTION****3.1 GENERAL**

- A. Shape excavation to produce as uniform and regular profile as possible, with no abrupt changes in slope, sharp projections, steps, overhangs, or benches except as shown on the Drawings or as approved by THORNTON.
- B. Preserve the foundation below and beyond the lines of excavation in the soundest possible condition. Repair any damage from CONTRACTOR's operations as directed by THORNTON.
- C. Keep subgrade free of ponded water and deleterious materials during foundation preparation. Prepare foundation when unfrozen and free of snow and ice.
- D. Do not use sections of prepared foundation as haul roads. Protect prepared foundation from traffic.
- E. Maintain prepared foundation in finished condition until overlying fill, or riprap bedding is placed.

**3.2 PREPARED FOUNDATIONS ON SOIL**

- A. Temporary Cover Requirements: none
- B. Subgrade Compaction: Scarify, moisture condition, and compact top 8 inches of subgrade in accordance with requirements of Section 31 23 23: FILL and as specified:
  - 1. Compaction: Not less than 95 percent relative compaction (ASTM D 698).
  - 2. Compaction Moisture: Between 2 percent below and 2 percent above optimum water content (ASTM D 698).
  - 3. Perform one compaction and one compaction moisture test per 1,500 sy of prepared subgrade.
- C. Correction for Soft or Loose Subgrade: Where subgrade cannot be compacted as specified, or in areas identified by THORNTON that display yielding or excessive rutting during construction activities, adjust moisture content and recompact, or overexcavate as specified in Section 31 23 16: EXCAVATION, and replace overexcavated material as specified in Section 31 23 23: FILL.
- D. Scarification and compaction of excavation slopes steeper than 2H:1V will not be required. Remove exposed soil that is desiccated, frozen, soft, wet, or otherwise disturbed, to the satisfaction of THORNTON prior to placing overlying or adjacent fill, backfill or concrete.

**END OF SECTION**

**SECTION 31 23 16  
EXCAVATION**

**PART 1 GENERAL**

**1.1 WORK INCLUDES**

- A. Required excavation to place earthfill, riprap, and riprap bedding.

**1.2 DEFINITIONS**

- A. Refer to applicable definitions of Section 31 23 13: SUBGRADE PREPARATION, and Section 31 23 23: FILL.
- B. Unclassified Excavation: All materials to be encountered in excavations, including soil and rock, regardless of hardness or moisture content.
- C. Unsuitable Foundation Soils: Soils that display yielding, excessive rutting, excessive water content, or have desiccated and are determined by THORNTON to be unsuitable for support of overlying earthfill or riprap bedding.

**1.3 SUBMITTALS**

- A. Administrative:
  - 1. Copy of excavation permit(s) as required by law.

**1.4 QUALITY CONTROL**

- A. Provide adequate survey control to avoid unauthorized overexcavation.

**1.5 EXCAVATION SAFETY**

- A. CONTRACTOR is solely responsible for making all excavations in a safe manner.
- B. Stability of all temporary slopes identified on the Drawings is solely CONTRACTOR's responsibility. Shore, sheet, brace, or slope temporary slopes to conform to all applicable regulations.
- C. Install and maintain shoring, sheeting, bracing, and sloping necessary to support the sides of the excavation, to keep and prevent any movement that may damage adjacent structures or foundation, damage or delay the Work, or endanger life and health. Install and maintain shoring, sheeting, bracing, and sloping as required by OSHA and other applicable governmental regulations or agencies.

**1.6 BLASTING**

- A. No blasting will be allowed.

**1.7 WEATHER LIMITATIONS**

- A. Material excavated when frozen or when air temperature is less than 32°F shall not be used as fill or backfill until material completely thaws.

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- B. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently or is appropriately moisture conditioned for proper compaction.

**1.8 SEQUENCING AND SCHEDULING**

- A. Clearing, Grubbing, and Stripping: Complete applicable Work specified in Section 31 11 00: SITE PREPARATION, prior to excavating.
- B. Dewatering: Conform to applicable requirements of Section 31 23 19: DEWATERING, prior to initiating excavation and maintain in a dewatered state throughout the period of excavation so excavation is completed in the dry.
- C. Perform preconstruction survey in accordance with Section 01 71 23: LAYOUT OF WORK AND QUANTITY SURVEYS.
- D. Coordinate final foundation excavation with related Work in Section 31 23 13: SUBGRADE PREPARATION.

**PART 2 PRODUCTS**

NOT USED

**PART 3 EXECUTION****3.1 GENERAL**

- A. Complete all excavation regardless of the type, nature, or condition of the materials encountered.
- B. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot except where dimensions or grades are shown or specified as maximum or minimum. Allow for working space, topsoil, riprap and riprap bedding, and similar items, wherever applicable.
- C. Do not excavate to beyond the lines and grades shown without written authorization of THORNTON.
- D. Excavation shall be performed in the dry.
- E. Selectively excavate, handle, haul, stockpile and process borrow materials as necessary to yield suitable types and sufficient quantities of the various fill and backfill materials required for construction of the Work.

**3.2 MOISTURE CONDITIONING OF BORROW MATERIAL**

- A. Moisture condition excavated materials at the point of excavation where possible when removed materials will be subsequently placed as fill and backfill.
- B. When practicable and where needed, pre-wet materials in advance of excavation. Sequence and coordinate pre-wetting with excavation from various borrow areas to produce borrow materials with uniform and consistent moisture conditions.

**3.3 FINAL EXCAVATION FOR RIPRAP AND RIPRAP BEDDING SUBGRADE**

- A. Grade and install the riprap with the objective to achieve a dirt-balanced site. If the CONTRACTOR cannot achieve a balanced site, all excess material shall be hauled from the site and property and disposed by the CONTRACTOR. Cost for hauling surplus material shall be incidental to the work.

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- B. Take all necessary precautions to preserve the material below and beyond the established lines of all excavation in the soundest possible condition. Repair any damage to foundation material beyond the required excavation lines due to frost, wetting, drying, erosion, physical disturbance, ineffective dewatering, or CONTRACTOR's operations.

**3.4 PERMANENT EXCAVATION SLOPES**

- A. Shape, trim, and finish cut slopes to conform with lines, grades, and cross sections shown, with proper allowance for topsoil or riprap and riprap bedding, where shown.
- B. Remove stones and rock that exceed 6-inch diameter and that are loose and may roll down slope. Remove exposed roots from cut slopes.

**3.5 STOCKPILING EXCAVATED MATERIAL**

- A. Stockpile excavated material that is suitable for use as fill or backfill until material is needed.
- B. Confine stockpiles to within approved work areas.
- C. Do not stockpile excavated material adjacent to trenches and other excavations unless excavation sideslopes and excavation support systems are designed, constructed, and maintained for stockpile loads.
- D. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce settlement.

**3.6 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATION**

- A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill at an on-site location designated by THORNTON. It is expected that the quantity of excavation will exceed the quantity of earth fill.
- B. Moisture content of excavated materials alone shall not be reason for wasting material. Moisten or dry material to the specified moisture content and use in permanent construction as specified in Section 31 23 23: FILL.
- C. Dispose of debris resulting from removal of organic matter, trash, refuse, and junk as specified in Section 31 11 00: SITE PREPARATION.

**3.7 OVEREXCAVATION OF UNSUITABLE FOUNDATION SOILS**

- A. Unsuitable foundation materials shall be removed. Excavate down to the top of suitable foundation material as determined by THORNTON. Backfill the excavated area using materials and placement procedures for the materials that are to be placed above the excavated area. Do not excavate below the limits shown on the Drawings without authorization from THORNTON.

**END OF SECTION**

**SECTION 31 23 23**  
**FILL****PART 1 GENERAL**

## 1.1 WORK INCLUDES

- A. Fill required to place riprap and riprap bedding.
- B. Miscellaneous fill or backfill not specifically covered in other sections.
- C. Does not include special earth materials covered in other Specification Sections, including RIPRAP AND RIPRAP BEDDING.

## 1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
  - 1. American Society for Testing and Materials (ASTM):
    - a. C 117 - Standard Test Method for Materials Finer Than 75-Micrometers (No. 200) Sieve in Mineral Aggregates by Washing
    - b. C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
    - c. D 422 - Standard Test Method for Particle-Size Analysis of Soils
    - d. D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>))
    - e. D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
    - f. D 2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
    - g. D 2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
    - h. D 2937 - Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method
    - i. D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
    - j. D 4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
    - k. D 4254 - Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
    - l. D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
    - m. D 4643 - Standard Test Method for Determination of Water (Moisture) Content of Soils by Microwave Oven Heating
    - n. D 4959 - Standard Test Method for Determination of Water Moisture Content of Soil by Direct Heating
    - o. D 6913 - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
    - p. D 6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

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2. American Association of State Highway and Transportation Officials (AASHTO):
  - a. T272 - Standard Method of Test for Family of Curves-One Point Method, in the Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Part II Tests
3. American National Standards Institute (ANSI): Z35.1, Safety Color Red
4. American Public Works Association (APWA): Uniform Color Code for Temporary Marking of Underground Utility Locations

**1.3 DEFINITIONS**

- A. Refer to applicable definitions of Section 31 23 16: EXCAVATION, and Section 31 23 13: SUBGRADE PREPARATION.
- B. Backfill: Fill materials placed in trenches, overexcavated areas, and around structures, pipes and other facilities.
- C. Borrow Material: Material from required excavations or from designated borrow areas on the site.
- D. Certified/Certification: Review, approved, stamped, and signed by a Professional Engineer registered in the State of Colorado.
- E. Completed Course: A course or layer that is ready for next layer or next phase of Work.
- F. Coverage: One coverage is defined as the requirement for successive trips of a piece of compaction equipment, which by means of sufficient overlap, will ensure contact on the entire surface of the layer by the equipment.
- G. Deleterious Materials: Organic matter, trash, rubbish, debris, oversize materials, and soluble materials.
- H. Fill: All materials used to raise existing grade where not defined as backfill.
- I. Fines: Material passing the No. 200 sieve as determined in accordance with ASTM D 422.
- J. Imported Material: Material obtained from sources off site.
- K. Lift: Loose (uncompacted) layer of material.
- L. Optimum Water Content:
  1. Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction.
  2. Determine field water content on basis of fraction passing 3/4-inch sieve.
- M. Oversize Materials: Soil particles, soil clods, sedimentary fragments, rocks, and other materials having a maximum dimension in excess of the specified limits.
- N. Particle Size: The size of a particle before compaction measured parallel to its longest dimension.
- O. Period of Inactivity or Extended Shutdown: Four days.
- P. Prepared Foundation: Ground surface after completion of required clearing and grubbing, stripping of topsoil, excavation to grade, and foundation preparation.



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- Q. Processed Borrow: Borrow that is physically modified by CONTRACTOR to derive a material that is suitable for a specific use.
- R. Relative Compaction:
1. Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D 698.
  2. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by ENGINEER.
- S. Relative Density: Calculated in accordance with ASTM D 4254 based on maximum index density determined in accordance with ASTM D 4253 and minimum index density determined in accordance with ASTM D 4254.
- T. Structural Backfill: Fill materials as required adjacent to structures and other facilities.
- U. Well-Graded:
1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
  2. Does not define numerical value that must be placed or coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
  3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

**1.4 CONTRACTOR QUALITY CONTROL**

- A. Perform water content, field density, gradation, Proctor, and other tests during borrow materials development and fill placement as needed to develop and manage operations, produce consistent fill and backfill meeting the Specifications, and that meet the frequencies in the Specifications.
- B. Notify THORNTON when any one of the following occur:
1. Fill is about to be placed on prepared foundation, or fill operations are about to be resumed after a period of inactivity.
  2. Soft, loose, wet, or dried surface is encountered where fill or backfill is to be placed.
  3. Materials appear to be deviating from the Specifications.

**1.5 THORNTON QUALITY ASSURANCE**

- A. THORNTON may perform field quality control tests to measure density and water content of soil in place, laboratory full compaction and associated one-point compaction tests, and gradation or index tests to confirm that materials placed meet the requirements of these Specifications.
- B. THORNTON's tests will be performed on materials taken at the place of excavation, stockpiles, conveyors, and on the fill. CONTRACTOR shall remove surface material and provide assistance as necessary with sampling and testing.
- C. CONTRACTOR shall pay for retesting due to failed tests. No additional placement shall occur until passing tests are achieved.

**1.6 SEQUENCING AND SCHEDULING**

- A. Place fill upon prepared foundation only during daylight hours and only after the prepared foundation has been inspected and accepted by THORNTON.

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- A. Excavated onsite materials derived from existing slope soils or designated onsite borrow areas having a maximum particle size of 6 inches, at least 50 percent finer than 3 inches, at least 25 percent finer than the No. 4 sieve, a plasticity index less than 40, and free of deleterious materials.
- B. Allowable Unified Soil Classifications System (USCS) classification of: CH, CL, CL-ML, SC-SM, SC, SM, SP-SC, SP-SM, SW-SC, SW-SM, GC, GM, GC-GM, GR-GC, GP-GM, GW-GC, GW-GM.
- C. It is expected that earthfill will be derived from the required slope excavations.
- D. Blend adequately during placement such that the compacted earthfill material forms a uniform, homogeneous, very stiff or dense, void-free compacted embankment fill.
- E. Remove cobbles, boulders, hard bedrock fragments, or other particles larger than 6 inches.

**2.2 TOPSOIL**

- A. Obtain topsoil from selective excavation during site preparation and stripping work that meets the following requirements:
  - 1. Maximum particle size of 3 inches.
  - 2. Free from deleterious materials.
  - 3. Sufficient organics to support vegetative growth.

**2.3 WATER FOR MOISTURE CONDITIONING**

- A. Free of hazardous or toxic contaminates, or contaminants deleterious to proper compaction.

**2.4 MOISTURE CONDITIONING EQUIPMENT**

- A. Provide water trucks and/or tankers and other supplemental equipment necessary to uniformly apply water to loose lifts of material for proper compaction and for watering of completed courses until overlying courses are placed.
- B. Watering equipment shall be equipped with pressurized distributor bars or other means necessary to assure uniform application of water.
- C. Provide blades, discs, harrows or other supplemental equipment necessary to process borrow materials and pulverize bedrock into acceptable size particles, blend non-uniform fill and backfill materials, for aerating and drying out wet materials, and for scarification of completed courses.
- D. Blending equipment shall be of sufficient type, size and power to blend the full depth of the loose lifts, and to cut into and scarify the underlying completed course to a depth of 2 inches to allow bonding of successive lifts. In addition, blending equipment shall be adjustable to allow light scarification of completed courses or haul roads that require reconditioning prior to placement of overlying fill.

**2.5 COMPACTION EQUIPMENT**

- A. Provide dedicated compaction equipment of suitable type, capable of achieving the requirements of the Specifications, and which provide a satisfactory uniform, homogeneous fill.

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- B. Hauling or placement equipment shall not be considered compaction equipment except under special circumstances as specified below.
- C. Provide hand-operated equipment for use in confined areas not accessible to regular compaction equipment or where regular compaction equipment might damage existing structures or piping. Compaction equipment shall be subject to the approval of ENGINEER.

**PART 3 EXECUTION****3.1 GENERAL**

- A. Prepare subgrade according to Section 31 23 13: SUBGRADE PREPARATION.
- B. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.
- C. Place and spread fill and backfill materials in horizontal lifts of uniform thickness in a manner that avoids segregation.
- D. Compact each lift at the specified moisture content, using the specified equipment, and to specified densities, prior to placing succeeding lifts.
- E. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.
- F. The maximum allowable particle size delivered in the fill and backfill at placement location and prior to any compaction shall be no larger than the maximum specified in Part 2.
- G. Process by blading, discing, harrowing, or other THORNTON-approved methods as necessary to provide sufficient disaggregation and blending of fill and backfill.
- H. Maintain moisture content of delivered materials and compact materials in the lift to produce the specified fill characteristics.
- I. Do not place fill or backfill if fill or backfill material is frozen, or if surface upon which fill or backfill is to be placed is frozen.
- J. Tolerances:
  - 1. Final Lines and Grades: Within a tolerance of 0.1-foot unless dimensions or grades are shown or specified otherwise.
  - 2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.

**3.2 MOISTURE CONDITIONING AND PROCESSING**

- A. When practicable, moisture condition and process material prior to and during borrow excavation so that material is within the specified moisture content and particle size limits at the time it is delivered to the fill area.
- B. Provide supplemental sprinkling on the fill to keep material within specified moisture content limits throughout the placement and compaction process, and to preserve moisture in completed courses until placement of overlying courses.
- C. Blend material by discing, blading, or harrowing to maintain uniform moisture content throughout the lift.

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- D. Do not attempt to compact material that contains excessive moisture. Material that becomes too wet shall be removed or reworked. Aerate material by blading, discing, harrowing, or other methods to hasten the drying process.
- E. Provide suitable types and numbers of watering and blending equipment to keep pace with fill and backfill placement activities. Provide additional equipment or restrict material placement rates if watering and blending equipment cannot keep pace with fill and backfill placement.
- F. Maintain moisture conditions of the fill surface during nights, weekends, holidays, and other periods of temporary work stoppage.

**3.3 COMPACTION**

- A. Compact all material by mechanical means. If tests indicate that compaction or moisture content is not as specified, or if compaction equipment being used is not as specified, terminate material placement and take corrective action prior to resuming material placement.
- B. Operate compaction equipment in strict accordance with manufacturer's instructions and recommendations. Maintain equipment in such condition that it will deliver the manufacturer's rated compactive effort.
- C. Operate tamping foot rollers at a speed less than 5 miles per hour, and vibratory drum roller at a speed less than 3 miles per hour.
- D. Operate sheepsfoot and tamping foot rollers to maintain the spaces between the individual feet clear of adherent materials that impair the effectiveness of the roller.
- E. Provide suitable numbers of equipment to keep pace with fill and backfill placement activities. Restrict material placement rates if compaction equipment cannot keep pace with fill and backfill placement.

**3.4 FILL**

- A. Construct fills to the lines and grades shown.
- B. All materials exposed on the compacted slopes shall be at the as-compacted density and moisture content when the overlying slope protection and topsoil are placed.
- C. Maintain the fill, including sloping the surfaces to drain, preventing or repairing gullies, and maintaining surfaces free of weeds or other vegetation until final completion and acceptance of all Work.
- D. After a layer has been dumped and spread to less than the maximum specified lift thickness to blend the materials.
- E. Remove and rework any smooth hard surfaces and deep ruts in the surface of the fill resulting from passage of construction equipment prior to placing overlying embankment.
- F. Protect fill during periods of inactivity or extended shutdown. Grade surfaces to facilitate runoff and wheel roll or compact with a smooth drum roller to reduce infiltration and softening. A loose lift of the specified material type can be placed to protect slopes during periods of frost.
- G. After periods of inactivity or extended shutdowns, prepare the fill surface prior to resumption of fill activities.

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1. Recondition the fill surface by scarifying to a minimum depth of 8 inches, moisture conditioning, and recompacting as specified. If previously placed fill has become damaged by saturation, frost, or desiccation to a depth greater than 8 inches, over-excavate damaged material and replace/re-compact.
2. No separate payment will be made for fill restoration after periods of inactivity or shutdown.

**H. Earthfill:**

1. Maximum Lift Thickness: 8 inches.
2. Compaction: Not less than 97 percent relative compaction (ASTM D 698).
3. Compaction Moisture: Between 2 percent below and 2 percent above optimum water content (ASTM D 698).

**3.5 FILL UNDER AND BACKFILL AROUND EXISTING STRUCTURES**

- A. Place backfill within 5 feet of structures in 6-inch-thick lifts. Use hand-operated or walk-behind compaction equipment within 5 feet of walls and footings. Stop backfill at required grade; make allowance for topsoil, slope protection and other fills where required.

**3.6 QUALITY CONTROL**

- A. CONTRACTOR shall retain a qualified testing laboratory with experience performing tests for heavy civil projects to perform quality control tests prior to and during fill and backfill placement. Test frequencies specified are minimums. Additional testing may be required where minimum frequencies are unrepresentative for variable materials or inconsistent construction operations, and to retest previously failed materials after corrective actions have been implemented or as requested by the ENGINEER.
- B. CONTRACTOR shall perform tests at the locations, depths, and times requested by THORNTON.
- C. Field Quality Control Tests:
  1. An initial number of tests are required prior to placement of fill or backfill; additional tests are required during construction at the specified frequency and whenever material variation occurs such that existing information is not representative.
  2. CONTRACTOR will perform Moisture-Density Relationship:
    - a. Prior to placement of fill and backfill, a minimum of two laboratory compaction density tests in accordance with ASTM D 698.
    - b. Apply rock corrections to density and moisture content determinations for oversize materials larger than 3/4-inch.
    - c. During fill and backfill placement, additional laboratory compaction tests are required whenever material variation occurs such that the existing relationships are not representative, and at the following minimum frequencies.
      - 1) One compaction test at every 50-feet of longitudinal subgrade. Unless otherwise directed by the Project Construction Coordinator.
  3. Gradation and Atterberg Limits:
    - a. Prior to placement of fill and backfill, two gradation tests and two Atterberg limit tests; tests shall correspond with samples used for initial laboratory compaction tests. Gradation test shall be performed in accordance with

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- ASTM D 422, and Atterberg limits test shall be performed in accordance with ASTM D 4318.
- b. During fill and backfill placement, additional gradation and Atterberg limit tests are required whenever material variation occurs and appears to deviate from the Specifications, and at the following minimum frequencies:
    - 1) One per every 50-feet of longitudinal subgrade unless directed otherwise.
4. In-Place Density and Moisture Content:
- a. During fill and backfill placement, in-place density testing using one, or a combination of the following methods: ASTM D 6938, D 2937, and D 2216 for each type of material placed each day, and one test shall be made for each 12-inch rise in filled area elevation for each work area, but not less than the minimum frequencies specified below:
    - 1) One per every 50-feet of longitudinal subgrade unless directed otherwise.
  - b. The maximum dry density and optimum water content at the location of the in-place density test shall be evaluated using the one-point compaction test and full-curve compaction tests (family of curves) of representative fill materials. Determine the maximum dry density and optimum water content in accordance with the Maximum Density and Optimum Water Content Calculation section and the Appendix section of AASHTO T272.
  - c. Retests of failed areas after corrective measures have been implemented are required; retests will reference the prior failing test number.
5. Correlations:
- a. In-place density and moisture content measurements determined in accordance with ASTM D 2937 (drive-cylinder density) and D 2216 (oven-dried moisture) will be correlated with similar measurements made in accordance with ASTM D 6938 (nuclear density and moisture) for same material type.
  - b. Where moisture content determinations are made in accordance with ASTM D 2216 (oven-dried) and D 4643 (microwave dried), ENGINEER will develop correlation between oven-dried and microwave-dried moisture contents for the same material type.
  - c. Correlations and applicable nuclear gage and microwave correction factors will be developed to evaluate fill and backfill placement.

**END OF SECTION**

# PRE-CONSTRUCTION MEETING

DATE: 1/17/2023 TITLE: Gravel Lakes Riprap

BID/PROJECT NO: 21-124 TIME: 2:00PM CONFERENCE ROOM: On-Site

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