MOREHEAD BEAUFORT YACHT CLUB

Specifications for

Spoil Area Improvements

TABLE OF CONTENTS

GENERAL REQUIREMENTS

1. Each contractor shall visit the site and be responsible for becoming familiar with conditions effecting the construction before submitting his bid.

2. Description of work: The contractor shall furnish all labor, materials, equipment, services and operations to complete the work as described in each division and work reasonably inferable from the drawings as is herein specified, and is normally done in practice.

3. All materials: New, free from defects and conforming to standards under whose requirements they were manufactured.

4. All work is to be installed as shown on the drawings, as herein specified and in accordance with the governing Building Code, codes and regulations of state and local authorities and the National Board of Fire Underwriters, whichever may have jurisdiction. If drawings and/or specifications are in conflict with the authorities having jurisdiction, the more stringent requirements shall be adhered to. Each contractor shall state in his bid where drawings and/or specifications differ from codes and regulations and these discrepancies should be reported to the owner.

5. Shop drawings: Submit as required in the various sections of these specifications, as called for on drawings, or required by owner or local building officials.

6. Before commencing with the work, the contractor shall verify measurements at the construction site and notify the owner authorized representative of any differences that may exist between actual dimensions and those indicated on the drawings.

7. Should any discrepancy occur between drawings or specifications, the contractor must notify the Owner for a clarification prior to continuing with the work. If the contractor proceeds with the work without requesting the proper interpretations and/or specification, he may be required to remove and replace such work at his own expense.

8. All workmanship and materials shall be guaranteed for a period of one year from the date of final acceptance unless specified otherwise for a longer period of time on specific items. The contractor shall be responsible for replacing or repairing his own defective work, as well as pay all costs incidental thereto, including damage to other work, furnishings or equipment.

9. Streets and roads shall be kept clean of debris.

10. Temporary Facilities: Provide as required in specific sections of these specifications or as required by local or state codes.

11. Tests and fees: Supplied and paid for by contractor except as noted elsewhere.

EROSION CONTROL

1. Scope of work: Work consists of furnishing all labor, materials, services and equipment as shown on the Drawings and/or specified therein.

2. Erosion and Sediment Control includes, but is not limited to items 3. and 4.

3. Maintain erosion control measures until the project is accepted and vegetation is established. Remove, repair or replace deteriorated erosion control such as silt fence. Remove and dispose of silt accumulation when necessary or as directed. Removed silt fence and other erosion control becomes the property of the contractor. Dress, permanently seed and mulch all areas disturbed during removal of fencing or any other erosion control measure.

4. Review Contract Documents for requirements that affect work of this section. Specification Sections that directly relate to work of this section include, but are not limited to:

    a. NCDENR or Local Jurisdiction Erosion Control Permit
    b. Mining Permit

5. Quality Assurance

    a. Perform erosion and sediment control in compliance with applicable requirements of local and state governing authorities having jurisdiction.

6. Product Delivery and Storage

    a. Take all required measures to ensure that all materials are protected from damage.
    b. All materials shall be delivered and stored within the Contractor's work limits or within an area approved by MBYC.

7. Products

    a. Inlet Protection Filter Fabric

        i. Inlet protection wire mesh shall be 3/8 Mesh Galvanized hardwire.

    b. Silt Fence

        i. Standard strength silt fence shall be polypropylene filter fabric backed with industrial netting and metal posts. Standard of Quality shall be Mirafi 100X or an approved equal. See project drawings.

    c. Seeding, Sodding, and Jute Mesh

i. For Erosion Control Seeding rates, see erosion control detail drawing.

8. Execution

a. General Erosion Control

i. Install construction erosion control features, as indicated on drawings and specifications prior to topsoil stripping, earthwork, and removal of existing vegetation. Keep the disturbance to a minimum. Install other features as described in the sequence of erosion, sediment and pollution control on the Contract Drawings.
ii. Start permanent seeding within Fourteen (14) calendar days of fine grading. When this is not possible, place temporary seeding at the rate specified in the drawings perennial rye within Twenty-one (21) days on all non paved areas. If adverse weather conditions prevent good germination in two (2) weeks, repeat seeding until the area is stabilized. Till under temporary grass when preparing for final seeding.
iii. Until a disturbed area is stabilized, trap runoff sediment by the use of methods acceptable to governing authorities.
iv. Provide erosion controls on slopes and swales traversing, bordering, or leaving the site. Limit the water flow to a non-erosive velocity.
v. Inspect all erosion and sediment control measures immediately after each rainfall and at least daily during prolonged rainfall. Make required repairs immediately. Keep daily records.
vi. Remove sediment deposits when they reach approximately one half of the height of the barrier. Dispose sediment in a manner that does not result in additional erosion or pollution.
vii. The Contractor is responsible for prompt removal and disposal of all rubbish and debris in accordance with the governing authorities.

b. Siltation Fence

i. Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.
ii. Install posts 2 feet deep on downstream side of the silt fence enabling posts to support the fabric from upstream water pressure. Install posts with nipples facing away from the silt fabric. Posts shall be 1.33 lb/linear foot steel with a minimum length of 4 feet and shall have projections to facilitate fastening of the fabric.
iii. Ensure that the height of the sediment fence does not exceed 24 inches above the ground surface.
iv. Construct the filter fabric from a continuous roll cut to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with 4 feet minimum overlap to the next post.
v. Support standard strength filter fabric by wire mesh (minimum 14 gauge with maximum mesh spacing of 6 inches) fastened securely to the upslope side of

the posts. Extend the wire mesh support to the bottom of the trench. Fasten the wire reinforcement, then fabric on the upslope side of the fence post. Wire or plastic zip ties should have a minimum 50 pound tensile strength.

vi. When a wire mesh support fence is used, space posts a maximum of 8 feet apart. Support posts should be driven securely into the ground a minimum of 24 inches.

vii. Extra strength filter fabric with 6 feet post spacing does not require wire mesh support fence. Securely fasten the filter fabric directly to the posts. Wire or plastic zip ties should have a minimum of 50 pound tensile strength.

viii. Attach the fabric to each post with three ties, all spaced within the top 8 inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1 inch vertically apart. Also, each tie should be positioned to hang on a post nipple when tightened to prevent sagging.

ix. Wrap approximately 6 inches of fabric around the end posts and secure with 3 ties.

x. Excavate a trench approximately 4 inches wide and 8 inches deep along the proposed line of posts and upslope from the barrier.

xi. Place 12 inches of the fabric along the bottom and side of the trench.

xii. Backfill the trench with soil placed over the filter fabric and thoroughly compact.

c. Seeding

i. For Erosion Control Seeding rates see erosion control detail project drawing.

d. Cleanup

i. During the Contract and at intervals as directed by the Owner authorized Representative or Engineer as erosion, sediment and pollution control procedures are completed, clear the site of all extraneous materials, rubbish, and debris. Leave the site in a clean, safe, well draining, and neat condition.

DEMOLITION & CLEARING

1. Related Documents

    a. Drawings and general provisions of the contract, including general and supplementary conditions and specifications sections, apply to this section.

2. Summary

    a. This Section includes the following:

        i. Protecting existing trees, shrubs, and plants to remain.
        ii. Removing existing Trees, shrubs, groundcover, and grass.
        iii. Clearing and grubbing.
        iv. Stripping and stockpiling topsoil.
        v. Removing above- and below-grade site improvements.
        vi. Disconnecting, capping or sealing, and abandoning site utilities in place or removing site utilities per drawings.
        vii. Temporary erosion and sedimentation control measures.

3. Definitions

    a. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 4 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

    b. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

4. Material Ownership

    a. Except for stripped topsoil or other materials indicated to remain MBYC property, cleared materials shall become Contractor's property and shall be promptly removed from Project site.

5. Submittals

a. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

6. Quality Assurance

    a. Preconstruction Conference: Conduct conference at Project site to comply with requirements of local or state erosion control permit requirements.

7. Project Conditions

    a. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations

        i. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
        ii. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

8. Salvageable improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

9. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

10. Preparation

    a. Protect and maintain benchmarks and survey control points from disturbance during construction
    b. Locate and clearly flag trees and vegetation to remain or to be relocated
    c. Protect existing site improvements to remain from damage during construction

        i. Restore damaged improvements to their original condition, as acceptable to owner.

11. Temporary erosion and sediment control

    a. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and sediment and erosion control plan specific to the site.

    b. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

    c. Remove erosion and sedimentation controls and restore and stabilize areas disturbed

during removal.

12. Tree Protection

a. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

   i. Do not store construction materials, debris, or excavated material within fenced area.
   ii. Do not permit vehicles, equipment, or foot traffic within fenced area.
   iii. Maintain fenced area free of weeds and trash.

b. Do not excavate within tree protection zones, unless otherwise indicated.

c. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

   i. Cover exposed roots with burlap and water regularly.
   ii. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
   iii. Coat cut faces of roots more than 2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
   iv. Backfill with soil as soon as possible.

d. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Owner.
   i. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
   ii. Replace trees that cannot be repaired and restored to full-growth status, as determined by Arborist.

13. Utilities

a. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.

b. Do not proceed with utility interruptions without Owner or Owner authorized Representative written permission.

14. Clearing and Grubbing

a. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.

i. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
ii. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
iii. Remove stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
iv. Use only hand methods for grubbing within tree protection zone.
v. Remove tree branches and dispose of off-site.

b. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

i. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

15. Topsoil Stripping

a. Remove sod and grass before stripping topsoil.
b. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

i. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

c. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Seed and straw as necessary per Erosion Control plan.

i. Do not stockpile topsoil within tree protection zones
ii. Dispose of excess topsoil as specified for waste material disposal. OR
iii. Stockpile surplus topsoil to allow for respreading deeper topsoil. Consult with Owner or Owner authorized Representative prior to hauling excess topsoil for disposal.

16. Site improvements

a. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

b. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

17. Disposal

a. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them

off Owner's property.

i. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

EARTHWORK

1. Summary

    a. This Section includes the following:

        i. Preparing and grading subgrades for slabs-on-grade, walks, pavements, and landscaping.
        ii. Excavating and backfilling for stormwater structures.
        iii. Excavating and backfilling for utility trenches.
        iv. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
        v. Excavating and backfilling for berms and structures.

2. Definitions

    a. Geotechnical Testing Agency: a qualified independent geotechnical testing and inspection laboratory employed by the MBYC to perform soil testing and inspection service during earthwork and paving operations.

    b. Fill: Soil material or controlled low-strength material used to fill an excavation.

    c. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

    d. Final Backfill: Backfill placed over initial backfill to fill a trench.

    e. Engineered Fill: Soil material deemed acceptable for fill applications by the owner contracted geotechnical engineer.

    f. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

    g. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

    h. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

    i. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

j. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

    i. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Designer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
    ii. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
    iii. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Designer. Unauthorized excavation, as well as remedial work directed by Designer, shall be without additional compensation.

k. Fill: Soil material used to raise existing grades.

l. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

    i. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, short-tip-radius rock bucket with rock teeth, rated not less than 268-hp (199-kW) flywheel power (CAT 333D) or boulders larger than ¾ cu.yd. (0.57 Cu. m) in size.
    ii. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp (157-kW) flywheel power (CATD7R) and developing a minimum of 48,510-lbf (216-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732 (CAT 330).
    iii. Material in beds, ledges, masses and boulders, of rock material 1 cu.yd or more in size that exceed a standard penetration resistance of 100 blows/ 3 inches when tested by a Geotechnical testing agency according to ASTM 1586.

m. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

n. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

o. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

p. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services.

3. Submittals

    a. General: Submit the following according to the Conditions of the Contract and General Requirements Sections of the specifications.

    b. Product Data: For the following:

        i. Each type of plastic warning tape.
        ii. Geo-textile.
        iii. Geo-membrane.
        iv. Outlet Structure
        v. Pipe
        vi. Stone, concrete or paving materials

    c. Samples: 12 inch-by-12 inch sample of sub-drainage geotextile and geomembrane.

    d. Pre-excavation Photographs or videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

4. Quality Assurance

    a. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

    b. Preconstruction Conference: Before commencing earthwork, Contractor shall meet with representatives of the MBYC, consultants, independent testing agencies, and other concerned entities. Review all earthwork and erosion and sedimentation control procedures and measures and responsibilities including implementation, maintenance, testing and inspection procedures and requirements. Contractor shall notify participants at least 5 working days prior to convening for conference.

    c. Testing and Inspection Service: MBYC will employ and pay for a qualified independent geotechnical testing agency to perform soil testing and inspection service during earthwork operations.

    d. Contractor's Quality Control Responsibilities: Contractor is solely responsible for quality control of the Work and the professional knowledge to perform the work.

        i. Contractor's Soil Consultant: Contractor shall retain at his own expense, if needed, the services of a qualified Soil Consultant to advise him on earthwork

construction techniques involved in the Work, including the design, checking and approval of temporary retaining structures, excavation slopes, excavation sequences, dewatering systems, other items pertinent to the Work, and construction methods for solution of problems which may be encountered during the prosecution of the Work. The Consultant shall be primarily concerned with construction methods which will result in finished earthwork of the required quality and with methods which will prevent settlement and damage to surrounding structures, roads, utilities, embankments and other items both within the property lines and on adjoining properties. This consultant shall not be the same company acting as the owner's geotechinical testing agency and shall otherwise present no conflict of interest to the project.

e. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.

5. Project Conditions

a. Existing Utilities:

i. Each Contractor who does excavation work will be responsible for locating underground utilities prior to excavation or driving of any shoring. The Contractor may obtain the services of a commercial utilities locator and/or call the various utility companies who may have lines in the area. In addition, they must notify the MBYC at least 5 days prior to excavation.
ii. The General Statutes of North Carolina requires contractors to notify North Carolina One-Call Center (NCOCC) at least 48 hours (holidays and weekend excluded) but not more than ten days prior to excavation on a public right of way.
iii. Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations. Exercise extreme caution to avoid damage to existing underground utility lines during construction. If damaged, repair or replace at no additional cost to MBYC.
iv. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
v. If services are interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the MBYC.
vi. Notify municipal agencies and service utility companies having jurisdiction. Comply with requirements of governing authorities and agencies for protection, relocation, removal, and discontinuing of services.
vii. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the authorized MBYC Representative and secure his instructions.

viii. Do not proceed with permanent relocation of utilities until written instructions are received from the owner authorized representative.
ix. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with MBYC and utility companies in keeping respective services and facilities in operation. If utility is damaged as a result of construction, repair the utility to the satisfaction of utility owner.
x. Do not interrupt existing utilities serving facilities occupied by MBYC or others, during occupied hours, except when permitted in writing by Owner authorized Representative and then only after acceptable temporary utility services have been provided.
xi. Provide minimum of 10 working day notice to MBYC and Designer, and receive written notice to proceed before interrupting any utility.
xii. Exercise extreme caution to avoid damage to existing underground utility lines during construction. If utilities are indicated to remain in place, provide adequate means of shoring, support and protection during earthwork operations.
xiii. Demolish and completely remove from site existing underground utilities indicated to be removed. Lines that are to be abandoned shall be left in place except where they interfere with the completion of the new work, in which case, they shall be demolished and removed from the site. Coordinate with utility companies for shutoff of services if lines are active

b. Protection of Persons and Property

i. Barricade open excavations occurring as part of this work and post with warning lights.
ii. Operate warning lights during hours from dusk to dawn each day and as recommended by authorities having jurisdiction.
iii. Before starting work, verify governing dimensions and elevations. Verify condition of adjoining properties. Take photographs to record any existing settlement or cracking of structures, pavements, and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.
iv. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
v. Confine equipment, apparatus, materials, storage and operations of workers to limits provided by law, ordinances, permits, contract documents, and as directed.
vi. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
vii. Clearly identify benchmarks and record existing elevations.
viii. Protect bench marks, monuments and reference points from displacement or damage and, if displaced or damaged, replace at no cost to MBYC.

c. Salvageable Improvements:

i. Carefully remove items indicated to be salvaged, and store on Owner's premises where indicated or directed.

6. Products

a. Materials

i. CMP (Corrugated Metal Pipe) :All pipe shall be fabricated from 16 gauge corrugated galvanized sheets.
ii. Pipe is to be new, clean, and free of defects.
iii. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.
iv. Satisfactory Soil Materials: ASTM D 2487 soil classification groups GC,ML, SC,CL, GW, GP, GM, SW, SP, and SM; unless otherwise recommended in a site-specific geotechnical report; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter. Liquid Limit (LL) less than 50; Plastic Index (PI) below 20.
v. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups MH, CH, OL, OH, and PT, unless otherwise recommended in a site-specific geotechnical report.
vi. Backfill and Fill Materials: Satisfactory soil materials.
vii. Subbase and Base Material: Naturally or artificially graded mixture of natural or crushed gravel, stone, recycled concrete as approved by GTA or other approved hard, durable material per ASTM D 2940 and conforming to the gradation limits as shown in the following table:

Sieve Size	Percent Passing (by weight)
1-1/2 inch	100
1 in	75-97
½ in	55-80
No. 4	35-55
No. 10	25-45
No. 40	14-30
No. 200	4-12

Note: The material passing the No. 40 sieve shall have a L.L of 30 or less and P.I. of 6 or less.

viii. Impervious fill: Mixture of clay or other material capable of compacting to a dense state that retards water intrusion.
ix. Topsoil: For areas not covered by building, drives, parking lots, walks or other hard surfaces, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from sub-soils, roots, heavy or stiff clay, stones

larger than 1 inch in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

x. Pipe bedding and initial backfill: Materials used 4 inches below all piping and to 12 inches above top of tallest pipe or tunnel section shall meet the following requirements:

1. Sand or sand-with-gravel mixture in which the gravel is either pea gravel (No. 78) or crushed stone without sharp edges.
2. Particles not larger than 2 inch.
3. Ninety (90) percent of the material passing a No. 2 sieve.
4. Ninety (90) percent retained by a No. 200 sieve.
5. All unsuitable material removed from the backfill soil.

7. ACCESSORIES

a. Detectable Warning Tape, water and sewer utilities: All underground piping and utilities, both metallic and non-metallic, except lawn irrigation lines, shall be identified with a warning tape. All non-metallic pipes shall have two stages of identification containing warning tape and detectable magnetic markers. Acid- and alkali-resistant polyethylene film warning tape manufactured for making and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; Standard color code for tape:

i. Blue: Water Systems
ii. Green: Sewer Systems

b. Detectable Warning Tape, other utilities: All underground piping and utilities, both metallic and non-metallic, except lawn irrigation lines, shall be identified with a warning tape. All non-metallic pipes shall have two stages of identification containing warning tape and detectable magnetic markers. Acid and alkali-resistant polyethylene film warning tape manufactured for making and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; Standard color code for tape:

i. Red: Electric
ii. Yellow: Gas, oil, steam and dangerous materials
iii. Orange: Telephone and other communications.

c. Geo-textiles

i. Drainage Geo-textile: Shall be 8 oz/yd^2 nonwoven needle-punched geo-textile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288.

d. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

i. Tensile Strength: 120 lb/ft (534 N/M); ASTM D 4632
ii. Tear Strength: 50 lb/ft (223 N/M); ASTM D 4533.
iii. Puncture Resistance: 65 lb/ft (289 N/M); ASTM D 4833.
iv. Water Flow Rate: 135 gpm per sq. ft. (5500 L/min per sq.m); ASTM D 4491.
v. Apparent Opening Size: No. 70 (0.212 mm); ASTM D 4751.
vi. UV Resistance (@ 500 hrs): 70% strength retained; ASTM D 4355.

8. Execution

a. Examination

i. Verification of Conditions: Examine the areas to receive the Work and the conditions under which the Work would be performed. Remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

b. Protection of Existing Utilities

i. Before excavating over or adjacent to existing utilities, notify the utility owner to ensure that protective Work will be coordinated and performed by Contractor in accordance with the requirements of such owner of the utility involved. If existing service lines, utilities and utility structures to remain in service are uncovered or encountered during these operations, protect from damage and provide support if necessary.
ii. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, immediately notify Owner authorized Representative and the utility owner. Cooperate with MBYC and utility owner in keeping their respective services, utilities and facilities in operation. Repair damaged utilities to the entire satisfaction of MBYC and utility owner concerned.

c. Protection of Existing Trees

i. Protection of Existing Trees: Protect trees indicated to remain and those which may be affected by performance of the Work, from damage to trunks, branches and roots. Do not excavate, fill or grade inside the drip line of such trees unless otherwise indicated. Protect tree trunks with 2inches planks in a suitable manner to the first branch or to a point 12’ from the ground. Do not trim branches without prior consultation with authorized MBYC Representative. When trimming, cut branches cleanly, close to the trunk, leaving no stumps or torn bark. Paint resulting cut surfaces with a suitable tree paint. Immediately cover roots which are accidently exposed. Roots 1inches and larger in diameter exposed by excavation shall be hand cut flush with the subgrade and the cut surface painted with a suitable tree paint.
ii. Do not use trees as guys, anchors, crane stays or for similar purposes. Do not store material or park vehicles within the drip line of trees.
iii. Contractor shall be liable to MBYC for the cost of replacing trees, which in the opinion of Designer, are damaged by performance of the Work.

d. Preparation

i. Protection: If, at any time, the safety of existing or new construction, utilities or other item appears to be endangered, provide proper means to support such structures, utilities and other items.

9. Rock and Unsuitable Soil Excavation

a. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth or rock. Do not excavate rock until it has been classified and cross sectioned by Owner. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.

i. Earth excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock, unsuitable soil or unauthorized excavation.
ii. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

b. Rock Excavation

i. Rock excavation shall be defined as the removal of a formation that cannot be excavated without systematic drilling and blasting, hoe-ram, jack-hammer, chemical expansion, or by a piece of excavating equipment as described below. In contrast, normal or earth excavation is a formation that, when plowed and ripped, breaks down in to small enough pieces to be easily moved, can be loaded in hauling units, and can be readily incorporated into an embankment or foundation in relatively thin layers. Boulders larger than one (1) cubic yard shall be classified as rock. The Contractor shall expose and clean the rock material for inspection and measurement by the Designer. Any material moved or removed without the measurement and approval of the Designer will be considered as earth excavation. The Designer is the final judge on what is to be classified as rock excavation.
ii. The Contractor may provide a demonstration that the material cannot be removed with a backhoe equipped with a minimum 2 cubic yard heavy-duty trenching bucket with rock ripping teeth placed on a machine capable of a lifting capacity of 30,000 pounds at a trench depth of 10 feet equal to a 70,000 pound Caterpillar cat 330 series track hoe.
iii. The Contractor may be required to provide equipment specification data verifying that the above minimum-rated equipment will be used for demonstration purposes. The equipment is to be in good repair and in proper working condition. Material which cannot be removed by this piece of equipment will be considered rock for purposes of trench and pit rock removal calculations.
iv. Rock payment lines are limited to the following:

1. For trenches/excavations, 6 inches below the bottom of the utility base, and 24 inches wider than the outside dimensions of the utility.
2. Outside dimensions of concrete work where no forms are required.
3. Include in the base bid the quantity of rock removal noted on the bid form if applicable.. Removal of quantities below or in excess of this amount will be credited or compensated at the unit price quoted in the bid form.

c. Unsuitable Soil

i. Unsuitable soil shall be defined as that which is not suitable for obtaining the compaction requirements specified in this Section; however, soils shall not be rendered unsuitable due to moisture content.

10. Storage of Excavated Materials

a. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage. For moisture sensitive soils, covering the stock pile maybe necessary.

b. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain, or on sidewalks, parking lots, roads and streets.

c. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

11. Dewatering

a. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

b. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

c. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

12. Explosives

a. Explosives are not allowed on Project Site.

13. Stability of Excavations

a. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

b. Slope or bench sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace all excavations where sloping or benching is not possible due to: space restrictions, being located within the drip-line of any existing trees that are to remain, stability of material excavated or location relative to roadways, buildings or existing utilities. Maintain sides of excavations and shoring in safe condition until completion of backfilling.

14. Excavations for Structures

    a. Extent: In addition to the requirements for clearing, excavate to accommodate the Work at the subgrades indicated, including to lower depths as required to clear rubble, obstructions and unsuitable subgrade materials.

    b. Disposal of Excavated Materials: Dispose of the following material off the site.

        i. Material resulting from clearing operations and excavated material which is unsuitable for fill.
        ii. Excess excavated materials.

15. Excavation for Utility Trenches

    a. Excavate trenches to indicated gradients, lines, depths, and elevations.

        i. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

    b. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

        i. Clearance: 18 inches each side of pipe or conduit.

    c. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

        i. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
        ii. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
        iii. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

    d. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

        i. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

16. Cold Weather Protection

    a. Protect excavation bottoms against freezing when atmospheric temperature is less than

35˚F.

17. Subgrade Inspection

a. Notify Owner authorized Representative to contact the geotechnical engineer when excavations have reached required subgrade.

b. If owner's geotechnical engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

c. Proof-roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet, saturated or frozen subgrades.

   i. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   ii. Proof-roll with a loaded tandem-axle dump truck weighing not less than 15 tons (13.6 tones), unless otherwise allowed by the geotechnical test agency.
   iii. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by geotechnical testing agency, and replace with compacted backfill or fill as directed.

d. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

e. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by geotechnical testing agency, without additional compensation.

18. Storage of Soil Materials

a. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

b. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

19. Backfill

a. Place and compact backfill in excavations promptly, but not before completing the following:

   i. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   ii. Surveying locations of underground utilities for Record Documents.
   iii. Testing and inspecting underground utilities.

iv. Removing concrete formwork.
v. Removing trash and debris.
vi. Removing temporary shoring and bracing, and sheeting.
vii. Installing permanent or temporary horizontal bracing on horizontally supported walls.

b. Place backfill on subgrades free of mud, frost, snow, or ice.

20. Placement and Compaction

a. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

b. When existing ground surface has a density less than that specified under Compaction for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

c. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

d. Before compaction, moisten or air dry each layer as necessary to achieve an allowable moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

e. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

f. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by geotechnical testing agency if soil density tests indicate inadequate compaction.

g. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 698:

i. Under structures, building slabs and steps, and pavements, compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.
ii. Under lawn or unpaved areas, compact top 6 inches of subgrade and each layer

of backfill or fill material at 90 percent maximum density.

iii. Under walkways, compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.

iv. At berms and dams, compact each layer of backfill or fill material at 95 percent maximum density or as specified in geotechnical report.

v. Under and around existing utilities, provide compaction equal to that specified for new work listed above. If compaction under existing utility lines can not be provided due to the width of pipe or conduit backfill with flowable concrete fill.

h. Moisture Control: Where dry subgrade or layer of soil material must be moisture conditioned (wetted) before compaction, uniformly apply water to surface of the material and mix thoroughly. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

i. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

ii. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

iii. Addition of lime to dry soil is generally permissible but shall be observed and documented by the geotechnical testing agency with the necessary tests performed.

21. Utility Trench Backfill

a. Place backfill on subgrades free of water, mud, frost, snow, or ice.

b. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

c. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.

i. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

d. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.

e. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

f. Place and compact final backfill of satisfactory soil to final subgrade elevation.

g. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

h. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

22. Soil Fill

a. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

b. Place and compact fill material in layers to required elevations as follows:

i. Under grass and planted areas, use satisfactory soil material.
ii. Under walks and pavements, use satisfactory soil material.
iii. Under steps and ramps, use Engineered fill.
iv. Under footings and foundations, use Engineered fill.
v. Berms to be constructed of Engineered fill.

c. Place soil fill on subgrades free of mud, frost, snow, or ice.

23. Soil Moisture Control

a. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 3 percent of optimum moisture content.

i. Do not place backfill or fill soil material on surfaces that are wet, frozen, or contain frost or ice.
ii. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

24. Grading

a. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

i. Provide a smooth transition between adjacent existing grades and new grades.
ii. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

b. Site Grading: Slope grades to direct water away from berms and to prevent ponding. Finish grades to required elevations within the following tolerances:

c. Finish subgrade to a tolerance of .1 of a foot when tested with a 10-foot straightedge.

d. In areas where the grading abuts a hard edge (concrete, asphalt, etc.), it is expected that the soil be left between ¼ inch and ¾ inch below the finish grade of the adjacent edge.

e. Slopes: Slopes should be over-constructed and cut back to the design geometry to ensure that the slope face soils are properly compacted.

25. Owner's Monitoring Activities

a. Owner's Geotechnical Testing Agency: A geotechnical testing agency, engaged at the Owner's expense, will perform the following activities to monitor the Contractor's Quality Control Program. The monitoring activities do not relieve the Contractor of sole responsibility for maintaining the Quality Control Program.

b. Field Inspection: Furnish field observation of earthwork operations.

c. Subgrade and Fill Testing: Inspect and test natural and compacted subgrades and compacted fill and backfill layers. Review each area and notify the Contractor after it is determined to be suitable for construction to proceed.

    i. Soil Footing Foundation Subgrades: Verify subgrade areas for footing foundations, utilizing visual inspection, in-place density testing, and/or penetrometer testing.
    ii. Building Slab, Paved areas, and Filled Areas: Determine density of soil in place by ASTM D1556 or D2937 or probing D5195 test methods as appropriate. Within building envelopes perform at least one in-place field density test for every 2000 ft^2, for each fill layer. Within paved areas perform at least one in-place density test for every 4000 ft^2 for each fill layer. Perform at least one in-place density test in non-structural subgrade every 6000 ft^2 for each fill layer.

d. Soil Containing Excessive Moisture: Review and determine the manner in which the contractor may lower the soil moisture if feasible.

e. Additional Compaction: If, in the opinion of the Owner's Geotechnical Testing Agency, based on results of the testing and inspection, the subgrade or fill layers are found to be below the specified density, additional compaction and testing is required at the expense of Contractor.

26. Erosion and sedimentation Control

a. Provide erosion control methods in accordance with requirements of authorities having jurisdiction and as shown on the contract documents.

27. Protection

a. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

b. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

    i. Scarify or remove and replace soil material to depth as directed by Geotechnical Engineer; reshape and recompact.

c. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

    i. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

28. Disposal of Surplus and Waste Materials

a. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off MBYC property.

29. Finishing

a. On completion of trenching and backfilling operations, restore grades to the original elevation or to the new subgrade elevation and replace surface to original condition. When trenching is through existing areas or beyond constructions limits, replace the surfaces to existing conditions.