CUYAHOGA VALLEY
NATIONAL PARK
Ohio

Stabilize Riverbank Along T wpath
Trail Near MM 20
CUVA
PMIS NO. 2248 2

PROJECT SPECIFI ATIONS

DRAFT

NATIONAL PARK SERVICE
May 2026

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

TABLE OF CONTENTS

DIVISION 01 — GENERAL REQUIREMENTS

01 11 00 - SUMMARY OF WORK .....
01 26 01 - CONTRACT MODIFICATION PROCEDURES .....
01 27 00 - DEFINITION OF CONTRACT LINE ITEMS .....
01 31 00 - PROJECT MANAGEMENT AND COORDINATION .....
01 32 16 - CONSTRUCTION SCHEDULE .....
01 32 33 - PHOTO DOCUMENTATION .....
01 33 23 - SUBMITTAL PROCEDURES .....
01 35 13.22 - ARCHEOLOGICAL PROTECTION .....
01 35 23 - SAFETY REQUIREMENTS .....
01 40 00 - QUALITY REQUIREMENTS .....
01 42 00 - REFERENCE STANDARDS .....
01 50 00 - TEMPORARY FACILITIES AND CONTROLS .....
01 56 39 - TEMPORARY TREE AND PLANT PROTECTIO .....
01 57 19.12 - NOISE AND ACCOUSTICS MANAGEME T .....
01 57 23 - TEMPORARY STORM WATER POLLUTION EVENT N .....
01 67 00 - PRODUCT REQUIREMENTS .....
01 73 40 - EXECUTION .....
01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DIS SAL .....
01 77 00 - CLOSEOUT PROCEDURES .....
01 78 23 - OPERATION AND MAINTENANC DATA .....
01 79 00 - DEMONSTRATION AND TRAININ .....

DIVISION 02 — EXISTING ND TIONS

02 21 13 - SITE SURVEYS .....
02 41 00 - DEMOLITIO [redacted]

DRAFT

DIVISION 31 — EARTHWORK

31 10 00 - SITE CLEARING .....
31 22 00 - SITE GRADING .....
31 23 00 - EARTHWORK .....
31 23 17 - ROCK EXCAVATION .....
31 23 19 - DEWATERING .....
31 23 33 - TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES .....
31 32 19 - GEOTEXTILES .....
31 32 19.13 - GEOGRID SOIL STABILIZATION .....
31 37 00 - RIPRAP .....

DIVISION 32 — EXTERIOR IMPROVEMENTS

32 15 40 - CRUSHED STONE SURFACING .....
32 91 13 - TOPSOILING AND FINISHED GRADING .....
32 92 00 - SEEDING, SODDING AND LANDSCAPING .....

DRAFT

DIVISION 02

EXISTING CONDITIONS

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 02 21 13 - SITE SURVEYS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Underground utility locate.
2. Measurement and mapping of all local site features, easem nts, u ty locates and legal monuments.
3. Photography of local site features and legal monum ts.
4. Mapping of all site easements.
5. Placement of local control for site work.
6. Placement of soil boring locations for geot hnical investi ation.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Society of Professiona urveyors

a. Minimum Standard Detail R qui ments for ALTA/NSPS Land Title Surveys, 2/16.

B. General:

1. Furnish a ecessar quipm rials, and labor to effectively measure the site in accordance h ese Specifications. Additional local surveying requirements for local l tting, mappi etc., shall be researched and followed by the surveyor.
2 The C ractor sh be responsible for all damage to public and private property resulting m the op tions of its employees.
3. The Contra r shall be responsible for gaining permission to access any site(s) required for surveying Any site-specific training to access the property shall be the responsibility of the Contra or.

1.3 DEFINI ON

A. “Contractor” shall mean person, firm, or corporation with whom the Owner may enter into contract for execution of work specified relating to the Survey of the site.

DRAFT

1.4 SUBMITTALS

A. Topographical Survey:

1. Submit to the Contracting Officer's Representative complete CAD files within two weeks after field visit.
2. CAD file shall be AutoCAD Civil 3D files with 3D points and TIN (Triangulated Irregular Network) surfaces of topography included. All site features shall be drawn and included within CAD file. Contractor shall receive Contracting Offi er's approval to use different CAD software.
3. TIN surface(s) shall be exported as individual .XML format fil . XML files shall be delivered with CAD files.
4. Point files of all field survey data, including control shall e deliv d in .csv format. Any point code description data sets shall be included with point file
5. Submit PDF of the completed topography survey t he Contracting Off r's Representative.

B. Site Photos:

1. Field survey photos shall be included with the og phical survey.

C. Site Staking:

1. Provide site control staking as quired f ite work.
2. Provide soil boring staking as re ired for g ical investigation drilling. Soil boring shall be clearly marked an abele

PART 2 - PRODUCTS - (N T USED)

PART 3 - EXECUTION

3.1 SURVEY

A The following sha e included in the final topography survey:

Survey datum nd units: the vertical and horizontals datum shall meet state and local guidelines. he datum and units shall be provided with the survey, including coordinate ystem, f units (international, U.S. survey), ground conversion factors (as applicable), et

a. All surveys shall be spatially tied in and geo-referenced. A datum specific only to the work area shall not be used.
b. The contractor shall provide all digital source data (i.e., for Trimble equipment, the .job file) and the RTK survey report.

2. Site topography and bathymetry including but not limited to:

a. Existing ground topography shall be recorded with a maximum grid spacing of 30 FT. Topography shall be presented in 1 FT intervals unless otherwise noted.

DRAFT

b. Grade breaks, including but not limited to: berms (tops and toes), depressions, ditches, swales, drainages, hills, rock piles, steep hill faces, Towpath and other trails, topsoil piles, road shoulders, road centerlines, waterlines, wetlands, trees, shrubs, storm water ponds, sidewalks, curbs, and flow lines.

c. Existing bathymetry including top of bank, edge of water, toes of slope and other grade breaks to define river bank and bed within 30 FT of proposed work area.

d. All roads surrounding public and private roads shall be surveyed, including centerline, edge of asphalt, intersections, shoulder, culverts, and drainage ditches. Private access roads shall be provided, including two tracks (b th tracks to allow for rebuilding if needed).

e. Adjacent property topography information shall be prov ed up to 100 FT past the proposed work area, unless otherwise noted by the C tr ing Officer. Additional topography past the initial work area shall includ ny utilit (road, storm water, sanitary, electric) that may need updating due to the proposed rk.

B. Easements: All utility, property, landscape, road, road ght-of-way, floodplain, a d public and private easement information shall be included and splayed with the survey file fo plat and/or site work. Road centerlines shall be provided fo ructure setb k requirements.

1. Research of site easements shall be the Contra r's sponsibility prior to site surveying.

a. Title reports shall be req sted as needed by t Contractor.

C. Monuments: All monuments shall be learly su ed and labe d within the survey file. All section corners and existing property p s shall be c Research of monuments shall be the responsibility of the Contractor prior to e visi

D. Control shall be clea y estab ed on the e. Contractor will be responsible for establishing a minimum of thre ontrol poin that can be cated within the site work area. Control shall be clearly establis d in an area t at will preser he horizontal and vertical information. Marked rebar (12 IN m imum depth h used for control points.

E. Underground utiliti all be located and surveyed in via Ohio Utilities Protection Service (OH locate ser es. All private and public underground utilities shall be located. U lities survey formati shall include the name of the corresponding utility company with the field marking

F. Power and electrica tilities shall be located and surveyed. All power poles, anchors, electrical s ctures, etc., sha be surveyed. Overhead electric lines crossing the survey site shall have the nex djacent pol) in all directions surveyed in. Utility owner information shall be provided with s ey.

G. Any additional surface utilities, including but not limited to: manholes, light structures, storm drains, fiber optics, railroads, inlets, utility boxes, hydrants, and valves shall be provided. Research of site utilities shall be completed prior to field survey visit.

H. All visible site structures, including but not limited to: buildings, fences, gates, junk piles, signs, mailboxes, concrete structures (top and bottom of concrete), walk paths, and cattle guards shall be surveyed.

DRAFT

I. Culverts shall be located and surveyed; inlets and outlet elevation shall be provided along with culvert size and type.

J. A 3D TIN surface shall be developed with the approved CAD software. Contractor shall review and prepare a 3D TIN surface to be used for grading and volume calculations.

K. Survey notes and legend information shall be included in survey deliverables.

L. Site photos shall include site features, including but not limited major stru ure, utilities or any additional items that may require removal to allow for site work. Adjac t roads, structures, property boundaries, etc., shall be photographed. All storm drains, c erts, and storm structures shall be clearly photographed.

3.2 WORKMANSHIP AND METHODS

A. Provide equipment capable of recording horizontal a vertical measurements with 1/100 FT degree of accuracy.

B. Contractor is responsible for meeting local surveying est p ctices and plat recording requirements.

C. Contractor is responsible for provid g a itional survey equ ment if needed when GPS equipment may not be suitable.

D. Aerial surveys are not to be used unless quest and appr ed by the Contracting Officer.

END OF SECTION 02 21 13

DRAFT

SECTION 02 41 00 - DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General provisions applicable to all demolition and removal
2. Civil/site demolition and removals.
3. Structural demolition and removals.
4. Disposal of demolition debris, materials, and equip nt.

B. Scope:

1. Contractor shall provide all labor, material quipment ols, and incidentals as shown, specified and required for demolition, remov and sposal Work.
2. The Work under this Specifications section inclu but is not necessarily limited to:

a. Demolition and remov o isting materials a quired. The Work includes demolition of structural ncrete ndations, wa attachments, appurtenances, piping, electrical utilities, avement, idewalks, fencing, and similar existing materials and items.

3. Demolitions an em ls indicated other Specifications sections shall comply with requirement of this Spe fications se ion.
4. Pay all c s associated ith transport and, as applicable, disposing of materials and equipm t resulting fr m demolition and removals Work.

C. Related Requireme :

1. Sectio 1 74 19 onstruction Waste Management and Disposal
2. Section 3 0 00 - Si Clearing.
3. Section 31 2 17 - Rock Excavation.

1.2 Q LITY ASSURANCE

A. Referen d S dards:

1. National Fire Protection Association (NFPA):

a. 241, Safeguarding Construction, Alteration, and Demolition Operations.

B. Regulatory Requirements:

1. Demolition, removals, and disposal Work shall be in accordance with 29 CFR 1926.850 through 29 CFR 1926.860 (Subpart T – Demolition), and all other Laws and Regulations.
2. Comply with requirements of authorities having jurisdiction.

DRAFT

C. Qualifications:

1. Electrical Removals: Entity and personnel performing electrical removals shall be electrician(s) legally qualified to perform electrical construction and electrical work in the jurisdiction where the Site is located.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review procedures under this and other Specifications secti d coordinate the Work that will be performed with or before demolition and rem als.

1.4 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Procedure Submittals:

a. Demolition and Removal Plan: Not less than n days prior to starting demolition Work, submit acceptab p for demolition an emoval Work, including:

1) Plan for coordinati shut-offs ing, temporary services, and continuing utility services.
2) Other proposed proce re as applicable.
3) E pme proposed f use in demolition operations.
4) Recycling/ posal facil (ies) proposed, including facility owner, facility name, loca on, and proce es. Include copy of appropriate permits and licenses d compliance s atus.
5) Plann demoliti ating sequences.
6) led schedule of demolition Work in accordance with the Schedule ac ted by Contracting Officer.

. Notificati of Inten d Demolition Start: Submit in accordance with Paragraph 3.1.A of this Specifi ions Section.

3. Qualification Statements:

a. Nam nd qualifications of entity performing electrical removals, including copy of enses required by authorities having jurisdiction.

1.5 SITE CONDITIONS

A. Owner makes no representation of condition or structural integrity of area(s) to be demolished or where removals are required.

DRAFT

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Notification:

1. Not less than 48 HRS prior to commencing demolition or remo l, advise Contracting Officer's Representative in writing of planned start of demo Work. Do not start removals without permission of Contracting Officer.
2. Where demolition or removals has potential to affect adjacent prope s, coordinate with Contracting Officer's Representative for notificatio
3. In accordance with Laws and Regulations, furni to authorities having ju diction, including emergency services as necessary, ap opriate notices of planned d olition and removals.

B. Protection of Adjacent Areas and Facilities:

1. Perform demolition and removal Work in manner t prevents damage and injury to property, structures, occupant th blic, and faciliti Do not interfere with use of, and free and safe access to and om, str res and prop es unless allowed in writing by Contracting Officer.
2. Closing or obstructing of roads, d ves, si walks, an passageways adjacent to the Work is not allowed unl approved in iti g by Contracting Officer. Conduct the Work with minimum nterfer ce to vehic r and pedestrian traffic.
3. Provide tem orary parti ns between emolition work areas and (a) areas that will be occupie uring demoli on and remov s, and (b) areas accessible to the public or visitors Maintain tem or artitions in place until demolition and removals work in the subjec ea is mplete or u ther Work requires removal of temporary partitions.
4. Provide appr te temporary barriers and other necessary protection.
5. damage facilities that are to remain when such damages result from Contra 's opera ns.
6. Protecting isting im ovements that are to remain in place, be reused, or remain the property of Owner. At no additional expense to the Owner, repair all items that are damaged dur g performance of the Work to their original condition, or replace with new. Do not erload pavements or surfaces to remain.

C. Existin Utiliti In addition to requirements of the General Conditions, Supplementary Conditio d Division 01 Specifications, perform the following:

1. Should unforeseen, unknown, or incorrectly shown or indicated Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.

DRAFT

2. Storm Water Sewerage: Existing storm water system shall remain in place until demolition is complete. Upon completing demolition, cut and cap storm sewerage. Remove existing storm water piping and related structures between points of cutting, and backfill, restore to grade, and stabilize the area over the removed facilities in accordance with the Contract Documents.
3. Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as gas; electric; and communications; and any service laterals serving the structure being demolished.
4. Shutdown of utility services shall be coordinated by Contractor; Co ractor is responsible for contacting utility owners.

D. Remediation:

1. If unanticipated Hazardous Environmental Condition is believed to b ncountered during demolition and removals, comply with requ ments of the Gene Conditions, as may be modified by the Supplementary Conditi s.

3.2 DEMOLITION - GENERAL

A. Locate construction equipment used for demolition Wo nd remove demolished materials and equipment to avoid imposing excessive loading on stream ks, excavations, slopes and adjacent structures, facilities and Un erg d Facilities.

B. Pollution Controls:

1. Use water sprinkli temporary en o res, and other suitable methods to limit emissions of d t and to lowest actical level. Comply with Section 01 57 23 - Temporary orm Wate ollution Pr ention.
2. Do not u water when ater may crea hazardous or objectionable conditions such as icing, f ding, or pol i
3. Clean adja nt stru ures, facilitie properties, and improvements of dust, dirt, and debris caused by de ion Work, in accordance with the General Conditions.

C. E plosives:

1. Explosives not allowed at the Site. Do not use explosives for demolition and removal Work.

D. Sal ge and Own hip:

1. M ri s and equipment to remain Owner's property shall be:

a. Protected from damage.

E. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces exposed by removals, and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by Contracting Officer.

DRAFT

3.3 STRUCTURAL REMOVALS

A. Remove structures to lines and grades shown or indicated, unless otherwise directed by the Contracting Officer. Where limits are not shown or indicated, limits shall be four inches outside item to be installed. Removals beyond limits shown or indicated shall be at Contractor's risk and expense and such excess removals shall be reconstructed to satisfaction of Contracting Officer without additional cost to Owner.

B. Recycling and Reuse of Demolition Materials:

1. All concrete, brick, masonry, reinforcing steel, structural metal miscellaneous metals, and other items contained in or upon the structure to be dem i d shall be removed, transported, and disposed of away from the Site, unless o erwise proved by Contracting Officer.
2. Do not use demolished materials as fill or backfill jacent to structures trenches, or as subbase under structures or pavement.

C. After removing concrete and masonry walls or p ions thereof labs, and similar construction that ties in to the Work or to existing construction atly rep the junction point to leave exposed only finished edges and finished surfaces.

D. Removal of Anchorages and Protrudi g Metals:

1. Where equipment or material a hored t crete or ma nry are removed and anchors are not to be re-used, and where isting m l d to be removed) protrude from concrete, remove the anchors and her m tal to not l ss than 1.5 IN beneath surface of concrete or mason ember. Rep r e resulting hole, using repair mortar for concrete and grout for asonry, be flush w h the surface.
2. Alternately when the an or is stainl s steel, the anchor may be cut flush with the surface the concrete masonry.

E. Where anchoring ateria including b , nuts, hangers, welds, and reinforcing steel, are required to attach th ork to existing construction, provide such materials under this Spe s section, less specified elsewhere in the Contract Documents.

3.4 DEMOLITION OF ITE IMPROVEMENTS

A. P vement, Sidewalk Curbs, and Gutters:

1. moliti of asphalt or concrete pavement, sidewalks, curbs, and gutters, as applicable, sh t minate at cut edges. Edges shall be linear and have a vertical cut face.
2. To cut pavement, sidewalks, curbs, and gutters, use machinery or tools that provides a smooth-cut edge, appropriate for the required. Where cut edges are not smooth, repair the cut edge to remain to provide a smooth, even appearance.

B. Fencing, Guardrails, and Bollards:

1. Completely remove below-grade posts and concrete.

C. Manholes, Vaults, Chambers, and Handholes:

DRAFT

1. If not shown or indicated on the Drawings, remove to not less than three feet below finished grade indicated on the Drawings.

D. Underground Facilities Other than Manholes, Vaults, Chambers, and Handholes:

1. Unless otherwise shown or indicated, cap ends of piping to remain in place in accordance with the "Mechanical Removals" Article in this Specifications section.

E. Landscaping: Comply with Section 31 10 00 - Site Clearing.

F. Other Site Improvements: When the Contract Documents require rem val of other site improvements not addressed above, copy with Contract requireme s r removal of buildings or structures.

3.5 DISPOSAL OF DEMOLITION DEBRIS

A. Disposal – General:

1. Promptly remove from the Site all debris, wa rubb h, material, and equipment resulting from demolition and removal operation romptly upon completion of demolition and removal operations, remove from th Site construction equipment used in demolition Work.
2. Do not sell at the Site demoliti mater r removed e pment. If materials, equipment or debris will be sold y Contrac ove the items from the Site and perform the sale or transaction els where n accorda ce with Laws and Regulations.
3. Cleaning and Rem l of Debris: om ly with the General Conditions, Supplementary Conditions, an Sectio 1 74 19 – nstruction Waste Management and Disposal.

B. Transportation d Disposal:

1. Non-Haza ous M rials, Equ p t, and Debris: Properly transport and dispose of non-hazardo d molition materials, equipment, and debris at appropriate landfill or suitable l tion, in accordance with Laws and Regulations. Non-hazardous materi does not tain Constituents of Concern such as (but not limited to) asbestos, PCBs, pet eum, haz dous waste, radioactive material, or other material designated as hazardous in aws or Regulations.
2 Hazardous M erials, Equipment, and Debris: When handling and disposal of items containing C stituents of Concern is included in the Work, properly transport and dispose of s h items in accordance with the Contract Documents and Laws and gulati s.

C. Submit to Contracting Officer information required in this Specification Section on proposed facility(ies) where demolition materials, equipment, and debris will be recycled. Upon request, Engineer or Owner, shall be allowed to visit recycling facility(ies) to verify adequacy and compliance status. During such visits, recycling facility operator shall cooperate and assist Engineer and Owner.

END OF SECTION 02 41 00

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

DIVISION 31

EARTHWORK

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Site clearing Work, including:

a. General provisions for site clearing Work.
b. Preparation for site clearing Work.
c. Clearing and grubbing.
d. Tree protection, selective removals, an elective trimming.
e. Disposal and cleaning.

B. Related Requirements: Include but are not necessari limit to:

1. Section 02 41 00 - Demolition
2. Section 31 23 00 - Earthwork
3. Section 01 35 13.22 - Archeolo ical Pr ion.

1.2 REFERENCES

A. Terminology:

1. Terms dicated below re not defined rms indicated with initial capital letters but, when use n this S ion, ha eanings indicated below:

"Arboris means Subcontractor retained to perform Work requiring a specialist in es, shrub brush, other vegetation of the types existing at the Site, and po ssing no ss than the required qualifications indicated in this Section.

b. "Cle ng and grubbing" means removing and disposing of all: (1) trees, brush, and other getation, logs, and similar items ("clearing"); and (2) stumps, roots, logs, rubbis and debris on or in the soil ("grubbing") after Clearing. Clearing and grubb g includes grinding and removing of stumps. When clearing and grubbing, and quired demolition Work is complete, the Site will be ready for grading and er new construction.

c. Demolition" means removal, whether in whole or in part, of existing human-made construction, such as removal of buildings, structures, and building systems; site work (such as pavement, curbs, sidewalks, gutters) and the like; Underground Facilities; and other existing construction.

d. "Selective removal" means removal of specific trees, shrubs, brush, and other vegetation as shown or indicated in the Contract Documents.

DRAFT

e. "Selective trimming" means removal of selected parts of trees, shrubs, brush, and other vegetation, performed by arborist, for the purpose of either: (1) allowing installation of new construction adjacent to or through the tree, shrub, brush, or vegetation, or (2) removing damaged or unhealthy growth, to allow balance of the subject tree, shrub, brush, or vegetation to continue normal, healthy growth.

f. "Site clearing" means all the Work required by this Section and related Drawings.

g. "Topsoil" means existing material at the Site, visible after clearing and grubbing, to be stripped, when such material is friable, clay loam, surface soil present in depth of not less than four inches. Topsoil shall be free of sub oil, clay lumps, stones, and other objects over two-inch diameter and other bjectionable material. Topsoil required for planting and landscaping Work in Specifications of Division 32 may differ from the meaning indicated i hi ection.

B. Reference Standards:

1. ASTM International (ASTM):

a. C700, Standard Specification for Vi fied Clay Pip Extra Strength, Standard Strength, and Perforated.

b. D448, Standard Classification for Sizes A egate for Road and Bridge Construction.

2. American National Standards sti (ANSI):

a. A300, Standard for Tree C re Operat n T ee, Shrub, and Other Woody Plant Maintenance – Standard Pr tices

3. International S ciety o rboricultu (ISA):

a. C tainer Rootb Shaving.

b. wn Correct

c. Bal and B rlapped Roo rrection.

d. Contai Root Correction.

High Bra ed Crown Observation.

f. L Branch Crown Observation.

g. Mu le Low B nches Crown Observation.

h. Balle nd Burlapped Root Observation.

i. Contai r Root Observation - Tree.

j. Protec n Maintenance.

1.3 ADMINI TRATIVE REQUIREMENTS

A. Pre-Clearing Conference:

1. Prior to commencing site clearing Work, actively participate in conference regarding site clearing Work. Date and time of conference will be mutually established by Contractor and Contracting Officer.

2. Location: Conference will be held at the Site at a location to be established by Contracting Officer.

DRAFT

3. Participants:

   a. Required Participants: Contractor's project manager, Contractor's site superintendent, arborist, Contracting Officer's Representative.
   b. Potential Participants: Contracting Officer and facility manager (if applicable).

4. Contracting Officer's Representative will chair the conference, prepare and distribute an agenda, and prepare and distribute a record of the conference.
5. Participants shall be prepared to discuss:

   a. Project requirements and the Contract requirements for e clearing Work.
   b. Submittals required for site clearing Work.
   c. Schedule for site clearing Work and availability of sourc
   d. Locations and types of site clearing Work, with specific attent to areas of selective removals, selective trimming, and able species. Lim of clearing and grubbing. Proposed locations for stockpil and temporary storage cuttings and debris.
   e. Environmental and other conditions the Site.
   f. Growth, vegetation, and existing con uction re iring protection.
   g. Required observations and field quality ntr for site clearing Work.

6. If additional information affecti g site clearing Wor ubsequently comes to light, reconvene the conference at e lies portunity.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Arborist

   a. Wh selec e removal, tive trimming, or both are required or necessary, retain rvices of, and employ in the Work, accredited arborist, possessing qualifica s acceptable to Contracting Officer.
   b. orist sha e skilled, trained, and possess documented experience in suc sfully pr cting, trimming, and restorative care of trees and shrubs of the types cessary for the Work.
   c. Certifi tion: Arborist shall be certified by either International Society of Arbor lture (ISA) or American Society of Consulting Arborists (ASCA).
   d. Arbo t shall use in selective removal and selective trimming Work only workers wi specific skill and successful experience in this type of Work required. Such orkers shall work under the direct, personal supervision of arborist.
   e. Submit to Contracting Officer's Representative names, employer(s), certifications, other relevant qualifications and record of relevant experience, as indicated below, for not less than three successful projects involving same species of trees, shrubs, and vegetation as involved in the site clearing Work:

      1) Names and telephone numbers of site owners, architects or engineers responsible for projects.
      2) Approximate contract price of the selective removal and selective trimming of trees, shrubs, and vegetation.

DRAFT

3) Approximate time of year work was performed on each referenced project.
4) Approximate quantity and types of selective removal and selective trimming of performed.
5) General indication of species of trees, shrubs, and vegetation involved.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Limits of Site Clearing Work: When limits of site earing ork are not expressly shown on the Drawings, or where Contractor proposes alterna e limits of site clearing Work, submit drawings, developed f m the Drawings, arly indicating proposed limits of site clearing Work, with dimensions indicated w e appropriate. Include location of trees p posed to be removed. Clearly ow tree protection measures for any vegetati to remain w in the Limits of Site Clearing Work.

b. Where proposed limits of clearing and g bbi , selective removals, and topsoil stripping are not identical with each other, arly and expressly indicate limits of each on the Shop Drawi gs

B. Informational Submittals: Submit the llowing

1. Permits and Approvals:

a. Submit py of h permit r uired and obtained for site clearing Work, issued by auth ty having j isdiction.

b. W re Contractin Officer's pe ission or approval is required for selected site ring activit b it copy of Contracting Officer's written permission or app val for uch activity

c. When oval of owner of property (other than Owner) is required for selected site clear activity, submit to Contracting Officer's Representative written copy uch appr l.

2. Certificates:

a. Arbor s certification that trees and shrubs shown or indicated to remain were prote ed during the site clearing Work in accordance with the Contract D ments.

b. here trees or shrubs (shown or indicated to remain) were damaged during site clearing Work, submit arborist's certification that such trees and shrubs were promptly and properly treated or, where successful treatment was not feasible, were replaced.

3. Qualifications Statements:

a. Arborist qualifications.

DRAFT

PART 2 - PRODUCTS

2.1 MATERIALS

A. Tree Wound Dressing:

1. Provide tree wound dressing, waterproof, adhesive and elastic with an antiseptic, free from kerosene, coal tar, creosote, and other material injurious to life of tree or other plant.

B. Filter Fabric:

1. In accordance with requirements for temporary erosion a sedim t controls indicated in Section 01 57 23 - Temporary Storm Water Pollution Prevention.

C. Drainage Fill:

1. Selected crushed stone, or crushed or uncru ed gravel, w hed.
2. Size 24 (in accordance with ASTM D448), ith 90 to 1 percent passing 2.5-inch sieve and not more than 10 percent passing 3/4-inch eve

D. Burlap:

1. Jute, not less than 7.2 ounces p squar d

E. For other materials needed for site clear g Work such as ne, topsoil, or other, comply with requirements of the Contract Documents

PART 3 - EXECUTION

3.1 SITE CLEARING GE ERAL

A. Li ts of Si Clearing rk:

1. Limits of s clearing ork are shown and indicated on the Drawings approved by the Contracting ficer.

B. G ral Provisions or Site Clearing:

1. C tra r shall provide all labor, materials, equipment, tools, services, and incidentals nec ary and required to perform site clearing Work in accordance with the Contract Documents.
2. Perform site clearing Work to avoid creating nuisances, pollution, and preventable adverse effects on the environment.
3. Comply with Section 01 57 23 - Temporary Storm Water Pollution Prevention, and this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".
4. Excavation required for site clearing shall comply with Section 31 23 00 - Earthwork.
5. Requirements of Authorities Having Jurisdiction:

a. Perform site clearing Work in accordance with Laws and Regulations.

DRAFT

b. Obtain, pay for, and comply with permits required for site clearing Work. Obtain from authorities having jurisdiction and furnish copy of each permit as a Submittal.

6. Traffic Control:

a. Where site clearing Work is along or adjacent to travelled ways subject to public traffic, comply with Section 01 50 00 - Temporary Facilities and Controls.
b. Establish such controls prior to and maintain in place throughout site clearing Work that has potential to affect traffic.

7. Site clearing Work shall comply with ANSI A300 and applicab ISA standards indicated in this Section's "References" Article, unless the Contract D c ents indicate more-stringent requirements.
8. Demolition Work is indicated in Section 02 41 00 - Demolition, incl ng removal of site improvements and Underground Facilities.

3.2 PREPARATION

A. Permits and Approvals:

1. Do not commence site clearing Work until necessar ermits and approvals are obtained and copies furnished to Contr ting Officer as Submit

B. Delineation of Limits of Site Clearing ork Areas

1. Locate and clearly fl g at the Site:

a. Limi of site clea ng Work.
b. Tr s, shrubs, ve tation, and o r materials to remain within limits of site ring Work
c. Tre shrub and vegeta o be selectively removed.
d. Salvag b trees, shrubs, and vegetation (to be relocated) within limits of site clearing rk.

. Flagging:

a. Flaggi shall be high-visibility type. Where necessary, provide lath or stakes driven to the ground, with flagging, to clearly delineate limits.
b. Provi different-colored flagging for each type of delineation required by this Ar le.
c. omptly replace lost, moved, or destroyed flagging until Contracting Officer's Representative concurs that flagging is no longer needed.

3. Review with Contracting Officer:

a. Before starting site clearing Work, other than flagging, review at the Site with Contracting Officer's Representative.
b. Make corrections as necessary.
c. Review all trees, [12]-inch diameter (measured one foot above ground) and larger, to be removed or selectively trimmed.

DRAFT

d. Review with Contracting Officer's Representative at the Site trees and shrubs to be selectively trimmed, to reach mutual agreement on extent of selective trimming required.

C. Protection: Establish protection of trees, shrubs, and vegetation to remain, in accordance with this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming", and other applicable provisions of the Contract Documents.

D. Temporary Erosion and Sediment Controls:

1. Provide applicable temporary erosion and sediment controls b re commencing clearing and grubbing and topsoil stripping Work.
2. Comply with temporary erosion and sediment control re remen f Section 01 57 23 - Temporary Storm Water Pollution Prevention.
3. Continue providing temporary erosion and sedimen controls as clearing nd grubbing and topsoil stripping Work progresses into previ sly uncleared, ungrubbe reas of the Site.

3.3 CLEARING AND GRUBBING

A. Clearing and Grubbing – General:

1. Remove and dispose of all mat ials con ting clearing nd grubbing Work within limits shown and indicated in th Contract D nts.
2. After grubbing Work is complete roper fill holes esulting from grubbing before commencing site ding Work.

B. Trees and Shrubs mproperly D stroyed or D maged:

1. Refer t is Section' rti l "Tree Protection, Selective Removals, and Selective Trimming

C. Tree hrubs to R ain:

. Trees and rubs to r ain shall be protected, and trimmed where necessary or required, in accordan with this Section's Article, "Tree Protection, Selective Removals, and Selective Tri ming".

3.4 TREE ROTEC ON, SELECTIVE REMOVALS, AND SELECTIVE TRIMMING

A. General Pr isions for Tree Protection, Selective Removals, and Selective Trimming:

1. Provide temporary fencing, barricades, or guarding measures, as recommended by arborist, outside drip line of trees and shrubs to remain.
2. Protect root systems from damage caused by noxious materials, storm water runoff, site clearing, planting and landscaping, other Work, and storage of materials and equipment. Protect root systems from flooding, erosion, and excessive wetting resulting from dewatering of excavations, drainage of tanks, and other construction activities.
3. Fires are not allowed under or adjacent to trees, shrubs, and other vegetation to remain.

DRAFT

4. Do not store matter resulting from site clearing or demolition, topsoil, or other excavated material within drip line of trees and shrubs to remain. Vehicles are not allowed within drip line. Restrict foot, vehicle and equipment traffic to prevent compaction of soil over root systems. Where such activities are unavoidable, and only as acceptable to Contracting Officer, provide temporary, continuous, heavy-duty wood planking effectively fastened together and capable of distributing loads from such activities. Temporary planking shall be underlaid by layer of filter fabric covered with two-inch layer of gravel.
5. Cut branches and roots, when necessary, with sharp pruning instrum nts; do not break or chop. Fully paint cuts 1/2-inch and larger in size with tree woun ressing.

B. Excavation and Protection of Trees and Shrubs:

1. Excavate within drip line of trees only where shown
2. Where trenching for utilities is required within drip ne, tunnel under o ound main lateral feeder roots by drilling, auger boring, pip jacking, or digging by h d under supervision of arborist. Do not cut main late roots or tap roots; cut smaller oots, which interfere with installation of the Wo .
3. Where excavation for the Work is required hin drip ne of trees or shrubs, hand excavate to minimize damage to root systems. rf m excavation under supervision of arborist. Provide temporary shoring or other prot ve support systems at excavations, to minimize sloping and bench g of excavations. U narrow tine spading forks and comb excavated material to ex ose ts
4. Relocate roots in backfill areas herever p ible. If larg main lateral roots are encountered, expose beyond exc ation lim s a ired to bend and relocate without breaking. If encountered immedi ly a acent to location of construction and relocation is not practical, s approxim three inches back from construction.
5. Do not allow posed r ts to dry o before permanent backfill is provided; provide temporary rth cover. ater and ma ain in moist condition and temporarily support and pro ct from dama until perman ly relocated and covered with earth.

C. Grade Adjustmen nd T ee Protection:

1. in existing rade within drip line of trees, unless otherwise shown or indicated. Lowerin f Precon uction Grade:

   a. Wher roposed finish grade is required below preconstruction grade around trees and sh bs to remain, slope the grade away from trees and shrubs as recommended by arb ist.
   b Prun ree and shrub roots exposed during grade lowering, or provide permanent p ections as recommended by arborist. Do not cut main or lateral roots or tap-oots; cut only smaller roots.
   c. Compensate for loss of roots and prune branches to stimulate root growth.
   d. Provide extended service through completion of the Contract correction period as recommended by arborist.

3. Minor Fills:

   a. Where preconstruction grade is six inches or less below elevation of finish grade shown, fill with topsoil complying with quality requirements of Specifications for finish grading and landscaping.

DRAFT

b. Place in single layer and do not compact.
c. Hand-grade to required finish elevations.

D. Tree and Shrub Pruning (Selective Trimming):

1. Perform pruning and selective trimming under the supervision of arborist.
2. Remove branches from trees and shrubs to remain only after Contracting Officer's concurrence, only to extent necessary to clear location of permanent construction, using branch removal methods in accordance with ANSI A300 and applic ble ISA standards indicated in this Section's "References" Article.
3. Extend pruning operation to restore natural shape of entire tre r shrub where pruning is approved by Contracting Officer and as recommended by a or
4. Prune branches to balance loss to root system caused by mage o utting of root system.
5. Chip branches removed from trees and shrubs. Sto pile and spread ch in accordance with arborist's recommendation.

E. Selective Trimming:

1. In addition to pruning (as required above), per m er selective trimming under direction of arborist.
2. Comply with ANSI A300 and plicable ISA stand s indicated in this Section's "References" Article.
3. Where shown or indicated, and ith arbo recommen tion, carefully remove larger branches, when necessary, using ppropriat m ds
4. Repair cut branches in accordanc with th s Section.
5. During selective t ing, avoid d ging healthy (to remain) elements of trees and shrubs.
6. Dispose of immings as ndicated in s Section's "Disposal and Cleaning" Article.

F. Selective Rem als:

1. Perform sele removals under direction of arborist.
2. ly with AN I A300 and applicable ISA standards indicated in this Section's "Refere s" Artic
3. Fully rem trees an hrubs shown or indicated for selective removal.
4. Remove stu s to not less than one feet below preconstruction ground surface.
5 During selec e removals, avoid damaging adjacent trees and shrubs to remain, and other property.
6. Remove la r branches before cutting the trunk of tree or shrub being selectively moved
7. Dis of trees and shrubs selectively removed as indicated in this Section's "Disposal and Cleaning" Article.

G. Repair and Replacement of Trees and Shrubs:

1. Perform tree and shrub repair under direction of arborist.
2. Cavity Repair:

a. Remove decayed areas to depth that exposes healthy tissue.
b. Shape cavities to provide drainage.

DRAFT

c. Paint inside of cavity with antiseptic tree wound dressing material.
d. Do not fill cavities.
e. When cavity's cross-section exceeds 60 percent of cross-section of tree or shrub branch, selectively trim subject branch. When cavity's cross-section exceeds 60 percent of cross-section of trunk of tree or shrub, remove tree or shrub upon Contracting Officer's authorization. Contracting Officer will consider arborist's recommendation. Comply with this Section's requirements for selective trimming and selective removals.

3. Repair trees and shrubs damaged by construction operations, or s ctively trimmed, within 24 hours of occurrence of such damage or selective trimming. Treat damaged trunks, branches, and roots according to written instruction f orist, in accordance with ANSI A300 and applicable ISA standards indicated n this S ion's "References" Article.
4. Remove and replace trees and shrubs that are (1) d d or destroyed due construction operations, or (2) damaged beyond reasonable h e of recovery (as determ d by arborist) following repairs, or (3) damaged a determined by arborist to be in apable of resuming normal growth pattern after repa .,
5. Obtain opinion from arborist regarding whe r dama trees, shrubs, and other vegetation is repairable with reasonable chanc f s cess. Submit arborist's certification required in this Section's "Submittals" Article.
6. For each tree or shrub to remai but is destroyed or maged (beyond repair) by Contractor:

a. For trees [8] inches or mo in diam r (ured one foot above preconstruction ground surface), provide tw repl ements of the same species. Each replacement shall be fo hes diameter asured one foot above top of root ball).
b. For tre smaller an [eight] hes diameter, and for shrubs, provide one repl ement for e h, of same cies. Replacements shall be equal in size to o ginal, up to m imum oof fou nches (measured one foot above root ball).
c. P ide repla tions at the Site.
d. Prov rep cements in accordance with the Contract Documents, including Specifi ons on planting and landscaping.

3.5 DISPOSAL AND CLEANIN

A. Disposal – General

1. Dispose of atter resulting from clearing and grubbing, selective removals, and selective mmin at appropriate offsite location.
2. Do use cleared, grubbed, or trimmed material as fill, backfill, or in embankments.
3. Dispose of cleared, grubbed, and trimmed material, and other materials, rubbish, and debris, in accordance with Laws and Regulations.
4. Pay all costs associated with transporting and disposing of materials and debris resulting from site clearing Work.
5. Cleared lumber and trimmings from trees are Contractor's property and, at Contractor's option, may be sold or salvaged offsite.

B. Cleaning:

DRAFT

1. Perform progress cleaning and other cleaning Work, and disposal of resulting materials and debris, in accordance with Section 01 74 19 – Construction Waste Management and Disposal.

C. Burning:

1. Burning of trees, shrubs, brush, other vegetation, and other materials at, or adjacent to, the Site, whether in-place or cut, is prohibited.

3.6 TOPSOIL STRIPPING

A. Stripping:

1. Before commencing topsoil stripping:

   a. Perform clearing and grubbing and sele ve removals.
   b. Remove grass and other vegetation t t may remain following clearing and grubbing.
   c. Provide necessary and required tempor ero n and sediment controls.

2. Strip topsoil to depths encountered, in manner that p vents intermingling of topsoil with underlying subsoil and other je able material. R move heavy growths of grass and vegetation and material below psoil.
3. Do not strip topsoil from within ip line of d shrubs to remain as part of the completed Project.

B. Reuse of Stripped To oil:

1. Reuse in e finish grad g and landsc ing Work topsoil that complies with the Contract Docum ts for such W rk

C. Disposal of Excess oil:

1 Topso excess quantity required for finished Project becomes Contractor's property when Con cting Of er indicates finish grading and landscaping Work is complete. Properly dis se of excess topsoil offsite. Contractor may sell excess topsoil at offsite location.

END OF SE TION 31 10 0

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 31 22 00 - SITE GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Earthwork - site excavation, grading, compaction, disposal [illegible] ste and surplus materials, construction of berms, dewatering and other E[illegible]hwork [illegible]lated work.

B. Related Requirements: Include but are not necessarily limi[illegible]d to:

1. Section 01 50 00 - Temporary Facilities and C[illegible]trols.
2. Section 01 57 23 - Temporary Stormwater P[illegible]llution Preve[illegible]tion.
3. Section 31 23 10 - Excavation and Backfil
4. Section 31 23 17 - Rock Excavation.
5. Section 31 23 19 - Dewatering.
6. Section 32 15 40 - Crushed Stone Surfacing.

1.2 REFERENCES

A. Terminology:

1. Terms indic[illegible]d in this [illegible]vision are [illegible]t defined terms indicated with initial capital letters, bu[illegible] when used in [illegible]his Section h[illegible]e the meaning indicated in this provision.
2. "Exca[illegible]on" consists [illegible]removal of ma[illegible]erials encountered to subgrade or rough grade elevation [illegible]quired [illegible]indicat[illegible]avation includes excavation of soils; pavements and other obstru[illegible]n [illegible]visible on surface; underground structures, utilities, and other items i[illegible]di[illegible]ated to be [illegible]molished and removed; boulders; and rock.
3. "Geot[illegible]nical eng[illegible]er" means the independent geotechnical specialist, licensed and registered [illegible]a profes[illegible]nal engineer in the same jurisdiction as the Site, retained by Contractor, [illegible]th responsibility for observing required field quality control activities and determining [illegible]ceptability of results of required field quality control activities, in accordance w[illegible]h the Contract Documents. Where geotechnical engineer is not the same person who [illegible]aled and signed this Section and related Drawings, geotechnical engineer [illegible]s not au[illegible]ority to approve or accept the Work or to modify the Contract Documents on be[illegible]lf [illegible] Engineer.
4. "Non structural fill" and "non-structural backfill" mean excavated materials placed and compacted to achieve finish grade elevations and do not support foundations, slabs, pavement, other flatwork, or carry imposed loads.
5. "Finish grade" means layer of soil or other acceptable material immediately below the Site's surfacing material (such as landscaping, pavement, and other surfaces).
6. "Rough grade" means layer of soil or other acceptable material immediately below the finish grade.
7. "Subgrade" means soil or other suitable material immediately below foundation bearing elevation, subbase material, fill material, backfill material, or topsoil.

DRAFT

8. "Unauthorized excavation" means removal of native material (a) beyond subgrade elevation or dimensions shown or indicated I the Contract Documents, and (b) outside of payment limits for Unit Price Work shown or indicated in the Contract Documents, without Contracting Officer's authorization or an appropriate Contract modification. Unauthorized excavation and all Work necessary to remedy unauthorized excavation in accordance with the Contract Documents are ineligible for payment, and Contractor is ineligible for additional Contract Price or additional Contract Time therefor.
9. "Unsuitable material" and "unsuitable soil material" means materials, including soil, encountered at the Site, at or below subgrade elevation, and of insuf cient strength, stiffness, and bearing capacity to support the completed Work.

B. Referenced Standards:

1. ASTM International (ASTM):

a. C33, Standard Specification for Concrete ggregates.
b. D698, Standard Test Methods for Lab tory Compaction Characterist s of Soil Using Standard Effort (12,400 FT-L F/CUFT).
c. D1241, Standard Specification for M rial for S l-Aggregate Subbase, Base, and Surface Courses.
d. D1557, Standard Test Methods for Labora y Compaction Characteristics of Soil Using Modified Effort (6 000 FT-LBF/CUF 2 700 kN-M/M)).
e. D2487, Standard Practi fo l ssification of S s for Engineering Purposes (Unified Soil Classificat n System
f. D3786, Standard Test Me od for Bu ting ength of Textile Fabrics--Diaphragm Bursting Streng Tes Method.
g. D4253, St d Test Metho or Maximum Index Density and Unit Weight of Soils U ng a Vi tory Table
h. D42 , Standard st Methods r Minimum Index Density and Unit Weight of S ls and Calcul on of Relativ Density.
i. D 32, Stand hod for Grab Breaking Load and Elongation of Geo tiles

2. an Assoc ion of State Highway and Transportation Officials (AASHTO)

a. M 4 Standard ecification for Sizes of Aggregate for Road and Bridge Const ction.
b. M 57, andard Specification for Materials for Embankment and Subgrades.
c. M 147 Standard Specification for Materials for Aggregate and Soil-Aggregate Subb se, Base, and Surface Courses.

1.3 SUBMITTALS

A. Acton Submittals: Submit the following:

1. Product Data:

a. Written indication of each source of materials to be used for site grading Work. Where materials from the Site will be used, so indicate in the Submittal.

DRAFT

b. Where materials not native to the Site will be used, indicate borrow source, location, and sufficient information to indicate to Contracting Officer's satisfaction that proposed materials are appropriate and comply with the Contract Documents and are do not constitute a Hazardous Environmental Condition Where borrow materials contain one or more Constituents of Concern, submit acceptable laboratory analysis results of representative samples sufficient to demonstrate such materials will not constitute a Hazardous Environmental Conditions when installed at the Site.

c. Regardless of source, submit:

1) Results and certification of gradation and materia f aggregate fill.
2) Results of representative sampling and testing m erial for gradation (as applicable) and material content.
3) Contractor's written certification that materials propose omply with the Contract Documents, including appli le reference standa

2. Samples:

a. Coordinate with Contracting Officer d Geotec ical Engineer locations of Samples and testing of borrow materials

B. Informational Submittals: Submit the following:

1. Supplier's Installation instructi s: Writ structions o handling, storing, and installing materials from offsite urces.
2. Field Quality Control Results:

a. Results requir field quali control activities, including installed material dens and mois e tests.
b. O optimum m ture-maximu density curve for each type of material e untered.
c. Rep of a al unconfined ompressive strength or results of bearing tests of each strata t d.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fill:

1. Sele ed, suitable material from suitable offsite borrow approved by Contracting Officer.
2. Structural Fill:

a. May be low volume change cohesive or granular soil at Contractor's option.
b. Free of organic matter, frozen material and debris.
c. Low volume change cohesive soil:

1) ASTM D2487 classification: [CL-ML or CL].
2) Liquid limit: Less than [45].

DRAFT

3) Maximum plasticity index: [20].

d. Granular soil:

1) ASTM D2487 classification: [GW, GP, GM, GC, SW, SP, SM or SC].

3. Non-Structural Fill:

a. ASTM D2487 classification: [GW, GP, GM, GC, SC, SW, SP, SM, CL-ML or CL].
b. Liquid limit: Less than [45].
c. Maximum plasticity index: [20].

B. Aggregate Base:

1. Granular Fill Material:

a. Clean, Granular material.
b. Less than 5% fines passing the No. 2 sieve.
c. ASTM D1241/AASHTO M147 Gradin B" other material acceptable to Engineer
d. State of Ohio Department of Transportation DOT):

1) Construction and aterial ifications Ite 304 Aggregate Base.

C. Geotextile Filter Fabric:

1. Nonwoven typ
2. Equivalent ening size 50 - 100 (U Standard Sieve).
3. Permeabi y coefficien cm/second): 07 minimum, 0.30 maximum.
4. Grab s gth: 90 LB minimum in eit er direction in accordance with ASTM D4632 requireme
5. Mullen burs gth: 125 PSI minimum in accordance with ASTM D3786 ements.

PART - EXECUTION

3.1 PR TECTION

A. Protect sti surface and subsurface features on-site and adjacent to site as follows:

1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.
2. Protect and maintain benchmarks, monuments or other established reference points and property corners.

a. If disturbed or destroyed, replace at own expense to full satisfaction of Contracting Officer and controlling agency.

DRAFT

3. Maintain free of damage, existing sidewalks, structures, and pavement, not indicated to be removed.

   a. Protect new and existing structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
   b. Any item known or unknown or not properly located that is inadvertently damaged shall be repaired to original condition.
   c. All repairs to be made and paid for by Contractor.

4. Provide full access to public and private premises, fire hydrant street crossings, and sidewalks to prevent serious interruption of travel.
5. Maintain stockpiles and excavations in such a manner to event i nvenience or damage to structures on-site or on adjoining property.
6. Avoid surcharge or excavation procedures which c result in heaving, ving, or slides.

3.2 SITE EXCAVATION AND GRADING

A. The site excavation and grading work includes the of te position of all material:

   1. That exceed quantities required for earthwork on th roject.
   2. That the Geotechnical engine cl fies as unclassifi xcavation.
   3. That the Geotechnical engineer lassifie nacceptable
   4. That the Geotechnical engineer ssifies as o lly contaminated.

B. Excavation and Grading

   1. Contract D wings may dicate both xisting grade and finished grade required for construc n of Project

      a. Sta all uni structures, p ng, roads, parking areas and walks and establish their e ons.
      Perform er layout work required.
      c. R lace prop ty corner markers to original location if disturbed or destroyed.

   2. Preparation ground surface for embankments or fills:

      a. Before ll is started, scarify to a minimum depth of 6 IN in all proposed emba kment and fill areas.
      Wh e ground surface is steeper than one vertical to four horizontal, plow surface a manner to bench and break up surface so that fill material will bind with existing surface.

   3. Protection of finish grade:

      a. During construction, shape and drain embankment and excavations.
      b. Maintain ditches and drains to provide drainage at all times.
      c. Protect graded areas against action of elements prior to acceptance of work.
      d. Reestablish grade where settlement or erosion occurs.

DRAFT

C. Borrow:

1. Provide necessary amount of approved fill compacted to density equal to that indicated in this Specification.
2. Include cost of all borrow material in original proposal.
3. Fill material to be approved by the Geotechnical Engineer prior to placement.

D. Construct embankments and fills as required by the Drawings:

1. Construct embankments and fills at locations and to lines of grad ndicated.

   a. Completed fill shall correspond to shape of typical cr s ction or contour indicated regardless of method used to show shap ize, an xtent of line and grade of completed work.

2. Provide approved fill material which is free from oots, organic matter, tra frozen material, and stones having maximum dimen n greater than 6 IN.

   a. Ensure stones larger than 4 IN are n laced in u per 6 IN of fill or embankment.
   b. Do not place material in layers greater n 8 I loose thickness.
   c. Place layers horizontally and compact eac yer prior to placing additional fill.

3. Compact soils as required to ai ecified density. lection of appropriate equipment is the Contractor's responsibili

   a. In general, compact cohesi soils y sheepsf t, and granular soils by pneumatic rollers, vibr s or by othe q pment as required to obtain specified density.
   b. Control oistur or each lay necessary to meet requirements of compaction.

E. Grading Tolera es: ±0.1 FT

3.3 USE OF EXPLOSI E

A. B ting with y type o xplosive is prohibited.

B Rock Excavation: efer to Specification Section 31 23 17.

3.4 C MPACTION D NSITY REQUIREMENTS

A. Obtain a ro from the Geotechnical Engineer with regard to suitability of soils and acceptable bgrade prior to subsequent operations.

B. Remove frozen, loose, wet, or soft material and replace with approved material.

C. Stabilize subgrade with well graded granular materials.

D. Assure by results of testing that compaction densities comply with the following requirements:

1. Sitework:

DRAFT

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Subgrade:		
Cohesive soils	90% per ASTM D698	-2 to +3% of optimum
Cohesionless soils	65% relative density per ASTM D4253 and ASTM D4254	
Rough Grade:		
Cohesive soils	95% of ASTM D698	-2 to +3% of mum
Cohesionless soils	75% relative density per ASTM D4253 and ASTM D4254	
Finish Grade:		
Cohesive soils	95% of ASTM D698	-2 to +3% of optim
Cohesionless soils	75% relative density per ASTM D4253 and ASTM D 54	

3.5 FIELD QUALITY CONTROL

A. All excavation, trenching, and relate sh ing bracing, etc. ll comply with the requirements of OSHA standards 29 CFR Part 192 650 Subp P and state quirements. Where conflict between OSHA and state regulations e sts, the m gent requirements shall apply.

B. The Geotechnical Engin or a Construc n Material Technician employed by the Geotechnical Engine and a g under th supervision shall inspect and test piles for compliance with th Specifica n Section.

1. If a Co ruction Mat al T chnician is utilized, all testing, observation and work indicated eing rformed by technical Engineer in this Section applies to the Construction rial Technician as well.

C. C ntractor pr des suffi nt notification and access so inspection and testing can be accomplished.

D. Responsibilities of Geotechnical Engineer and/or Construction Material Technician :

1. Review pro sed materials for fill and backfill around structures.
2. rificati n and documentation of satisfactory soil materials, subgrade quality, sampling, pl m nt, moisture conditioning, compaction and testing of proposed soil materials, and field esting for quality control.
3. Moisture density relations, required for all materials to be compacted.
4. Extent of compaction testing will be as necessary to assure compliance with specifications.
5. Prepare and submit inspection and test reports to the Contractor and Contracting Officer's Representative.
6. Test reports to include the following:

   a. Report and certification of aggregate fill and drainage fill.

DRAFT

b. Test reports on borrow material.
c. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
d. Field reports; in-place soil density and moisture tests.
e. One optimum moisture-maximum density curve for each type of soil encountered.
f. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
g. Other documentation necessary for the Contracting Officer to accept earthwork.
h. Propose corrective measures as necessary for defective work r Contracting Officer to accept.

E. Give minimum of 24 hours' advance notice to Contracting Office R resentative and Geotechnical Engineer when ready for compaction or subgrade sting an inspection.

F. Should any compaction density test or subgrade inspectio ail to meet specifi ion requirements, perform corrective work as necessary, a o additional expense to ner.

G. Pay for all costs associated with corrective work d retesting re lting from failing compaction density tests.

END OF SECTION 31 22 00

DRAFT

SECTION 31 23 00 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Earthwork - excavation, backfilling, grading, compaction, di al of waste and surplus materials, placing crushed stone, construction of berms, sh eting, acing and other Earthwork related work.

B. Related Specification Sections include but are not nece rily limited to:

1. Section 01 57 23 - Temporary Storm Wate ollution Prev ntion.
2. Section 31 23 19 – Dewatering
3. Section 31 23 17 - Rock Excavation
4. Section 31 23 33 - Trenching, Backfilling and C acting for Utilities.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM Internat nal (TM):

a. C3 C33M, Stan d Specifica n for Concrete Aggregates.
b. D 98, Standard est Methods fo Laboratory Compaction Characteristics of Soil Us Standa Effort (FT-LBF/FT^3).
c. D155 St dard Test Methods for Laboratory Compaction Characteristics of Soil Using M ified Effort (56,000 FT-LBF/FT^3(2,700 kN-M/M^3)).
d. 487, Sta rd Practice for Classification of Soils for Engineering Purposes (U ied Soil ssification System).
e. D378 Standard Test Method for Bursting Strength of Textile Fabrics-- Diaph gm Bursting Strength Tester Method.
f. D4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils sing a Vibratory Table.
D4 4, Standard Test Methods for Minimum Index Density and Unit Weight of ils and Calculation of Relative Density.
h. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

2. Occupational Safety and Health Administration (OSHA):

a. 29 CFR Part 1926.650, Safety and Health Regulations for Construction - Excavations, referred to herein as OSHA Standards.

DRAFT

1.3 DEFINITIONS

A. Excavation:

1. Consists of removal of material encountered to subgrade elevations required or indicated.
2. Includes excavation of soils; pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; boulders; and rock.

B. Foundations: Footings, base slabs, foundation walls, mat foundations, g de beams, piers and any other support placed directly on soil or rock.

C. Geotechnical Engineer: Independent geotechnical specialist pr ding f d quality control for the project.

D. Non-Structural Fill/Backfill: Soil materials placed and mpacted to achieve fin grade elevations that do NOT support foundations, slabs, p ing, or other flatwork.

E. Structure: Buildings, foundations, slabs, tanks, c s or othe man-made stationary features occurring above or below ground surface.

F. Subgrade: The earth or soil layer immediately below foun tion bearing elevation, subbase material, fill material, backfill mater l, psoil materials.

G. Unauthorized Excavation:

1. Consists of remov l f materials b on indicated subgrade elevations or dimensions.

a. Unau orized exc ation, as w as associated remedial work, shall be at C ractor’s exp se.

2. Unsuitabl Soil Ma ials: So ials encountered at or below subgrade elevation of insufficient s h and stiffness to support construction as determined by the chnical E ineer.

1.4 SUBMITTALS

A. op Drawings:

1. roduct t hnical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.
b. Manufacturer's installation instructions.

2. Certifications.

B. Samples:

1. Coordinate samples and testing for approval of off-site materials with the Geotechnical Engineer.

DRAFT

2. Submit source of fill and backfill materials proposed for use.
3. Submit source of borrow materials proposed for use.
4. Test reports.

    a. Report and certification of aggregate fill and drainage fill.
    b. Test reports on borrow material.
    c. Field reports; in-place soil density and moisture tests.
    d. One optimum moisture-maximum density curve for each type of soil encountered.

1.5 PROJECT CONDITIONS

A. Salvageable Items: Carefully remove items to be salvaged, and ore on wner's premises unless otherwise directed.

B. Dispose of waste materials, legally, off site.

    1. Burning, as a means of waste disposal, is n permitted.

C. Site Information:

    1. Data in the geotechnical baseline reports are not int ded as representations or warranties of accuracy or continuity betw en il borings. The C ractor will be responsible for interpretations or conclusions d wn fro is data.
    2. Additional test borings and othe xplorator p tions may be performed by Contractor, at the Contractor's op n; ho ever, no c ange in the Contract Sum will be authorized for such dditional expl at n.
    3. Site data provi d is n contractual d shall be considered "for information only."

PART 2 - PRODUCTS

2.1 MATE LS

A. ill and Backfil

    1. Selected mat al approved by Geotechnical Engineer from off site borrow. Structural Fi

        Ma be low volume change cohesive or granular soil at Contractor's option.
        b F e of organic matter, frozen material and debris.
        c. Low volume change cohesive soil:

            1) ASTM D2487 classification: [CL-ML or CL].
            2) Liquid limit: Less than [45].
            3) Maximum plasticity index: [20].

        d. Granular soil:

            1) ASTM D2487 classification: [GW, GM, GC, SW, SM or SC].

DRAFT

3. Non-Structural Fill:

   a. ASTM D2487 classification: [GW, GP, GM, GC, SC, SW, SP, SM, CL-ML or CL].
   b. Liquid limit: Less than [45].
   c. Maximum plasticity index: [20].

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect existing surface and subsurface features on-site and adjacent to site as follows:

1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.
2. Protect and maintain benchmarks, monuments or other established reference points and property corners.

   a. If disturbed or destroyed, replace at own expense to full satisfaction of Contracting Officer and controlling agency.

3. Verify location of utilities.

   a. Omission or inclusion of utility items does not constitute nonexistence or definite location.
   b. Secure and examine local utility records for location data.
   c. Take necessary precautions to protect existing utilities from damage due to any construction activity.

      1) If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
      2) Do not interrupt existing utilities serving facilities occupied by Owner or others during occupied hours, except when permitted in writing by Contracting Officer and then only after acceptable temporary utility services have been provided.
      3) Obtain Contracting Officer's approval prior to disconnecting any utility service.

      Repair damages to utility items at own expense.
   e. In case of damage, notify Contracting Officer's Representative at once so required protective measures may be taken.

4. Maintain free of damage, existing sidewalks, structures, and pavement, not indicated to be removed.

   a. Protect new and existing structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

DRAFT

b. Any item known or unknown or not properly located that is inadvertently damaged shall be repaired to original condition.
c. All repairs to be made and paid for by Contractor.

5. Provide full access to public and private premises, fire hydrants, street crossings, sidewalks and other points as designated by Contracting Officer's Representative to prevent serious interruption of travel.
6. Maintain stockpiles and excavations in such a manner to prevent inconvenience or damage to structures on-site or on adjoining property.
7. Avoid surcharge or excavation procedures which can result in he ing, caving, or slides.

3.2 SITE EXCAVATION AND GRADING

A. The site excavation and grading work includes the offsite sposition of all ma ial:

1. That exceed quantities required for earthwork n the project.
2. That the Geotechnical engineer classifies a unacceptable
3. That the Geotechnical engineer classifies a tentially ntaminated.

B. Excavation and Grading:

1. Perform as required by Drawi gs oved by Contra g Officer.
2. Drawings to indicate both exis g grad d finished gra required for construction of Project.

a. Stake all uni structures, pi n roads, parking areas and walks and establish their el tions
b. Perf m other lay t work req ed.
c. R lace property orner marker o original location if disturbed or destroyed.

3. Preparatio f grou d surface fo bankments or fills:

Before fi s started, scarify to a minimum depth of 6 IN in all proposed bankmen nd fill areas.
b. Wh ground face is steeper than one vertical to four horizontal, plow surface in a m nner to bench and break up surface so that fill material will bind with existin surface.

4. Protection o finish grade:

a. uring construction, shape and drain embankment and excavations.
b. Maintain ditches and drains to provide drainage at all times.
c. Protect graded areas against action of elements prior to acceptance of work.
d. Reestablish grade where settlement or erosion occurs.

C. Borrow:

1. Provide necessary amount of approved fill compacted to density equal to that indicated in this Specification.
2. Fill material to be approved by Geotechnical Engineer prior to placement.

DRAFT

D. Construct embankments and fills as required by the Drawings:

1. Construct embankments and fills at locations and to lines of grade indicated.

   a. Completed fill shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed work.

2. Provide approved fill material which is free from roots, organic matt r, trash, frozen material, and stones having maximum dimension greater than 6 IN

   a. Ensure that stones larger than 4 IN are not placed in u p 6 IN of fill or embankment.
   b. Do not place material in layers greater than 8 IN loose thickne
   c. Place layers horizontally and compact each l er prior to placing dditional fill.

3. Compact soils as required to obtain specified nsity. Selection of appropria equipment is the Contractor's responsibility.

   a. In general, compact cohesive soils by s psf , and granular soils by pneumatic rollers, vibrators, or by other equipment as uired to obtain specified density.
   b. Control moisture for each layer necessary to et requirements of compaction.

E. Grading Tolerances: ±0.1 FT.

3.3 USE OF EXPLOSIVES

A. Blasting with any pe of expl ve is prohi ed.

3.4 COMPACTION ENSIT REQUIR NTS

A. Obtai roval from otechnical Engineer with regard to suitability of soils and acceptable su grade pri o subseq t operations.

B Provide dewaterin ystem necessary to successfully complete compaction and construction requirements. See S cification Section 31 23 19 - Dewatering.

C. Re ve frozen, lo e, wet, or soft material and replace with approved material.

D. Stabiliz ub de with well graded granular materials.

E. Assure by results of testing that compaction densities comply with the following requirements:

1. Sitework:

DRAFT

SOIL TYPE	COMPACTION DENSITY	MOISTURE CONTENT
Cohesive soils	95% per ASTM D698	-2 to +3% of optimum
Cohesionless soils	75% relative density per ASTM D4253 and ASTM D4254	

3.5 EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES

A. General:

1. In general, work includes, but is not necessarily limited t xcav n for structures and retaining walls, removal of underground obstructions and undesirab material, backfilling, filling, and fill, backfill, and subgrade c mpaction.
2. Obtain fill and backfill material necessary to pro ce grades required.

   a. Materials and source to be approved Geotechnic l Engineer.
   b. Excavated material approved by Ge chnical En neer may also be used for fill and backfill.

3. In the paragraphs of this Specification Section, the rd "soil" also includes any type of rock subgrade that may be pr en or below existing bgrade levels.

B. Excavation Requirements for Structur

1. General:

   a. Do n commenc xcavation foundations for structures until Geotechnical En neer approve

      1) The re val of p nd other unsuitable and undesirable material from i ng subgrade.
      2) D ity and moisture content of site area compacted fill material meets requi ments of specifications.
      3) Site sur rge or mass fill material can be removed from entire construction ite or portion thereof.
      4) rcharge or mass fill material has been removed from construction area or rtions thereof.

      En neer grants approval to begin excavations.

2. Dim sions:

   a. Excavate to elevations and dimensions indicated or specified on the Drawings.
   b. Allow additional space as required for construction operations and inspection of foundations.
   c. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction.
   d. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

DRAFT

3. Removal of obstructions and undesirable materials in excavation includes, but is not necessarily limited to, removal of old foundations, existing construction, unsuitable subgrade soils, expansive type soils, and any other materials which may be concealed beneath present grade, as required to execute work indicated on Contract Drawings.

   a. If undesirable material and obstructions are encountered during excavation, remove material and replace.
   b. Remove unsuitable subgrade soils located below foundations. The bottom of the overexcavation shall be located outside the exterior limits of f undations around the perimeter of structure the following horizontal distanc whichever is greater:

      1) Distance equal to depth of overexcavation bel tom of foundations.
      2) 5 FT.

   c. When excavation has reached required subg de elevations, notif Geotechnical Engineer, who will make an inspection of onditions.

      1) If Geotechnical Engineer det mines that bea ng materials at required subgrade elevations are unsuit e, provid Subgrade Stabilization as specified herein.

4. Construction traffic:

   a. Minimize construction tr ffic on n soils and sa rated soils to avoid soil disturbance.
   b. Repair disturbed subgrade ils pri to placing fill or construction work.

5. Proof-roll all grade o receive fi or concrete placement after subgrade has been scarified an compacted

   a. P of-roll in th r ce of Geo echnical Engineer with a fully-loaded tandem axl ump t ck or other eq ment with a minimum gross weight of 25 tons.

6. l off bottom of excavations to receive foundations or compacted fill.

   a. Rem ve loose terials and bring excavations into approved condition to receive concr or fill material.
   b. Where ompacted fill material must be placed to bring subgrade elevation up to unders e of construction, scarify existing subgrade upon which fill material is to be pl ed to a depth of 6 IN and then compact to density stated in this Sp ification Section before fill material can be placed thereon.
   c. o not carry excavations lower than shown for foundations.
   d. If any part of excavations is carried below required depth without authorization, notify Contracting Officer's Representative and correct unauthorized excavation. Corrections may include:

      1) Under soil supported footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation.

DRAFT

2) In locations other than those above, including slabs on grade and pile supported foundations, backfill and compact unauthorized excavations as specified for authorized excavations of same classification.
3) No extra compensation will be made to Contractor for correcting unauthorized excavations.

7. Make excavations large enough for working space, forms, and inspection.
8. Notify Geotechnical Engineer and Contracting Officer's Representative as soon as excavation is completed in order that subgrades may be inspected.

   a. Do not commence further construction until subgrade u er compacted fill material, under foundations, and under retaining wall gs has been inspected and approved by the Geotechnical Engineer as bei g free o ndesirable material, being of compaction density required by this specification, an ing capable of supporting the allowable foundation design b aring pressures and perimposed foundation, fill, and building loads to be ced thereon.
   b. Geotechnical Engineer shall be given t opportunity to inspect subgra below fill material both prior to and after s grade compa on.
   c. Place fill material, foundations, and r ining w footings, as soon as weather conditions permit after excavation is com let , inspected, and approved and after forms and reinforcing are inspected and app ved.
   d. Before concrete or fill m terial is placed, prot approved subgrade from becoming loose, wet, fr zen, oft due to weath construction operations, or other reasons.

9. Subgrade stabilization:

   a. If subg de unde oundations r fill material is in a frozen, loose, wet, or soft con ion before nstruction i laced thereon, remove frozen, loose, wet, or soft m erial and repl e with appro d compacted material.
   b. P vide comp ity of replacement material as stated in this Specification Sec
   c Loose, or soft materials, when approved by Geotechnical Engineer, may be tabilized a compacted working mat of well graded crushed stone.
   d. C pact sto mat thoroughly into subgrade to avoid future migration of fines into e stone v s.
   e. Remo and replace frozen materials.
   f. Metho of stabilization shall be performed as directed by Geotechnical Engineer.
   g. Do no lace further construction on the repaired subgrades, until the subgrades hav een approved by the Geotechnical Engineer.

10. Pro on of structures:

   a. Prevent new and existing structures from becoming damaged due to construction operations or other reasons.
   b. Prevent subgrade under new and existing foundations from becoming wet and undermined during construction due to presence of surface or subsurface water or due to construction operations.

11. Shoring:

DRAFT

a. Shore, slope, or brace excavations as required to prevent them from collapsing.
b. Remove shoring as backfilling progresses but only when banks are stable and safe from caving or collapse.
c. Construct shoring that is required to retain water as part of the dewatering system, using non-permeable details such as interlock sealant for sheet piles.

12. Drainage:

a. Control grading around structures so that ground is pitched to prevent water from running into excavated areas or damaging structures.
b. Maintain excavations where foundations or fill material are to be placed free of water.
c. Provide pumping required to keep excavated spaces clear of water during construction.
d. Provide free discharge of water by trenches, pumps, wells, well points, or other means as necessary and drain to point of disposal that will not damage existing or new construction or interfere with construction operations.

13. Frost protection:

a. Do not place foundations, or fill material on frozen ground.
b. When freezing temperatures may be expected do not excavate to full depth indicated, unless foundation fill material can be placed immediately after excavation has been completed and approved.
c. Protect excavation from frost if placing concrete or fill is delayed.

C. Filling and Backfilling:

1. Provide material as approved by Geotechnical Engineer for filling and backfilling.
2. Fill and backfill placement:

a. Prior to placing fill and backfill material, obtain optimum moisture and maximum density properties for proposed material from Geotechnical Engineer.
Place fill and backfill material to maximum allowable lift thickness indicated in Paragraph 3.3 C, 5, b of this Section.
c. Compact material with equipment of proper type and size to obtain density specified.
d. Use hand operated equipment for filling and backfilling within 5 FT of walls and less than 3 FT above pipes.

1) Compaction equipment exceeding 3000 LBS dead weight shall not be used within 5 FT of the wall as a minimum
2) Contractor is responsible for method of compaction so as not to damage wall.

e. Use only hand operated equipment for filling and backfilling next to walls and retaining walls.
f. Do not place fill or backfill material when temperature is less than 40 DEGF and when subgrade to receive material is frozen, wet, loose, or soft.
g. Use vibratory equipment for compacting granular material; do not use water.

DRAFT

3. Backfilling against walls:

   a. Do not backfill around any part of structures until each part has reached specified 28-day compressive strength and backfill material has been approved.
   b. Do not start backfilling until concrete forms have been removed, trash removed from excavations, concrete finishing, dampproofing and waterproofing have been completed.
   c. Bring backfill and fill up uniformly around the structures and individual walls, piers, or columns.

3.6 FIELD QUALITY CONTROL

A. All excavation, trenching, and related sheeting, bracing, etc. shall comply w the requirements of OSHA Standards, and state requirements. Where confl between OSHA d state regulations exists, the more stringent requirements shal apply.

A. The Geotechnical Engineer or a Construction Ma ial Technicia employed by the Geotechnical Engineer and acting under their sup ision shal rovide the testing, observation, and work required under this Section.

   1. If a Construction Material Technician is utilized, al sting, observation and work indicated as being performed y G chnical Enginee n this Section applies to the Construction Material Technic as wel

B. Responsibilities of the Geotechnical Eng eer a Construc on Material Technician:

   1. Review propo d mat ls for fill a backfill around structures.
   2. Services wi include ve ication and ocumentation of satisfactory soil materials, subgrad quality, sampl g, placement oisture conditioning, compaction and testing of propos soil materia a d field testing for quality control.
   3. Moisture sity r tions requir or all materials to be compacted.
   4. Extent of com ion testing will be as necessary to assure compliance with fications.
   5 Prepar d submi spection and test reports to the Contractor and Contracting Officer's Represent ve.
   6. Test reports include the following:

      a. Repor nd certification of aggregate fill and drainage fill.
      b. Test ports on borrow material.
         V fication of suitability of each footing subgrade material, in accordance with ecified requirements.
      d. Field reports; in-place soil density and moisture tests.
      e. One optimum moisture-maximum density curve for each type of soil encountered.
      f. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
      g. Other documentation necessary for the Contracting Officer to approve earthwork.
      h. Propose corrective measures as necessary for defective work for Contracting Officer to accept.

END OF SECTION 31 23 00

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 31 23 17 - ROCK EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Earthwork - excavation, grading, disposal of waste and surpl aterials, and other Earthwork related work.

B. Related Specification Sections include but are not necessa ly limited to:

1. Section 01 57 23 - Temporary Storm Water P ution Prevention
2. Section 31 22 00 - Site Grading.
3. Section 31 23 00 - Earthwork
4. Section 31 23 33 - Trenching, Backfilling and omp ing for Utilities.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Occupational Safety and Health A min tration (OSHA):

a. 29 CF Part 192 Subpart P Excavations, Occupational Safety and Health Sta dards, referre to herein as SHA Standards.

1.3 DEFINITIONS

A. R Exca n:

1. Classificati of rock e cavation shall include solid ledge rock in its natural location that requires syst atic quarrying, and/or drilling for its removal and also boulders that exceed 1/2 C YD in volume.
2. Rock excava on includes any material which cannot be dislodged by a D-8 Caterpillar actor, or quivalent, equipped with a hydraulically operated power ripper, or by a C rpi r 330 hydraulic excavator, or equivalent, without the use of drilling or blasting.

B. Geotechnical Engineer: Independent geotechnical specialist providing field quality control for the project.

C. Structure: Buildings, foundations, slabs, tanks, curbs, pavement or other man-made stationary features occurring above or below ground surface.

DRAFT

1.4 PROJECT CONDITIONS

A. See Specification Section 31 22 00.

B. Site Information:

1. Subsurface Data presented in the Schematic Design Geotechnical Reports are not contractual and shall be considered “for information only.”.

a. Conditions are not intended as representations or warrantie f accuracy or continuity between soil borings.
b. The Contractor will be responsible for interpretations nclusions drawn from this data.

2. Additional test borings and other exploratory opera ns may be perform d by the Contractor, at the Contractor’s option; however change in the Contrac um will be authorized for such additional exploration.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect existing surfa and surface fea es on-site and adjacent to site:

1. See Speci cation Sectio 31 22 00.

3.2 ROCK EXCAVA ON

A. Th ock ex ation wo includes the offsite disposition of all material:

1. That excee uantities equired for earthwork on the project.
2. That the Geo chnical Engineer classifies as unacceptable.
That the Geo chnical Engineer classifies as potentially contaminated.

B. Cont t Drawin may indicate both existing grade and rough grade required for construction of Proje

1. Stake all units, structures, piping, roads, parking areas and walks and establish their elevations.
2. Perform other layout work required.
3. Replace property corner markers to original location if disturbed or destroyed.

C. When rock is encountered:

1. Strip free of earth.

DRAFT

3.3 USE OF EXPLOSIVES

A. The use of explosives is prohibited.

3.4 FIELD QUALITY CONTROL

A. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA standards 29 CFR Part 1929 Subpart P, and state requirements. Where conflict between OSHA and state regulations exists, the more stringent requirem ts shall apply.

B. Responsibilities of a Construction Materials Technician for Site Ex ion and Grading:

1. A Construction Material Technician, employed by the Geotechnical gineer and acting under their supervision, can perform all testing, obs vation and work i icated as being performed by the Geotechnical Engineer in this ecification Section.

END OF SECTION 31 23 17

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dewatering system.
2. Surface water control system.
3. Monitoring wells.
4. System operation and maintenance.
5. Water disposal.

B. Related Specification Sections include but are not ecessarily lim ted to:

1. Section 01 57 23 - Temporary Storm Water P ution revention
2. Section 31 22 00 - Site Grading.
3. Section 31 23 33 - Trenching, Backfilling, and Com cting for Utilities.

1.2 QUALITY ASSURANCE

A. Obtain permit from Ohio EPA under Nat nal ollutant Discharge Elimination System (NPDES) for storm-w er d arge from nstruction sites.

1.3 DEFINITION

A. Dewatering:

1 Lowe of grou water table and intercepting horizontal water seepage to prevent groundw r from en ing excavations.
2. Disposing o emoved ater.

B. rface Water Cont l:

1. emoval surface water within open excavations.

C. Foundation

1. Footings, retaining walls, grade beams, piers and any other support placed directly on soil or rock.

DRAFT

1.4 SUBMITTALS

A. Shop Drawings:

1. Dewatering plan design data and Drawings including the following:

a. Proposed type of dewatering system with complete description of equipment and instrumentation to be used.
b. Arrangement, locations, and depths of system components.
c. Pipe sizes and capacities.
d. Filter types and sizes.
e. Water disposal method and location.
f. Surface water control devices.
g. System operation, monitoring, and maintenance procedures.
h. Method of monitoring water quality.
i. Signed and sealed by professional engine

2. Product technical data including:

a. Dewatering pump data including the fo win

1) Size, capacity, and means of operation engine and motor.

b. Pumping equipment for ntrol of face water w in excavation.

1.5 PROJECT CONDITIONS

A. Site Information:

1. The su rface condit ns presented in he Schematic Design Geotechnical Reports are not intend as rep entations ranties of accuracy or continuity between soil borings. The actor will be responsible for interpretations or conclusions drawn from data.
2 Additi l test bo gs and other exploratory operations may be performed by Contracto t the Co ctor's option; however, no change in the Contract Sum will be authorized f such additional exploration.

PART 2 - PR DUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of surface and ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. The design of the temporary dewatering system shall account for soil conditions, rainfall, fluctuations in the surface and ground water elevations and the potential settlement impact on adjacent facilities due to dewatering.

DRAFT

PART 3 - EXECUTION

3.1 DEWATERING

A. Review Schematic Design Reports before beginning excavation and determine where groundwater is likely to be encountered during excavation.

B. Where groundwater is or is expected to be encountered during excavation nstall a dewatering system to prevent softening and disturbance of subgrade below foundati s and fill material, to allow foundations and fill material to be placed in the dry, and to mai ain a stable excavation side slope.

1. Employ dewatering specialist for selecting and operating dewatering stem.
2. Groundwater shall be maintained at least 2 FT belo the bottom of any cavation.
3. Install groundwater monitoring wells as necessa
4. Keep dewatering system in operation until de load of structure exceeds pos le buoyant uplift force on structure.

C. Dispose of groundwater to an area which will not in fere th construction operations or damage existing construction.

1. Shut off dewatering system a uc ate to prevent a ck upsurge of water that might weaken the subgrade.
2. Discharge water into settling ba s.

3.2 SURFACE WATER ONTR L SYSTEM

A. Provide ditches erms, and ot r devices to vert and drain surface water from excavation area as specified in pecification cti n 01 57 23.

B. Divert surface wat seepage water within excavation areas into sumps and pump water into drain nnels, sto drains and settling basins in accordance with requirements of the a ncies hav jurisdict

C Control and remo unanticipated water seepage into excavation.

END OF CTION 31 23 19

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 31 23 33 - TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavation, trenching, backfilling and compacting for all un ound utilities.

B. Related Specification Sections include but are not necessarily mited to:

1. Section 03 31 31 - Concrete Mixing, Placing, Joi ng, and Curing.
2. Section 31 23 00 - Earthwork.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):

a. D698, Standard Test Meth ds for L oratory mpaction Characteristics of Soil Using Standard Effort (12,4 FT LBF/FT^3 (600 kN-M/M^3)).
b. D4253, S d Test Metho for Maximum Index Density and Unit Weight of Soils U ing a Vib tory Table
c. D4 4, Standard est Methods r Minimum Index Density and Unit Weight of ls and Calcu ion of Relative Density.

B. Qualifications: Hi an dependent soils laboratory to conduct in-place moisture-density tests for ba kfilling to assu that all work complies with this Specification Section.

1.3 DEFINITIONS

A. xcavation: All ex vation will be defined as unclassified.

1.4 SUBMI TAL

A. Shop Drawings:

1. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.
b. Manufacturer's installation instructions.

DRAFT

2. Submit respective pipe or conduit manufacturer's data regarding bedding methods of installation and general recommendations.
3. Submit sieve analysis reports on all granular materials.

B. Informational Submittals:

1. Trench shield (trench box) certification if employed:

a. Specific to Project conditions.
b. Re-certified if members become distressed.
c. Certification by registered professional structural engin , registered in the state where the Project is located.
d. Owner is not responsible to, and will not, review a appro

1.5 SITE CONDITIONS

A. Avoid overloading or surcharge a sufficient dista e back from ge of excavation to prevent slides or caving.

1. Maintain and trim excavated materials in such m er to be as little inconvenience as possible to public and adjoinin property owners.

B. Provide full access to public and priv e prem nd fire hydr s, at street crossings, and sidewalks to prevent serious interrupti of travel

C. Protect and maintain ben h marks, monu n or other established points and reference points and if disturbed or d oyed, place item o full satisfaction of Contracting Officer and controlling agency

D. Verify locatio f existing u er ound utiliti s

PART 2 - PROD TS

2.1 MATERIALS

A. ckfill Material:

1. s approv d by Geotechnical Engineer.

a. Free of rock cobbles, roots, sod or other organic matter, and frozen material.
b. Moisture content at time of placement: ±3% of optimum moisture content as specified in accordance with ASTM D698.

DRAFT

2. Gravel trench backfill materials:

a. Uniformly graded pea gravel defined below:

Sieve Size	3/4 IN	3/8 IN	No. 4	No. 8	No. 50	No. 200
Percent Passing by Weight	100	80 - 100	60 - 100	45 - 95	7 - 55	0 - 15

B. Bedding Materials:

1. As approved by the Geotechnical Engineer.
2. Granular bedding materials:

a. ASTM D2321 Class 1B.

1) Well-graded crushed stone.

3. Flowable fill:

a. Description: Flowable fill shall be a mixtur f cement, fly ash, fine sand, water, and air having a consis which will flow u r a very low head.
b. Material characteristics:

1) The approximate qu tities o ach c nent per cubic yard of mixed material shall be as f ow

Cem t (Type I o II): 50 LBS.
b) Fly h: 200 LBS
c) Fin sand: 2,700 L S.
d) W ter:
Air content: 10%.

Actu quantities shall be adjusted to provide a yield of 1 cubic yard with the ma als used.
3) pproximate compressive strength should be 85 to 175 PSI.
4) ne sand shall be an evenly graded material having not less than 95% ssing the No. 4 sieve and not more than 5% passing the No. 200 sieve.
5) Mixing and handling of the material shall be in accordance with Specification Section 03 31 31.

PART 3 - EXECUTION

3.1 GENERAL

A. Remove and dispose of unsuitable materials to site provided by Contractor.

DRAFT

3.2 EXCAVATION

A. Unclassified Excavation: Remove rock excavation, clay, silt, gravel, hard pan, loose shale, and loose stone.

B. Excavation for Appurtenances:

1. 12 IN (minimum) clear distance between outer surface and embankment.
2. See Specification Section 31 23 00 for applicable requirements.

C. Groundwater Dewatering:

1. Where groundwater is, or is expected to be, encountered ring e vation, install a dewatering system to prevent softening and disturbance of subgrade allow subgrade stabilization, pipe, bedding and backfill material to placed in the dry d to maintain a stable trench wall or side slope.
2. Groundwater shall be drawn down and maint ed at least 3 FT below the bo m of any trench or manhole excavation prior to exca tion.
3. Review soils investigation before beginning xcavation nd determine where groundwater is likely to be encountered during xca ion.

   a. Employ dewatering specialist for selecting an perating dewatering system.

4. Keep dewatering system in ope tion un d ad load of p , structure and backfill exceeds possible buoyant uplift rce on pip cture.
5. Dispose of groundwater to an are which ill not int fere with construction operations or damage existin nstruction.
6. Install ground ter m oring well s necessary.
7. Shut off de atering sys m at such a e to prevent a quick upsurge of water that might weaken e subgrade.

D. Trench Excavati

1. ate trench by open cut method to depth shown on Drawings and necessary to accomm date wor

   a. Supp existing utility lines and yard piping where proposed work crosses at a lower vation.

      1) tabilize excavation to prevent undermining of existing utility and yard piping.

2. Open trench outside buildings, units, and structures:

   a. No more than the distance between two manholes, structures, units, or 300 LF, whichever is less.
   b. Field adjust limitations as weather conditions dictate.

DRAFT

3. Any trench or portion of trench, which is opened and remains idle for seven calendar days, or longer, as determined by the Geotechnical Engineer or Construction Materials Technician, may be directed to be immediately refilled, without completion of work, at no additional cost to Owner.

   a. Said trench may not be reopened until Geotechnical Engineer or Construction Materials Technician is satisfied that work associated with trench will be prosecuted with dispatch.

4. Observe following trenching criteria:

   a. Trench size:

      1) Excavate width to accommodate free working space.
      2) Maximum trench width at top of pipe conduit may not eed outside diameter of utility service by more an the following dimens s:

OVERALL DIAMETER OF UTILITY SERVICE	EXCESS ME ION
33 IN and less	1 N
more than 33 I	24 IN

      3) Cut trench walls ver ally f m bottom f trench to 1 FT above top of pipe, conduit or utility ser e
      4) K p tren es free of s ace water runoff.

         a) Incl e cost in Bid
         b) N ep ate payment for surface water runoff pumping will be made.

E. Trenching for Elec nstallations:

   1 Obser he prece g Trench Excavation paragraph in PART 3 of this Specification Section.
   2. Modify for ctrical installations as follows:

      a. Open more than 600 LF of trench in exterior locations for trenches more than 12 IN ut not more than 30 IN wide.
         An ength of trench may be opened in exterior locations for trenches which are 12 wide or less.
      c. Do not over excavate trench.
      d. Cut trenches for electrical runs with minimum 30 IN cover, unless otherwise specified or shown on Drawings.

F. Flowable Fill:

   1. Flowable fill shall be:

      a. Discharged from a mixer by any means acceptable to the Geotechnical Engineer or Construction Materials Technician into the area to be filled.

DRAFT

b. Placed in 4 FT maximum lifts to the elevations indicated.

1) Allow 12 HR set-up time before placing next lift or as approved by the Geotechnical Engineer or Construction Materials Technician.
2) Place flowable fill lifts in such a manner as to prevent flotation of the pipe.

2. Flowable fill shall not be placed on frozen ground.
3. Subgrade on which flowable fill is placed shall be free of disturbed or softened material and water.
4. Conform to appropriate requirements of Specification Section 31 00.
5. Flowable fill batching, mixing, and placing may be started if w ather conditions are favorable, and the air temperature is 34 DEGF and rising.
6. At the time of placement, flowable fill must have a temp ature of least 40 DEGF.
7. Mixing and placing shall stop when the air temperature is 38 DEGF less and falling.
8. Each filling stage shall be as continuous an operati as is practicable.
9. Prevent traffic contact with flowable fill for at l t 24 HRS after placeme r until flowable fill is hard enough to prevent ruttin y construction equipment.
10. Flowable fill shall not be placed until wat has been cont lled or groundwater level has been lowered in conformance with the requ ments of e preceding Groundwater Dewatering paragraph in PART 3 of this Spec ati Section.

3.3 PREPARATION OF FOUNDATIO FO PIPE LAYING

A. Over-Excavation:

1. Backfill and com to 90% of m im m dry density per ASTM D698.
2. Backfill with anular dding mate l as option.

B. Rock Excavati :

1. Excavate imum f 6 IN belo ttom exterior surface of the pipe or conduit.
2. Backfill to gr with suitable earth or granular material.
3. bell holes trench bottom.

C. Subgrade Stabili ion:

1 Stabilize the bgrade.
Observe the lowing requirements when unstable trench bottom materials are encountere

a. otify Geotechnical Engineer and Contracting Officer's Representative when unstable materials are encountered.

1) Define by drawing station locations and limits.

b. Remove unstable trench bottom caused by Contractor failure to dewater, rainfall, or Contractor operations.

1) Replace with subgrade stabilization with no additional compensation.

DRAFT

3.4 BACKFILLING METHODS

A. Do not backfill until tests to be performed on system show system is in full compliance with specified requirements.

B. Carefully Compacted Backfill:

1. Furnish where indicated on Drawings, specified for trench embedment conditions and for compacted backfill conditions up to 12 IN above top of pipe or cond it.
2. Comply with the following:

a. Place backfill in lifts not exceeding 8 IN (loose thick s
b. Hand place, shovel slice, and pneumatically tamp carefu compacted backfill.
c. Observe specific manufacturer's recommendations regarding b kfilling and compaction.
d. Compact each lift to specified requiremen

C. Common Trench Backfill:

1. Perform in accordance with the following:

a. Place backfill in lift thicknesses capable of b g compacted to densities specified.
b. Observe specific manu ctu 's recommendatio regarding backfilling and compaction.
c. Avoid displacing joints an appurten causing any horizontal or vertical misalignment, separation, distor on.

D. Water flushing for c olida is not per tted.

E. Backfilling for ectrical Insta ations:

1. Observe t preced g Carefully mpacted Backfill paragraph or Common Trench Backfill para in PART 3 of this Specification Section or when approved by the chnical E neer or Geotechnical Technician.
2 Modify r electri installation as follows:

a. Obse notes and details on electrical drawings for fill in immediate vicinity of direct rial cables.

3.5 COM CTION

A. General:

1. Place and assure bedding, backfill, and fill materials achieve an equal or higher degree of compaction than undisturbed materials adjacent to the work.
2. In no case shall degree of compaction below minimum compactions specified be accepted.

DRAFT

B. Compaction Requirements:

1. Unless noted otherwise on Drawings or more stringently by other Specification Sections, comply with following minimum trench compaction criteria.

a. Bedding material:

LOCATION	SOIL TYPE	COMPACTION DENS TY
All locations	Cohesionless soils	[75]% relative density by A M D4253 and ASTM D4254

b. Carefully compacted backfill:

LOCATION	SOIL TYPE	COMPACTI N DENSITY
All applicable areas	Cohesive soils	95% of ma mum y density by ASTM D698
	Cohesionless soils	[75]% relative den y by ASTM D4253 and AS D4254

c. Toe drain bedding and back l:

LOCATION	SOIL TY E	COMPACTION DENSITY
All locations	ohesion	0% relative density by ASTM D4253 and ASTM D4254

d. Co mon tren backfill:

OCATION	SOIL TYPE	COMPACTION DENSITY
Under pavem nts, roa ays, surfaces within ghw y right-of-ways	Cohesive soils	95% of maximum dry density by ASTM D698
	Cohesionless soils	[60]% of relative density by ASTM D4253 and ASTM D4254
Under turfed, sodded, plant seeded, nontraffic areas	Cohesive soils	85% of maximum dry density by ATM D698
	Cohesionless soils	[40]% of relative density by ASTM D4253 and ASTM D4254

DRAFT

3.6 FIELD QUALITY CONTROL

A. Testing:

1. Perform in-place moisture-density tests as directed by the Geotechnical Engineer or Construction Material Technician.
2. Perform additional tests until compaction meets or exceeds requirements.
3. Ensure excavations are safe for testing personnel.

END OF SECTION 31 23 33

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 31 32 19 - GEOTEXTILES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonwoven geotextile material.

B. Related Specification Sections include but are not necessarily mited to:

1. Section 31 23 00 - Earthwork.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of Stat hway Transportati Officials (AASHTO):

a. M288, Standard Specific on for Ge ile Specification for Highway Applications.

2. ASTM Internati STM):

a. D3 6, Standard est Method f Bursting Strength of Textile Fabrics-Diaphragm B sting Streng Tester Method
b. D 55, Stand Te d for Deterioration of Geotextiles by Exposure to Ligh Moi ure and Heat in a Xenon Arc Type Apparatus.
D4491, ndard Test Methods for Water Permeability of Geotextiles by rmittivity
d. D 3, Stand d Test Method for Trapezoid Tearing Strength of Geotextiles.
e. D463 Standard Test Method for Grab Breaking Load and Elongation of Geote les.
f. D4751 Standard Test Method for Determining Apparent Opening Size of a Geote ile.
D4 9, Standard Practice for Determining the Specification Conformance of osynthetics.
h. D4833, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
i. D4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.
j. D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

DRAFT

B. Qualifications:

1. Each manufacturing, fabricating firm shall demonstrate five years continuous experience, including a minimum of 10,000,000 SQFT of geotextile installation in the past three years.
2. Installing firm shall demonstrate that the site Superintendent or Foreman has had responsible charge for installation of a minimum of 1,000,000 SQFT of geotextile.
3. Installer shall attend pre-installation conference.

1.3 DEFINITIONS

A. Manufacturer: Manufacturer producing geotextile sheets from in and dditives.

B. Installer: The Installers are the individuals actually perfo ing the hands-on rk in the field.

1.4 SUBMITTALS

A. Shop Drawings:

1. Manufacturer's documentation that raw materials an roll materials comply with required geotextile physical properties
2. Manufacturer and Installer qua y cont anuals.
3. Original test results for resins, r material tory seam tests at frequency specified in respective quality control man s.

   a. Results all in de or brack the rolls delivered for use in the Work.

4. Geotextil layout plan w h proposed s e, number, position and sequencing of geotextile rolls an direction of field seams.
5. Proposed ails of nchoring erlapping if different than included in Contract Documents.

B. I rmationa bmittals

1. Submit writ certifications that:

   a. The g textiles delivered to site meets the requirements of this Specification Secti n.
      Th geotextiles was received and accepted in undamaged condition from shipper.

2. For n edle punched geotextiles, the manufacturer shall certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers.
3. Qualification documentation specified in the QUALITY ASSURANCE Article in PART 1 of this Specification Section.

DRAFT

1.5 DELIVERY, STORAGE AND HANDLING

A. Label, handle, and store geotextiles in accordance with ASTM D4873 and as specified herein.

B. Wrap each roll in an opaque and waterproof layer of plastic during shipment and storage.

1. Do not remove the plastic wrapping until deployment.

C. Label each roll with the manufacturer's name, geotextile type, lot number oll number, and roll dimensions (length, width, gross weight).

D. Repair or replace geotextile or plastic wrapping damaged as a resu torage or handling.

E. Do not expose geotextile to temperatures in excess of 71 DEGC (160 DEG or less than 0 DEGC (32 DEGF) unless recommended by the manufa rer.

F. Do not use hooks, tongs or other sharp instruments f handling geotextile.

1. Do not lift rolls lifted by use of cables or c ns in cont with the geotextile.
2. Do not drag geotextile along the ground.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to complianc ith Contract D uments, the following manufacturers are acceptable:

1. GSE L ng Technolo .
2. Propex G syntheti
3. SKAPS Ind i
4. T Cate Miraf
5 Tenax
. Or appro d equal.

2.2 ATERIALS AND MANUFACTURE

A. Geot ile:

1. Non ven pervious sheet of polymeric material.
2. Geotextile fibers:

a. Long-chain synthetic polymer composed of at least 85% by weight polyolefins, polyesters, or polyamides.
b. Filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure.
c. Do not add reclaimed or recycled fibers or polymer to the formulation.

DRAFT

3. Form geotextile into a network such that the filaments or yarns retain dimensional stability relative to each other, including the selvages.
4. The geotextile physical properties shall equal or exceed the minimum average roll values listed below.

   a. Values shown are for the weaker principal direction.
   b. Acceptance of geotextile shall be in accordance with ASTM D4759.
   c. Type I Geotextile: AASHTO M288 Class 2, for use in demolition fill.

PROPERTY	T M THOD	MINIMUM AVERAGE ROLL VALUE
Mass per Unit Area, OZ/SY	ASTM D5261	=10
AOS, U.S. Standard Sieve	ASTM D4751	70-100
Permittivity, SEC-1	ASTM D4491	.5
Puncture, LBS	AS M D4833	=90
Grab Tensile, LBS	ASTM D4632	=250
Trapezoidal Tear, LBS	ASTM D4533	=90
Burst Strength, PSI	ASTM D3786	=190
Ultraviolet Degradation % re ned @ HRS	A M D4355	=50
Sewn Seam Strength, LBS	ASTM D4632	=220

   d. Type 2 eotexti AASHTO M288 Class 2, for use with riprap and in other areas show on the Dra ngs.

PROPERTY	TEST METHOD	MINIMUM AVERAGE ROLL VALUE
Ma er Unit A OZ/SY	ASTM D5261	=8
AOS, U Standard Sieve	ASTM D4751	70-100
Permittiv SEC-1	ASTM D4491	=0.2
Punctur LBS	ASTM D4833	=90
Grab ensile, LBS	ASTM D4632	=250
pezoidal Tear, LBS	ASTM D4533	=90
Burst Strength, PSI	ASTM D3786	=190
Ultraviolet Degradation % retained @ 500 HRS	ASTM D4355	=50
Elongation, %	ASTM D4632	=15
Sewn Seam Strength, LBS	ASTM D4632	=220

DRAFT

B. Thread:

1. High-strength polyester, nylon, or other approved thread type.
2. Equivalent chemical compatibility and ultraviolet light stability as the geotextile.
3. Contrasting color with the geotextile.

PART 3 - EXECUTION

3.1 PREPARATION

A. Construct the surface underlying the geotextiles smooth and free of ruts or protrusions which could damage the geotextiles.

3.2 INSTALLATION

A. Install geotextiles in accordance with manufacturer's written recommendations.

B. Hand place geotextile.

1. No equipment will be permitted on traffic in direct contact with the geotextile.

C. Lay geotextile smooth so as to be free of tensile stress, folds, and wrinkles.

D. Seam Construction:

1. Sew all Type 2 geotextile seams.
2. Broom clean existing geotextile and cut off to provide a clean area for seaming with the new geotextile.
3. Sew seams continuously using [illegible] A flat seam with one row of a two-thread 401 chain stitch unless otherwise recommended by the manufacturer.
4. Minimum distance from the geotextile edge to the stitch line nearest to that edge: 2 IN unless otherwise recommended by the manufacturer.
. Test seams at the frequency specified in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.
6. Tie off threads at the end of each seam to prevent unraveling.
Construct seams on the top side of the geotextile to allow inspection.
8. Sew skipped stitches or discontinuities with an extra line of stitching with 18 IN of overlap.
9. Type 2 geotextile seams may be sewn or overlapped.

a. Construct overlapped seams in accordance with manufacturer's recommendations or as shown on Drawings.

E. Heat tack the geotextile overlaps as shown on the Drawings.

F. Backfill anchor trenches in accordance with Specification Section 31 23 00.

G. Place cover soil in accordance with Specification Section 31 23 00.

DRAFT

H. Protect geotextiles from clogging, tears, and other damage during installation.

I. Geotextile Repair:

1. Place a patch of the same type of geotextile which extends a minimum of 12 IN beyond the edge of the damage or defect.
2. Fasten patches continuously using a sewn seam or other approved method.
3. Align machine direction of the patch with the machine direction of the geotextile being repaired.
4. Replace geotextile which cannot be repaired.

J. Use adequate ballast (e.g., sand bags) to prevent uplift by wind.

K. Do not use staples or pins to hold the geotextile in place.

L. Do not leave geotextile uncovered for more than 14 da

3.3 FIELD QUALITY CONTROL

A. Conduct destructive seam testing at locations identified Engineer.

1. Minimum testing will be at a eq cy of one test per 000 linear feet of seam.

B. Provide as-constructed drawing showi roll numb out; joint locations; and destructive sample repair, and patch locations.

END OF SECTION 31 32 19

DRAFT

SECTION 31 32 19.13 - GEOGRID SOIL STABILIZATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnishing and installing structural geogrid as reinforcemen ween soil layers.

B. Related Specification Sections include but are not necessarily mited to:

1. Section 31 23 00 - Earthwork.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM)

a. D1388, Standard Test M od for Sti s of Fabrics.
b. D4873, Standard Guide fo dentifi ion, S ge, and Handling of Geosynthetic Rolls and Samples.

2. Geosyntheti Research titute (GR

a. -4(a), Stand d Practice for D termination of the Long-Term Design Strength of iff Geog .
b. GG- S ndard Practice for Determination of the Long-Term Design Strength of Flexi Geogrids.

B. Qualifications:

1. Each manufa uring firm shall demonstrate five years continuous experience, including a minimum of 000,000 SQFT of geogrid installation in the past three years.
2. Installing fir shall demonstrate that site Superintendent or Foreman has had responsible harge for stallation of a minimum of 100,000 SQFT of geogrid.
3. In lle hall attend pre-installation conference.

C. Manufacturer's Representative:

1. A qualified and experienced engineer employed by the geogrid manufacturer or it's supplier shall be available for a minimum of one day of site assistance at the start of installation, to assist the Contractor in the proper construction/ installation techniques.

a. Thereafter, the representative shall be available on an on call basis during the construction of the remainder of the Project.

DRAFT

1.3 DEFINITIONS

A. Manufacturer: Manufacturer producing geogrid material from resin and additives.

B. Installer: The Installers are the individuals actually performing the hands-on work in the field.

C. Geogrids:

1. A geogrid is a synthetic planar structure formed by a regular network of tensile strength elements with apertures of sufficiently large size to allow for inte cking with the surrounding soil so as to perform the primary function of reinf ement.
2. Stiff geogrids have a stiffness of 1000 G-CM or higher, wh ed in accordance with ASTM D1388.
3. Flexible geogrids have a stiffness of less than 1000 G-CM, when tes in accordance with ASTM D1388.

D. Partial Factor of Safety:

1. Partial factors of safety are applied to the u mate stren h of the geogrid to account for site specific long term environmental and stre on ons.

a. FSCR: Partial Factor of Safety for creep def ation.
b. FSID: Partial Factor of af for installation d age.
c. FSCD: Partial Factor of afety f tential chem l degradation.
d. FSBD: Partial Factor of S fety for p biological degradation.
e. FSJCT:

1) P ial Fa r of Safety or junction strength to account for the difference etween ri nd through e-junction strengths used to determine the ultimate st ngth and oth partial factors of safety of a stiff geogrid.
2 Not appl bl t flexible geogrids.

f. FSJN P tial Factor of Safety for connection strength between multiple geogrid panels.

1.4 SUBMITTALS

A. op Drawings for ngineer's approval:

1. Manufact er's certification that raw materials and roll materials comply with required ge ri hysical properties.
2. Man acturer and Installer quality control manuals.
3. Original test results for resins and roll material at frequency specified in respective quality control manuals.

a. Results shall include or bracket the rolls delivered for use in the Work.

4. Documentation of Partial Factors of Safety in accordance with GRI GG-4.
5. Geogrid layout plan with proposed size, number, position and sequencing of geogrid rolls and direction of all field joints.

DRAFT

6. Proposed method of placing fill material upon the geogrid.

   a. Include documentation that equipment will not damage geogrid.

B. Informational Submittals:

1. Qualification documentation specified in the QUALITY ASSURANCE Article in PART 1 of this Specification Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Geogrids shall be labeled, handled, and stored in accordance wi ASTM D4873 and as specified herein.

1. Each roll shall be wrapped in an opaque and wat proof layer of plastic d g shipment and storage.
2. The plastic wrapping shall not be removed ntil deployme t

B. Each roll shall be labeled with the manufacturer's na ge id type, lot number, roll number, and roll dimensions (length, width, gross weight).

1. Geogrid or plastic wrapping d m d as a result of st ge or handling shall be repaired or replaced.
2. Geogrid shall not be exposed to mperature cess of 60 DEGC (140 DEGF) or less if recommended by the manufact r.

C. No hooks, tongs or ot r sha instrument hall be used for handling geogrids.

1. Rolls sha not be lifted use of cabl or chains in contact with the geogrids.
2. Geogri shall not be agged along the ground.

PART 2 - PRODUCTS

2.1 MANUFACTURE S

A. bject to complian with the Contract Documents, the following manufacturers are ac table:

1. H sk Inc., 11107-A South Commerce Blvd., Charlotte, NC 28241.
2. Nic n/Mirafi Group, USA, 365 S. Holland Dr., Pendergrass, GA 30567.
3. The Tensar Corp., 5775-B Glenridge Dr., Atlanta, GA 30328.
4. Or approved equal.

DRAFT

2.2 MATERIALS

A. The geogrid shall be a regular network of integrally connected polymer tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the protective cover soil.

1. The geogrid structure shall be dimensionally stable and able to retain its geometry under construction stresses and shall have high resistance to damage during construction, to ultraviolet degradation, and to all forms of chemical and biological gradation encountered in the soil being reinforced.

B. The partial Factors of Safety used in the computation of the Long r Allowable Design Strength shall be in accordance with the following:

STIFF GEOGRIDS						
Value	FSCR	FSID	FSCD	FTBD	FSJCT[2]	FSJNT
Minimum	1.7	1.2	1.1	1.1	1.0	1.2
Default	NA[1]	1.4	1.4	3	3.0	2.0

FLE E GEOGRIDS						
Value	FSCR	FSID	FSC	FTBD	F CT[2]	FSJNT
Minimum	1.7	1.2	1.1		NA[3]	1.0
Default	NA[1]	1.4	1	1.3	NA[3]	2.0

1. Default v ues shall be ed in the abs ce of test information and documentation.
2. Notes:

a. Defau es for determination of FSCR are not permitted.
Values f FSJCT may be 1.0 if through the junction testing was used to determine ultimate ength and other partial factors of safety.
c. FS T is not ap licable for flexible geogrids.

PART 3 XECUTION

3.1 EXAMI TI N

A. Care shall be taken to keep the geogrid clean and free from debris prior to installation.

DRAFT

3.2 INSTALLATION

A. Install geogrid in accordance with manufacturer's instructions and where indicated on the Drawings

1. Handle all geogrid rolls in such a manner as to ensure they are not damaged in any way and the following shall be complied with:

a. The geogrid shall be positioned by hand as necessary after bei g unrolled to minimize and smooth wrinkles.

2. Secure the geogrid in place with pins, staples, sandbags or pproved method to prevent movement during fill placement. Place, spread, a comp the fill material in a manner that prevents the development of wrinkles or movement of th geogrid. Keep the geogrid taut during the placement of the initial lift o not operate cons ction equipment directly on the geogrid.
3. Do not leave geogrid uncovered for more tha 4 days.

B. Protective Soil Cover: See Specification Section 23 00.

3.3 FIELD QUALITY CONTROL

A. Conduct test section to demonstrate th t the pr ed cover soi acement techniques will not damage the geogrid.

B. Provide as-constructed d wing showing ll umber; layout; and joint locations.

END OF SECTION 31 32 1 13

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 31 37 00 - RIPRAP

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stone revetment (riprap) for protection of slopes and draina ys against erosion.

a. Channel protection.
b. Embankment protection.
c. Bridge abutments.
d. Culvert outlets.
e. Hydraulic structures.

B. Related Specification Sections include but are not n ssari limited to:

1. Section 31 23 00 - Earthwork.
2. Section 31 23 33 - Trenching a filling, and Compa ng for Utilities.
3. Section 31 25 00 - Soil Erosion nd Se nt Control.
4. Section 33 40 00 - Storm Draina e.
5. Section 31 32 19 - Geotextiles.

1.2 QUALITY ASSURANCE

A. Referenced S dards:

1. ASTM Inter i al (ASTM):

a. 27, Stan d Test Method for Density, Relative Density (Specific Gravity), and Ab rption of arse Aggregate.
b. D37 D3744M, Standard Test Method for Aggregate Durability Index.
c. D5312 D5312M, Standard Test Method for Evaluation of Durability of Rock for Erosio Control Under Freezing and Thawing Conditions.
d. D531 D5313M, Standard Test Method for Evaluation of Durability of Rock for Ero on Control Under Wetting and Drying Conditions.
e D 519, Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials.

DRAFT

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

2. Certifications.
3. Test reports.
4. Submit all tests and certification in a single coordinated sub

a. Partial submittals will not be accepted.

5. Construction Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Riprap shall be made up of durable a ular s tone that is fr f laminations, seams and fractures, or injury due to blasting .

B. Individual stones making up the riprap sh l b resistant to weathering and shall not contain cracks, non-mineraliz def shale, un nd sandstone, or organic material.

C. Do not use thin ab-like piec Neither the idth nor thickness of any stone shall be less than one-third of t stone's lengt

D. Gradation of the m ri

2.2 MATERIAL Q LITY C NTROL

A. Granular Bedding:

1. The materia making up the granular bedding shall consist of crushed, angular No. 1 or No. 2 (AA HTO M43) gravel, limestone, or sandstone, weighing not weigh less than 135 L S/CU T (saturated surface dry). The material shall be composed of tough durable part s free of organic matter, soft material, and friable particles, and meet the following physical properties

Percent of wear, Los Angeles test, maximum	50 %
Loss, sodium sulfate soundness test, maximum	15 %
Percent by weight of fractured pieces, minimum	90 %.

DRAFT

B. Aggregate Filter:

1. The material making up the aggregate filter shall consist of crushed, angular No. 3 or No. 4 (AASHTO M43) gravel, limestone, or sandstone, weighing not less than 135 LBS/CUFT (saturated surface dry). The material shall be composed of tough durable particles free of organic matter, soft material, and friable particles, and meet the following physical properties

Percent of wear, Los Angeles test, maximum	50 %
Loss, sodium sulfate soundness test, maximum	15 %
Percent by weight of fractured pieces, minimum	90 %

C. Riprap:

1. Riprap material quality shall be evaluated using on f the following tw methods:

a. Specific rock properties:

1) Quarry rock tests completed o ock that i epresentative of the material to be used on the project may be su itte or review if the testing was completed by a reputable testing com ny for State or Federal agency certification purp ses within the last fi years. The material testing requirements are s f ws:

a) Minimum Sp cific Grav y er ASTM C127.
b) Durability Ab rptio Ratio less han 10 fails, greater than 23 passes, tween 10 and 3 asses only if the Durability Index is greater than 52.

(1) Durability A orption Ratio = Durability Index / (PCT Ab rption+1), Durability Index test ASTM D3744, Absorp n test ASTM C127

c) Maximum of 1% loss due to Wetting and Drying test ASTM 5313/D5313M.
d) M imum of 5% loss due to Freeze Thaw test ASTM D5312/D5312M.

b. Ability f rock to perform.

1) The Contractor may propose to use material from a source that has a documented track record of acceptable performance for comparable applications and exposure conditions. If requesting approval of materials using this method, provide the following information for the Engineer to review to determine if the riprap is of acceptable quality:

a) Documentation of the riprap material source.
b) Installation performance data.
c) Available material testing data.
d) Maintenance records for the riprap installation.
e) Recent photos of riprap installation.

DRAFT

f) Contact information for the Owner of the project.

2) The Engineer shall review the provided information to determine whether the in place material was subjected to conditions expected for the project and if the rock performed satisfactorily .

3) A minimum of one month shall be allowed after the information has been submitted by the Contractor for review of data, , a site visit, and material determination.

PART 3 - EXECUTION

3.1 MATERIAL ACCEPTANCE

A. Final acceptance is determined at the in-place riprap in llation which shall con of a homogenous mass with a distribution of rock sizes th meets the specified gradatio Riprap transport, handling, and placement methods shall t cause break ge of individual rocks or segregation of riprap gradation.

B. Rock quality shall be determined at the quarry. Stone a coloration or appearance dissimilar to the accepted material shall be rejected.

C. A representative gradation sample sh be loc d adjacent to th stockpile locations at both the quarry and project stockpile area for th duration o oject.

D. Arriving loads of material ot bearing rea n le similarity to the representative gradation sample shall be rejec d. Th Contractor m y arrange for gradation measurements of rejected loads at the projec ite. If the alysis pro the rejected stone meets the project requirements, then the Contra or shall be re mbursed for th gradation measurements.

E. The representati gradati n sample m e of adequate size to demonstrate compliance with the specified grada The Contractor may use test Method A or B as defined in ASTM D551 termine th radation. The minimum sample size shall be 20 times the largest i vidual sto of the gr tion.

F. The gradation test all be performed by the Contractor or qualified geotechnical testing company for each c s of installed riprap and repeated for every 50,000 tons of placed material. he gradation of i talled riprap is questioned, then ASTM D5519 Test Method D may be use o determine the installed material meets the specification.

G. The ripr gr ation shall be produced at the quarry and shall not be accomplished by mixing at the project te.

H. The representative gradation sample may be incorporated into the project during final placement upon notification and approval by the Contracting Officer.

DRAFT

3.2 PREPARATION

A. Submit a construction plan for review and approval by the Contracting Officer prior to starting grading. The construction plan must demonstrate knowledge of site constraints, design requirements, and permitting restrictions. The following components are required at a minimum:

1. Staging area layout with adequate area for stockpile area.
2. Ground preparation for the staging and stockpile area.
3. Location of worksite stockpile area and acceptance areas.
4. Erosion and sediment control measures.
5. Description of work.
6. Haul pattern.
7. Schedule.
8. Description of restoration plan to preconstruction c ditions for staging ea, stockpile area, and work site.

3.3 STOCKPILE AREAS

A. Riprap stockpiles shall be a maximum of 12 FT high an aced so rock does not roll down the slope. The stockpile areas shall have compacted surface th a minimum 6 IN thick sand-clay-gravel or crushed stone pad to p ovi f r storage of ripr without fines being introduced to the riprap gradation. Any riprap or one wh has become c ntaminated with topsoil, fines, or debris shall not be used unless the c taminatin m ial has been removed from the riprap prior to placement at no additional cost Ow r.

3.4 PLACEMENT

A. Provide at lea 24 HR notic o th Geotechnical Engineer to review the work in the field including the sub ade, g textile fabri d aggregate bedding. Do not place any geotextile fabric, aggregate be i g, or stone material on prepared base prior to the Geotechnical Engi review. cement of bedding, fabric, or riprap on ice or snow is not permitted.

B. Subgrade:

1 Compact fill eas to density specified for backfill in accordance with Specification Section 31 2 0 - Earthwork.
2. Grade subg de to elevations indicated in the plans within plus or minus 0.1 FT in dry as an 0.3 FT in areas that are underwater and do not require dewatering for co tion.
3. The subgrade shall be smooth and free of topsoil, organic material, roots, sticks, debris, yielding material or other materials that would prevent meeting the specified subgrade elevation tolerance.

C. Aggregate Bedding:

1. Place aggregate bedding only after inspection of the subgrade by the Geotechnical Engineer.

DRAFT

2. Finished top of bedding elevations shall be ±0.1 FT in dry areas and +0.1 FT or -0.3 FT in areas below water that do not require dewatering for construction. The extreme of any elevation or thickness tolerance shall not be continuous over an area greater than two hundred square feet. Any difference in aggregate bedding layer shall not result in a thinner than the specified riprap thickness unless approved by the Contracting Officer.
3. Place granular bedding material to the lines and grades shown on the drawings.
4. Compaction of the granular bedding is not required, but the material shall be finished to an even surface.
5. The bedding materials shall not be contaminated with soils, debris o vegetation. If contaminated, the bedding material shall be removed and replace at the Contractor's expense.
6. Placement of riprap shall be completed in a timely manner te lacement of bedding material to avoid loss of bedding material over time or m erial er on.
7. Maintain the bedding material until the riprap is in place.

D. Aggregate Filter:

1. Place the aggregate filter only after inspec n of the subg de by the Geotechnical Engineer.
2. Place aggregate filter material to the lines and g d hown on the drawings.
3. The finished top of the aggregate filter shall be ± FT in dry areas and +0.1 FT or -0.3 FT in areas below water that d ot require dewateri for construction. The extreme of any elevation or thickness tole nc ll not be contin s over an area greater than two hundred square feet. Any diffe nce in th regate filte layer shall not result in a riprap thickness thinner than spe fied unle app d by the Contracting Officer.
4. Compaction of the aggregate filte mater l is not required, but the material shall be finished to an ev face.
5. The filter mat ials sha ot be cont inated with soils, debris or vegetation. If contamina d, the filter aterial shall removed and replaced at the Contractor's expens
6. Placeme of riprap leted in a timely manner, after placement of the aggregate f r to oid loss of the filter material over time or material erosion.
7. Maintain the a egate filter material until the riprap is in place..

E. R prap:

1. Place riprap prepared bedding only after the Geotechnical Engineer has reviewed the work.
2 Place riprap prepared foundation per line and grade shown on the plans. The riprap hickness t rance is +0.5 FT and -0 FT as measured over an area of 200 SQFT when p ced i he dry, and 400 SQFT when placed underwater.
3. Rip material shall be placed to result in a homogenous mass with a minimum of voids. Rearranging of individual rock may be required to obtain a suitable distribution of rock sizes.
4. Riprap placement methods shall not result in the following: cause breakage of individual rocks, result in segregation of riprap gradation, result in introduction of fines, or impact the filter material.
5. Individual stones making up the riprap shall not be dropped from a height greater than 1 FT.
6. When placing riprap on a slope, start placement from the bottom of slope and proceed to top of slope.

DRAFT

7. Place rock to full thickness in a single operation to avoid displacing the underlying material.
8. The top of riprap shall match adjoining grades and allow for positive drainage.
9. Maintain the riprap until acceptance at project completion.

END OF SECTION 31 37 00

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

DIVISION 32

EXTERIOR IMPROVEMENTS

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 32 12 16 - ASPHALTIC CONCRETE VEHICULAR PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphaltic concrete vehicular paving.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Construction standards: State of Ohio, Dep tment of T nsportation, "Construction and Material Specifications," as amended to date

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:

a. Ackn ledgeme hat produ submitted meet requirements of standards ref nced.
b. phalt design x

PART 2 - PRODUCTS

2.1 MATERIALS

A. sphaltic Concrete er the ODOT CMS Items 401, 402, 403, 407, 408, 409, 440, 441, and 4

2.2 MIXES

A. Comply with mix design categories per the ODOT CMS.

DRAFT

PART 3 - EXECUTION

3.1 APPLICATION

A. Construct to line, grade and section as shown on Drawings and in accordance with the referenced State Specifications.

B. Tolerance of Finished Grade: +0.10 FT from required elevations.

3.2 FIELD QUALITY CONTROL

A. Utilize an ODOT approved asphaltic concrete mixing plant per ODOT CM Item 402. The plant is to follow the quality assurance program as outline in ODOT CMS It 403.

B. Perform quality control testing as required for accep nce per the ODOT CMS.

END OF SECTION 32 12 16

DRAFT

SECTION 32 15 40 - CRUSHED STONE SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Crushed Stone surfacing.

a. Drainage outflow area.
b. Towpath Trail, Connector Trail and other wal ways.

B. Related Specification Sections include but are not ne ssarily limited to:

1. Section 31 22 00 - Site Grading.
2. Section 31 37 00 – Riprap.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Hig wa and Transportation Officials (AASHTO):

a. T2, S pling Sto , Slag, Gra l, Sand and Stone Block for Use as Highway ma ials.

2. ASTM In national ASTM)

a C29, St ard Test Method for Bulk Density ("Unit Weight") and Voids in gregate
b. C1 Standa Test Method for Sieve Analysis of Fine and Coarse Aggregates.
c. D75, andard P actice for Sampling Aggregates.
d. D582 Standard Test Method for Determining the Percentage of Fractured Particl in Coarse Aggregate.

1.3 SUBMI TAL

A. Product Data:

1. Acknowledgement that products submitted meet requirements of standards referenced.
2. Sieve analysis reports on all granular materials.
3. Source tests: submit certified test reports and service records to determine acceptability and application of stone materials.

DRAFT

PART 2 - PRODUCTS

2.1 MATERIALS

A. Crushed Stone Surfacing:

1. Fractured Faces: ASTM D5821 - 85% of the rock shall be fractured on all faces.
2. Electrical Resistivity: Minimum 3,000 ohm-meters.
3. DSMO Loss: ASTM DMSO - Maximum 12%.
4. Bulk Density: ASTM C29 - Minimum 80 PCF.
5. Gradation: No. 6 Stone as defined by AASHTO M43 or pe A TM C136 as defined below:

Sieve Size	1 IN	3/4 IN	8 IN	No. 4	N 8
Percent Passing by Weight	100	50	5 to 10	4 to 9	0 to 2

2.2 SOURCE QUALITY CONTROL

A. Furnish material from a single sourc

B. Obtain samples per ASTM D75 from ocal quarr t typically provides material to meet the specification requirements.

PART 3 - EXECUTION

3.1 PREPARATIO

A. Trim and dress all ar to required cross sections.

B. ing areas tha e below lowable minus tolerance limit to grade by filling with material similar to adjacen material.

C. Compact to density ecified for backfill in accordance with Specification Section 31 23 00.

D. Do n place any one on soft, muddy, or frozen material.

E. Prevent c mination of existing surfacing stone during excavation activities.

F. Do not place any stone material on prepared base prior to approval by Geotechnical Engineer.

3.2 PLACING

A. Place to required thickness and grades:

1. Depth: -0 IN, +2 IN.

DRAFT

B. Place to full thickness in a single operation to avoid displacing the underlying material.

C. Compact material to a firm uniform layer.

D. Maintain a neat and dust-free finish surface.

END OF SECTION 32 15 40

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT

SECTION 32 91 13 - TOPSOILING AND FINISHED GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Topsoiling and finished grading.

B. Related Specification Sections include but are not necessarily mited to:

1. Section 01 57 23 - Temporary Storm Water Pollu n Prevention.
2. Section 31 10 00 - Site Clearing.
3. Section 31 23 00 - Earthwork.
4. Section 32 92 00 - Seeding, Sodding and L dscaping

C. Location of Work: All areas within limits of grading a ll areas outside limits of grading which are disturbed in the course of the work.

1.2 SUBMITTALS

A. Shop Drawings:

1. Project Data Test repo for furnish d topsoil.

PART 2 - PRODUCTS

2.1 M ERIA

A Topsoil:

Original surf e soil typical of the area.
2. Friable, loam soil capable of supporting native plant growth.

2.2 TOLERA ES

A. Finish Grading Tolerance: ±0.1 FT from required elevations.

DRAFT

PART 3 - EXECUTION

3.1 PREPARATION

A. Correct, adjust and/or repair rough graded areas.

1. Cut off mounds and ridges.
2. Fill gullies and depressions.
3. Perform other necessary repairs.
4. Bring all sub-grades to specified contours, even and properly c mpacted.

B. Loosen surface to depth of 2 IN, minimum.

C. Remove all stones and debris over 2 IN in any dimension

3.2 ROUGH GRADE REVIEW

A. Reviewed by Contracting Officer in Specification S ion 3 10 00.

3.3 PLACING TOPSOIL

A. Do not place when subgrade is wet or zen enou ause clodding.

B. Spread and lightly compact to a depth of IN or all disturbed earth areas.

C. Provide finished su ace free o tones, stic or other material 1 IN or more in any dimension.

D. Provide finish surface smo h and true to required grades.

E. Restore stockpile t condition of rest of finished work.

3.4 CCEPTANCE

A. Upon completion o opsoiling, obtain Contracting Officer's acceptance of grade and surface.

B. M e test holes wh e directed to verify proper placement and thickness of topsoil.

END OF SECTI N 32 13

DRAFT

SECTION 32 92 00 - SEEDING, SODDING AND LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding, sodding and landscape planting:

a. Soil preparation.
b. Native grass seeding.
c. Plants and planting.
d. Maintenance of new and transplanted m erials.
e. Replacement of dead or impaired m rials at the end of the first growing season.

B. Related Specification Sections include but are not n ssari limited to:

1. Section 32 91 13 - Topsoiling and Finished Grading

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American N sery and L ndscape A ciation/American National Standards Institute (ANLA/A SI):

a. Z6 Ameri n Stan Nursery Stock.

1.3 SU MITTA S

A Shop Drawings:

Product techn al data including:

Ack wledgement that products submitted meet requirements of standards r renced.
b. Manufacturer's installation instructions.
c. Signed copies of vendor's statement for seed mixture required, stating botanical and common name, place of origin, strain, percentage of purity, percentage of germination, and amount of Pure Live Seed (PLS) per bag.
d. Listing of type of cover crop to be used and rates and procedures for planting if fall planting of Native Grass is anticipated.
e. Source and location of plants and plant material, as per Paragraph 3.3A.

2. Certification that each container of seed delivered will be labeled in accordance with Federal and State Seed Laws and equals or exceeds Specification requirements.

DRAFT

3. Test reports.

1.4 SEQUENCING AND SCHEDULING

A. Installation Schedule:

1. Provide schedule showing when trees, shrubs and other plant materials are anticipated to be planted.
2. Show schedule of when lawn type and other grass areas are antici ted to be planted.

B. Pre-installation Meeting:

1. Meet with Contracting Officer's Representative and oth r parties as cessary to discuss schedule and methods, unless otherwise indicated b Contracting Offic

PART 2 - PRODUCTS

2.1 MATERIALS

A. TYPE "A" Seed Mixture - Lawn:

1. Seed mix to conform with ODO 659.07.

B. Native Grass Seeding: Certified seed of cal adapted strains.

1. Seed mixtur

CUVA Hardy pland Seed M x or approved qual;

Species Name	mmon Name	Percent of Mix (%)
Ely adensis	Nodding Wild Rye	33.03
Sorghastrum nut	Indian Grass	21.54
Echinacea purpurea	Purple Coneflower	15.24
P icum virgatum	Switch Grass	14.53
Lupin perenn	Perennial Lupine	6.91
Asclepias tuberosa	Butterfly Weed	3.15
Rudbeckia hirta	Black-eyed Susan	2.24
Oenothera biennis	Evening Primrose	1.42
Achillea millefolium	White Yarrow	0.81
Agrostis perennans	Autumn Bentgrass	0.81

DRAFT

Species Name	Common Name	Percent of Mix (%)
Solidago canadensis	Canada Goldenrod	0.30

C. Plants:

1. Sound, healthy, vigorous, free from disease, insect pests or their eg , grown in same or colder climatic zone as project.

   a. Live Stakes/Whips/Branch Layering.

      1) Branches shall be locally harvested and kept in optimal dition until installation to ensure viability.
      2) Branches shall be covered during nsportation to prevent dry and stress to the live cuttings. Branches s ll arrive on site within eight (8) hours after cutting.
      3) Cuttings on site not-in-use shal heale n moist soil or water, shaded and protected from wind at all times. hes shall be used within two (2) days after cutting. When temperature is 5 egrees Fahrenheit or above, cuttings must be installed he same day they cut.
      4) Material is subje to app al by the Cont ting Officer prior to use.
      5) Species and size a ndicated awings.

D. Fertilizer

1. Fertilizer sha not be u d.

PART 3 - EXECUTION

3.1 MA NCE AND EPLACEMENT

A. General:

Begin mainte nce of planted areas immediately after each portion is planted and continue unt inal acceptance or for a specific time period as stated below, whichever is the longer.

2. vide d maintain temporary piping, hoses, and watering equipment as required to con water from water sources and to keep planted areas uniformly moist as required for proper growth.
3. Protection of new materials:

   a. Provide barricades, coverings or other types of protection necessary to prevent damage to existing improvements indicated to remain.
   b. Repair and pay for all damaged items.

4. Replace unacceptable materials with materials and methods identical to the original specifications unless otherwise approved by the Contracting Officer.

DRAFT

B. Seeded or Sodded Lawns:

1. Maintain seeded lawns: one growing season, minimum, after installation and review of entire project area to be planted.
2. Maintenance period begins at completion of planting or installation of entire area to be seeded or sodded.
3. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, and replanting as required to establish a smooth, uniform lawn, free of weeds and eroded or bare areas.
4. Lay out temporary lawn watering system and arrange watering s dule to avoid walking over muddy and newly seeded areas.

    a. Use equipment and water to prevent puddling and ater er n and displacement of seed or mulch.

5. Mow lawns as soon as there is enough top grow to cut with mower set a commended height for principal species planted.

    a. Repeat mowing as required to maint height.
    b. Do not delay mowing until grass blades nd er and become matted.
    c. Do not mow when grass is wet.
    d. Time initial and subsequ nt mowings as requ d to maintain a height of 1-1/2 to 2 IN.
    e. Do not mow lower than 1/2 IN.

6. Remulch with new mulch in area where ulch has been disturbed by wind or maintenance ope s sufficiently o ullify its purpose.

    a. Anch as require to prevent placement.

7. Unaccep ble plantin h se areas that do not meet the quality of the specified material, p duce t specified re s, or were not installed to the specified methods.
8. Replant bare using same materials specified.
9. cting Off r will review final acceptability of installed areas at end of mainten ce perio
10. Maintain r aired are until remainder of maintenance period or approved by Contracting fficer, whichever is the longer period.

C. N ive Grass Seedi :

1. aintain l seeded areas for one year .
2. Do mow bed native grass.
3. When weeds are shading out 70% of (minimum 6 IN) native grass seed, shred weeds back to height of seedlings with a rotary shredder.
4. Do not allow weeds to exceed a height of 8 IN.
5. Herbicide (1/2 to 1 LB active ingredient per acre) may be used to control weed growth after the first year.

    a. Do not apply until weeds are 40% broadleaf, seedlings at least 1 IN high and 2-4 leaf stage.
    b. If herbicide is used, apply twice.

DRAFT

6. Water according to need to maintain survival of planting.
7. Regrade and replant eroded or bare areas evident at end of one year period.

D. Trees and Shrubs:

1. Maintenance includes but is not limited to watering when necessary, removing dead or dying branches, removing sprouts and suckers; tightening, repairing or replacing tree stakes and wrapping; maintaining mulch to originally specified depth; and weeding plant beds and pits.
2. Remove and replace all new plants supplied, which are impaired ad, or dying during one year from initial acceptance.
3. Contracting Officer will review completed planting for acc a ity of installation.

    a. Approval of planting denotes initial acceptance and the beginn g of the maintenance period.

4. Maintenance will be required for transplanted material.
5. Maintenance period extends from start of t nsplanting op ations through first full growing season.
6. Transplanted material will not be subject to rep cem nt unless they were unacceptably maintained as specified for new trees and shrubs.

END OF SECTION 32 92 00

DRAFT

THIS PAGE INTENT ONALLY LEFT BLANK

DRAFT