

SECTION 31 00 00

SITE WORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. These general requirements apply to all sitework operations. Refer to Division 31 Specification sections for specific general, product and execution requirements.

1.02 RELATED SECTIONS

- A. Site Preparation: Section 31 15 00.
- B. Earthwork: Section 31 30 00.

1.03 QUALITY ASSURANCE

- A. Comply with local, State and Federal requirements regarding materials, methods of work and disposal of excess and waste materials.
- B. Obtain and pay for required inspections, permits and fees.

1.04 PROJECT CONDITIONS

- A. Each Contractor shall locate and identify existing underground and overhead utilities in areas of their sitework.
 - 1. If utilities are to remain, provide adequate means of protection during sitework operations. Repair utilities damaged during sitework operations at responsible Contractor's expense.
- B. When uncharted or incorrectly charted underground piping or other utilities are encountered during sitework operations, notify the Architect immediately for procedure directions.
- C. Locate, protect and maintain benchmarks, monuments, control points, and protect engineering reference points. Reestablish disturbed or destroyed items at responsible Contractor's expense.
- D. Control dust caused by the work. Dampen surfaces as required.
- E. Perform site operations and the removal of debris and waste materials to assure minimum interference with streets, walks, and other adjacent facilities.

- F. Protect existing paving and other services or facilities on site and adjacent to the site from damage caused by sitework operations. Cost of repair and restoration of damaged items at responsible Contractor's expense.
- G. Protect and maintain utility services, valves and other services, except items designated for removal.
- H. Owner will occupy adjacent facilities during the entire construction period. Perform site work operations to minimize conflicts and to facilitate Owner's use of the premises and their ability to conduct normal operations.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. As selected by Contractor, except as indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine the areas and conditions under which sitework is to be performed and materials installed. Do not proceed with the work until unsatisfactory conditions are corrected.
- B. Consult the records and drawings of adjacent work and of existing utilities and their connections which may affect sitework.

END OF SECTION

SECTION 31 15 00
SITE PREPARATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work Included: Perform site preparation work as shown and specified for all site preparation operations. Work includes:
 - 1. Protecting existing improvements to remain.
 - 2. Removing plants, lawns and vegetation.
 - 3. Removing designated site improvements.
 - 4. Removing debris and waste materials.
 - 5. Stripping topsoil.

1.02 RELATED SECTIONS

- A. Site Work: Section 31 00 00.
- B. Earthwork: Section 31 30 00.
- C. Seeding: Section 32 92 19.

1.03 QUALITY ASSURANCE

- A. Comply with Section 31 00 00 requirements.

1.04 PROJECT CONDITIONS

- A. Perform site preparation work before starting paving operations.
- B. Locate, protect, and maintain active utilities and site improvements to remain.
- C. Provide necessary barricades, coverings and protection to prevent damage to existing improvements indicated to remain.
- D. Restore to original grades and conditions, areas adjacent to site disturbed or damaged as a result of site preparation work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials and equipment: As selected by Contractor, except as indicated.

- B. Tree Protection: Provide one of the following:
 - 1. Wood Rail Fence: 4 x 4 posts; 2 x 4 rails; 4'-0" exposed height above grade.
 - 2. Fabric Fence: 4'-0" high wood slat snow fence fabric or plastic mesh; steel drive posts.

PART 3 EXECUTION

3.01 SITE CLEARANCE AND PROTECTION

- A. Clear and grub areas as required for access to sitework operations and performance of the work.
- B. Remove and dispose of all plants, other vegetation matter and debris from areas to be cleared and grubbed within Contract limits.
 - 1. Use only hand methods for grubbing inside the drip line of trees designated to remain. Strip existing grassplant materials to a maximum depth of 1" under tree canopies and carefully till or scarify existing grade to a maximum depth of 1".
 - 2. Remove stumps to their full depth; remove 3" and larger roots to a depth of 2'-0" below finished grade; and remove 3" and larger roots within 5'-0" of an underground structure, utility line, footings and paved areas.
- C. Care and Removal of Trees: Remove trees within building limits as indicated on the Drawings. Do not remove any other trees without permission of Architect.
- D. Other Improvements: Remove fences and other existing improvements as required to perform the work, and store and maintain for future replacement by Contractor.
- E. Protection Requirements: Protect existing trees indicated to remain in place, against unnecessary cutting, breaking, skinning, or bruising of roots and bark, smothering of trees by stockpiling construction materials or excavated materials within drip line.
 - 1. Protect designated trees to remain with 4'-0" high double wood rail type [or fabric type] fence enclosure. Locate enclosure at drip line of each tree.
 - 2. Erect temporary tree protection fencing before starting site preparation work. Maintain fencing during entire construction period. Remove temporary fencing when no longer needed or when acceptable to the Architect.
 - 3. Water trees and other vegetation as required to maintain their health during the course of construction operations.
 - 4. Interfering branches of trees may be removed, subject to Architect's approval.
 - 5. Contractor is responsible for all damage to plants scheduled to remain. Damage is defined as including the following: removal of tree,

disfigurement of the tree including skinned bark, broken branches or improper pruning and unnecessary compaction of root zone under canopy circumference. Damage that occurs shall be corrected as described below:

- a. Cost for tree replacement shall determined in accordance with the "Guide for Plant Appraisal" by the Council of Tree and Landscape Appraisers (International Society of Arboriculture, Publication #P1209).

F. Topsoil - Stripping and Storage

1. Strip topsoil to its full depth at building areas, and all areas to be regraded or resurfaced.
2. Stop topsoil stripping at trees designated to remain, a sufficient distance to prevent damage to the root system.
3. Dispose of roots, stones and other debris; store topsoil in piles within the work limits.
 - a. Obtain approval of Architect prior to establishing topsoil storage areas.
 - b. Grade and slope stockpiles for proper drainage and to prevent erosion.
 - c. Do not remove topsoil from the site.

3.02 EXISTING UTILITIES

- A. Information on the drawings relating to existing utility services and other structures is from the best sources presently available. All such information is furnished only for information and is not guaranteed. Excavate test pits as required to determine exact locations.
- B. Raise or lower existing catch basins, inlets, manholes and similar structures to accommodate new grade elevations at paved and lawn areas where indicated. Rework structures as required. Reuse existing catch basin, inlet and manhole frames and covers.

3.03 WASTE MATERIALS

- A. Stockpile, haul from site daily and legally dispose of waste materials and debris. Accumulation not permitted.
- B. On-site burning of combustible, cleared materials is not permitted.

3.04 CLEANING

- A. At completion of work, clean site within Contract limits and leave site clear, clean and free of rubbish and debris and suitable for site work operations.

3.05 REPLACEMENT OF MISCELLANEOUS ITEMS

- A. Replace with existing material previously removed and stored.

B. If damaged, repair to Architect's satisfaction or replace with new material.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work Included: Provide temporary and permanent erosion and sediment control items as required by governing agency, as required by permit, as indicated on drawings and as specified herein.
- B. Erosion Control on this project is subject to the requirements of Ohio EPA stormwater general permit OHC000003. All contractors and subcontractors performing work on the site are to sign the duty to inform and certification. Contractor will be responsible for any and all fines incurred by the owner due to failure to provide and or maintain the necessary erosion control measures on site.
- C. Contractor is to maintain a copy of the Stormwater Pollution Prevention Plan (SWPPP) and all required logs in the job trailer at all times for the duration of the job. All logs are to be updated as indicated on the plans.
- D. Provide additional erosion control for eco-lab construction within the stream corridor protection zone.

1.02 RELATED SECTIONS

- A. Earthwork: Section 31 30 00.
- B. Seeding: Section 32 92 19.

1.03 SUBMITTALS

- A. Submit material qualification tests and certificates of compliance in accordance with the requirements of the General Conditions and Section 01 33 23.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Topsoil: See Section 31 30 00.
- B. Hay or Straw Bales: Tightly bound bales of unrotted hay or straw locally available from recent cuttings. Bindings shall be rot resistant string or wire.
- C. Bale Anchors: 1/2" x 3' reinforcing rods or 2" x 2" x 3' wood stakes, 2 per bale.

- D. Filter Barrier Geotextile: Either woven or nonwoven construction and consist of polypropylene, polyethylene or polyamide fibers or polymeric filaments. Orient filaments or fibers into a stable network enabling them to retain their spacing relative to one another. Provide barrier ultraviolet stabilized and inert to chemicals found in soils.
- E. Filter Barrier Stakes: 2" x 2" x 3' wood stakes.
- F. Riprap Bedding: 1-1/2" stones with maximum of 5% passing No. 4 sieve.
- G. Graded Riprap Stone: Quarried stone of approximate dry density of 165 pounds per cubic foot and the following gradations:

Size - Inches (Square Openings)

| Type | Maximum | Average (1) | Minimum (2) |
|---------|---------|-------------|-------------|
| R-2 | 3 | 1-1/2 | 1 |
| R-3 | 6 | 3 | 2 |
| R-4 (3) | 12 | 6 | 3 |
| R-5 (3) | 18 | 9 | 5 |

- (1) "Average Size" is that size exceeded by at least 50% of the total weight of the stone placed.
- (2) Pieces smaller than minimum size shown shall not exceed 15% of the total weight of the stone placed.
- (3) 4" bedding layer required.

- H. Seed and Soil Supplements: Provide seed mixture with 20% by weight of perennial ryegrass, 30% red fescue and 50% Kentucky bluegrass. Provide pulverized agricultural limestone and commercial fertilizer 10-20-20 or approved substitute.
- I. Mulch: Unrotted straw free from weeds and course material or other approved product suitable for required application.
- J. Mulch Binder: Cutback or emulsified asphalt or synthetic binder similar to PETROSET, TERRATAK or AEROSPRAY.
- K. Jute Matting: Cloth or plain weave, undyed and unbleached single jute yarn, 47 to 49" wide, averaging approximately 1 pound per lineal yard, loosely twisted construction (burlap).
- L. Matting Staples: No. 8 plain wire, 6-10" long.
- M. Commercial Matting Products: ERISONET, HOLDGRO, WEEDCHECK, CURLEX. Product must cover minimum of 30% of soil surface.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Install temporary and permanent sediment control items prior to clearing and commencing earthwork or as soon as practical as sitework progresses.
- B. Install required permanent erosion and sediment items as soon as no damage or deterioration will result to those items due to construction activities.
- C. Five vernal pools/floodplain depressions will be excavated within the stream corridor protection zone, an area that is currently protected by silt fence.
 - 1. For work inside the stream corridor protection zone, install additional silt fence such that it rings the area of work, and is located between the area of work and the stream. This silt fence should then connect back up with the already installed silt fence upgradient of the pool.

3.02 STRAW BALE BARRIERS

- A. Place where indicated or otherwise required by grading operations to reduce erosion and minimize sediment content or runoff.
- B. Place bales in a single row, lengthwise along the contour, unless in a swale, with ends of adjacent bales tightly abutting.
- C. Orient bales so that bindings are around the sides rather than along top and bottom of bale.
- D. Entrench and backfill bales. Excavate 4" deep trench the width of the bale and the length of proposed barrier. After bales are staked and chinked, backfill against bales.
- E. Anchor each bale with two stakes or rebars driven through the bale. Drive first stake in each bale toward the previously staked bale to force bales together.
- F. Chink (fill by wedging) gaps between bales with straw to prevent water from flowing between bales. Scatter loose straw over area immediately uphill from barrier to increase barrier efficiency.
- G. Inspect barriers approximately every two days. Immediately repair or replace barriers found to be damaged or ineffective.
 - 1. Inspect immediately after rainfalls and daily during prolonged rainfall.
 - 2. Promptly attend to barriers showing signs of end runs or undercutting.
- H. Remove bales after upslope areas have been permanently stabilized.
- I. Inspect sediment deposits after each rainfall. Remove deposits when levels reach

approximately 1/2 the height of the bales.

- J. Dress to conform to existing grades, prepare and seed sediment deposits remaining after barrier is removed.

3.03 FILTER FABRIC BARRIERS

- A. Construct where indicated or otherwise required by grading operations to reduce sediment runoff.
- B. Provide height of barrier from 15" to 18".
- C. Provide barrier in continuous roll, cut to barrier length to avoid joints.
- D. Place stakes a maximum of 3' apart at the barrier location; driven securely into ground a minimum of 8".
- E. Excavate a trench approximately 4" wide and 4" deep along the line of stakes and upslope from the barrier.
- F. Staple filter material to wood stakes with wire staples (minimum 1/2" long). Extend 8" of fabric into trench. Do not staple filter material to existing trees.
- G. Backfill and compact trench with excavated material.
- H. If a filter is to be constructed across a ditch line or swale, provide barrier of sufficient length to eliminate end flow. Plan configuration shall resemble an arc or horseshoe with the ends oriented upslope.
- I. Remove filter barrier when upslope area has been permanently stabilized.
- J. Inspect filter barrier immediately after each rainfall and daily during prolonged rainfall. Immediately make required repairs.
- K. Remove and replace damaged or otherwise ineffective filter fabric.
- L. Inspect sediment deposits after each rainfall. Remove deposits when levels reach approximately 1/2 the height of the bales.
- M. Dress to conform to existing grades, prepare and seed sediment deposits remaining after barrier is removed.

3.04 RIPRAP PLACEMENT

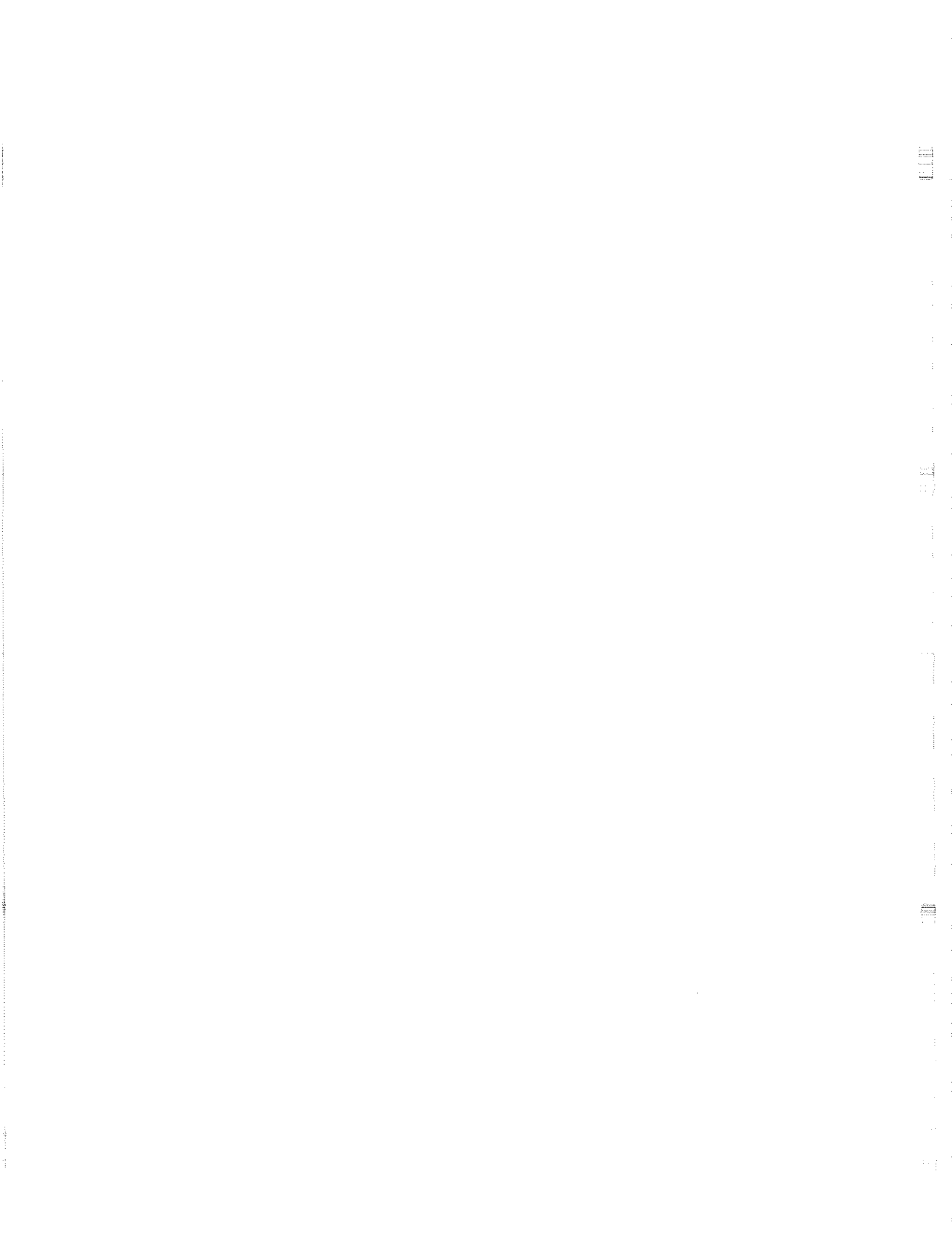
- A. Place riprap on filter fabric and bedding layer, where indicated, to produce a well graded mass of rock with minimum practical percentage of voids.
- B. Place riprap or bedding so that filter fabric is not damaged, punctured or misplaced.

3.05

MAINTENANCE

- A. Maintain erosion and sediment control items until final project acceptance. Repair breaches and replace deteriorated or missing items immediately upon discovery.
- B. Clean sedimentation basins and catch basins as required to maintain effectiveness or as otherwise directed.
- C. Removal: Remove temporary erosion control items as directed prior to project close-out.

END OF SECTION



SECTION 31 30 00

EARTHWORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Requirements of this section apply to all earthwork operations as shown and specified. Work includes:

1. Site grading and filling (embankment) to attain proposed grade elevations, profiles and contours.
2. Ecolab grading and filling to attain proposed grade elevations, profiles, and contours
2. Subgrade preparation for pavement, roadways, sidewalks and curbs.
3. Trench excavating and backfilling.
4. Providing granular bedding for water lines.
5. Removing surplus, debris and waste materials.
6. Field quality control testing and inspection.
7. Providing granular base for pavement, roadways, sidewalks, curbs and unit pavers.
8. Temporary erosion protection.

B. Related Work

1. Site preparation: Section 31 15 00.
2. Seeding: Section 32 92 19.
3. Asphalt Paving: Section 32 12 16.
4. Concrete Paving: Section 32 13 13.
5. Erosion and Sediment Control: Section 31 25 00.

C. A separate contract has been awarded for Testing and Inspection Services. Cooperate with and coordinate work of this Section with Testing and Inspection Laboratory. See Section 01 45 29, included herein for reference, for tests being performed and for additional coordination requirements.

1.02 SUBMITTALS

A. Submit inspection reports on fill material, subgrade, granular base, foundation excavations, and compaction operations.

1.03 QUALITY ASSURANCE

A. Comply with Section 31 00 00 requirements.

B. Perform earthwork in compliance with applicable requirements of governing

authorities.

- C. Materials and methods of construction: Comply with Ohio Department of Transportation (ODOT) Construction and Material Specifications, 2010 Edition and as specified.
- D. Testing and Inspection: Performed by a qualified independent testing laboratory, under the supervision of a registered professional engineer, specializing in soils engineering.
 - 1. Provide and pay for soils testing and inspection services during earthwork operations. Testing, inspection service, and Soils Engineer shall be acceptable to the Architect.
- E. Reference Standards
 - 1. ASTM: American Society for Testing and Materials.

1.04 PROJECT CONDITIONS

- A. Protect existing trees, plants, lawns and other features designated to remain as part of the work.
- B. Protect excavations by shoring, bracing, sheeting, underpinning or other methods, as required to prevent cave-ins or loose dirt from entering excavations. Barricade open excavations and post warning lights at work adjacent to public roadways. Conform to Occupational Safety and Health Administration (OSHA), Safety and Health Standards 29 CFR 1926, Subpart P "Excavations, Trenching and Shoring," and all local laws, ordinances and regulations.
- C. Promptly repair damages to adjacent facilities caused by earthwork operations. Cost of repair at responsible Contractor's expense.
- D. Promptly notify Architect of unexpected subsurface conditions. Discontinue work until notification to resume work is provided by the Architect.
- E. Protect bottoms of excavations and soil beneath and around foundations from frost and freezing.
- F. Grade around excavations to prevent surface water draining into excavated areas.
- G. Geotechnical Information: See Section 0 32 00.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All topsoil, fill and backfill material subject to testing and approval. Provide additional imported topsoil and fill as required to complete the work.

B. Backfill and Fill Materials

1. On-site fill: Clean soil or soil-rock mixture free of foreign materials, organic material and debris. Suitable excavated materials removed to accommodate new construction may be used for fill, subject to the Soil Engineer's approval.
2. Imported fill: Clean, natural sandy-clay subsoil or soil-rock mixture, free of foreign matter, organic material, and debris. Designate borrow area. Sample and test as directed by the Geotechnical Engineer.

C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand; capable of specified compaction, and free of organic soil, shale, lumps, or excessive amounts of clay and other foreign substances.

D. Pipe Bedding Material: Crushed stone meeting size No. 57 grading requirements of ASTM D448.

E. Drainage Fill: Washed, uniformly graded mixture of crushed stone, or crushed/uncrushed gravel, having the following gradation:

| Sieve Size | Total % Passing |
|------------|-----------------|
| 1" | 100 |
| 3/4" | 90 - 100 |
| 3/8" | 20 - 55 |
| No. 4 | 0 - 10 |
| No. 8 | 0 - 5 |

F. Topsoil: Sandy loam or loam soil as defined by USDA Soil Conservation Service, Soil Classification System. Free from admixture of subsoil, heavy clay, coarse sand, stones, plants, roots, sticks, and other foreign materials. 95% of topsoil shall pass a 2.0 mil sieve. Organic content shall be 4% to 12% of total dry weight.

1. If the quality or quantity of topsoil stored under Section 31 15 00 is insufficient to complete the work, provide imported topsoil. Obtain rights and pay all costs for imported topsoil material.
2. Proposed topsoil shall be acceptable to Architect and Soils Testing Firm.

G. Lean Concrete Fill: Minimum 1500 psi, ready mixed. See Section 03 30 00.

H. Erosion Control: See section 31 25 00

PART 3 EXECUTION

3.01 GENERAL

A. Examine areas and conditions under which work is to be performed. Consult the

records and drawings of adjacent work and of existing utilities for conditions which may affect the work under this Section.

- B. Establish extent of grading and excavation by area and elevation; designate and identify datum elevation and project engineering reference points. Set required lines, levels, and elevations.
- C. Do not cover or enclose work of this Section before obtaining required inspections, tests, approvals, and location recording.

3.02 EXISTING UTILITIES

- A. Before starting grading and excavating, establish the location and extent of underground utilities in the work area. Exercise care to protect existing utilities during earthwork operations. Perform excavation work near utilities by hand and provide necessary shoring, sheeting and supports as the work progresses.
 - 1. Locate utilities which require tie-in work before performing work on new utility extension. Verify location and depth of existing utility. Notify Architect of discrepancies in actual field verified inverts and elevations and those indicated on drawings. Do not proceed with utility line work until procedure directions have been obtained from Architect.
- B. Protect active utility services uncovered by excavation.
- C. Notify Architect when interference with existing utility is necessary.
- D. Replace utilities disturbed or destroyed with new materials of same size, quality and dimensions as directed by Architect, at Contractor's expense.
- E. Maintain or permit maintenance of existing overhead, surface, or sub-surface utilities encountered.
- F. Remove abandoned utility service lines from areas of excavation. Cap, plug or seal abandoned lines and identify termination points at grade level with markers.
- G. Accurately locate and record abandoned and active utility lines rerouted or extended on Project Record Documents.

3.03 SITE GRADING

- a. Grading: Grade surfaces to assure areas drain away from structures and to prevent ponding and pockets of surface drainage. Provide subgrade surfaces free from irregular surface changes and as follows:
 - 1. Subgrade surface shall be free of exposed boulders or stones exceeding 4" in greatest dimension in paved areas; 1" in lawn areas.
 - 3. Fill all areas of settlement to proper grade before subsequent construction.
 - 4. Planted areas: Allow for 6" average depth of topsoil at planted areas.
 - 5. Paved areas: Shape surface of subgrade areas to line, grade and

- cross-section indicated. Provide compacted subgrade suitable to receive paving base materials. Subgrade tolerance plus 1/2", minus 1".
6. Granular base: Grade subgrade surface smooth and even, free of voids to receive granular base materials. Provide compacted subgrade suitable to receive granular base materials. Tolerance 1" in 10'-0".
 7. Perform grading, within branch spread of existing trees to remain, by hand methods to elevations indicated. Cut roots cleanly to 3" depth below proposed finished grade. Coat cut roots with tree wound paint.

3.04 ECOLAB CONSTRUCTED WETLAND GRADING

General Construction Phasing Requirements

1. Clear and grub the site.
2. String the top 12 inches of topsoil from across the site and stockpile in an approved
 - a. NOTE: Spoils from previous site work have been disposed of in this area, so the top layer of soil may not be the native topsoil. The Professional Wetland Scientist (PWS) providing construction oversight services will evaluate the material being removed and direct stockpiling of appropriate soils for top-dressing the planting areas.
3. Complete mass earthwork, over-excavating 12 inches to allow for topsoil replacement.
4. Excavated material will be used to construct the berm to be located on the south side of the wetland.
5. Compact soil within the wetland basin using a sheep's-foot roller or other appropriate means to reduce soil porosity and ensure that the basin permeability will be sufficiently reduced to hold water.
6. Install water control structure per the Instructions provided on sheet, leaving all boards in place (these will be adjusted later by the PWS).
7. Re-spread 12 inches of stockpiled topsoil across the site to obtain finish grades as shown on the plans and complete fine grading, working to minimize compaction of this topsoil layer. Small irregularities are acceptable and even desirable to create a natural, heterogeneous wetland surface.
8. **NOTE: Planting phase is to be completed by volunteers in mid- to late May. All earthmoving activity is to be completed by May 20, 2011.**

3.04 EXCAVATING: GENERAL

- A. Excavate to limits shown on the Drawings or specified.
- B. Earth excavation shall include the satisfactory removal and disposal of all materials encountered regardless of the nature of the materials, the condition of the materials at the time they were excavated or the manner in which they were excavated, except materials classified as rock excavation.

C. Storage

1. Store material suitable for backfill adjacent to excavation within work limits shown.
2. Trim neatly, avoid overloading sides of excavation.
3. Do not place on roadways, sidewalks or private property.

D. Extra excavation: Excavate unsatisfactory soil materials extending below required elevations to depth as directed. Such extra excavation will be paid for under the unit price for removal and recompacting or removal and replacement work. Obtain Architect's written authorization before performing extra excavation work.

E. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevation or side dimensions without the specific direction of the Architect.

1. Elsewhere: Backfill and compact unauthorized excavations as specified for authorized excavations of the same classification, unless otherwise directed by the Architect.

F. Shore, sheet or brace excavations as required to maintain them secure; remove shoring as backfilling progresses, when banks are safe against caving.

3.05 EXCAVATING: TRENCH

A. General

1. Open cut excavations from surface. Under cuts are not permitted.
2. Maintain 5'-0" clear between trench and parallel building footing. When parallel trenches are required to be deeper than footing, maintain a clear distance at least 1-1/2 times the vertical distance below the bottom of the footing or 5'-0", whichever is greater.

B. Width: Limit to 2'-0" plus the pipe diameter. Maintain excavation walls as near vertical as practical. Provide cribbing and trench wall support required.

C. Depth

1. Excavate to depths indicated. Provide a minimum of 4'-0" of cover where depths are not indicated.
2. Existing ground elevations shown on the Drawings represent approximated grades at the time the Drawings were prepared.

D. Bottoming: Provide trench bottom for ODOT Item 603.04 Class B pipe bedding.

E. Tunneling: Not permitted except where shown on the drawings specified herein or authorized in writing by Architect.

3.06 ROCK EXCAVATION

- A. Rock excavation: All excavation is unclassified. No additional payment will be made for rock excavation.

3.07 DRAINAGE

- A. Prevent surface water and subsurface or groundwater from flowing into the excavation.
- B. Do not allow water to accumulate in excavations. Remove water from excavations. Provide sumps, pumps, suction and discharge lines and other dewatering system components necessary to convey the water away from the excavations.
- C. All excavation shall be performed under workable dry conditions; prior to any excavation below groundwater level, the dewatering system as shall be installed and placed in operation in order to lower water level below the excavation bottom.
- D. Provide dewatering devices filtered to prevent the removal of fines from the soil.

3.08 PIPE BEDDING

- A. General: Bed all water and sewer lines, except lines requiring concrete encasement. Use bedding material specified herein.
 - 1. Bed pipe in rock excavation in granular backfill material specified herein.
- B. Limits: ODOT Item 603.04, Class B.
- C. Protection: Carefully place bedding by hand to avoid damage to pipe.
- D. Compaction: Comply with requirements specified herein below.

3.09 FILLING AND BACKFILLING

- A. This Article applies to all filling (embankment) and backfilling operations. Additional requirements for trench backfilling are listed in Article 3.11.
- B. Obtain inspection and approval of subgrade surfaces by Soils Engineer before filling operations. Scarify, dry and compact soft and wet areas; remove and replace unsuitable subgrade materials with compacted fill material as directed.
- C. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below:
 - 1. In all excavations: Excavated or borrow backfill materials.
 - 2. Against face of structure at footing drainage pipes: Drainage fill.
 - 3. Directly under building slabs: Building porous fill; 6" thick unless otherwise indicated.

4. Under walks, steps and pavements: Subbase material.
 5. Trenches Containing Underground Pipes/Ducts/Etc: Granular base; extend to minimum 6" above top of duct.
- D. Preparation for Backfill: Backfill excavations as promptly as the Work permits, but not until completion of the following:
1. Acceptance by Owner of construction below finished grade, including where applicable, dampproofing, waterproofing and perimeter insulation.
 2. Inspection, testing, approval and recording locations of underground utilities.
 3. Removal of concrete formwork.
 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off sheet piling driven below bottom of structures to prevent settlement of the structure or utilities, or leave in place if required.
 5. Removal of trash and debris.
 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
 7. Do not backfill against walls until slab on grade and first floor is complete and concrete has attained its design strength.
- E. Placement and Compaction
1. Place backfill and fill materials in layers not more than 8" in loose depth.
 2. Lift thickness requirements may be modified by Soils Engineer to suit equipment and materials or other conditions when required to assure satisfactory compaction.
 3. Moisture-condition fill material by aerating or watering and thoroughly mix materials to obtain moisture content permitting proper compaction.
 4. Place and compact each layer of fill to indicated density before placing additional fill material. Repeat filling until proposed grade is attained.
 5. Suspend fill operations when satisfactory compaction results cannot be obtained because of environmental or other unsatisfactory site condition. Do not use muddy or frozen fill materials. Do not place fill material on muddy or frozen subgrade surfaces.
 6. Maintain surface conditions which permit adequate drainage of rain water and prevent ponding of surface water in pockets. When fill placement is interrupted by rain, remove wet surface materials or aerate and permit to dry before placing additional fill material.
 7. Use hand tampers or vibrating compactors at foundation walls. Do not use rolling equipment adjacent to foundation walls.

3.10 TRENCH BACKFILL

- A. Carefully deposit to depth of 12 inches above the top of pipe by methods which will prevent damage or movement of pipe. Deposit backfill in the pipe zone by hand (shovel) for pipe 18 inches and smaller.
- B. Concrete Encasement

1. Trenches Below Footings: Encase pipe for full width and height of trench, extending 12" beyond each edge of footing.
 2. Trenches where top of pipes are within 2' of driving or parking surfaces: Top of encasement to be minimum 12" above top of pipe.
- C. Backfill only after exact locations and depths of lines and equipment have been recorded and tests and inspections have been completed.
- D. Provide clay bulkheads, minimum 3' long, across full width of pipe trenches at 100' intervals, to impede natural flow of groundwater. Extend bulkheads to 1' above top of pipe.

3.12 COMPACTION

- A. Provide compaction control for all fill and backfill. Field compaction tests and related laboratory analysis shall be performed by a qualified independent laboratory, a member of the American Society for Testing and Materials, under the supervision of a registered Professional Engineer specializing in soils engineering. Soils proposed for fill and backfill shall be analyzed by the Soils Engineer.
- B. Perform all compaction work in accordance with ASTM D698 Standard Proctor Method. Percentages of compaction are as follows:
1. Vehicle Pavement and Roadways: Compact top 12" of subgrade and each layer of fill or backfill to 98% of maximum dry density.
 2. Pedestrian Walks: Compact top 6" of subgrade and each layer of fill or backfill to 95% of maximum dry density.
 - a. Exercise care to obtain proper compaction under edges of walks that abut walls, stairs, curbs, adjacent slabs and other structures.
 3. Lawns and Unpaved Areas: Compact top 6" of subgrade and each layer of fill or backfill material to 90% of maximum dry density.
 4. Compact fill and backfill material for mechanical, plumbing and electrical trenches within building and pavement areas and extending minimum 5'-0" beyond building and pavement areas to 100% of maximum dry density.
- C. Puddling or jetting of fill and backfill materials as a compaction method is not permitted.
- D. Provide adequate equipment to achieve consistent and uniform compaction of fill and backfill materials.
- E. In cut areas, the subgrade surface must meet density criteria equivalent to those specified above for fill layers under various area classifications.
- F. Maintain moisture content of materials, during compaction operations within required moisture range to obtain indicated compaction density.
1. Where the subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to the surface of subgrade, or layer of soil material, to prevent free water appearing on the surface during

- or subsequent to compaction operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - a. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until the moisture content is reduced to a satisfactory value, as determined by moisture-density relation tests.

G. Proof Rolling

1. After all topsoil has been removed, those areas receiving fill and those areas that have been cut shall be proof rolled with a loaded tandem axel dump truck or similar heavy rubber tired vehicle with a minimum axial load greater than nine (9) tons.
2. Unstable material evidenced by the rolling shall be stabilized or removed and replaced with a material complying with backfill and fill material, and compacted accordingly.

3.13 FINISH GRADING

A. General

1. Finish grade all disturbed areas to blend with surface of adjacent undisturbed areas.
2. Confine work to top 6 inches of backfill except in Ecolab where 12" of topsoil will be placed.
3. Roll to proper compaction.

B. Lawn Areas

1. Use stockpile of topsoil previously stored.
2. If supply is not sufficient, obtain additional topsoil from outside source at Contractor's expense.

C. Placement

1. Do not use frozen or muddy topsoil. Place during dry weather.
2. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of subgrades.
3. Remove stones, roots, weeds, and debris while spreading topsoil materials. Provide surfaces suitable for soil preparation provided under lawn work.
4. At trees designated to remain, manually install topsoil not exceeding 2" depth under tree canopies. Avoid damage to root system.

3.14 MAINTENANCE

- A. Protect finish graded areas from traffic and erosion. Keep free of trash and debris. Repair and reestablish grades in settled, eroded and damaged areas.

B. Where completed areas are disturbed by construction operations or adverse weather, scarify surface, reshape and compact to required density.

C. Erosion Control: see section 31 25 00

3.15 WASTE MATERIALS

A. Stockpile, haul from site and legally dispose of waste materials, including excess excavated materials, rock, trash and debris.

B. Maintain disposal route clear, clean and free of debris.

3.16 TESTING

A. Cooperate with testing laboratory during earthwork operations. As a reference, the following tests will be performed.

B. Contractor shall cooperate with, provide access to the work, obtain samples, and assist testing agency and their representatives in execution of their functions.

C. Fill material and granular base materials: Test proposed materials to verify suitability for use, gradation of materials, moisture density relation by ASTM D698 Standard Proctor Method and percent of organic materials.

D. Subgrade surfaces: Based on visual examination at the site, provide bearing tests as required to verify subgrade surfaces are adequate and meet or exceed design bearing values.

E. Compaction operations: Provide full time inspection and testing during building area filling and compaction operations. Test each lift of fill to verify compaction meets specified requirements. Provide periodic inspection and testing during site area filling and compaction operations.

F. When, during progress of work, field tests indicate that installed compacted materials do not meet specified requirements, provide additional compaction until specified density is achieved, or remove and replace defective materials with new compacted materials as directed by the Architect. Cost of additional labor, materials and testing to attain specified density at Contractor's expense.

G. Contractor may, at his own option and for his own purpose, make other tests and inspections at the Contractor's expense.

H. Employment of testing agency shall not relieve the Contractor of his sole responsibility to furnish materials and construction in full compliance with the Contract Documents.

END OF SECTION

