

DIVISION 2 - SITE WORK

02000 - EROSION AND SEDIMENT CONTROL

As identified in the section Program Information/General Requirements, Basic Design Requirements and in Division 1 - General Requirements, Section 01500 - Construction Facilities and Temporary Controls, the A/E must include temporary and permanent erosion and sediment control measures as part of the construction specifications. The contractor is required to implement these measures, to inspect for control effectiveness and immediately to correct any damaged or deficient control devices. In general, the erosion and sediment control measures must comply with the City of Minneapolis Erosion Control, the Ramsey County Erosion and Sediment Control Handbook and the City of Duluth Erosion Control Requirements as applicable. Specifically, these measures will include, but are not limited to, silt fences, storm inlet protection, entry/exit provisions to minimize tracking, and stabilization of exposed soils as identified in Division 1 - General Requirements. Any storm water discharge from a construction site must be visibly free of sediment and only contain rainwater. Also refer to Division 15 - Mechanical, Section 15250 - Mechanical Insulation.

02050 - DEMOLITION

1. Demolition of Existing Structures: Demolition of existing structures shall be included in the A/E's work. Demolition shall include the following:

1.1. Vermin Eradication

1.1.1. Buildings to be razed, or partially razed, shall be treated with a pesticide(s) to ensure that the building(s) is free of vermin (rodents, insects).

1.1.2. A pest control operator that is licensed by the Minnesota Department of Agriculture shall apply pesticide.

1.1.3. All pesticides shall be EPA-registered and applied according to the manufacturer's recommendations.

1.1.4. The Environmental Hygiene Officer (EHO) at the Department of Environmental Health and Safety (DEHS) shall be notified at least two weeks before application of any pesticide.

1.1.5. Treatment shall be done at least one week before razing the building(s).

1.1.6. After the initial treatment, the EHO and the pest control operator shall arrange a date and time to do a joint inspection of the building(s) to

be razed. Together, they shall certify that the pesticide treatment was effective and that the building is vermin-free.

1.1.7. If vermin are found during the joint inspection, the building(s) shall be treated again. Once treated again, the EHO shall certify that the building(s) are vermin free before razing.

1.1.8. A record of certificate of pesticide application shall be submitted to the EHO. The application shall note the pesticide(s) used and quantity, method of application, location of application, targeted vermin, and pre-treatment and post-treatment inspection results. The EHO shall approve and return the certificate to the contractor for inclusion in the final closeout documents. Refer to Division 1, Section 01700 - Contract Closeout.

1.1.9. Refer to Appendix U - Pest and Insect Control for more information.

1.2. To facilitate landscaping, all parts of the building shall be razed to 3 feet below grade. Basement floors shall be broken up to facilitate drainage. All razed material shall be removed from university property. The A/E shall confirm with the owner's representative if building foundations and floors can be abandoned in place or whether complete demolition is required.

1.3. Minimize dust floatation off the job site by a water application or other control measures as listed in Appendix B - Dust, Contaminant, Odor and Fungal Control Measures. No visible emissions from the job site are allowed as defined by MN Rules 7011.0150. Coordinate water source with the university.

1.4. Permits

1.4.1. The university shall pay for and obtain a University of Minnesota Demolition Permit.

1.4.2. The contractor shall pay for and obtain a demolition permit from the Minnesota Pollution Control Agency (MPCA). The MPCA requires a demolition permit of existing structures regardless if asbestos is present. Please contact DEHS at least 30 days before expected start of demolition to allow time for processing the permit. At a minimum, the permit must be submitted to the MPCA at least 10 working days prior to starting demolition.

1.4.3. The contractor shall pay for and submit a Notification of Intent to Perform a Demolition to the Hennepin County Department of Environmental Services 10 working days prior to start of demolition.

1.5. Utility Disconnects

1.5.1. Fire Alarm: Coordinate with the owner's representative.

1.5.2. Electric: Coordinate with the owner's representative and University Energy Management.

1.5.3. Steam: Coordinate with the owner's representative and University Energy Management.

1.5.4. Domestic Water: Water service shall be capped after service valve in manhole if the city allows reuse. If not, the city shall remove service at the main. The university shall be responsible for removing manhole ring and cover per city specifications.

1.5.5. Well Abandonment: Coordinate with the owner's representative and DEHS.

1.5.6. Storm and Sanitary Sewer: The sanitary sewer shall be capped at a location that the city determines, as well as dictated by the storm and sanitary sewer separation plan.

1.5.7. Fire Protection Water: Coordinate with the owner's representative.

1.5.8. Chilled Water: Coordinate with the owner's representative and University Energy Management.

1.5.9. Natural Gas: Gas service to university property shall be cut and capped at the street as close to the main as possible by the gas company that has jurisdiction.

1.5.10. Telephone/Telecommunications: Coordinate with the owner's representative.

1.5.11. BSAC: Coordinate with the owner's representative.

1.5.12. Meters shall be returned to the respective utility companies.

1.6. Miscellaneous Removals: Coordinate with the owner's representative.

- A. Useful items as requested by Facilities Management Zone Office
- B. Key cores
- C. Building cornerstone/time capsule
- D. Potable water, lab water, industrial water, DI water, RO water, natural gas, lab air, lab vacuum and all medical gases
- E. Sale of furniture

F. Sale of valuable building fixtures and equipment

1.7. Pre-Demolition Considerations

- A. Vibration monitoring: Survey adjacent buildings for equipment that is vibration-sensitive
- B. Condition survey of adjacent buildings/tunnels
- C. Additional protection for adjacent fresh air intakes
- D. Traffic routing and staging for dump trucks
- E. Dust control/water hydrants/sufficient water pressure
- F. Protection of adjacent building structures
- G. Method of detaching demolished building from remaining building

1.8. Hazardous Materials: The demolition specifications shall state that the handling and removal of all hazardous materials shall be conducted in accordance with Appendix K - Hazardous Materials Procedures.

1.9. Demolition Record Drawings: The contractor shall submit a record drawing to the university that indicates the below grade elements left in place. Refer to Division 1, Section 01700 - Contract Closeout, Submittals.

1.10. Interior Demolition

1.10.1. Areas occupied by the university during demolition shall be protected from dust and noise by temporary dust-tight and sound-retardant partitions. Refer to Appendix B - Dust, Contaminants, Odors and Fungal Control Measures.

1.10.2. Demolition operations such as pneumatic hammering, sledging and drilling shall be scheduled at times when the building is not normally occupied. Consult with the owner's representative to establish a schedule to be included in the project manual.

1.11. Maintenance of Services and Access: Due to the fact that university research projects are often conducted over many years, it is critical that demolition of remodeling projects does not interrupt the building utilities services. The A/E shall specify the university operations, utility services, and egress and ingress requirements that must remain operational during the demolition. These services may include plumbing, heating, ventilation, lighting, power, communication, elevator systems, and building ingress and egress.

1.12. Removal and Disposal of Debris: Debris resulting from demolition in occupied areas shall be removed daily. No debris shall be disposed of in university facilities, containers or on university property.

02115 - SELECTIVE CLEARING

1. Tree and Plant Protection: Refer to Division 1, Section 01530 - Barriers and Enclosures for tree protection requirements.

2. Tree Removal: The university shall designate which trees and shrubs shall be preserved, transplanted or removed. Coordinate with the owner's representative and University Landcare prior to the end of the Schematic Design phase.

3. Removal of Organic Soil: Organic soil and sod shall be stripped from areas to be occupied by buildings, walks, drives and other paved areas. All unused material shall be removed from university property as verified with the owner's representative and University Landcare. Refer to Program Information/General Requirements, 6. Site Planning for more information.

02200 - EARTHWORK

For extensive excavation adjacent to existing structures, utilities, walks, trees or streets, the contractor shall submit design calculations and details that are certified by a professional engineer. The engineer shall be registered in the state of Minnesota, and experienced with excavation support systems in relation to earth retention.

02210 - GRADING

1. Specialty Grading

1.1. It is the experience at the university that construction activities or the previous use of a site may result in drainage problems. For example, subsoil under plantings and lawn on a former parking lot can become so compacted that the water does not drain through the soil. The A/E shall specify how to prepare the subsoil so water drains and does not perch below the topsoil.

1.2. Before topsoil is placed in landscaped areas, scarify the upper 18 inches of the sub-grade. Refer to Section 02900, item 1. Topsoil for material requirements.

1.3. The university shall retain an independent testing agency to conduct percolation tests to verify that water drains from the soil. Specifications for the tests are as follows: Drill a 4-inch diameter hole to a depth of 24 inches; pour 6 inches of gravel into the hole and cover it with water. Allow the water to drain for one hour and refill the entire hole with water. To pass the test, the water must drain out at the rate of 1 inch per hour or faster. If hardpan zones are encountered while drilling, a second test using a 4-inch diameter tube shall be conducted to verify vertical drainage.

1.4. Slopes for the Duluth Campus

1.4.1. PROHIBITED: Sudden changes in elevation between new construction and existing grade.

1.4.2. A change in grade must be gradual so it does not cause a stumbling hazard or create depth perception problems by allowing mowers to "high center" over the connection point.

1.4.3. When possible, areas behind the curb of roads and parking lots shall be slightly convex (5 feet back from curve) to reduce gouging by snow removal equipment.

2. Finish Grading for Landscaped Areas: Specify 6-inch depth of topsoil for lawn areas and 18-inch depth for planting beds. To provide a transition layer that facilitates drainage, blend the first 2 inches of topsoil into the rough sub-grade material by rototilling. To avoid compaction of the soil under lawns and plantings, perform finish grading and planting work when soil is dry.

3. Removal of Excess Material: All excess material shall become the contractor's property. Excess material shall be removed from university property.

02220 - EXCAVATING, BACKFILLING AND COMPACTING

1. Soil Testing in Excavations: The university shall retain an independent testing agency to verify that the foundation soil meets the design bearing capacity as determined by the soil borings. If the soil does not meet the required bearing capacity, the independent testing agency shall make recommendations for the corrective work.

2. Excavating

2.1. Specifications shall include all excavation work regarding construction, including the following related work:

- A. Excavation of unsuitable soils
- B. De-watering as required for dry excavations
- C. Protection of excavations from freezing
- D. Provision for surface runoff
- E. Erosion control

2.2. Tunnels under walkways or drives or in a location where a walk or drive is probable in the future shall be designed to withstand normal traffic loads. Consider the following: snow removal by loaded sanding trucks, traffic from full size front-end loaders and traffic from construction in the future.

2.3. A form from Appendix LL - University Utility Register must be submitted prior to burying a tunnel.

3. Blasting: Excavation by blasting shall be permitted only if the university specifically authorizes it in writing. Blasting also must be preceded by a geological report by an independent consultant that the university hires. The A/E shall specify maximum allowable noise and vibration levels. The contractor shall submit a plan that describes how the specified noise and vibration levels will be maintained.

4. Backfill: The A/E shall specify placement of fill and backfill for construction, including the following related work and requirements:

4.1. Fill types placed below ground-supported slabs, foundations, paved areas and exterior fill against foundation walls shall be based on the recommendations in the geotechnical report.

4.2. Debris shall be removed prior to filling.

4.3. Walls and other unsupported structures shall be braced during fill operations.

4.4. If there is a bentonite component in the waterproofing assembly, then the backfill shall be material that can be compacted in 12-inch minimum lifts to a proctor density of 98 percent or better.

5. Compacting: The A/E shall specify compaction requirements based on the geotechnical report.

5.1. For lawns, planting areas and other unimproved surface areas: compaction shall be a minimum of 80 percent of maximum density and a maximum of 85 percent maximum density.

6. Compaction Tests: The university shall retain an independent testing agency to conduct compaction tests. The university shall pay for the original tests. Areas that do not meet compaction requirements shall be compacted and tested again until specifications are met. The contractor may be required to pay the cost of re-compaction, as well as revisit the areas.

7. Recycled Aggregate Base: Recycled aggregate base, excluding bituminous is acceptable for university projects.

02500 - PAVING AND SURFACING

Refer to Division 3, Section 03300 - Cast-in-Place Concrete for material standards applicable to concrete walks, drives and curbs.

02515 - UNIT PAVERS

Verify material and location of any proposed unit paver surfaces with the owner's representative and University Landcare prior to the end of the Schematic Design phase.

02574 - BITUMINOUS PAVING

- 1. PROHIBITED:** Due to lack of durability, bituminous surface for walkways.
2. Bituminous surface on roadways, driveways and parking areas shall be a minimum thickness of 3 inches. The A/E shall consult with a civil engineer to design and specify actual lift thickness for pavement and base. The lift thickness shall be based upon projected vehicle traffic, and in accordance with MN DOT Standard Specifications for Construction.
3. University of Minnesota-Duluth allows for bituminous sidewalks in low-visibility, non-academic areas such as around sports fields, recreational areas, campus parking lots in outlying areas and back entrances/fire lanes for auxiliary buildings. Any bituminous surface used for a sidewalk shall be built to low-volume roadway specifications.

02575 - SIDEWALKS (LINK TO UNIVERSAL ACCESS DESIGN)

(REFERENCE/HAVE LINK TO UNIVERSITY EXTERIOR STANDARDS ALSO)

- 1. PROHIBITED:** Trees and tree grates within sidewalks.
2. Design of sidewalk width and location shall be based on expected pedestrian volume and circulation routes. Adhere to the following guidelines:
 - 2.1. Sidewalks shall be a minimum clear width of 7 feet and a maximum width of 12 feet.
 - 2.2. Include angled or radius transitions at all sidewalk intersections of 120 degrees or less.
 - 2.3. Sidewalks shall run parallel to streets and driveways, except at building entrances.
 - 2.4. Sidewalks shall be adjacent to curbs without a grass boulevard. The sidewalks also shall have a clear width of 7 feet that is unencumbered by signs, light poles and other obstructions. Review sidewalk alignment with University Landcare.
 - 2.5. Replacement sidewalks shall match adjacent sidewalks in width and texture.
 - 2.6. Concrete sidewalks shall be non-reinforced and a minimum of 5 inches thick.

2.7. The City of Minneapolis Public Works Department must approve sidewalk design within Minneapolis street right of way. The contractor must notify the Public Works staff before pouring concrete where street sign collars will be.

3. Sidewalks on the Duluth Campus

3.1. PROHIBITED: Eight-foot sidewalks that are scored into 4-foot squares.

3.2. Each sidewalk layout shall address the following:

3.2.1. PROHIBITED: Placing a sidewalk where it will direct pedestrians through a safety hazard.

3.2.2. Provide a safe route of travel to and from the core building, which may not be the shortest distance to the main entrance.

3.2.3. Maintain accessibility for people with disabilities when possible.

3.2.4. Consider that most people head to the nearest door from where they park or enter the campus when determining layout.

3.2.5. Consider the trade off between aesthetics and green space vs. the quickest and shortest routes.

3.2.6. Consider how the project will affect traffic flow between buildings, fields, lots and off-campus areas.

3.3. Sidewalks shall have a standard surface (brushed or tined) and a standard color for the concrete.

3.4. The choice of color for the sealant shall match the color of the adjacent walkway.

3.5. Standard sidewalks shall be 8 feet wide with 8-foot square slabs when possible.

3.6. In high traffic areas, a 2-foot section of Grassy Paver or approved equal shall be installed along the edge of the sidewalk.

3.7. Exterior stairs should be avoided if possible. If installed, seriously consider heating the stairs.

3.8. All connections to parking lots and streets shall have curb cuts for disabled people.

3.9. No parking shall be allowed within 20 feet of a crosswalk, or pedestrian bump outs shall be installed to protect pedestrian sight lines around parked or stopped vehicles.

3.10. An accessible route (1:20 slope maximum/1:50 cross slope) shall be provided between the street, parking lot and main entrance.

3.11. No light posts, hydrants, manholes, curb boxes, electrical boxes or signposts shall be located closer than 3 feet (5 feet preferred) of a sidewalk.

02710 - SUBDRAINAGE SYSTEMS

1. Foundations

1.1. Install piping for drainage at perimeter footings and under the lowest floor if the soil investigation report indicates that it is necessary.

1.2. Specify the components of the drain pipe system.

1.3. DEHS shall confirm discharge requirements with appropriate regulatory agencies.

02900 - LANDSCAPING

1. Topsoil: It is the experience at the university that construction activities or the previous use of a site may result in drainage problems. For example, subsoil under plantings and lawn on a former parking lot can become so compacted that the water does not drain through the soil. The A/E shall specify how to prepare the subsoil so water drains and does not perch below the topsoil. Refer to Section 02210 - Grading for specific sub-grade preparation requirements.

1.1. Soil in a non-irrigated area is classified as loam soil. It has the following composition:

Sieve size or material	% passing through sieve
#4 sieve	100
#10 sieve	80-90
#200 sieve	40-60
silt*	10-40
clay*	5-20
organic matter	3-10

1.2. Soil in an irrigated area is classified as sandy loam soil. It has the following composition:

Sieve size or material	% passing through sieve
#4 sieve	100
#10 sieve	80-90
#200 sieve	15-25
silt*	10-20
clay*	5-10
organic matter	3-10

* Silt:Clay ratio shall be 2:1 or less

1.3. Refer to Section 02210 - Grading for topsoil depth and placement requirements.

1.4. The university must test the topsoil to ensure proper pH, soil fertility and gradation. The contractor assumes the risk of topsoil replacement or amendment if topsoil is placed prior to test results. Topsoil pH shall be no lower than 5.5 and no higher than 7.5, with 6 to 6.5 preferred. The owner's representative shall coordinate testing with University Landcare.

1.5. Remove all undesirable plant material in areas to receive sod, seeding or planting. Provide the required amount of topsoil as indicated in Section 02210 - Grading and place as indicated. Make sure topsoil to receive sod in lawn areas is smooth and uniform to grade, as well as free of rocks, sticks, roots, rubble and other debris.

1.6. The maximum lead content in the soil shall not exceed 400 parts/millions for non-residential and non-childcare facilities. The maximum lead content in topsoil for residential and childcare facilities shall not exceed 100 parts/million. The university shall retain an independent testing agency to test the topsoil for lead content.

1.7. Landscaping design for parking facilities shall consider CPTED recommendations. An irrigation system is required for landscaped areas. Toro equipment must be used per university protocol. Refer to Section 02900, item 5. Automatic Irrigation for system requirements.

2. Lawns, Trees, and Shrubs

2.1. PROHIBITED: The university will not accept trees that are planted too deep.

2.2. All plant material shall be from nursery stock and shall meet the latest edition of American Standard for Nursery Stock of the American Association of Nurserymen, Inc. regarding size, grade and quality. To meet the university's commitment to provide a selection of plant material on campus for academic purposes, no substitutions of specified plant material sizes, grades, species, qualities or forms shall be made without the written permission from the owner's representative.

2.3. Plant trees and shrubs with the root flare of the plant at grade level. The radius of the tree pit shall be a minimum of 12 inches larger than the radius of the tree ball. After placing in planting pit, remove the material around the ball, as well as the burlap, including the burlap, twine and wire from the upper one-third of the ball. Remove soil from the top of the root ball as needed to expose root flare.

2.4. Lay sod so that adjacent strips butt tightly with no space between strips. Stagger strips. Areas with sod shall match the grade of adjoining turf, sidewalks, curbs and/or seeded areas. Immediately after sod has been laid, irrigate it thoroughly. The areas with sod shall be substantially complete when the sod is thoroughly knitted, which is determined when a sod strip does not rise from the soil when grasped by the grass blades and lifted.

2.5. The contractor shall be responsible for all maintenance until the owner's representative accepts responsibility. Maintenance shall begin immediately after each plant is planted and shall continue until installation of all planting is complete, inspection has been made and planting is accepted exclusive of the guarantee. Maintenance shall include watering, weeding, mowing, mulching, pruning, straightening, resetting plants to proper grade or upright positions and other necessary operations.

3. Landscape Mulch and Edging

3.1. PROHIBITED: Using weed barrier fabric in planting beds.

3.2. Apply shredded hardwood mulch 4 inches deep on planting beds to discourage weed growth.

3.3. Limit the use of gravel or rock to areas without plants.

3.4. For landscape edging, use heavy gauge steel that is a minimum of 1/8-inch thick with an interlocking metal stake system.

4. Site Furniture

4.1. To provide continuity throughout the campus, benches, litter receptacles, ash urns and other site furniture shall be purchased through University Landcare. The A/E shall indicate placement and quantity of furniture in the contract documents. The contractor shall install the owner-supplied furniture. The owner's representative and University Landcare must approve any deviation from University Site Furniture standards.

4.2. Bike Racks: To provide continuity throughout the campus, provide Dero Racks, Inc., Swerve model bike racks or university-approved equal. Coordinate quantity and location of bike racks with the owner's representative, University Landcare, and Parking and Transportation Services.

4.3. Refer to Division 16, Section 16520 - Exterior Luminaries for light fixture and standard requirements.

5. Automatic Irrigation

5.1. PROHIBITED: Subsurface watering because of the inability to ensure that the components are operating correctly.

5.2. All landscaped areas, including parking facilities, shall have an automatic, aboveground irrigation system.

5.3. All valves, controllers and heads shall be manufactured by the Toro Co. Exception: Specify Hunter PGP heads in lieu of Toro 700 series heads. In addition, the systems shall meet the following requirements:

5.3.1. PROHIBITED: Multi-strand wire.

5.3.2. Wires shall be minimum 14-gauge solid-copper.

5.3.3. The clock shall be Toro Vision II, and mounted on the exterior of the building.

5.3.4. Specify exterior shut-off adjacent to the building for main supply.

5.3.5. Specify 2-inch water supply and an approved back-flow prevention device for system expansion in the future.

5.3.6. The system shall include a rain sensor, which must be exposed to weather to be effective.

5.3.7. Specify quick-couplers and keys for hand watering. Verify quantity and location with the owner's representative and University Landcare.

5.3.8. Specify isolation valves for large systems. Verify quantity and location with the owner's representative and University Landcare.

5.3.9. Minneapolis campus systems shall include a deduct meter. Coordinate with the owner's representative, University Landcare and Minneapolis Water Department.

5.4. The contractor shall submit a hard copy and AutoCAD compatible, digital As Built Plan upon completion of the project. The contractor shall include one fall blowout and one spring start-up in the one-year warranty. Refer to Division 1, Section 01700 - Contract Closeout: Submittals.

6. Final Acceptance Process: Coordinate the following procedure with the General and Supplementary Conditions and with Division 1. Include the following procedure for the final acceptance process of the lawn and planting areas in the contract documents.

- 6.1. The contractor shall complete the work, and submit a written request for a walkthrough.
- 6.2. The A/E shall walk through and develop a punch list. University Landcare is invited to attend.
- 6.3. The contractor shall complete the punch list, care for plants as necessary and request a final walkthrough.
- 6.4. The A/E and University Landcare shall conduct a final walkthrough.
- 6.5. If the walkthrough is accepted, the A/E shall issue a Certificate of Substantial Completion. At this time, University Landcare takes over care of lawns and plantings.

End of Division 2 - Site Work
University of Minnesota Facilities Management
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