

Division 13 00 50 – Landcare Requirements

GENERAL

1. The intent of this section is to inform the AE about specific requirements that are to be incorporated into the contract documents to provide direction and set expectations for the contractor as they mobilize on a project site to begin construction. In many cases the contractor has not had direction on how to protect the exterior space in and around a construction site. This often results in damage to and/or destruction of important elements in the surrounding outdoor environment.
2. Where “Landcare” is mentioned it will have different contact points depending on the campus/location the work is taking place on. For the Twin City Campuses, this function resides in Facilities Management Landcare. For Crookston it resides in Facilities and Operations. For Morris it resides in Plant Services and Master Planning. For Duluth it resides in Facilities Management – Grounds (Landscape) or Engineering Services (Hardscape). In all cases “Landcare” shall refer to the specific department/group/etc. that is responsible for the care and maintenance of the exterior grounds on that campus. The AE shall work with the Project Manager and the appropriate “Landcare” group to determine which requirements, listed below, pertain to the campus/location where the project will occur. Some requirements will vary depending in the facility location and the “Landcare” group that is charge of those facilities.
3. A/E of record shall insure that at a minimum the following requirements are fully incorporated into the project design and Contract Documents:

A. CONSTRUCTION STAGING & TREE PROTECTION

1. Contact Landcare at least two weeks prior to the start of construction to verify staging and tree protection requirements. Meet on-site with Landcare during tree protection installation.
2. All landscape elements shall be protected from damage unless noted and approved by Landcare.
3. Prevention of soil compaction: Apply an 8 – 12” layer of wood mulch in staging areas to minimize soil compaction from vehicles, equipment, and other construction activities. Re-apply mulch as needed for longer duration projects. For short duration staging or frequently changing equipment access use TrakMat sheets or a double layer of ¾” plywood under entirety of equipment. Upon project completion, remove accumulated mulch and restore site to pre-project conditions. Landcare shall inspect and approve restoration.
4. Irrigation protection: If construction activities will impact irrigation systems, notify Landcare to coordinate irrigation outage. Cut and cap irrigation mainlines outside the limits of work to prevent debris from entering piping. If irrigation lateral line or heads are encountered during construction, cut or pull pipe out of the way, and notify Landcare. Upon project completion, restore irrigation according to University Standards. Landcare shall inspect and approve of repairs.
5. Tree protection: Adherence to the below tree protection requirements will help preserve the historical aesthetic of campus, maximize the ecological benefits of campus trees, and demonstrate commitment and best management practices (BMP) to academic partners.
 - 5.1. Tree protection requirements should be indicated on project drawings. Specific drawing sheets for tree protection or tree removals may be required. Verify requirement with Landcare.
 - 5.2. Tree protection for pre-construction:

- 5.2.1. Landcare shall designate which trees to preserve, transplant, or remove.
- 5.2.2. Trees to be preserved must be protected from damage.
- 5.2.3. The Tree Protection Zone (TPZ) will be established by Landcare based on industry BMP's and site conditions.
- 5.2.4. Landcare or vendor approved by Landcare will install tree protection barriers that prohibit entry into TPZ. Acceptable tree protection barriers include concrete traffic barriers or chain link fencing. Plastic construction, safety, or snow fence is not acceptable.
- 5.2.5. Where entry into TPZ is anticipated and approved, an 8 – 12" layer of wood mulch must cover the ground to minimize soil compaction and protect tree roots. Landcare may approve use of TrakMat sheets or a double layer of ¾" plywood in lieu of mulch for staging that is short in duration or frequently changes.
- 5.2.6. Additional preventative requirements, dependent on the scope of work and needs of contractor, shall be performed, or authorized by Landcare including but not limited to the following:
 - 5.2.6.1. Branch pruning and/or tying
 - 5.2.6.2. Root pruning
 - 5.2.6.3. Plant health care treatments
- 5.3. Tree protection during construction:
 - 5.3.1. Contractor must exercise caution to avoid damage when working near trees and shall notify Landcare of any concerns related to tree and/or root interference with the project. This includes any changes in scope of work.
 - 5.3.1.1. Any pruning of branches or roots must be performed or authorized by Landcare.
 - 5.3.1.2. Any unauthorized pruning or removing of any part of the tree or root system is prohibited.
 - 5.3.1.3. Where excavation adjacent to trees is approved, trench must be shored to maintain soil around the root system.
 - 5.3.1.4. For projects long in duration, reapplication of mulch staging areas may be necessary. Mulch must be removed at completion of project and site restored to pre-project conditions. Landcare shall inspect and approve of restoration.
 - 5.3.2. Prohibited actions within the TPZ include but are not limited to those listed below.
 - 5.3.2.1. Using trees for crane stays, guy anchors, or other fastenings.
 - 5.3.2.2. Exposing trees to fires, engine exhaust, or other sources of extreme heat.
 - 5.3.2.3. Unauthorized staging of materials, debris, or excavated soil.
 - 5.3.2.4. Unauthorized equipment or pedestrian staging or traffic.
 - 5.3.3. The University may need to enter work site to monitor tree condition & health and/or perform plant health care. Compliance with site PPE and notification will occur.

B. PUBLIC ART INSTALLATIONS

- 1. Public art installations shall be subject to the same staging and restoration requirements as other University projects.

C. SUBGRADE PREPARATION, TOPSOIL AND FINISH GRADING

- 1. Subgrade preparation requirements
 - 1.1. Before spreading topsoil, till sub-grade to a minimum of 2" to encourage vertical drainage and avoid perched water tables. Remove stones, sticks, roots & rubbish larger than 2" in any dimension.
 - 1.2. Verify that water percolates at a rate of 1" per hour or faster by conducting percolation tests. Verify number and location of tests with Landcare. 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. 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. Submit percolation test results. Work with Landcare to develop remediation plan if hardpan is prevalent.

2. Topsoil material requirements:

- 2.1. Submit particle size gradation and soil fertility test results. Contractor assumes risk of topsoil replacement or amendment for topsoil placed prior to test result submittal approval.
- 2.2. Topsoil for irrigated areas is classified as sandy loam and has the following composition:

Sieve size or material	% passing or % of composition
#4 sieve	100
#10 sieve	80-90
#200 sieve	15-25
Silt	10-20
Clay	5-10
Organic matter	3-10

- 2.2.1. Silt:Clay ratio shall be 2:1 or less
- 2.2.2. pH shall be minimum 5.5 and maximum 7.5, with 6 to 6.5 preferred.
- 2.2.3. Maximum lead content shall not exceed 400 ppm for non-residential and non-childcare facilities. Maximum lead content for residential and childcare facilities shall not exceed 100 ppm.
- 2.3. Topsoil for non-irrigated areas – verify composition with Landcare.

3. Topsoil Placement:

- 3.1. Topsoil depth requirements: 4-inches for lawns, 12-inches planting beds.
 - 3.2. To establish a transition, till the first 2 inches of topsoil into the top of sub-grade material.
 - 3.3. Perform finish grading and planting work when soil is dry.
 - 3.4. Remove rocks, sticks, roots, rubble and other debris larger than 2” in any dimension from topsoil.
 - 3.5. Grade smooth and uniform surface with a minimum 2% slope away from buildings.
 - 3.6. Compact soil at edges of walks and drives to prevent settling resulting in trip hazards, and set finish grade 1” below adjacent pavement edges to minimize snow plow damage to lawns and plantings.
 - 3.7. Contact Landcare upon completion of grading for pre-sodding/pre-seeding inspection.
4. Remove from University property and legally dispose of all excess material, rocks and debris generated by landscaping operation.
5. Soil amendment compost to be well-composted, stable, and weed-free organic matter produced by composting feedstock and bearing USCC’s “Seal of Testing Assurance”.
6. Protect areas of in-place soil from additional compaction, disturbance, and contamination. If planting soil or subgrade is over compacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination, restore the subgrade and replace contaminated soil with new soil which meets the requirements listed above.
7. Keep adjacent paving and construction clean and work area in an orderly condition. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off University’s property unless otherwise indicated.

D. WALKWAYS

1. Unit Pavers: Verify material and location of any proposed unit paver surfaces with Landcare prior to the end of the Schematic Design phase.
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 unencumbered by signs, light poles and other obstructions. In order to minimize hard-surface area, maximum width shall be designed to accommodate normal pedestrian loads.
 - 2.2. Provide angled or radius transitions at all sidewalk intersections of 120 degrees or less to minimize foot traffic through landscaped areas.
 - 2.3. Due to foot traffic, service vehicle parking and winter damage to grass boulevards, Landcare prefers sidewalk placement adjacent to curbs without a boulevard. If boulevards are constructed, minimum boulevard width (between curb and sidewalk) shall be 8'. Review sidewalk alignment with University Landcare.
 - 2.4. Replacement sidewalks shall match adjacent sidewalks in width, jointing pattern, and finish.
 - 2.5. Concrete sidewalks shall be non-reinforced and a minimum of 5 inches thick.
 - 2.6. Use of asphalt pavement for permanent sidewalks is prohibited.
 - 2.7. Asphalt 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.
 - 2.8. 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.
 - 2.9. Trees planted within paved areas require structural soil quantities sufficient to support the species selected.
 - 2.10. Tree grates are discouraged due to maintenance and safety issues. In some cases, tree grates will be accepted. Review proposed locations with Landcare.
 - 2.11. Review design of sidewalks within Minneapolis street right of way with City of Minneapolis Public Works Department. Contractor must notify Public Works staff before pouring concrete in order to coordinate street sign collar locations.

E. SITE FURNITURE

1. To provide continuity and efficient maintenance and operations throughout campus, site furniture shall be purchased through University Landcare. The designer shall indicate placement and quantity of furniture in the contract documents. The contractor shall install the owner-supplied furniture. The project manager and Landcare must approve any deviation. Upon request, Twin Cities Landcare will provide a catalog of Site Furniture Standards.
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 Landcare and Parking and Transportation Services.
3. Refer to Division Twenty-Six, Section 265600- Exterior Lighting for University standard exterior light fixtures, poles, and base standard requirements.

F. ORNAMENTAL FENCE

1. General: Ornamental fence system – heavy industrial steel internally secured. Equivalent to Ameristar Aegis II
 - 1.1. Description: The manufacturer shall supply an industrial ornamental steel fence system. The system shall include all components (i.e., pickets, rails, posts, gates and hardware) required. The fence is a three-rail design with a top rail, a rail 5-1/4” from the top rail and bottom rail that varies with the fence height and allows pickets to be 2” above finished grade. Fence panels are 6’ or 8’ wide, 3/4” pickets spaced 4” o.c., and post size that is determined by height of fence.
 - 1.2. References
 - 1.2.1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - 1.2.2. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.
 - 1.3. Submittal
 - 1.3.1. The manufacturer's submittal package shall be provided prior to installation.
 - 1.4. Product Warranty
 - 1.4.1. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 10 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.
 - 1.4.2. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufactures warranty shall be guaranteed for five (5) years from date of original purchase.
2. Materials
 - 2.1. Steel material for fence framework (i.e. tubular pickets, rails and posts), shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90.
 - 2.2. Material for pickets shall be 1” square x 14 Ga. tubing. The cross-sectional shape of the rails shall be double wall design with outside cross-section dimensions of 1.75” square and a minimum thickness of 14 Ga. Picket holes in the rail shall be spaced 4.715” o.c. Picket retaining rods shall be 0.125” diameter galvanized steel. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections. Fence posts and gateposts shall meet the minimum size requirements of Table 1.
3. Fabrication:
 - 3.1. Pickets, rails and posts shall be precut to specified lengths. Rails shall be pre-punched to accept pickets. Pickets shall be predrilled to accept retaining rods.
 - 3.2. Grommets shall be inserted into the prepunched holes in the rails and pickets shall be inserted through the grommets so that predrilled picket holes align with the internal upper raceway of the rails (Note: This can best be accomplished by making an alignment jig). Retaining rods shall be inserted into each rail so that they pass through the predrilled holes in each picket.
 - 3.3. The manufactured galvanized framework shall be subjected to a thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash, an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The

color shall be Black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.

- 3.4. Completed sections (i.e., panels) shall be capable of supporting a 600 lb. load applied at midspan without permanent deformation. Panels shall be biasable to a 25% change in grade.
- 3.5. Swing gates shall be fabricated using 1.75” x 14ga double channel rail, 2” sq. x 12ga. gate ends, and 1” sq. x 14ga. pickets. Gates that exceed 6’ in width will have a 1.75” sq. x 14ga. intermediate upright. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding. Gusset plates will be welded at each upright to rail intersection. Cable kits will be provided for additional trussing for all gates leaves over 6’.
- 3.6. Pedestrian swing gates shall be self-closing, having a gate leaf no larger than 48” width. Integrated hinge-closer set (2 qty) shall be ADA compliant that shall include a variable speed and final snap adjustment with compact design (no greater than 5” x 6” footprint). Hinge-closer set (2 qty) shall be tested to a minimum of 500,000 cycles and capable of self-closing gates up to a maximum gate weight of 260 lbs. and maximum weight load capacity of 1,500 lbs. Hinge-closer device shall be externally mounted with tamper-resistant security fasteners, with full range of adjustability, horizontal (.5” - 1.375”) and vertical (0 - .5”). Maintenance free hinge-closer set shall be tested to operate in temperatures of negative 20 F to 200 F degrees, and swings to negative 2 degrees to ensure reliable final lock engagement

Table 1 – Minimum Sizes for Posts

Table 1 – Minimum Sizes for Posts				
<u>Fence Posts</u>	<u>Panel Height</u>			
2-1/2” x 12 Ga.	Up to & Including 6’ Height			
3” x 12 Ga.	Over 6’ Up to & Including 10’ Height			
4” x 11 Ga.	Over 10’ Height			
Table 1 – Minimum Sizes for Posts				
<u>Gate Leaf</u>	<u>Gate Height</u>			
	<u>Up to & Including 6’</u>	<u>Over 6’ Up to & Including 8’</u>	<u>Over 8’ Up to & Including 10’</u>	<u>Over 12’</u>
Up to 4’	3” x 12Ga.	3” x 12 Ga.	4” x 11 Ga.	4” x 11 Ga.
4’1” to 6’	3” x 12Ga.	3” x 12 Ga.	4” x 11 Ga.	4” x 11 Ga.
6’1” to 8’	4” x 11 Ga.	6” x 3/16”	6” x 3/16”	6” x 3/16”
8’1” to 10’	4” x 11 Ga.	6” x 3/16”	6” x 3/16”	6” x 3/16”
10’1” to 12’	6” x 3/16”	6” x 3/16”	6” x 3/16”	8” x 1/4”
12’1” to 16’	6” x 3/16”	6” x 3/16”	8” x 1/4”	8” x 1/4”

Table 2 – Coating Performance Requirements

<u>Quality Characteristics</u>	<u>ASTM Test Method</u>	<u>Performance Requirements</u>
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 3,500 hours (Scribed per D1654; failure mode is accumulation of 1/8” coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625” ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

G. LANDSCAPE IRRIGATION

1. All landscaped areas shall have an automatic landscape irrigation system.
2. In order to standardize watering practices and promote water conservation, the University has invested in a centrally controlled, ET based irrigation system for the campus. Twin Cities campus, all new irrigation systems must be designed for compatibility with the Toro Sentinel system.
3. Subsurface watering products will be evaluated by Landcare on a case by case basis.
4. All new installs require 100% coverage, including true head to head to head coverage and matched precipitation rate nozzles.
5. A one-year warranty period including on fall blow-out and one spring start-up.
6. Submittals include hard copy and AutoCAD compatible as-built plan. Refer to Division 1, Section 017700 – Contract Closeout: Submittals
7. Irrigation systems shall include the following components:
 - 7.1. Water supply: Specify approved back-flow prevention device and deduct meter. Review water supply size with Landcare to ensure capability of future system expansion. If backflow prevention device is located outside, an enclosure is required. Coordinate back-flow prevention device, meter installation, and enclosure requirements with Landcare, University Energy Management, and the municipal water department.
 - 7.2. Main Line: Specify Class 160 PVC irrigation main line. Main line depth to be 12-18” below finished grade. Pipe-pulling for main line installation prohibited.
 - 7.3. Exterior Shut-off: Specify an exterior shut-off valve adjacent to the water source location for emergency system shut-down. Verify additional isolation valve quantity and location with Landcare.
 - 7.4. Exterior Winterization Connection Point: Specify 1” quick-couple for winterization connection point within 2’ after exterior shut-off.
 - 7.5. Master Valve: Hunter PGV series valve with flow control knob. Valve size to match main line size.
 - 7.6. Flow Sensor: Data Industrial, or approved equal, flow sensor. Install per manufacturer’s requirements.
 - 7.7. Flow Sensor Wire: 20 gauge twisted pair shielded cable wire. Install per manufacturer’s requirements.
 - 7.8. Controller: Toro Sentinel wall-mounted controller on building exterior. Verify controller location with Landcare. Verify use of 2-wire decoder system with Landcare.
 - 7.9. Grounding Device: Install grounding device per manufacturer’s requirements.
 - 7.10. Valves: Specify Hunter PGV series valves with flow control knob for zone and master valves.
 - 7.11. Control Wire: Minimum 18-gauge color coded solid copper wire for multi-strand conventional wire installation. Provide two (2) additional control wires beyond what is required for installation. Minimum 14-gauge twisted pair wire for 2-wire installation. Install per manufacturer’s requirements
 - 7.12. Lateral Line: 1” or 1-1/4” polyethylene pipe. Lateral line depth to be 8-12” below finished grade.
 - 7.13. Wire Nuts: Specify direct burial wire nuts for buried wire splices. Specify waterproof wire nuts for wire splices in valve boxes or as required by component manufacturer’s installation requirements.
 - 7.14. Heads: Hunter heads for rotor installations. Toro 570 spray heads for fixed spray installations. Hunter MP Rotator with Toro 570 body for rotating stream installation. Landcare approval

required for use of any variable arc nozzle. Do not mix head types in any one zone. Landcare approval required for any deviation from these products.

7.15. Drip Irrigation:

7.15.1. Valves: Rain Bird 100 or 150 Drip Control Kit depending on required size from Manufacturer's recommendations.

7.15.2. Drip Line: Rain Bird XFS 0.92-12" with copper or XFS 0.92-18" with copper depending on plant spacing.

7.15.3. Flush Valve: Flush valve for each dip zone. Install per Manufacturer's requirements.

7.15.4. Air Relief Valve: Air relief valve for each drip zone. Install per manufacturer's requirements.

7.15.5. Operation Indicator: Toro DL-ML9 operation indicator for each drip zone. Install per manufacturer's requirements.

7.16. Quick Couples: 1" quick-couples and keys for hand watering, Toro 474 or compatible. Verify quantity and locations with Landcare.

7.17. Boxes: NDS Pro Series for all boxes. Set box flush at grade and prevent boxes from sitting on pipe.

7.18. Sleeves: 4" schedule 40 PVC sleeve for all sleeve installations.

H. PLANTINGS

1. All plant material shall meet the requirements of the most recent 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.

1.1. No substitutions of specified plant material sizes, grades, species, qualities, or forms shall be made without Landcare approval and written permission from the project manager.

1.2. The University will not accept trees that are planted too deep. Plant trees and shrubs so that the first true root is within one inch of finish grade. Prior to planting, remove soil from top of the root ball as needed to expose first true root. Reject any nursery stock received with more than 4" of soil covering the first true root. Landcare may inspect plantings to verify planting depth.

2. Examination of planting areas, with installer present, for compliance with requirements and conditions affecting installation and performance of the work

2.1. Verify that no foreign or deleterious material or liquid such as paint, paint wash out, concrete slurry, concrete layers or chunks, etc. has been deposited in soil within the planting area. If soil has become contaminated work with Landcare to develop remediation plan.

2.2. Plant installation shall not occur during periods of excessive soil moisture.

2.3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

3. Preparation of planting area

3.1. Protect structures, utilities, sidewalks, pavements, turf areas and existing plants from damage caused by planting operations.

3.2. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and walkways.

3.3. Lay out plants at locations direct by Landscape Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

4. Excavation

4.1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to

support root ball and assist in drainage away from center. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

- 4.2. B&B and container material excavation is to be approximately three times as wide as the material diameter.
- 4.3. Bare-root stock material excavate 12 inches wider than root spread and deep enough to accommodate vertical roots.
- 4.4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball. Planting depth of small container stock shall be such that the top of the mulch surface shall be flush w/ the top of the root mass. Review planting details with Landcare.
- 4.5. Keep excavations covered or otherwise protected when unattended by installer's personnel.
- 4.6. Notify Landcare if unexpected rock or obstructions detrimental to trees or shrubs are encountered.
- 4.7. Notify Landcare if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

5. Planting

- 5.1. Inspect at time of planting that first order lateral root of tree is within 1 inch of finished grade regardless of location of root flare. Remove soil in a level manner from the root ball to where the top-most root emerges from the trunk.
- 5.2. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- 5.3. Set each plant plumb and in center of planting pit or trench. Backfill soil may consist of subsoil and topsoil removed from excavation unless otherwise indicated. Use planting soil if additional soil is needed. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Continue backfilling process and water after placing and tamping final layer of soil.
- 5.4. For B&B stock, remove burlap, twine, wire etc. from the upper one-third of the ball.

6. Mechanized tree-spade planting

- 6.1. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, B&B root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
- 6.2. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.
- 6.3. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
- 6.4. Cut exposed roots cleanly during transportation operations.
- 6.5. Where possible, orient the tree in the same direction as in its original location.

7. Tree stabilization

- 7.1. Staking & guy wire method are acceptable. The mulch ring should be large enough to encompass the stakes and eliminate a conflict with turf mowers.
 - 7.1.1. Upright staking: Space three matching stakes evenly around the tree. Place stakes upright, angled slightly away from the tree. Fasten a tree tie to each stake and loosely tie the other end around the main stem. Attach ties at approximately half the height of the tree and allow enough slack for the tree to sway naturally.
 - 7.1.2. Support staking: Set one upright fiberglass stake near the trunk and drive it into the ground 8-12 inches deep. Secure the trunk to the stake with a flexible tie.

- 7.1.3. Root ball staking: Use two upside down, U-shaped stakes to secure the root ball on both sides of the stem. Drive each stake into the ground so the horizontal piece is firmly holding the root ball in place avoiding damage to the roots.
 - 7.1.4. Guy wire: Space three matching stakes evenly around the tree at a slight angle. Stakes should be 1-1.5 feet above grade. Fasten tree tie to each stake and loosely tie the other end around the main stem in the lower half of the tree. Tree tie should be at a 45-degree angle between the tree and the anchor and should allow enough slack for the tree to sway naturally.
8. Weed barrier fabric or landscape fabric is prohibited in planting beds.
 9. Plant material to have a 1 year warranty period. Landcare to take over maintenance after substantial completion.

I. MULCH AND EDGING

1. Organic mulch shall be 100% double-shredded hardwood, tub-ground to medium/fine texture, natural in color, including no pieces larger than 4" in any dimension, and free of deleterious materials. Apply to a uniform depth of 3 inches and finish level with adjacent finished grades. Do not place mulch within 4 inches of tree trunks or stems or within 3 inches of shrub trunks or stems. Do not bury shrub branches or crowns with mulch.
2. Alternative mulch materials must be approved by Landcare.
3. Gravel, rock, or other inorganic mulches are prohibited in planted areas.
4. Bed edges shall be straight lines or smooth flowing curves. Irregular bed edges will not be accepted. Separate mulched areas from turf areas with a 45-degree, 4-to-6-inch-deep, cut-edge. If edging is used, specify 3/16" thick steel with an interlocking metal stake system. Metal edging is not approved for use at the Twin Cities campus.

J. SODDING & SEEDING

1. Sod Material: specify ASPA/TPI certified nursery grown sod, free of stones, with a strong fibrous root system and a maximum of 5 weeds per 1,000 sq. ft. To conserve water, Landcare encourages the use of low-impact sod varieties. Review sod species and variety with Landcare.
2. Sod Installation:
 - 2.1. Remove all undesirable plant material in areas to receive sod, seeding or planting.
 - 2.2. Contact Landcare to approve grading prior to placing sod.
 - 2.3. Lay sod within 24 hours of harvesting.
 - 2.4. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface.
 - 2.4.1. Lay sod across slopes exceeding 1:3.
 - 2.4.2. Anchor sod on slopes with steel staples spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.
 - 2.5. Areas with sod shall match the grade of adjoining turf, sidewalks, curbs and/or seeded areas. Provide smooth transitions to match existing grade where sod work interfaces existing conditions.

- 2.6. To minimize snowplow damage, ensure that soil is firm, and grade is one inch below top of adjacent walkways, extending 6 to 12 inches horizontally away from walk.
 - 2.7. Cut tree rings in an even, circular fashion at a distance of 18 inches from the base of trees. Jagged or irregular bedlines will not be accepted.
 - 2.8. Immediately after sod has been laid, irrigate it thoroughly. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod. Sod will be considered substantially complete when the sod is thoroughly knitted to the soil.
 - 2.9. Remove excess soil, rocks, and debris. Clean mud, soil, and other debris from walks, lots, and adjacent areas before leaving the site.
3. Seed Material: review seed mix with Landcare.
4. Seed Installation:
- 4.1. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
 - 4.1.1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 4.1.2. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 4.1.3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
 - 4.2. Verify rate of application with Landcare.
 - 4.3. Rake seed lightly into top 1/8 inch of soil.
 - 4.4. Protect seeded areas with erosion-control blankets installed and stapled according to manufacturer's written instructions.
 - 4.4.1. Erosion-control blanket: Futerra F4 Netless Erosion Blanket or equivalent. Include manufacturer's recommended steel wire staples, 6 inches long.
 - 4.5. Water thoroughly until erosion-control blanket and top 1 inch of soil are saturated avoiding run off.

K. MAINTENANCE AND ACCEPTANCE

1. Sod: Water regularly to ensure root development. Do not over water; soil beneath sod should be damp, but not soaking wet. Mow sod until accepted to maintain a maximum height of 3". Remove any piles or windrows of clippings from lawn areas to avoid killing grass. The contractor is responsible for watering and mowing until substantial completion.
2. Trees, shrubs, and perennial plantings: Water, mulch, straighten, re-set, raise, stake, etc. as needed until accepted by the project manager and Landcare. The contractor is responsible for watering until substantial completion.
3. Irrigation: Demonstrate operation of completed system to Landcare.
4. Warranties: All plant materials for one year from date of acceptance; All irrigation parts for 60 days of consecutive operation.

END OF DIVISION 130050 - LANDCARE REQUIREMENTS