Division 32 – Exterior Improvements

1. Except as otherwise supplemented in this manual, these items must meet the requirements and standards of VDOT's "Road and Bridge Specifications" and "Construction Manual". (VDOT Manuals)

32 06 10 13 Pedestrian Walkway Schedule (Sidewalks)

1. In general all permanent sidewalks shall be cast-in-place concrete. If temporary walkways are required, they may be asphalt. Concrete will not be accepted if graffiti is present. Concrete with graffiti shall be removed by the Contractor and replaced at Contractor's expense. Cracked concrete will not be accepted, except as approved in writing by the University.
2. Mason's standard sidewalk is minimum 6 feet wide, 4 inch slab. The precise geometry of the cross section of the sidewalk shall be determined based upon the hierarchy established elsewhere in this manual. Thickness shall be provided proportionally to the width as noted in the details. Sidewalks shall be constructed of 3000 psi, 4 – 6% air entrained concrete reinforced with 6 x 6 #10 welded plan cold drawn steel flat panel wire mesh, with broom finish. Wire mesh shall be supported by, and attached to, 2 inch rebar chairs that are spaced adequately to ensure support of the mesh during the concrete pour. Sidewalks shall be on a compacted base of VDOT 21A crushed stone. Aggregate used within the sidewalk shall be rounded. Sidewalks shall be graded so as to drain fully and away from buildings/entrances, shall have no surface indentation that permits standing water (e.g. "bird baths"), or back-up into curb/yard inlets.
3. Install 3'chamfers at all sidewalk intersections for electric carts.
4. Install ramps where sidewalks intersect roads for general accessibility and electric cart access. Consult Mason Facilities for exceptions.
5. Control, construction, and contraction joints shall be coordinated with the architectural and landscape designs to ensure the pattern is acceptable. Transverse control joints shall occur 6 feet on center for 6 foot wide sidewalks. Transverse contraction joints with premolded joint fillers shall occur 48 feet on center. Premolded joint fillers shall be ½ inch thick asphalt impregnated fiber board conforming to ASTM C 1751. Control joints shall be made with tools that provide slightly curved edges and no flats on the surface of the sidewalk.
6. Use non-slip finish on sidewalks, steps, and metal grates where a slipping hazard may exist.
7. Ensure that any and all drainage grates that are provided in pedestrian walkway areas provide an opening of no more than ½ inch diameter (i.e. "heel safe").

32 12 00 Flexible Pavement

1. All asphalt pavements shall conform to the following minimum thickness for the use intended as noted below. The subgrade bearing capacity shall be determined by tests. During preparation of the subgrade, the Contractor shall request CBR tests be performed. CBR test results can take several weeks to be obtained so the contractor needs to factor this into their schedule. Final pavement design shall be based on CBR results, but at a minimum thickness as shown below. Pavement designs shall be in conformance with VDOT requirements. Proof rolling with a fully loaded, 3 axle, tandem dump truck shall be required with the University and its geotechnical engineer present. The proof rolling is to identify any localized soft spots in the subgrade. Areas not acceptable to the Geotechnical engineer shall be undercut and have acceptable material installed until an acceptable proof roll is achieved

VALUE PAVEMENT TYPE	MIN. CBR TYPE	TYPE & THICKNESS OF BASE COURSE	TYPE & THICKNESS OF SURFACE COURSE

Primary Arterial roads and service roads with heavy truck & bus traffic	5 FX	3" Intermediate Mix, 3" Base Mix, 8" Untreated Aggregate	1 ½" Surface Mix
	10 PW		
SecondaryFeeder Roads which carry bus & truck traffic and bus & truck parking lots	5 FX	3" Intermediate Mix, 3" Base Mix, 6" Untreated Aggregate	1 ½" Surface Mix
	10 PW		
Tertiary Driveways which carry only passenger cars and passenger car parking lots	5 FX	3" Base Mix, 7" Untreated Aggregate	1 ½" Surface Mix
	10 PW		

32 13 13 Rigid Paving (Concrete Paving)

1. Specify cast-in-place concrete for permanent sidewalks. If temporary walkways are required, they may be asphalt.

    - Specify that the Contractor protect newly placed concrete exposed to the public to insure that concrete is not defaced prior to complete setting up. Replacement of defaced concrete is included in the Contract Sum.
    - Specify 3000 psi air-entrained concrete for exterior paving, reinforced with 6 x 6 #10 welded wire fabric delivered in flat sheets and not rolled. Design paving with a 6 inch aggregate base. Specify a heavy broom finish perpendicular to the direction of travel, with sawn or tooled joints at a maximum of 6 feet on-center. Specify premolded 1/2-inch thick asphalt impregnated fiber board joint filler for construction joints and where full separation is required.
    - See above for Mason's standard sidewalk information.
    - Control, construction, and contraction joints shall be coordinated with the architectural and landscape designs to ensure the pattern is acceptable. Transverse control joints shall occur 10' on center for wide slabs, each direction. Coordinate with Mason and Landscape Architect. Transverse contraction joints with premolded joint fillers shall occur 48' on center, conforming to ASTM C 1751 and caulked with an appropriate type for this application. Control joints shall be made with tools that provide slightly curved edges and no flats on the surface.
    - Fairfax Campus concrete paving: Specify naturally buff-colored concrete, or include some color admixture, avoiding cool-gray toned concrete.
    - Prince William Campus concrete paving: Intermix concrete and unit pavers incorporating the same tones as indicated above for pavers on this campus. Avoid strong yellow or brown tones.
    - Arlington Campus concrete paving: Specify concrete with tan or beige tones.

- Additional requirements for concrete work are included in Division 03.
- Requirements for exterior railings are included in Division 05.

32 14 00 Unit Pavers

1. Specify a mixture of paving colors, textures, patterns, and materials.
    - Specify paver patterns with high Solar Reflectance Indices (SRIs) of at least 29.
    - Fairfax Campus pavers: specify red, buff, tan, and clay tones.

    Cambridge Pavingstones (Lyndhurst, NJ) KingsCourt or RoundTable Collections with ArmorTec in the following colors:
    - Chestnut
    - Chestnut/Salmon
    - Toffee/Onyx
    - Sahara
    - Onyx/Chestnut
    - Salmon/Onyx
    - Golden/Onyx
    - Onyx/Natural
    - Sahara/Chestnut
    - Chestnut/Bronze
    - Salmon

    - Prince William Campus pavers: specify brick red, grays, and white tones.

    Cambridge Pavingstones KingsCourt or RoundTable Collections with ArmorTec in the following colors:
    - Onyx
    - Ruby
    - Salmon
    - Onyx/Natural
    - Ruby/Onyx
    - Salmon/Onyx

    - Arlington Campus pavers: specify brick red, grays, and white tones. Traditional brick pavers may also be used.

    Unilock (Brewster, NY) Series 3000
    - Black Granite
    - Coral Gem
    - Crystal Rose
    - Ice Grey
    - Renaissance
    - Starlight

32 14 43 Porous Surfaces

1. Where possible specify permeable surfaces that allow water to relieve into the strata below.

    Cambridge Pavingstones Crusader Collection Aqua Bric Type 1 (refer to campus details above for color choice)

32 16 13 Concrete Curbs and Gutters

1. Concrete curbs shall be formed of minimum 4000 psi concrete. Voids will not be accepted in the back of curbs. Cracked concrete will not be accepted, except as approved in writing by the University.

32 17 00 Paving Specialties

1. Requirements for bollards are in Division 03.

32 17 23 Parking Space Marking

1. Non-handicap parking stalls shall normally be 8.5 foot wide and 18 feet deep with a 22 foot aisle. Stall line markings shall be 4 inches wide single line, white color. If required include directional arrows in the contract.

32 31 00 Fences and Gates

1. Fencing is required around all climbing hazards and grade installed mechanical and electrical equipment (i.e. cooling towers, emergency generators, etc.).

32 32 00 Retaining Walls

1. Finishes and materials must be approved by the University.

32 70 00 Wetlands

1. All projects must fully conform with the requirements of the U.S. Army Corp of Engineers and the State of Virginia's Department of Environmental Quality as it relates to regulatory wetlands and waters of the U.S. (www.deq.virginia.gov/programs/water/wetlandsstreams/permitsfeesregulations.aspx) See the Campus Environmental Constraints Maps for additional information. Corps JD letter must be provided by the Contractor unless otherwise specified by the University.

32 80 00 Irrigation

1. All new buildings shall be prepared for irrigation systems whether these systems are part of the project or not. Systems shall be vandal-proof and include programmable boxes and rain meters. Sprinkler heads shall be "pop-up" type that fully retract when not in use. The system must also possess a drain valve(s) so the system can be flushed or drained using air pressure. Preparation shall include a location within an appropriate Mechanical or Electrical equipment Room for a controller, with a designated circuit breaker, and an empty 1 inch conduit with pull rope to a point 5 foot outside the building, 3feet below grade, with shutoff valve inside the building in an accessible location. Regardless of the system being installed, a backflow preventer must be installed as part of irrigation system under the building contract. Additionally, all irrigation systems must be separately metered.
2. New buildings shall also be provided with outside water access. Coordinate locations and quantity of outside water hydrants/hose bibs with the university. Turn-on valves must fit a standard four way universal water key with hose connections sized for a standard garden hose.

32 91 00 Planting Preparation

1. Preparation of Subgrade: Specify that subsoil shall be loosened to a depth of 5 inches and graded to remove all ridges and depressions so that it will be parallel to proposed finished grade. Remove stones over 1 inch in any dimension, sticks, rubbish and other extraneous matter.

32 91 19 13 Topsoil Placement and Grading

1. Specify that all topsoil shall be tested against the following Specifications:

Quantity	Size Fraction	Range of Particle Diameter
Percent by oven dry weight	inches	mm
Less than 2% gravel	Larger than 1	25
Less than 3% gravel	¼ to 1	6-25
Less than 10% gravel	2/25 to ¼	2-6
40% to 65% sand	1/500 to 2/25	.05-2.00

25% to 60% silt	1/12,500 to 1/500	.002-.05
Less than 20% clay	Smaller than 1/12,500	.002

- Amounts of sand, silt, and clay – determined by official hydrometer method or mechanical analysis of the soil. Gravel sized particles should be determined by separation on screens with appropriate size openings.
- Soil should be relatively free of under composed organic material like roots, sticks, leaves and paper and of any other undesirable trash like glass, plastic or metal fragments that would have to be removed before seeding or planting. Topsoil should be 4 inches-6 inches compacted 85%.
- Organic matter content (% over dry weight of soil): Sandy loam 1.25% to 20%, Loam and Silt Loam 2.5% to 20%.
- On soil with less than 10% organic matter, use wet oxidation method of analysis. On soil with more than 10% organic matter, use loss on ignition method of analysis.
- Soil reaction – pH of 4.5 to 7.0
- Soluble salt content: conductivity (ECe, milliohms per centimeter)

  Less than 1.00 mmhos/cm for a 1:1 soil: water ratio,

  Less than 0.50 mmhos/cm for a 1:2 soil: water ratio,

  Less than 0.33 mmhos/cm for a 1:3 soil: water ratio.

32 92 00 Turf and Grasses

1. Lawns and plantings may have an underground irrigation system based on the direction of the University. See Section 32 80 00.
2. Sod shall be used for ground cover for all disturbed areas on the East Campus, in the grass strip of the typical road section, and within five (5) feet of either side of walkways and buildings, sports fields. Seeding is acceptable for Erosion and Sediment Controls but must be replaced with sod. Hydro-seeding is not preferred. Mason will indicate the type of lawn treatment that will prevail.
3. Preferred sod shall be turf type tall fescue. Sod should be ½ inch-1 inch thick rolled sod is acceptable upon approval of the Project Manager.
4. All new lawn sodded areas shall have the entire perimeter staked and roped off immediately upon completion. Stakes shall be no less than 30 inches high installed and string banner shall be two strands stake to stake. After turf establishment (2-3 weeks), watering and regular mowing is required by the contractor for 60 days beyond establishment of turf, and a 6 month final inspection of the turf shall be conducted at which time areas requiring additional treatment at the contractor's expense will be identified.
5. Straw Mulching: Salt hay with nonasphaltic liquid tackifier is preferred. For finished grades having slopes in excess of 20% shall be mulched with erosion control fabric run vertically from top to bottom of slope and stapled with wire staples .125 inches in diameter or greater and spaced at 48 inch intervals. In areas of high velocity runoff such as receiving swales and drainage ditches fabric of sufficient strength and density shall be used and installed in direction of flow and stapled at 24 inch intervals.
6. AOSCA (Association of Seed Certification Agencies) certified seed. Sowed at a rate of 4-5 lbs/1,000 square feet.

   - Full Sun Mixture: 50% Kentucky Bluegrass

     10% Perennial Ryegrass

10% Perennial Ryegrass
15% Chewing Fescue
15% Creeping Red Fescue

- Shade Mixture: 30% Chewing Fescue
  15% Creeping Red Fescue
  30% Kentucky Bluegrass
  35% Hard Fescue
- Tri-Plex Rye Mixture: 33.3% Perennial Ryegrass
  33.3% Perennial Ryegrass
  33.3% Perennial Ryegrass
- Drought Mixture: 90% Turf-type Tall Fescue
  10% Kentucky Bluegrass

7. Inspections will be made at completion of the following tasks:
   - At completion of the soil loosening phase to insure that the minimum depths have been achieved.
   - At completion of the removals and/or screening phase to insure that specified dimension material has been removed.
   - At completion of the top soiling phase to insure that full depth of cover has been achieved.
   - At completion of the fine grading phase to insure that specified slopes, uniformity and positive drainage have been achieved.
   - At completion of the seeding and mulching phase to insure adequate coverage.
   - At the end of the 60 Day Maintenance Period to insure adequate percentage of growth and coverage as specified has been achieved.
8. It is the responsibility of the Contractor to notify the Project Manager of the completion of each task in writing for approvals prior to proceeding to the next phase. Unsatisfactory conditions much be corrected at Contractor's expense before beginning next phase tasks.

32 93 00 Plants

1. Specify that the Contractor shall guarantee newly installed plants for a period of one year after date of acceptance against defects, including death and unsatisfactory growth. Trees which are not healthy, dying, or the design value of which, in the opinion of the A/E or Mason, has been destroyed through root damage, loss of branches, bark damage, etc. shall be replaced by the Contractor at no cost to the University. Exceptions are defects resulting from abuse or damage by others, or unusual phenomena or incidents which are beyond landscape installer's control.
2. Specify that plants which are determined to be defective shall be replaced at the proper season or planting time after the guarantee period is complete and replacement plants will be guaranteed by the Contractor for an additional growing season under an extended guarantee at no addition cost.
3. Specify that, during the guarantee period, the Contractor shall, from time to time, inspect the watering and other maintenance practices carried on by the University and promptly report to the University any practices which he considers unsatisfactory and not in his interests or good horticultural practices. The failure of the Contractor to inspect or report shall be construed as an acceptance by him of the University's maintenance practices and shall not thereafter claim that any defects which may later develop are the result of such practice.

32 93 43 Trees

1. Trees shall be from the University Planting pallet.

32 94 13 Landscape Edging

1. A Mowing Edge shall be installed at all trees and around perimeter of the building. This edge shall be of steel or metal quality and not rubber/plastic.

32 94 33 Planters

1. Install drainage in outdoor plant boxes.