

2 Sitework

GENERAL

Designers shall verify that all applicable portions of these standards are incorporated into the project's design, drawings, specifications and final construction. Requests for variances from these standards shall be submitted in writing to the DCM Project Manager, using the KU Standards Variance Request Form found in [Appendix A1.1](#), for review and written approval or rejection as indicated on the form.

RELATED DOCUMENTS & REQUIREMENTS

Refer to the following for requirements that also apply to work of this section.

- Division 1 - General Requirements**; refer to sections regarding construction testing and field quality control requirements. Also contains additional information re: information that KU can furnish and the consultant's obligations to field-verify existing conditions.
 - Unless directed otherwise, the Owner shall separately contract for quality control testing during construction, not the Contractor. Verify with DCM for each project.
 - Quality Control Testing of Sewer Lines: Video scans of sewer systems may be arranged for by the Owner, if appropriate.
- Campus Landscape Master Plan: All projects shall be designed and constructed to be consistent with the Campus Landscape Master Plan.
 - Current editions of this document can be viewed at the KU-DCM website: <http://www.ku.edu/home/fmku/>
- Division 3 – Concrete**: These requirements are also applicable for site-related concrete work.
- Division 5 – Metals**: Contains requirements for handrails and guardrails.
- Division 15 – Mechanical**: Contains additional information applicable to site utilities.
- Division 16 – Electrical**: Contains information on site lighting and site utilities.
- Division 17 – Telecommunication Systems**: Contains information on site infrastructure related to telecommunications systems.

STREETS & PARKING LOTS – DESIGN GUIDELINES

Reference Standards: Comply with the following.

- "Standard Specification for State Road and Bridge Construction," Kansas Department of Transportation (KDOT)

- ❑ "Specifications and Construction Methods for Asphalt Concrete," The Asphalt Institute.

Parking – Typical Dimensions:

- ❑ Drive Lane with 90-Degree Stalls on each side: 65' back-to-back is recommended overall dimension; 58' back-to-back is the minimum overall dimension.
- ❑ Parking Stalls: 8'-5" typical o.c. stall widths.

Emergency Vehicle Access: Each project shall consider access routes for police, fire and emergency medical vehicles to drive up close to buildings. Indicate proposed access routes on preliminary site plans and code plans, and discuss need for paving with KU.

Minimum Paving Thickness:

- ❑ Service Drives & Drive Lanes: 8" asphalt (6" base & 2" top course); or 6" p.c. concrete.
- ❑ Parking Areas: 6" asphalt (4" base & 2" top course); or 6" AB-3 compacted base with 4" asphalt; or 6" p.c. concrete.
- ❑ Loading Dock Aprons: 8" – 10" p.c. concrete; verify thickness required for actual loading conditions; do not use asphalt pavements in loading dock areas where trucks may park for extended periods of time.

Jointwork: Comply with recommendations of the Portland Cement Association (PCA).

- ❑ Consultants shall show all control and expansion joints in all pavements on site plans.

Striping: 4" wide; white for typical stalls; yellow for handicapped stalls, centerlines and crosswalks.

Curb and Gutters: Cast-in-place portland cement (P.C.) concrete, reinforced; include KU's standard details as shown in [Appendices A2.4 and A2.5](#) in the drawings. Asphaltic curbs are NOT to be used.

Underground Conduits and Sleeves: Provide marker at top of curb above all underground conduit or sleeve locations.

- ❑ Use a 2" high "S" symbol cast or embossed into concrete.

Handicapped Parking: Indicate handicapped parking stalls on site plans. KU prefers to use universal stalls, as shown in the ADA Accessibility Guidelines, to greatest extent possible.

Service Vehicle Parking: Indicate on site plans at least one stall adjacent to each new or renovated building for temporary parking of delivery, service or maintenance vehicles.

- Verify location and quantity required with DCM and user group.
- KU Parking Department shall provide appropriate signage for each stall of this type.

Parking Lot Signage: KU Parking shall provide standard university signage for handicapped, visitor or maintenance stalls, as well as signage designating parking lot zone designations or directional signage.

- Designers may provide appropriate posts for the mounting of handicapped, visitor or maintenance parking stall signage, or KU can arrange to provide the simple steel tube posts with the signage.

SIDEWALKS – DESIGN GUIDELINES

Accessibility:

- Layout walks to achieve 1:20 or less slopes in all locations, to greatest extent feasible.
- Avoid use of 1:12 ramps as much as possible.
- All walks to be noted to have a 1:50 (1/4" per foot) maximum cross-slope.
- Provide accessible routes from building entrances to accessible parking or loading zones and, wherever feasible, to other walks and accessible routes across campus.

Standard Widths:

- 8' minimum width at main circulation walks
- 6' minimum at secondary, less-heavily traveled walks
- 4' minimum at incidental, low-traffic walks.

Standard Thickness: 5-1/2" (due to maintenance vehicle traffic on walks).

Concrete Mix: 4,000 psi; 3" to 4" slump; 6% +/- 1% air-entrained concrete.

Expansion & Control Joints: Designers shall show on site or floor plans.

- Expansion joints shall be required at all walk to curb, manhole, structure or building abutments, and at no greater than 40' o.c. in continuous walks or slabs in each direction.
- Expansion joints details shall require 1/2" diameter x 12" long smooth dowels at 18" maximum o.c., centered in depth of walk and set perpendicular to walk's long dimension.
- Expansion joints shall be detailed to indicate sealant on top of 1/2" thick joint filler.
- Control joints shall be detailed to be sawcut s or tooled / trowel-cut joints, penetrating one-fourth the depth of the slab.

Subgrade: Require undisturbed or compacted earth subgrade; sand fill is NOT acceptable; 1" or 2" of granular fill may be used for leveling subgrade only.

Thickened Edges: Exposed edges of all sidewalks and walks on each side of expansion joints shall be detailed to be thickened to be not less than 8" deep, with bottom of thickened edge angled up to bottom of walk at no more than 45 degree slope.

Finish: All walks shall receive a broom finish, perpendicular to the primary direction of travel.

HANDICAPPED CURB RAMPS – DESIGN GUIDELINES

Handicapped curb ramps shall be provided at each location where new walks abut curbs. They shall be set at approximately 90-degree angles to the curb and directly opposite each other, in the direction of travel.

- Comply with provisions of the Americans with Disabilities Act, and KU's standard curb ramp detail.
- Designers shall include KU's standard curb ramp detail, as shown in [Appendix A2.2](#), in the bid documents.
- Brick Pavers on Ramp: Glen-Gery "Chambersburg", brown color, with chamfered edges

BICYCLE PARKING AREAS – DESIGN GUIDELINES

General: The University has considerable bicycle traffic and has adopted a standard for bicycle parking rails. Areas heavily used as bicycle routes should be identified for development of bicycle parking with each project.

- Each project shall include bicycle parking in an unobtrusive area near one or more building entrances.
- KU's standard bike rack detail, as shown in [Appendix A2.3](#), shall be included in the construction drawings.

RETAINING WALLS – DESIGN GUIDELINES

Retaining walls shall be constructed of appropriate materials for the context of each location, and shall be one of the following materials.

- Low Walls (typically 3' or less): Concrete, concrete masonry or stone materials.

- Medium to Tall (3' or higher): Reinforced concrete, with a sandblasted or otherwise appropriate decorative finish and rustication joint patterns. Also required for walls supporting significant lateral loads.

SITE SURVEYS AND LAYOUTS

Facilities Operations will provide benchmarks, with coordinate point locations and elevation information, per the University's established campus-wide coordinate system.

- A qualified land surveyor or civil engineer must layout all work. Facilities Operations will not layout projects for consultants or contractors.

Survey Drawings: Comply with all applicable requirements for Site Plan Drawings, as noted below.

SITE PLAN DRAWINGS

All site surveys and site plan drawings shall comply with the following, unless otherwise directed or approved by the University.

Scale: 1" = 20'-0" (preferred)

- Optional Scales: 1" = 30'-0" , 40'-0" , 50'-0" or 100'-0" , as approved by KU.

Campus Coordinate System: Show KU's campus-wide coordinate grid on all site plans, including surveys.

- Grid Interval: 100' in both directions, 50' when appropriate, or as approved by KU.
- KU-FO will locate campus coordinate system onsite for site surveyors. DCM can provide copies of existing site plans in AutoCAD files which include this information, for designers to use during preliminary design.

Topographic Contours:

- Planning or Preliminary Design Drawings: Two-foot intervals, or as approved by KU.
- Surveys & Construction Drawings: One-foot intervals.

Survey Drawings:

- The unedited survey drawing shall be included in the contract documents, with an annotation: This sheet is included for reference and information only.
- Include the surveyor's seal and firm information on each survey drawing, in addition to the primary project consultant's project title block.

Existing Underground Utility Lines: Add the following text to the bid documents. Typically, include these notes on each site plan drawing which contains information about new &/or existing site utilities:

- Contractor shall call both Kansas One Call (1-800 DIG-SAFE; 1-800-344-7233) to request a utility locate ticket and the Facility Operations Engineering office (785-864-5620; cell: 785-393-4235) prior to beginning any excavation work, for onsite assistance in locating known underground utilities in the area of work.
- Contractor shall contact FO Engineering office (785-864-5620; cell: 785-393-4235), prior to backfilling any underground utility lines and shall allow adequate time during normal business hours for FO personnel to survey and establish location and depths of all lines.

EARTHWORK - 02300

Geotechnical Engineering Report: Consultant shall edit applicable specification sections to incorporate or reflect contents of this report, shall note that the entire report is available for review at the Owner or Architect's office, and shall note that this information is included for reference and general information only.

- Designers shall NOT simply reference the geotechnical report and indicate that the Contractor is to comply with the report recommendations. These reports often contain optional or analytical statements, which require the Designer to evaluate and select the most appropriate actions. Designers are required to include appropriate and explicit details or specification text regarding the geotechnical report's recommendations in the bid documents for each project.
- Soil Borings shall be copied and bound into the project manual as an appendix at the end of the Division Two specifications.

Stripping and Stockpiling:

- Indicate the area of grading to be stripped and salvage topsoil for reuse onsite.
- Identify the area for stockpiling on the drawings.

Fill Materials: If onsite material is not available in sufficient quantity, Contractor shall purchase and haul in approved off-site materials.

Backfill:

- Backfill compaction work shall follow the recommendations of KDOT Section 210 (1990), unless directed otherwise by Engineering Geologist.
- Under Slabs & Walks: Only granular fills will be allowed beneath walks or slabs-on-grade. Sand is explicitly prohibited for use as a fill material.
- Backfill behind walls shall be free-draining crushed limestone at weep holes, wrapped with an acceptable, permeable geotextile fabric, topped with an 18" deep compacted soil cap.

- ❑ Drainage fill shall be a washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1 1/2" sieve and not more than 5% passing a No. 4 sieve.

Piping Trench Backfill: Use CS-1 materials (pea gravel is acceptable, but NOT sand).

- ❑ Backfill in utility trenches where rollers cannot reach shall be compacted with power tampers in 6-inch (maximum) layers to meet specified type of compaction.

Topsoil: Include the following in the contract documents:

- ❑ Topsoil must be of good quality, friable loam, free of extraneous material and plant growth, and shall not consist of more than 30% clay.
- ❑ A minimum of six inches (6") of topsoil shall be spread in all designated areas.
- ❑ All areas to receive topsoil that are densely compacted, glazed or "hard-panned," shall be roughed-up or scarified prior to topsoil placement.

Excess Cut Materials: Haul and dispose excess cut materials at off-site locations, per governing regulations, unless onsite locations are made available by the University.

TERMITE CONTROL – 02361

Termite control treatments shall be provided under all slab-on-grade construction.

UTILITY TUNNELS – DESIGN GUIDELINES

General: Each new building or addition shall be required to extend the campus utility tunnel system as necessary to convey appropriate site utilities to it, as part of it's scope of work.

- ❑ In some cases, the University may determine that the location or character of the building or addition does not require utility tunnel extensions.
- ❑ Identification System: KU has developed a system for identifying utility tunnel components, which shall be used on all projects. The University can provide site plans of existing tunnel designations, and shall assign appropriate designations to all new tunnel components. Designers shall show the designations for pertinent tunnel components, both existing and new, on drawings.

Design: Each new utility tunnel shall be designed to accommodate current and future utility needs those parts of the campus served by it, as determined by the University.

Designers shall consult with DCM, FO and NTS to determine the best location for tunnels. DCM's Planning staff shall also be consulted to identify future proposed building or

infrastructure locations, which shall be shown on proposed tunnel site plans, to verify that the needs of both have been coordinated.

Construction documents shall include dimensioned site plans to clearly locate all tunnel segments, cross-sections and appropriate details. Drawings shall also include vertical and horizontal profiles of each tunnel segment, showing all existing structures and utility lines crossing or abutting tunnel segments.

- ❑ **Minimum Interior Dimensions:** Tunnels shall be designed to be a walk-through system, and shall typically have a 7' clear interior height. Tunnels shall be not less than 7' wide. This width is intended to accommodate not less than a 4' interior clear walkway width between the anticipated utility lines and their support systems. This assumes a 2' width along one side for wet piping, and a 1' width along the opposite side for dry piping/conduits. If light fixtures are ceiling-mounted, the 7' clear height is from their bottom surface.
 - ❑ **Profile:** Tunnels are typically recilinear, but other profiles will be considered on a per-project basis.
- ❑ **Utility Lines in Tunnels:** Tunnels are intended to accommodate the following utility lines: Steam, condensate, chilled water and primary electrical lines. Domestic water, irrigation water, sanitary sewers, storm sewers and gas lines are NOT to be routed within tunnels.
 - ❑ **Telecommunication Lines:** Telecommunication lines are typically NOT to be routed within utility tunnels, as determined by NTS and DCM on a per-project basis. The preferred alternative is to construct a concrete-encased conduit ductbank which is poured directly adjacent to the campus utility tunnels, and which terminates in pullboxes or telecommunication rooms that are adjacent to tunnel entry points. Refer to **Division 17** for additional requirements.
- ❑ **Existing Utility Lines:** When new tunnels cross-over existing underground utility lines, the existing lines shall be relocated as required as part of the new tunnel's project, to accommodate the desired tunnel routing.
 - ❑ Existing or new cross-over utility lines shall not be penetrate tunnel walls, unless it is technically infeasible to relocate them. If cross-over lines are specifically approved by KU to penetrate tunnel walls, the Designer must detail their points of penetrations to be watertight, using sleeves, sealed fittings or other means.
- ❑ **Structural Loads:** Tunnels shall be designed to withstand vehicular traffic loading over the top of them, whether exposed on grade as a sidewalk, street or parking area, or fully buried below grade.
- ❑ **Maintenance Access & Egress:** Tunnels shall be accessible from standard swing doors to the greatest extent feasible. On-grade entrances with sloped hatches and sloping walkways are preferred. DCM or FO personnel can illustrate by some existing examples, such as the Mississippi Street tunnel entrance. Tunnel walking surfaces shall be level or uniformly sloped. Where changes in height occur abruptly or when access is from above or below, stairs shall be used in lieu of ladders or manholes to provide access.
- ❑ **Material Access:** Tunnels and access points shall be designed to accommodate easy access of materials and equipment into any segment, for maintenance or new construction purposes. If 20' sections of piping cannot be carried into each tunnel segment through nearby pedestrian access points, piping access shall be provided into each tunnel segment by access ports, trench grates or similar means.

- ❑ Security: All entry points for pedestrians or materials shall be secured, either by locks or mechanical fasteners. Locksets on doors into tunnels shall be locked on exterior at all times, but operable from the interior at any time (no interior keyed locks or deadbolts).
- ❑ Safety: Utility tunnels shall be designed in compliance with OSHA standards regarding "confined spaces".
 - ❑ Per KU-FO policy, contractors and consultants working within tunnels are advised that nobody is to enter the tunnels alone, and they are to wear hardhats and carry a flashlight and two-way radio or cell phone with them at all times.
 - ❑ Contact the KU Facility Operations Safety Officer prior to initial tunnel access, to review KU's tunnel access safety policy. Verify and complete any training, permits or documentation that may be required by FO before entering tunnels.
- ❑ Drainage: Tunnels shall have a means of conveying intruded water to drains spaced at appropriate intervals that daylight onto grade. If tunnel segments are below-grade, provide sumps and sump pumps which direct intruded water out onto grade. Detail outlets so they will not be damaged by mowing equipment or vehicular traffic, and to exclude small animals from entering tunnel system.
 - ❑ One option for internal drainage is to slope tunnel floor $\frac{1}{4}$ " per foot to one side, and provide a 1-1/2" deep x 3-1/2" wide cast-in-place gutter along the low side of the tunnel floor, directing water to drains or sumps.
- ❑ Ventilation: Provide by natural or mechanical means, as appropriate for conditions expected within each tunnel segment.
- ❑ Lighting & Power: Provide general illumination throughout all sections of utility tunnels, operable by internally-illuminated light switches at each access point into tunnel.
 - ❑ Light fixtures shall be corner-type, mounted above the "dry piping" side of the tunnel, with a polycarbonate lens and fluorescent bulbs. Space fixtures at intervals adequate for wayfinding and egress. Recommended lighting levels are 1 fc minimum, and 5 fc average. All lighting shall be fed from a circuit that has emergency backup power.
 - ❑ Ground-fault duplex outlets shall be provided at 100' maximum spacings within tunnels, fed by 20 amp circuits that are independent of the lighting system. Install duplex outlets adjacent to light fixtures as much as possible.
- ❑ Telephones: Provide campus-only telephones at major nodes and adjacent to equipment rooms, for use by maintenance personnel. Phones shall be secured in a waterproof box, with a lock keyed to KU's maintenance keys.

Construction: Utility tunnels shall be constructed of materials and configurations deemed appropriate for each application.

- ❑ Tunnels shall be constructed of either cast-in-place concrete, or precast concrete.
 - ❑ Corrugated metal and metal deck framing materials are NOT allowed in new tunnels.
- ❑ Utility Support Systems: Support components and fasteners shall be of non-corrosive materials or of hot-dipped galvanized steel. Utility lines are not to be hung from tunnel ceilings, though light fixtures and duplex outlets may be ceiling-mounted.

- ❑ Waterproofing: Tunnels shall have dampproofing applied on below-grade wall surfaces and, if below grade, on top surfaces. Tunnels in areas where the water table or groundwater is expected to consistently occur above the tunnel's floor elevation, or where a sidewalk is poured above the tunnel roof, shall receive waterproof membranes on all below-grade surfaces, including bottoms.
 - ❑ ALL below-grade construction joints shall be detailed to have continuous waterstops (if cast-in-place concrete) or mastic seals (if precast concrete) applied within the joint, to limit groundwater or surface water intrusion.
- ❑ Tunnel Terminations at Buildings: Detail so that tunnels are separated from buildings with one-hour fire-rated doors and walls. All penetrations through termination walls shall be firestopped. Doors shall have locksets and smoke gasketing. Provide sleeves through termination walls for future utility lines, as directed by DCM.

Steam And Condensate Piping Insulation In Tunnels: Designers shall specify preformed Mineral-Fiber (fiber glass) insulation per ASTM C547, type I in thicknesses identified below. Install field-applied, 30-mil minimum, PVC fitting covers and insulation jacketing per ASTM D1784.

- ❑ Insulation thicknesses greater than 2-inches shall be built-up of multiple-layer installations, with each layer secured separately. Joints in multiple layer installations shall be staggered.
- ❑ Submittals and Quality Control sections of the specification should specifically include the "mockup" requirements identified within Masterspec Section 15083 for Contractor demonstrations of quality of insulation applications and finishes.
- ❑ Other product and execution requirements should be per Masterspec Section 15083.
- ❑ Tables – Required Pipe Insulation Thicknesses:

Pipe Size (Inches)	Total Insulation Thickness (Inches)
1	1-½
1-½	2-½
2	2-½
3	3
4	3
6	4

Pipe Size (Inches)	Total Insulation Thickness (Inches)
8	4
10	4
12	4
14	4
16	4
>16	4 (min.)

SITE UTILITIES – DESIGN GUIDELINES

Construction Profile Drawings: Designers shall include profile drawings in the construction documents for new water service, sanitary sewer and storm sewer piping systems.

- ❑ Profile drawings shall show new lines in vertical relationship to all other piping or underground structures that they cross, to scale and to correct elevation for each.

- ❑ Profiles shall also show all thrust blocks required at vertical changes in direction in water service lines, and reference appropriate details.

Piping Trench Backfill: Refer to Earthwork - 02300 for requirements.

Flush-Grade Valve Boxes: All boxes or enclosures for accessing valves in underground utility piping shall be embedded in a 5-1/2" thick cast-in-place concrete collar, set flush to adjacent grades and extending 6" on all sides around valve box.

Manholes and Valve Boxes: Do NOT locate these structures in steps or walks. If existing manholes or valve boxes are to occur in new steps or walks, review optional locations with DCM and adjust as agreed upon.

Plastic Lines: All plastic utility lines, such as sanitary sewers, low-voltage electrical, irrigation systems and gas lines, shall be wrapped with trace wire.

Piping & Supports for Underground Utility Lines thru Exterior Walls:

- ❑ All sanitary and storm sewers leaving the building shall be cast iron for a distance of at least 10 feet from the building, or for the full distance if in filled or unstable ground. Where cast iron pipe enters or leaves the building, a sleeve shall be provided in the wall and sealant shall be installed between the sleeve and pipe to allow for movement.
- ❑ All services leaving the building which are laid on filled earth, including sanitary sewer, storm sewer and water main, shall be supported at each joint and elbow on reinforced concrete beams until the pipe rests on solid undisturbed soil.
- ❑ Concrete beams shall bear on a ledge or pocket in the foundation wall and on at least five feet of solid undisturbed earth beyond the excavation. Construction of beams shall be the responsibility of the Mechanical Subcontractor. Ledges or pockets in foundation walls shall be provided by the contractor responsible for constructing those walls.
- ❑ The Mechanical Subcontractor shall have complete responsibility for proper installation of all exterior underground piping installed by him, shall warranty these lines against breakage and shall be liable for all damages, repairs, and replacement caused by settling of pipe or backfill one year warranty period specified in the General Conditions.

WATER DISTRIBUTION – 02510

System Ownership and Authority: At the outset of design, the designer shall determine, through discussions with KU personnel, if water service extensions are to be made from a source that is owned by the University or from a source that is owned by an outside authority. Subsequent design criteria and specification editing will be guided by this determination.

Water Metering: Refer to **Division 15** for metering and backflow prevention requirements.

Materials: Water distribution pipe to buildings may be one of the following.

- Lines 4" Diameter and Greater: AWWA cement-lined ductile iron.
- Lines less than 4" Diameter: Annealed Type K copper.
- The use of polywrap or PVC piping is not allowed on underground water lines.

Thrust Blocks: All water services lines shall have cast-in-place concrete thrust blocks provided at all changes in direction, both horizontal and vertical. Thrust blocks shall be engineered for each condition and detailed by Designer on construction drawings.

Steam Lines: Direct-buried steam lines are NOT acceptable. Steam lines shall be located in accessible tunnels.

Fire Hydrants: All fire hydrants shall be painted OSHA yellow.

SANITARY SEWERAGE – 02530

Materials – Beneath Buildings & Structures:

- Cast iron piping (Class 500).
- Extend cast-iron piping to at least 5' outside of building's exterior walls.
- No other materials will be acceptable under buildings.

Materials – Outside Buildings: The university will allow the use of the following, as indicated by the A/E for each project.

- Plastic pipe: ANSI/ASTM D3034-89, type PSM, SDR 35, polyvinyl chloride (PVC) material.
- Cast iron piping (Class 500).
- Vitreous clay piping (VCP) will not be allowed.

Joints: Bell and spigot joints shall be used; no-hub joints are NOT permitted.

Manholes: Provide a manhole at each point of connection of new lines to existing lines, and at changes in direction of underground lines.

Discharge Monitoring Flume: Designers shall consult with KU's Environment, Health and Safety (EHS) office to verify if a discharge monitoring flume shall be required for those projects that may carry sanitary wastes other than those from standard toilet or locker room sources. Comply with EHS and City of Lawrence recommendations or requirements.

NATURAL GAS DISTRIBUTION – 02553

General: The university is provided natural gas service by Kansas Public Service. All extensions of gas service lines from KPS gas mains shall be provided by KPS, to within immediate proximity of new building.

STEAM DISTRIBUTION – 02555

General: Direct-buried steam or condensate lines are NOT acceptable.

STORM DRAINAGE – 02630

General: Runoff from new roofs shall be discharged through underground storm sewer systems, unless otherwise approved or directed by the University.

Storm Water Detention: The City of Lawrence Stormwater Ordinances shall be met on all projects, unless otherwise directed or approved by the University. Copies of those ordinances may be obtained by contacting the City Engineer of Lawrence.

Materials: Reinforced concrete pipe (RCP) or poly-vinyl chloride (PVC) piping may be used.

- Storm sewers shall be RCP for sizes 8" diameter and larger.
- Storm sewers smaller than 8" may be cast iron or, if the area is not rocky, PVC piping (Schedule 80, SDR 35 minimum).
- Vitreous clay piping (VCP) is NOT an acceptable material for storm drainage systems.
- Corrugated Metal Pipe (CMP) is discouraged, but may be permitted on a case-by-case basis, as approved by the Director of DCM.

Grates: Designers shall carefully select all storm water structures and grates to avoid hazardous conditions within areas subject to pedestrian or bicycle traffic.

- Specify grates and structures that exclude bicycle tires, wheelchair tires and high heels in areas subject to that traffic. All grates and drains in areas of pedestrian traffic shall be ADA-compliant.

HOT- MIX ASPHALT PAVING – 02741

Asphaltic Concrete Base Course: KDOT Section 1103, Mix BM-2B

Asphaltic Concrete Surface Course: KDOT Section 1103, Mix BM-2

Gravel Surfacing Aggregate: KDOT Section 1111, Type SA-1 or SA-X

Base Aggregate: KDOT Section 1111, Type AB-3

LAWN SPRINKLER PIPING – 02813

General: Underground lawn sprinkler systems may utilize automatic pop-up heads or may provide quick disconnects for hoses and sprinkler devices to be manually attached by the Owner. Verify which types of systems are appropriate for each project with the University's Landscape Architect.

Lawn Sprinkler System Piping: PVC, Schedule 40, rated for 160 psi.

Backflow Preventers: Provide on each irrigation system water service line. Locations inside buildings are preferred to exterior pits.

Sprinkler Components: Limited to products produced by Weathermatic only.

Controls: Review options for including KU's central building automation control system (BACS) components as part of sprinkler system controls with KU Landscape Architect, FO and DCM personnel.

LAWNS AND GRASSES – 02920

Seed and Sod: Project Designer shall edit KU's standard specification section, included herein as [Appendix A2.1](#), as applicable for each project and include it in the bid documents.

- All disturbed areas, fills and embankments shall be seeded and fertilized.
- Seeding rate varies and shall be determined in consultation with the University Landscape Architect.

EXTERIOR PLANTS – 02930

General: Plants shall be true to name and shall conform to the grading criteria set forth in the "USA Standards for Nursery Stock".

- The University Landscape Architect in the Office of Design and Construction Management shall inspect all plant materials prior to commencing with planting work. No plant excavations shall be undertaken by the Contractor prior to the approval of the University Landscape Architect.
- Facilities Operations shall be consulted for location of underground utility lines, which must be taken into account in the excavation of the planting areas.
- Remove planting debris from project site.

Maintenance of Plantings: The Contractor shall be responsible for maintaining plants in healthy growing condition for a period of nine (9) months from the date of acceptance by the University Landscape Architect.

- Any plants which do not survive in good condition past this time period, as judged by the University Landscape Architect, shall be replaced at no additional cost to the University and warranted for an additional nine months from the date of their re-acceptance.

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