STATE UNIVERSITY CONSTRUCTION FUND

PROGRAM DIRECTIVES

DIRECTIVE 2-2 Issue date: September 2012

CAMPUS ROADS AND PAVEMENTS

1. General

   a. The purpose of this Directive is to outline the Fund's minimum requirements for the Consultant relative to the design and specification of roadways and pavements. Design guidelines for architectural and aesthetic aspects are covered by design vocabularies developed for individual Campuses by the respective master plans or as identified in project site programs.

   b. The objective is to achieve a safe, durable and maintenance free installation of pavements in keeping with local considerations, budget concerns, and maintenance operations.

2. Policy

   a. It is the Fund's objective to integrate the use of generally accepted engineering standards for safe and long-lasting design of pavements, geometric roadway design, traffic control devices, and other roadway appurtenances in the construction of new and rehabilitated Campus pavements.

   b. Adherence to such standards shall be the responsibility of the design consultant. Information contained within this Directive has been compiled in an attempt to demonstrate design standards preferred by the Fund, although it shall be the consultant's responsibility to communicate design criteria pertinent to the specific project application.

3. Planning

   a. The Consultant shall review and discuss with the Campus and Fund the Campus' vocabulary and standards. Issues related to the design of Campus roadways and pavements shall include, but are not limited to: roadway and parking layout, traffic calming, handicap accessibility and parking, stormwater management and runoff reduction and control, sight distance, emergency and service vehicular destination and access, fire lanes, clear areas, snow removal, traffic control and signage, intersection operation, driveway and intersection locations, pedestrians desire lines and conflicts with vehicular movements, bus or transit destination and routes, etc.

b. Where required, the Consultant shall consult with and/or obtain approval by authorities having jurisdiction. Although identified during early stages of design, these approvals shall be secured prior to Pre-Bid Approval and shall identify those requirements, including permits, fees and notification, specific to the construction phase. Approvals and consultations shall include, but are not necessarily limited to, State, County or local highway departments, local fire departments, and railroads. See Directive 1D-3 Governing Agency Submissions.

c. The Consultant is required to perform field investigations and studies to documents existing conditions more thoroughly. See Directive 1C-12 Survey Mapping and Utility Locating.

4. Standards

a. Consultants performing engineering design of sitework, including roadways, parking and associated utilities are to review and survey existing and planned traffic circulation systems with regard to the need for function, regulation and control. This survey shall include consultation with the Campus personnel to determine needs, compatibility with Campus Master Plan, identification of available Campus standard and preferences, and potential permitting requirements associated with intended construction. Unless included in the lump sum fee or the Schedule B of the Consultant's Agreement, the services and fees related to surveying existing conditions may be provided through extra compensation when approved by the Fund.

b. Where traffic problems are unusually complex, the Consultant may propose to the Fund that the services of a qualified traffic engineering consultant be secured to assist in the development of recommendations.

c. Consultants shall use the following as a guide to horizontal and vertical roadway alignment design: "*Guidelines for Residential Subdivision Street Design: A Recommended Practice*" as published by the Institute of Transportation Engineers (ITE) for local and collector streets, and "A Policy on Geometric design of Highways and Streets (2011)" as published by the American Association of State Highway and Transportation Officials (AASHTO).

d. The use of rigid and flexible pavements shall be reviewed with the Campus and Fund. Considerations should be given to use, longevity and costs. Concrete pavements and slabs shall be considered in significant loading areas and fuel handling areas.

e. The use of porous pavements shall be reviewed with the Campus and the Fund. Considerations should be given to the first costs, operational and maintenance requirements, suitability and location, finished aesthetic look, supplemental surface drainage, and stormwater benefits.

f. Traffic Control signs and devices shall be in accordance with *The National Manual of Uniform Traffic Control Devices (MUTCD).*

g. Wayfinding signage shall be discussed with the Campus and Fund and shall be in accordance with master plan and Campus vocabulary.

h. Accessibility by and design issues of facilities for persons with disabilities shall be constructed in accordance with applicable sections of the Americans with Disabilities Act (ADA), and the American National Standards Institute (ICC/ANSI), and the Building Code of New York State.

i. Fire fighting apparatus access roads and areas as required by the Fire Code of New York State shall be reviewed with the Campus, local fire department and the Fund. This shall include fire apparatus access during construction.

5. Design Criteria

The Engineer shall consider the following as applicable to the design of campus roadways and pavements:

a. While taking into account ADA requirements and existing pedestrian desire lines, pedestrian-vehicular conflict should be minimized. Crosswalks should include curb ramps, pavement striping or contrasting surface, lighting, passive interruptions and traffic calming as compatible with Campus standards, and appropriate signage. Crosswalks shall be located where there is adequate stopping sight distance for vehicles on road system.

b. Local traffic circulation patterns should not have to rely on extensive traffic regulations in order to function efficiently. Development of controls should be sufficient to provide circulation amenities necessary to keep enforcement to a minimum.

c. Intersections should meet at a 90° angle where practical and angles less than 70° should be avoided. Intersection design needs to consider adequate sight distance. Safe approach speed involves safe stopping sight distance on vertical and horizontal curves, beginning approximately 100 feet from the intersection plus clear sight distance.

d. Intersections shall be designed with a flat grade and properly drained, preferably with drainage inlets located immediately upgradient of the intersection all appropriate directions.

e. Sight lines at intersections shall be verified and shall not be obstructed by landscaping, signage or other site amenities. Design values for safe stopping sight distance shall be calculated for wet pavement conditions.

f. The horizontal alignment of Campus roadways should be designed to discourage unsafe speeds through the use of curvilinear alignment and discontinuities on road system.

g. With respect to roadway curvature, a minimum tangent between reverse curves shall be 50 feet for minor roadways and 100 feet for collectors such as loop or perimeter roads. A minimum centerline distance of 300 feet (for 30 mph) is recommended for Campus collector roadways and 180 feet for minor roadways, depending of speed, gradients, and other pertinent design factors.

h. A minimum pavement width must allow for safe passage in each direction. Paved travelways (12 feet) in width shall be separated with double, yellow striping. Shoulders (2 to 5 feet) shall be provided on roadways without vertical curbing and are generally limited in rural applications. Where curbs are provided, an appropriate offset (0.5 to 2 feet) shall be included between the outside of the travelway to the face of curb. Wider shoulder widths should be reviewed if bicycle or jogging lanes are desired. All other pavement widths shall be designed to accommodate Campus snow removal techniques.

i. A typical curb height shall be 6 inches. For installations where pedestrian travel is restricted and more frequent asphalt topping is anticipated or in areas where peak demands may invite vehicle/landscape violations (student unions, residence halls) the curb height can be increased to 8” to prevent vehicular mountings.

j. The vertical alignment of Campus roadways will be more economical and attractive if vertical alignments closely adhere to topography, where practical. Such design may minimize cut and fill as well as excessive embankments.

k. Maximum grades are recommended between 8% and 10%, although campuses which experience more severe icing the maximum preferred grade shall be 8%. The recommended maximum grade within 100 feet of an intersection shall be 5%. Minimum grades required for proposed road drainage and construction shall

be 2%. Grades less than 2% shall be minimized; the finished surface as permissible by NYSDOT tolerances shall not result in inappropriate grades and or cross-slopes nor extend above the grade intended by design.

l. Stormwater conveyance systems shall be sized to interface with the available capacity of the MS-4 or other discharge point. Unless directed otherwise, stormwater conveyance systems shall be designed to accommodate a 10-year design storm.

m. Inlets shall be properly located as to ensure proper surface drainage and not result in prolonged durations of ponding along campus roads, at pedestrian crosswalks, or within parking areas.

n. The design of off–street parking shall be specific to the project and its location. The capacity, configuration, access, lighting and landscaping, and maintenance shall be reviewed by the Fund and Campus, acknowledging Campus specific vocabularies and master plans.

o. In general the parking stall orientation, internal sight distances, circulation patterns, and pedestrian movements within a parking lot and in relation to the users' destination shall be such that the appropriate use of the lot is safe, clear and durable. Where practical, aisles shall be oriented so that pedestrians can approach their destination without weaving between parked cars.

p. The use and location of raised versus striped islands should be reviewed. Light pole bases within parking areas shall be protected with a raised concrete base and shall be located within islands or at intersections of stall striping. These features shall be reviewed in consideration of snow removal methods.

q. Grades within parking areas shall consider earthwork activities and sight distance at access locations as well as proper grading and drainage. Grades within handicap parking stalls and access aisle shall not exceed 2 percent. Creation of low points and sheet flow across lots shall consider pedestrian movements as related to icing, ponding or splashing.

r. The layout, width and selection of materials for sidewalk construction, together with desire lines and specific snow removal methods, shall be reviewed with Campus personnel. The use of salt may be a factor in discouraging the use of concrete. Snow removal by means of heavier vehicles shall warrant the construction of a more substantial and wider section.

s. Sidewalk and roadway design shall consider separated or integrated bicycle or jogging paths. These features shall be discussed with the Fund and Campus personnel in response to Campus planning and vocabulary.

t. The use of underdrains shall be encouraged in order to extend the life expectancy of campus pavements.

u. Safety, aesthetics and Campus standards shall be reviewed and discussed specific to the use and installation of guiderail. The use of guiderail along Campus roadways shall be reviewed in accordance with design recommendations of the NYSDOT.

v. Graphic Design

1) Roadway layout shall use standard stationing system, typically 50-feet increments.
2) Plans of roadways shall be minimum 1" = 50', provided sufficient detail can be conveyed.
3) Roadway curves shall be described by degree of curvature, and/or dimensions in feet for radius.
4) Show typical and special roadway sections, including full cross-sections.

6. Material Choice and Specifications

a. Ease of maintenance under local weather conditions, with particular attention on pavement life expectancies of 20 years in combination with expectant vehicular loading, drainage and snow removal are the principal considerations in determining specified materials.

b. Where applicable, materials and quality control shall be in accordance with New York State Department of Transportation Materials and Specification and materials shall be readily available locally.

c. Asphalt pavements shall be surfaced with hot mix asphalt concrete in accordance with materials and methods from the *New York State Department of Transportation Standard Specifications for Construction Materials and Materials*, latest edition.

1) Light-duty pavements shall be identified as having minimal traffic loadings and no expected emergency or service vehicles.

2) Standard pavements shall be pavements having moderate traffic loadings (including pedestrian paths with expectation of emergency or service vehicles including snow removal), parking areas, service roads, and Campus roads.

3) Use of heavy-duty pavements shall be considered along main Campus roadways and loading dock areas

d. Design and composition of flexible pavement sections shall be reviewed based on vehicular loadings, field and soil conditions. In general:

1) Light-duty pavements shall consist of 9 to 12 inches compacted granular subbase, 2 inches asphalt binder course, and 1 ½ inches asphalt top course.

2) Standard pavement section shall consist of a minimum of 12 inches compacted granular subbase, 2 ½ to 3inches asphalt binder course, and 1 ½ inches asphalt top course.

3) Heavy pavements shall be a minimum of 12 inches compacted granular subbase, 4 inches asphalt base course, 2-1/2 to 3 inches asphalt binder course, and 1 ½ inches asphalt top course, depending on field conditions and vehicular loading.

e. Subbase material shall be placed on subgrade material properly prepared in accordance with NYSDOT (regional sources and availability shall be considered). Granular subbase material, as well as the need for stabilization fabric, shall be selected in accordance with soil conditions and pavement design.

f. The following reflects the Fund's preference for curbing. These shall be reviewed in coordination with Campus standards:

1) Split face granite is generally the most desirable. The use of economy granite should be discussed.

2) Precast concrete curb is acceptable (as a value engineering option at Pre-Bid) and has the advantage of controlled fabrication with installation identical to granite curb.

3) When approved by the Fund, poured-in-place concrete curb, when finished and cured properly, should resist salt damage and freezing

temperatures. Linseed oil mixtures have proven successful in combating seasonal influences. The use of nosing rebar is recommended.

4) Pre-cast bumper blocks are useful in temporary situations where they are salvageable and can also be used in parking lots where there is no need for drainage containment or large scale snow removal operations, provided the installations are appropriately secured to pavements.

g. Rigid pavements shall be installed on the appropriate subbase material and provided with construction joints and reinforcing as required by design and intended use.

h. All concrete structures (precast or cast-in-place) and castings shall be sufficient for H-20 vehicle loading. Grates along roads shall be bicycle safe.

i. The use of premolded pavement marking is desired for symbols, crosswalk striping, stop bars, and pavement text.

j. A perforated HDPE underdrain trench wrapped in filter fabric is preferred over sock drains roadway applications.

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