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NAVFAC PTS-G20 (September 2022)  
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Preparing Activity: NAVFAC SUPERSEDING PTS-G20 (December 2018)  
  
PERFORMANCE TECHNICAL SPECIFICATION  
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SECTION G20  
  
SITE IMPROVEMENTS  
09/22

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NOTE: This section is intended to be used as a guide and contains requirements that are common to many different types of facilities; however, not all requirements and equipment items will be applicable to all projects. In addition, there may be special requirements for a particular project that are not addressed at all. The RFP preparer may have to incorporate additional information to address these special requirements in this PTS and corresponding Part 3 ESR. If the RFP preparer chooses to delete building elements that are not required for the project, do not change the remaining Uniformat paragraph designations (example - A102001). Uniformat designations are unique to the products they are assigned to. However, the subparagraph numerical extensions (example – 1.2 or a,b,c) of the Uniformat designations may change if subparagraphs are deleted.  
  
This guide specification is formatted utilizing Uniformat II, an industry recognized standard, ASTM E 1557. When the RFP preparer chooses to add a paragraph that does not apply to an existing building element already included in the specification, refer to the Uniformat/WBS located on the NAVFAC Design-Build Website for a listing of Uniformat II designations and definitions.  
  
NOTE: The RFP preparer may view or hide the criteria notes in this PTS section by modifying the WORD preferences for "Hidden text". To view the criteria notes, choose "File" then "Option". Click "Display" then check the "Hidden text" box under "Always show these formatting marks on the screen". In the same section, check the box for "Print hidden text" under "Printing options" to print the criteria notes.  
  
NOTE: For hangar projects, consult Project Manager on airfield pavement design and specification. This section does not address airfield pavements or pavement markings. State Department of Transportation standards are not acceptable for airfield pavements.  
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NOTE: The Table of Contents is intended for navigation purposes only for the RFP writer and should not show up in the printed document.  
  
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**G20 GENERAL**

RFP Part 3 including the Engineering System Requirements (ESR) provide project specific requirements. The RFP Part 4, Performance Technical Sections (PTS) provide generalized technical requirements that apply to multiple facility types and include more requirements than are applicable to any one project. Therefore, only the RFP Part 4 requirements that apply to the project and further define the RFP Part 3 project specific requirements are required.

**G20 1.1 DESIGN GUIDANCE**

Provide the design and installation in accordance with the following references. This Performance Technical Specification (PTS) adds clarification to the fundamental requirements contained in the following Government Standards. The general requirements of this PTS section are located in PTS Section Z10, *General Performance Technical Specification*.

Industry standards, codes, and Government standards referenced in the section text that are not found in the [Unified Master Reference List (UMRL)](https://www.wbdg.org/ffc/dod/unified-master-reference) in the [Federal Facility Criteria (FFC)](https://www.wbdg.org/ffc/federal-facility-criteria) at the [Whole Building Design Guide (WBDG)](https://www.wbdg.org/) website, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the referenced standard at the time of Contract award.

**G20 1.1.1 Industry Standards and Codes**

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

AMERICAN SOD PRODUCERS ASSOCIATION (ASPA)

U.S CONSUMER PRODUCT SAFETY COMMISSION, PUBLICATION NO. 325

Refer to UMRL for reference designation identification.

**G20 1.1.2 Government Standards**

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

|  |  |
| --- | --- |
| FS RR-F-191 | Fencing and Wire and Post Metal (and Gates, Chain-link Fence Fabric, and Accessories) |

FACILITIES CRITERIA (UFC)

|  |  |
| --- | --- |
| UFC 1-200-01 | DoD Building Code (General Building Requirements) (A reference in this PTS section to UFC 1-200-01 requires compliance with the Tri-Service Core UFCs that are listed therein, which includes the following significant UFC(s): UFC 1-200-02, High Performance and Sustainable Building Requirements UFC 3-201-01, Civil Engineering UFC 3-201-02, Landscape Architecture UFC 3-210-01, Low Impact Development UFC 3-220-01, Geotechnical Engineering |
| UFC 3-250-01 | Pavement Design for Roads and Parking Areas |
| UFC 3-270-01 | Asphalt Maintenance and Repair |
| UFC 3-270-02 | Asphalt Crack Repair |
| UFC 3-270-03 | Concrete Crack and Partial Depth Spall Repair |
| UFC 3-270-04 | Concrete Repair |
| UFC 4-022-02 | Selection and Application of Vehicle Barriers |
| UFC 4-022-03 | Security Fences and Gates |

**G20 1.2 QUALITY ASSURANCE**

**G20 1.2.1 Qualifications of Tree Location Contractor**

Contractor is required to be a professional tree moving company holding Landscape Contractor's license in the state where the work is to be performed and have a minimum ten years of tree relocation experience. Contractor must be a Certified Arborist certified by the International Society of Arboriculture. Arborist is required to oversee all tree moving operations during construction.

**G20 1.2.2 Qualifications of New Landscape Contractor**

Construction company must hold a Landscape Contractor's license in the state where the work is to be performed and have a minimum five years of landscape construction experience.

**G20 1.3 PERFORMANCE VERIFICATION AND ACCEPTANCE TESTING**

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Part 2 Section 01 33 10.05 20, *Design Submittal Procedures*, and Part 2 Section 01 33 00.05 20, *Construction Submittal Procedures*, for additional requirements.

Verify satisfactory performance via Performance Verification, as detailed in this section of the RFP. Verify satisfactory performance also via testing as detailed in the paragraph, Field Quality Control, in UFGS Specification Sections utilized.

**G20 1.3.1 Subgrade Preparation Performance Verification**

Perform subgrade preparation in accordance with PTS Section G10. If required by the Designer of Record, perform proof rolling. Perform proof rolling in the presence of the Contracting Officer. Rutting or pumping of material is required to be undercut and replaced with satisfactory soil materials as defined in Section G10, *Site Preparation*.

**G20 1.3.2 Base Course Performance Verification**

**G20 1.3.2.1 Aggregate Base Course**

a. Sampling: ASTM D75/D75M.

b. Gradation: ASTM C136.

c. Thickness: Confirm in-place compacted thickness. Acceptable tolerances are plus or minus 0.5 inches (13 mm). One test for every 500 square yards (418 square meters); minimum 2 tests.

d. Density: ASTM D1556 or ASTM D6938. One field test for every 1000 square yards (836 square meters); minimum 2 tests. ASTM D1557, Method A, B or C; one laboratory test for the project.

e. Visual: Provide smooth surface with no ruts.

**G20 1.3.2.2 Other Types of Base Courses**

For other types of base courses, provide field testing in accordance with the SHS.

**G20 1.3.3 Bituminous Concrete Pavement Performance Verification**

a. Visual: Provide finished surface that is uniform in texture and appearance and free of cracks and creases.

b. Sampling: ASTM D979.

c. Job Mix: Determine gradation and bitumen content. One sample for every 400 tons (362,500 kilograms); minimum 1 test.

d. Thickness: ASTM D3549. Confirm in-place compacted thickness. Acceptable tolerances are plus or minus 0.5 inches (13 mm) for bituminous base course and plus or minus 0.25 inches (6 mm) for bituminous surface course. One test for every 500 square yards (418 square meters); minimum 2 tests.

e. Surface Smoothness: Test surface smoothness by using a 10 foot (3 meter) straightedge in transverse and longitudinal directions to pavement. Acceptable tolerances are plus or minus 0.25 inches (6 mm) for bituminous base and surface courses.

f.• Density: Conduct field density of in-place compacted pavement in accordance with ASTM D2950 and correlated with ASTM D1188 or ASTM D2726/D2726M. One field test for every 1000 square yards (836 square meters); minimum 2 tests. One laboratory test for the project.

**G20 1.3.4 Portland Cement Concrete Pavement Performance Verification**

a. Visual: Provide finished surface that is uniform in texture and appearance and free of cracks.

b. Sampling: ASTM C31/C31M.

c. Thickness: Acceptable tolerances are plus or minus 0.5 inches (13 mm). One test for every 500 square feet (418 square meters); minimum 2 tests.

d. Surface Smoothness: Test surface smoothness by using a 12 foot (3.6 meter) straightedge in transverse and longitudinal directions to pavement. Provide finished surfaces of the pavements with no abrupt change of 0.71 inch (18 mm) or more.

e. Strength: Samples for strength tests of each mix design of concrete placed each day are required to be taken not less than once a day, nor less than once for each 100 cubic yards (120 cubic meters) of concrete, nor less than once for each 5000 square feet (500 square meters).

1) Compressive Strength: ASTM C39/C39M. Make five test cylinders for each set of tests. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Determine each strength test result by the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 500 psi, take a minimum of three ASTM C42/C42M core samples from the in-place work represented by the low test cylinder results and test. Consider the concrete represented by core test structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Retest locations represented by erratic core strengths.  
  
2) Flexural Strength: ASTM C78/C78M. Make four test specimens for each set of tests. Test two specimens at 28 days, and the other two at 90 days. Concrete strength will be considered satisfactory when the minimum of the 90-day test results equals or exceeds the specified 90-day flexural strength, and no individual strength test is less than the design strength. If the ratio of the 28-day strength test to the specified 90-day strength is less than 65 percent, make necessary adjustments for conformance.

f. Remove concrete not meeting strength criteria and provide new acceptable concrete at no expense to the Government. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

**G20 1.3.5 Concrete Joint Performance Verification**

Install a test section of 500 linear feet (150 m) at start of sealing operation for each sealant to be used. Obtain approval of test section by Contracting Officer prior to installing additional joint seal. Reject joint sealer that fails to cure properly, or fails to bond to joint walls, or reverts to uncured state or fails in cohesion, or shows excessive air voids, blisters, or has surface defects, swells, or other deficiencies, or is not recessed within indicated tolerances. Remove rejected sealer and reclean and reseal joints.

**G20 1.3.6 Topsoil Performance Verification**

Prior to planting design, provide a commercial soil analysis. Amend planting areas based on the soil test's interpretation, amendment type, and quantity recommendations (including soil nutrients and texture, with percentages shown). Use additional topsoil only in areas where soil analysis shows that the existing soil is inadequate for growth of plant materials.

**G20 1.3.7 Final Inspection for Planting and Irrigation**

Request the final inspection in writing at least 10 days prior to the last day of the planting and irrigation Establishment Period. The Landscape Contractor must attend the inspection with the Contracting Officer and document the inspection. The Landscape Architect-of-Record must also attend the inspection and provide the Contracting Officer with a letter certifying that the planting and irrigation is installed per the plans and irrigation coverage is correct and appropriate for optimum plant survival. At the end of the Establishment Period, remove stakes and guy cables.

**G20 1.3.8 Landscape and Irrigation Establishment Period and Guarantee**

Guarantee transplanted trees, newly planted vegetation and irrigation systems for a period of one year after the Contracting Officer's final acceptance. This acceptance, and the submittal of irrigation as-builts and controller charts, begins the Establishment Period. Replace trees, shrubs, and ground covers that die or have 20 percent or more of their crowns that die during planting operations or the guarantee period with healthy plants of the same species or variety during the appropriate planting season. The Landscape Architect-of-Record must, along with the Contracting Officer, attend, approve and document the start of the Establishment Period and document quarterly and final inspections. The Landscape Architect of Record must document quarterly and final inspections by submitting written reports with photographs to the Contracting Officer. During this period, perform tasks including, but not limited to: watering, mowing, overseeding, fertilizing, mulching, pruning, weeding, eradicating pests (rodents, rabbits, insects, mammals and fungus), restaking, adjusting guy wires, adjusting irrigation systems, maintaining erosion control materials, removing dead or broken branches by pruning in accordance with ANSI A300 Part 1, maintaining edging of planter beds, checking for girdling of trees, removal of trash and debris, and replenishing mulch to assure plant material is in a healthy and thriving condition or replace plant material at Contractor's expense. Reseed broadcast seeded or hydro-seeded areas that do not achieve the 95-percent coverage by the end of the Establishment Period by the same method and maintain an additional 120 days to ensure coverage requirements are met. Maintain turf in a manner that promotes proper health, growth, rich natural green color, and a neat, uniform, manicured appearance, free of bare areas, ruts, holes, weeds, pests, dead vegetation, debris, and unwanted vegetation that present an unsightly appearance. Mow weekly during the growing season and remove excess clippings.

**G20 1.4 DESIGN SUBMITTALS**

Submit design submittals in accordance with UFC 1-200-01, *DoD Building Code*(*General Building Requirements)*, Part 2 Section 01 33 10.05 20, *Design Submittal Procedures*, FC 1-300-09N, *Navy and Marine Corps Design Procedures*, and UFC 3-201-01, *Civil Engineering*.

In addition, UFGS sections listed below or in the body of the PTS text are to be used by the Designer of Record (DOR) as a part of the design submittal. If the UFGS products or systems are applicable to the project, the DOR is required to edit these referenced UFGS sections and submit them as a part of the design submittal specification. Edit the specification sections in accordance with the limitations stated in PTS Section Z10, *General Performance Technical Specifications*.

32 11 20, *[Base Course for Rigid][ and ][Subbase] [Select-Material] [for Flexible Paving]*

32 11 33.13, *Portland Cement-Stabilized Base Courses*

32 11 36.13, *Lean Concrete Base Course*

32 12 16.16, *Road-Mix Asphalt Paving*

32 13 13.06, *Portland Cement Concrete Pavement for Roads and Site Facilities*

32 13 43, *Pervious Concrete Paving*

32 14 13.13, *Interlocking Precast Concrete Unit Paving*

Provide sustainability submittals in accordance with Part 2 Section 01 33 29, *Sustainability Requirements and Reporting*.

**G20 1.5 CONSTRUCTION SUBMITTALS**

Submit a transplanting plan for projects which include transplanting trees. Submit the plan showing existing and proposed locations of transplanted trees. Include in the plan delineate methods and times for root pruning, digging, balling, removing, storing, transporting, planting, watering, and maintenance to ensure survivability. Include also in the plan equipment, anti-desiccant, and pesticides to be used. Provide a listing of the plant material to be transplanted by common name and botanical name as listed under "Nomenclature" in ANSI Z60.1; classification; caliper; and height.

Provide sustainability submittals in accordance with Part 2 UFGS Section 01 33 29, *Sustainability Requirements and Reporting*.

**G20 1.5.1 Transplanting Plan**

Submit a transplanting plan for projects which include transplanting trees. Submit the plan showing existing and proposed locations of transplanted trees. Include in the plan delineate methods and times for root pruning, digging, balling, removing, storing, transporting, planting, watering, and maintenance to ensure survivability. Include also in the plan equipment, anti-desiccant, and pesticides to be used. Provide a listing of the plant material to be transplanted by common name and botanical name as listed under "Nomenclature" in ANSI Z60.1; classification; caliper; and height.

**G20 1.5.2 As-Builts**

Submit a complete set of irrigation as-builts to the Contracting Officer, to include the recording of measurements onto a record set of full-size project irrigation plans. Indicate measurements for locating water meters, pressure supply lines at 100 foot (30 m) intervals, backflow prevention devices, rain/freeze sensors, valves (including quick couplers and hose bibbs), controllers (and control wire, if routed separately from pressure supply line); dimensioned from two permanent points of reference, such as building corners, sidewalks, and other permanent features.

**G20 1.6 ANTITERRORISM (AT) STANDARDS**

Incorporate the minimum AT standards indicated in UFC 4-010-01, *DoD Minimum Antiterrorism Standard for Buildings*.

**G20 1.7 PROJECT LIMITATIONS**

Prior to the start of design, determine the exact limit-of-work line for the project periphery, considering items such as, but not limited to, utility work, landscape areas, and laydown areas. See PTS G2050 for limits of landscape areas.

**G2010 ROADWAYS**

**G2010 1.1 PAVEMENT DESIGN**

Provide geometric and pavement design, including minimum pavement sections, in accordance with UFC 3-201-01, *Civil Engineering*, and the State Department of Transportation. Provide pavement calculations in accordance with FC 1-300-09N, *Navy and Marine Corps Design Procedures*. Provide any required additional pavement design to provide a complete and useable facility.

For pavements subject to aircraft traffic or aircraft ground support equipment traffic consult Government Civil Reviewer for design criteria and requirements. State Department of Transportation standards are not acceptable for airfield pavements.

**G2010 1.2 PAVEMENT AESTHETICS**

Provide surfaces consistent in color and finish.

**G2010 1.3 TRAFFIC CONTROL DEVICES**

Provide and install new traffic control devices (i.e., signs and markings) in accordance with the United States Department of Transportation Federal Highway Administration's *Manual on Uniform Traffic Control Devices* and their standard, "Rigid Sign Supports". Also provide new traffic control devices along/in the existing streets adjacent to the project site as necessary to provide complete traffic control to the new facilities.

**G2010 1.4 EXISTING UTILITY STRUCTURES**

Adjust existing utility structures to meet the new finished pavement grades as required.

**G201001 BASES & SUBBASES**

Prepare subgrade in accordance with Section G10, *Site Preparation*. Use geotextiles for separation or reinforcement in accordance with manufacturer's instructions. Provide base course under paved areas in accordance with the State Highway specifications (SHS) in the state where the project is located.

Place base course in accordance with the SHS for that particular base course and in layers of equal thickness with no compacted layer more than 6 inches (150 mm) thick. Compact base course at optimum moisture content to 100 percent ASTM D 1557 maximum dry density.

Where SHS are not available or applicable, the Designer of Record must utilize the UFGS Specification Sections referenced under paragraph 1.1.2 entitled "Government Standards" for the project specification. Submit these specifications in edited form as a part of the design submittal for the project.

**G201002 CURBS & GUTTERS**

Provide concrete curbs and gutters in accordance with the SHS and standards or as specified in UFC 3-201-01, *Civil Engineering*, whichever is more stringent. Where the SHS do not include concrete materials for curbs and gutters, provide concrete in accordance with the standard mix of the SHS for a minimum compressive strength at 28 days of 3500 psi (25 MPa) concrete.

**G201003 PAVED SURFACES**

Where SHS are not available or applicable, the Designer of Record must utilize the UFGS Specification Sections referenced under paragraph 1.1.2 entitled "Government Standards" for the project specification. Submit these specifications in edited form as a part of the design submittal for the project.

**G201003 1.1 PAVEMENT MIX**

**G201003 1.1.1 Bituminous Concrete Pavement**

Provide bituminous concrete pavement in accordance with the standard mix of the SHS based on the pavement design and vehicle loading indicated in this RFP.

**G201003 1.1.1.1 Bituminous Concrete Placement**

Provide bituminous concrete placement, including minimum temperature during placement, joints, and maximum lift thickness in accordance with the SHS. Compact bituminous concrete in accordance with the SHS, modified to 96 percent of maximum laboratory density.

**G201003 1.1.2 Portland Cement Concrete Pavement**

If reinforced, provide the welded wire fabric in conformance to ASTM A185. Provide bar reinforcement in conformance to ASTM A615/A615M, Grade 400 (Grade 60).

Provide concrete in accordance with the standard mix of the SHS for the design strength required by UFC 3-201-01, *Civil Engineering*, plus allowable deviations. Unless noted otherwise in Part 3 or Part 6, provide a minimum compressive strength at 28 days of 3500 psi (25 MPa) concrete.

If required for sustainability goal, provide Portland cement concrete pavement with a Solar Reflectance Index (SRI) greater than or equal to 29.

**G201003 1.2 JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT**

Provide joints in accordance with SHS and UFC 3-250-01, *Pavement Design for Roads and Parking Areas*. Install joints in a manner and at such time to prevent random or uncontrolled cracking. Locate joints to form a regular rectangular pattern. Wherever curved pavement edges occur, make joints to intersect tangents to curve at right angles.

**G201003 1.2.1 Expansion Joints**

Provide thickened edge expansion joints at the intersection of two rigid pavements. Use preformed joint filler, ASTM D1751. Provide filler that is compatible with joint sealer material. Hold preformed joint filler in position during concreting operations.

**G201003 1.2.2 Isolation Joints**

Provide thickened edge isolation joints by placing a 1/2-inch (12 mm) preformed joint filler (ASTM D 1751) around each structure that extends into or through the pavement before concrete is placed at that location.

**G201003 1.2.3 Contraction Joints**

Saw joint lines within specified tolerance, straight, and extend for width of transverse joint, and for entire length of longitudinal joint.

**G201003 1.2.4 Construction Joints**

If an emergency stop occurs remove the concrete back to location of transverse joint and install a construction joint.

**G201003 1.2.5 Joint Sealants**

ASTM D5893/D5893M; provide single component cold-applied silicone. Provide a self-leveling and non-acid curing silicone sealant.

**G201003 1.2.6 Preformed Compression Seals**

Use preformed compression seals in areas where silicone joint sealant does not perform, such as areas subject to water inundation, blasts, or constant/repeated fuel spillage.

ASTM D 2628. ASTM D 2835, for lubricant.

**G201003 1.3 PRIME COAT**

Use prime coat in accordance with the SHS. Use emulsified asphalt for prime coat materials.

**G201003 1.4 TACK COAT**

Tack coat is required for bituminous pavement overlays and on vertical cut faces of pavement patches. Provide tack coat in accordance with the SHS.

**G201003 1.5 PAVEMENT PATCHES**

Provide pavement patches for existing pavements where required for installation of utility trenches. Sawcut 12 inches beyond edge of trench. Provide thicknesses of pavement materials equal to or greater than the existing pavement section.

For spalls or repairs of existing concrete pavement, perform repairs in conformance with UFC 3-270-03, *Concrete Crack and Partial Depth Spall Repair*, and UFC 3-270-04, *Concrete Repair*. Provide spall repair materials that are either Rapid Setting Cementitious Concrete (RSCC), epoxy concrete, or polymer-modified Portland Cement (non-sag mortar) products specially formulated for spall repairs, with a proven record (in service at least three years) of satisfactory use under loading and environmental conditions similar to those at the location of intended use. Provide a manufacturer's data sheet and certificate supporting the satisfactory use to the Contracting Officer with the design. A product manufacturer's representative is required to be present during the initial two days of product application to verify that manufacturer's instructions for use are adhered to by the Contractor. Give the Contracting Officer 7 days notice prior to the initial application in order to be present.

**G201004 MARKING & SIGNAGE**

**G201004 1.1 MARKING**

Provide pavement markings in accordance with the SHS. Design materials for life expectancy of at least 3 years under an average daily traffic count per lane of approximately 9000 vehicles. Water based paints must have durability rating of at least 4 when determined in the wheel path area.

Provide a half-rate initial marking application on bituminous pavements. Provide the remaining application at the end of the normal curing period.

**G201004 1.2 SIGNAGE**

Provide signage in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).

**G201005 GUARDRAILS & BARRIERS**

**G201005 1.1 GUARDRAILS**

Provide guard (guide) rails in accordance with the SHS. Where the SHS do not include materials for guardrails, provide guardrails in accordance with the *AASHTO Roadside Design Guide*.

**G201005 1.2 BOLLARDS**

For bollards to prevent damage, provide minimum 4 feet height, 4 inch diameter steel pipe filled with concrete, painted, and embedded in a portland cement concrete foundation.

For bollards located at building entries or other high-visibility areas provide decorative bollards matching the design of the facility or consistent with the Base Exterior Architecture Plan (BEAP) and the Installation Appearance Plan.

Bollards for security are specified in Section G204004, "Security Structures".

**G201006 RESURFACING**

Adjust rims of existing utility structures to match proposed grades after resurfacing.

**G201006 1.1 SLURRY SEAL**

ASTM D 3910 and in accordance with the SHS.

**G201006 1.2 BITUMINOUS CONCRETE OVERLAY**

Remove old pavement by cold milling to depths required to provide new surface and leave underlying materials intact. Clean the pavement of excessive dirt, clay or other foreign matter with power brooms and hand brooms immediately prior to the milling operation.

Repair or replace damaged utility structures, valve boxes, or pavement that is torn, cracked, gouged, rutted, broken or undercut at no additional expense to the Government.

Provide bituminous concrete overlay produced from hot or cold recycling of the milled material or from virgin materials in accordance with the provisions of UFC 3-201-01, *Civil Engineering*, and the standard mix of the SHS based on the pavement design and vehicle loading as indicated in this RFP.

**G201006 1.3 CRACK SEALING**

Use fiber reinforced crack sealer for sealing cracks in asphalt pavement after milling and prior to resurfacing. Provide crack sealing conforming to the following requirements in UFC 3-270-01, *Asphalt Maintenance and Repair*, and UFC 3-270-02, *Asphalt Crack Repair*.

**G2020 PARKING LOTS**

Refer to Section G2010.

**G2020 1.1 PERMEABLE PAVEMENT**

Provide permeable concrete pavers of solid interlocking paving units complying with ASTM C936, resistant to freezing and thawing when tested according to ASTM C67, and made from normal-weight aggregates. If required for sustainability goal, provide permeable concrete pavers with a Solar Reflectance Index (SRI) greater than or equal to 29.

Provide pervious concrete in accordance with UFGS Section 32 13 43, *Pervious Concrete Paving*.

Do not use asphalt-surfaced porous pavement.

**G202001 BASES & SUBBASES**

Refer to Section G201001.

**G202002 CURBS & GUTTERS**

Refer to Section G201002.

**G202003 PAVED SURFACES**

Refer to Section G201003.

**G202004 MARKING & SIGNAGE**

Refer to Section G201004. Provide water-based paints only.

Mark to denote traffic lanes and parking spaces; mark in accordance with the requirements of UFC 3-201-01, *Civil Engineering*.

**G202005 GUARDRAILS & BARRIERS**

Refer to Section G201005.

**G202005 1.1 WHEELSTOPS**

Provide precast concrete wheelstops.

**G202006 RESURFACING**

Refer to Section G201006.

**G2030 PEDESTRIAN PAVING**

Locate new sidewalks such that they maintain continuity of pedestrian traffic to and from the existing sidewalks adjacent to the site(s).

**G203001 BASES & SUBBASES**

Provide as required by local standards or geotechnical report; refer to Section G201001.

**G203003 PAVED SURFACES**

**G203003 1.1 SIDEWALKS**

Provide sidewalks of Portland cement concrete pavement with 4 inches (100 mm) thick minimum or permeable pavement. Provide concrete and permeable pavement in accordance with Section G201003 and G2020, respectively. For PCC sidewalks, provide a broomed finish. Provide sidewalks of at least 5 feet (1.5 meters) wide, except that sidewalks connecting entry points of housing units to the housing unit's parking are required to be at least 36 inches (900 mm) wide. In housing areas, offset sidewalks paralleling streets to maintain a minimum grassed separation of 5 feet (1.5 meters) from the back face of the curb to the closest edge of the sidewalk.

Unless indicated otherwise, provide a transverse slope of 1/48. Limit variation in cross section to 0.25 inch in 5 feet (6 mm in 1.50 m).

Submit samples boards in accordance with ESR G2050 and PTS G2050 and finish schedule on final plans.

**G203003 1.1.1 Joints for PCC Pavement Sidewalks**

Provide contraction joints spaced at intervals equivalent to the width of the sidewalk. Provide 0.5 inch (13 mm) thick transverse expansion joints at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures; space expansion joints every 50 feet (15 m) maximum. Provide isolation joints by placing a 1/2-inch (12 mm) preformed expansion joint filler around each structure that extends into or through the sidewalk before concrete is placed at that location.

**G203003 1.2 CONCRETE PAVERS**

ASTM C936. Install in accordance with manufacturers recommendations.

**G203003 1.3 HANDICAPPED RAMPS**

Provide handicapped ramps of PCC pavement with an exposed aggregate finish, truncated domes, or as required by the SHS at roadway intersections.

**G203004 GUARDRAILS & BARRIERS**

Refer to Section G201005.

**G2040 SITE DEVELOPMENT**

**G204001 FENCING & GATES**

**G204001 1.1 CHAIN LINK FENCE**

Provide chain link fence designated as security fencing in accordance with paragraph G204001 - 1.3.

Provide chain link fence fabric that is at least 9 gauge (3 mm) steel wire mesh material (before coating) with mesh openings not larger than 2 inches (51 mm). Do not use aluminum fabric, posts or accessories. Install fence in accordance with ASTM F567 and the manufacturer's written installation instructions.

**G204001 1.1.1 Tensions Wires and Top Rails**

Provide rails in accordance with FS RR-F-191/3, Class 1, steel pipe, Grade A.

**G204001 1.1.2 Gates**

Provide gates in accordance with FS RR-F-191/2 with posts and fabric as specified for fence.

**G204001 1.1.3 Posts and Braces**

Provide posts and braces in accordance with FS RR-F-191/3, Class 1, steel pipe, Grade A. Brace each gate, terminal and end post with truss rods.

**G204001 1.1.4 Fencing Accessories**

Provide fencing accessories in accordance with FS RR-F-191/4. If PVC coating is required, provide accessories with PVC color coating similar to that specified for chain-link fabric or framework.

**G204001 1.2 ORNAMENTAL FENCE**

**G204001 1.3 SECURITY FENCE**

Provide security fencing systems in accordance with UFC 4-022-03, *Security Fences and Gates*, and this RFP.

**G204001 1.3.1 Chain Link Security Fence**

Provide chain link fence in accordance with paragraph G204001 - 1.1, excepted as noted otherwise. Ensure that the fabric has twisted and barbed selvage at the top and bottom. Do not provide top rails. Locate posts and structural supports on the inner side of the fencing. Install outriggers facing outward except when the fence is mounted directly on the property line.

**G204001 1.3.2 Signage**

Provide signage at a minimum of 200 foot (61 m) intervals along the entire perimeter.

**G204001 1.3.3 Drainage Culverts and Utility Openings**

Provide protective measures to prevent access through culverts, storm drains, sewers, air intakes, exhaust tunnels and utility openings or across drainage ditches or swales in accordance with UFC 4-022-03.

**G204001 1.4 OPENINGS IN PERIMETER AND SECURITY FENCING**

Do not cover, block or lace openings in perimeter fencing and security fencing with material which would prevent a clear view of personnel, vehicles or material in the outer or inner vicinity of the fence line.

**G204001 1.5 FENCE GROUNDING**

Ground and bond the fence in accordance with the National Electric Safety Code (NESC) - IEEE C2 and UFC 4-022-03. Ground fencing on either side of every gate and at other locations when the fencing is near and parallel to high tension power lines. Grounding is also required at intervals of 1000 feet (305 meters) to 1500 feet (457 meters) when the fencing runs through isolated areas and at lesser distances depending on the proximity of the fencing to public roads, highways and buildings where the fencing is around or within explosive storage, production, operating or handling areas.

**G204001 1.6 ENCLOSURES FOR UTILITY EQUIPMENT**

Where fencing is used to provide an enclosure for utility equipment, ensure a minimum clearance is provided no less than 3 feet (900 mm) around the equipment to permit maintenance access and ventilation. Provide stone, gravel or concrete paving within the enclosure.

**G204002 RETAINING WALLS AND FREESTANDING WALLS**

Provide retaining walls to permanently resist soil pressures as well as live loads. Provide wall drainage to minimize lateral loading and protect wall materials against degradation.

**G204003 EXTERIOR FURNISHINGS**

Refer to ESR G20 and other portions of the RFP for exterior furnishings required on this project. Permanently attach site furnishings to concrete pads. Provide site furnishings in conformance with the Base Exterior Architecture Plan (BEAP) and or Installation Appearance Plan for each Activity. If no product guidance is given, coordinate material, finish and color with architecture (fiberglass and aluminum are not acceptable) and provide to the greatest extent possible, materials with industrial recycled content, preferably from regionally local manufacturers.

**G204003 1.1 PICNIC AND PASSIVE RECREATION AREAS**

Include tables, with attached benches, on concrete bases sloped to drain and permanent barbecue grill(s) for picnic areas. Additionally, provide separate receptacles for trash, recycling and barbecue ashes. Permanently attach site furnishings to concrete paving extending a minimum of 12 inches (300 mm) past the furnishing, with the exception of picnic tables and benches, which require concrete paving extending 2 feet (600mm) minimum on all sides. Set the elevation of the finished concrete plus 1 inch (25 mm) above adjacent grade.

**G204003 1.2 TRASH RECEPTACLES**

Provide trash receptacles with drain hole and stationary or self-closing lids with anchor chains secured to the receptacle to protect the contents from weather. Design receptacles to hold heavy-duty plastic or galvanized steel liners of the same manufacturer. Consider potential weight of full containers when deciding on 'top loading' or 'side loading' receptacles. Include a concrete pad 12 inches (300 mm) larger on all sides than the size of the trash receptacle base.

**G204003 1.3 BENCH**

Minimum 6 feet (1.8 meter) length to match trash and recycling receptacle material & color, installed a minimum of 18 inches (450 mm) above finish grade, permanently installed with anchor bolts or in-ground. For benches located in nonpaved areas, provide concrete pads extending a minimum 2 feet (0.6 meters) beyond the edge of the seat portion of the bench (or both front and back if accessible from either).

**G204003 1.4 RECYCLING RECEPTACLES**

Provide recycling receptacles, single-piece with separate slots for cans, bottles, newspaper. Match height, material, and style of the trash receptacle.

**G204003 1.5 BARBEQUE**

Minimum 12 inches (300 mm) x 18 inches (450 mm) with heavy-duty grill and hinged stainless steel lid, factory primed and painted with rust-resistant paint. Install so coal height is a minimum of 36 inches (0.91 meter) above finish grade.

**G204003 1.6 HOT ASH RECEPTACLE**

Minimum 28 square inches (181 square centimeters) x 42 inches (1.1 meter) high pre-cast reinforced concrete with drain hole with steel ash grate and cast in "Hot Coals Only" logos on each side with white letters on a red background.

**G204004 SECURITY STRUCTURES**

Where identified for project elsewhere in this RFP, provide active and passive vehicle barriers to effectively stop or detect penetration by explosive-laden vehicles through the perimeter of a protected area in accordance with UFC 4-022-02, *Selection and Application of Vehicle Barriers*. When vehicle barriers are included in the project, refer to Part 5 of the RFP for additional requirements.

**G204005 SIGNAGE**

Provide facility signage in accordance with local code, the Installation and Appearance Guide, the Base Exterior Architectural Plan (BEAP) and this RFP.

Size messages and graphics on signs according to the functional viewing distance. Typically, at least 1 inch (25 mm) of letter height per 25 feet (7.62 meters) of viewing distance is required for readability.

Refer to Section G201004, "Marking & Signage" for traffic signage.

**G204007 PLAYING FIELDS**

**G204007 1.1 PLAYGROUNDS**

Design playgrounds and provide surfacing and equipment in accordance with this RFP and U.S. Consumer Products Safety Commission Publication 325 and ASTM F1487. Border tot-lots and play-lots with reinforced concrete curbing to a depth appropriate to the safety surfacing utilized. Provide shade and wind protection where these elements may significantly limit the use of the facilities. For tot-lots and play-lots provide separated areas with appropriately sized equipment and materials to serve their developmental levels. Separate areas by a buffer zone, which can be an area of shrubs, hardscape or benches. Provide signage to give guidance to adults as to the age appropriateness of the equipment.

**G204007 1.1.1 Tot Lots**

Design each "tot lot" to accommodate children from ages 2 through 5 to provide a variety of play activities and motor skill development opportunities which include, as a minimum:

For multi-activity structures provide a minimum of two platforms and two slides, one wheel chair accessible, swing set for young children, paired spring mounted 'riders' or other similar apparatus. Locate at least two benches with backs on concrete bases for convenience to, and observation of, the tot-lot.

**G204007 1.1.2 Play Lots**

Design each "play lot" to accommodate children from ages 5 to 12 to provide a wider range of activities and opportunities for greater motor skills development and improvement. These include, as a minimum:

For a multi-activity structure, provide a minimum of three platforms and two slides, one wheel chair accessible. A swing set, or other similar apparatus. Locate at least two benches with backs on concrete bases for convenience to, and observation of, the play-lot.

**G204007 1.1.3 Equipment**

Provide tot lot and play lot equipment that is factory finished institutional quality, in compliance with ASTM F1487, the United States Consumer Products Safety Commission's *Guidelines for Public Playgrounds*, and the UFC 3-201-01, *Civil Engineering*. Use only equipment that has been approved by International Play Equipment Manufacturers Association (IPEMA) and installed by a National Playground Contractors Association (NPCA) Contractor.

Site tot lot and play lot equipment to provide use and no encroachment zones in accordance with ASTM F1487. A use zone is a clear, unobstructed area under and around play equipment where a child would be expected to land when jumping or falling from a piece of play equipment. Requirements for use zones vary for the age group and for different pieces of equipment. Show all use zones for play equipment on the site plan to ensure there is no conflict between play activities on the ground and swinging or jumping from the equipment. The No-encroachment zone is an additional area beyond the use zone where children using the equipment can be expected to move about and should have no encroaching obstacles. This area varies according to the types of adjacent equipment, and their orientation to one another.

**G204007 1.1.4 CCA-Treated Lumber**

Do not use chromated copper arsenate (CCA) treated lumber in recreational facilities for children.

**G204007 1.1.5 Playground Safety Surface**

Provide a playground safety surface, in accordance with ASTM F355 and ASTM F1292, throughout use zones and under play equipment in tot lots and play lots. Natural wood products and decomposed granite are not allowed for surfacing. Loose fill surfacing must be a minimum of 4 inches (100 mm) below the top of edging. Consider local climate, soil conditions, location and size of area, type of activity, age of users, and intensity of use when choosing surfacing material. Provide soil separator fabric between playground loose-fill material and subgrade soil. Design play areas with permeable surface and adequate drainage. Drain to sump a minimum of 20 feet out from the playground curbing or to storm drain.

**G204007 1.2 PLAYING FIELDS**

Provide playing surfaces in accordance with this RFP. Use synthetic turf systems approved by the reviewing Government Landscape Architect or Civil Engineer.

**G204090 OTHER SITE IMPROVEMENTS**

Provide other site improvements in conformance to the BEAP or Installation Appearance Plan and to the requirements of UFC 4-010-01.

**G204090 1.1 DUMPSTER PADS AND ENCLOSURES**

Provide 200 mm (8 inch) thick non-reinforced portland cement concrete pavement dumpster pads sized larger than what is required to accommodate the specific dumpsters to be used at the site. Make the concrete pad large enough to accommodate the front wheels of the carrying truck.

Select the dumpster enclosure's materials and style to complement the adjacent buildings and facilities. Provide walls be at least 1.83 meters (6 feet) in height. Where possible, orient the openings of enclosures away from building entrances and main streets.

**G2050 LANDSCAPING**

Landscape area is defined as permeable areas within the project boundaries not covered by buildings, roads, parking lots, sidewalks, and other non-permeable areas. Provide landscape improvements to all site areas disturbed by construction.

**G2050 1.1 DESIGN**

Design landscaped areas in accordance with Presidential Executive Order 13148 of April 2000, with a goal to reduce fertilizers, pesticides, and water use. The intent is to achieve a base-wide ratio of 20 percent maximum non-native plants and 80 percent minimum locally or regionally native plants. Do not use plants deemed invasive by the project state or region's Exotic Pest Plant Council, State Department of Agriculture or local chapter of the American Society of Landscape Architects as a threat to ecosystems or agriculture. Select only plant species which require little or no supplemental irrigation after the initial establishment period. Only nursery-grown plants are acceptable. Cover non-paved site areas disturbed by construction operations with plant material or inorganic mulch. Stabilized soil, decomposed granite, and organic mulch are not acceptable as ground covers. Provide landscape architectural work in accordance with UFC 3-201-02, *Landscape Architecture*. For projects with planting or irrigation areas, utilize the design services of a Landscape Architect licensed in the state of the project. The Landscape Architect of Record must visit the site at least once prior to design, twice during construction, and quarterly during the Establishment Period, including the Establishment Period start and completion. The Landscape Architect of Record must attend the kickoff partnering meeting and CDWs. Courtyards and plazas are to be designed by the Landscape Architect. For the CDW, provide a Site Analysis Plan to demonstrate the design thought process. It is the Contractor's responsibility to coordinate between disciplines including architecture, civil engineering, electrical engineering, mechanical engineering, fire protection, and landscape architecture. Coordinate location of utilities, structures, and equipment. For projects in dry climates (arid and semi-arid), eliminate or minimize the use of turf, except when needed for active or passive recreation.

The Landscape Architect-of-Record is required to submit 5 sample boards of landscape materials. Sample boards to include but not limited to colors, finishes, textures of hardscape paving, walls, signs, monument piers, inorganic mulches, organic mulches, and other site improvements. Include cut sheets of proposed plant material.

**G205001 FINE GRADING AND SOIL PREPARATION**

See Section G10, *Site Preparation*. Provide 4 inches (102 mm) of topsoil with appropriate soil amendments, as recommended by a current soil composition test, for areas to be planted with turf grass.

**G205002 EROSION CONTROL MEASURES**

See Section G10, Site Preparation.

**G205003 TOP SOIL AND PLANTING BEDS**

See paragraph titled, G205005 PLANTINGS.

**G205004 SEEDING, SPRIGGING, AND SODDING**

Hydroseed areas that are to be seeded and are larger than 1,000 square feet (92.90 square meters). Select hydroseed mix composition that is appropriate for surrounding land use and compatible and consistent with local application rates, seed availability and established practice in the project area. If project dates are unknown, specify required planting dates or alternative species for different seasons. Apply seed at a time best suited for germination of the selected species. Seeded areas are required to achieve a 95-percent coverage of the selected species and be weed free at the end of the Establishment Period.

**G205005 PLANTINGS**

**G205005 1.1 EXISTING PLANT MATERIAL TO REMAIN OR BE TRANSPLANTED**

Preserve existing trees to the greatest extent possible. Identify preserved trees on the plans with tree species, caliper and dripline. Tag trees to be saved with plastic or vinyl tape tied to the tree caliper. Protect existing trees by fencing planting areas to remain from compaction and other damage with a barrier of metal poles a maximum 8 feet (2.4 meter) on center with plastic netting to a minimum of 10 feet (3.0 meter) radius from outside of the tree's trunk. Where tree drip lines are greater than 10 feet (3.0 meter) from the tree's trunk, locate barrier fencing at the drip line of the tree. Install signs on each Tree Protection Zone fence indicating that the barrier is not allowed to be taken down or moved without the participation of a Certified Arborist. Ensure that the details and specifications clearly state that none of the following activities occur within the tree protection barricade: driving, parking, storing materials, dumping waste, concrete washout, adding fill soil, trenching, removing soil, grubbing, or other disturbance to the tree or the associated roots. Do not allow debris from tree or stump removal operations to fall on or otherwise damage plants that are not scheduled for removal. Do not remove plastic tape and barrier fencing until planting operations are ready to begin and or instructed by the Contracting Officer. Replace existing trees to remain or to be transplanted that are unhealthy, that die, or have 20 percent or more of their crowns that die during the establishment period with healthy plants of the same species or variety during the appropriate planting season. During the landscape establishment period, replace trees, turf, shrubs, and ground cover that are damaged or destroyed during construction operations by the Contractor at no additional cost to the Government. At the direction of the Contracting Officer, remove the existing tree and stump and replace it with trees of the same genus and species equal to the total caliper of the existing tree. Provide replacement trees that are 4 inch (100 mm) minimum caliper. Replace shrubs with 5 gallon (18.9 liter) size container, ground cover with flat containers planted at 8 inches (200 mm) on center, and turf with sod, all of the same genus and species.

**G205005 1.2 UTILITIES**

Do not place trees within 10 feet (3 meter) of above or below-grade utility line or structure. Within roadway sightlines, height of mature shrubs is limited to 3 feet (1 m) and trees must be limbed up a minimum of 6 feet (2 m) so their mature growth does not obstruct views from vehicle intersections or points of vehicle ingress or egress. Coordinate utilities between the Landscape Architect and appropriate disciplines.

**G205005 1.3 RECYCLING**

Green waste: Contact the Public Works Department for potential green waste collection and hauling by the Government. Separate green waste not collected by the Government from construction debris and deliver to the base's or local landfill's green waste recycling area. Quantify and report diverted waste to the Contracting Officer.

**G205005 1.4 PLANTING**

**G205005 1.4.1 Plant Quantities**

Provide trees at the minimum rate of one (1) tree per 1,000 square feet (92.9 square meters) of Landscape Area. Provide trees for parking areas at a minimum of one (1) tree per every 5 parking spaces around the parking perimeter and one (1) tree per every 10 parking spaces within the parking area. Provide a minimum of one (1) tree in each end aisle planter. Total minimum quantities may be reduced only by the reviewing Government Landscape Architect. Tree quantities reduced by the Government Landscape Architect will be included on the ADD/DEDUCT List by the Contracting Officer. For bioretention areas, provide minimum quantities of trees, shrubs, and ground covers in accordance with State regulations. Provide a minimum tree size of 24 inch (600 mm) box/2 inch (50 mm) caliper, or if within an anti-terrorism zone provide a minimum size of 36 inch (910 mm) box/3 inch (76 mm) caliper. For trees within concrete or other non-permeable paved areas, allow a minimum non-paved planting area of 4 feet by 8 feet (1.2 m by 2.4 m) per tree.

For dry climates (arid and semi-arid) only: Plant a minimum of 40 percent of the landscaped areas with shrubs and groundcover so that at 50 percent plant maturity, they form mass plantings. Utilize a minimum ratio of 60 percent 5 gallon (18.9 liter) shrubs or groundcover and 40 percent 1 gallon (3.79 liter) shrubs or groundcover. The remaining 60 percent of the landscape area may be inorganic mulch, planted or a combination thereof. For inorganic mulch, provide 3 inch (76 mm) depth of 3/4-inch (19 mm) and smaller rock, and for larger than 3/4-inch (19 mm) size, assure complete ground surface coverage. Provide plant material calculation summary matrix on planting plan.

For other climate zones: Plant the majority of shrubs at major entrances to buildings and at other important planting zones that are specific to each site. The overall design intent is to plant mostly trees and turf, with shrubs and ground covers used sparingly, to reduce maintenance costs while still providing for functional planting requirements (e.g., soil stabilization, energy conservation, force protection, and aesthetics). Provide a minimum size 3 gallon (11.4 liter) container for shrubs and 1 gallon (3.79 liter) container for ground covers.

**G205005 1.4.2 Plant Quality**

Provide plants that comply with ANSI Z60.1 and ANSI A300, Part 1, current editions. Plants must be in a healthy, disease and pest free condition. Provide seed, sod, and sprigs that are State Certified.

**G205005 1.4.3 Plant Selection**

The reviewing Government Landscape Architect has final approval authority on selected plant material. Species deemed unsuitable for planting by the Government Landscape Architect will not be allowed.

**G205005 1.4.4 Plant Installation**

Perform planting operations, including but not limited to planting soil mixes and fertilization, in accordance with local established practices and agricultural extension service recommendations. Stake or guy new or transplanted trees with three stakes [2 inch x 2 inch x 8 feet (50 mm x 50 mm x 2.4 m) hardwood], or three guy cables [five-strand, 3/16 inch (5 mm) diameter galvanized steel cable]. Install linear tree root barriers at the edge of paving where trees are planted within 10 feet (3 m) of sidewalks, curbs, walls, columns, and other hard surface areas. Do not encircle tree root balls with root barriers.

**G205005 1.4.5 Edging Materials and Mulching Materials**

Provide 3/16 inch (5 mm) minimum thick by 5 inch (127 mm) minimum deep aluminum edging or 6 inch (150 mm) by 6 inch (150 mm) minimum, concrete edging dividing turf and planting beds and dividing planted and non-planted inorganic mulch areas. Provide stake type and spacing for aluminum edging per manufacturer's recommendations. Plastic edging is not allowed. Mulch planted areas not mulched with inorganic mulch with a 3-inch (75 mm) depth of organic shredded hardwood mulch. For inorganic mulch where rock cobble size is greater than half of the profile depth, provide Â¾ inch (19 mm) comparable color and shape rock mulch in bottom half of profile. For dry climates only, organic mulch must be shredded redwood bark unless approved otherwise by the reviewing Government Landscape Architect. Mulches (organic and inorganic) must not be subject to sloughing off on sloped sites. Submit samples of mulches to the reviewing Government Landscape Architect for approval prior to installation. Decomposed granite is not allowed. Provide a 3-inch (75 mm) depth of organic shredded hardwood mulch between plants used to form a mass (in dry climates, mulch in the remainder of planting beds with inorganic mulch). Install mulching materials prior to the start of the Establishment Period.

**G205005 1.4.6 Fertilizer**

Fertilize transplanted trees, new trees, shrubs, ground covers, turf, perennials and ornamental grasses as recommended by local agricultural extension services.

**G205005 1.4.7 Weed Fabric and Erosion Control Fabric**

Provide a weed barrier fabric of sheet polypropylene or polyester fabric specifically designed for weed control purposes beneath planted or mulched non-planted areas. Treat fabric for protection against deterioration due to ultraviolet radiation. Provide fabric that is a minimum 99 percent opaque to prevent photosynthesis and seed germination from occurring, yet allowing air, water and nutrients to pass through to the roots. Minimum weight must be 5 ounces per square yard (0.11 kg per square meter) with a minimum thickness of 20 mils (0.50 mm) with a 20 year minimum guarantee. Provide a biodegradable product designed specifically for erosion control on sloped areas 3 (horizontal):1 (vertical) and steeper in slope. Do not place weed fabric over the root balls of trees.

**G205005 1.4.8 Drainage**

Provide for proper grading and drainage of turf and planting areas. Provide sub-surface drainage where soil or other conditions do not allow surface drainage. Do not drain roof gutters into planter areas.

**G205007 IRRIGATION SYSTEMS**

**G205007 1.1 IRRIGATION**

Where an irrigation system is required per other parts of this RFP, provide a permanent, below-grade system. Provide 100 percent sprinkler head to head coverage. Provide pop-up heads in turf and landscape zones when adjacent to walks, roads, parking lots, or in sparsely planted landscape areas where pedestrians may circulate. Provide pop-up heads project-wide on high-traffic sites such as, but not limited to, dining, housing, entertainment, daycare, education and recreation facilities. For dry climates, provide deep root watering systems for trees. Verify adequate water pressure for irrigation purposes and provide booster pumps and or pressure regulation as required. Provide minimum 18 inch (450 mm) cover over pressurized (mainline) PVC irrigation pipe and 12 inch (300 mm) cover over non-pressurized (lateral line) PVC irrigation pipe. 1/2-inch (13mm) pipe is not allowed. Provide pressurized (mainline) pipe in conformance with ASTM D1785, PVC 1120, Schedule 40. Provide non-pressurized (lateral) pipe in conformance with ASTM D2241, PVC 1120 SDR 21, Class 200. Test the entire system in the presence of the Contracting Officer and Landscape Architect-of-Record to ensure proper performance. Provide irrigation components that are commercial or institutional quality. Provide rain shut-off device and watertight splices. Provide sprinkler heads, bodies and nozzles of the same manufacturer. Irrigation heads on the same valve must have nozzles with matched precipitation rates.

**G205007 1.2 OPERATION AND CONTROL**

Assure systems automatically operate on an "irrigation window" between 2000-0530. Provide compatible and fully functional control if a central control system exists on base. Otherwise, provide evapotranspiration-measuring control with flow meter and master valve with controller capable of indicating visible or auditory notification, such as a blinking light or beeping sound, of system shut-off.

**G205007 1.3 ZONING**

Provide separate control valves for differing plant species coefficients, landscape coefficients, and solar exposures, for areas with differing irrigation head types or differing precipitation rates, and top and bottom of slopes. Provide a separate irrigation backflow prevention device and water meter. Turf, trees, and shrubs/groundcover are not allowed on the same valve. Provide separate concrete valve box with cast iron lid and valve ID for each valve and wire splice. Provide quick coupling valves at 100 feet (30 m) on center. Provide in-head check valves for sloped areas with 0.5 feet (150 mm) or more in elevation change.

**G205007 1.4 TEMPORARY IRRIGATION**

Provide ultra-violet resistant pipe and fittings for above-grade, temporary irrigation. Only non-pressure pipe is allowed above grade. Install irrigation systems intended to remain in place longer than one year below grade.

**G205007 1.5 NON-POTABLE IRRIGATION**

Provide lavender-colored pipe, sprinkler head and quick coupler caps, valve tags, signage, and associated filtration equipment.

**G205007 1.5.1 Controller Charts**

Provide one chart for each new controller or existing re-sequenced controller. The chart must be an actual plan reduced to fit inside maximum dimensions of the controller housing. Use black line print for chart and a different color to indicate each station area of coverage. After chart is completed and approved for final acceptance, seal chart between two 20 mil (0.5 mm) pieces of clear plastic. Affix the chart to the inside of the controller cabinet door using approved mastic or fastening system. Provide one additional copy of the chart in electronic format. Additionally, provide the installation with a maintenance plan and schedule as part of the turn-over items.

-- End of Section --