# Design-Build (DB) Part 4 Technical Requirements Sample

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## 4.1 Fixed Design Criteria

The Design-Build Contractor (DBC) shall utilize the Bridging Documents and Technical Requirements as the basis for the design and proposal. The following items have been identified by the National Park Service (NPS) as items that must be maintained in the design as it moves forward into Construction Documents (CDs). Any items not identified as **Fixed Design Criteria** are flexible items for the DBC to resolve per NPS and Federal requirements.

### 4.1.5 Mechanical Fixed Design Criteria

- There are no mechanical systems associated with this project. The restroom buildings are un-conditioned spaces.
- Mechanical ventilation for restroom exhaust is not permitted. Operable windows must provide adequate operable area to meet code requirements for natural ventilation.

### 4.1.6 Plumbing Fixed Design Criteria

- All water piping mains shall be located in the Utility Room and mounted exposed for easy repair access. Piping must be routed so that each restroom (Men's and Woman's) can be isolated separately for repairs.
- All shock arrestors for flush valve plumbing fixtures must be located in the Utility Room in an exposed location.
- Hot water heaters and hot water piping will not be required for rest room plumbing fixtures.
- All plumbing fixtures are to be wall hung with heavy duty carriers.
- All floor drains shall be equipped with waterless trap primers (trap guards) in lieu of traditional trap primers.
- All plumbing fixtures shall be manually operated. Metered faucets and automatic flush valves are not permitted.
- Each restroom building must have an individual water meter located in the Utility Room.
- For park maintenance purpose, all faucets shall be manufactured by Moen.
- Plumbing fixtures must be provided with the following flow rates:
    - Water Closets: 1.28 Gpf, single flush.
    - Urinals: 1/8 Gpf, Waterless urinals are not permitted.
    - Lavatory: 0.5 Gpm.

### 4.1.7 Architecture Fixed Design Criteria

- **Form, Functionality, Building Envelope, & Materials**
    - General: Structures shall reflect park design and construction guidelines for constructability, materials, scale, color and overall appearance.
    - Site Plan: Orient building entries toward campground vehicular and pedestrian land.
    - Building Size & Configuration: Conform with the schematic design (SD) documents. Provide required minimum clear dimensions as noted. Overall outside dimensions shall

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correspond to a whole number of masonry units (do not cut block).

- Floors: Floors shall slope uniformly to floor drains across length and width of floor slab with slope not exceeding 1.8% in any direction.
- Roofs: Provide hipped roofs to match existing with a minimum slope of 3:12. The roof forms and roof slopes of all buildings shall be designed to match.
- Roof Tile: Salvage roof tile from existing buildings for reuse. Salvage related appurtenances including metal eave closures for reuse. Document in photographs the existing method of tile attachment. Protect and store all salvaged roofing materials until new construction is ready for reinstallation. Install salvaged tile together on the same roofs. If the color and texture of salvaged tiles varies, reinstall tile in a manner to distribute the variation across the entire installation. Do not mix salvaged and new roof tiles on the same roof. Provide all elements for a complete roofing installation in accordance with the National Roofing Contractors Association guidelines. New roof tile shall match salvaged tile in size, material, shape, color, and texture.
- Roof Eaves: Provide continuous factory-finished aluminum eave flashing with drip edge. Provide textured (wood grain) aluminum cladding at fascia boards. Lap all flashing and cladding materials to ensure positive drainage away from substrates. Provide vented, factory-finished aluminum soffit panels at the undersides of roof eaves.
- Skylights: Provide manufactured skylight units with high-efficiency light transmission, polycarbonate weather shield, and vandal-proof interior lens flush with the finished ceiling. Skylights shall be curb-mounted for installation with high profile roofing materials (Spanish S-tile). Provide pre-fabricated or field-built curbs. Provide manufacturer's flashing system and trims. Provide highly reflective, flexible tunnel with adapter box for installation in hard ceilings. Install in accordance with manufacturer's specifications. ***Velux Commercial TCR SUN TUNNEL skylight, Velux USA, or Solatube, Solatube International, Inc., Wasco, or approved equal.***

- **Accessibility**
  - All construction shall meet Architectural Barriers Act Accessibility Standards (ABAAS) requirements.
  - The top of finished floor (tile) elevation shall be flush with the sill at the entry (no transition).
  - Provide accessible signage required at restroom entries, directions to restrooms on front elevation and/or site arrival point, and roof identification on Utility/Janitor room.
  - At group restroom, a minimum two lavatories shall be wheelchair accessible.
  - At small restrooms, a minimum one lavatory shall be wheelchair accessible.
  - Accessible water closets and urinals shall comply with ABAAS requirements.
  - Except for ambulatory toilet compartments, all restrooms shall have accessible layouts, fixtures, accessories, interior and exterior paths, and entry and compartment doors.
  - Ambulatory toilet compartments shall have 2' - 10" (min.) clear width.
  - Ambulatory toilet compartments shall have 60" (min.) clear depth from rear wall to face of compartment door.
  - Urinal alcove shall have 2' - 10" (min.) clear width.

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- **Finishes**
  - Interior masonry walls and privacy partitions and ceilings: Seal and finish with anti-graffiti paint. ***Spray RTV silicone that is room temperature volcanized, suitable for the density of the proposed surface, meeting all needs for regulatory compliance, UV stable, breathable, suitable for extreme temperatures, providing simplified graffiti removal process and weather penetration resistance. ProSoCo, Professional Products of Kansas, Dow Corning, or approved equal.***
  - Toilet Partitions (non-masonry; includes doors): Provide solid material toilet partitions (phenolic or equal) with integral factory finish and manufacturer's anti-vandalism stainless steel hardware and anchors. ***Bobrick Sierra Series Solid Color Reinforced Composite (SCRC), Bobrick DuraLine Series, Scranton Products, Global Partitions, or approved equal.***
- **Fixtures and Accessories**
  - All fixtures shall meet ABAAS requirements.
  - Utility/Janitor: (3) 4' L. X 12" D. wall shelves.
  - Utility/Janitor: (1) 4' L. mop and broom wall hanger.
  - Utility/Janitor: (4) general purpose wall hooks.
  - Utility/Janitor: (1) wall mount mops sink with wall braced faucet (having bucket hanger).
  - Restrooms: Accessible water closets (wall hung vitreous china with hinged seat and manual flush valve).
  - Men's Restroom: Accessible Urinal (wall hung vitreous china with manual flush valve).
  - Restrooms: Accessible lavatory (wall hung vitreous china with accessible manual faucet and ***single hole faucet location and through-wall hanger***. ***American Standard Lucerne (Model 0356.421), Kohler K-2031, or approved equal.***

**End of 4.1 Fixed Design Criteria**

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# DC 0 - Facility Design Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The construction consists, generally, of new buildings. The occupancy is a comfort station consisting of toilet rooms.

### 1.2 RELATED REQUIREMENTS

A. Section DC A - Substructure Criteria.

B. Section DC B1 - Superstructure Criteria.

C. Section DC B2 - Exterior Enclosure Criteria.

D. Section DC B3 - Exterior Doors Criteria.

E. Section DC B4 - Roofing Criteria.

F. Section DC C - Interiors Criteria.

G. Section DC C2 - Interior Finishes Criteria.

H. Section DC C31 - Information Fixtures Criteria.

I. Section DC D3 - Plumbing Criteria.

J. Section DC D6 - Electrical Criteria.

K. Section 01 41 00 - Regulatory Requirements: List of applicable codes and other regulations.

### 1.3 DEFINITIONS

A. Code: The code referred to herein consists of all applicable local, state, and federal regulations, and the following:

1. See Section 01 41 00 for list of applicable regulations.
2. Non-Regulatory Criteria Documents: In addition to specific regulatory requirements, the following documents are also incorporated into the definition of "the code" for the purposes of this project, except for administrative provisions contained therein; where referenced, the role of the code official described in the document will be performed by Owner.
   a. ICC International Building Code.
   b. ICC International Plumbing Code.
   c. NFPA 70 - National Electrical Code.

B. Electrical: Provision and distribution of electrical power to operate all electrically-operated devices, including those included under other services and those provided separately by the Owner; artificial lighting to illuminate spaces and tasks, both interior and exterior, without reliance on natural light and grounding systems.

C. Exterior Enclosure: All non-structural vertical exterior elements, including openings and elements closing or covering openings, comprising the exterior skin, the structure supporting the skin unless part of the superstructure, weather barriers, balcony walls and railings, parapets, joint sealers, insulation, exterior ceilings and soffits, and wall mounted appurtenances, but not including the interior finish unless an integral part of the enclosure.

D. Fixtures: Fixed elements used by occupants in the functioning of the project but not having services connections.

E. Information Fixtures: Fixed elements relating to communications but not part of communications services, such as signs and other identifying devices (including those mounted on the roof, exterior walls, or in the site), visual display surfaces, including projection screens, and fixed mountings and enclosures for communications equipment.

F. Interior Finishes: All applied finishes on the interior of the building, including on the interior side of exterior wall elements; wall finishes, including wall bases, trim, corner guards and other protection; floor finishes, including recessed mats and grilles; suspended ceilings and soffits, applied ceiling finishes; stair finishes and other finishes.

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G. Interiors: All elements necessary to subdivide and finish the enclosed space, including partitions, doors, interior windows and other openings, stairs, finishes, and fixtures, except fixtures associated with services and specialized equipment.

H. Plumbing: Means of delivery of water to points of utilization.

I. Proven-by-Mockup: See Section 01 30 50.

J. Proven-in-Use: See Section 01 30 50.

K. Roofing: All elements forming weather barriers at the sloped or essentially flat weather-proof enclosure over the entire "top side" of the building, including all elements from the top of the deck up, roof coverings, gutters and downspouts, wearing surfaces, roof openings and elements that close openings, such as skylights, vents, and hatches, and roof mounted appurtenances.

L. Services: Mechanized, artificial, automatic, and unattended means of supply, distribution, transport, removal, disposal, protection, control, and communication.

M. Shell: The superstructure, exterior enclosure, and roofing.

N. Site Elements and Work: Modifications to the site, site improvements, and site portions of services (i.e. utilities).

O. Substantiation: See Section 01 30 50.

P. Substructure: Elements below grade and in contact with the ground.

Q. Superstructure: All elements of floor and roof construction above grade and within basements, and elements required for support, including structural frame and load-bearing walls, and including fireproofing and firestopping, and vapor retarders and air barriers when an integral part of the structure.

**1.4 FIELD CONDITIONS**

A. Project Site: The project site is currently occupied by existing structures.

B. Do not enter, cross, infringe upon, or limit access to adjacent property without first obtaining written permission from the property owner.

C. Existing Built Elements:
   1. Extent of preservation, restoration, re-use, or adaptation is specified in the project program.
   2. Salvage:
      a. For Reinstallation: Removal of the following, storage, cleaning, and reinstallation:
         1) Concrete roof tiles and related appurtenances including metal eave closures.
   3. Demolition:
      a. The following existing elements must be removed to accomplish new construction:
         1) The entire existing structure.
      b. Remove all other existing construction and utilities that are not required for the design.

**PART 2 PRODUCTS (SEE OTHER SECTIONS)**

**2.1 DO NOT USE:**

A. Aluminum electrical conductors or aluminum buswork in panelboards.

**PART 3 DESIGN CRITERIA**

**3.1 BASIC FUNCTION**

A. Code: Make all portions of the project comply with the code.

B. Provide built elements and site modifications as required to fulfill needs described in the project program and as specified.

C. Provide permanently enclosed spaces for all functional areas shown in the project program, unless otherwise indicated.

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D. Provide a physical enclosure that keeps out weather, unwelcome people, animals, and insects without requiring specific action by occupants, while providing convenient movement of occupants between inside and outside, desirable natural light, and views from inside to outside.

E. Provide the following services:
   1. Plumbing.
   2. Electrical.

F. Provide the following fixtures as shown in the project program and as specified:
   1. Information fixtures.
   2. Plumbing fixtures accessories.
   3. Lighting fixtures.

G. Substantiation: Provide the substantiation specified in Section 01 30 50 for all built elements and products used, whether or not specifically itemized for that element or product.

### 3.2 AMENITY AND COMFORT CRITERIA

A. Public Amenity: Conduct operations so as to cause minimum annoyance of the occupants, public and adjacent property owners and tenants.
   1. Where existing structures on the site continue to be occupied, provide alternate means of access with physical barriers and directional signs acceptable to Owner.

B. Environmental Responsibility:
   1. In addition to other requirements, provide design and construction that minimizes adverse effects on the exterior environment, enhances the quality of the indoor environment, and minimizes consumption of energy, water, construction materials, and other resources.

C. Water Penetration Resistance: Design and select materials to prevent water penetration into the interior of the building, under conditions of rain driven by 35 mph wind.

D. Natural Light: Provide fenestration in shell as required to meet requirements for natural light in accordance with code.

E. Ventilation:
   1. Natural Ventilation: Design and construct shell to provide natural ventilation in accordance with the following:
      a. Minimum Ventilation Opening Area: 4 percent of total floor area.
   2. Ventilation of Attics, Crawl Spaces, and Similar Semi-Enclosed Spaces: Design and construct shell to provide outside air movement through enclosed shell volumes in accordance with code.

F. Sound Transmission and Vibration Resistance:
   1. Shell: Design and construct the shell to limit sound transmission as follows:
      a. Ambient Sound Level: Maintain ambient sound levels in perimeter spaces within Noise Criteria (NC) ranges specified in Section DC C during normal hours of occupancy.
      b. Exterior Noise Level: Maintain maximum average daytime and nighttime noise level from interior sound sources in accordance with local regulations, measured at the project property line.
      c. Vibration Control: Use shell elements that will not resonate at frequencies that are characteristic of ambient exterior sound sources at the project site.
   2. Services:
      a. Maintain the sound transmission characteristics of assemblies through which services must pass.
      b. When services are located within assemblies that perform sound isolation functions, consider the noise produced by the service itself as one of the external sound sources.
   3. Structure-Borne Sound and Vibration: Prevent transmission of perceptible sound and vibration from equipment that rotates, vibrates, or generates sound, by isolating such

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equipment from superstructure or by isolating equipment support foundations from building foundations.

G. Cleanliness:
   1. Exterior Surfaces: Design and select materials to:
      a. Prevent attraction and adherence of dust and air-borne dirt and soot, and minimize appearance of settled dust and dirt.
      b. Be washed reasonably clean by normal precipitation.
      c. Prevent precipitation from washing settled dust and dirt over surfaces exposed to view.

H. Appearance:
   1. Exterior Appearance: Design and select materials to provide exterior appearance with characteristics as follows:
      a. Matching the materials on the existing building.
   2. Services Elements:
      a. Conceal services elements from view to greatest extent possible, with exposed portions of simple, neutral design and color.
         1) Exception: Standard designs of manufacturers, without consideration for appearance, may be used for fire suppression sprinkler heads.
         2) Exception: Exposed portions are acceptable in SU1, SU2, SV1, and SV3 areas.
         3) Where exposed portions are acceptable, do not obstruct or diminish clear dimensions of doorways, windows, other operable openings, access panels and cabinet doors, or passageways, stairs, and other exit ways.
         4) Where exposed piping or conduits are acceptable, install it close to walls and overhead structure, parallel and square to finished construction, plumb and nominally horizontal (except where required to slope for drainage).
      b. Cover annular spaces around pipes, ducts, and conduits, where they pass through walls, ceilings, and floors with escutcheons or cover plates.
         1) Exception: Escutcheons not required in SU1, SU2, SV1, and SV3 areas, provided annular spaces are filled completely.
      c. Mountings: On finished surfaces, use concealed attachments with cover plates, frames, or trim overlapping finishes.

## 3.3 HEALTH AND SAFETY CRITERIA

A. Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
   1. For all elements required to have a fire resistive rating and which are not made of materials and systems specified as acceptable by the code, use proven-by-mock-up construction.
   2. For proven-by-mock-up construction, acceptable testing agencies are Underwriters Laboratories Inc., Underwriters Laboratories of Canada, Inchcape Testing Services (Warnock-Hersey), and Factory Mutual.
   3. Maintain fire resistance of walls, floors, ceilings, and other fire-rated assemblies that services must pass through, in accordance with requirements of the section in which the fire-rated assembly is specified.
   4. Provide fire-rated separations between equipment rooms and other spaces where required and as specified by the code.
   5. Combustible pipes may be used only where buried if outside building.
   6. Provide products which are fire rated for the specific locations where they are installed.
   7. Substantiation:
      a. Design Development: Identification of assemblies required to have fire resistance rating and method to be used to achieve rating.
      b. Construction Documents: Identifying numbers on the construction drawings.

B. Prevention of Accidental Injury: As required by code and as follows:
   1. Safety Glazing: As defined by 16 CFR 1201, provide in locations required by code, glazed

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areas subject to human impact, glazed areas at grade, doors, and _____.

2. Prevent ice and snow from falling off building elements onto pedestrians, building occupants, vehicles, and _____.
3. Protect pedestrians, building occupants, vehicles, and _____ from objects accidentally dropped from elevated observation decks, balconies, plazas, or _____.
4. Services: Avoid safety hazards wherever possible where services must involve flammable materials or hazardous operations and comply with code.

C. Lightning Hazard: Perform a Lightning Risk Assessment in accordance with NFPA 780, Annex L. Provide results and interpretation of Lighting Risk Assessment to Contracting Officer.

D. Health Hazards - In the Design:
1. Design to prevent growth of fungus, mold, and bacteria on surfaces and in concealed spaces on a long-term basis.

E. Health Hazards - During Construction:
1. Hazardous Construction Materials: Design and construct to comply with the requirements of the code and the following:
   a. Whenever construction operations could result in worker contact with hazardous materials, follow recommendations of an American Board of Industrial Hygiene Certified Industrial Hygienist (CIH) employed by Design-Builder.

F. Physical Security: In addition to any provisions that may be required by law or code, design and construct both exterior and interior spaces to incorporate accepted principles of crime prevention through environmental design (CPTED), using natural (as opposed to technological) methods of providing surveillance, access control, and territorial reinforcement wherever possible.
1. Definition of Elements at Ground Level: For purposes of physical security, any element within 20 feet of the ground, grade, or adjacent paving.

G. Electric Shock Hazard: Provide equipment which protects personnel from electrical shock.
1. Electrically-Operated Equipment and Appliances: UL listed for application or purpose to which they are put, suitable for wet locations listing for exterior use.

H. Excess Pressure Hazard: Design pressurized components to withstand operational pressures without failure and to relieve or reduce excessive pressure to prevent failure.

I. Misuse: Minimize misuse that could result in damage to property, injury, or loss of life.

J. Vermin Resistance: Use components that are resistant to the entry of rodents and insects.

## 3.4 STRUCTURAL CRITERIA

A. Structural Performance: Design and select materials to support all loads without damage due to loads, in accordance with code.
1. Substantiation:
   a. Construction Documents: Detailed design analysis by licensed structural engineer.
   b. Construction: For structures engineered by their manufacturer or fabricator, detailed design analysis prepared by and shop drawings stamped by a licensed structural engineer, with approval of engineer-of-record recorded.

B. Construction Loads and Erection Stresses: Accommodate temporary construction loads and erection stresses during construction.

## 3.5 DURABILITY CRITERIA

A. Expected Service Life Span: Expected functional service life of the built portions of this project is 50 years.
1. Ducts, Piping, and Wiring in All Services: Same as the service life of the building.
2. All Components Permanently Installed Underground or Encased in Concrete: Not less than service life of building.
3. Software and Firmware Integral to Operation of Services Equipment: Minimum 20 years functional life without reprogramming required.
4. Service life spans of individual elements that differ from the overall project life span are

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defined in other sections.

B. Water Penetration Resistance:
   1. Shell: Design and select materials to prevent water penetration into the interior of shell assemblies under conditions of rain driven by 35 mph wind.
      a. Exception: Controlled water penetration is allowed if materials will not be damaged by presence of water or freezing and thawing, if continuous drainage paths to the exterior are provided, and water passage to the building interior is prevented.
      b. Substantiation: In addition to requirements specified for proven-in-use and proven-by-mock-up construction, drawings showing paths of water movement with particular attention to changes in direction or orientation and joints between different assemblies.
   2. Component Mountings: Where components are mounted to surfaces that are required to be moisture-resistant, seal mounting surface of components to finish surface so that moisture cannot penetrate under or behind component. Use material that is not affected by presence of water that is mildew-growth resistant and that has a minimum service life of 10 years.

C. Moisture Vapor Transmission Resistance: Design to prevent deterioration of materials due to condensation of moisture vapor inside assemblies.
   1. Use supplementary vapor retarder if necessary to meet requirements.
   2. Use method of sealing joints between elements that will be effective given available construction practices.

D. Corrosion Resistance: Prevent corrosion by using corrosion-resistant materials, by preventing galvanic action, by preventing contact between metals and concrete and masonry, and by preventing condensation on metals.
   1. Separation of Dissimilar Metals:
      a. Where different metals subject to galvanic action are exposed to weather or moisture, prevent direct contact between them.
      b. Piping Connections for Piping of Dissimilar Metals: Dielectric adapters.
   2. Aluminum: Prevent direct contact of aluminum with concrete or cementitious materials.
   3. Steel: Where permitted to be coated with other than zinc, zinc-alloy, or aluminum-zinc alloy, follow the recommendations of Society for Protective Coatings (SSPC) in regard to preparation for coating and coating type.
   4. Outdoor Metal Elements Except in Contact with Soil: The following are considered corrosion-resistant metals:
      a. Aluminum
      b. Stainless steel, Type 304 or 316.
      c. Hot-dipped galvanized steel, with minimum zinc coating of 0.90 oz/sq ft total, both sides, or equivalent aluminum-zinc alloy coating.
      d. Cadmium-plated steel, with minimum coating of 12 micrometers.
   5. Indoor Metal Elements Potentially Exposed to Moisture: The following are considered corrosion-resistant metals:
      a. All metals listed above for exterior exposure.
      b. Brass and bronze, but not copper.
      c. Cast iron, ductile iron, and malleable iron.
      d. Steel coated with high-build epoxy or coal tar-based paint, with minimum coating of 12 micrometers.
      e. Chrome-plated steel.
   6. Underground Metal Elements: Provide supplementary protection sufficient to prevent corrosion completely for the service life of the element without maintenance unless otherwise stated.
      a. Underground metal elements include, but are not limited to, pipes, tanks, conduits, ducts, structural members.
      b. 3 inches of concrete cover is considered to be permanent protection.
      c. Coatings or wrappings are not considered sufficient protection for the following types

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of elements:

1) Underground elements subject to movement due to structural loads or thermal expansion or contraction.
2) Metal elements buried in a soil environment known to cause corrosion on similar nearby structures.
3) Metal elements buried in a soil environment in which stray DC (direct current) electrical currents are present.
4) Metal piping carrying petroleum products or other hazardous or toxic materials buried or otherwise installed without means of visual observation of entire exterior surface of piping.
5) Metal tanks holding petroleum products or other hazardous or toxic materials buried or otherwise installed without means of visual observation of entire exterior surface of tank.

d. Cathodic protection is not considered sufficient protection.

E. Weather Resistance: Design and select materials to minimize deterioration due to precipitation, sunlight, ozone, normal temperature changes, salt air, and atmospheric pollutants.
   1. Weather resistance requirements apply to all components exposed to the outdoor environment, including services, unless specifically excepted. Equipment enclosures are considered the equivalent of the exterior enclosure.
   2. Deterioration includes corrosion, shrinking, cracking, spalling delamination, abnormal oxidation, decay and rot.
   3. Surfaces Exposed to View: Deterioration adversely affecting aesthetic life span includes color fading, crazing, and delamination of applied coatings.
   4. Joint Components and Penetration Seals: Capable of resisting expected thermal expansion and contraction. Use overlapping joints that shed water wherever possible.
   5. Transparent Elements (Glazing): No haze, loss of light transmission, or color change during entire expected service life.
   6. Service Temperature: Low temperature equal to historically-recorded low. High temperature equal to that expected due to any combination of air temperature and heat gain from solar and other sources.
   7. Freeze-Thaw Resistance: Adequate for climate of project.
   8. Ozone Resistance: Do not use materials that are adversely affected by ozone.
   9. Liquid Storage and Distribution Components: Prevent freezing during longest duration of low temperature anticipated based on historical weather data. If necessary, provide automatically controlled supplemental heating.
   10. Buried Water Piping: Minimum of 6 inches below lowest recorded level at which the ground freezes.
   11. Services Passing From Inside to Outside: Openings through shell sealed as required to meet performance specified and using materials specified in Section DC B2.

F. Temperature and Humidity Endurance: Design equipment to endure temperature and humidity that will be encountered and to resist damage due to thermal expansion and contraction.

G. Impact Resistance: Design and select materials to resist damage due to impact in accordance with code and the following:
   1. Minimize damage from windborne debris propelled at up to 35 mph.
   2. Design and select materials to resist damage from hail of size up to 1/2 inch.
   3. Minimize damage due to potential vandalism.
   4. Natural Hazards: Design to resist damage from perching, nesting, and feeding birds and _____.

H. Accidental Damage Resistance:
   1. Minimize potential for damage to built elements due to accidents.
   2. Accidental Water Leakage: Locate components that would be damaged by water leakage from pipes or through foundations. Or roof out of likely paths of water and at least 4 inches above floor level.

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3. Buried Components: Minimum of 12 inches below surface of ground.
4. Underground Piping and Conduit: Watertight and root proof.
5. Finishes on Exposed Components Subject to Touching by Occupants: Durable enough to withstand regular scrubbing using ordinary methods.
6. Equipment: Provide equipment which has been designed to prevent tampering.

I. Wear Resistance: Design and select materials to provide resistance to normal wear-and-tear in accordance with code and the following:
   1. Elements Within Reach of Pedestrians: Minimize degradation from rubbing and scratching caused by pedestrians.
   2. Minimize degradation caused by windblown sand, acid rain, and _____.

J. Resistance to Biological Factors:
   1. Animals: Do not use materials that are attractive to or edible by animals or birds.
   2. Insects: Do not use materials that are edible by insects unless access by insects is prevented.
   3. Wood: When wood is used, provide at least the protection recommended by American Wood Protection Association (AWPA) as contained in AWPA U1.

## 3.6 OPERATION AND MAINTENANCE CRITERIA

A. Waste (Trash/Rubbish) Removal: As described in the project program and as follows:
   1. See Section DC E1 for requirements for solid waste disposal.
   2. See Request for Proposal (RFP) and NPS Project Sustainability Checklist for construction waste management requirements.

B. Ease of Operation and Use:
   1. Intended operating personnel are personnel with a reasonable level of training for similar activities.
   2. Provide facility, equipment, and systems that are easily operated by intended personnel.
      a. Space Around Components: Working clearances and access routes as required by code and as recommended by component manufacturer.
      b. Access: All mechanical and electrical equipment located to allow easy access. Provide access doors for equipment accessed through walls, partitions, or fixed ceilings.
      c. Valves and Other Control Devices: Accessible handles, switches, control buttons, valve handles on top/upper side, chain or other remote operators where located out of normal reach above floor level in SU1 and SU2 spaces.
   3. Minimize the need for specialized training in operation of specific equipment or systems. Identify all equipment and systems for which the manufacturer recommends or provides training programs.
   4. Preparation for Use: Prepare services for use by testing appropriately for proper operation before start-up, eliminating operational anomalies, adjusting control systems for optimum operation, and demonstrating proper functioning.

C. Ease of Maintenance:
   1. Minimize the amount of maintenance required.
   2. Do not locate any equipment requiring maintenance on the roof, in attics, in crawl spaces, where access must be through attics or crawl spaces, or where access is not possible using removable panels or doors.
   3. Light Levels: Provide adequate lighting for locating and maintaining equipment.
   4. Cleaning: Where not otherwise specified, design equipment mountings to allow easy cleaning around and under equipment, if applicable, without crevices, cracks, and concealed spaces where dirt and grease can accumulate and with raised, closed bases for equipment mounted on the floor.
   5. Equipment Enclosures: Provide removable access panels to allow cleaning.
   6. Site Utilities: Record or mark locations of existing, abandoned, and new utility lines in such a manner that they can be easily located during and after completion of construction.
   7. Piping Systems:

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a. Piping Other Than Gravity Drains: Provide means of isolating convenient portions of piping system so that small portions may be shut down leaving the remainder in operation, and so that drainage of the entire system is not required to enable repair of a portion of it.
b. Piping: Entire systems drainable without disassembly of piping.

8. Replaceability of Parts:
   a. Parts Having Service Life Less Than That Specified for Element: Easily replaceable, without de-installation or de-mounting of the entire element, component, or equipment item.
   b. Valves: Easily replaceable internal parts, eliminating necessity of removal of entire valve for repair.
   c. Parts Availability: Readily available from stocking distributors within 50 miles of project location.

D. Ease of Replacement:
   1. Elements Not Required to have Expected Service Life Span Equal to that Specified for the Facility as a Whole: Make provisions for replacement without undue disruption of building operation.

**End of DC 0 - Facility Design Criteria**

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# DC A - Substructure Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Substructure comprises foundations, floors on grade, and other substructure elements.

B. Foundations: Structures responsible for transferring dead loads, live loads, and environmental loads of completed building to the earth in such a way that a complete load path is provided.
   1. Standard Foundations: Spread footings below columns, linear spread footings below load-bearing walls, foundation walls not part of basements, caisson (pier) caps, and pile caps.
   2. Other Foundations: All types of special foundation systems, including permanent shoring and underpinning, raft foundations, piles, drilled piers (caissons), cofferdams, and permanent dewatering systems.

C. Floors on Grade: Structural slabs that are installed over fill or at excavated and compacted grade, including all depressions in the floor, such as trenches, pits, and sumps. Also equipment bases, under floor and perimeter drainage, thermal insulation at floor edge, and moisture barriers installed integrally with floor system.

D. Submittals: Submit informational concrete mix design for all concrete mixes.

### 1.2 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC B1 - Superstructure Criteria: Reinforced masonry requirements.

### 1.3 REFERENCE STANDARDS

A. ACI 201.2R - Guide to Durable Concrete, 2008

B. ACI 302.1R - Guide for Concrete Floor and Slab Construction, 2004 (errata 2007)

C. ACI 301- Specifications for Structural Concrete, 2005

D. ACI 318 - Building Code Requirements for Structural Concrete, 2008

### 2.1 METHODS OF CONSTRUCTION

A. Use any of the following methods and techniques:
   1. Excavation, backfill, and compaction by machine or hand.
   2. Pile driving.
   3. Caisson or pier drilling.
   4. Perimeter sheet piles and subsequent excavation.

B. Do not use any of the following methods and techniques:
   1. Tunneling or boring.

### 2.2 FOUNDATIONS

A. Use one of the following:
   1. Concrete slab on grade.
   2. Reinforced concrete spread footings.
   3. Bored piles.
      a. Auger cast grout piles.
      b. Bored and belled concrete piles.
      c. Uncased cast-in-place concrete piles.
   4. Driven piles.
      a. Prestressed concrete piles.
      b. Steel H piles.
   5. Raft foundations.
   6. Reinforced concrete.

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B. Do not use any of the following:
   1. Treated wood.
   2. Untreated wood.
   3. Foam plastic insulation below grade.
   4. Unfilled tubular steel piles.
   5. Box caissons.
   6. Sheeted caissons.

**2.3 FOUNDATION WALLS**

**2.4 FLOORS ON GRADE**

A. Use one of the following:
   1. Concrete floor slabs throughout the project.

B. Do not use any of the following:
   1. Masonry pavers on compacted fill.
   2. Wood flooring on treated wood sleepers.
   3. Bituminous concrete paving.

**2.5 EXCAVATION RETAINING WALLS**

A. Use one of the following:
   1. Steel sheet piling.
   2. Wood cribbing in structural steel H-piles.

**2.6 WATER PENETRATION TREATMENT**

A. Use one of the following. Submit product data.
   1. Damp proofing. Submit manufacturer's data and instructions.
   2. Sheet waterproofing. Submit manufacturer's data and instructions.
   3. Fluid-applied waterproofing. Submit manufacturer's data and instructions.

**PART 3 DESIGN CRITERIA**

**3.1 BASIC FUNCTION**

A. Provide substructure as required to support the completed and occupied building safely and without uncontrolled subsidence or other movement.

B. Provide floors on grade as required to enclose habitable spaces and support interior functions without subsidence structural cracking, or other uncontrolled movement.

C. When excavation extends below bearing stratum for adjacent structures provide permanent underpinning to extend foundation of structures on adjacent property lines.

D. Prevent deterioration of loadbearing stratum due to accumulation of water in excavation.

E. Where substructure is integral with elements defined within another element group, meet requirements of both element groups.

F. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

**3.2 STRUCTURAL CRITERIA**

A. Capacity: Provide loadbearing substructure members as required by code and designed to distribute dead loads, live loads, and environmental loads so that bearing capacity of soil is not exceeded.
   1. Extend bearing portions of substructure to levels below frost line at project location, not less than 2 ft. below grade.
   2. Minimum Wall Thickness: Not less than thickness of superstructure walls supported by foundation walls.
   3. Minimum Foundation Wall Thickness: 8 in.
   4. Minimum Wall Reinforcement: Steel, ASTM A615, with minimum yield strength not less than 60,000 psi.
   5. Spread Footings: Designed not to exceed the allowable soil bearing capacity.

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6. Footings: Minimum compressive strength of 4000 psi and minimum thickness of 10 in.
7. Caissons and Drilled Piers: Bearing on rock.
8. Piles: Designed with adequate friction to withstand loading.
9. Pile, Pier, or Caisson Caps: Minimum compressive strength of 4000 psi and minimum thickness of 12 in.

B. Dead Loads: Accommodate loads from weights of building materials, construction itself, and all fixed service equipment.

C. Live Loads: Accommodate loads from use and occupancy of the building, either uniformly distributed loads as prescribed by code or concentrated loads, whichever are more demanding structurally.
   1. Uniformly Distributed Loads: As required by code for building occupancy.
   2. Concentrated Loads: As required by project program and building design.

D. Environmental Loads: Accommodate loads from all environmental forces in accordance with code and the following:
   1. Lateral Soil Loads: Lateral pressure of soil adjacent to vertical substructure elements including potential surcharge from fixed or moving loads and potential hydrostatic pressure.
      a. Increase lateral pressure assumptions if expansive soils have been identified by a geotechnical investigation unless expansive soils are excluded from backfill.
   2. Wind: Overturning and shear forces attributable to design wind speed at project location applied to full building height.
   3. Seismic: Overturning and shear forces attributable to seismic design parameters at project location applied to full building height.

### 3.3 DURABILITY CRITERIA

A. Expected Service Life Span: Same as building service life without any deterioration.

B. Corrosion Resistance of Underground Metal Elements: See Section DC 0.

C. Concrete Durability:
   1. Monolithic Concrete Floor Slabs on Grade: Composition and finishing as recommended by ACI 302.1R based on type of anticipated traffic and intended use.
      a. Foot Traffic, Exposed Surface: Class 1; minimum 28-day compressive strength of 3000 psi; maximum slump of 5 in; single troweling; nonslip finish where required by Volume C - Interiors.
   2. Concrete Slabs On Grade Partly or Completely Exposed to Freezing Conditions:
      a. Water-Cement Ratio: As recommended by ACI 302.1R.
         1) Moderate to Severe Exposure: Maximum 0.50.
         2) Exposure Subject to Deicing Chemicals: Maximum 0.45.
         3) Exposure to Salt Water: Maximum 0.40.
      b. Air Content: In accordance with recommendations of ACI 201.2R.

**End of DC A – Substructure Criteria**

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# DC B1 - Superstructure Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES CRITERIA

A. The superstructure comprises roofs and their supports.

B. Roofs: Roof construction, including canopies, and elements required for their support, insulation, fireproofing, and firestopping.

C. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC A - Substructure Criteria: Reinforced concrete foundation walls and slabs-on-grade.

C. Section DC B2 - Exterior Enclosure Criteria: Weather resistance of exposed superstructure.

D. Section DC B4 - Roofing Criteria: Roof coverings and finishes.

E. Section DC C2 - Interior Finish Criteria: Floor finishes.

F. Section 01 30 50 - Design Procedures and Substantiation Requirements.

### 1.3 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2005

## PART 2 PRODUCTS

### 2.1 SUPERSTRUCTURE

A. Use one of the following:
   1. Load-bearing masonry walls, wood joists and rafters or trusses, wood deck, and minor structural steel.

B. Do not use:
   1. Pre-engineered metal building.
   2. Air-supported structure.
   3. Pre-engineered glazed structure.
   4. Geodesic domes.
   5. Un-fireproofed structural steel.
   6. Precast concrete structural frame.
   7. Insulated concrete form walls.
   8. Do not use liquid-membrane curing compound on concrete floors unless it will not interfere with adhesion of floor finishes.

### 2.2 ROOF SUPERSTRUCTURE

A. Structure Supporting Roofs:
   1. Use one or more of the following:
      a. Wood joists and rafters or pre-engineered wood trusses. Submit calculations for pre-engineered roof trusses.

B. Roof Decks:
   1. Use one or more of the following:
      a. Structural wood panels. APA-rated. Minimum 5/8 inches (16 mm) thick.
   2. Do not use:
      a. Any construction with unprotected openings to floor below.
      b. Precast concrete.

### 2.3 COMPONENTS OF SUPERSTRUCTURE ELEMENTS

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A. Insulation on Top of Decks: See Section DC B4.

B. Insulation Under Decks at ceiling joists or bottom chords of trusses:
   1. Use one of the following:
      a. Rigid board insulation. Provide on attic-side of manufactured attic access panels.
      b. Sprayed cellulose fiber insulation at attics, typical. Submit manufacturer's product data.

C. Air Barrier:

D. Vapor Retarder:
   1. Use one of the following:
      a. Plastic sheet at winter-warm-side of insulation between ceiling panels and the bottoms of ceiling joists or bottom chords of roof trusses. Tape seams.

**PART 3 DESIGN CRITERIA**

**3.1 BASIC FUNCTION**

A. Provide structural elements, above grade and within basements, capable of supporting all anticipated loads without failure or damage.

B. Do not use any electrically-operated or fuel-powered construction for support of floor or roof members.

C. Where superstructure elements also must function as elements defined within another element group, meet requirements of both element groups.

D. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

**3.2 STRUCTURAL CRITERIA**

A. Structural Design: In addition to the requirements of the code, design to comply with ASCE 7.

B. Capacity: Design and provide load-bearing structural members of capacities required by code.

C. Dead Loads: Design to resist loads from weights of materials, construction, and fixed service equipment.

D. Live Loads:
   1. Floors: Resist uniformly distributed and concentrated loads.
   2. Roofs: Resist uniformly distributed and concentrated loads.

E. Environmental Loads:
   1. Wind: Basic wind speed in accordance with code.
   2. Roof: Roof live load in accordance with code.
   3. Rain: Resist loads from ponding rainwater when the primary drainage system is blocked.
   4. Earthquake: In compliance with provisions of code.

F. Structural Serviceability: Comply with requirements and recommended design procedures of ASCE 7.

G. Reinforced Masonry:
   1. Concrete Block: ASTM C90, Normal Weight.
   2. Mortar: ASTM C270, Property Specification.
      a. Exterior, below grade: Type S.
      b. Exterior, load bearing: Type N.
      c. Exterior, non-load bearing: Type N.
      d. Interior, load bearing: Type N.
      e. Interior, non-load bearing: Type O.
   3. Grout: ASTM C476.
   4. Reinforcing Steel: ASTM A615, Grade 60 deformed bars.
   5. Joint Reinforcement: Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A

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82/A 82M steel wire, mill galvanized to ASTM A 641/A 641M, Class 3; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure.

### 3.3 DURABILITY CRITERIA

A. Expected Service Life Span: Same as for facility as a whole, except as follows:
   1. Load-Bearing Structural Members: Minimum of 50 years with no anticipated deterioration.
   2. Protective Elements: Minimum 25 years.

B. Impact Resistance of Load-Bearing Members: Use materials that are not easily damaged by common hand tools.

C. Portions of Superstructure Exposed on Exterior: Comply with requirements of Section DC B2 for water penetration, weather resistance, impact resistance, and wear resistance.
   1. Exposed Roof Deck Surfaces: Comply with requirements for roofing weather barrier.

**End of DC B1 - Superstructure Criteria**

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# DC B2 - Exterior Enclosure Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Exterior enclosure comprises the essentially vertical separation between exterior and interior conditioned space, including exterior walls, exterior windows, exterior doors, other openings, exterior wall fixtures, and other exterior enclosure elements.

B. Exterior Walls: The supporting structure; the exterior skin, vapor retarders, air barriers, and insulation; glazed walls; the interior skin if an integral part of the wall; exterior screens and railings; balcony walls and parapets; exterior soffits unless they do not form a weather barrier; firestopping and draftstopping within wall and between wall and floors; and other exterior wall elements.

C. Exterior Windows and Other Openings: Windows, fixed glazing other than glazed walls, ventilation openings, protection devices for openings, and elements that form or complete the openings, unless an integral part of another element.

D. Exterior Doors: See Section DC B3 for additional requirements.

E. Exterior Wall Appurtenances: All elements attached to the outside of the exterior walls, unless consisting of equipment or services fixtures. Exterior wall appurtenances required are those defined in the project program, made necessary by the design, and the following:

### 1.2 RELATED REQUIREMENTS

A. Section DC0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC B1 - Superstructure Criteria: Reinforced masonry requirements.

C. Section DC B3 - Exterior Doors Criteria: Additional requirements for doors in exterior enclosure.

D. Section DC C2 - Interior Finishes Criteria: Interior finish of exterior walls.

E. Section DC C31 – Information Fixtures Criteria: Exterior wall-mounted signs.

F. Section DC D4 - HVAC Criteria: Additional requirements for air intake and exhaust openings.

G. Section DC G1 - Site Improvements Criteria: Exterior wall-mounted flagpoles.

H. Section 01 30 50 - Design Procedures and Substantiation Requirements.

### 1.3 REFERENCE STANDARDS

A. AAMA 1503 - Voluntary Test Method for Thermal Transmission and Condensation Resistance of Windows, Doors, and Glazed Wall Sections, 1998.

B. ASCE 7 - Minimum Design Loads for Buildings and Other Structures, 2005

C. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference, 2002 (Reapproved 2010).

D. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls By Uniform Static Air Pressure Difference, 2000 (Reapproved 2009).

E. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference, 2000 (Reapproved 2009).

## PART 2 PRODUCTS

### 2.1 EXTERIOR WALL ELEMENTS

A. Exterior Skin of Exterior Walls:

1. Use one of the following:

a. Ground face concrete block. Protect from damage and discoloration during construction. Seal exterior surface with a penetrating sealer (matte, clear). Apply sealer in accordance with the product manufacturer's specifications. Provide

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integrally colored mortar to match CMU throughout. Submit CMU and mortar samples demonstrating type, size, texture, finish, and color of materials to be used.

1) Exterior CMU walls (structural and garden screens): Provide integrally colored 8"w x 16"l x 4"h (nominal) blocks. Pattern: Running bond; provide stacked bond below window sills. Top of wall at exterior garden screen walls shall be a masonry dimension (do not cut blocks) approximately 5'-6" above finished slab. Provide 2"h cap trim blocks to match masonry units below and finish tops of panels.
2) Interior restroom demising partitions (at utility chase): Provide integrally colored 6"w x 16"l x 4"h (nominal) blocks. Pattern: Running bond.
3) Interior CMU restroom privacy partitions between compartments: Provide integrally colored 6"w x 16"l x 4"h (nominal) blocks. Provide 2"h cap trim blocks to match other masonry units and finish tops of panels. Top of wall height shall be a masonry dimension (do not cut blocks) approximately 5'-6" above finished slab. Tie privacy partitions into the concrete floor slab, reinforce and grout solid as required by code to resist overturning. Pattern: Running bond.

2. Do not use:
   a. Precast concrete.
   b. Exterior insulation and finish system.
   c. Siding panels.
   d. Glass.
   e. Portland cement plaster.
   f. Tile.

B. Supporting Structure of Exterior Walls:
1. Use one of the following:
   a. Load-bearing unit masonry assemblies.
2. Do not use any of the of the following for the supporting structure of walls:
   a. Cast-in-place concrete.
   b. Insulated concrete form walls.
   c. Precast concrete.
   d. Tilt-up wall construction.
   e. Non-load-bearing unit masonry assemblies.
   f. Surface bonded masonry construction.
   g. Secondary structural steel members.
   h. Cold formed metal framing.
   i. Wood stud framing
   j. Glazed curtain wall.
   k. Structural glass curtain wall.
   l. Translucent wall panel assembly.

C. Exterior Ceilings and Soffits:
1. Use one of the following:
   a. Factory-finished, vented linear metal soffit panels. Calculate required vent area to satisfy code requirements for attic ventilation. Submit manufacturer's product data and material sample.

## 2.2 WINDOWS

A. Windows (Operable and Fixed):
1. Window Operation: Use one of the following:
   a. Horizontal sliding windows. Windows shall be thermally broken, factory-finished anodized aluminum (AAMA 608.1) or spray-applied organic coated (painted) aluminum (AAMA 2604). Refer to the architectural drawings and size to fit within masonry openings. Install and flash in accordance with manufacturer's specifications. Hardware: Provide manufacturer's factory-finished hardware. Submit manufacturer's

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product data and finish color sample.

2. Glazing: Tempered, single pane glazing.
3. Use one of the following:
   a. Aluminum windows.

B. Glazing: Glass and plastic.
1. Use one of the following:
   a. Fully tempered glass.
   b. Double pane insulated glass units.

## 2.3 OTHER EXTERIOR ENCLOSURE ELEMENTS

A. Lintels:
1. Use one of the following:
   a. Steel.

B. Sills:
1. Use one of the following:
   a. Precast concrete. Submit material sample.
   b. Unit masonry. Submit material sample.

C. Concealed Flashings:
1. Use one of the following:
   a. Aluminum flashing.
   b. Galvanized steel flashing.
   c. Self-adhering, flexible membrane flashing.

# PART 3 DESIGN CRITERIA

## 3.1 BASIC FUNCTION

A. Provide an essentially vertical separation between exterior and interior conditioned space, that keeps out weather, uninvited people, and animal and insects, without unusual action by occupants, while providing convenient movement of occupants between inside and outside, desirable natural light, and views from inside to outside.

B. Fill, cover, close, or otherwise protect all openings in the exterior walls (other than doors) so that the entire exterior enclosure functions as specified, using windows and other opening elements as specified, without using components that must be installed at changes of season.

C. Where exterior enclosure elements also must function as elements defined within another element group, meet requirements of both element groups.

D. In addition to the requirements of this section, comply with all applicable requirements of Section DC0 - Facility Design Criteria.

## 3.2 STRUCTURAL CRITERIA

A. Design Loads:
1. Refer to Section DC B1 for Structural Criteria.

B. Wind Design: No damage when tested in accordance with ASTM E330 at 1.5 times positive and negative design wind loads using 10 second duration of maximum load.
1. Members Not Supporting Glass: Maximum deflection of 1/360 of span, unless otherwise indicated.
2. Unit Masonry: Maximum deflection of 1/600 of span unless otherwise indicated.
3. Members Supporting Glass: Maximum deflection of flexure limit of glass; with full recovery of glazing materials.

C. Lintels: Constructed to span openings and support loads imposed by exterior wall; maximum deflection of 1/600 of span, vertically and horizontally.

D. Railing Assemblies: Resistant to required forces in accordance with ASCE 7.

## 3.3 DURABILITY CRITERIA

A. Expected Service Life Span: Same as for facility as a whole, except as follows:

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1. Wall Primary Weather-Barrier Elements: Minimum 50 years functional and aesthetic service life, excluding joint sealers.
2. Transparent Elements (Glazing): Same as other wall primary weather-barrier elements, except accidental breakage is considered normal wear-and-tear.
3. Joint Sealers in Exterior Skin: Life span expectancy equal to that specified for primary weather barriers.
    a. Exception: Lesser life span, with minimum of 20 years, is acceptable providing the joint surface does not exceed 1 percent of the face surface of the jointed area and the joint design provides secondary water-shedding design.
4. Surfaces Exposed to View: Minimum 20 years aesthetic service life; in addition, deterioration includes color fading, crazing, and delamination of applied coatings.
5. Substantiation: As specified for expected service life span in Section DC 0, including service life analysis and life cycle cost analysis.

B. Temperature Endurance: Allow for daily expansion and contraction within and between elements caused by temperature range from most extreme low temperature to 70 degrees F greater than the most extreme high temperature, in any year, without causing detrimental effect to components and anchorage.

C. Water Penetration Resistance:
1. Drain water, moisture, and condensation entering assemblies to the exterior.
    a. Top of Openings: If wall construction does not provide its own methods of drainage, use separate flashing to prevent water from entering opening components or the interior of the building.
    b. Bottom of Openings: Integral or separate sill or flashing to prevent water running over or draining out of opening components from entering the wall construction below or the interior of the building.

D. Integral Interior Surfaces: Comply with requirements for interior finish.

**End of DC B2 - Exterior Enclosure Criteria**

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# DC B3 - Exterior Doors Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Exterior doors comprise all openings in the exterior wall that function to allow the entrance and exit of people, vehicles, and goods, including exterior doors. Include doors of all sizes and uses, operable grilles and screens, gates, and other exterior door opening elements.

B. Other Exterior Door Opening Elements: All components required to complete the openings, including lintels, sills, flashings, and joint sealers, unless an integral part of another element.

C. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC B2 - Exterior Enclosure Criteria: Additional requirements applicable to doors located in exterior enclosure.

### 1.3 REFERENCE STANDARDS

A. AAMA 1503 - Voluntary Test Method for Thermal Transmission and Condensation Resistance of Windows, Doors, and Glazed Wall Sections, 1998.

B. ANSI A250.4 - American National Standard Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing, 2001.

C. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies, 1984 (Reapproved 2002).

D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches, 2003.

E. BHMA A156.3 - American National Standard for Exit Devices, 2001.

F. BHMA A156.5 - American National Standard for Auxiliary Locks & Associated Products, 2001.

G. BHMA A156.12 - American National Standard for Interconnected Locks & Latches, 2005.

H. BHMA A156.13 - American National Standard for Mortise Locks & Latches, 2005.

I. NAAMM HMM 862 - Guide Specifications for Commercial Security Hollow Metal Doors and Frames, 2003

## PART 2 PRODUCTS

### 2.1 EXTERIOR DOORS

A. Main Entrance Doors:
   1. Use one of the following:
      a. Hollow steel doors, heavy duty. Provide factory primed for field finishing. Size: 3'-0" x 6'-8", min. Submit manufacturer's data and instructions.

B. Hardware for Swinging Doors :
   1. Use satin, stainless steel finish at all doors.
   2. Hinges: Ball-bearing butt hinges with vandal-proof pins. 1-1/2 pairs. Submit manufacturer's product data.
   3. Locksets: ENTRY DOORS: Passage function. Dead bolt only with push plate/pull. Provide keyed exterior/thumb turn interior. Provide 10-inch kick plate, both sides. SERVICE DOORS: Classroom function (always locked from exterior). ADA-compliant lever-activated latch/lockset with escutcheon. Bored (cylindrical) with deadbolt. Provide silencers at all latch-side jambs. Provide all hardware from park standard manufacturer. Submit manufacturer's product data.
   4. Door Closers: Unless specifically indicated as one type, concealed overhead frame-

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mounted type. Submit manufacturer's product data.

5. Door Stops: Unless specifically indicated as one type, floor-mounted type. Submit manufacturer's product data.
6. Door Hold-Opens: Unless specifically indicated as one type, overhead door/frame mounted type. Submit manufacturer's product data.

## 2.2 OTHER EXTERIOR DOOR OPENING ELEMENTS

A. Lintels:
   1. Use one of the following:
      a. Unit masonry.
      b. Steel.

B. Concealed Flashings:
   1. Use one of the following:
      a. Galvanized steel flashing.

C. Joint Sealers: Same as specified for exterior enclosure. Submit manufacturer's product data and color samples.

D. Do not use:
   1. Different metals subject to galvanic action in direct contact with each other.
   2. Aluminum in direct contact with concrete or cementitious materials.

# PART 3 DESIGN CRITERIA

## 3.1 BASIC FUNCTION

A. Secure all openings in the exterior wall that function to allow the entrance and exit of people, vehicles, and goods, so that the entire exterior enclosure functions as specified, using doors as specified, without using components that must be installed at changes of season.

B. Where exterior door elements also must function as elements defined within another element group, meet requirements of both element groups.

C. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria, and DC B2 - Exterior Enclosure Criteria.

## 3.2 AMENITY AND COMFORT CRITERIA

A. Accessibility and Convenience:
   1. Door Handles and Knobs: As required by code; where code and other requirements allow an option, exit devices are preferred.
   2. Mode of Operation: Self-closing, with manual hold-open, unless otherwise indicated.

B. Water Penetration Resistance: If so desired, provide justification for exemption of door openings from water penetration requirements of Sections DC 0 and DC B2.

C. Appearance:
   1. Doors and frames at Building Entrances: Match color of window finish.
   2. Door Hardware: Provide hardware with matching finishes throughout: Satin, Stainless Steel.

## 3.3 HEALTH AND SAFETY CRITERIA

A. Emergency Egress:
   1. Provide exit doors minimum 36 inches wide.

B. Physical Security:
   1. Doors non-removable from outside without use of key.
   2. Secure each exterior door using a "fail-secure" method that allows entrance plus exit from inside using only one motion.
      a. Keys: Type as required to minimize unauthorized entry.
      b. Lock Functions: Appropriate to the location and function and as follows:
         1) Entrance Doors: Store door with dead bolt (must be unlocked during hours of operation).

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2) Service Entry Doors: Always-Locked, with Deadbolt.

c. Lock Function Definitions: As described in ANSI/BHMA A156.2 (F36-F48, F75-F94, F107-F109), A156.3 ("X" prefix), A156.5 ("E" prefix), A156.12 (F95-F106), and A156.13 (F01-F25); type of lock required may also be governed by other criteria.

1) Always-Locked, with Deadbolt: F98.

3. Forced Entry: Provide doors capable of resisting forced entry equivalent to:

a. Swinging Doors: ASTM F476 Grade 10.

b. Locks and Lock Cylinders: ANSI/BHMA A156.5 Security Grade 1.

## 3.4 STRUCTURAL CRITERIA

A. Lintels: Constructed to span door openings and support loads imposed by exterior wall with maximum deflection vertically and horizontally of 1/360 of span.

B. Door Frames: Constructed to span door opening with maximum deflection vertically and horizontally of 1/360 of span.

## 3.5 DURABILITY CRITERIA

A. Service Life Span of Operating Components: Remaining operable for 20 years under normal exposure conditions for the project site.

B. Water Penetration Resistance: Design openings and components of openings to positively drain water to exterior of the building.

1. Top of Openings: If wall construction does not provide its own methods of drainage, use separate flashing to prevent water from entering opening components or the interior of the building.

2. Bottom of Openings: Integral or separate sill or flashing to prevent water running over or draining out of opening components from entering the wall construction below or the interior of the building.

C. Physical Endurance:

1. Doors, Frames, and Hardware: ANSI A250.4 Level A using hardware specified.

2. Doors, Frames, and Anchors: NAAMM HMMA 862 endurance test requirements.

D. Wear Resistance:

1. Door Surfaces: Scuff-resistant in areas where foot impact is likely; highly scratch-resistant in areas where hand contact is likely.

2. Door Handles and Knobs: Highly scratch-resistant and of finish that will minimize appearance changes due to wear; satin or brushed finish and no plated or coated finishes.

E. Swinging Doors: Control door swing to prevent damage due to impact, to either door or element impacted.

## 3.6 OPERATION AND MAINTENANCE CRITERIA

A. Ease of Use and Repair: Provide doors that will be easy to use by occupants, easy to repair or service, and with operating components easy to replace.

**End of DC B3 - Exterior Doors Criteria**

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# DC B4 - Roofing Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Roofing comprises all elements forming weather and thermal barriers at the sloped or essentially flat weather-proof enclosure over the entire "top-side" of building and over exposed floor superstructure, including plaza decks, balconies, and other exposed floors; including roof coverings, closures for roof openings, roof fixtures, and other roof elements, not including the structural supporting elements of the roof.

B. Roof Coverings: All weather-resistive components, including the primary weather barrier, vapor retarders, insulation, wearing surfaces, water collectors and conductors, trim and accessories.

C. Roof Openings: Skylights, ventilation openings, access openings, and other elements necessary to close roof openings, and elements associated with those openings.

D. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

### 1.3 REFERENCE STANDARDS

A. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections, 2009.

B. AAMA GDSG-1 - Glass Design for Sloped Glazing, 1987.

C. AAMA TSGG - Two-Sided Structural Glazing Guidelines for Aluminum Framed Skylights, 2004.

D. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference, 2000 (Reapproved 2009).

E. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential, 2000 (Reapproved 2009).

F. SMACNA (ASMM) - Architectural Sheet Metal Manual, 2003.

### 1.4 FIELD CONDITIONS

A. The following existing roofing elements must be removed to accomplish new construction:
   1. Existing concrete roof tiles and appurtenances including metal eave closures. Salvage and store for reuse.

## PART 2 PRODUCTS

### 2.1 ROOF COVERINGS

A. Roof Coverings In General:
   1. Use one of the following:
      a. Product, whose installation method is specified in the code, provided the material complies with specified requirements.

B. Sloped Roofs:
   1. Use one of the following:
      a. New concrete tiles matching existing, salvaged tiles. Submit manufacturer's product data and material samples.
      b. Existing salvaged roof tiles. Reuse whole, unbroken tiles only. Discard broken, chipped, or cracked tiles.

C. Water Collectors and Conductors:
   1. Use one of the following:
      a. Factory-finished galvanized steel sheet metal. Submit manufacturer's product data.

D. Flashing, Trim, and Accessories:

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1. Use one of the following:
    a. Factory-finished galvanized sheet metal. Submit manufacturer's product data.

## 2.2 ROOF OPENINGS

A. Roof Openings In General:
    1. Use one of the following:

B. Skylights:
    1. Use one of the following:
        a. Curb-mounted, sun tunnel type with acrylic dome and highly reflective light tube and lens at finished ceiling. Submit manufacturer's product data.

C. Ventilation Openings In or On Plane of Roof:
    1. Use one of the following:
        a. Ridge vents. Provide manufacturer's product data.
        b. Fixed gravity ventilators. Provide manufacturer's product data.

# PART 3 DESIGN CRITERIA

## 3.1 BASIC FUNCTION

A. Provide a weather-proof enclosure over the entire "top-side of building that also excludes unwelcome people, animals, and insects without requiring specific action by occupants, while shedding water and preventing uncontrolled water infiltration, withstanding anticipated loading conditions, providing required access, and permitting the entry of desirable natural light.

B. Where roofing elements also must function as elements defined within another element group, meet requirements of both element groups.

C. In addition to the requirements of this section, comply with all applicable requirements of Section DC0 - Facility Design Criteria.

## 3.2 AMENITY AND COMFORT CRITERIA

A. Thermal Performance: As specified in Section DC 0 and the following:

B. Water Penetration Resistance - Skylights Only:
    1. No uncontrolled water penetration at static pressure of 2.86 psf and 5.0 gal/sf/hr, when tested in accordance with ASTM E331.

C. Run-Off: Direct water run-off to storm drains without splashing or dripping.

D. Appearance:
    1. Roof tile: Match existing, salvaged roof tile in material, size, color, texture, and attachment technique. So to achieve a consistent appearance, install all new tile together on a single roof. Provide 5% overage as attic stock.

## 3.3 HEALTH AND SAFETY CRITERIA

## 3.4 STRUCTURAL CRITERIA

A. Self-Supporting Elements: Same requirements as for superstructure.

B. Rainwater Load: As required by code.

C. Roof Component Wind Resistance:
    1. Uplift: Same pressure as specified in code for structural members.

D. Roof Covering Substrate: Sufficiently rigid or dense to support water barrier in a manner that prevents puncture due to traffic on roof.

## 3.5 DURABILITY CRITERIA

A. Expected Service Life Span: Same as for facility as a whole, except as follows:
    1. Roof Covering Weather-Barriers: Minimum 50 years, fully functional.
    2. Surfaces Exposed to View: Minimum 50 years aesthetic service life; in addition, deterioration includes color fading, crazing, and delamination of applied coatings.
    3. Aesthetic Life Span: Significant degradation of appearance during the functional life span is not acceptable.

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4. Manufacturer Approval of Design: Where roof covering manufacturer recommends or requires certain design features for satisfactory performance or for warranty, with manufacturer's requirements.
5. Manufacturer Warranty:
   a. Materials: 20 years, minimum.
   b. Installation and Workmanship: 5 years, minimum.

B. Water Penetration Resistance: None, under conditions of rain driven at 50 mph, unless water paths are completely accessible.
   1. Water Barrier Type Roof Coverings: Use a water barrier that is lapped for positive run-off.
      a. Minimum Slope:
         1) Field of Roof: 3 inch per foot.
         2) Water Conductors: 1/8 inch per foot.
      b. Fasteners Penetrating Water Barrier: Prohibited, unless fasteners are located under overlapping material.
   2. Shingles, Tiles, and Other Traditional Lap-Type Roof Coverings: If proven-in-use overlap dimensions are used, mock-up testing is not required.

C. Weathering Resistance: Provide weather-exposed roof coverings and other components that comply with weather resistance specified in Section DC 0 and the following:
   1. Minimization of Deterioration Due to Weather: For weather barrier materials, minimization means no deterioration that adversely affects water penetration resistance at any time during the specified service life span.

### 3.6 OPERATION AND MAINTENANCE CRITERIA

A. Water Conductor Capacity: As required by code or SMACNA Architectural Sheet Metal Manual (ASMM), whichever is greater, based on 10 year 5 minute intensity.

B. Ease of Replacement: As specified in Section DC 0 for elements not required to have expected service life span equal to that specified for the facility as a whole.
   1. Glazed Elements: Design and install glazed elements so that glazing can be replaced from outside without need for scaffolding or other temporary supports inside the building.

**End of DC B4 - Roofing Criteria**

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# DC C - Interiors Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Interiors comprise all elements necessary to subdivide and finish space enclosed within the shell, including applied interior surfaces of the exterior enclosure; interior doors, windows, and other openings and coverings; interior fixtures attached to interior construction to add functionality to enclosed spaces, except for elements classified as equipment or services fixtures.

B. Interior Openings: Doors, windows, louvers, vents, expansion joint covers.
   1. Other Interior Openings: Interior utility openings such as hatches and access panels, louvers and vents, expansion joint covers, and elements forming or completing interior openings, including sills, jambs, heads, and operating hardware.

C. Interior Finishes: All functional and decorative applied interior finishes, including secondary support structures, for ceilings, walls, floors, doors, and other field finished elements.

D. Interior Fixtures: Functional items that are permanently attached to interior walls, ceilings, and floors, except for elements classified as equipment or services fixtures, comprising the following elements:
   1. Toilet, Bath, and Laundry Accessories.
   2. Information Fixtures: Identifying devices, visual display surfaces, and communications enclosures.

E. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC C2 - Interior Finishes Criteria: Additional requirements for ceilings and interior finishes.

C. Section DC C31 - Information Fixtures Criteria: Additional requirements for information fixtures.

D. Section DC D4 - HVAC Criteria: Louvers and vents associated with ductwork.

E. Section DC G1 - Site Improvements Criteria: Exterior stairs and railings detached from the building.

F. Section 01 30 50 - Design Procedures and Substantiation Requirements.

### 1.3 REFERENCED STANDARDS

A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications, 2011.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials, 2010b.

C. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact, 2007.

D. ASTM F1233 - Standard Test Method for Security Glazing Materials And Systems, 2008.

E. IESNA (LH) - Lighting Handbook, 2000.

F. IESNA RP-5 - Recommended Practice of Daylighting, 1999.

### 1.4 FIELD CONDITIONS

A. The following existing interior elements must be removed to accomplish new construction:
   1. Existing partitions, ceilings, doors, finishes, and fixtures (entire interior will be gutted).
   2. Abandoned services elements, including pipes, ducts, conduit, equipment, and fixtures.

## PART 2 PRODUCTS

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## 2.1 OWNER-FURNISHED PRODUCTS

A. The following items are to be provided by Owner:
   1. Waste receptacles.

B. Owner-Furnished Items: Performance requirements that specify characteristics of equipment items do not apply; requirements for accommodating items to the project do apply.

## 2.2 PARTITIONS

A. Partial Height Partitions:
   1. Design and construct partitions using the following:
      a. Concrete masonry units at toilet compartments. Provide manufacturer's product data and material samples.
   2. Do not use:

B. Demountable Partitions:
   1. Use the following:
      a. Solid material (phenolic or similar) at operable toilet partition doors. Refer to the "Fixed Design Criteria" in the RFP for the Basis of Design. Install operable door panels using full-length piano-type hinges. Provide manufacture's product data and material samples.
   2. Do not use:
      a. All metal panel systems.
      b. Laminated metal-honeycomb panel systems.

C. Interior Railings:
   1. Use the following:
      a. Pipe and tube railings of stainless steel for grab bars at accessible water closets. Meet ABAAS requirements. Submit manufacturer's product data.

## 2.3 OTHER INTERIOR OPENINGS

A. Access Doors:
   1. Use one of the following:
      a. Manufactured metal doors at ceilings to provide code-compliant attic access. Paint to match ceiling finish. Secure with locking hardware. Submit manufacturer's product data.

## 2.4 TOILET, BATH, AND LAUNDRY ACCESSORIES

A. Reflective Surfaces of Mirrors:
   1. Use one of the following:
      a. Glass with bright chrome frame. Size: 18" w x 36" tall. Provide one per lavatory. Submit manufacturer's product data.

B. Toilet, Bath, and Laundry Accessories:
   1. Use one of the following:
      a. Stainless steel accessories. Finish: Satin.

# PART 3 DESIGN CRITERIA

## 3.1 BASIC FUNCTION

A. Interiors: Provide appropriately finished interiors for all spaces indicated in the program, equipped with interior fixtures as required to function properly for specific occupancies.

B. Interior Partitions: Provide physical separation between spaces, constructed to achieve fire ratings required by code, appropriate security between adjacent spaces, and visual, acoustical, olfactory, and atmospheric isolation as necessary to maintain desirable conditions in each space.

C. Other Interior Openings:
   1. Access Openings: Provide interior openings where required for maintenance access to mechanical services and other concealed systems, designed to be as unobtrusive as

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possible.

D. Interior Finishes: Provide finishes for interior surfaces that are appropriate for the functions of each space.
   1. See Section DC C2 for criteria.

E. Interior Fixtures: Provide interior fixtures that are necessary for the proper functioning of each space.
   1. Mirrors:
      a. One for each lavatory, unless otherwise indicated.
      b. Other locations where indicated in project program.
   2. Grab Bars: Wherever required for safety and assistance in use of toilet and bath fixtures, and at toilets designed for the disabled, showers, and bathtubs. Meet ABAAS requirements.
   3. Holders and dispensers for toilet, sink, and bath supplies furnished by Owner.
      a. Toilet Paper: Roll, consumer-size; one dispenser per toilet and bidet.

F. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

### 3.2 AMENTIY AND COMFORT CRITERIA

A. Accessibility: Provide interior fixtures that are easily usable by disabled persons without outside assistance.
   1. Pipe and tube railings of stainless steel for grab bars at accessible water closets. Meet ABAAS requirements. Submit manufacturer's product data.

B. Visual Privacy:
   1. Provide fixed, full-height partitions at toilet rooms and dressing rooms that afford visual privacy between adjacent stalls.

C. Glare: Provide interior fixtures that are not a source of direct or reflected glare.

D. Natural Ventilation: Design and construct interiors to permit air movement between exterior openings positioned to enhance warm weather thermal comfort of occupants in all major spaces.

E. Convenience:
   1. Interior Fixtures: Provide interior fixtures with fittings and controls that are manageable without special instruction or the need for excessive force.

F. Appearance: Provide interiors that are pleasing in appearance and do not detract from the primary functions performed in each space.
   1. Provide operable partitions that are compatible in appearance with fixed partitions in the same space, employing similar materials, colors, and textures.
   2. Other Interior Openings:
      a. Compatibility: Provide access panels, hatches, and louvers that are compatible in appearance with the finished surfaces in which they are installed, employing similar colors and textures.
   3. Interior Fixtures: Provide interior fixtures that are coordinated in design with other elements of interior construction, using compatible materials, colors, textures, and design features.

G. Texture: Provide interior elements and surfaces that are textured appropriately for primary functions to be accommodated within each space.
   1. Surfaces Within Reach: Provide durable, low maintenance exposed surfaces where within reach of occupants engaged in activities normal for the particular space in which they are installed.
      a. Flat, Exposed Metal Surfaces: Finishes that are satin, that is, non-reflective rather than smooth polished surfaces.
      b. Flat Metal Surfaces: Coatings not permitted.
      c. Hardware and Other Rounded Metal Surfaces: Coatings not permitted.

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2. Surfaces Not Within Reach: For surfaces that are not within normal reach of occupants, provide textures that are comparable to those within normal reach.

### 3.3 HEALTH AND SAFETY CRITERIA

A. Flammability: Provide interior fixtures made of materials with flame spread index of 25 or less and smoke developed index of 450 or less when tested in accordance with ASTM E84 at all locations throughout the project.

B. Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
   1. Substantiation:
      a. Design Development: Identification of assemblies required to have fire resistance rating and method to be used to achieve rating.
      b. Construction Documents: Identifying numbers placed on the construction drawings.

C. Safety: Design and provide interior construction to protect building occupants in accordance with code and the following:
   1. Egress: Provide egress from all interior spaces in accordance with code.
   2. Tripping: Protect building occupants from tripping hazards due to uneven floor surfaces or abrupt changes in floor elevation of more than 1/8 inch.
   3. See other sections for minimum performance values for other interior elements.
   4. Broken Glass Hazard: Provide only fully tempered float glass for glass in fixtures.
   5. Fixtures Expected to Support or Assist in the Support of Persons: Touchable surfaces having slip resistance of 0.50, measured in accordance with ASTM D2047, using wet conditions.

D. Sanitation: At spaces used for food preparation and medical treatment, provide smooth, impervious, and water-resistant partition surfaces and integral coved base that will allow chemical cleaning and sterilization without damage.

### 3.4 STRUCTURAL CRITERIA

A. Structural Performance: Provide interior construction and fixtures to support without damage all loads required by code.
   1. Live Loads: Provide suspended interior fixtures or portions of fixtures designed for storage or support of persons or objects that have been engineered and installed to withstand 1.5 times the anticipated live loads without excessive deflection or permanent distortion.
      a. Grab Bars: Strength, design, anchorage, and support as required to withstand 250 pounds-force applied vertically at the center between supports and 250 pounds-force tension applied at any support; supports of sufficient rigidity to prevent rotation of bars under load.

### 3.5 DURABILITY CRITERIA

A. General Durability: Provide interior construction and fixtures that are suitable in durability for the degree and type of traffic to be anticipated in each space and ordinary cleaning and maintenance operations.
   1. At toilet rooms and janitorial closets, provide interior construction that will allow harsh chemical cleaning without damage.

B. Vandal Resistance: In spaces accessible to the public and not subject to continuous surveillance, provide interior construction and fixtures that are inherently vandal resistant or designed to be difficult to access or damage.

C. Theft Resistance: Provide interior fixtures at all locations that are attached to substrates with concealed, tamper-resistant, or tamperproof fasteners to minimize theft and vandalism.
   1. Toilet Accessories:
      a. In Public Restrooms: Secure to substrates using tamperproof or concealed fasteners.

### 3.6 OPERATION AND MAINTENANCE CRITERIA

A. Frequency of Servicing: Owner expects that refilling/emptying will occur at the following

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intervals; provide capacity appropriate to servicing interval and expected use, based on project occupancy:

1. Toilet Paper Dispensers: Daily, with sufficient redundancy to prevent running out.
2. Waste Receptacles: Daily.

B. Ease of Use:
   1. Interior Fixtures with Movable Components: Easy to use without special instruction and designed to prevent misuse.
   2. Hinges and Latches: Heavy duty hardware, easily adjustable, providing minimum anticipated service life of 20 years.
   3. Mechanical Controls: Movable cranks, rotors, pulleys, and levers designed for trouble-free operation over a minimum anticipated service life of 20 years.
   4. Substantiation:
      a. Design Development: Product data on hardware and other movable components of interior fixtures.
      b. Construction Documents: Details of interior fixtures, documenting construction features.

C. Ease of Cleaning:
   1. Waste Receptacles: Disposable liners or bags.

D. Ease of Repair:
   1. Mirrors: Breakable glazing replaceable without disassembly of frame.

E. Ease of Maintenance: Provide interior fixtures at all locations that are designed to permit repair or replacement of individual components without removal of fixture.

**End of DC C - Interiors Criteria**

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# DC C2 - Interior Finishes Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Interior finishes comprise the following elements:
   1. Wall finishes, including those applied to the interior face of exterior walls and to the vertical faces of superstructure elements.
   2. Floor finishes.
   3. Applied ceiling finishes.
   4. Finishes applied to other interior surfaces.

B. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC 00 - Spaces: Definitions of space names.

C. Section 01 30 50 - Design Procedures and Substantiation Requirements.

### 1.3 REFERENCED STANDARDS

A. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method, 2007e1.

B. ASTM D2047 - Standard Test Method for static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine, 2004.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials, 2010b.

## PART 2 PRODUCTS

### 2.1 CEILINGS AND CEILING FINISHES

A. Use one or more of the following:
   1. Painted (1-layers) 1/2-inch cabinet-grade plywood. Stagger installation of panels such that joints do not align. Indicate panel layout in Reflected Ceiling plans. Submit manufacturer's sample.

### 2.2 WALL FINISHES

A. Use one or more of the following:
   1. Interior surface of exterior unit masonry construction shall be interior finish. Protect from damage and/or discoloration during construction. Seal interior surface with anti-graffiti coating. Coating systems having the following essential characteristics: suitable for the density of the proposed surface, complies with all local regulations, UV stable, breathable, suitable for extreme temperatures, providing simplified graffiti removal process and weather penetration resistance. Prosoco, Sherwin Williams, Dulux, or Professional Products of Kansas, or approved equal. Install in accordance with product manufacturer's recommendations for specified use. Submit manufacturer's data for masonry sealer.

### 2.3 FLOOR FINISHES

A. Use one or more of the following:
   1. Quarry tile. Provide bullnose base with sanitary cove throughout. Grout in accordance with manufacturer's recommendations and the Tile Council of North America (TCNA). Submit manufacturer's product data and material samples for tile and grout.

## PART 3 DESIGN CRITERIA

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## 3.1 BASIC FUNCTION

A. Provide appropriately finished interiors for all spaces required by the program.

B. Substantiation:

1. Design Development: Identification of all criteria applicable to each finish; manufacturer's product data showing compliance.
2. Construction Documents: Detailed schedule of finish locations; manufacturer's product data.

C. Where interior finishes are integral with elements defined within another element group, meet requirements of both element groups.

D. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Performance and Section DC C - Interiors Criteria.

## 3.2 HEALTH AND SAFETY CRITERIA

A. Flammability:

1. Ceilings in Primary Spaces: Provide ceilings with ratings not greater than the following, when tested in accordance with ASTM E84:
   a. Flame Spread: 25.
   b. Smoke Developed: 450.

B. Slip Resistance: For spaces subject to floor wetting, provide floor finishes with inherent slip resistance under wet conditions.

1. At spaces such as toilets and maintenance rooms, provide floor surfaces with minimum static coefficient of friction of 0.60 when wet, measured in accordance with ASTM C1028 or ASTM D2047.

C. Cleanliness:

1. For spaces such as toilet rooms, provide wall, ceiling, and floor surfaces that are inherently resistant to moisture and that can be cleaned by caustic agents without damage.

## 3.3 DURABILITY CRITERIA

A. Expected Service and Aesthetic Life Span:

1. Ceilings: Provide ceilings and ceiling finishes that are appropriate for anticipated usage and traffic in each area, based on a 20 year replacement cycle.

B. Integral Finishes: Surfaces made of the same material as the core or substrate and which can be refinished after damage to like-new appearance.

1. Integral finishes are required as follows:
   a. At interior partitions throughout the project.
2. Field-applied finishes are permitted as follows:
   a. At ceilings throughout the project.
   b. At floors throughout the project.

**End of DC C2 - Interior Finishes Criteria**

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# DC C31 - Information Fixtures Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Information fixtures comprise the following:
   1. Identifying devices, such as signs, dimensional letters, plaques, and directories.

B. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

### 1.3 REFERENCE STANDARDS

A. Architectural Barriers Act Accessibility Standards (ABAAS); current edition.

## PART 2 PRODUCTS

### 2.1 IDENTIFYING DEVICES

A. Identifying Devices:
   1. Use one of the following:
      a. Wall-mounted room signs. Submit manufacturer's product data, samples, and dimensioned shop drawings illustrating the types and locations of signs.

B. Provide identifying devices using the following methods and techniques:
   1. Manufactured and prefinished sign systems for surface mounting throughout the project.

C. Interior Wall-Mounted Signs:
   1. Use one of the following:
      a. Dimensional letter signs using aluminum, stainless steel, bronze, or plastic sheet letters. Submit manufacturer's product data, samples, and dimensioned shop drawings illustrating the types and locations of signs.

D. Room and Function Label Signs:
   1. Use one of the following:
      a. Frameless metal panel signs with raised characters and graphics. Submit manufacturer's product data, samples, and dimensioned shop drawings illustrating the types and locations of signs.
      b. Cast metal plaques. Submit manufacturer's product data, samples, and dimensioned shop drawings illustrating types and locations of signs.

E. Directional Signs:
   1. Use one of the following:
      a. Frameless metal panel signs with raised characters and graphics. Submit manufacturer's product data, samples, and dimensioned shop drawings illustrating the types and locations of signs.
      b. Cast metal plaques. Submit manufacturer's product data, samples, and dimensioned shop drawings illustrating the types and locations of signs.

## PART 3 DESIGN CRITERIA

### 3.1 BASIC FUNCTION

A. Provide information fixtures that are necessary for direction to and identification of functions and spaces as required by the program.

B. Signage:
   1. Signs that provide guidance to, or information about, building functions or spaces, including directional signs, locator maps, and logotypes.
   2. Building directories with replaceable information strips.

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C. Where information fixtures are integral with elements defined within another element group, meet requirements of both element groups.

D. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria, and Section DC C - Interiors Criteria.

### 3.2 AMENITY AND COMFORT CRITERIA

A. Accessibility:
   1. Provide identification devices that comply with Architectural Barriers Act Accessibility Standards (ABAAS), current issue.
   2. Function Labels: Graphic and Braille signs for the following building services and functions:
      a. Toilets
      b. Closets

B. Appearance:
   1. Provide signage for entire project that is consistent in design with other interior features and coordinated with overall color scheme.

### 3.3 DURABILITY CRITERIA

A. Service Life Span:

B. Outdoor Units: Finish and materials complying with specified requirements for exterior enclosure specified in Section DC 0; leakproof enclosures, for protection of contents.

C. Surface Finish: Minimum service life of 20 years without color deterioration.

D. Wear Resistance:

E. Impact Resistance:
   1. Signs: For signs located at grade and the first floor of the building, constructed to resist damage from vandalism.

### 3.4 OPERATION AND MAINTENANCE CRITERIA

A. Vandalism Resistance: For signs in public areas that are within reach, provide signs that are positively attached to substrate by concealed mechanical devices and not by double-sided tape, sealant, or adhesive.

**End of DC C31 - Information Fixtures Criteria**

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# DC D3 - Plumbing Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Plumbing elements comprise the following:
   1. Domestic Water: All elements required to distribute water to fixtures, including piping and equipment for water cooling, heating and storage.
      a. Water Distribution: Piping within the building, serving fixtures. specialties, and equipment.
   2. Sanitary Waste: All elements required for removal of sanitary waste, including piping, venting, discharge and disposal, and equipment.
   3. Plumbing Fixtures: All fixtures necessary for sanitation, occupancy, and use that are connected to water supply or drainage.

B. Utility Sources and Outlets:
   1. Water Source: Source constructed for this project.
   2. Sewage Disposal: Connect building sewer to the existing park sewage system.

### 1.2 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

### 1.3 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems, 2007.

B. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes, 2010.

C. ASTM B88 - Standard Specification for Seamless Copper Water Tube, 2009.

## PART 2 PRODUCTS

### 2.1 DOMESTIC WATER PIPING AND EQUIPMENT

A. Water Piping, Buried:
   1. Use one of the following:
      a. Copper pip (ASTM B42), with brazed or soldered cast copper or wrought copper or bronze fittings, or flared cast bronze fittings. Minimum working pressure of 160 Psi.
   2. Do not use:
      a. Type M copper.

B. Water Piping, Not Buried:
   1. Use one of the following:
      a. Copper tube, cast copper, wrought copper, or bronze fittings, and soldered joints.
   2. Do not use:
      a. Type M copper.

C. Valves For Shut-Off or Isolation of Equipment, Fixtures, and Parts of Systems:
   1. Use one of the following:
      a. Ball valves.

### 2.2 SANITARY WASTE AND VENT PIPING AND EQUIPMENT

A. Sanitary Waste and Vent Piping, Buried:
   1. Use one or more of the following:
      a. Acrylonitrile butadiene styrene (ABS) plastic pipe and fittings, with solvent welded joints.
      b. Polyvinyl chloride (PVC) DWV pipe and fittings, with solvent welded or gasketed joints.

B. Sanitary Waste and Vent Piping, Not Buried:
   1. Use one or more of the following:
      a. Acrylonitrile butadiene styrene (ABS) DWV plastic pipe and fittings, with solvent

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welded joints.
b. Polyvinyl chloride (PVC) DWV pipe and fittings, with solvent welded joints.

C. Cleanout Plugs:
1. Use one or more of the following:
a. Same material as piping.

D. Cleanout Caps:
1. Use one or more of the following:
a. Cast iron.

E. Floor Drains:
1. Use one of the following:
a. Cast iron with waterless trap primer.
2. Do not use:
a. Trap Primers.

## 2.3 PLUMBING FIXTURES

A. Water Closets :
1. Use one or more of the following:
a. External flush valve type.
b. Vitreous china.
c. Wall mounted fixtures.
d. 1.28 gpf.

B. Urinals:
1. Use one or more of the following:
a. Vitreous china.
b. Wall mounted fixtures.
c. 1/8 gpf.

C. Lavatories:
1. Use one or more of the following:
a. Vitreous china.
b. Wall-hung fixtures.
c. Single hole for faucet connection.

D. Faucets and Trim:
1. Use one or more of the following:
a. Polish chrome-plated finish.
b. Single control type faucet with grid style strainer.

E. Utility (Mop or Janitor's) Sinks:
1. Use one or more of the following:
a. Floor-mounted fixtures.
b. Free standing, once piece, fiberglass laundry tub.

# PART 3 DESIGN CRITERIA

## 3.1 BASIC FUNCTION

A. Provide water supply necessary for building occupancy and use.

B. Provide delivery of domestic water to points of utilization.
1. Provide cold domestic water to plumbing fixtures as required.

C. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

D. Substantiation:
1. Construction Documents: Complete system details.
2. Construction and Closeout: Functional performance testing, as specified in Section 01 30 50.

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## 3.2 AMENITY AND COMFORT CRITERIA

A. Convenience:
   1. Fixture Heights: As specified in code and per ABASS.
   2. Maneuvering Space: Provide comfortable space between and around fixtures.
   3. Maneuvering Space: Provide space between and around fixtures as required per code and per ABASS.
   4. Faucets: Single action operation in the following locations.
      a. Restrooms.
   5. Install floor drains flush with the surface on which they are installed, out of pedestrian traffic patterns wherever possible.
   6. Do not locate floor drains and floor cleanouts in doorways or directly in traffic paths.

B. Odors:
   1. Do not locate sanitary waste vent openings where odors are noticeable by occupants or by occupants of adjacent properties or where odor-bearing air may enter building spaces.
      a. Do not terminate vents within 10 feet horizontally of doors, windows, air intake or exhaust openings, or other openings in the exterior closure, unless vent termination is at least 3 feet above the top of the opening.
      b. Do not locate vent openings under overhangs.
      c. Extend vent pipes at least 6 inches above the surface of roofs.
      d. Extend vent pipes at least 12 inches above overflow level of the highest fixture served by the vent.
   2. Connect fixtures to prevent entry of sewer gases into occupied spaces.
   3. Provide traps for all indoor drains connected to rain water drainage system.

C. Appearance:
   1. Fixtures:
      a. Smooth, corrosion-resistant, non-absorbent, with no crevices to collect dirt.
      b. Color: White, except where metal fixtures are required.

## 3.3 HEALTH AND SAFETY CRITERIA

A. Health: Provide potable water
   1. Maintain the safety of the potable water source at all times.
   2. Do not connect the potable water source to any non-potable water source.
   3. Keep animals and vermin out of open pipes, tanks, and other system components.
   4. Keep other contaminants out of the distribution systems, equipment, and water source.
   5. All openings and edges around the sides and bottom of each fixture permanently sealed with waterproof material.

B. Waste Disposal: Connect each fixture to sanitary drainage system for proper disposal of waste and harmful materials.

C. Pressure Control: Control pressures to protect the building, fixtures, equipment, and occupants from harm.
   1. Maximum Water Distribution Working Pressure: 80 psi.
   2. Pressure Reduction: Use pressure reducing valves or regulators.
   3. Air Removal: Remove air trapped in water distribution system.

D. Prevention of Sewer Gas Leaks:
   1. Provide waste system vents as required by code to avoid trap siphonage or compression.
   2. Prevent entry of sewer gases from the sanitary sewer into building's sewer system.

E. Protection of Potable Water Supply: As required by code.

F. Toxic Materials:
   1. Lead: Do not use lead or lead-containing materials in potable water systems.
   2. Lead: In solid materials (including pipe), maximum lead content of 8 percent; in solders and flux, maximum lead content of 0.2 percent.

## 3.4 DURABILITY CRITERIA

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A. Wear Resistance:
   1. Shutoff Valves: Resistant to corrosion, breakage, and scratching due to continual contact with water, human usage, and cleaning with abrasive materials.
   2. Fixtures, Trim and Accessories: Resistant to corrosion, breakage, scratching, burning, fading and chipping due to continual contact with water, human usage, and cleaning with abrasive materials.

B. Joint Durability: Provide watertight joints.

C. Electrical Component Protection:
   1. Do not route piping through electrical rooms, switchgear rooms, transformer vaults, and elevator equipment rooms unless it is absolutely necessary.
      a. Where piping must be routed near electrical equipment, shield the electrical equipment with drip pans which drain to the nearest floor drain.

## 3.5 OPERATION AND MAINTENANCE CRITERIA

A. Water Consumption:
   1. Water Closets: 1.28 gallons per flush, maximum, with complete waste removal in one flush.
   2. Urinals: 1/8 gallon per flush, maximum, with complete waste removal in one flush.
   3. Lavatory Faucets in Public Restrooms: 0.5 gallon per minute.

B. Capacity of Water Service: Provide adequate water flow and pressure to supply peak demand requirements. Comply with requirements specified in the code.
   1. Size the water supply to meet code. _____
   2. Water Delivery: If the water source has insufficient flow or pressure, provide means of increasing to required level.
      a. Substantiation:
         1) Construction: Test of system flow and pressure; submit report verifying performance.
   3. Water Flow:
      a. Maximum Velocity: 8 fps at the design flow rate.
   4. Water Supply Pressures:
      a. Water Pressure Flow at Fixtures: 8 psi, minimum, except as otherwise required by code.
         1) Flush Valves at Water Closets and Urinals: 25 psi minimum.
      b. Pressure Classification: Provide pipe, pipe components, and equipment with a pressure classification of 125 psi.
   5. Substantiation:
      a. Construction: Prior to installation of plumbing fixtures and prior to concealment of piping, air and water tests of piping systems at 110 percent of operating pressure, maintaining pressure for 2 hours to demonstrate system is watertight.
      b. Construction: Functional tests of fixtures and equipment.
      c. Occupancy: Observation of function during full occupancy simulating extreme conditions.

C. Waste Pipe Sizing:
   1. Size piping as required by code.
   2. Building Drain: 4 inches diameter, minimum.
   3. Pipes 3 inches in Diameter and Smaller: Sloped at 1/4 inch per foot, minimum, downward in the direction of flow.
   4. Pipes 4 inches in Diameter and Larger: Sloped at 1/4 inch per foot, minimum, downward in the direction of flow.
   5. Substantiation:
      a. Construction: Air and water pressure tests of piping systems; functional tests of drains and equipment under simulated full occupancy loads.
      b. Occupancy: Observation of function during full occupancy simulating extreme conditions.

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D. Ease of Cleaning:
   1. Use wall-mounted fixtures in public restrooms, for ease of cleaning floors.
   2. Provide adequate access for cleaning each fixture and the areas around it.
   3. Floor Drains: At low points in floor and flush with finish floor surface.
   4. Cleanout Plugs: Flush with floor surface.

E. Ease of Maintenance and Repair:
   1. Do not locate underground piping beneath electrical service, equipment, or footings.
   2. Provide a shutoff valve at the service entry point.
   3. Isolation of Piping Segments and Equipment: Provide a means of isolating the following:
      a. Water meter from building piping.
      b. Each water branch from main service.
   4. Provision for Drainage of Water Distribution Piping:
      a. Provide a system drain at the lowest point in the system.
   5. Plumbing Fixtures:
      a. Faucet valves easily removable and replaceable as a single unit.
      b. Each pipe connection to each fixture provided with a stop valve, for easy disconnection from water service.

**End of DC D3 - Plumbing Criteria**

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# DC D6 - Electrical Criteira

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Electrical: Provision and distribution of electrical power to operate all electrically-operated motors, lighting fixtures and devices, including those included under other services, VIP RV sites and those items provided separately by the Owner; artificial lighting to illuminate spaces and tasks, both interior and exterior, independent of reliance on natural light, and grounding systems.

B. Electrical Energy Supply: Utility power source.
   1. Electrical Power Source: Existing public utility.
   2. Electric Utility: NV Energy.

C. Service and Distribution: Service entrance equipment, distribution equipment, service and feeder wiring (conductors and raceways), monitoring, safety and control equipment, and other elements required for a complete functional system.
   1. Main Electrical Service: There are existing utility service transformers that convert primary distribution voltage to the desired utilization voltage.
   2. Distribution Circuit Configuration: Radial circuit arrangement.
   3. Site Distribution Panelboard Locations: As shown on the drawing.
   4. Comfort Station Panelboard Locations: Locate in utility chases .

D. Branch Circuits: Branch circuit wiring and receptacles and other branch circuit wiring systems, comprising the following elements:
   1. Branch circuit breakers.
   2. Conductors and conduits from panelboards to fixtures, motors, VIP RV sites and wiring devices.
   3. Raceways and boxes. Raceway size shall be 3/4", minimum.
   4. Wiring devices, including, but not limited to, receptacles, wall switches, remote control switching devices, and wall plates.
   5. VIP RV Site Pedestals: Provide, locate and install per NEC Article 551. All new pedestals shall provide a minimum of 50-amperes at 240-volts and shall include integral provisions for both 30- and 20- ampere circuits per NEC Article 551.71. Each VIP RV site shall be provided with its own dedicated branch circuit.

E. Interior Lighting: Comprising the following elements:
   1. Luminaires for general interior illumination.
   2. Luminaires for lighting of all exterior entrances.
   3. All luminaires shall be commercial grade, vandal resistant and energy efficient.
   4. All illumination levels shall be designed in accordance with IESNA recommendations.
   5. Exterior entrance lighting shall be photocell controlled with manual switch override.
   6. Interior restroom lighting shall be controlled via combination photo cell and motion sensors. Motions sensors shall be provided with integral timers that allow adjustment for up to 30 minutes of "ON" time. Motion sensor coverage shall be 100% of the restroom space.
   7. Interior utility chase lighting shall be controlled via standard snap switch.

## PART 2 PRODUCTS

### 2.1 SERVICE AND DISTRIBUTION

A. Configuration:

1. Upgrade the existing site electrical distribution system panelboards at the East and West Site service locations as required to provide an NEC compliant electrical distribution system with at least 25% spare electrical capacity for future needs. The Contractor shall verify whether the existing Nevada Energy transformers are adequate to service the needs of this project. The DB Contractor shall confirm this with both NEC compliant electrical load calculations and

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coordination with NV Energy. If it is determined that the existing transformers will need to be replaced, all NV Energy costs related to transformer replacement will be paid by the Park (LAKE).

2. Provide new underground service laterals for all new comfort stations.
3. Replace VIP RV pedestals and associated electrical branch circuit feeders as indicated on the drawings. Utilizing a single branch circuit for more than one VIP RV site is not allowed. Existing conduits may be re-used if their condition and suitability for re-use is properly verified and approved by the Contracting Officer.
4. The maximum allowable voltage drop between the utility transformer and all receptacles, lighting fixtures, motors and VIP RV sites shall be no greater than 5% at the maximum ampacity allowed by the respective feeder and branch circuit overcurrent protective devices.

## 2.2 SECONDARY SERVICE AND DISTRIBUTION

A. Secondary Service and Distribution Feeders:
   1. Conduits:
      a. Use one of the following:
         1) Below Grade: PVC conduit.
         2) Exterior, Exposed: GRS conduit.
         3) Interior, Exposed: IMC conduit.
         4) Interior, Concealed: EMT.
      b. Do not use:
         1) Below Grade: EMT.
         2) Exterior, Exposed: EMT.
   2. Conductors:
      a. Use:
         1) Copper.
      b. Do not use:
         1) Aluminum.

B. Main Site and Comfort Station Service Equipment:
   1. Types of Equipment:
      a. Use: Main service entrance sites and individual comfort station distribution.
         1) Distribution panelboard.
         2) Listed for use as service entrance equipment.
   2. Main Devices:
      a. Use:
         1) Molded case circuit breakers.
      b. Do not use:
         1) Fused switches.
         2) Bolted pressure switch.
   3. Branch Devices:
      a. Use:
         1) Circuit breakers.
      b. Do not use:
         1) Fused switches.
   4. Busbars:
      a. Use:
         1) Copper.
      b. Do not use:
         1) Plated aluminum.

## 2.3 BRANCH CIRCUITS

A. Branch Circuit Wiring:
   1. Use the following:
      a. Copper conductors in raceway. #12 AWG minimum conductor size.
      b. Conductors in raceway are allowed to be exposed in utility chase area only.

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2. Do not use:
    a. Type AC or MC cabling in lengths exceeding 6-feet where rigid conduit may be utilized unless otherwise required by Code.
    b. Nonmetallic-sheathed cable.

B. Receptacle Cover Plates:
1. Use the following:
    a. Material and Finish: Stainless steel, brushed.
2. Do not use the following:
    a. Material: Plastic.
    b. Material and Finish: Metal, chrome plated.
    c. Material: Wood.

## 2.4 LIGHTING

A. Interior Lighting:
1. Use of any of the following lamps types is permitted:
    a. Compact fluorescent.
    b. Full size fluorescent, T5 or T5HO.
    c. LED.
2. Do not use:
    a. Incandescent lamps.

# PART 3 DESIGN CRITERIA

## 3.1 BASIC FUNCTION

A. Provide electrical power with the appropriate characteristics to operate all electrically operated devices.
1. Capacity: Calculated in accordance with NFPA 70.
2. Capacity: The site distribution services and the electrical service to each comfort station shall be sized in accordance with NEC Article 230.
3. Spare Capacity: Provide capacity at least 25 percent more than the connected load. _____
4. General Receptacle System Voltage: 120 volts/single-phase/60 Hz.
5. Panelboards: In accordance with code plus 25 percent spare capacity.
6. Electrical Metering: Meter incoming electrical service lateral for each comfort station. Meters shall meet local utility company requirements for revenue metering accuracy. _____.

B. Distribution: Distribute electric power for equipment circuits, lighting circuits, receptacle circuits, electrical utilization devices, and VIP RV sites.
1. Branch Circuits: Provide adequate electrical power and safe and efficient distribution from panelboards to lighting, wiring devices, VIP RV sites, and equipment, based on the project program and requirements of other sections.

C. Lighting: Provide artificial means of lighting interior and exterior spaces.
1. Interior Lighting: Provide artificial lighting for all interior spaces that is adequate in quality and distribution for the performance of tasks typical for the type of space and the characteristics of the intended population, regardless of the availability of natural light.
    a. Provide lighting controls for restroom entrances and restroom interior spaces to reduce artificial light level when natural light is present, while maintaining specified light levels. Lighting "On" / "Off" level shall be fully adjustable. Provide a manual override located in the utility chase for all photocell controlled fixtures.
    b. Provide manually switched lighting in the utility chase only.
2. Exterior Lighting: Provide artificial lighting for exterior spaces (building entrances) that is adequate in quantity, quality, and distribution for the performance of tasks typical for the type of outdoor space and the characteristics of the intended user population.

D. Grounding: Provide a grounding system at each site distribution location and comfort station in accordance with the requirements of:

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1. NFPA 70 - National Electrical Code (NEC), Article 250.

E. Where electrical elements also must function as elements defined within another element group, meet the requirements of both element groups.

F. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

G. Substantiation:
   1. Proposal: Description of systems required, sources, input-side capacities, identification of service voltages and amperage, means of distribution, and major equipment.
   2. Design Development: Single-line diagrams, showing feeder and equipment sizes; engineering calculations showing input- and output-side capacities and loads and sizes of distribution elements. Contractor shall include complete NEC compliant electrical load and voltage drop calculations and written verification of coordination with NV Energy.
   3. Construction Documents: Complete system details, riser diagrams, equipment characteristics and calculations.
   4. Construction: Continuity test of wiring systems prior to functional performance testing.
   5. Construction and Closeout: Functional performance testing.
   6. Closeout: For each panelboard, balance current on each phase conductor within 15 percent.

## 3.2 AMENITY AND COMFORT CRITERIA

A. Accessibility: Comply with ADA Accessibility Guidelines and the following:
   1. Receptacles: Provide ADA accessible receptacles as noted below.
      a. Location: Where ADA accessible receptacles are required, mount devices no higher than 46 inches and not less than 15 inches above the finished floor.
      b. Provide a single, above counter, GFCI-protected receptacle between every pair of mirrors in each restroom as indicated on the Architectural plans.
      c. Provide a minimum of one, centrally located, GFCI-protected receptacle in each and every utility chase.
   2. Lighting Controls: Provide lighting controls for all spaces, regardless of location.
      a. Location: Where accessible lighting controls are required, provide devices that are mounted so they can be reached from a wheelchair and are not more than 54 inches and not less than 15 inches from the floor.
      b. Operating Force: Where accessible lighting controls are required, provide controls that can be operated without tight grasping or pinching and by a force of not more than 5 lbf.

B. Artificial Light Levels: Provide maintained ambient illuminance values for various activities based on the primary visual tasks to be accommodated and that are within the ranges specified in the IESNA Lighting Handbook.
   1. Interior Lighting: Not less than the following, when measured at task height:
      a. Restrooms:
         1) Toilet Room or Bathroom: 10 fc.
      b. Utility Equipment Spaces:
         1) Utility chase: 30 fc.
   2. Exterior Area Lighting: Not less than the following, when measured at grade:
      a. Building Entrance Areas: 4 fc, maximum uniformity ratio (average to minimum) of 4:1.
   3. Substantiation:
      a. Design Development: Overall lighting scheme, including types of luminaires and lamps.
      b. Construction Documents: (1) Calculations of illuminance levels and uniformity ratios for representative areas, prepared by a registered electrical engineer. (2) Written verification that the lighting design is in accordance with the requirements included in section, 3.02 "AMENITY AND COMFORT CRITERIA".
      c. Construction: Measurements of illuminance levels and uniformity ratios for

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representative locations, with a report setting forth results after correcting for maintenance factors keyed to luminaire design and lamp types.

C. Artificial Light Quality: Provide luminous environment in each space that is designed to complement the functions and the character of the space.
   1. Interior Lighting:
      a. Distribution: In keeping with geometry of space and location of visual tasks.
      b. Visual Comfort: Provide lighting systems with the following characteristics:
         1) VCP: Visual Comfort Probability (VCP) of not less than 70.
         2) Luminance Ratio: Maximum luminance of luminaire does not exceed average luminance by ratio of more than 5:1 at 45, 55, 65, 75, and 85 degrees from nadir for crosswise and lengthwise viewing.
         3) Maximum luminances of luminaires crosswise and lengthwise do not exceed the following values:
            (a) 45 degrees above nadir: 7710 cd/sq m.
            (b) 55 degrees above nadir: 5500 cd/sq m.
            (c) 65 degrees above nadir: 3860 cd/sq m.
            (d) 75 degrees above nadir: 2570 cd/sq m.
            (e) 85 degrees above nadir: 1695 cd/sq m.
      c. Spatial Luminance: Provide luminous environments throughout project in which brightness ratios are maintained within the following ranges:
         1) Task Area and Adjacent Darker Surroundings: 3:1
         2) Task Area and Adjacent Lighter Surroundings: 1:3
         3) Task Area and More Remote Darker Surfaces: 10:1
         4) Task Area and More Remote Lighter Surfaces: 1:10
         5) Light Sources and Adjacent Surfaces: 10:1
         6) Any Surfaces Within Normal Field of View: 30:1
      d. Color of Light: Appropriate for functions accommodated in space and characteristics of interior finishes.
         1) Color: Provide light sources throughout project with Color Rendering Index of not less than 70.
      e. Substantiation:
         1) Construction Documents: Calculations for representative spaces, prepared by a registered electrical engineer, and product data for lamps and luminaires.
   2. Exterior Restroom Entrance Lighting:
      a. Glare Minimization: Provide exterior building entrance lighting that minimizes the incidence of discomfort glare and avoids disability glare under all normal conditions of use, in accordance with IESNA recommendations.
      b. Provide full cut-off fixtures that do not contribute to light pollution, light tresspass and are Dark-Sky friendly.

D. Lighting Cutoff:
   1. Configure exterior lighting to avoid spill light on adjacent property and streets.

E. Convenience:
   1. Locate comfort station electrical metering in the utility chase adjacent to the electrical panelboard.
   2. Locate panelboard inside of the utility chase next to utility chase entrance door.
   3. Provide metering at each comfort station which includes the following:
      a. Energy Readings of:
         1) Real accumulated energy.
         2) Reactive accumulated energy.
         3) Apparent accumulated energy.
      b. Real-Time Readings of:
         1) Fundamental voltage.
         2) Fundamental real power.

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c. Demand Readings:
    1) Demand current; peak.
    2) Demand real power; peak.
    3) Demand apparent power, peak.

F. Appearance:
1. Conceal electrical conduit in walls and behind ceilings in the occupied spaces.
2. Conceal grounding conductors and ground terminals wherever possible.
3. Character of Lighting Fixtures: Coordinated with architecture and other building systems and appropriate to finish level.
4. Provide exterior building entrance lighting that is compatible with overall project appearance and coordinated with site layout and building organization.
    a. Luminaire Mounting:
        1) Style compatible with building design.
        2) Material and finish compatible with exterior building elements.
    b. Luminaire Design:
        1) Material and finish of housing compatible with mounting.

## 3.3 HEALTH AND SAFETY CRITERIA

A. Fire Hazard:
1. Provide electrical equipment and materials in compliance with code and that are UL listed or labeled.
2. Fire-Resistant Construction: Provide lighting elements throughout the project that are made of incombustible materials in compliance with code and that are UL listed or labeled, with flame spread and smoke developed ratings printed on product.

B. Lightning Hazard: Perform a Lightning Risk Assessment in accordance with NFPA 780, Annex L. Provide results and interpretation of Lighting Risk Assessment to Contracting Officer.

C. Electrical Hazards: Design in accordance with al NFPA standards that apply to the occupancy, application, and design.
1. Control access to spaces housing electrical components and allow access only by qualified personnel.
2. Comply with NFPA 70 requirements for hazardous locations applications.

D. Protection from Breakage:
1. Locate comfort station service and distribution equipment in utility chase.
2. Replace exterior site distribution equipment in the same location.
3. New VIP RV pedestals shall be located in accordance with NEC Article 551.77.

## 3.4 STRUCTURAL CRITERIA

A. Seismic Design:
1. Provide service and distribution elements with the ability to move where differential movement is anticipated.

## 3.5 DURABILITY CRITERIA

A. Expected Service Life Span:
1. Electrical:
    a. Power Distribution Equipment: Same as building service life.
2. Lighting Fixtures: Minimum 15 years.
3. All Grounding Systems: Life of the building without requiring any more maintenance than annual inspection and minor repairs not more frequently than annually.

B. Minimum Outdoor Operating Temperature: Provide lighting systems that operate at temperatures as low as 0 degrees F.

C. Moisture Resistance:
1. Regardless of whether exposure to moisture is likely or not, design lighting equipment to be resistant to moisture. All lighting fixtures shall be UL listed for wet locations.

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2. Enclosures: As required to protect equipment from environment in which it is installed, complying with NEMA 250 and:
   a. Areas to be Hosed-Down, or Equivalent, Exterior or Interior: Type 4.
   b. Exterior, Exposed to Weather and Wind: Type 3S.
   c. Exterior, Other Locations: Type 3R.
   d. Interior, Subject to Settling Dust, Falling Dirt, or Dripping Liquids: Type 5.
   e. Interior, Subject to Circulating Dust: NEMA Type 12.
   f. Interior, Other Locations: Type 1.

D. Impact Resistance:
   1. Provide service and distribution equipment and VIP RV pedestals with industrial grade enclosures.

E. Vandal Resistance - Lighting:
   1. Parts not easily removed without the use of special tools. All lighting fixtures and lighting controls shall be commercial grade. Residential grade is not acceptable.
   2. Lenses of tempered glass, high impact acrylic, polyacrylate, or polycarbonate.
   3. Substantiation:
      a. Proposal: Identification of proven-in-use assemblies of the same type, for inspection by Contracting Officer / Owner.
      b. Preliminary Design: Identification of proven-in-use assemblies of the same type, for inspection by Contracting Officer / Owner. Submit lighting fixture and control equipment cut sheets for approval.
      c. Design Development: Identification of actual products to be used.

## 3.6 OPERATION AND MAINTENANCE CRITERIA

A. Protection Against Disturbances:
   1. Transient Voltage Suppression: ____ Transient Voltage Suppression devices shall be selected to properly protect site distribution equipment and comfort station services, tested to meet ANSI/IEEE C62.41 and be UL 1449 listed.
      a. Provide protection of the following:
         1) Site electrical distribution panelboards.
         2) Entire building (comfort station) service.
      b. Substantiation
         1) Preliminary Design: Identification of circuits to be provided with surge protection.
         2) Design Development: Description of surge protection devices to be used.

B. Energy Efficiency:
   1. Comply with requirements of 10 CFR Parts 433, 434 and/or 435, as applicable.
   2. The Lighting Power Density (LPD) shall not exceed 0.7 watts per square foot.
   3. Interior Lighting Controls: Provide level of control of lighting appropriate to type of space and Owner's requirements for energy conservation.
      a. Daylighting Controls: Provide controls as indicated below:
         1) Controls: Daylight sensing controls, on/off. Include override of motion sensors at restroom interior locations and override of photocell on/off at exterior entrances.
   4. Light Sources: Provide lamps with average lamp efficiency rating not less than the following:
      a. Compact Fluorescent and LED Lamps: 55 lumens/watt.
      b. Full Size Fluorescent Lamps: 75 lumens/watt.
   5. Ballasts: Provide electronic or energy efficient ballasts with fluorescent lamps.

C. Ease of Use:
   1. Configuration: Design wiring and protective devices so that outages caused by local overloads do not affect unrelated areas or systems.
   2. Voltage Regulation: Within 5 percent of design voltage at furthest electrical utilization point on distribution system.

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D. Allowance for Change and Expansion:
   1. Spare Capacity - System Wide:
      a. Load: 25 percent, minimum.

E. Ease of Cleaning:
   1. Interior Lighting: Provide luminaires that do not collect dirt rapidly and are readily cleanable.
      a. Luminaire Categories: Provide luminaires of IESNA Category I, II, or V, for minimum dirt accumulation and LDD factors.
   2. Exterior Area Lighting: Provide luminaires of IESNA Category I, for minimum dirt accumulation and LDD factors.

F. Ease of Maintenance:
   1. Relamping: Provide luminaires designed for easy relamping with special tools.

**End of DC D6 - Electrical Criteria**

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# DC G - Site Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Site work comprises the following elements:
   1. Site Preparation: All modifications to the site and grades required for construction of new work and for proper functioning of the project; comprised of the following elements:
      a. Clearing: Removal of trash, existing built elements, and vegetation that is not needed, and temporary erosion control.
      b. Earthwork: Changing of grade levels, removal of soil and rock, modifying existing soils in preparation for construction, and temporary and permanent erosion and sediment control structures made of soil or rock.
      c. Other Site Preparation.
   2. Site Improvements: All elements required to provide finished and durable site surfaces and outdoor improvements described in the scope of work and attached RFP drawings.
   3. Site Services: All outdoor and underground elements required to complete the design of services defined elsewhere.

B. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Additional requirements for demolition and preservation of existing vegetation.

B. Section DC G1 - Site Improvements Criteria: Additional requirements for site improvements.

C. Section DC G2 - Site Services Criteria: Additional requirements for site services.

### 1.3 REFERENCE STANDARDS

A. AASHTO GTN - Guide on Evaluation and Abatement of Traffic Noise, 1993.

B. ASCE 7 - Minimum Design Loads for Buildings and Other Structures, 2010.

C. FHWA FLP-94-005 - Best Management Practices for Erosion and Sediment Control, 1995.

D. NFPA 1144 - Standard for Reducing Structure Ignition Hazards from Wildland Fire, 2008.

E. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service, 1986

F. ABAAS - Architectural Barriers Act Accessibility Standards, 2004

G. Draft Final Accessibility Guidelines for Outdoor Developed Areas, October 19, 2009

### 1.4 FIELD CONDITIONS

A. The following existing site elements must be preserved:
   1. All underground utility service(s) to each comfort station and campsite, until the applicable utility service(s) has been replaced with new laterals and/or service lines as part of the project scope of work.
   2. Preserve and protect all trees identified in RFP drawings.
   3. Irrigation to trees to be protected.

B. Salvage the following site elements:
   1. All topsoil removed during construction, for re-use.
   2. All picnic tables
   3. All fire rings
   4. All site boulders
   5. All site markers

## PART 2 PRODUCTS AND METHODS

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## 2.1 TEMPORARY EROSION AND SEDIMENTATION BMPS

A. Temporary Sediment Barriers and Traps:
   1. Use one or more of the following methods:
      a. Silt fences, of geotextile fabric on wood posts.
      b. Straw or hay bales, anchored to ground.
      c. Sandbag barriers.
      d. Brush, logs, and poles.

B. Temporary Erosion Control Structures:
   1. Use one or more of the following:
      a. Checkdams in swales and drainage ditches.
      b. Grade stabilization structures in gullies.
      c. Diversion channels across slopes.
      d. Temporary downdrain structures to convey concentrated run-off down the face of cut or fill slopes.
      e. Level spreaders across slopes to convert concentrated flow to sheet flow.

C. Temporary Vegetative Erosion Control Measures:
   1. Use one or more of the following:
      a. Mulching of disturbed areas for stabilization, using:
         1) Straw or hay.
         2) Wood waste, chips, or bark.
         3) Erosion control matting or netting.

## 2.2 EXCAVATION AND GRADING

A. Changing of Grade Levels:
   1. Use one or more of the following methods:
      a. Grading.
      b. Balanced cut and fill, with no excess soil to be removed.
      c. Removal of excess soil from site.
      d. Removal of rock from site.
      e. Importation of fill from off site.
   2. Do not use any of the following methods:
      a. List any exclusions.

B. Excavation:
   1. Use one or more of the following methods:
      a. Machine excavation.
      b. Hand excavation.

## 2.3 EROSION AND SEDIMENTATION CONTROLS

A. Erosion Control Measures: See Section DC G1.

B. Prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) in conjunction with the requirements and regulations of the local Authority Having Jurisdiction (AHJ). The Contractor shall obtain all NPDES and Temporary Storm Water permits required for construction.

C. Develop and implement temporary erosion and sediment control measures and other Best Management Practices (BMPs) prior to or in conjunction with commencement of earthwork in accordance with the State Erosion and Sediment Control Laws and Regulations, and NPS Standards. Remove all non-permanent erosion control measures after vegetation is fully established.

D. Maintain temporary erosion control measures in accordance with state Erosion and Sediment Control Laws and Regulations throughout the project until areas are fully stabilized.

## 2.4 SITE CLEARING

A. Prior to clear and grub, pull all site topsoil to the perimeter of the site and store in windrows not exceeding 12" in height. Clear and grub project site as required for project construction.

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Upon completion of construction activities spread the windrowed topsoil evenly across the unpaved portions of the site.

B. Burning is not permitted.

C. The Contractor shall clear all trees, shrubs, brush and vegetation necessary for construction of the project. Clearing includes the felling, trimming, and cutting of trees into sections.

D. Preserve and protect trees, shrubs and vegetation not directly impacted by the construction in accordance with specification section, Temporary Environmental Controls.

E. Remove and dispose of trees to a depth of at least 18 inches (450 mm) below ground surface. Fill depressions with satisfactory material and compact. Mound fill 2 inches (50 mm) above adjacent surface to allow for settling when not part of a subbase.

F. Remove stumps to a depth of at least 18 inches (450 mm) below ground surface and grind stumps 18 to 30 inches (450 to 750 mm) below ground surface or as required for earthwork operations. Fill depressions with satisfactory material and compact. Mound fill 2 inches (50 mm) above adjacent surface to allow for settling when not part of a subbase.

G. Within the clearing limits, remove and dispose of all logs, shrubs, brush, matted roots, roots larger than 2 inches (50 mm) in diameter, and other debris to a depth of at least 18 inches (450 mm) below ground surface. Fill depressions made by grubbing with satisfactory material and compact to make the new surface conform to the adjacent surface of the ground.

## 2.5 SITE DEMOLITION AND RELOCATIONS

A. Demolition work shall include the demolition, removal and legal disposal of existing construction debris as required to accommodate the new construction. The Contractor shall take care to prevent damages to existing utilities, construction and materials not scheduled for demolition, repair or replacement, and shall repair damages to the construction and materials to the satisfaction of the Contracting Officer and at no additional cost to the Government.

B. Do not begin demolition until the Demolition Plan has been approved by and authorization is received from the Contracting Officer.

C. Whenever possible, all features demolished shall be salvaged or recycled in lieu of being disposed of as waste in a landfill. Existing features to be demolished which are not salvageable or reused, shall become the property of the Contractor and shall be removed from project site. The Government will not be responsible for the condition, loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

D. Remove and store materials and equipment to be reused or relocated to prevent damage, and reinstall as the work progresses.

E. Salvage materials and equipment that are to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site on the station in accordance with instructions of the Contracting Officer.

F. Prevent the spread of dust and debris to occupied portions of a building or on pavements and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water for dust control if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris that may result from construction operations.

## 2.6 ABOVE GROUND SITE DEMOLITION AND PROTECTION OF FEATURES

A. Prevent the spread of dust and debris to occupied portions of a building or on pavements and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water for dust control if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris that may result from construction operations.

B. Where pedestrian and or driver safety is endangered in the area of demolition work, provide temporary traffic control in accordance with MUTCD.

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C. Protect existing survey monuments. Any damaged monuments shall be replaced by a Professional Land Surveyor licensed in the State of Nevada.

D. Protect existing work that is to remain in place, be reused, or remain the property of the Government. At no additional expense to the Government, repair all items that are damaged during performance of the work to their original condition, or replace with new. Do not overload pavements to remain.

E. Remove concrete and asphaltic concrete paving, curbs, aggregate base and slabs as required for construction of project. Remove existing aggregate base in areas to receive new pavement to the depth of the proposed pavement section below new finish grade. Provide neat sawcuts at limits of pavement removal; protect sawcuts so that new pavement will butt against the existing without feathering.

F. Preserve existing trees to the greatest extent possible. The Contractor shall tag trees to be saved with plastic or vinyl tape tied to the tree caliper. The Contractor shall protect existing trees by fencing planting areas to remain from compaction and any 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. The Contractor shall not allow debris from tree or stump removal operations to fall on or otherwise damage plants that are not scheduled for removal. Plastic tape and barrier fencing shall not be removed until planting operations are ready to begin and or instructed by the Contracting Officer.

## 2.7 UNDERGROUND SITE DEMOLITION

A. Terminate utilities in accordance with state and local rules and regulations; the nationally recognized code; and the requirements of the utility provider covering the specific utility; NPS Standards; and approved by the Contracting Officer.

B. Protect existing utilities to remain. Where removal of existing utilities and pavement is required, provide approved barricades, temporary covering of exposed areas, and temporary services or connections. Repair damage to existing utilities to remain at no additional expense to the Government.

C. Repair relocated items that are damaged or replace damaged items with new undamaged items as approved by the Contracting Officer and at no additional expense to the Government.

D. Remove rubbish and debris from the station daily; do not allow accumulations inside or outside the building(s) or on pavements. Store materials that cannot be removed daily in areas specified by the Contracting Officer.

## 2.8 HAZARDOUS WASTE REMEDIATION

A. In the event of a spill or release of hazardous substances, pollutant, contaminant or oil, notify the Contracting Officer immediately. Containment actions shall be taken immediately to minimize the effect of any spill or leak. Clean up shall be performed at the Contractor's expense in accordance with the ESR and the approved spill work plan as described in NPS Standards and Specification Section, Temporary Environmental Controls.

B. All waste materials shall become the property of the Contractor and shall be transported, disposed of in accordance with the criteria listed in the ESR and the approved disposal plan as described in Specification Section, Temporary Environmental Controls.

C. Demolition and/or removal of asbetos pipe shall be in compliance with the most current and most stringent regulations of the applicable OSHA, EPA, and State of Nevada requirements. This includes, but is not limited to:

1. Nevada Occupational Safety and Health Act, Asbestos Regulations (NRS 618.750-618.850).
2. Nevada Administrative Code for Asbestos Disposal (444.965-444976).
3. Federal OSHA Asbestos Regulations (Construction Standard) (29CFR 1926.110)
4. EPA AHERA Asbestos Regulations (40 CFR Part 763).

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## 2.9 TEMPORARY DEWATERING

A. The design of the temporary dewatering system shall account for soil conditions, rainfall, fluctuations in the groundwater elevations and the potential settlement impact on adjacent facilities due to dewatering. Provide dewatering in accordance with NPS standards and as part of the Contractor's Geotechnical Analysis. While the excavation is open, the water level shall be maintained continuously, at least 1.0 foot (0.30 m) below the working level.

B. French drains, sumps, ditches or trenches will not be permitted within 3 feet (0.9 m) of the foundation of any structure without written approval of the NPS Contracting Officer or his appointee.

## 2.10 SITE EARTHWORK

A. The Contractor shall preserve natural topographic features to minimize the impact on the existing drainage patterns at and adjacent to the site. Provide site grading in accordance with NPS Standards.

B. Finish grading shall provide drainage towards new and existing drainage features. Finish grading shall not result in low spots that hold water or that direct runoff towards new or existing facilities or site amenities. Finish grading shall be in accordance with NPS Standards.

C. All earthwork shall be designated "Unclassified". All unsuitable material and surplus excavation shall become the property of the Contractor and shall be disposed of in accordance with Federal, State and Local requirements and regulations.

D. Remove unsatisfactory soil materials from the site in accordance with Federal, State, and Local requirements and regulations; and replace with satisfactory soil materials as recommended as part of the Contractor's Geotechnical Analysis.

E. Provide compaction in accordance with NPS standards and recommendations of the project's Geotechnical Engineer, whichever is greater. 95% of ASTM D 1557 shall be achieved in areas under structures, spread footings, concrete slabs, and paved areas.

F. Provide bedding in accordance with Clark County Utility Standards and recommendations of the project's Geotechnical Engineer.

G. Provide soil stabilization designed to function as required by site conditions in accordance with the State Highway specifications and standards in the State of Nevada. Apply and install geosynthetics in accordance with the maanufacturer's written instructions.

H. Provide slope stabilization methods in accordance with the State Highway specifications and standards in the State of Nevada. Design and install manufactured products, gabions, geogrids, rock anchors in accordance with the manufacturer's written instructions.

## 2.11 TOPSOIL

A. Provide topsoil according to the recommendations of the Contractor's Geotechnical Analysis and Park Standards, except when landscaping is required. All topsoil must be certified weed free.

B. Provide a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.

   1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce satisfactory topsoil.

## 2.12 FILL AND BORROW

A. Onsite material is assumed to generally be suitable for fill. Borrow material should be in accordance with the recommendations of the Contractor's Geotechnical Analysis. If utilized from an offsite source, Contractor to determine location of suitable borrow material source. Government to approve the borrow source and material prior to import.

# PART 3 DESIGN CRITERIA

## 3.1 BASIC FUNCTION

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A. Provide all modifications to the site and site improvements and utilities required for proper functioning of the project and as indicated in the project program.

B. Prepare site for execution of earthwork by removing trash, debris, loose rocks, all vegetative matter not required for final design, and all unwanted built elements, and by protecting soils from erosion.

C. Modify the site grades and soils as required for construction of buildings and utilities, for proper functioning of the project, and as indicated in the project program.

D. Where site elements also must function as elements defined within another element group, meet the requirements of both element groups.

E. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

## 3.2 HEALTH AND SAFETY CRITERIA

A. Safety:
   1. Inhibit:
      a. The intentional passage of people across controlled access highways, except at intended roadway crossings.
      b. The intentional driving of vehicles from adjacent public rights-of-way onto the site, except at intended roadway accesses.
      c. The intentional driving of vehicles from roadways and parking areas onto pedestrian walkways and planted areas.
   2. Prevent:
      a. The passage of people from the site onto the public right-of-way.
   3. Substantiation:
      a. Construction Documents: Identification of barrier location and type.

B. Maximum Slopes:
   1. Slopes with Smooth Pavement: 1:10, unless restricted to vehicular use.
   2. Slopes Covered with Vegetation: 1:5, unless less than 3 feet in height.
   3. Slopes with Pedestrian-Inhibiting Vegetation: 1:1, unless less than 5 feet in height.
   4. Slopes With No Access From Top: Limited only by structural stability and resistance to erosion.

C. Fire Sources: Design to minimize the danger of wildfires spreading to the site, by complying with NFPA 1144.
   1. Substantiation:
      a. Design Development: Identification of measures taken; review by authorities having jurisdiction.

D. Vermin/Animal Control: Prevent and eliminate standing water that could become stagnant.

E. Physical Security:
   1. Prevent passage of people between:
      a. The site and adjacent properties.
      b. The site and adjacent public rights-of-way.
   2. Substantiation:
      a. Construction Documents: Identification of physical security measures and locations.

F. Vehicular Safety: Comply with the code.
   1. Provide visual barriers at extreme changes in elevation near roadways.
   2. Provide tactile warnings where pedestrian walkways cross or run adjacent to roadways.

## 3.3 STRUCTURAL CRITERIA

A. Earthwork: Provide structural design in accordance with ASCE 7 if not otherwise required by code.
   1. Bearing Capacity: Under substructure, paving, and site structural elements, maintain natural bearing capacity or achieve or correct compaction as required to prevent

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uncontrolled subsidence or other movement.

2. Substantiation:
   a. Design Development: Engineering design of any structural fills required.

B. Site Fixtures, Equipment, and Services:
   1. Provide foundations or other mountings as required to support the completed and operational element permanently and safely and without uncontrolled subsidence or other movement.
   2. Design structural elements in accordance with code and requirements specified in Section B.
   3. Miscellaneous Site Structures with Floors or Roofs: Designed to comply with same requirements as building superstructure.
   4. Substantiation: Same as required for superstructure.

C. Retaining Walls: Design retaining walls to permanently resist soil and water pressure as well as live loads.
   1. Substantiation:
      a. Design Development: Engineering design and estimate of longevity.

## 3.4 DURABILITY CRITERIA

A. Weather Resistance of Built Elements: Same as for facility as a whole.

B. Weather Resistance of Plants and Turf: Use plants that will withstand extremes of weather likely to occur without supplementary irrigation and without seasonal protection other than mulch.
   1. Owner agrees that maintenance to the level specified by the Design-Builder will be necessary to assure survival of the plants.
   2. Exception: Supplementary irrigation is expected during new plant establishment period.
   3. Substantiation:
      a. Design Development: Documentation of the historical extremes and duration of extremes in temperature, rainfall and drought periods; proven-in-use documentation on major plant groups to be used, under similar site conditions in the same climatic region; length of time required for full establishment.
      b. Construction Documents: Proven-in-use documentation of all plants used; proven-in-use data may be from actual nearby growing locations or from non-local nursery supplier having plants grown under same climatic conditions.
      c. Closeout: Maintenance requirements of all plants used, for new plant establishment period and subsequent maintenance; length of establishment period for each type of plant.
      d. Occupancy: Report of inspection of plants at end of spring, summer, fall, and winter, beginning with season immediately following planting.

C. Soil Erosion Resistance: Comply with the code and the following:
   1. Maintain the existing site features that contribute to erosion resistance to the greatest extent possible.
   2. Maintain temporary and permanent erosion and sediment controls during demolition and relocation operations or replace as soon as demolition or relocation is complete.
   3. The present natural resistance to erosion is insufficient; take measures to improve the resistance to erosion.
   4. Design to minimize soil erosion.
   5. Permanent erosion control structures are required wherever permanent vegetation will not prevent erosion or sediment loss.
   6. If erosion occurs during construction and within one year after completion, relocation or replacement of eroded soil and repair of eroded areas shall be performed by the Design-Builder at no cost to the Owner.
   7. If erosion occurs within one year after completion, provide improved erosion control measures within one week after notification by Owner.

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8. During construction, take whatever measures are required to minimize the amount of eroded soil that is transported off the site or into waterways under the most extreme short term and 24-hour rainfall events that might occur in 25 years.
9. In the design and constructed elements, take whatever measures are required to minimize soil erosion under the most extreme short term and 24-hour rainfall events that might occur in 25 years, and to prevent eroded soil from being transported off the site or into waterways.
10. Construct sediment barriers and traps wherever run-off will leave the property and wherever significant erosion will occur on the property.
11. Design erosion control measures in accordance with "Best Management Practices (BMPs)" and design procedures prescribed by law.
    a. USDA Natural Resources Conservation Service recommendations, including:
        1) TR-55, Urban Hydrology for Small Watersheds.
    b. State of Nevada Erosion and Sediment Control Manual.
    c. Federal Highway Administration FLP-94-005, Best Management Practices for Erosion and Sediment Control.
12. Temporary Measures:
    a. Whenever grades are changed, vegetative stabilization is required immediately to be maintained until final grades are stabilized with permanent vegetation.
    b. Construct temporary construction exit wherever construction equipment will have to enter the site from public roads, to prevent transportation of soil onto roads.
    c. Replace temporary measures with permanent measures unless made unnecessary by constructed site elements, final topography, or permanent vegetation.
13. Substantiation:
    a. Preliminary Design: Preliminary site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
    b. Design Development: Site plan showing grading and new improvements, probable causes of erosion during construction, proposed methods of prevention and remediation, and maintenance requirements for permanent erosion control measures.
    c. Design Development: Where extensive areas of soil will be disturbed, storm water flow and volume calculations, with soil loss predictions.
    d. Construction Documents: Complete erosion and sediment control plan, including scheduling of temporary and permanent measures and construction.
    e. Construction: Daily inspection and repair of erosion control measures; cleanout of sediment control structures weekly.
    f. Closeout: Removal of temporary measures, cleanout of permanent measures, and repair of damage; submittal of written maintenance procedures.
    g. Occupancy: Weekly inspection of site and repair of damage.

D. Traffic Resistance: Provide finished site surfaces that are permanently resistant to the type of traffic to be expected, under all weather conditions.
1. Where vegetated surfaces will not withstand the anticipated traffic, provide pavement or other surfacing.
2. If vegetated surfaces are damaged due to traffic within one year after completion, replacement of vegetation with more durable materials shall be performed by the Design-Builder at no cost to the Owner.
3. Vegetation and fencing may be used to discourage pedestrian traffic, if other functional requirements can be met.
4. Substantiation, Paving and Hard Surfacing:
    a. Preliminary Design: Identification of types and thicknesses of paving and surfacing for various functions.
    b. Design Development: Proven-in-use documentation of paving and surfacing consistent with types of traffic anticipated; manufacturer's data may be submitted for

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modular paving units.

c. Construction Documents: Engineering calculations, based on anticipated weights and intensity of traffic.

E. Flooding:

1. Control storm water runoff as required to prevent damage to project elements, including vegetation, and to prevent damage to neighboring sites, including vegetation.
2. Prevent storm water runoff into public utilities in excess of actual capacity or amount allowed by public agencies, whichever is less, under conditions of the most extreme rainfall that might occur in 50 years.
3. Minimize increase in storm water runoff into rivers, streams, lakes, and other waterways and drainageways as required by authorities having jurisdiction.
4. Substantiation:
   a. Design Development: Engineering design of site drainage, including drainage volume calculations.

F. Vehicular Collision: Design to minimize the probability of vehicular impact on site fixtures and accidental driving on lawns and landscaped areas.

## 3.5 OPERATION AND MAINTENANCE CRITERIA

A. Water Conservation: Minimize water use to the maximum extent possible.

1. Substantiation:
   a. Design Development: Water system design, estimated water use, explanation of conservation measures.
   b. Construction Documents: Calculated water use based on final design.
   c. Commissioning: Field verification.

B. Ease of Maintenance:

1. Design and construct earthwork elements so that they are permanent, not requiring periodic maintenance to maintain stability or appearance.

C. Theft Deterrence: Provide site fixtures that are either anchored securely to the ground using fastenings not easily removable, or that are too heavy for one person to carry, and that are made of materials with no intrinsic or salvage value.

**End of DC G - Site Criteria**

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# DC G1 - Site Improvements Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Site improvements comprise the following elements:
   1. Pavements and Surfacing: Finished surfaces for vehicular and pedestrian traffic, other than turf, comprising the following elements:
      a. Exterior paved or surfaced areas such as roadways, driveways, and walkways.
      b. Exterior steps and ramps not connected to buildings, including stair nosings
      c. Appurtenances for roadways and driveways, including pavement markings.
      d. Signs, including "stop," "yield, and directional signs and parking space marking and identification.
   2. Site Fixtures and Equipment: Fixtures, equipment, and miscellaneous structures located out-of-doors, except those located on the roof or mounted on walls of buildings. Site fixtures and equipment that are required include:
      a. Site furnishings , including:
         1) Accessible Picnic Tables
         2) Fire Rings
      b. Outdoor signs, other than roadway and parking lot signs.
         1) Main building identification sign.
      c. Minor site structures, including:
         1) Water spigots as referenced on the drawings.
   3. Protect existing trees and vegetation to remain. Maintain irrigation to existing trees and vegetation during and at project completion.

B. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC D3 - Plumbing Criteria: Water Spigot requirements.

C. Section DC G - Site Criteria: Criteria that apply to all site elements.

### 1.3 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; current edition; (ADAAG - Americans with Disabilities Act, Accessibility Guidelines).

B. ABAAS - Architectural Barriers Act Accessibility Standards, 2004

C. Draft Final Accessibility Guidelines for Outdoor Developed Areas, October 19, 2009

D. AASHTO GDPS - Guide for Design of Pavement Structures, Volume 1; 1993 with 1998 supplement.

E. AASHTO GDHS - A Policy on Geometric Design of Highways and Streets, 2004.

F. ASTM D2027 - Standard Specification for Cutback Asphalt (Medium-Curing Type), 2010.

### 1.4 FIELD CONDITIONS

A. The following existing elements must be preserved:
   1. Salvage all existing picnic tables and fire rings as indicated on the drawings. Relocate as approved by the Contracting Officer.

## PART 2 PRODUCTS

### 2.1 PAVEMENTS AND SURFACING

A. Pavements Design: Provide geometric design; and pavement design and calculations, including minimum pavement sections, in accordance with the recommendations of the

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Contractor's Geotechnical Analysis and all Nevada Department of Transportation (NDOT) requirements. Provide any required additional pavement design to provide a complete and useable facility.

B. Bituminous Concrete Pavement Performance Verification
   1. Visual: Finished surface shall be uniform in texture and appearance and free of cracks and creases.
   2. Sampling: ASTM D979.
   3. Job Mix: Determine gradation and bitumen content. One sample for every 400 tons (362,500 kilograms); minimum 1 test.
   4. Thickness: ASTM D 3549. 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.
   5. 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.
   6. Density: Conduct field density of in-place compacted pavement in accordance with ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726. One field test for every 1000 square yards (836 square meters); minimum 2 tests. One laboratory test for the project.
   7. Pavement grades at accessible campsites and routes to comfort station, water and other common elements should be tested using a 24-inch electronic level. Measure longitudinal (running) and cross slopes as required by CQC inspection form.

C. Portland Cement Concrete Pavement Performance Verification
   1. Visual: Finished surface shall be uniform in texture and appearance and free of cracks. All concrete shall contain integral color, Yosemite Brown #641.
   2. Sampling: ASTM C 31M (ASTM C 31).
   3. 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.
   4. Surface Smoothness: Test surface smoothness by using a 10 foot (3 meter) straightedge in transverse and longitudinal directions to pavement. The finished surfaces of the pavements shall have no abrupt change of 0.12 inch (3 mm) or more. Pavement grades at accessible campsites and routes to comfort station, water and other common elements should be tested using a 24-inch electronic level. Measure longitudinal (running) and cross slopes as required by the CQC inspection form.
   5. Strength: Samples for strength tests of each mix design of concrete placed each day shall 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).
      a. Compressive Strength: ASTM C 39. 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. Each strength test result shall be 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 C 42/C 42M core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core test shall be considered 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. Locations represented by erratic core strengths shall be retested.
      b. Flexural Strength: ASTM C 78. 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.

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6. 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.
7. Pavement at accessible sites and routes from these sites to comfort station, water and other common elements – test slope by using a 24" electronic level, measure running slopes and cross slopes as required by CQC inspection form.

D. Concrete Joint Performance Verification
1. Install a test section of 500 linear feet (150 m) at start of sealing operation for each type sealant to be used. Obtain approval of test section by Contracting Officer prior to installing additional joint seal. 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 shall be rejected. Remove rejected sealer and reclean and reseal joints.

## 2.2 PAVEMENT AND SURFACE DESIGN

A. Pavements Design: Provide geometric design; and pavement design and calculations, including minimum pavement sections, in accordance with the recommendations of the Contractor's Geotechnical Analysis and all Nevada Department of Transportation (NDOT) requirements. Provide any required additional pavement design to provide a complete and useable facility.

B. Provide surface consistent in color and finish. All concrete shall contain integral color, Yosemite Brown #641.

C. Existing utility structures shall be adjusted to meet the new finished pavement grades as required.

D. Concrete Joints: Joints shall be in accordance with NPS standards or NDOT. Joints shall be installed in a manner and at such time to prevent random or uncontrolled cracking. Joints shall form a regular rectangular pattern. Wherever curved pavement edges occur, make joints to intersect tangents to curve at right angles.
1. Provide thickened edge expansion joints at the intersection of two rigid pavements. Use preformed joint filler, ASTM D 1751. Filler must be compatible with joint sealer material. Preformed joint filler shall be securely held in position during concreting operations.
2. 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.
3. Contraction Joints - Joint lines shall be sawed within specified tolerance, straight, and extend for width of transverse joint, and for entire length of longitudinal joint.
4. Construction Joints - If an emergency stop occurs, remove the concrete back to location of transverse joint and install a construction joint.
5. Joint Sealants - ASTM D 5893; Provide single component cold-applied silicone. Silicone sealant shall be self-leveling and non-acid curing.
6. Preformed Compression Seals - ASTM D2628; Use performed compression seals in areas where silicone joint sealant does not perform, such as areas subject to water inundation, blasts, or constant/repeated fuel spillage.

## 2.3 BASES, SUB-BASES, AND CRUSHED AGGREGATE

A. Prepare subgrade in accordance with Section G10, Site Preparation. Geotextiles may be used for separation or reinforcement in accordance with manufacturer's instructions. Provide base course under paved areas in accordance with the recommendations of the Contractor's Geotechnical Analysis and NDOT requirements.

B. Place base course in accordance with the recommendations of the Contractor's Geotechnical Analysis and NDOT requirements 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 95 percent maximum dry density per AASHTO T180.

C. Where STATE HIGHWAY SPECIFICATIONS are not available or applicable, the Designer of

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Record shall utilize the applicable Clark County Engineering Engineering Standards. Submit these specifications in edited form as a part of the design submittal for the project.

D. Aggregate Base Course and Crushed Aggregate Performance Verification:
   1. Sampling: ASTM D75
   2. Gradation: ASTM C136
   3. 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.
   4. Density: ASTM D 1556 or ASTM D 2922 and ASTM D 3017. One field test for every 1000 square yards (836 square meters); minimum 2 tests. ASTM D 1557, Method D; one laboratory test for the project.
   5. Visual: Surface shall be smooth with no ruts.

## 2.4 PAVEMENT MIXES

A. Provide bituminous concrete pavement and chip seal in accordance with the applicable standard mix recommendations of the Contractor's Geotechnical Analysis and NDOT requirements based on the projected vehicle loading.

B. Chip seal surfacing placement, including pre-construction tasks, minimum temperature during placement, seal material / rate, aggregate material, maximum lift thickness, and cure time shall be in accordance with Subsection 6-408 of the NDOT Construction Manual. Contractor shall review existing pavement conditions and provide a reliable chip seal surfacing to accommodate existing conditions.

C. Portland Cement Concrete - If reinforced, the welded wire fabric shall conform to ASTM A 185. Bar reinforcement shall conform to ASTM A 615/A 615M, Grade 400 (Grade 60). Provide concrete in accordance with the applicable standard mix of the Geotechnical Report or NDOT for the design strength plus any allowable deviations.

D. Prime Coat: Provide prime coat in accordance with the State Highway Specifications.

E. Tack Coat: Tack coat is required for bituminous pavement overlays and on vertical cut faces of pavement patches. Tack coat shall be in accordance with the STATE HIGHWAY SPECIFICATIONS.

F. Pavement Patches
   1. Thicknesses of pavement materials shall be equal to or greater than the existing pavement section.
   2. For spalls or repairs of existing concrete pavement, perform repairs in conformance with the American Concrete Institute (ACI) or NDOT. Spall repair materials shall be 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. A manufacturer's data sheet and certificate supporting the satisfactory use shall be provided to the Contracting Officer with the design. A product manufacturer's representative shall be present during the initial two days of product application to verify that manufacturer's instructions for use are adhered to. The Contracting Officer shall be given 7 days notice prior to the initial application in order to be present.

## 2.5 TRAFFIC CONTROL DEVICES

A. New traffic control devices (i.e., signs and markings) shall be provided and installed in accordance with the United States Department of Transportation Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) and their standard, "Rigid Sign Supports". New traffic control devices shall also be provided along/in the existing roads adjacent to the project site as necessary to provide complete traffic control to the new facilities.

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B. Existing signs to be relocated shall be provided and installed in accordance with the United States Department of Transportation Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) and their standard, "Rigid Sign Supports".

C. Temporary traffic control shall be provided in accordance with the requirements and guidelines set forth in the MUTCD.

**2.6 MARKING AND SIGNAGE**

A. Pavement markings shall be in accordance with the NDOT. Materials shall be designed for life expectancy of at least 3 years under an average daily traffic count per lane of approximately 9000 vehicles. Water based paints shall have durability rating of at least 4 when determined in the wheel path area.

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

C. Provide accessibility markings and signage as required by NPS Accessibility Standards, ABA Accessibility Standards for Federal Facilities and the Draft Final Accessibility Guidelines for Outdoor Developed Areas, dated October 19, 2009.

D. Provide signage in accordance with the MUTCD.

**2.7 EXTERIOR SITE SIGNAGE**

A. Remove and replace facility signage as required by local code, NPS standards, the Installation and Appearance Guide, this RFP and direction of the Contracting Officer.

B. 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.

C. Refer to Park Service Standards for traffic signage.

**2.8 EXTERIOR FURNISHINGS**

A. Refer to portions of the RFP for exterior furnishings required on this project. All site furnishings shall be attached securely with weather resistant fasteners. Site furnishings shall conform to NPS Standards. 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.

**PART 3 DESIGN CRITERIA**

**3.1 BASIC FUNCTION**

A. Provide all elements required for finished and durable site surfaces, and outdoor improvements described in the project program.

B. Provide exterior pavements and surfacing, as required by the project program and by code, that are adequate in extent and sufficiently durable to accommodate without damage the types of traffic that can be reasonably anticipated for the facility type and intended user population.

1. Roadways and Driveways: Provide paved surfaces as required for vehicular access to the project site and to various functional areas requiring vehicular access, including main entrance and parking areas.
   a. Comply with recommendations of AASHTO "A Policy on Geometric Design of Highways and Streets".
   b. Minimum Widths: Traffic lanes not less than 11 ft wide.
   c. Maximum Slopes: 1:10.
   d. Traffic Lanes and Directional Markings: Permanent and highly visible, minimum width of 4 in.
2. Parking Areas: Provide paved surfaces as required for vehicular parking.
   a. Minimum Width of Parking Spaces: 96 in.
   b. Space Markings: Permanent and highly visible, minimum width of 4 in.
   c. Parking Signage: As required by code and project program.

3. Walkways and Pedestrian Ramps: Provide paved surfaces as required for pedestrian movement on the site without damage to landscaping.
    a. Minimum Widths: Sized to allow comfortable two-way traffic.
        1) Main Entrance: 72 in.
        2) Secondary Routes: 48 in.
    b. Handrails, Railings, or Protective Walls: Required when pedestrian surfaces are more than 12 in above adjacent grade.

C. Provide all fixtures, equipment (other than that associated with services), and miscellaneous structures located out-of-doors that are required by the project program and that are required as a result of these and other requirements.

D. Provide landscaping over all areas of the site not finished with paving, surfacing, or buildings.

E. Provide other site construction elements required for a complete facility.

F. Where site improvements are integral with elements defined within another element group, meet requirements of both element groups.

G. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria, and Section DC G - Site Criteria.

## 3.2 AMENITY AND COMFORT CRITERIA

A. Thermal Comfort: Provide pavements and surfacing at RV pads with minimum initial reflectivity of 0.3 to reduce solar heat gain.

B. Accessibility:
    1. Comply with ABAAS or the Draft Final Accessibility Guidelines for Outdoor Developed Areas, as applicable.
    2. Accessible Campsites: Provide number of accessible campsites shown on RFP drawings with 20' wide RV pads by length shown, in conformance with the Draft Final Accessibility Guidelines for Outdoor Developed Areas requirements for accessible campsites.
    3. Accessible ramp at group campground comfort station: Provide ramp with firm and stable surface in conformance with the Draft Final Accessibility Guidelines for Outdoor Developed Areas requirements.

C. Appearance:
    1. Pavements and Surfacing: Provide rigid surfaces that are smooth, consistent in color and finish, sloped and drained to avoid ponding, and neatly finished at edges.
        a. Vehicular Areas: No traffic markings.
        b. Pedestrian Areas: Designed to contrast visually with vehicular areas.

## 3.3 HEALTH AND SAFETY CRITERIA

A. Potable Water Contamination:
    1. Prevent contamination of potable water supply by irrigation water.

B. Pollution Control: Comply with 40 CFR 280.70 and applicable state and local regulations for underground storage tank and utilities removal, including emptying, closure, and removal of tank and utility lines, and removal of all contaminated soil found.

## 3.4 STRUCTURAL CRITERIA

A. Exterior Ramps: Capable of supporting loads in excess of those required by code, as follows:
    1. Live Load: Minimum 150 psf.
    2. Concentrated Load: Minimum 400 pounds at any point.

B. Underground Structures: Comply with the requirements of the code.

C. Substantiation:
    1. Construction Documents: Engineering calculations, stamped by a registered structural engineer.

## 3.5 DURABILITY CRITERIA

A. Service Life Span:

1. Paved Surfaces: 20 years, under normally anticipatable usage.
2. Minor Site Structures: Same as for equivalent building elements.
3. Other Fixed Site Improvements: 15 years under normal use and weather.
4. Substantiation:
    a. Construction Documents: Proven-in-use data.

B. Traffic Resistance: Provide surfacings that are designed and engineered to withstand the types and intensity of traffic anticipated for the facility size and type.
    1. Pavements and Surfacing: To accommodate traffic as follows, based on procedures in AASHTO GDPS and GDPS3-V2, Guide for Design of Pavement Structures:
    2. Substantiation:
        a. Construction Documents: Computations to establish pavement strength and thickness, stamped by a registered civil or structural engineer.

C. Weather Resistance:
    1. Site Fixtures and Equipment: Same as specified for components of exterior shell in Section DC 0.

**End of DC G1 - Site Improvements Criteria**

# DC G2 - Site Services Criteria

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Provide the following site services:
   1. Water Supply: Means of distributing water for all purposes required in buildings and on site. See Section DC D3 for additional requirements.
   2. Sanitary Sewer: Means of removing liquid waste generated in buildings on site. See Section DC D3 for additional requirements.
   3. Electrical Power: Adequate supply of power for project functions. See Section DC D6 for additional requirements.

B. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

### 1.2 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. For required capacities of systems, see relevant D series sections.

C. Section DC D3 - Plumbing Criteria: Coordinate with site elements of water distribution.

D. Section DC D3 - Plumbing Criteria: Coordinate with site elements of sanitary sewer.

E. Section DC D6 - Electrical Criteria: Coordinate with site elements of electrical power supply.

F. Section DC G - Site Criteria: Criteria that apply to all site elements.

### 1.3 REFERENCE STANDARDS

A. Code of Federal Regulations (CFR)

B. UNI-BELL PVC Pipe Association (UBPPA)

C. American Water Works Association (AWWA)

D. American Society for Testing and Materials (ASTM)

E. National Fire Protection Association (NFPA)

F. Underwriters Laboratories, Inc. (UL)

G. American Association of State Highway and Transportation Officials (AASHTO)

H. American Concrete Pipe Association (ACPA)

I. National Sanitation Foundation International (NSF)

J. International Plumbing Code (IPC)

K. American Society of Civil Engineers (ASCE)

### 1.4 QUALITY ASSURANCE

A. Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard. The Contractor shall perform field tests and provide labor, equipment and incidentals required for testing.

B. All materials shall be new, and shall bear the label of standardizing agency whenever standards have been established and label service is normally and regularly furnished by the agency. All equipment provided shall be listed and labeled suitable for the specified purpose, environment, and application and installed in accordance with manufacturer's recommendations.

C. Provide such other labor and materials as are required for a complete and usable system in accordance with the requirements of the criteria listed, regardless of whether such materials and associated labor are called for elsewhere in this RFP.

## 1.5 COORDINATION

A. To the extent that site work is indicated on the RFP drawings, the Contractor shall verify that the locations and inverts of all site utility lines are coordinated with surrounding grades and existing utility lines. If necessary, the Contractor shall make adjustments to the locations and inverts indicated on the RFP drawings in accordance with applicable codes and standards.

## 1.6 FIELD CONDITIONS

A. Protect all existing water mains and sanitary sewer mainlines and related appurtenances in the project area during construction and installation of the new water laterals and sanitary sewer laterals to each building and point of use.

B. Protect the existing irrigation system piping and associated structures and appurtenances during construction.

C. Protect existing utilities to remain. Where removal of existing utilities and pavement is required, provide approved barricades, temporary covering of exposed areas, and temporary services or connections. Repair damage to existing utilities to remain at no additional expense to the Government.

D. Terminate utilities in accordance with state and local rules and regulations; the nationally recognized code; and the requirements of the utility provider covering the specific utility; NPS Standards; and approved by the Contracting Officer.

E. Utility Relocation: Repair relocated items that are damaged or replace damaged items with new undamaged items as approved by the Contracting Officer and at no additional expense to the Government.

F. Project Record Documents: Record actual locations of piping mains, laterals, valves, utility connections, cleanouts, thrust restraints, and invert elevations. Identify and describe unexpected variations due to subsoil conditions or discovery of uncharted utilities.

## 1.7 DELIVERY, STORAGE AND HANDLING OF MATERIALS

A. Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves, and hydrants free of dirt and debris. Handle in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench.

## 1.8 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, valves, and all system equipment and appurtenances.

B. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

# PART 2 PRODUCTS

## 2.1 WATER PIPING

A. Replace all water piping laterals from the existing water main to the new restroom facilities and all designated water spigots.

B. PVC Pipe: AWWA C900, Class 100
   1. Fittings: AWWA C111, cast iron
   2. Joints: ASTM D3139, compression gasket ring

C. Polyethylene Pipe: AWWA C901
   1. Fittings: AWWA C901, molded or fabricated
   2. Joints: Compression

D. Tracer Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water

Service" in large letters.

## 2.2 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves
   1. Up to 3-inches: Brass or bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.

C. Ball Valves
   1. Up to 2-inches: Brass body, teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA inlet end, compression outlet with electrical ground connector, with control rod, valve key, and extension box.

D. Valve Boxes
   1. Valve box and vault cover rim elevations shall be set flush with finished surface of paved areas or 1 inch above finished grade in unpaved areas.
   2. Cast iron or ductile iron; designed to accommodate HS-20 traffic loadings and shall be selected with consideration for pedestrian, bicycle, and wheelchair traffic where appropriate. The word "Water" shall be stamped or cast into cover so that it is plainly visible.

## 2.3 SANITARY SEWER PIPING

A. Replace all sanitary sewer collection piping (laterals) from the existing sanitary sewer main to the new restroom facilities and all designated points-of-use as required.

B. Plastic Pipe
   1. ASTM 3034, Type PSM, Polyvinyl Chloride (PVC) material, bell and spigot style solvent sealed joint end.
   2. ASTM D1785, Schedule 40, Polyvinyl Chloride (PVC) material, bell and spigot style solvent sealed joint end.
   3. Joint Seals: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.
   4. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps, and other configurations required.

C. Tracer Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.

## 2.4 MANHOLES AND CLEANOUTS

A. In accordance with local code and requirements. Submit for approval.

B. Manholes:
   1. Use one or more of the following:
      a. Prefabricated concrete.
      b. Poured-in-place concrete.
   2. Manhole frames and covers shall be FS A-A-60005; cast iron or ductile iron; designed to accommodate HS-20 traffic loadings and shall be selected with consideration for pedestrian, bicycle, and wheelchair traffic where appropriate. The word "Sewer" shall be stamped or cast into covers so that it is plainly visible.
   3. Manhole rim elevations shall be set flush with finished surface of paved areas or 1 inch above finished grade in unpaved areas.

C. Cleanouts: Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections. Cleanout rim elevations shall be set flush with finished surface of paved areas or 1 inch above finished grade in unpaved areas.

## 2.5 STORM SEWER PIPING

A. Storm sewer piping 12 inches (300 mm) and larger in diameter shall be reinforced concrete. HDPE pipe may only be used when written approval is received by the Government or indicated in another part of the RFP.

B. Reinforced Concrete Pipe:
   1. Circular Pipe: ASTM C 76M (ASTM C 76). Provide required Class based on design information and methods in ASTM C 76M (ASTM C 76). Class III minimum.
   2. Elliptical Pipe: ASTM C 507M (ASTM C 507). Provide required Class based on design information and methods in ASTM C 76M (ASTM C 76).
   3. Joints: ASTM C 990M (ASTM C 990) butyl gaskets; or ASTM C 443M (ASTM C 443) rubber O-ring joints.

C. Installation: Install piping in accordance with the manufacturer's recommendations (ACPA 01-102 and 01-103).

**2.6 STORM SEWER STRUCTURES**

A. 1. Structure rim elevations shall be set flush with finished surface of paved areas or 1 inch (25 mm) above finished grade in unpaved areas.

B. Drainage structures frame and covers shall be FS A-A-60005; cast iron or ductile iron; designed to accommodate HS-20 traffic loadings and shall be selected with consideration for pedestrian, bicycle, and wheelchair traffic where appropriate. The word "Storm" shall be stamped or cast into covers so that it is plainly visible.

**2.7 CULVERTS**

A. The minimum culvert size is 12 inches (300 mm) in diameter. Culverts 2 inches (300 mm) and larger in diameter shall be reinforced concrete. HDPE pipe may only be used in landscaping and when written approval is received by the Government or indicated in another part of the RFP.

B. Flared end sections shall be provided for 15 inch and larger piping. Flared end sections shall be the same material as pipe material. Fasten flared end sections to piping in accordance with the pipe manufacturer’s standards.

C. Provide erosion control riprap at storm outlets in accordance with the State Highway Specifications (SHS) and standards where the project is located.

D. Provide cast-in-place concrete headwalls in accordance with the State Highway Specification (SHS) and standards for 12-inch culverts.

**PART 3 DESIGN CRITERIA**

**3.1 BASIC FUNCTION**

A. Provide means of distributing water for all purposes required in buildings and on site.
   1. Capacity: Size the water system distribution laterals and sanitary sewer system collection laterals in accordance with Code.

B. Provide sanitary sewer lateral sizing to meet building sanitary sewer requirements.
   1. Type of Drainage: Gravity sewer.
   2. Minimum Pipe Size: 4 inches in diameter.
   3. Pipe Slope: 4 inches per 100 feet.

C. Provide electrical power supply and distribution elements.

D. Where site services elements must also function as elements defined within another element group, meet requirements of both element groups.

E. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria, Section DC G - Site Criteria.

**3.2 AMENITY AND COMFORT CRITERIA**

A. Leakage: Provide distribution systems which are leak-free.

B. Accessibility: Provide clearances around components that are adequate for service and use.

**3.3 HEALTH AND SAFETY CRITERIA**

A. Safety Hazards: Avoid safety hazards wherever possible; where services must involve flammable materials or hazardous operations, comply with code.

B. Unauthorized Access: Provide locking devices to stop unauthorized access.

C. Excess Pressure: Design pressurized components to withstand operational pressures without failure and to relieve or reduce excessive pressure to prevent failure.

D. Electrical Shock: Isolate electrical conductors from personnel.
   1. Provide a means of disconnecting power at each piece of equipment.

E. Accidental Explosion: Provide equipment designed to withstand electromotive forces without catastrophic failure.

F. Misuse: Minimize misuse that could result in damage to property, injury, or loss of life.

G. Vermin Resistance: Use components that are resistant to the entry of rodents and insects.

H. Maintain minimum required separation of water piping from sanitary sewer piping in accordance with local code and requirements.

**3.4 STRUCTURAL CRITERIA**

A. Concealed or Buried Piping and Components: Design cover or concealment so that they are not subjected to damaging stresses due to applied loads.

B. Supports for Piping and Components: Support piping and components using the following:
   1. Supports that allow movement of the pipe without undue stress on the piping, tubes, fittings, components, or foundations.
   2. Substantiation:
      a. Design Development: Details of supports, including engineering analysis.

C. Structural Design of Components and Their Supports: In accordance with code.
   1. Anchors: Securely and positively attach piping to supports.

**3.5 DURABILITY CRITERIA**

A. Service Life Span: Same as the service life of the building.
   1. Piping: Same as service life of building.
   2. Piping and Components Permanently Installed Underground or Encased in Concrete: Same as service life of building.
   3. Shut-Off Valves and Similar Components: Same as service life of building.

B. Weather Resistance:
   1. Burial Depth of Piping: 6 inches below lowest recorded level at which the ground freezes. Minimum burial depth of 12 inches.

C. Corrosion Resistance: Prevent corrosion by using corrosion-resistant materials, by preventing galvanic action, by preventing contact between metals and concrete and masonry, and by preventing condensation metals.
   1. Sanitary Sewers: Provide internal coatings on concrete structures to protect against microbiologically influenced corrosion.
   2. Electrical Conduits: Provide buried conduits which are resistant to corrosion.
   3. Metals Considered Corrosion-Resistant: Aluminum, stainless steel, brass, bronze, cast iron, ductile iron, malleable iron, hot-dipped galvanized steel, chrome-plated steel, cadmium-plated steel, and steel coated with high-build epoxy or coal tar-based paint.
   4. Underground Elements: Provide supplementary protection for underground metal pipes and tanks, sufficient to prevent corrosion completely, for the service life of the element without maintenance.
      a. 3 inches of concrete cover is considered to be permanent protection.
      b. Bituminous or other waterproof coating or wrapping is considered permanent protection unless cathodic protection is required and unless underground element is subject to movement due to structural loads or thermal expansion or contraction.
      c. See Section DC D6 for cathodic protection requirements.

D. Resistance to Accidental Damage and Abuse:
   1. Provide barriers or protected locations for services, to prevent damage due to vehicular traffic.

2. Buried Components: Minimum of 12 inches below surface of ground.
3. Underground Piping: Watertight and rootproof.

## 3.6 OPERATION AND MAINTENANCE CRITERIA

A. Ease of Use: Provide easy access to and working clearances around system components.

B. Ease of Maintenance:
   1. Piping: Provide means of isolating portions of piping system, so that small portions may be shut down leaving the remainder in operation, by using isolation valves located so that drainage of the entire system is not required for repair.
   2. Sanitary Sewers:
      a. Maximum Manhole Spacing: 400 feet.
      b. Maximum Cleanout Spacing: 100 feet.

C. Ease of Service: Provide a shutoff valve at the utility service main and the service entry point.

D. Maintenance Service: Maintain services as specified in Section 01 30 50, including periodic inspections, routine maintenance recommended by manufacturers, and repair and replacement of defective elements.

**End of DC G2 - Site Services Criteria**